



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION IV

611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-8064

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RADIATION CONTROL  
PROGRAM

Kansas Department of Health and Environment  
ATTN: John Irwin, Director  
Bureau of Air and Radiation  
109 S.W. 9th Street  
Topeka, Kansas 66612-1228

Gentlemen:

SUBJECT: APPRECIATION OF ASSISTANCE PROVIDED BY HAROLD L. SPIKER  
AND PAMELA K. CHAFFEE

This letter documents our appreciation for the assistance provided by Mr. Harold L. Spiker and Ms. Pamela Chaffee of your staff during a recent survey of potentially contaminated areas at the old Spencer Chemical Corporation site, which is located on 1200 acres at the Jayhawk Works, south of Crescent, Kansas.

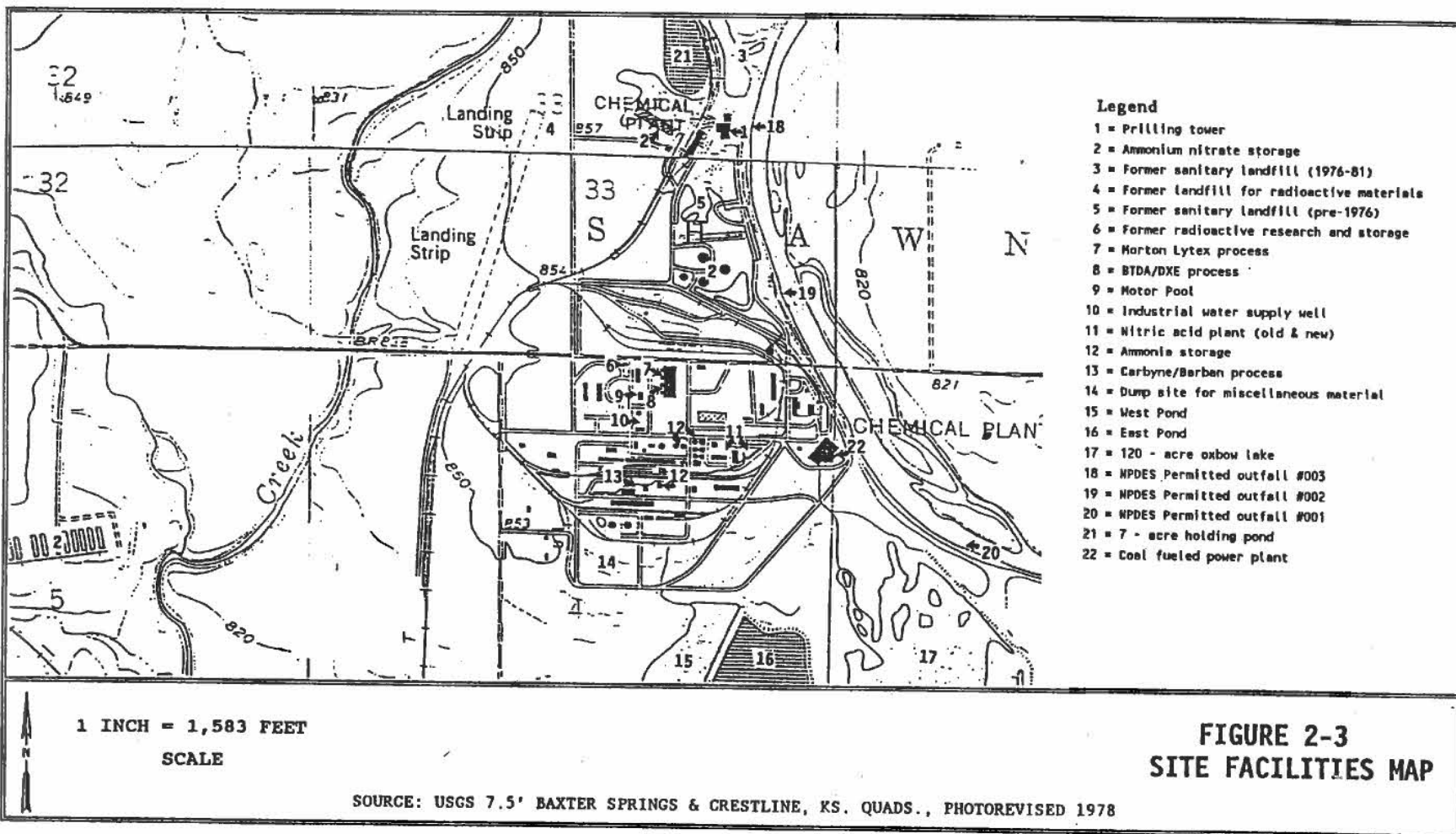
Mr. Spiker and Ms. Chaffee accompanied our inspector all over the site (through high weeds and rough terrain) as eight potential burial sites or waste dumps and four buildings were surveyed. The assistance was of great value, and was most appreciated.

Please pass on our appreciation to your staff.

Sincerely,

  
L. J. Callan, Director  
Division of Radiation Safety  
and Safeguards

cc:  
Kansas Radiation Control Program Director







UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-3064

NOV 17 1992

MEMORANDUM FOR: Richard E. Cunningham, Director  
Division of Industrial and Medical  
Nuclear Safety, NMSS

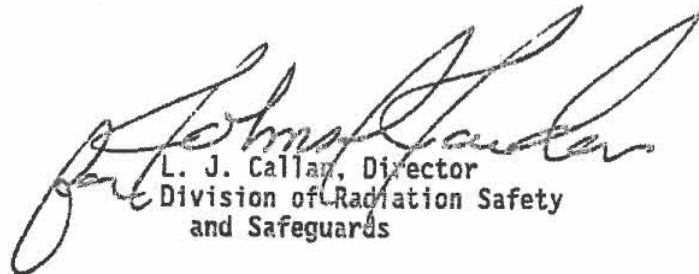
FROM: L. J. Callan, Director  
Division of Radiation Safety  
and Safeguards, RIV

SUBJECT: REGION IV REVIEW OF SPENCER CHEMICAL CORPORATION  
DECOMMISSIONING ACTIVITIES

The purpose of this memorandum is to report the completion of Region IV's review of the decommissioning activities associated with the Spencer Chemical Corporation site near Kansas City, Kansas. This review was accomplished consistent with our commitment in an August 31, 1992, memorandum to you that responded to your June 11, 1992, memorandum that provided a list of potentially contaminated sites generated by ORNL. Details of our review are provided in the attachment to this memorandum.

We have reviewed the Spencer site decommissioning activities performed by Gulf Chemical Corporation under license by the state of Kansas and have visited the site, accompanied by state of Kansas personnel. We performed cursory visual and radiation surveys of 11 areas of potential contamination, and we have not identified any information to suggest that site decontamination was inadequate. Accordingly, we recommend that the Spencer Chemical Corporation Jayhawk site be removed from the ORNL list of potentially contaminated sites.

Should you have any questions concerning this memorandum, please contact Wesley L. Holley at (817) 860-8198.

  
L. J. Callan, Director  
Division of Radiation Safety  
and Safeguards

Attachment: (As stated)

## ATTACHMENT

### BACKGROUND:

The former 1200-acre Spencer Chemical Corporation Jayhawk Works site is located in the extreme southeast corner of the state of Kansas, approximately 6 miles north of Oklahoma and 7 miles west of Missouri. Spencer Chemical Corporation (SCC) had a shipping designation of Military, Kansas. The site is still known as the Jayhawk Works even though SCC no longer owns it. Currently the site is divided and has several owners.

SCC was licensed by U.S. Atomic Energy Commission (AEC) to possess enriched uranium and thorium. The AEC licenses allowed SCC to receive UF<sub>6</sub> and to process it into enriched uranium oxides and uranium carbides in the physical form of fused ceramic pellets and finely divided powder. License SNM-329, which authorized this process for production, expired on September 30, 1962. License SNM-154, which authorized a pilot plant for this process, was terminated on December 28, 1964.

SCC had ceased operations and had disposed of its licensed material by May 12, 1961. During the decontamination of the site, a process building was decontaminated, dismantled, burned, and buried. Other areas of the site were decontaminated, surveyed, and returned to unrestricted use.

After the termination of SCC's AEC license SNM-154 in 1964, Kansas became an Agreement State. On September 29, 1982, the state issued a license to Gulf Oil Corporation (owner of the Jayhawk Works at that time) requiring Gulf to decontaminate the site, if needed, and to perform a thorough final survey. Gulf Oil Corporation (GOC) performed radiation and contamination/smear surveys of the areas where uranium and thorium had been used by SCC. GOC used nitric acid, hammer and chisel, and jackhammer to clean up residual radioactivity. The areas were decontaminated according to the criteria in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material"; U.S. Nuclear Regulatory Commission, Division of Fuel Cycle and Material Safety; July 1982. The waste from these decontamination activities was shipped to a waste vendor for burial.

Where the dismantled process building had been burned and buried, an area approximately 40 feet by 200 feet, GOC core sampled in 12 places in an evenly spaced grid. Samples were taken from the surface to a 10-foot depth at 1 to 2-foot intervals. The maximum concentrations were 0.5 pCi per gram of soil for both uranium and thorium. These samples also revealed that a clay bed had been placed at 6 feet under the material that was burned, a 1-foot clay/rock mixture had been placed over the burned material, and 1 foot of topsoil had been placed over the area.

After GOC performed the final survey, the state of Kansas, Department of Health and Environment, performed a final confirmatory survey and subsequently terminated GOC's license.

Presently the Jayhawk Works site has been divided and is owned by Allco Chemical Corporation, Koch Refining Company, and Chevron Chemical Company.

### ORNL POTENTIALLY CONTAMINATED SITE ACTIVITIES

Oak Ridge National Laboratory (ORNL) was contracted by NRC to evaluate approximately 17,000 retired licenses for potential to have significant contamination. Using the criteria that ORNL developed and not knowing about the decommissioning and surveys of the Jayhawk site performed under auspices of the state of Kansas, SCC was ranked ninth in the nation because of the large amounts of licensed material possessed and processed, and because of the burned and buried building.

### REGION IV ACTIVITIES

Upon learning of the high rank of SCC on the ORNL list, Region IV gave high priority to determining the history and condition of the Jayhawk site. After reviewing the available docket files on SCC, Region IV contacted the state of Kansas to determine their knowledge about the site. In learning of the activities of the state of Kansas concerning SCC and in reviewing the decommissioning and survey activities documented by Kansas, NRC identified nothing to indicate that SCC had not been decommissioned adequately.

However, in view of its size and sketchy history, Region IV arranged to visit the Jayhawk site.

On September 29, 1992, a Region IV inspector accompanied 2 State of Kansas (Agreement State) personnel on a tour of the Jayhawk site. One of the Kansas personnel had been involved in the GOC cleanup of the site and the final confirmatory survey. Our guide during this tour was an employee of Allco Chemical Corporation.

The NRC inspector and Kansas personnel performed a cursory survey utilizing micro R meters. Four buildings were surveyed where Jayhawk personnel thought radioactive material might have been during the SCC era. Also, 7 potential and actual waste/trash/burial/dump sites were surveyed. These sites were determined from information provided by State of Kansas personnel, Jayhawk site personnel, and old photographs.

The approximate average background of the Jayhawk site was 6-8 micro R per hour. All exposure rates were determined at approximately 3 feet from the surface of the area surveyed. The exposure rates measured at 3 feet and at the surface were approximately the same. Exposure rates generally varied from 4-13 micro R per hour, although in a former waste dump area (Quaker Valley) a small area (approximately 6 inches by 6 inches) was found to read 14 micro R per hour with the general area average exposure rate of approximately 7-8 micro R per hour.

In another former SCC trash dump area, there was a 4-foot high by 15-foot diameter pile of what appeared to be black catalytic beads. The maximum exposure rate was approximately 30 micro R per hour at 3 feet from the surface and about 50 micro R per hour at the surface of the pile. A sample analyzed by the State of Kansas indicated the radioactivity to be from natural,

nonlicensable sources. In this trash dump area the exposure rate varied from 5-9 micro R per hour except for the pile of beads.

#### CONCLUSIONS

Because of the decommissioning efforts of GOC and the final confirmatory survey performed by the State of Kansas, Region IV concludes that the licensed material process areas at the Jayhawk site probably were decontaminated adequately for unrestricted use. Surveys performed by the NRC Region IV inspector and the State of Kansas on September 29, 1992, of the buildings and waste/trash/burial/dump sites of potential contamination resulted in exposure rates of such low magnitude that further investigation appears not to be warranted. The Jayhawk site appears to have been adequately decontaminated such that unrestricted occupation of the site will not result in significant radiation exposure from this material.

We recommend that the SCC/Jayhawk site be removed from the ORNL list of potentially contaminated sites.

**PRELIMINARY ASSESSMENT**  
**GULF OIL CHEMICAL COMPANY - JAYHAWK PLANT**  
**CRESTLINE, KANSAS**

**EPA Identification Number**  
**KSD007167869**



**Kansas Department of Health and Environment**  
**Bureau of Environmental Remediation**  
**Pre-Remedial Section**

**August 1990**

**Preliminary Assessment**

**completed by:**

Pamela Chaffee, Environmental Geologist

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Danny Cooper, Environmental Technician

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Remediation

**Field Work Completed By:**

Kansas Department of Health and Environment

Pamela Chaffee, Environmental Geologist and Team  
Leader

Danny Cooper, Environmental Technician

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#### ATTACHMENTS

Attachment 1	-	Chronological History of the Former GOCC-Jayhawk Plant.
Attachment 2	-	Chemicals and Processes Known to be Used at the Former GOCC-Jayhawk Plant.
Attachment 3	-	1989 Analytical Data for Monitoring and Recovery Wells at Allco Chemical Corporation (Former GOCC-Jayhawk Plant).
Attachment 4	-	Lithologic Logs for Monitoring Wells at Allco Chemical Corporation (Former GOCC-Jayhawk Plant).
Attachment 5	-	Water Level Measurements in Monitoring Wells at Allco Chemical Corporation (Former GOCC-Jayhawk Plant).
Attachment 6	-	EPA Preliminary Assessment Form 2070-12.
Attachment 7	-	Laboratory Analyses.



## SECTION 1: INTRODUCTION

The Kansas Department of Health and Environment (KDHE) has entered into a cooperative agreement with the Environmental Protection Agency (EPA) under which the KDHE will perform investigations of selected contaminated sites in Kansas. The investigations are conducted in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986, collectively known as "Superfund". The purpose of the investigations is to determine if sites qualify for listing on the National Priority List (NPL), thus making them eligible for federally mandated cleanups.

The site of the former Gulf Oil Chemicals Company (GOCC, a division of Gulf Oil Corporation) - Jayhawk Plant is located approximately three miles south of Crestline, Kansas, and 1.5 miles east of Alternate Highway 69, in Cherokee County. The facility, originally 2,500 acres in size, produced fertilizers, pesticides, and other organic and agricultural chemicals. In addition, Gulf manufactured commercial explosives at the plant. Gulf Oil Corporation purchased the property with the existing facilities in 1964 from Spencer Chemical Company. Gulf operated the facility until the early 1980's when it began to close down operations and sell off parts of the plant. In the mid-1980's, Gulf merged with Chevron Chemical Company, but Chevron has had no operations at the site. At the present time, the following companies own property at the former GOCC-Jayhawk Plant Site:

- Allco Chemical Corporation
- Chevron Chemical Company
- Koch Chemical Company
- PBI Gordon Corporation
- Thermex Energy Corporation

Puritan Bennett Corporation also leases property at the former plant. In addition, some parcels may have been sold to area farmers.

A review of KDHE files document the following activities during the period that GOCC operated at the site:

- a) frequent non-compliance with the state's National Pollutant Discharge Elimination System (NPDES) permit limitations,
- b) use of unlined evaporation ponds to dispose of untreated process wastewater via chemical sewers [these ponds were officially closed under KDHE guidance in 1987],
- c) use of three on-site landfills permitted by the KDHE,
- d) several observed and alleged dump sites and waste piles,

e) several spills of organic and inorganic materials resulting in contamination discharging to an on-site 120 acre lake or directly to Spring River and contamination of soil,

f) the generation, handling and storage of considerable quantities of organic chemicals, chemical wastes, pesticide residues, ammonium nitrate, and 'still bottoms' associated with the various chemical processes conducted at the facility,

The primary objective of this Preliminary Assessment is to determine if surface or subsurface contamination is present as a result of past activities at the site.

The site contacts for the current owners are as follows:

Howard L. Ryser,  
VP, Manufacturing  
Allco Chemical Corporation  
P.O. Box 247  
Galena, Kansas 66739  
(316)783-1321

John D. Alford,  
Plant Engineer  
Koch Chemical Company  
P.O. Box 1748  
Pittsburg, Kansas 66762  
(316)783-1343

Kenneth H. Autry  
Kansas Facilities Manager  
Thermex Energy Corporation  
P.O. Box 95  
Riverton, Kansas 66770  
(316)783-1361

Steven G. Raatz,  
Sr. Facilities Planning Engineer  
Chevron Chemical Company  
6001 Bollinger Canyon Road  
San Ramon, California 94583  
(415)842-5890

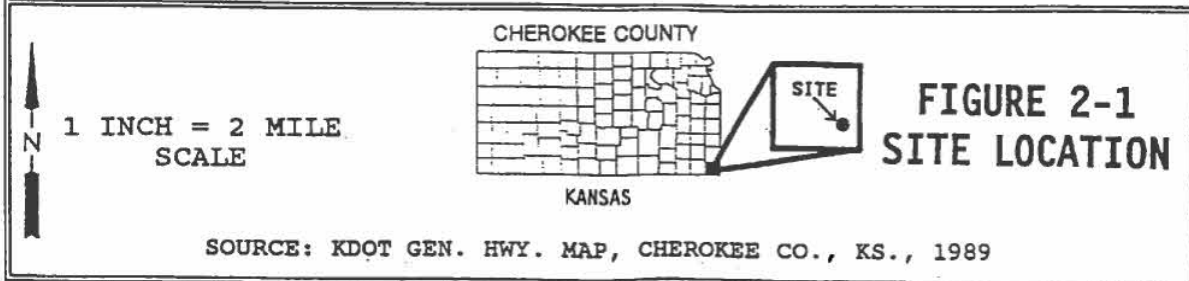
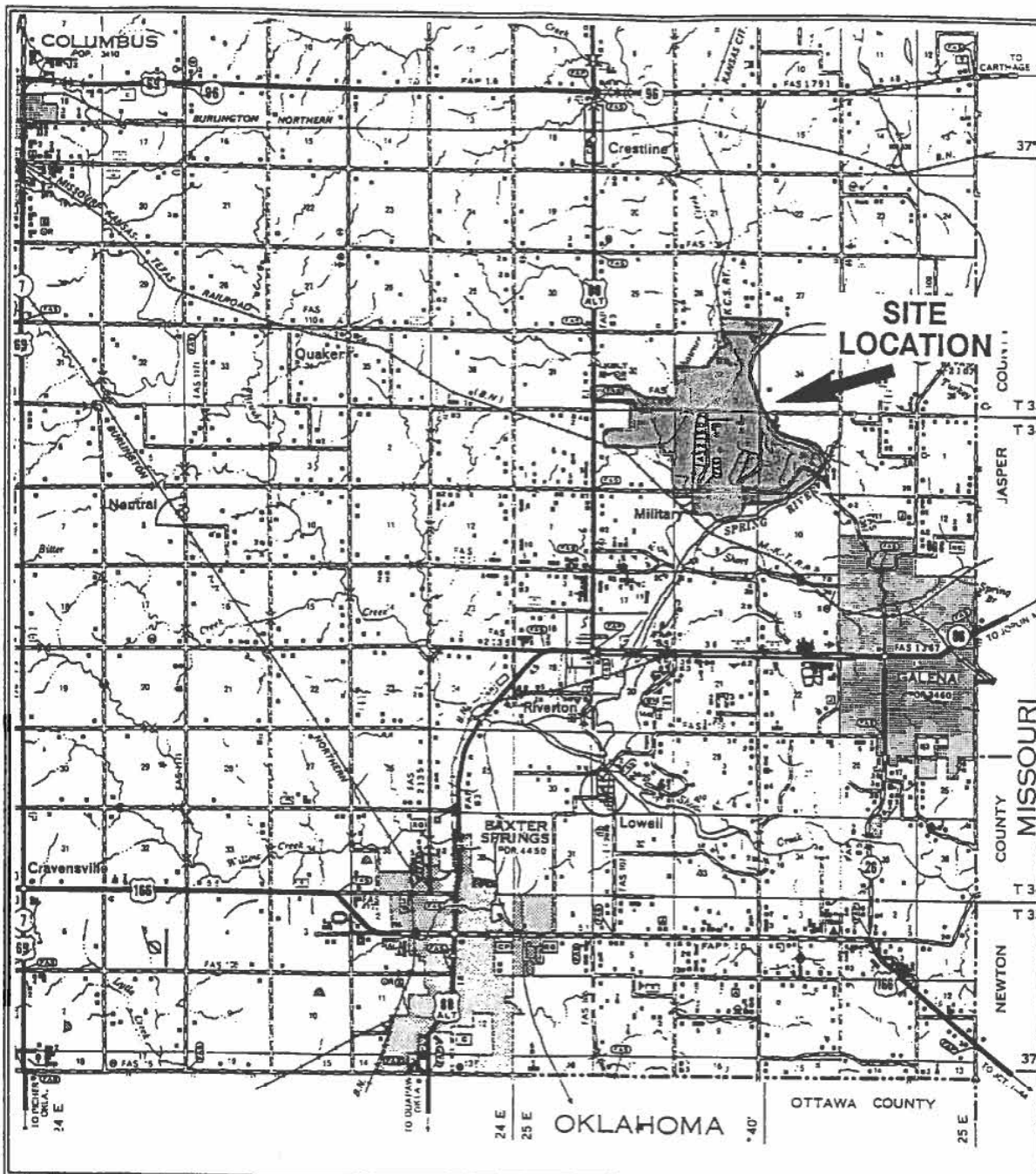
Sherrill Cantrell,  
Plant Manager  
PBI/Gordon Corporation  
P.O. Box 78  
Crestline, Kansas 66728  
(316)848-3849

or  
Charles Willhite, Manager  
Environmental Affairs  
PBI/Gordon Corporation  
1217 W. 12th Street  
Kansas City, Missouri 64101  
(816)421-4070

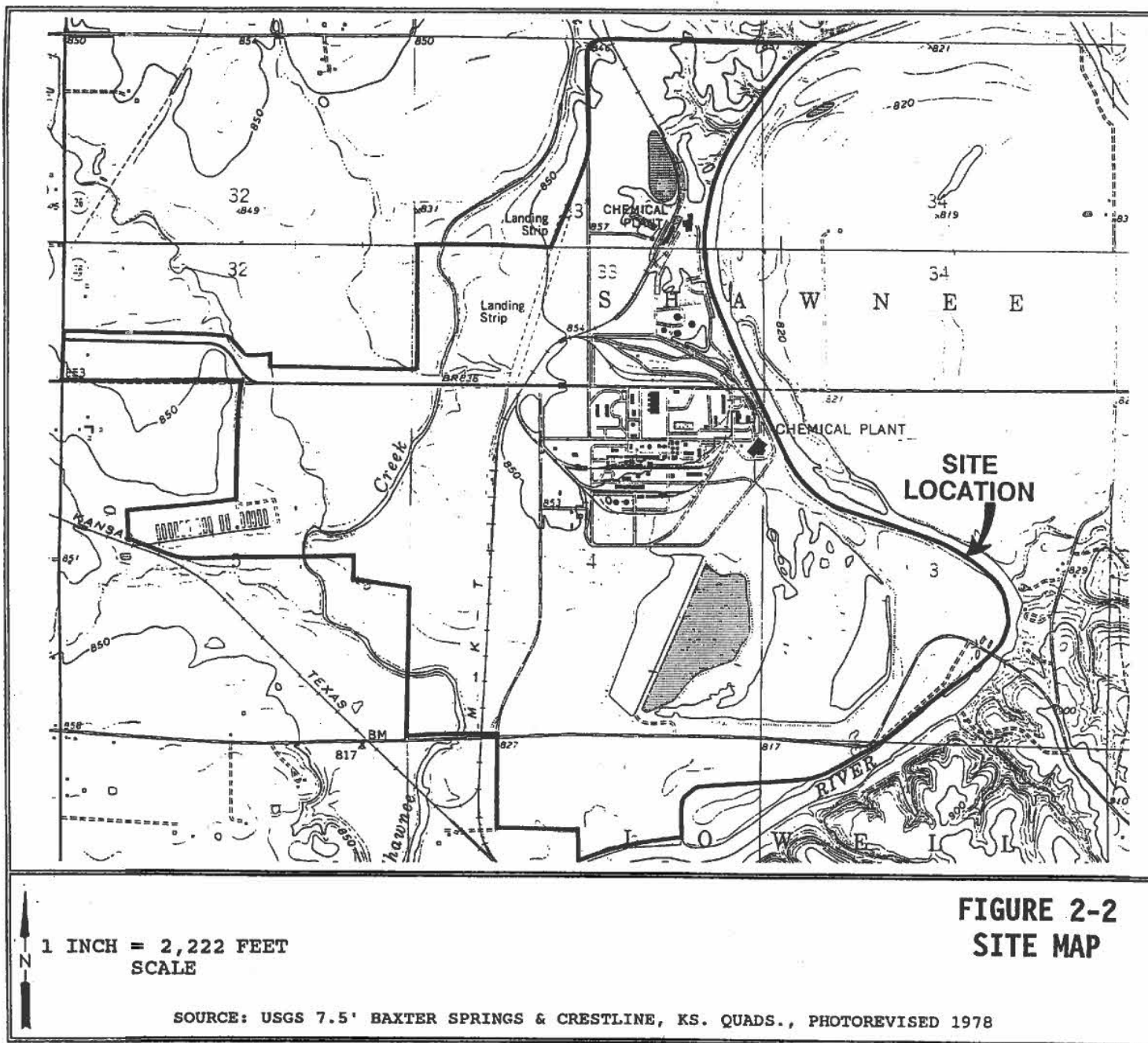
## SECTION 2: SITE INFORMATION

### 2.1 Site Location

The former GOCC-Jayhawk Plant site is situated approximately one mile northwest of the city limits of Galena, Kansas, in the southeastern part of Cherokee County (Figure 2-1). It is located approximately three miles north of Riverton, Kansas and one mile east of Alternate US 69 Highway. The site consists of an area bordered by Spring River on the east and south and Shawnee Creek on the west in Section 33, Township 33 South, Range 25 East and Sections 3, 4, and 9, Township 34 South, Range 25 East. It also includes an area in the N $\frac{1}{2}$  of Section 5, Township 34 South, Range 25 East (Figure 2-2). The site's geographic coordinates are 37° 06' 43" North latitude and 94° 40' 24" West longitude.



PRELIMINARY ASSESSMENT OF GOCO-JAYHAWK PLANT SITE  
AUGUST 1990



PRELIMINARY ASSESSMENT OF GOCC-JAYHAWK PLANT SITE  
AUGUST 1990

## 2.2 Site History

The former GOCC-Jayhawk Plant, originally known as the Jayhawk Ordnance Works, was built in 1942 by the U.S. Government for the production of ammonium nitrate explosives.

The Spencer Chemical Company (SCC) purchased the facility in 1948 and expanded the existing nitric acid production capacity and added herbicide manufacturing units. SCC was also involved in the research and processing of nuclear fuels from 1958 to 1962 (KDHE/BEHS, Radiation Control Section - GOCC files).

Gulf Oil Corporation purchased the site from SCC and operated at the facility from 1964 to 1983. GOCC continued the manufacture of explosives, expanded the herbicide, ammonium nitrate, nitric acid and other specialty chemical operations.

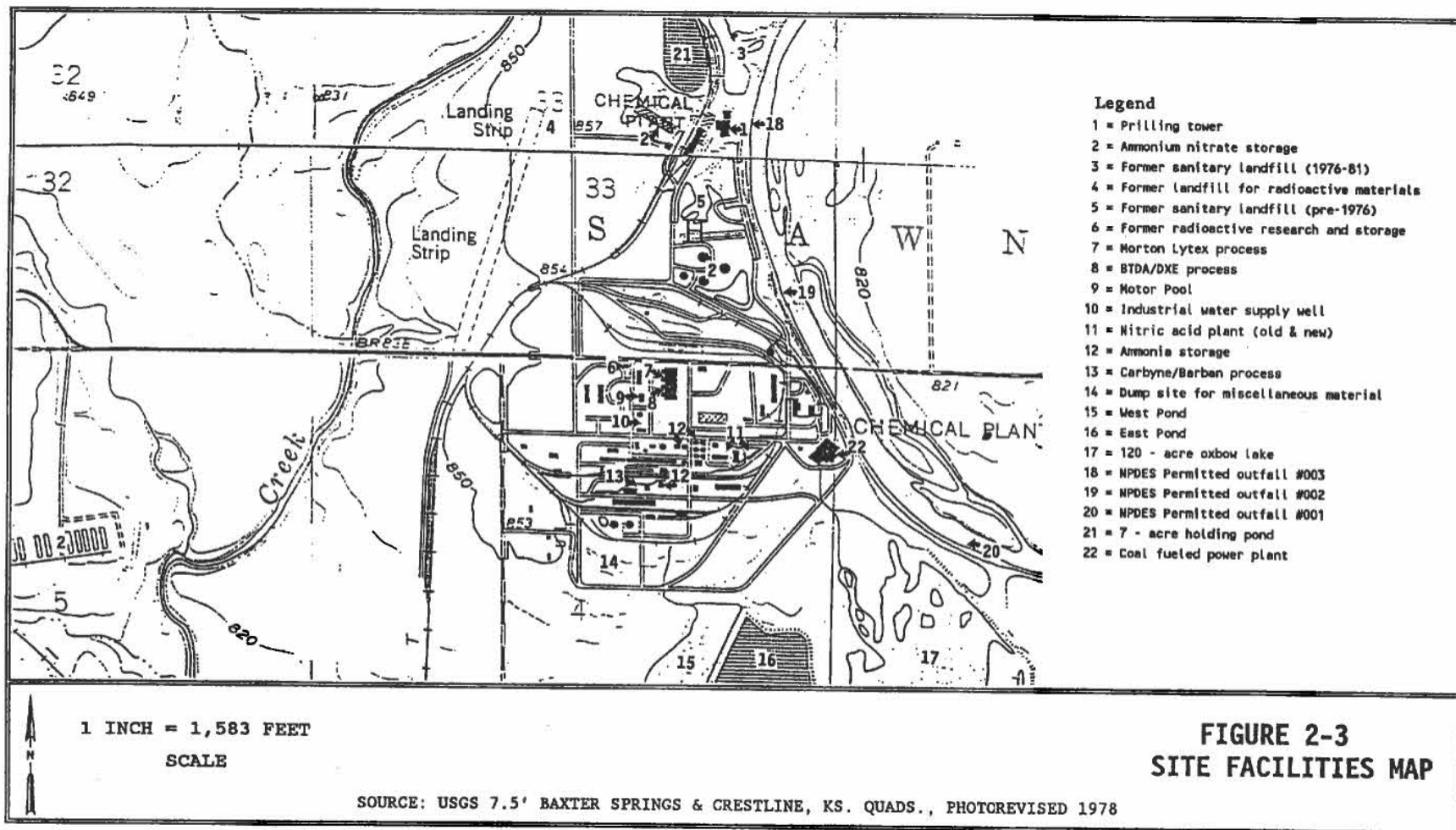
Evaporation ponds were installed in 1942 and 1956 (West Pond and East Pond, respectively), for evaporation of process wastewater from the facility, while stormwater runoff was routed to an on-site 120-acre oxbow lake located just east of the ponds (see Figures 2-2 and 2-3). Chevron Chemical Company assumed the operational responsibility of closing the ponds after merging with GOCC in 1984. Closure was completed and approved by KDHE in 1987 (KDHE/BAWN, Chevron Chemical Company Files, 1987).

During the years that GOCC operated the facility, there were numerous reported discharges to Spring River of effluent and surface water runoff containing high concentrations of ammonia and nitrate. Even after being issued an NPDES permit in 1975, GOCC violated the permit limitations set for total nitrogen at outfalls 003 (prilling towers area) and 001 (120-acre lake), and total suspended solids and pH at outfall 001 (KDHE/BoW Industrial Programs Section files). Ammonium nitrate pellets (fertilizer, commercial and explosive grades) were manufactured at the prilling towers located at the northern end of the facility. There the pellets were stored until shipment off-site via railroad cars (Figure 2-3).

GOCC utilized a coal-fueled steam-generating power plant, located on east side of the facility adjacent to Spring River. Piles of coal were stored and handled on the north side of the power plant (Figure 2-3).

Water supply at the GOCC-Jayhawk Plant was obtained from Spring River and a deep water well constructed in 1942 (Abernathy, 1943). Surface water was used for cooling purposes at the prilling towers and power plant. Regulation of the water well as a non-community public water supply began in 1977 and included continuous chlorination and regular sampling and testing for coliform bacteria. In August 1985, the well water was tested for the first





PRELIMINART ASSESSMENT OF GOCO-JAYHAWK PLANT SITE  
AUGUST 1990

time for volatile organic chemicals (VOCs) and analytical results showed a concentration of 1,2-dichloroethane near the Kansas Action Level (KAL)<sup>1</sup> with a trace concentration of toluene. Subsequent testing confirmed the contamination; Allco was directed to cease using the well for drinking water purposes but was allowed to continue its use as an industrial water supply. The Allco well has been placed on the Kansas Identified Sites List. Table 2-1 shows VOC analytical results for the industrial well.

Hazardous wastes were stored until they could be shipped off-site to approved facilities near Wichita and Kansas City, Kansas. As a result of occasional spills some of these wastes were released into the 120-acre lake via the stormwater sewers and/or to Spring River.

Several spills involving transformer oil, ammonium nitrate, DXE (1,1-di(ortho-xylyl) ethane), benzyl chloride, and other chemicals occurred during GOCC's operation of the plant (KDHE/BAWM and BoW, GOCC - Jayhawk Plant files).

Attachment 2 is a list of all chemicals (finished products, intermediates, wastes, etc.) known to have been used or generated by GOCC at the Jayhawk Plant. Figure 2-3 shows where most of the chemicals were used, stored or generated at the facility.

Two sanitary landfills located north of the main plant were used by GOCC (refer to Figure 2-3). The landfills were operated and subsequently closed under KDHE guidance (KDHE/BAWM - GOCC files).

GOCC shut down all manufacturing operations at the Jayhawk facility in August 1983 and began to divest portions of the facility to the current owners.

### 2.3 Potential Sources

The GOCC-Jayhawk Plant is the only known source of contamination detected at the site. Information obtained from a representative of the Allco Chemical Company during the site visit in April 1990, indicated that leakage of wastes generated at Allco's BTDA building had resulted in shallow groundwater contamination.

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<sup>1</sup> In December, 1985 the KDHE issued the final draft of "Program Strategy Addressing Volatile Organic Chemicals (VOCs) in Kansas Groundwater". This document outlined, among other items, the maximum contaminant levels for VOCs in public water supply wells and the guidelines for enforcing these levels. The Kansas Action Level (KAL) is the maximum contaminant level set by the KDHE for public water supplies. All public water supplies in the state of Kansas are required to meet the KAL standards set by the KDHE. Public water supplies not meeting the KAL standards are required to notify their customers of the contamination, and upon review by the KDHE, may be required to discontinue the use of the water source, blend water with other non-contaminated sources, treat the contaminated water, and/or supply an alternate source of water. In addition, the KALs are used as a guideline to advise private well owners of safe drinking water standards.

**TABLE 2-1**  
**Historical Analytical Data for Allco Chemical Corp.**  
**(formerly GOCC-Jayhawk Plant)**  
**Deep Industrial Water Well**  
**(all units in ppb)**

DATE SAMPLED	LABORATORY	1,2-DCA	Toluene
08/07/85	KDHE	4.9	0.500
09/03/85	KDHE	14.6	ND
09/27/85	Wilson [immed sample]	6.1	-
09/27/85	Wilson [after 5 mins]	6.2	-
09/27/85	Wilson [after 30 mins]	5.8	-
09/03/86	Wilson	8.6	-
03/16/87	Wilson	7.3	-
10/15/87	Wilson	4.5	-
09/06/88	KDHE	47.9	ND
12/21/88	Wilson	12.0	-
12/29/88	KDHE [immed sample]	12.4	ND
12/29/88	KDHE [after pumping]	12.6	-
11/ /89	Weston	23.0	-
12/28/89	Continental	16.0	-

**Abbreviations:**

ND - Not detected  
 - - Not analyzed  
 ppb - Parts per billion<sup>2</sup>  
 1,2-DCA - 1,2-dichloroethane

**Note:** The KAL for 1,2-DCA is 5 ppb.  
 The KAL for toluene is 2,000 ppb.

**Sources:** Mr. Howard Ryser, V.P. Manufacturing, Allco Chemical Corp.  
 KDHE Analytical Laboratory.

<sup>2</sup>The units commonly used throughout this report for liquid samples (water, wastewater) are parts per billion (ppb) or micrograms per liter (ug/L). One (1.0) ppb in water is approximately equivalent to detecting one drop of the contaminant in 12,500 gallons of water. The units that are used for solid samples (soil, sediment and sludge) are milligrams per kilogram (mg/kg) or parts per million (ppm). One (1.0) mg/kg in a solid is equivalent to detecting one ounce of the contaminant in approximately 31 tons of solid material.



## SECTION 3: SAMPLING AND CHEMICAL DATA

### 3.1 Field Activities and Analytical Results

Groundwater samples were collected from three wells: two monitoring wells and the industrial water supply well, all of which are currently located on Allco property. Figure 3-1 shows the location of the Allco monitoring wells and the industrial water well. The monitoring wells were installed as part of a property transfer environmental assessment of the Allco facility early in 1989. Based on analytical results of water samples collected from the monitoring wells in April and November 1989, wells MW3D and MW7S were selected for sampling during the preliminary assessment. In addition, MW7S is located near the former location of buildings used for research and processing of nuclear fuels and was considered a good source to characterize possible contamination that may have reached the water table from these activities.

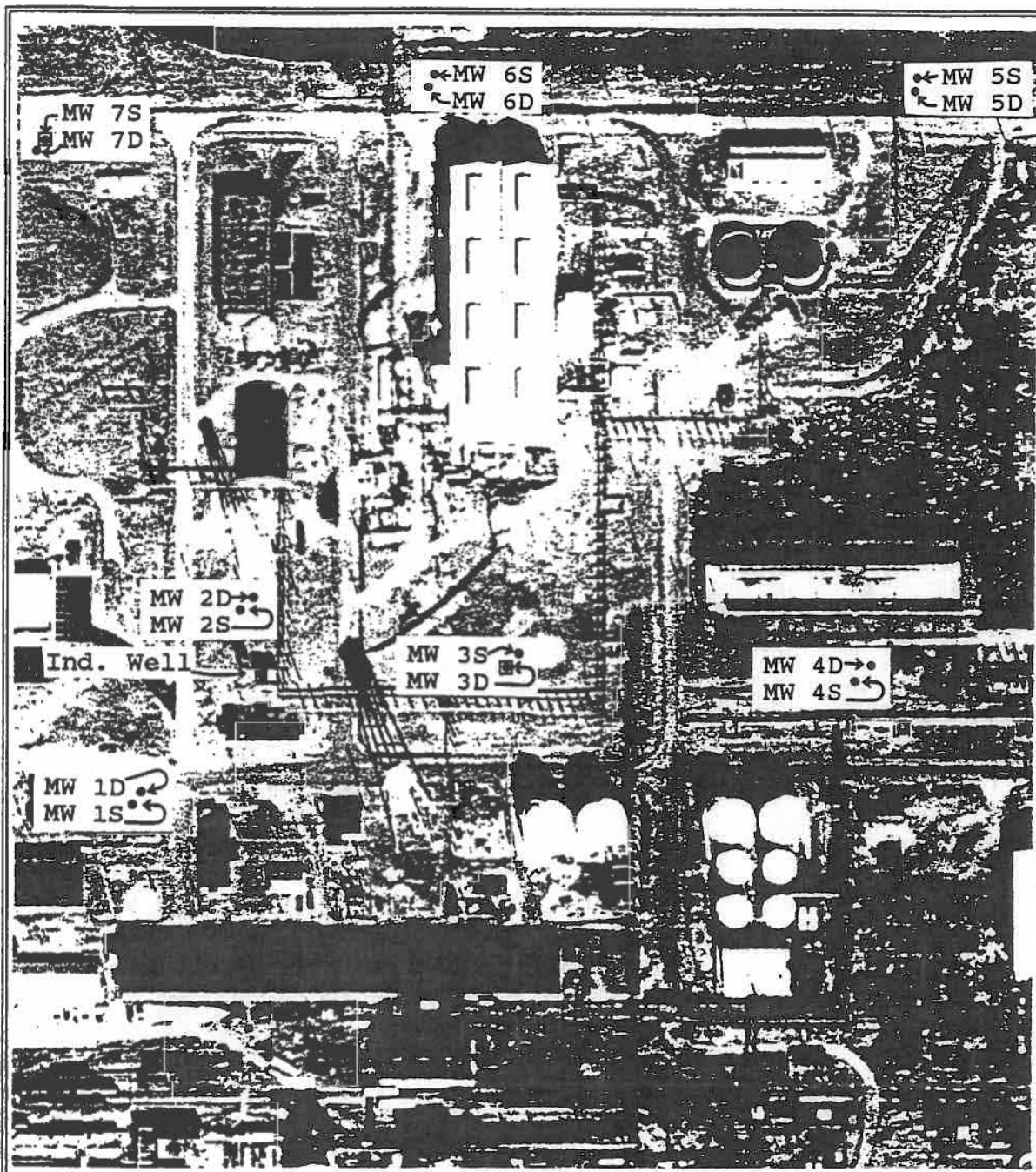
Samples taken from the monitoring wells were collected using a teflon bailer after three well-volumes of water had been purged. The industrial well was sampled at a tap located inside the well/pump house.

Five surface water samples were collected during the preliminary assessment. Surface water samples (SW3, SW2, and SW1) were collected at or near discharge points representing the former NPDES permitted outfalls 001, 002, 003, respectively (refer to Figures 2-3 and 3-2). Two samples were collected from Spring River at points located upstream (SW4) and downstream (SW5) of the site (refer to Figure 3-2). Analytical results for surface and groundwater samples collected are presented in Table 3-1.

Soil samples collected at three on-site locations are shown in Figure 3-2). Soil #1 was a sludge/sediment sample collected from the bottom of a cement-lined ditch that drains stormwater runoff from the main facility (and formerly cooling water and fly ash from the power plant), to the 120-acre oxbow lake. Soil #2 was a composite sample collected near a small drainage ditch located adjacent to a dump site containing miscellaneous processed and demolition (wooden) material. A background composite soil sample (#3) was collected from a wooded area near the northern boundary of the site. Tables 3-2 and 3-3 list the analytical results for soil samples collected during the Preliminary Assessment.

All samples were analyzed for priority pollutant VOCs (except SW1, SW2 and SW3), pesticides, polychlorinated biphenyls (PCBs), base neutral and acid extractable organic compounds (BNAs) and selected inorganic constituents, including heavy metals.

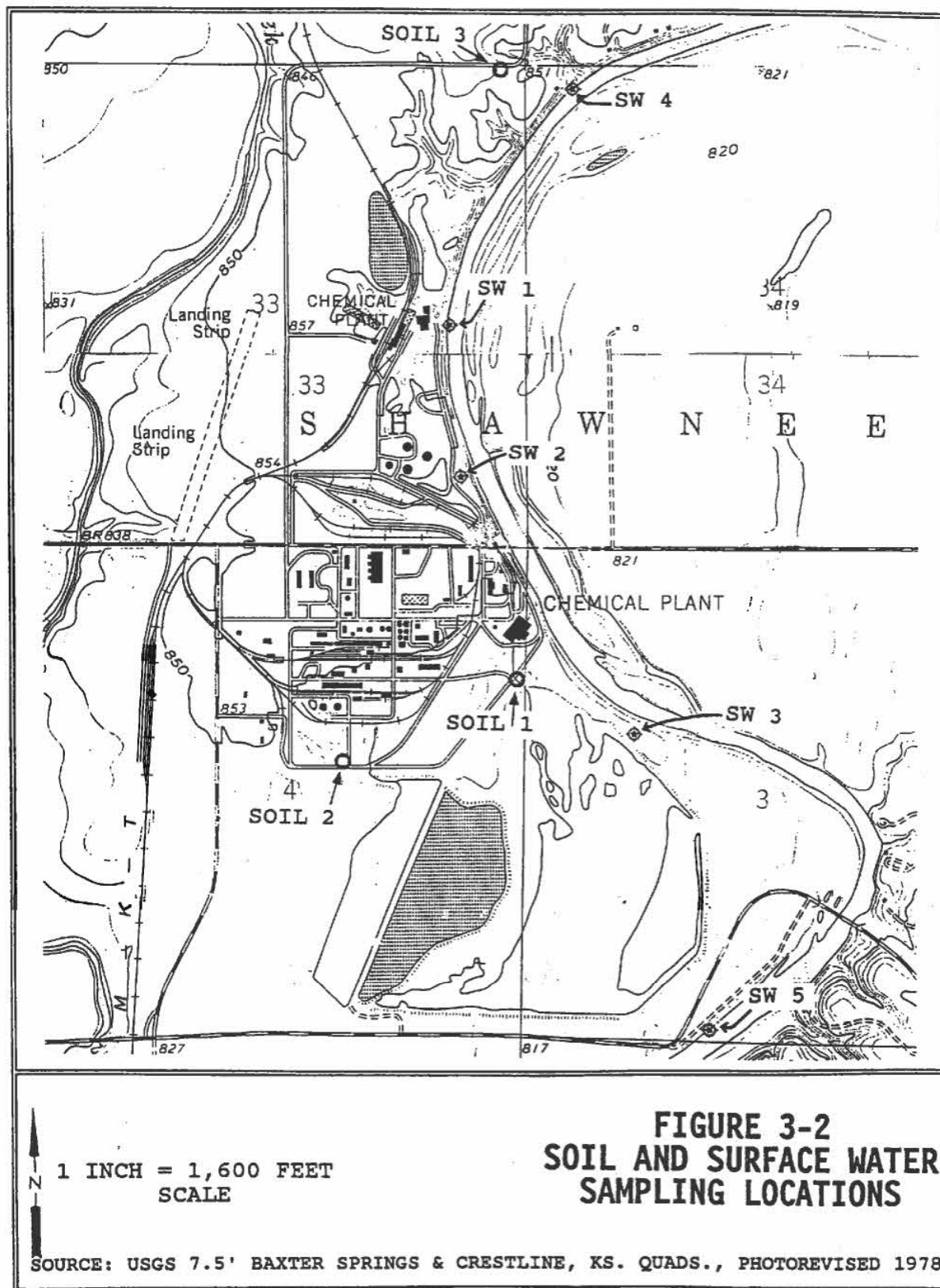
Three surface water samples (SW1, SW2 and SW5) and one groundwater sample (MW7S) were analyzed for gross alpha radiation.



**FIGURE 3-1**  
**MONITORING WELLS**  
**AND GROUND WATER**  
**SAMPLING LOCATIONS**

SOURCE: KDOT AERIAL PHOTOGRAPH, JANUARY 1990

PRELIMINARY ASSESSMENT OF GOCJ-JAYHAWK PLANT SITE  
AUGUST 1990



PRELIMINARY ASSESSMENT OF GOCO-JAYHAWK PLANT SITE  
 AUGUST 1990

**TABLE 3-1**  
(units in ppb)  
April 1990, Water Analytical Data  
Gulf Chemical Company, Crestline, Kansas

ORG	SW1	SW2	SW3	SW4	SW5	Ind.W	MW3D	MW7S	KAL
O / P							*		
Xyl	NA	NA	NA	ND	ND	ND	1240	ND	440
Phtha	ND	15.6	ND	ND	ND	ND	ND	ND	4200
TCM	NA	NA	NA	ND	ND	ND	ND	50.3	100
TCE	NA	NA	NA	ND	ND	ND	ND	57.9	5
Benz	NA	NA	NA	ND	ND	ND	2.9	ND	5
2-Nit	ND	ND	ND	ND	ND	ND	21.3	ND	290
Phen	ND	ND	ND	ND	ND	ND	10.9	ND	300
4-Nit	ND	ND	ND	ND	ND	ND	14.5	ND	290
Ben A	ND	ND	ND	ND	ND	ND	32.4	ND	-
DCA	NA	NA	NA	ND	ND	17.7	ND	ND	5
INO				(units in ppm)					
T.H.	562	467	174	161	166	136	1356	294	400
Sul	149	500	82	49	50	24	555	580	250
Nit	465	46	0.8	1.9	1.9	0.2	191	3.7	10
Mn	6.89	20.25	0.02	0.14	0.23	0.02	6.4	0.6	0.05
Cd	0.016	0.046	ND	ND	ND	ND	0.022	ND	0.01
Zn	1.54	5.10	0.08	0.08	0.07	ND	0.22	0.13	5.0

Abbreviations:

O/P Xyl	- Ortho &/or para-xylene	ORG-	Organic
Phtha	- Bis(2-ethylhexyl) phthalate	INO-	Inorganic
TCM	- Trichloromethane	Sul-	Sulfate
TCE	- Trichloroethylene	Nit-	Nitrate (as N)
Benz	- Benzene	Mn	- Manganese
2-Nit	- 2-Nitrophenol	Cd	- Cadmium
Phen	- Phenol	Zn	- Zinc
4-Nit	- 4-Nitrophenol	ND	- Not detected
Ben A	- Benzoic Acid	NA	- Not analyzed
DCA	- 1,2-Dichloroethane	*	- Numerous hydrocarbons present
ppb	- parts per billion	TH	- Total Hardness
ppm	- parts per million	KAL	- Kansas Action Level

Source: KDHE Analytical Data, 1990.

**TABLE 3-2**  
**April 1990, Soil Sampling (Organic) Analytical Data**  
**The Former GOCC-Jahawk Plant**  
**(units in ppm)**

ORGANICS	* SOIL#1	* SOIL#2	Bkg SOIL#3
Phenanthrene &/or Anthracene	5.3	3.4	ND
Fluoranthene	1.8	3.0	ND
Pyrene	1.5	2.4	ND
Chrysene &/or Benzo(A)Anthracene	1.3	2.9	
Benzo<(B) &/or (K)>Fluoranthene	ND	3.4	ND
Indeno(1,2,3-c,d) pyrene	ND	1.6	ND
Benzo(g,h,i)perylene	ND	1.9	ND
Ortho &/or para xylene **	1.7	ND	ND
Naphthalene	3.4	ND	ND
2-methyl naphthalene	8.4	ND	ND
Dibenzofuran	2.2	ND	ND
<b>PESTICIDES</b>			
PCB-1254	ND	44.0	ND

**Abbreviations:**

- ND - Not detected.
- Bkg- Background.
- \* - Numerous hydrocarbons present.
- \*\* - Holding time for VOCs (14 days) was exceeded before analyses could be completed.
- ppm- Parts per million.
- PCB- Polychlorinated biphenyl.

**Note:** Only detected organic compounds reported.

**Source:** KDHE Analytical Data, 1990.



**TABLE 3-3**  
**April 1990, Soil Sampling (Inorganic) Analytical Data**  
**The Former GOCC-Jayhawk Plant**  
**(units in ppm)**

Inorganic	Soil #1	Soil #2	Bkg Soil #3	EP Tox Soil #2	EP Tox Standard
Calcium	30761.9	9033.6	318.5	209.8	-
Magnesium	2832.3	2795.7	63.0	50.3	-
Sodium	389.6	226.6	198.3	3.7	-
Potassium	55.6	56.6	102.6	0.6	-
Silica	1953.3	1777.7	997.3	3.6	-
Boron	ND	ND	3.90	0.04	-
Iron	4033.55	3139.35	572.47	ND	-
Manganese	1359.68	867.63	151.54	15.78	-
Arsenic	4.057	5.457	5.943	ND	5.0
Barium	23.55	22.06	39.35	0.34	100.00
Cadmium	1.848	3.041	0.099	0.053	1.0
Chromium	28.655	9.116	1.189	0.169	5.0
Copper	27.74	33.92	1.81	0.03	-
Lead	54.572	852.346	2.864	1.2	5.0
Mercury	0.14	0.1	ND	NA	0.2
Selenium	ND	ND	1.031	ND	1.0
Silver	ND	ND	ND	ND	5.0
Zinc	419.61	519.51	17.70	7.80	-
Aluminum	666.76	955.60	1040.23	0.19	-
Beryllium	0.18	0.36	0.24	ND	-
Nickel	7.79	9.75	2.76	0.09	-
Antimony	ND	ND	ND	ND	-
Thallium	ND	ND	0.54	ND	-

Abbreviations: ND - Not detected                      Bkg - Background  
NA - Not analyzed                                      Tox - Toxicity  
ppm - Parts per million

Source: KDHE Analytical Data, 1990.

**TABLE 3-4**  
**April 1990, Radiation Analytical Data**  
**The Former GOCC-Jayhawk Plant**  
**(units in picocuries/liter)**

Parameter	SW#1	Error	SW#2	Error	SW#5	Error	MW7S	Error
Gross Alpha	12	3	5	1	4	1	ND	-
Gross Uranium	ND	-	1	1	NA	-	NA	-

Abbreviations: ND - Not detected  
NA - Not analyzed  
Source: KDHE Analytical Data, 1990.

Additionally, analysis for gross uranium concentration was conducted on samples with gross alpha radiation levels of 5 picocuries/liter or greater (SW1 and SW2). Results of these analyses are presented in Table 3-4.

### 3.2 Hazardous Substance Characteristics

The primary contaminants detected at the GOCC-Jayhawk Plant site during the preliminary assessment were the VOCs trichloromethane (or chloroform), trichloroethylene (or trichloroethene), 1,2-dichloroethane, ortho &/or para-xylene and the inorganic constituents cadmium, nitrate, sulfate, manganese, zinc and sodium. Other VOCs and inorganic chemicals were found at relatively low levels.

Trichloromethane, Chemical Abstract Service Registry (CAS) #67-66-3, is also known as chloroform, formyltrichloride, methanetrichloride, methenyltrichloride, methyltrichloride and trichloroform. Trade names are FEON 20, R20 and R20 (refrigerant) (ATSDR, 1987). Trichloromethane has a KAL of 100.0 ppb in water. Trichloromethane is highly toxic, and a suspected human carcinogen. Trichloromethane after prolonged inhalation can cause paralysis, cardiac respiratory failure and death (Sax, 1984). Trichloromethane decomposes and emits toxic chloride vapors when heated. Trichloromethane is used primarily as a fluorocarbon, other uses include use as an extraction solvent; as a solvent for penicillin, alkaloids, vitamins, flavors, lacquers, floor polishes, artificial silk manufacture, resins, fats, greases, gums, waxes, adhesives, oils and rubber; a dry cleaning spot remover; in fire extinguisher; as an intermediate in the preparation of dyes and pesticides; and in fumigants (Sax and Lewis, 1987). Studies suggest that trichloromethane would be highly mobile in soil (ATSDR, 1987). Trichloromethane reacts violently with acetone + base, aluminum, disilane, lithium, magnesium, nitrogen tetroxide, potassium, perchloric acid + phosphorus pentoxide, potassium hydroxide + methanol, k-tert-butoxide, sodium, sodium hydroxide + methanol, and sodium methylate (Sax, 1984).

Trichloroethylene (TCE), CAS #79-01-6, is also known as trichloroethene, acetylene trichloride, 1-chloro-2,2-dichloroethylene, 1,1-dichloro-2-chloroethylene, ethylenetrichloride and NCI-co4546 (Sax, 1984). Trade names are Algylen, Anameth, Benzinol, Blacosolv, Blancosolv, Cecolene, Chlorilen, Chorylea, Chorylen, Chorylen, Circosolv, Crawhaspol, Densinfluat, Dow-Tri, Dukeron, Fleck-Flip, Flock Flip, Fluate, Gemalgene, Germalgene, Hi-Tri, Lanadin, Lethurin, Narcogen, Narkogen, Narkosoid, Neu-Tri-Nialk, Perma-A-Chlor, Perm-A-Clor, Petzinol, Philex, Threthylen, Threthylene, Tretylene, Triad, Trial, Triasol, Trichloran, Trichloren, Triclene, Tri-Clene, Trielene, Trielin, Triklone, Trilen, Trilene, Triline, Trimar, Triol, Tri-Plus, Tri-Plus M, Vestrol, Vitran, and Westrosol (ATSDR, 1988). TCE has a KAL of 5.0 ppb in water. It is a strong skin/eye

irritant and has tested animal positive as a carcinogen (Sax, 1984). Prolonged inhalation of moderate concentrations of TCE will cause headaches, and drowsiness. Chronic exposure to TCE can cause damage to the liver and kidneys. It has been linked to tumors of the liver, kidney, lung, male sex organs and leukemia (ATSDR, 1988). When heated, TCE decomposes and emits toxic chloride vapors. TCE can react violently with aluminum, barium, nitrous dioxide, lithium, magnesium, liquid oxygen, ozone, potassium hydroxide, potassium nitrate, sodium, sodium hydroxide and titanium (Sax, 1984). TCE is used for metal degreasing; extraction solvent for oils, fats, waxes; solvent dyeing; dry cleaning; refrigerant and heat exchange liquid; fumigant; cleaning and drying electronic parts; diluent in paints and adhesives, textile processing; chemical intermediate; aerospace operations (flushing liquid oxygen) (Sax and Lewis, 1987).

1,2-Dichloroethane (1,2-DCA), CAS #107-06-2, is also known as sym-dichloroethane, and ethylene dichloride, and the trade name Dutch Oil. 1,2-DCA has a KAL of 5.0 ppb in water. 1,2-DCA is moderately toxic (Sax, 1984), a strong irritant to the eyes and skin and has been listed as a carcinogen by the EPA (Windholz, 1983). 1,2-DCA is toxic by ingestion, inhalation and skin absorption. When heated it decomposes and emits toxic chloride vapors. 1,2-DCA is used in the production of vinyl chloride, trichloroethylene, vinylidene chloride, and trichloroethane. It is also used as a lead scavenger in anti-knock gasoline; paint, varnish, and finish removers; metal degreasing, soaps and scouring compounds, wetting and penetrating agents, organic synthesis, ore flotation, solvents and fumigants. 1,2-DCA is incompatible with teraoxide (Sax and Lewis, 1987).

Polychlorinated biphenyl - 1254 (PCB-1254), CAS #1109-76-91 is also known as Arochlor 1254, Arcoclor 1254, chlorodiphenyl(54% Cl), and NCI-c02664. PCB-1254 is considered highly toxic and is a suspected human carcinogen. PCBs are used as coolants in transformers and electrical capacitors. PCBs are insoluble in water. They are non-volatile and non-combustible. #PCBs are extremely persistent in the environment (Sax and Lewis, 1987 and Student, 1981).

Ortho-xylene, CAS #95-47-6, is also known as 1,2-dimethylbenzene, o-dimethylbenzene, o-methyltoluene, 1,2-xylene, 1,2-dimethylbenzene and o-xylol. Ortho-xylene has a KAL of 440 ppb in water. It is considered moderately toxic and has a moderate mobility in soil which increases significantly with increased organic carbon content (Hughes, 1985). Ortho-xylene is used in the manufacture of phthalic anhydride; vitamin and pharmaceutical syntheses, dyes, insecticides and motor oils. It is incompatible with oxidizing materials (Sax and Lewis, 1987).

Para-xylene, CAS #106-42-3, is also known as p-dimethylbenzene, p-methyltoluene, 1,4-xylene, 1,4-dimethylbenzene, and p-xylol. Para-xylene has a KAL of 440 ppb in water. It is considered moderately toxic (Sax, 1984) and has a low mobility in soil which increases



significantly with increased organic carbon content (Hughes, 1985). Para-xylene was the 28th highest-volume chemical produced in the United States in 1985 and is used in the synthesis of terephthalic acid for polyester resins and fibers (Dacron, Mylar, Terylene); vitamin and pharmaceutical synthesis and insecticides. It is incompatible with acetic acid and air; nitric acid, and 1,3-dichloro-5,5-dimethyl-2,4-imid-azolidindione (Sax and Lewis, 1987).

Cadmium, CAS #744-04-39, is also known by the chemical symbol Cd. Cadmium has a hexagonal crystalline structure and is a silver-white malleable metal. In refined state cadmium is available in bars, sheets, wire or powder. Cadmium and its salts are considered highly toxic. Cadmium and certain cadmium compounds are animal carcinogens. Ingestion of cadmium and soluble cadmium compounds causes increased salivation, choking, vomiting, abdominal pain, anemia, renal dysfunction, diarrhea and tenesmus. Inhalation of dust or fumes causes throat dryness, coughing, headache, vomiting, chest pain, extreme restlessness and irritability, pneumonitis, and possibly bronchopneumonia. Cadmium is used as a constituent of easily fusible alloys; soft solder and solder for aluminum; electroplating, deoxidizer in nickel plating; process engraving, electrodes for cadmium vapor lamps, photocells; photometry of ultraviolet sunrays, and in nickel cadmium storage batteries. Veterinarians use cadmium salts as wormers in swine and poultry. Cadmium is a moderate fire hazard when exposed to heat or flame as a dust or by chemical reaction with oxidizing agents, metals,  $\text{HN}_3$ , zinc, selenium, and tellurium. A moderate explosive hazard exists when cadmium dust is exposed to flame (Sax, 1984; Windholz, 1983). The KAL for cadmium is 10 ppb.

Nitrates (reported as nitrogen (N)), were detected at levels which exceed the KAL of 10 ppm. Nitrates are classified as non-hazardous substances; however, they are a concern in drinking water supplies due to potential adverse health effects which can be caused by consuming water contaminated with excessive levels of nitrates. Excessive nitrate consumption by infants less than one year in age may result in infant cyanosis, also called methemoglobinemia or "blue baby" syndrome (Robbins, 1989). Excessive application of pesticides and fertilizers may increase the level of nitrates in the environment.

### 3.3 Discussion of Results

The analytical results for groundwater samples collected from the monitoring wells (MW3D and MW7S) indicate VOC contamination of the shallow groundwater system by xylenes, trichloromethane (or chloroform), and trichloroethylene (or trichloroethene). The concentrations for these VOCs exceeded the KALs for public drinking water systems (PWS). Other organic chemicals were detected in MW3D but at levels below their KALs. These data confirm the VOC contamination detected in these wells in 1989. The source of the xylene contamination detected in MW3D is apparent in data obtained

for samples collected from recovery wells that were installed later in 1989 when an underground leak of liquid wastes on the east side of Allco's BTDA building was discovered. The wastes appeared to contain acetone and xylene. The data are presented in Attachment 3.

Concentrations of nitrate, cadmium, sulfate, total hardness and manganese found in MW3D also exceeded KALs for these constituents.

The deep industrial well continued to show contamination by 1,2-dichloroethane (1,2-DCA) at a level exceeding the KAL. This contaminant has not been detected in the shallow groundwater at the site (where sampled). 1,2-DCA (or ethylene dichloride) has been used at the GOCC-Jayhawk Plant (refer to Attachment 2). The probability is low that the extensive, deep aquifer tapped by this well is generally contaminated with 1,2-DCA. A search of the water quality records for deep PWS wells within a four mile radius of the site does not indicate the presence of 1,2-DCA in the deep aquifers. A potential source of this contamination is at the wellhead which was in an unsanitary condition and poorly protected.

Analytical results of the surface water samples showed excessive levels of manganese in all samples except the discharge from the 120-acre lake (SW3). Manganese is not considered to be hazardous to human health, but may degrade water quality by causing black stains and precipitate.

Nitrate concentrations in samples from NPDES outfalls 002 (SW2) and 003 (SW1), exceeded the KAL by four and forty times, respectively. These concentrations of nitrate also exceeded the former NPDES permit limitation for total nitrogen (set at a maximum of 25 ppm) by almost two and nineteen times respectively (KDHE/BOW, Industrial Programs Section - GOCC files). The day that sample SW1 was collected, water was observed seeping upward in an empty detention basin, flowing through an underground drainage system, and into Spring River at outfall 003. The detention basin was located adjacent to the 7-acre holding pond located north of the prilling tower area (refer to Figure 2-3). Water stored in this pond was reported to be process wastewater hauled from offsite by Thermex from their commercial explosives manufacturing plant at Hallowell, Kansas (Autry, April 2, 1990).

Cadmium concentrations in samples SW2 and SW1 and sulfate and zinc concentrations in SW2 also exceeded KALs.

The concentrations of several inorganic constituents found in soil samples #1 and #2 greatly exceeded those in the background soil sample (#3). Those of most concern are the heavy metal concentrations detected for cadmium, chromium, lead and mercury because of their known adverse health effects. Further testing of Soil #2 was conducted because of its unusually high lead concentration to determine if the soil exhibited the

characteristics of E.P. toxicity (40CFR, Part 261.24, 1988). The sample passed the toxicity test and, therefore, is not considered to be a hazardous waste.

Several priority pollutant base neutral extractable organic compounds (BNAs) were detected at the two soil sample locations near the industrial portion of the site while none were detected in the background soil sample. These compounds are typical coal tars and may be associated with the former use of the power plant and coal storage or the spillage or dumping of oil (see below).

Soil #2 contained 44 ppm of the PCB-1254. A thin seep of a black oily liquid was noted at a depth of eight inches when this soil sample was collected. PCBs were listed as having been used at the former GOCC-Jayhawk Plant. In addition, PCB-containing transformers had been used at the former plant and some were reported to have leaked. Several of these transformers were left on-site when subsequent owners purchased portions of the plant (KDHE/BAWM, Thermex Energy Corp. Files). The KDHE may require removal and treatment of soil if 50 ppm, or more of PCB's are found in a soil sample. The presence of 44 ppm may indicate that higher concentrations are present at the site.

A small quantity (1.7 ppm) of ortho &/or para xylene was detected in soil/sediment sample #1 collected from the lined portion of the stormwater drainage ditch which discharges to the 120-acre lake.

Because the EPA recommended allowable holding time of 14 days was exceeded before the analysis could be completed on the soil samples, the sample #1 may have contained a slightly higher concentration of o/p xylene and small quantities of other VOCs at the time of collection. In addition, the other soil samples collected during the site visit may have contained small quantities of VOCs even though none were detected (See Attachment 7).

#### SECTION 4: GEOLOGY AND HYDROLOGY

##### 4.1 Groundwater

Use of groundwater within a four mile radius of the site is limited predominantly to public water supply purposes. Because deep water wells are required to obtain adequate groundwater supplies, very few individuals use wells for domestic, industrial or irrigation purposes. For many years in the early 1900s deep wells provided water supply to towns and the mining industry (zinc, lead and coal) in southeast Kansas (Abernathy, 1941).

Deep wells within the four-mile radius obtain groundwater supplies from rocks of the Cambrian-Ordovician System, at depths ranging from 870 feet to 1,140 feet (KDHE/BoW, Water Well Records, and Macfarlane and Hathaway, 1987). The chief groundwater zones in the Cambrian-Ordovician System are, in ascending order, the Lamotte

(Reagan) Sandstone, Roubidoux Formation, and the Jefferson City-Cotter Dolomites (Abernathy, 1941).

The deep water supply well utilized at the GOCC-Jayhawk Plant is 901 feet deep and was completed in sandstones in the Roubidoux Formation. Groundwater occurring in the overlying Mississippian limestones was cased out due to extreme hardness and considerable concentrations of iron and iron-sulfide compounds. Approximately 400 feet of dense carbonates and shale separate the Mississippian limestones from the Roubidoux Formation (Abernathy, 1943).

In the vicinity of the site, groundwater occurs in the Cambrian-Ordovician aquifers under confined conditions. Groundwater in the Mississippian formation is an unconfined or water-table aquifer.

Groundwater flow in the Cambrian-Ordovician aquifers is generally westward across the region from recharge areas in the Ozarks of southern Missouri to discharge areas west and south in Kansas and Oklahoma (Macfarlane and Hathaway, 1987).

The surface geology at the site consists of Quaternary alluvium (clay, silt, sand and gravel), associated with Spring River and Shawnee Creek, overlying the Mississippian bedrock. Based on lithologic logs from the installation of monitoring wells at the Allco portion the former GOCC facility, the alluvial material ranges in thickness from approximately 10 feet to 25 feet (refer to Attachment 4). Where the alluvial material is absent, topsoil directly overlies weathered limestone bedrock and in the northern portions of the former plant site, a few feet of Cherokee Shale (Pennsylvanian) may overlie the Mississippian limestones (KDHE/BAWM, GOCC - Jayhawk Plant files and Pierce and Courtier, 1937).

The shallow monitoring wells (marked with an S) installed during the environmental assessment of the Allco facility, were completed in the unconsolidated Quaternary deposits (generally less than 20 feet total depth) while the deep (D) wells were completed in the uppermost Mississippian limestone units, generally a 40 to 55 feet total depth (refer to Attachment 4). Water level measurements taken in 1989 and 1990 (refer to Attachment 5) indicate a groundwater divide trending north-northwest to south-southeast from north of the plant down into the mid-portion of the former plant. These data further indicate that this shallow groundwater movement is affected by both Shawnee Creek and Spring River (bordering the site on the west and east, respectively) and their confluence directly south of the plant, discharging to them during periods of low stage.

#### 4.2 Surface Water and Drainage

The Former GOCC-Jayhawk Plant, located in the Spring River Valley, is situated between the south-flowing Spring River, to the east,



and its tributary Shawnee Creek, to the west (Figure 2-2). The confluence of the two is approximately one mile south of the site.

Most surface water runoff from the former plant site is discharged to Spring River either directly via former NPDES permitted outfalls (#002 and #003) or indirectly via stormwater sewers to the 120-acre oxbow lake then to outfall #001 (Figure 2-3).

During periods of high river stage flooding of an area east of the 120-acre lake has been reported (Autry, April 4, 1990). A flood hazard study of the plant site indicated that a record flood would crest at or below an elevation of 822.5 feet which would inundate part of the plant (KDHE/BAWM, Chevron Chemical Company Files, 1983).

## SECTION 5: TARGETS

For Superfund scoring purposes the target population includes: (1) those persons using the groundwater as a drinking water supply or for irrigation within a four mile radius of the site, and (2) the number of persons using surface water as a drinking water supply or for irrigation within 15 miles downstream of the site.

### 5.1 Human Targets

Use of the groundwater as a drinking water source within a four mile radius of the site is as follows: 1,380 metered residences in Galena, Kansas (Haines, 1990), 300 metered residences in Riverton, Kansas (Carey, 1990, Harper, 1990 and Smith, 1990), 635 metered residences in Cherokee County RWD #2 and #8 (Kirk, 1990 and Thompson, 1990), 750 students attending Riverton Schools and 68 employees at the Empire District Electric Plant in Riverton, Kansas (Buckmaster, 1990 and Nichols, 1990). The public water intake at Baxter Springs, Kansas is the only surface water used for drinking water or irrigation within 15 miles downstream of the site. The Baxter Springs PWS has 2,300 metered residences (Morton, 1990). For Superfund scoring purposes each residence that uses groundwater, within a four mile radius, or surface water, within 15 miles downstream, as a source of drinking water is multiplied by 3.8 people per residence to convert to population. Therefore, potentially 9,615 people use groundwater within a four-mile radius and 8,740 people use surface water as a drinking water source within 15 miles downstream of the site .

There are 111 acres irrigated by surfacewater within a four mile radius of the site (KSBA/DWR, 1990). For Superfund scoring purposes, irrigated acreage is converted to population by assuming 1.5 persons for each acre. Using this conversion, approximately 167 people are potentially affected by surface water from the area of the site.

The total target population for the former GOCC-Jayhawk Plant Site is 18,522.

## 5.2 Environmental Targets

Superfund scoring takes into account threatened species, endangered species and critical habitats of wildlife to formulate environmental targets.

The following is a list of wildlife species in Cherokee County that are designated as threatened (T) or endangered (E). In addition, information as to the occurrence of these species and the designation of critical habitat in Cherokee County is presented (KDWP, 1987).

<u>Species</u>	<u>Status</u>	<u>Occurrence in County</u>	<u>Critical Habitat Designated</u>
Arkansas Darter	T	Occurs in Spring River Tributaries	Yes
Bald Eagle	E	Occurs occasionally in winter	No
Broadhead Skink	T	Occurs in suitable habitat	No
Cave Salamander	E	Occurs in suitable habitat	Yes
Central Newt	T	Occurs in suitable habitat	Yes
Dark-sided Salamander	T	Occurs in suitable habitat	Yes
E. Hognose Snake	T	May occur in suitable habitat	No
E. Narrowmouth Toad	T	Occurs in suitable habitat	Yes
E. Spotted Skunk	T	May occur in suitable habitat	No
Gray Myotis	E	May occur in suitable habitat	Yes
Graybelly Salamander	E	Occurs in suitable habitat	Yes
Green Frog	T	Occurs in suitable habitat	Yes
Grotto Salamander	E	Occurs in suitable habitat	Yes
Heel-splitter Mussel	E	May occur in suitable habitat	No
Least Tern	E	May occur occasionally in summer	No
Neosho Madtom	T	Occurs in Neosho and Spring Rivers	Yes
N. Crawfish Frog	T	Occurs in suitable habitat	Yes
N. Redbelly Snake	T	May occur in suitable habitat	No
N. Spring Pepper	T	Occurs in suitable habitat	Yes
Peregrine Falcon	E	May occur occasionally in winter	No
Piping Plover	T	May occur occasionally, spring & fall	Yes
Redspot Chub	T	Occurs in Spring River tributaries	Yes
Snowy Plover	T	May occur occasionally, spring & summer	No
White-faced Ibis	T	May occur occasionally, spring thru fall	No

The potential for significant environmental contamination by surface water is high and the above named species should all be considered targets for the former GOCC-Jayhawk Plant Site.

## SECTION 6: PRELIMINARY AND PROJECTED HRS SCORES

No HRS score was prepared for the site during the preparation of this Preliminary Assessment report. A new scoring system for Superfund sites is in preparation and is not yet available for use. The conclusions and recommendations presented below are based on the judgement and experience of the KDHE investigators.

## SECTION 7: CONCLUSIONS AND RECOMMENDATIONS

### 7.1 Conclusions

The analytical results from the samples collected and information obtained during the Preliminary Assessment indicate that the groundwater and surface water are currently being affected.

One environmental concern is the groundwater contamination detected at the site. VOC contamination of groundwater in the unconsolidated deposits and the shallow weathered bedrock zone can be attributed, at least in part, to activities at the Allco Chemical Corporation facilities (a portion of the original GOCC plant). The one VOC contaminant detected in groundwater samples from the deep industrial well may be the result of potential contaminant sources at the wellhead and poor wellhead protection practices. The sources of contamination of the shallow and deep groundwater aquifers appear to be separate.

Surface water runoff from areas where ammonium nitrate was manufactured, handled and stored contains high concentrations of nitrate and flows directly into Spring River. Seepage from the 7-acre holding pond, reportedly containing wastewater from Thermex's Hallowell Plant, also could have contributed to the high nitrate concentration and gross alpha radiation found in SW1.

Surface water contamination may adversely affect the aquatic ecology of Spring River.

On-site soils contain concentrations of inorganic constituents (including heavy metals) considerably higher than background levels. However, the levels did not exceed EP toxicity limits, and therefore, the soils are not considered hazardous. The concentration of lead, in the soil was within the range of the interim soil cleanup level for total lead which has been set at 500 to 1,000 ppm (EPA, 1989).

Soil sample (#2) contained the PCB-1254 at a concentration (44 ppm) that may involve further sampling and testing. Cleanup of soil containing 50 ppm or more of PCBs is required under Federal Regulations (40CFR, Part 761, 1989).

## 7.2 Recommendations

Organic contamination has been detected in shallow and deep groundwater aquifers and in soil at the site. Because of the nature of the contamination and use of the different aquifers a preliminary HRS score may not exceed the required score of 28.5 necessary for additional federal funding under the Superfund program. Consideration as a viable NPL candidate, however requires additional sampling to identify the extent of the contamination to the shallow aquifer and the potential to contaminate the deeper aquifer.

Information obtained from the preliminary assessment indicates that VOC contamination of shallow groundwater has potentially resulted, in part, from the activities of the Allco Chemical Corporation, a subsequent owner of property at the former GOCC-Jayhawk Plant. A more intensive investigation (scanning site investigation) is needed to determine the extent and source of each type of contamination and should be conducted in conjunction with any past, ongoing and future investigations conducted by Allco.

Any investigation at the Allco facility should also attempt to determine the source of the 1,2-DCA contamination detected in samples from the deep industrial well. An inspection of the wellhead by KDHE staff and a time-series sampling of the well should be conducted.

The remaining portions of the former plant site should be investigated to determine the extent of contamination detected at the site. Additional sampling of soil should be conducted to determine the extent of PCB and heavy metals contamination near Soil #2 sample location. The potential threat to shallow groundwater and the excessive levels of nitrate in surface water runoff warrants soil sampling and further surface water sampling in the vicinity of the prilling towers.

A soil-gas investigation should be conducted to determine if shallow groundwater contamination by VOCs exists at other portions of the site and assist in the selection of soil and groundwater sampling locations.



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## **ATTACHMENT 1**

### **Chronological History of the Former GOCC-Jayhawk Plant**

## ATTACHMENT I

### Chronological History of the Site

- 1942 - Jayhawk Ordnance Works built by the U.S. Government for production of ammonium nitrate explosives.
- West Pond built for evaporation of process wastewater
- Deep water well drilled to supply water for facility
- 1948 - Spencer Chemical Company (SCC) purchases facility
- SCC expands existing nitric acid production capacity and adds herbicide manufacturing units
- 1956 - SCC adds East Pond to manage increased process wastewater production
- 1958 to - SCC is involved in the research and processing of  
1962 nuclear fuels
- 1964 - Two buildings used to process and store radioactive material are decontaminated, dismantled, disposed of, burned and buried in a pit northwest of the main facility
- Gulf Oil Corporation purchases and operates the facility under Gulf Oil Chemicals Company (GOCC)
- 1964 to - Numerous discharges of plant effluent to Spring River  
early containing high concentrations of ammonia and nitrate  
1970s
- 1974 - Gulf expands the herbicide, ammonium nitrate and other specialty chemical operations
- 1975 - National Pollutant Discharge Elimination System (NPDES) Permit issued to GOCC-Jayhawk Plant
- 1977 - GOCCs deep industrial well is designated a non-community public water supply. KDHE requires continuous chlorination and bi-monthly sampling and testing for coliform bacteria
- 1977 to - Numerous reported exceedances of the numerical  
1980 limitations set by the NPDES Permit for total nitrogen at outfall 001 and 003, and for total suspended solids and pH at outfall 001
- 1983 - GOCC shuts down all manufacturing operations at the Jayhawk Plant
- GOCC submits closure plan to KDHE for the process wastewater evaporation ponds (West and East Ponds)
- Allco Chemical Corporation purchases the specialty



chemicals facilities from GOCC which includes the BTDA/DXE and crop protection chemicals (herbicides) manufacturing facilities

- 1984 - Bunker Properties, Inc. (later to become PBI/Gordon Corp.) purchases the ammonium storage area located west of the main plant site
- Thermex Energy Corporation purchases approximately 1,070 acres of the GOCC-Jayhawk Plant which includes the prilling tower and the power and nitric acid plants (all of which remain idle). Also included are the 120-acre oxbow lake and the technical (explosives) research laboratory located on the west side of the plant
- 1985 - Koch Chemical Company purchases the specialty chemical facilities (Plants #1 and #2 - crop protection) from Allco.

## **ATTACHMENT 2**

**Chemicals and Processes Known to be Used at the Former GOCC-Jayhawk Plant**

## ATTACHMENT 2

### Chemicals and Processes Known To Be Used at the Former GOCC - Jayhawk Plant

#### CARBYNE PROCESS

M-chloroaniline  
Ethyl acetate  
M-chlorophenyl isocyanate  
M-chlorophenyl carbamyl chloride  
3-chloroaniline hydrochloride  
Bis (3-chlorophenyl) urea  
3-chlorophenyl carbamic acid  
(butynediol) 2-butyne - 1,4 diol  
4-hydroxy -2 butynyl -N-(3 chlorophenyl) carbamate; (monocarbamate)  
2-butyne-1,4 bis (3 chlorophenyl) carbamate; (biscarbamate) (CARBYNE)  
ethylene dichloride (1,2-dichloroethane)  
toluene

#### BARBAN PROCESS (the above plus the following)

thionyl chloride  
4-chloro-2-butynyl-N-(3-chloro-phenyl) carbamate (BARBAN)  
epichlorohydrin  
pyridine

#### BUTAM PROCESS

Triethylamine  
Isopropylbenzylamine  
Pivaloyl Chloride  
Pivalic Anhydride  
Sodium Bicarbomate  
Sodium Chloride  
Sodium Hydroxide  
Benzylchloride  
Isopropylamine  
N-Benzyl-N-Isopropyl Trimethyl Acetamone (Butam)

N,N-Dibenzyisopropyl Benzylamine  
Pivalic Acid  
Trimethyl Acetic Acid  
Sodium Sulfite  
Dimethylforamide

#### ONAMER M PROCESS

3-4 Dichlorobutene  
1-4 Dichlorobutene  
Dimethyl Amine  
Bisamine  
Sodium Methylate  
Triethanolamine  
Hydrochloric Acid  
Sodium Borohydride  
Sodium Methylate

#### BTDA/DXE PROCESS

3,4,3',4' - Benzophenone Tetracarboxylic Dianhydride (BTDA, Epoxy Additive)  
1,1-Di (Ortho-Xylyl) Ethane (DXE, Insulating Oil)  
Acetaldehyde  
Ortho-Xylene  
Sulfuric Acid  
Benzophenone Mono, Di and Tri-Carboxylic Acid  
Tetra Methyl Benzophenone

#### PREFOX PROCESS (Corn Herbicide)

S-Ethyl-Diethylthiocarbamate, (Ethiolate)  
2-Chloro-4 (Cyclopropylamino)-6-(Isopropylamino)-5-Triazine, (Cyprazine)  
Agrimul A&N-300, (Surfactant)  
Isophorone, (Solvent)

#### CLOBBER PROCESS (Corn Herbicide)

3'-4'-Dichlorocyclopropane Carboxanilide, (Cypromid)  
Microcel E (Moisture Absorber)  
Aerosol OT-B (Surfactant)  
Polyfon H (Anti-Caking Agent)

#### INTERMEDIATES FROM RATICATE MANUFACTURE SHOXIN

5-(a Hydroxy -a- 2 - Pyridyl - Benzylidene - 5 - Norbornene-2,3, Dicarboxamine), (Norborm)  
M-Carbamoyl-Maleimide

#### POLYANHYDRIDE RESINS (O-Polymer of Maleic Anhydride and Alrho Olefin)

PA-6 (Hexnel (C<sub>6</sub>) Maleic Anhydride Copolymer)  
PA-10 (Decene 1 - (C<sub>10</sub>) Maleic Anhydride Copolymer)  
PA-14 (Tetradecene 1 (C<sub>14</sub>) Maleic Anhydride Copolymer)

#### MORTON LYTEX PROCESS

T-Butyl Perbenzoate  
Methylene Chloride  
Calcium Stearate  
Aluminum Stearate  
Magnesium Oxide  
Antimony Oxide  
Deca Bromo Diphenyl Oxide  
Hexahydrophthalic Anhydride  
Maleic Anhydride  
Styrene Maleic Anhydride  
Cadmium Sulfo Selenide  
Butylated Hydroxy Toluene  
Epichlorohydrin

## OTHER

Nitric Acid

Ammonia

Ammonium Nitrate

Methanol

Ethylene Glycol

Phosphoric Acid

Lignite

Uranium Enrichment By-Products

Acetone

Biocides (Cooling Towers)

n-Alkyl Dimethyl Benzyl Ammonium Chloride

Calcium Hypochlorite

Sodium Bichromate, Dichromate

Bis (Tri-n-Butyl) Oxide

Xylol

Sodium Aminotrimethyl Phosphonate

Hydrochloric Acid

Chlorine

Various Calgon treatment chemicals for which we do not <sup>know</sup> chemical composition:

Calgon CL-37 Defoamer

Calgon CL-361 Deposit Penetrant

Calgon CL-4000 Cooling Water Treatment

Calgon H-130 Microbiocide

Calgon H-212 Microbiocide

Calgon PA-11FP Antifoam and Sludge Control

Calgon CL-68 Corrosion Inhibitor

Calgon CL-14W Scale & Deposit Inhibitor

Calgon K-91 Oxygen Scavenger

Calgon NL-90 Condensate Corrosion Inhibitor

Calgon SL-5000 Organic Sequestering Agent

Calgon BA-11-FP

Calgon H-106

Calgon H-204

Calgon SL-500

Amyl Acetate

n-Hexane

Naptha

Various Lubricating and Fuel Oils, Kerosene

Dimethylformamide

"Dowtherm" Mono Chlorinated Biphenyl

Poly-Chlorinated Biphenyl (PCB)

(Source: Gulf Memorandum dated June 18, 1982, from Strad Will to D.L. Caputo. KDHE/BAWM, GOCC files)



### **ATTACHMENT 3**

**1989 Analytical Data for Monitoring and Recovery Wells at Allco Chemical  
Corporation  
(Former GOCC-Jayhawk Plant)**

TABLE 3-4  
APRIL 1989 ORGANIC ANALYTICAL RESULTS - GROUNDWATER  
ALL VALUES IN UG/L (PPB)

Well No.	1S	1D	2S	2D	3S	3D	4S	5S	5D	6S	6D	7S	7D
Methylene Chloride	3J	18	22	17	6B	7B	6B	3JB	4JB	7B	7B	3JB	4JB
Acetone	--	25	13	15	6JB	31B	7JB	11B	9JB	--	16B	12B	10B
Chloroform	--	10	--	--	3J	--	21	--	--	--	5	39	88
1,2 Dichloroethane	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	--	66	--	--	--	--	--	--	--	--	--	--	2J
Trichloroethene	--	--	--	--	--	--	--	--	--	--	--	39	96
Tetrachloroethene	--	13	--	--	--	--	--	--	--	--	--	1J	1J
Toluene	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	--	--	--	--	--	4J	--	--	--	--	--	--	--
Styrene	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene (total)	--	--	--	--	--	840	--	--	--	--	--	4J	--
Benzene	--	--	--	--	--	--	--	--	--	--	--	--	--

Well No.	8S	9S	3S Duplicate	Field Blank	Drilling Water	MCL	KAL	KNL
Methylene Chloride	4JB	Dry	6B	5B	--	NE	50	5
Acetone	13B	Dry	4JB	11B	--	NE	NE	NE
Chloroform	--	Dry	--	--	--	100*	100	0.5
1,2 Dichloroethane	3J	Dry	--	--	--	5	5	0.5
Carbon Tetrachloride	--	Dry	--	--	--	5	5	0.5
Trichloroethene	--	Dry	--	--	--	5	5	0.5
Tetrachloroethene	2J	Dry	--	--	--	5*	7	0.7
Toluene	1J	Dry	--	--	--	2000*	2000	200
Ethylbenzene	3J	Dry	--	--	--	700*	680	68
Styrene	1J	Dry	--	--	--	5*	NE	NE
Xylene (total)	26	Dry	--	--	--	10,000*	440	44
Benzene	2J	Dry	--	--	--	5	5	0.5

J - Identified below method detection limit. Value is estimated concentration

B - Identified in method blank

- - Not Detected

\* - Proposed Value

MCL - Maximum Contaminant Level

KAL - Kansas Action Level

KNL - Kansas Notification Level

Note: All other HSL Volatile Organic Compounds were not detected in any groundwater samples.

A0283

(Source: Howard Ryser, Allco Chemical Corp., April 13, 1990)

TABLE 3-1  
NOVEMBER 1989 ORGANIC ANALYTICAL RESULTS - GROUNDWATER  
ALLCO CHEMICAL CORPORATION

Cust ID:	AL-RW02-02	AL-RW03-02	AL-RW04-02	AL-RW06-02	AL-RW03-TB	VBLK
Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Methylene Chloride	U	4 JB	230 JB	1800 JB	2 JB	2 J
Acetone	16,000 B	3 JB	2300 B	3800 JB	U	13
1,1-Dichloroethene	U	U	U	U	U	U
Chloroform	U	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U
2-Butanone	U	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U	U
Trichloroethene	U	U	U	U	U	U
Benzene	U	U	U	U	U	U
Tetrachloroethene	U	U	U	U	U	U
Toluene	U	U	U	U	U	U
Chlorobenzene	U	U	U	U	U	U
Ethylbenzene	U	U	U	U	U	U
Xylene	130,000	32	140,000	100,000	U	U

Cust ID:	AL-GW1D-02	AL-GW1D-FB2	AL-GW3D-02	AL-GW4S-02	AL-GW4D-02	AL-GWPW-02	VBLK	VBLK BS
Matrix:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Methylene Chloride	6 B	6 B	6 B	U	2 JB	6 B	9	9 B
Acetone	U	6 J	U	5 JB	30 B	U	U	9 J
1,1-Dichloroethene	U	U	U	U	U	U	U	U
Chloroform	10	U	U	U	4 J	U	U	U
1,2-Dichloroethane	U	U	U	U	U	23	U	U
2-Butanone	U	4 JB	U	U	U	U	4 J	U
Carbon Tetrachloride	110	U	U	U	5	U	U	U
Trichloroethene	U	U	U	U	U	U	U	U
Benzene	U	U	5	U	U	U	U	U
Tetrachloroethene	12	U	U	U	17	U	U	U
Toluene	U	U	U	U	U	U	U	U
Chlorobenzene	U	U	U	U	U	U	U	U
Ethylbenzene	U	U	4 J	U	U	U	U	U
Xylene	U	U	460	U	U	U	U	U

Cust ID:	AL-GW7S-02	AL-GW7S-02DP	AL-GW7D-02	VBLK BS	VBLK	VBLK	VBLK BS
Matrix:	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Methylene Chloride	7 B	6 B	U	5 B	U	U	3 J
Acetone	18	U	U	6 JB	6 J	U	U
1,1-Dichloroethene	U	U	U	U	U	U	U
Chloroform	49	46	130	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	U
2-Butanone	5 JB	U	U	U	U	U	10 B
Carbon Tetrachloride	U	U	U	U	U	U	U
Trichloroethene	61	58	130	U	U	U	U
Benzene	U	U	U	U	U	U	U
Tetrachloroethene	U	U	U	U	U	U	U
Toluene	U	U	U	U	U	U	U
Chlorobenzene	U	U	U	U	U	U	U
Ethylbenzene	U	U	U	U	U	U	U
Xylene	U	U	U	U	U	U	U

VBLK - laboratory blank  
PW - production well

FB - field blank  
DP - duplicate

U - below detection limit  
B - detected in blank  
J - estimated value

(Source: Howard Ryser, Allco Chemical Corp., April 13, 1990)

## **ATTACHMENT 4**

**Lithologic Logs for Monitoring Wells at Allco Chemical Corporation  
(Former GOCC-Jayhawk Plant)**

**(Source: Howard Ryser, Allco Chemical Corporation, April 3, 1990)**

GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.		
				ALLCO CHEMICAL CORP., GALENA, KS				1 of 2	MW1D		
START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH					
3/28/89	4/1/89	Mathes	HSA/CORE	6.25"/4"	2"	44.50'					
LOGGER		TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED							
R. BENNETT				15.30'/'							
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFCATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
										TOPSOIL	
1	SS	15	.5 .5 1 1							Med. Gray SILT; little fine Sand; some root structures; abundant red staining; moist.	OVA=0
2	SS	8	2 3 4 5		5					Med. Gray, SILT; trace of fine Sand; trace of root structures; abundant root staining; dry.	OVA=0
3	SS	12	1 3 4 7							Same as above; some 1/16" to 1/4" red concretions (unknown origin); dry, very tight.	OVA=0
4	SS	8	3 5 7 8		10					Same as above; trace of white deposits (silt character); increase in sand fraction.	OVA=0
5	SS	18	5 19 28 19							Med. Gray, GRAVEL, fine to coarse, well rounded to angular; and Silt; little Sand, fine to medium, subrounded; trace of coarse Sand; abundant red staining; dry.	OVA=0
6	SS	7	8 11 10 13		15					Gray Green, Same as above, decrease in silt content; dry.	OVA=0
7	SS	8	50							Med. Gray, Bedrock, Limestone or Dolomite.	OVA=0
8	C	30	-		20					Heavily fractured, chalky LIMESTONE with some chert. No pieces over 4" in length. Abundant horizontal and some vertical fractures. Commonly filled with clays. Major fracture at 19.3 to 20.5 feet, filled with glauconitic clay; loss of circulation. Below 20.5 feet, solution weathering and vuggy. Evidence of water transmission.	Run 1, RQD=0%
9	C	12								Heavily fractured and weathered mixture of LIMESTONE fragments and glauconitic clay.	Run 2, RQD=0%
10	C	30								Fractured cherty LIMESTONE to 25 feet. Most pieces at approximately 4". Abundant horizontal fractures filled with clay and broken rock. Some horizontal fractures well connected. Fracture surfaces showing solutioning with lack of angular surface.	Run 3, RQD=41%
11	C	18			25					Chalky LIMESTONE. Pieces from 3" to 6". Abundant horizontal fracture and solutioning. Becomes vuggy at 26.5'. Fractures filled with clays. Vugs appear open.	

\*ASTM D1586

SS = SPLIT SPOON

D = DENNISON

ST = SHELBY TUBE

C = CORE

CT = CUTTINGS

CS = CONTINUOUS SAMPLER

OT = OTHER

ALLCO CHEMICAL CORP.

GALENA, KS

PAGE NO.

1 of 2

HOLE NO.

MW1D



## GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION

ALLCO CHEMICAL CORP., GALENA, KS

PAGE NO.

2 of 2

HOLE NO.

MW1D

DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
0					Chalky LIMESTONE with trace of Chert. Pieces generally larger than 4". Most breaks are horizontal due to drilling. Small solution fractures are vertical but mineralized and conductive. Trace of fossils.	
30					Chalky LIMESTONE same as above to 35'.	Run 4, RQD=92%
35					Cherty LIMESTONE with angular fractures. Fracturing partially filled with glauconitic Clay. Limestone and Chert has some brecciated zones.	
36.5					Chalky LIMESTONE from 36.5' to 37'. Limestone has abundant small solution channels (open voids).	
40					Cherty LIMESTONE, heavily brecciated, very vuggy (open voids), some pyrite mineralization observed in voids; some red staining in vugs. From 40' to 44' are large, near-vertical, fractures, some red staining and mineralization.	
44.5					Cherty LIMESTONE, same as above.	Run 5, RQD=89%
					End of Boring at 44.5 feet.	

STM 01586

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ALLCO CHEMICAL CORP.  
GALENA, KS

PAGE NO.

2 of 2

HOLE NO.

MW1D

<b>GEOLOGIC DRILL LOG</b>		PROJECT NAME AND LOCATION <b>ALLCO CHEMICAL CORP., GALENA, KS</b>				PAGE NO. <b>1 of 2</b>	HOLE NO. <b>MW2D</b>
		FINISH <b>8/89 3/29/89</b>	DRILLER <b>MATHES</b>	DRILL METHOD <b>HSA/CORE</b>	BOREHOLE DIAMETER <b>6.25"/4"</b>	WELL DIAMETER <b>2"</b>	TOTAL DEPTH <b>44.50'</b>
ER <b>BENNETT</b>		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <b>'/'</b>	

SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
SS	12	3							TOPSOIL	OVA=0
		3							Med. Gray, SILT; and Gravel; white Chert(?); angular; abundant red staining; dry; FILL.	
SS	14	2							Med. Gray, SILT; some Sand, fine; trace med. Sand, subrounded; abundant red and black staining; little root structures; dry; native material.	OVA=0
		3								
		5							Same as above, but no black staining observed; tip of sampler contains red, fine Sand; dry.	OVA=0
SS	14	1								
		3								
		4								
		9								
SS	8	8							Med. Gray, SAND, fine to medium, subrounded; little silt; abundant red staining, little black staining; moist.	OVA=0
		6								
		7								
		7								
SS	18	3							Same as above; trace coarse Sand, well rounded; and Gravel, fine to medium, subangular to well rounded; dry.	OVA=0
		10								
		15								
		17								
SS	14	10							Med. Gray, BEDROCK; Limestone, or Dolomite. Contact at 13.5'. Initial 0.5' is weathered.	OVA=0
		44								
		45								
		42								
C	12								Heavily fractured cherty LIMESTONE, abundant solution channels partially filled with clay. Fractures orientated both vertically and horizontally. Some orange staining.	Run 1, RQD=33%
C	12								19' to 21': Large horizontal fracture filled with glauconitic clay. Loss of circulation.	
C	12								Moderately fractured cherty LIMESTONE; Fracturing horizontally orientated with glauconitic clay observed in fractures. Large horizontal fracture observed at 22.5'	
C	12								Large horizontal fracture with dissolution features on fracture walls.	
									Large fracture from 25' to 26', partially filled with glauconitic clay.	
C	12									

\*ASTM D1586  
SS = SPLIT SPOON

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C = CORE  
CT = CUTTINGS  
CS = CONTINUOUS SAMPLER  
OT = OTHER

ALLCO CHEMICAL CORP.  
GALENA, KS

PAGE NO.  
**1 of 2**

HOLE NO.  
**MW2D**

DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					Fracturing increases below 27'. Largest fragment is 3". Presence of glauconitic clay increases.	Run 2, RQD=9%
13					Heavily fractured cherty LIMESTONE; Fractures are vertically and horizontally orientated, Some black colored glauconitic clay observed. Average core fragments is 3".	
14					Fracturing increases. Decrease in recovery to 1' for 2.5' core.	Run 3, RQD=62%
15					Chalky LIMESTONE with some chert. Some horizontal fractures showing evidence of water transmission. Some brecciated character with void spaces filled with precipitates or glauconitic clay. No solution channels observed.	
16					Same as above to 37.5'.	
7					Heavily fractured (vertically and horizontally) cherty LIMESTONE; abundant evidence of water transmission, strong pocky texture to limestone surface. Partial filling of fractures with glauconitic clay. Trace of orange staining.	Run 4, RQD=15%
18						Triconed from 41.5' to 44.5'
					End of Boring at 44.5'.	

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 CT = CUTTINGS  
 CS = CONTINUOUS SAMPLER  
 OT = OTHER

**ALLCO CHEMICAL CORP.**  
**GALENA, KS**

<b>EOLOGIC DRILL LOG</b>		PROJECT NAME AND LOCATION <b>ALLCO CHEMICAL CORP., GALENA, KS</b>		PAGE NO. <b>1 of 2</b>	HOLE NO. <b>MW3D</b>
RT <b>28/89</b>	FINISH <b>4/5/89</b>	DRILLER <b>MATHES</b>	DRILL METHOD <b>HSA/TRICONE</b>	BOREHOLE DIAMETER <b>6.25"/4"</b>	WELL DIAMETER <b>2"</b>
GER		TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <b>'/'</b>	
<b>R. BENNETT</b>					

SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
									<b>TOPSOIL</b>	
1 SS	12	2 7 3 4							Med. Gray, SILT; and Gravel, fine to coarse, subangular to subrounded, abundant red staining; little Sand, medium to coarse, subrounded; some root structures; dry.	OVA=0
2 SS	10	7 3 5 6		5					Med. Gray, SILT; little Gravel, fine, subangular to subrounded; abundant red staining; trace of black staining; dry.	OVA=0
									Same as above; dry.	OVA=0
3 SS	15	1 3 4 5							Med. Gray, SAND, fine to medium, well rounded; some Gravel, fine to medium, subangular to well rounded; trace coarse Sand, subrounded; some black staining; abundant red staining; trace horizontal solution channels.	OVA=0
4 SS	15	2 6 13 36		10					Med. Brown, GRAVEL, fine to coarse, subangular to subrounded; some Sand, fine to coarse, subangular to subrounded; little silt; moist.	OVA=0
5 SS	12	13 15 18 14							Med. Gray, weathered BEDROCK; some Silt.	OVA=0
6 SS	6	7							Med. Gray, LIMESTONE with Chert fragments.	Auger refusal at 14.7'
7 CT				15						
				20						
									Med. Brown, SILT; trace Limestone fragments.	
8 CT									Med. Gray, LIMESTONE with Chert.	
9 CT				25					Med. Brown, SILT; some Limestone fragments.	
10 CT										
11 CT										

\*ASTM D1586  
 SS = SPLIT SPOON  
 D = DENNISON  
 ST = SHELBY TUBE  
 C = CORE  
 CT = CUTTINGS  
 CS = CONTINUOUS SAMPLER  
 OT = OTHER

**ALLCO CHEMICAL CORP.  
GALENA, KS**

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**1 of 2**

HOLE NO.  
**MW3D**

## GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION

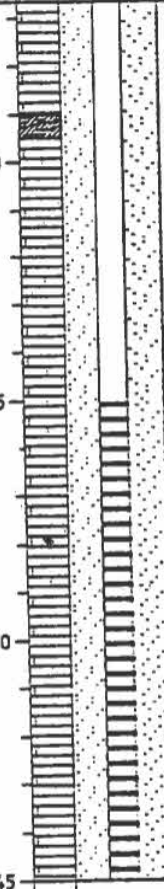
ALLCO CHEMICAL CORP., GALENA, KS

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HOLE NO.

MW3D

SAMPLE TYPE		RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION SAMPLE INTERVAL	DESCRIPTION	NOTES
CT					30				Light Gray, LIMESTONE.	
									Med. Brown, SILT.	
									Light Gray, LIMESTONE.	
					35					
					40				Med. Gray, LIMESTONE with Chert.	
15 CT					45				End of Boring at 45'.	

ASTM D1586  
SS = SPLIT SPOON  
D = DENNISON

ST = SHELBY TUBE  
C = CORE  
CT = CUTTINGS

CS = CONTINUOUS SAMPLER  
QT = OTHER

ALLCO CHEMICAL CORP.  
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HOLE NO.  
MW3D

ASTM D1586

SS = SPLIT SPOON  
2 = DENNISON

ST = SHELBY TUBE

C = CORE

CT = CUTTINGS

CS = CONTINUOUS SAMPLER

OT = OTHER

ALLCO CHEMICAL CORP.  
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MW3D



GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.
				ALLCO CHEMICAL CORP., GALENA, KS				1 of 2	MW5D
START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH			
4/4/89	4/6/89	MATHES	HSA/TRICONE	6.25"/4"	4"	54.50'			
LOGGER		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED					
R. BENNETT				21.00'/'					

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
										TOPSOIL	
1	SS	12	3 2 4 5							Med. gray, SILT; some Sand, fine; Abundant red staining; dry.	OVA=2
2	SS	10	1 2 3 4		5					Same as above with fine Gravel, subrounded.	OVA=0
3	SS	10	1 3 5 5							Med. gray, SILT; some Sand, fine; little root structures; little solution channels; trace of red staining; dry.	OVA=0
4	SS	8	5 5 6 8		10					Med. gray, SILT; some fine Sand; little Gravel, medium, subrounded; little root structures; some solution channels; abundant red and black staining; dry.	OVA=0
5	SS	8	3 5 8 9							Med. gray, SILT; some Sand, fine; some red and black staining; some solution channels; dry.	OVA=0
6	SS	10	4 6 7 7		15					Med. gray, SAND, fine; some Silt; some red and black staining; moist.	OVA=0.5
7	SS	6	1 4 6 7							Med. gray, SILT; and Gravel, fine to coarse, subrounded to subangular; some Sand, fine to coarse, subrounded; abundant red staining; dry.	OVA=0
8	SS	4	5 7 4 4		20					Med. gray, GRAVEL, fine to coarse, subangular; and Sand, fine to medium, subangular; trace of silt, abundant red staining; dry.	OVA=0
9	SS	2	25/4"							Med. gray, GRAVEL, fine to medium, subangular to subrounded; and Silt; some Sand, fine to coarse, subrounded; some red staining; saturated.	OVA=0
10	CT									Interlayered med. gray LIMESTONE and Chert, with light gray (chalky) Limestone. No Silt beds observed.	Triconed from 21.5 to 54.5'.

*ASTM D1586 SS = SPLIT SPOON D = DENNISON	ST = SHELBY TUBE C = CORE CT = CUTTINGS	CS = CONTINUOUS SAMPLER OT = OTHER
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ALLCO CHEMICAL CORP. GALENA, KS		PAGE NO. 1 of 2	HOLE NO. MW5D
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# GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION

ALLCO CHEMICAL CORP., GALENA, KS

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SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	EL. (ft)	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
11 CT				30					Light gray, LIMESTONE, (Chalky).	
12 CT				35					Med. gray, LIMESTONE with Chert.	
13 CT				40					Light gray, LIMESTONE with Chert.	
14 CT				45					Med. Gray, LIMESTONE with Chert.	
15 CT				50					Dark gray, LIMESTONE with Chert.	
									End of Boring at 54.5	

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**ALLCO CHEMICAL CORP.**  
**GALENA, KS**

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HOLE NO.  
MW5D

<b>GEOLOGIC DRILL LOG</b>		PROJECT NAME AND LOCATION <b>ALLCO CHEMICAL CORP., GALENA, KS</b>			PAGE NO. <b>1 of 2</b>	HOLE NO. <b>MW6D</b>
DATE <b>4/4/89</b>	FINISH <b>4/9/89</b>	DRILLER <b>MATHES</b>	DRILL METHOD <b>HSA/CORE</b>	BOREHOLE DIAMETER <b>6.25"/4"</b>	WELL DIAMETER <b>2"</b>	TOTAL DEPTH <b>50.50'</b>
GGER <b>R. BENNETT</b>		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <b>'/'</b>		

DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					<b>TOPSOIL</b>	
1	SS	12	2	2	Dark gray, SILT; trace of Sand, fine; trace of gravel, fine, subrounded; trace of root fibers; abundant red staining; moist.	OVA=0
2	SS	16	2	3	Same as above; moist.	OVA=0
3	SS	14	2	3	Med. gray, SILT; trace of fine Sand; some solution channels; abundant red staining; dry.	OVA=0
4	SS	12	3	5	Same as above with some black staining; dry.	OVA=0
5	SS	12	2	6	Med. gray, SILT; some Gravel, fine to coarse, subrounded to subangular; little Sand, fine; abundant red and black staining; moist. Also, interlayered 1" lenses of Sand, fine to medium, subrounded; wet; abundant red staining.	OVA=1 in sand lenses.
6	SS	12	5	18	Same as above to 14'; Contact with weathered Cherty LIMESTONE; dry.	OVA=2 units above L.S.
7	C	59			Heavily fractured Cherty LIMESTONE, abundant solution channels partially filled with glauconitic clay; trace of fossils. Large fracture filled with glauconitic clay to 20'; Loss of circulation.	Core Run 1, RQD=0%
8	C	96			Same as above.	Triconed from 23 to 30 feet.
					Large fracture filled with glauconitic clay to 26.5'	

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OT = OTHER

**ALLCO CHEMICAL CORP.  
GALENA, KS**

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HOLE NO.  
**MW6D**

## GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION

ALLCO CHEMICAL CORP., GALENA, KS

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2 of 2

HOLE NO.

MW6D

DATE	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					30					Lt. gray, Chalky LIMESTONE.	
9	C	96								Chalky LIMESTONE; Horizontal and vertical fractures partially filled with glauconitic clay; some orange staining.	Core Run 2, RQD=85%
					35					Increase in solution channels. Vuggy feature showing evidence of water transmission.	
10	C	42								Same as above to 38.5'; Below is heavily fractured Cherty LIMESTONE; Brecciated character partially filled with precipitates and glauconitic clay; abundant vug development showing evidence of water transmission; some orange staining; trace of fossils.	Core Run 3, RQD=44%
					40					Decrease in brecciated character.	
11	C	96								Cherty LIMESTONE with some vuggy texture; some horizontal fractures partially filled with glauconitic clay; trace of fossils.	Core Run 4, RQD=79%
					45					Stiolites observed to 50.5'. Cherty LIMESTONE is very competent, only trace of fractures observed.	
					50					End of Boring at 50.5'.	

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OT = OTHER

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GALENA, KS

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MW6D

<b>GEOLOGIC DRILL LOG</b>		PROJECT NAME AND LOCATION <b>ALLCO CHEMICAL CORP., GALENA, KS</b>			PAGE NO. <b>1 of 2</b>	HOLE NO. <b>MW7D</b>
START DATE <b>3/3/89</b>	FINISH DATE <b>4/5/89</b>	DRILLER <b>MATHES</b>	DRILL METHOD <b>HSA/TRICONE</b>	BOREHOLE DIAMETER <b>6.25"/4"</b>	WELL DIAMETER <b>2"</b>	TOTAL DEPTH <b>46.50'</b>
DRILLER <b>R. BENNETT</b>		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <b>'/'</b>		

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
										<b>TOPSOIL</b>	
1	SS	18	1 1 4 6							Med. brown SILT; some Clay; trace of Sand, medium, well rounded; some root fibers; some red staining; dry.	OVA=0
2	SS	20	2 2 3 5		5					Med. gray, SILT; and Sand, fine; trace of Gravel, fine, well rounded; trace of Sand, coarse; abundant red staining. 6" lens of fine Sand, med. gray; trace of red staining; dry.	OVA=0
3	SS	12	3 3 5 5							Med. gray, SILT; and Sand, fine; little coarse Sand to fine Gravel, subrounded; some solution channels and fractures; abundant red staining; dry.	OVA=0
4	SS	18	5 7 14 14		10					Same as above to 9.5'	OVA=0
5	SS	14	5 26 40 29							Red brown, GRAVEL, fine to coarse, subangular to well rounded; and Silt; little Sand, medium to coarse, subrounded; abundant red staining; dry. Same as above, tip contains Chert fragments.	OVA=0 Contact with Bedrock at 13.5 feet.
6	SS	4	15 50/6"		15					<b>BEDROCK; Limestone and Chert.</b>	OVA=0
7	C									Med. gray, Limestone with Chert.	Triconed from 16.5 to 46.5'.
8	C									Med. Brown, SILT; some Limestone and Chert fragments.	
9	C									Med. gray, LIMESTONE.	
10	C				25					Med. brown, SILT; little Limestone and Chert fragments. Lt. gray, LIMESTONE.	Chalky in character.

\*ASTM D1586  
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D = DENNISON  
ST = SHELBY TUBE  
C = CORE  
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OT = OTHER

**ALLCO CHEMICAL CORP.  
GALENA, KS**

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HOLE NO.  
**MW7D**

# GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION

ALLCO CHEMICAL CORP., GALENA, KS

PAGE NO.

2 of 2

HOLE NO.

MW7D

WELL	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
11	C				30					Med. gray, LIMESTONE with Chert.	
12	C				35					Interlayering of light gray Limestone and Med. gray Limestone with Chert; Some Silt nodules observed.	
					40						
					45						
										End of Boring at 46.5'.	

\*ASTM D1586

SS = SPLIT SPOON  
D = DENNISON

ST = SHELBY TUBE

C = CORE

CT = CUTTINGS

CS = CONTINUOUS SAMPLER

OT = OTHER

ALLCO CHEMICAL CORP.  
GALENA, KS

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HOLE NO.

MW7D



<b>GEOLOGIC DRILL LOG</b>		PROJECT NAME AND LOCATION <b>ALLCO CHEMICAL CORP., GALENA, KS</b>			PAGE NO. <b>1 of 1</b>	HOLE NO. <b>MW4S</b>
ART <b>1/4/89</b>	FINISH <b>4/4/89</b>	DRILLER <b>MATHES</b>	DRILL METHOD <b>HSA</b>	BOREHOLE DIAMETER <b>6.25"</b>	WELL DIAMETER <b>2"</b>	TOTAL DEPTH <b>13.50'</b>
LOGGER <b>R. BENNETT</b>		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <b>8.50'/'</b>		

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
										<b>FILL</b>	
1	SS	0	1 2 3 5							No Recovery.	
2	SS	8	1 2 3 5		5					Med gray, SILT; and Gravel, fine to coarse, subangular; some Sand, fine to medium, subrounded; some slag fragments; dry; Tip of sampler with medium Sand with black oily liquid; Abundant red staining; FILL.	OVA=0
3	SS	10	4 8 34 50							Med. gray, Same as above with black staining. Tip contains Gravel, medium to coarse, angular; dry; NATIVE MATERIAL.	OVA=0
4	SS	10	17 15 13 8		10					Med. gray, GRAVEL, fine to coarse, subrounded to angular; and Silt; some Sand, fine to medium, subrounded to angular, abundant red and black staining; saturated.	OVA=0
5	SS	8	25 34 48 25/1'							Med: gray, GRAVEL, fine to coarse, subangular; some Silt; little Sand, fine to medium, subrounded; Abundant red staining; dry.	OVA=0, Gravel is weathered limestone fragments.
										End of Boring at 13.5'.	

\*ASTM D1586  
 SS = SPLIT SPOON  
 D = DENNISON  
 ST = SHELBY TUBE  
 C = CORE  
 CT = CUTTINGS  
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**ALLCO CHEMICAL CORP.  
GALENA, KS**

PAGE NO.  
**1 of 1**

HOLE NO.  
**MW4S**

## **ATTACHMENT 5**

**Water Level Measurements in Monitoring Wells at Allco Chemical  
Corporation  
(Former GOCC-Jayhawk Plant)**

TABLE 3-1  
WATER LEVEL MEASUREMENTS  
ALLCO CHEMICAL CORP.

WELL	WELL ELEVATION METERS	WELL ELEVATION FEET	WATER LEVEL METERS	WATER LEVEL FEET	WATER ELEVATION METERS	WATER ELEVATION FEET
MW-1S	261.59	858.22	3.48	11.42	258.10	846.8
MW-1D	261.59	858.23	4.12	13.51	257.47	844.72
MW-2S	262.06	859.77	2.58	8.48	259.47	851.29
MW-2D	261.96	859.46	2.56	8.41	259.40	851.05
MW-3S	261.31	857.33	2.75	9.02	258.56	848.31
MW-3D	261.18	856.88	2.14	7.03	259.03	849.85
MW-4S	260.32	854.07	3.94	12.93	256.38	841.14
MW-5S	264.63	868.2	3.33	10.92	261.30	857.28
MW-5D	261.95	859.41	3.07	10.06	258.88	849.35
MW-6S	262.64	861.68	2.91	9.56	259.73	852.12
MW-6D	262.50	861.22	3.10	10.16	259.40	851.06
MW-7S	262.24	860.36	2.24	7.35	260.00	853.01
MW-7D	262.12	859.96	2.36	7.75	259.75	852.21

(Source: Howard Ryser, Allco Chemical Corp., April 1990)

Water Level Measurements  
in  
Allco Chemical Corp. Monitoring Wells  
by  
KDHE Personnel, April 5, 1990  
for  
Preliminary Assessment of the Former GOCC-Jayhawk Plant

<u>Well</u>	<u>Water Level*</u>
1 S	11.25
1 D	13.70
2 S	8.15
2 D	8.05
3 S	5.76
3 D	6.75
4 S	7.80
4 D	6.58
5 S	10.20
5 D	9.40
6 S	8.70
6 D	9.50
7 S	6.16
7 D	6.67

Source: KDHE Field Notes, 1990

\* In feet below top of casing

## **ATTACHMENT 6**

**EPA Preliminary Assessment Form 2070-12**



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

IDENTIFICATION

01 STATE 02 SITE NUMBER  
KS D007167869

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site) Gulf Oil Chemical Company-Jayhawk Plant (former)		02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER 3½ miles south and 1½ mile east of Crestline, Ks.				
03 CITY Crestline	04 STATE Ks	05 ZIP CODE	06 COUNTY Cherokee		07 COUNTY CODE 011	08 CONG DIST
09 COORDINATES LATITUDE 37° 06' 43.0"N		LONGITUDE 094° 40' 24.0"W				
10 DIRECTIONS TO SITE (Starting from nearest public road) 1½ mile east of Alternate Highway 69 on Federally-Assisted Secondary (FAS) Highway 2160.						

III. RESPONSIBLE PARTIES

01 OWNER (if known) Thermex Energy Corporation		02 STREET (Business, mailing, residential) P.O. Box G				
03 CITY Riverton	04 STATE Ks	05 ZIP CODE 66770	06 TELEPHONE NUMBER (316) 783-1361		Gary R. Eck	
07 OPERATOR (if known and different from owner)		08 STREET (Business, mailing, residential)				
09 CITY		10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER ( )		
13 TYPE OF OWNERSHIP (Check one) <input checked="" type="checkbox"/> A. PRIVATE <input type="checkbox"/> B. FEDERAL: _____ (Agency name) <input type="checkbox"/> C. STATE <input type="checkbox"/> D. COUNTY <input type="checkbox"/> E. MUNICIPAL <input type="checkbox"/> F. OTHER: _____ (Specify) <input type="checkbox"/> G. UNKNOWN						
14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply) <input type="checkbox"/> A. RCRA 3001 DATE RECEIVED: ____/____/____ MONTH DAY YEAR <input type="checkbox"/> B. UNCONTROLLED WASTE SITE (RCRA 103 ci) DATE RECEIVED: ____/____/____ MONTH DAY YEAR <input type="checkbox"/> C. NONE						

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION <input checked="" type="checkbox"/> YES DATE 04 / 04 / 90 <input type="checkbox"/> NO MONTH DAY YEAR		BY (Check all that apply) <input type="checkbox"/> A. EPA <input type="checkbox"/> B. EPA CONTRACTOR <input checked="" type="checkbox"/> C. STATE <input type="checkbox"/> D. OTHER CONTRACTOR <input type="checkbox"/> E. LOCAL HEALTH OFFICIAL <input type="checkbox"/> F. OTHER: _____ (Specify) CONTRACTOR NAME(S): _____				
02 SITE STATUS (Check one) <input checked="" type="checkbox"/> A. ACTIVE <input type="checkbox"/> B. INACTIVE <input type="checkbox"/> C. UNKNOWN		03 YEARS OF OPERATION BEGINNING YEAR 1964   1984 ENDING YEAR <input type="checkbox"/> UNKNOWN				
04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED VOCs (o/p-xylene, trichloromethane, trichloroethylene, and benzene) and small quantities of several BNA compounds have been detected in groundwater from the shallow aquifer while only one (1,2-dichloroethane) in groundwater from deep aquifers. Concentrations of VOCs, nitrate and cadmium in groundwater exceeded the EPA maximum contaminant levels. Secondary drinking water standards were exceeded for sulfate, manganese and zinc. PCBs, heavy metals, several BNAs and one VOC (o/p-xylene) were detected in on-site soils.						
05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION Groundwater is used predominantly for public drinking water supplies. Surface water downstream is also used. Therefore, the population could be subject to contaminated drinking water. In addition, contaminated surface water runoff could be harmful to aquatic life in Spring River.						

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents) <input type="checkbox"/> A. HIGH (Inspection required promptly) <input checked="" type="checkbox"/> B. MEDIUM (Inspection required) <input type="checkbox"/> C. LOW (Inspect on time available basis) <input type="checkbox"/> D. NONE (No further action needed, complete current disposition form)			
--	--	--	--

VI. INFORMATION AVAILABLE FROM

01 CONTACT Pamela K. Chaffee	02 OF (Agency, Organization) KDHE/BER		03 TELEPHONE NUMBER (913) 296-0969	
04 PERSON RESPONSIBLE FOR ASSESSMENT Pamela K. Chaffee	05 AGENCY KDHE	06 ORGANIZATION BER	07 TELEPHONE NUMBER (913) 296-0969	08 DATE 08 / 23 / 90 MONTH DAY YEAR





POTENTIAL HAZARDOUS WASTE SITE  
PRELIMINARY ASSESSMENT  
PART 2 - WASTE INFORMATION

I. IDENTIFICATION  
01 STATE 02 SITE NUMBER  
KSD007167869

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	unknown		contaminated groundwater
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	unknown		contaminated groundwater/soil
IOC	INORGANIC CHEMICALS	unknown		contaminated groundwater
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	unknown		contaminated groundwater/Soil

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
OCC	ortho &/or Para Xylene	95-47-6/106-42-3	In Groundwater	140,000	ug/l
SOL	Trichloromethane	67-66-3	In Groundwater	130	ug/l
SOL	Trichloroethylene	79-01-6	In Groundwater	130	ug/l
SOL	1,2-Dichloroethane	107-06-2	In Groundwater	47.9	ug/l
OCC	PCB-1254	1109-76-9	In Soil	44.0	mg/kg
MES	Cadmium	744-04-39	In Groundwater	22	ug/l
MES	Chromium	7440-47-3	In Soil	9.116	ug/kg
MES	Copper	7440-50-8	In Soil	33.92	mg/kg
MES	Lead	7439-92-1	In Soil	852.346	mg/kg
IOC	Sulfate		In Groundwater	555	mg/l
IOC	Nitrate (as N)		In Groundwater	191	mg/l
MES	Manganese	7439-96-5	In Groundwater	6.4	mg/l
SOL	Methylene Chloride	75-09-2	In Groundwater	1,800	ug/l
SOL	Acetone	67-64-1	In Groundwater	16,000	ug/l
SOL	Carbon Tetrachloride	56-23-5	In Groundwater	110	ug/l
SOL	Tetrachloroethene	127-18-4	In Groundwater	17	ug/l

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 (Give specific references, e.g., state files, sample analyses, reports)

KDHE Kansas Health and Environment Laboratory  
Howard Ryser, Allco Chemical Corporation



POTENTIAL HAZARDOUS WASTE SITE  
PRELIMINARY ASSESSMENT

PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE 02 SITE NUMBER

KS D007167869

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION

02 ☒ OBSERVED (DATE: 8/7/85 )

☐ POTENTIAL

☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: \_\_\_\_\_

04 NARRATIVE DESCRIPTION

The VOC 1,2-DCA has been detected in the deep aquifer which is the primary drinking water source within the four-mile radius. Several VOCs were detected in samples collected in April and November 1989 from the shallow water-table aquifer. Samples collected in April 1990 confirmed the VOC contamination in addition to high levels of nitrate, cadmium, sulfate, manganese and zinc.

01 ☒ B. SURFACE WATER CONTAMINATION

02 ☒ OBSERVED (DATE: 4/4/90 )

☐ POTENTIAL

☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: \_\_\_\_\_

04 NARRATIVE DESCRIPTION

Surface water runoff is contaminated with high concentrations of nitrate, cadmium, sulfate, and zinc. Surface water downstream of the site is used for public drinking water supply. Surface water samples collected from Spring River upstream and downstream of the site showed only high concentrations of manganese.

01 ☐ C. CONTAMINATION OF AIR

02 ☐ OBSERVED (DATE: \_\_\_\_\_ )

☐ POTENTIAL

☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: \_\_\_\_\_

04 NARRATIVE DESCRIPTION

None known

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS

02 ☐ OBSERVED (DATE: \_\_\_\_\_ )

☐ POTENTIAL

☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: \_\_\_\_\_

04 NARRATIVE DESCRIPTION

None known

01 ☒ E. DIRECT CONTACT

02 ☐ OBSERVED (DATE: \_\_\_\_\_ )

☒ POTENTIAL

☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: \_\_\_\_\_

04 NARRATIVE DESCRIPTION

The potential exists for direct contact of contaminated, uncontained runoff from the site.

01 ☒ F. CONTAMINATION OF SOIL

02 ☒ OBSERVED (DATE: 4/4/90 )

☐ POTENTIAL

☐ ALLEGED

03 AREA POTENTIALLY AFFECTED: \_\_\_\_\_

04 NARRATIVE DESCRIPTION

Soil contamination by heavy metals at levels greater than background and the PCB-1245 were detected in on-site samples.

01 ☒ G. DRINKING WATER CONTAMINATION

02 ☒ OBSERVED (DATE: 8/7/85 )

☐ POTENTIAL

☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: \_\_\_\_\_

04 NARRATIVE DESCRIPTION

The on-site deep water well had previously been used as a public water supply until contamination by the VOC 1,2-DCA was first detected in August 1985.

01 ☒ H. WORKER EXPOSURE/INJURY

02 ☐ OBSERVED (DATE: \_\_\_\_\_ )

☒ POTENTIAL

☐ ALLEGED

03 WORKERS POTENTIALLY AFFECTED: \_\_\_\_\_

04 NARRATIVE DESCRIPTION

The potential for worker exposure to contaminated groundwater may exist since the deep water well is still used for industrial and domestic (non-drinking) purposes. Bottled drinking water, however, is provided at all currently operating facilities.

01 ☒ I. POPULATION EXPOSURE/INJURY

02 ☐ OBSERVED (DATE: \_\_\_\_\_ )

☒ POTENTIAL

☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: \_\_\_\_\_

04 NARRATIVE DESCRIPTION

The potential for human exposure to contaminated surface water runoff exists since discharge to Spring River is, in some cases, above river stage. Because access to the currently operating facilities is restricted, the potential for human exposure is low.



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

I. IDENTIFICATION

01 STATE 02 SITE NUMBER  
KS D007167869

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☒ J. DAMAGE TO FLORA  
04 NARRATIVE DESCRIPTION

02 ☒ OBSERVED (DATE: 4/4/90)

☐ POTENTIAL

☐ ALLEGED

Distressed vegetation was observed in some areas around the former plant site, especially in vicinity of the prilling towers and the former coal storage and handling area.

01 ☒ K. DAMAGE TO FAUNA

02 ☐ OBSERVED (DATE: \_\_\_\_\_)

☒ POTENTIAL

☐ ALLEGED

04 NARRATIVE DESCRIPTION (Include name(s) of species)

Contamination of surface water may result in damage to fauna.

01 ☐ L. CONTAMINATION OF FOOD CHAIN  
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: \_\_\_\_\_)

☐ POTENTIAL

☐ ALLEGED

None observed

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES  
(Spills/runoff/standing liquids/leaking drums)

02 ☒ OBSERVED (DATE: 4/4/90)

☐ POTENTIAL

☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED: \_\_\_\_\_

04 NARRATIVE DESCRIPTION

Seepage was observed from an unlined pond potentially containing wastewater high in nitrate concentration. A surface water discharge observed on-site was reported to be a leaking lateral line.

01 ☒ N. DAMAGE TO OFFSITE PROPERTY  
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: \_\_\_\_\_)

☒ POTENTIAL

☐ ALLEGED

Contaminated surface water runoff from the site may affect downstream drainages.

01 ☒ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs  
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: \_\_\_\_\_)

☐ POTENTIAL

☐ ALLEGED

N/A

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING  
04 NARRATIVE DESCRIPTION

02 ☒ OBSERVED (DATE: 4/4/90)

☐ POTENTIAL

☐ ALLEGED

Some small dumpsites have been reported and observed on-site. Also reports of disposal and burial of cyanide salts by a previous owner.

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

III. TOTAL POPULATION POTENTIALLY AFFECTED: \_\_\_\_\_

IV. COMMENTS

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

KDHE/BoW files

KDHE/BAWM files

KDHE/BER files

KDHE Kansas Health and Environmental Laboratory

Howard Ryser, VP Manufacturing, Allco Chemical Corporation

**ATTACHMENT 7**  
**Laboratory Analyses**

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024190C  
Report Date: 4-13-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: Sample Type: WATER  
Collection Site: FB - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: - - Time: \*\*\*\*

RESULTS OF ANALYSIS

PURGABLE ORGANICS	Concentration (UG/L)	Detection Limit (UG/L)
CHLOROMETHANE	NOT DETECTED	5.0
BROMOMETHANE	NOT DETECTED	1.2
VINYL CHLORIDE	NOT DETECTED	0.8
CHLOROETHANE	NOT DETECTED	3.7
DICHLOROMETHANE	NOT DETECTED	0.9
1,1-DICHLOROETHYLENE	NOT DETECTED	0.6
1,1-DICHLOROETHANE	NOT DETECTED	0.5
TRANS &/OR CIS 1,2-DICHLOROETHYLENE	NOT DETECTED	0.5
TRICHLOROMETHANE (THM)	NOT DETECTED	0.5
1,2-DICHLOROETHANE	NOT DETECTED	0.6
1,1,1-TRICHLOROETHANE	NOT DETECTED	0.7
TETRACHLOROMETHANE	NOT DETECTED	0.7
BROMODICHLOROMETHANE (THM)	NOT DETECTED	0.5
1,2-DICHLOROPROPANE	NOT DETECTED	0.5
TRANS 1,3-DICHLOROPROPENE	NOT DETECTED	0.8
TRICHLOROETHYLENE	NOT DETECTED	0.6
BENZENE	NOT DETECTED	0.5
DIBROMOCHLOROMETHANE (THM)	NOT DETECTED	0.7
CIS 1,3-DICHLOROPROPENE	NOT DETECTED	0.9
1,1,2-TRICHLOROETHANE	NOT DETECTED	0.6
BROMOFORM (THM)	NOT DETECTED	1.5
1,1,2,2-TETRACHLOROETHANE	NOT DETECTED	0.6
TETRACHLOROETHYLENE	NOT DETECTED	1.1
TOLUENE	NOT DETECTED	0.5
CHLOROBENZENE	NOT DETECTED	0.5
ETHYLBENZENE	NOT DETECTED	0.7
META-XYLENE	NOT DETECTED	0.6
ORTHO &/OR PARA-XYLENE	NOT DETECTED	0.6
1,3-DICHLOROBENZENE	NOT DETECTED	1.0
1,2-DICHLOROBENZENE	NOT DETECTED	1.0
1,4-DICHLOROBENZENE	NOT DETECTED	1.0

Analyst: RICHARD L. PIERCE *RP*

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024540C  
Report Date: 5- 1-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENESENE043425E Sample Type: SEDIMENT  
Collection Site: SOIL #1 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1430

RESULTS OF ANALYSIS

PRIORITY POLLUTANT	Concentration (MG/KG)	Detection Limit (MG/KG)
ACID EXTRACTABLES	NOT DETECTED	1.0
ORTHO-CHLOROPHENOL	NOT DETECTED	1.0
2-NITROPHENOL	NOT DETECTED	1.0
PHENOL	NOT DETECTED	1.0
2,4-DIMETHYLPHENOL	NOT DETECTED	1.0
2,4-DICHLOROPHENOL	NOT DETECTED	1.0
2,4,6-TRICHLOROPHENOL	NOT DETECTED	1.0
4-CHLORO-M-CRESOL	NOT DETECTED	1.0
2,4-DINITROPHENOL	NOT DETECTED	25.0
4,6-DINITRO-O-CRESOL	NOT DETECTED	5.0
PENTACHLOROPHENOL	NOT DETECTED	5.0
4-NITROPHENOL	NOT DETECTED	5.0

Note: 2,6-Dichlorophenol if present, is calculated as 2,4-Dichlorophenol.

Comment: THE ABOVE RESULTS AND DETECTION LEVELS ARE ON A DRY WEIGHT BASIS.  
NUMEROUS HYDROCARBONS ARE INDICATED AS PRESENT.

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024250C  
Report Date: 5- 1-90

SAMPLE COLLECTION INFORMATION

HT

Sample Identification Number: NENESENE043425E Sample Type: SEDIMENT  
Collection Site: SOIL #1 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1430

RESULTS OF ANALYSIS

PURGABLE ORGANICS	Concentration (MG/KG)	Detection Limit (MG/KG)
CHLOROMETHANE	NOT DETECTED	5.0
BROMOMETHANE	NOT DETECTED	1.2
VINYL CHLORIDE	NOT DETECTED	0.8
CHLOROETHANE	NOT DETECTED	3.7
DICHLOROMETHANE	NOT DETECTED	0.9
1,1-DICHLOROETHYLENE	NOT DETECTED	0.6
1,1-DICHLOROETHANE	NOT DETECTED	0.5
TRANS &/OR CIS 1,2-DICHLOROETHYLENE	NOT DETECTED	0.5
TRICHLOROMETHANE (THM)	NOT DETECTED	0.5
1,2-DICHLOROETHANE	NOT DETECTED	0.6
1,1,1-TRICHLOROETHANE	NOT DETECTED	0.7
TETRACHLOROMETHANE	NOT DETECTED	0.7
BROMODICHLOROMETHANE (THM)	NOT DETECTED	0.5
1,2-DICHLOROPROPANE	NOT DETECTED	0.5
TRANS 1,3-DICHLOROPROPENE	NOT DETECTED	0.8
TRICHLOROETHYLENE	NOT DETECTED	0.6
BENZENE	NOT DETECTED	0.5
DIBROMOCHLOROMETHANE (THM)	NOT DETECTED	0.7
CIS 1,3-DICHLOROPROPENE	NOT DETECTED	0.9
1,1,2-TRICHLOROETHANE	NOT DETECTED	0.6
BROMOFORM (THM)	NOT DETECTED	1.5
1,1,2,2-TETRACHLOROETHANE	NOT DETECTED	0.6
TETRACHLOROETHYLENE	NOT DETECTED	1.1
TOLUENE	NOT DETECTED	0.5
CHLOROBENZENE	NOT DETECTED	0.5
ETHYLBENZENE	NOT DETECTED	0.7
META-XYLENE	NOT DETECTED	0.6
ORTHO &/OR PARA-XYLENE	1.7	0.6
1,3-DICHLOROBENZENE	NOT DETECTED	1.0
1,2-DICHLOROBENZENE	NOT DETECTED	1.0
1,4-DICHLOROBENZENE	NOT DETECTED	1.0

Comment: ONE UNIDENTIFIED COMPOUND WAS PRESENT.

Analyst: RICHARD L. PIERCE *RP*

Roger H. Carlson, Ph.D., Director

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The accepted holding time for those parameters marked with HT was exercised prior to completion of the analysis. Proper consideration should be given to this fact when interpreting this data.

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024530C  
Report Date: 5- 1-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENESENE043425E Sample Type: SEDIMENT  
Collection Site: SOIL #1 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1430

RESULTS OF ANALYSIS

PRIORITY POLLUTANT BASE NEUTRAL EXTRACTABLES	Concentration (MG/KG)	Detection Limit (MG/KG)
HEXACHLOROETHANE	NOT DETECTED	1.0
BIS(2-CHLOROETHYL) ETHER	NOT DETECTED	1.0
BIS(2-CHLOROISOPROPYL) ETHER	NOT DETECTED	1.0
HEXACHLOROBUTADIENE	NOT DETECTED	1.0
1,2,4-TRICHLOROBENZENE	NOT DETECTED	1.0
NAPHTHALENE	3.4	1.0
BIS(2-CHLOROETHOXY) METHANE	NOT DETECTED	1.0
2-CHLORONAPHTHALENE	NOT DETECTED	1.0
ACENAPHTHYLENE	NOT DETECTED	1.0
ACENAPHTHENE	NOT DETECTED	1.0
DIMETHYL PHTHALATE	NOT DETECTED	1.0
2,6-DINITROTOLUENE	NOT DETECTED	1.0
FLUORENE	NOT DETECTED	1.0
4-CHLOROPHENYL PHENYL ETHER	NOT DETECTED	1.0
2,4-DINITROTOLUENE	NOT DETECTED	1.0
DIETHYL PHTHALATE	NOT DETECTED	1.0
HEXACHLOROBENZENE	NOT DETECTED	1.0
4-BROMOPHENYL PHENYL ETHER	NOT DETECTED	1.0
PHENANTHRENE &/OR ANTHRACENE	5.3	1.0
DI-N-BUTYL PHTHALATE	NOT DETECTED	1.0
FLUORANTHENE	1.8	1.0
PYRENE	1.5	1.0
BUTYL BENZYL PHTHALATE	NOT DETECTED	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	NOT DETECTED	5.0
CHRYSENE &/OR BENZO(A) ANTHRACENE	1.3	1.0
DI-N-OCTYL PHTHALATE	NOT DETECTED	1.0
BENZO(B) &/OR (K) >FLUORANTHENE	NOT DETECTED	1.0
BENZO(A) PYRENE	NOT DETECTED	1.0
INDENO(1,2,3-C,D) PYRENE	NOT DETECTED	2.5
DIBENZO(A,H) ANTHRACENE	NOT DETECTED	2.5
BENZO(G,H,I) PERYLENE	NOT DETECTED	2.5
2-METHYLNAPHTHALENE	8.4	
DIBENZOFURAN	2.2	

Comment: THE ABOVE RESULTS AND DETECTION LEVELS ARE ON A DRY WEIGHT BASIS.  
NUMEROUS HYDROCARBONS ARE INDICATED AS PRESENT.

Analyst: DENNIS L. DOBSON

Qz0

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

PESTICIDE ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024520C  
Report Date: 5-18-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENESENE043425E      Sample Type: SEDIMENT  
Collection Site: SOIL #1 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER      Date: 4-4-90      Time: 1430

RESULTS OF ANALYSIS

PRIORITY POLLUTANT PESTICIDES	Concentration (MG/KG)	Detection Limit (MG/KG)
ALDRIN	NOT DETECTED	0.13
ALPHA BHC	NOT DETECTED	0.13
BETA BHC	NOT DETECTED	0.13
DELTA BHC	NOT DETECTED	0.13
GAMMA BHC	NOT DETECTED	0.13
CHLORDANE	NOT DETECTED	1.0
P,P' DDD	NOT DETECTED	0.21
P,P' DDE	NOT DETECTED	0.10
P,P' DDT	NOT DETECTED	0.55
DIELDRIN	NOT DETECTED	0.30
ENDOSULFAN I	NOT DETECTED	0.10
ENDOSULFAN II	NOT DETECTED	0.10
ENDOSULFAN SULFATE	NOT DETECTED	0.55
ENDRIN	NOT DETECTED	0.55
HEPTACHLOR	NOT DETECTED	0.10
HEPTACHLOR EPOXIDE	NOT DETECTED	0.10
TOXAPHENE	NOT DETECTED	10.
PCB-1016	NOT DETECTED	3.0
PCB-1221	NOT DETECTED	3.0
PCB-1232	NOT DETECTED	3.0
PCB-1242	NOT DETECTED	3.0
PCB-1248	NOT DETECTED	3.0
PCB-1254	NOT DETECTED	3.0
PCB-1260	NOT DETECTED	3.0

Comment: ALL RESULTS AND DET'N LEVELS ARE ON A DRY WT. BASIS.

Analyst: JOHN GOULD *JA*

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
 Kansas Health & Environmental Laboratory  
 Biochemical Analysis Laboratory  
 Bldg. 740, Forbes Field, Topeka, KS 66620-8420  
 (913) 296-1657

RESULTS OF LABORATORY ANALYSES

Report To: PAM CHAFFEE--BER  
 Address:

Lab Number: 1959PT  
 Account Code: BER  
 Matrix: SOIL

Locality: GULF CHEMICAL 03011234 CRESTLINE

Time Collected: 1430

Collected By: CHAFFEE/COOPER

Depth Collected: 1

Sample ID: NENESENE043425E

Date Collected: 4- 4-90

Date Received: 4- 9-90

Date Reported: 4-24-90

Comments: SOIL #1  
 ACID LEACH; ANALYSIS COMPLETE

\* \* \* \* \*

Results expressed in Milligrams/Kilogram

Total Hard.	NA	pH	NA	Iron	4033.55
(CaCO3)		Turbidity	NA	Manganese	1359.68
Calcium	30761.9	Specific Cond.	NA	Arsenic	4.057
Magnesium	2832.3	T. Dissolved Solids	NA	Barium	23.55
Sodium	389.6	Total Phosphorus (P)	NA	Cadmium	1.848
Potassium	55.6	Silica (SiO2)	1953.3	Chromium	28.655
		Boron	ND	Copper	27.74
Total Alk. *	NA	Dissolved Oxygen	NA	Lead	54.572
(CaCO3)		BOD	NA	Mercury	0.1400
Chloride	NA	COD	NA	Selenium	ND
Sulfate	NA	Ammonia (N)	NA	Silver	ND
Nitrate (N)	NA	T. Sus. Solids	NA	Zinc	419.61
Fluoride	NA			Aluminum	666.76
				Beryllium	0.18
Cyanides	NA	Carbonate Hardness	NA	Nickel	7.79
Oil/Grease	NA	Non-Carbonate Hard.	NA	Antimony	ND
Phenols	NA	NaHCO3 Alkalinity	NA	Thallium	ND
TDP	NA	MBAS	NA		
Sulfide	NA	Flash Point	NA		

Chemist: FD

NA - Not Analyzed

ND - Not Detected

\* \* \* \* \*

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024570C  
Report Date: 5- 1-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: SESWSWNE043425E Sample Type: SOIL  
Collection Site: SOIL #2 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1520

RESULTS OF ANALYSIS

PRIORITY POLLUTANT	Concentration (MG/KG)	Detection Limit (MG/KG)
ACID EXTRACTABLES		
ORTHO-CHLOROPHENOL	NOT DETECTED	1.3
2-NITROPHENOL	NOT DETECTED	1.3
PHENOL	NOT DETECTED	1.3
2,4-DIMETHYLPHENOL	NOT DETECTED	1.3
2,4-DICHLOROPHENOL	NOT DETECTED	1.3
2,4,6-TRICHLOROPHENOL	NOT DETECTED	1.3
4-CHLORO-M-CRESOL	NOT DETECTED	1.3
2,4-DINITROPHENOL	NOT DETECTED	1.3
4,6-DINITRO-O-CRESOL	NOT DETECTED	32.4
PENTACHLOROPHENOL	NOT DETECTED	6.5
4-NITROPHENOL	NOT DETECTED	6.5

Note: 2,6-Dichlorophenol if present, is calculated as 2,4-Dichlorophenol.

Comment: THE ABOVE RESULTS AND DETECTION LEVELS ARE ON A DRY WEIGHT BASIS.  
NUMEROUS HYDROCARBONS ARE INDICATED AS PRESENT.

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024260C  
Report Date: 5- 1-90

SAMPLE COLLECTION INFORMATION

HT

Sample Identification Number: SESWSWNE043425E Sample Type: SOIL  
Collection Site: SOIL #2 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1520

RESULTS OF ANALYSIS

PURGABLE ORGANICS	Concentration (MG/KG)	Detection Limit (MG/KG)
CHLOROMETHANE	NOT DETECTED	5.0
BROMOMETHANE	NOT DETECTED	1.2
VINYL CHLORIDE	NOT DETECTED	0.8
CHLOROETHANE	NOT DETECTED	3.7
DICHLOROMETHANE	NOT DETECTED	0.9
1,1-DICHLOROETHYLENE	NOT DETECTED	0.6
1,1-DICHLOROETHANE	NOT DETECTED	0.5
TRANS &/OR CIS 1,2-DICHLOROETHYLENE	NOT DETECTED	0.5
TRICHLOROMETHANE (THM)	NOT DETECTED	0.5
1,2-DICHLOROETHANE	NOT DETECTED	0.6
1,1,1-TRICHLOROETHANE	NOT DETECTED	0.7
TETRACHLOROMETHANE	NOT DETECTED	0.7
BROMODICHLOROMETHANE (THM)	NOT DETECTED	0.5
1,2-DICHLOROPROPANE	NOT DETECTED	0.5
TRANS 1,3-DICHLOROPROPENE	NOT DETECTED	0.8
TRICHLOROETHYLENE	NOT DETECTED	0.6
BENZENE	NOT DETECTED	0.5
DIBROMOCHLOROMETHANE (THM)	NOT DETECTED	0.7
CIS 1,3-DICHLOROPROPENE	NOT DETECTED	0.9
1,1,2-TRICHLOROETHANE	NOT DETECTED	0.6
BROMOFORM (THM)	NOT DETECTED	1.5
1,1,2,2-TETRACHLOROETHANE	NOT DETECTED	0.6
TETRACHLOROETHYLENE	NOT DETECTED	1.1
TOLUENE	NOT DETECTED	0.5
CHLOROBENZENE	NOT DETECTED	0.5
ETHYLBENZENE	NOT DETECTED	0.7
META-XYLENE	NOT DETECTED	0.6
ORTHO &/OR PARA-XYLENE	NOT DETECTED	0.6
1,3-DICHLOROBENZENE	NOT DETECTED	1.0
1,2-DICHLOROBENZENE	NOT DETECTED	1.0
1,4-DICHLOROBENZENE	NOT DETECTED	1.0

Analyst: RICHARD L. PIERCE *ALP*

Roger H. Carlson, Ph.D., Director

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The suggested holding time for these percentages marked with HT was 120 minutes prior to conversion of the acid. Proper consideration should be given to this fact when interpreting this data.

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024560C  
Report Date: 5- 1-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: SESWSWNE043425E Sample Type: SOIL  
Collection Site: SOIL #2 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1520

RESULTS OF ANALYSIS

PRIORITY POLLUTANT BASE NEUTRAL EXTRACTABLES	Concentration (MG/KG)	Detection Limit (MG/KG)
HEXACHLOROETHANE	NOT DETECTED	1.3
BIS(2-CHLOROETHYL)ETHER	NOT DETECTED	1.3
BIS(2-CHLOROISOPROPYL)ETHER	NOT DETECTED	1.3
HEXACHLOROBUTADIENE	NOT DETECTED	1.3
1,2,4-TRICHLOROBENZENE	NOT DETECTED	1.3
NAPHTHALENE	NOT DETECTED	1.3
BIS(2-CHLOROETHOXY)METHANE	NOT DETECTED	1.3
2-CHLORONAPHTHALENE	NOT DETECTED	1.3
ACENAPHTHYLENE	NOT DETECTED	1.3
ACENAPHTHENE	NOT DETECTED	1.3
DIMETHYL PHTHALATE	NOT DETECTED	1.3
2,6-DINITROTOLUENE	NOT DETECTED	1.3
FLUORENE	NOT DETECTED	1.3
4-CHLOROPHENYL PHENYL ETHER	NOT DETECTED	1.3
2,4-DINITROTOLUENE	NOT DETECTED	1.3
DIETHYL PHTHALATE	NOT DETECTED	1.3
HEXACHLOROBENZENE	NOT DETECTED	1.3
4-BROMOPHENYL PHENYL ETHER	NOT DETECTED	1.3
PHENANTHRENE &/OR ANTHRACENE	3.4	1.3
DI-N-BUTYL PHTHALATE	NOT DETECTED	1.3
FLUORANTHENE	3.0	1.3
PYRENE	2.4	1.3
BUTYL BENZYL PHTHALATE	NOT DETECTED	1.3
BIS(2-ETHYLHEXYL) PHTHALATE	NOT DETECTED	6.5
CHRYSENE &/OR BENZO(A)ANTHRACENE	2.9	1.3
DI-N-OCTYL PHTHALATE	NOT DETECTED	6.5
BENZO(B) &/OR (K) >FLUORANTHENE	3.4	1.3
BENZO(A)PYRENE	NOT DETECTED	1.3
INDENO(1,2,3-C,D)PYRENE	1.6	3.3
DIBENZO(A,H)ANTHRACENE	NOT DETECTED	3.3
BENZO(G,H,I)PERYLENE	1.9	3.3

Comment: THE ABOVE RESULTS AND DETECTION LEVELS ARE ON A DRY WEIGHT BASIS.  
NUMEROUS HYDROCARBONS ARE INDICATED AS PRESENT.

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

PESTICIDE ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024550C  
Report Date: 5-22-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: SESWSWNE043425E Sample Type: SOIL  
Collection Site: SOIL #2 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4-4-90 Time: 1520

RESULTS OF ANALYSIS

PRIORITY POLLUTANT PESTICIDES	Concentration (MG/KG)	Detection Limit (MG/KG)
ALDRIN	NOT DETECTED	0.50
ALPHA BHC	NOT DETECTED	0.20
BETA BHC	NOT DETECTED	0.20
DELTA BHC	NOT DETECTED	0.20
GAMMA BHC	NOT DETECTED	0.20
CHLORDANE	NOT DETECTED	0.20
P,P' DDD	NOT DETECTED	4.0
P,P' DDE	NOT DETECTED	0.80
P,P' DDT	NOT DETECTED	0.40
DIELDRIN	NOT DETECTED	2.0
ENDOSULFAN I	NOT DETECTED	1.0
ENDOSULFAN II	NOT DETECTED	0.40
ENDOSULFAN SULFATE	NOT DETECTED	0.40
ENDRIN	NOT DETECTED	0.50
HEPTACHLOR	NOT DETECTED	4.0
HEPTACHLOR EPOXIDE	NOT DETECTED	0.10
TOXAPHENE	NOT DETECTED	0.40
PCB-1016	NOT DETECTED	40.
PCB-1221	NOT DETECTED	13.
PCB-1232	NOT DETECTED	2.5
PCB-1242	NOT DETECTED	13.
PCB-1248	NOT DETECTED	13.
PCB-1254	NOT DETECTED	13.
PCB-1260	NOT DETECTED	13.

Comment: ALL AND DET'N LEVELS ARE ON A DRY WT. BASIS.

Analyst: JOHN GOULD *JK*

Roger H. Carlson, Ph.D., Director

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 Kansas Health & Environmental Laboratory  
 Biochemical Analysis Laboratory  
 Bldg. 740, Forbes Field, Topeka, KS 66620-8420  
 (913) 296-1657

RESULTS OF LABORATORY ANALYSES

Report To: PAM CHAFFEE, BER.  
 Address:

Lab Number: 2154PT  
 Account Code: BER  
 Matrix: SOIL

Locality: SOIL #2 GULF CHEMICAL 03011234 CRESTLINE Time Collected: 1520

Collected By: CHAFFEE/COOPER

Depth Collected: \*\*\*\*

Sample ID: SESWSWNE043425E

Date Collected: 4- 4-90

Comments: EP TOXICITY ON 1960PT

Date Received: 4- 9-90

Date Reported: 5- 3-90

\* \* \* \* \*

Results expressed in Milligrams/Liter

Total Hard.	NA	pH	NA	Iron	ND
(CaCO <sub>3</sub> )		Turbidity	NA	Manganese	15.78
Calcium	209.8	Specific Cond.	NA	Arsenic	ND
Magnesium	50.3	T. Dissolved Solids	NA	Barium	0.34
Sodium	3.7	Total Phosphorus (P)	NA	Cadmium	0.053
Potassium	0.6	Silica (SiO <sub>2</sub> )	3.6	Chromium	0.169
		Boron	0.04	Copper	0.03
Total Alk.	NA	Dissolved Oxygen	NA	Lead	1.200
(CaCO <sub>3</sub> )		BOD	NA	Mercury	NA
Chloride	NA	COD	NA	Selenium	ND
Sulfate	NA	Ammonia (N)	NA	Silver	ND
Nitrate (N)	NA	T. Sus. Solids	NA	Zinc	7.80
Fluoride	NA			Aluminum	0.19
				Beryllium	ND
Cyanides	NA	Carbonate Hardness	NA	Nickel	0.09
Oil/Grease	NA	Non-Carbonate Hard.	NA	Antimony	ND
Phenols	NA	NaHCO <sub>3</sub> Alkalinity	NA	Thallium	ND
TDP	NA	MBAS	NA		
Sulfide	NA	Flash Point	NA		

Chemist: FD

NA - Not Analyzed

ND - Not Detected

\* \* \* \* \*

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Kansas Health & Environmental Laboratory  
Biochemical Analysis Laboratory  
Bldg. 740, Forbes Field, Topeka, KS 66620-8420  
(913) 296-1657

RESULTS OF LABORATORY ANALYSES

Report To: PAM CHAFFEE--BER  
Address:

Lab Number: 1960PT  
Account Code: BER  
Matrix: SOIL

Locality: GULF CHEMICAL 03011234 CRESTLINE

Time Collected: 1520

Collected By: CHAFFEE/COOPER

Depth Collected: 0.8

Sample ID: SESWSWNE043425E

Date Collected: 4- 4-90

Date Received: 4- 9-90

Date Reported: 4-24-90

Comments: SOIL #2  
ACID LEACH; EP TOXICITY PENDING

\* \* \* \* \*

Results expressed in Milligrams/Kilogram

Total Hard.	NA	pH	NA	Iron	3139.35
(CaCO <sub>3</sub> )		Turbidity	NA	Manganese	867.63
Calcium	9033.6	Specific Cond.	NA	Arsenic	5.457
Magnesium	2795.7	T. Dissolved Solids	NA	Barium	22.06
Sodium	226.6	Total Phosphorus (P)	NA	Cadmium	3.041
Potassium	56.6	Silica (SiO <sub>2</sub> )	1777.7	Chromium	9.116
		Boron	ND	Copper	33.92
Total Alk.	NA	Dissolved Oxygen	NA	Lead	852.346
(CaCO <sub>3</sub> )		BOD	NA	Mercury	0.1000
Chloride	NA	COD	NA	Selenium	ND
Sulfate	NA	Ammonia (N)	NA	Silver	ND
Nitrate (N)	NA	T. Sus. Solids	NA	Zinc	519.51
Fluoride	NA			Aluminum	955.60
				Beryllium	0.36
Cyanides	NA	Carbonate Hardness	NA	Nickel	9.75
Oil/Grease	NA	Non-Carbonate Hard.	NA	Antimony	ND
Phenols	NA	NaHCO <sub>3</sub> Alkalinity	NA	Thallium	ND
TDP	NA	MBAS	NA		
Sulfide	NA	Flash Point	NA		

Chemist: FD

NA - Not Analyzed

ND - Not Detected

\* \* \* \* \*

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024600C  
Report Date: 5- 1-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENENENE333325E Sample Type: SOIL  
Collection Site: SOIL #3 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1855

RESULTS OF ANALYSIS

PRIORITY POLLUTANT	Concentration (MG/KG)	Detection Limit (MG/KG)
ACID EXTRACTABLES		
ORTHO-CHLOROPHENOL	NOT DETECTED	1.0
2-NITROPHENOL	NOT DETECTED	1.0
PHENOL	NOT DETECTED	1.0
2,4-DIMETHYLPHENOL	NOT DETECTED	1.0
2,4-DICHLOROPHENOL	NOT DETECTED	1.0
2,4,6-TRICHLOROPHENOL	NOT DETECTED	1.0
4-CHLORO-M-CRESOL	NOT DETECTED	1.0
2,4-DINITROPHENOL	NOT DETECTED	25.0
4,6-DINITRO-O-CRESOL	NOT DETECTED	5.0
PENTACHLOROPHENOL	NOT DETECTED	5.0
4-NITROPHENOL	NOT DETECTED	5.0

Note: 2,6-Dichlorophenol if present, is calculated as 2,4-Dichlorophenol.

Comment: THE ABOVE RESULTS AND DETECTION LEVELS ARE ON A DRY WEIGHT BASIS.

Analyst: DENNIS L. DOBSON  
Q2Q

Roger H. Carlson, Ph.D., Director

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Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024590C  
Report Date: 5- 1-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENENENE333325E Sample Type: SOIL  
Collection Site: SOIL #3 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1855

RESULTS OF ANALYSIS

PRIORITY POLLUTANT BASE NEUTRAL EXTRACTABLES	Concentration (MG/KG)	Detection Limit (MG/KG)
HEXACHLOROETHANE	NOT DETECTED	1.0
BIS(2-CHLOROETHYL)ETHER	NOT DETECTED	1.0
BIS(2-CHLOROISOPROPYL)ETHER	NOT DETECTED	1.0
HEXACHLOROBUTADIENE	NOT DETECTED	1.0
1,2,4-TRICHLOROBENZENE	NOT DETECTED	1.0
NAPHTHALENE	NOT DETECTED	1.0
BIS(2-CHLOROETHOXY)METHANE	NOT DETECTED	1.0
2-CHLORONAPHTHALENE	NOT DETECTED	1.0
ACENAPHTHYLENE	NOT DETECTED	1.0
ACENAPHTHENE	NOT DETECTED	1.0
DIMETHYL PHTHALATE	NOT DETECTED	1.0
2,6-DINITROTOLUENE	NOT DETECTED	1.0
FLUORENE	NOT DETECTED	1.0
4-CHLOROPHENYL PHENYL ETHER	NOT DETECTED	1.0
2,4-DINITROTOLUENE	NOT DETECTED	1.0
DIETHYL PHTHALATE	NOT DETECTED	1.0
HEXACHLOROBENZENE	NOT DETECTED	1.0
4-BROMOPHENYL PHENYL ETHER	NOT DETECTED	1.0
PHENANTHRENE &/OR ANTHRACENE	NOT DETECTED	1.0
DI-N-BUTYL PHTHALATE	NOT DETECTED	1.0
FLUORANTHENE	NOT DETECTED	1.0
PYRENE	NOT DETECTED	1.0
BUTYL BENZYL PHTHALATE	NOT DETECTED	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	NOT DETECTED	5.0
CHRYSENE &/OR BENZO(A)ANTHRACENE	NOT DETECTED	1.0
DI-N-OCTYL PHTHALATE	NOT DETECTED	5.0
BENZO<(B) &/OR (K)>FLUORANTHENE	NOT DETECTED	1.0
BENZO(A)PYRENE	NOT DETECTED	1.0
INDENO(1,2,3-C,D)PYRENE	NOT DETECTED	1.0
DIBENZO(A,H)ANTHRACENE	NOT DETECTED	1.0
BENZO(G,H,I)PERYLENE	NOT DETECTED	1.0

Comment: THE ABOVE RESULTS AND DETECTION LEVELS ARE ON A DRY WEIGHT BASIS.

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024270C  
Report Date: 5- 1-90

SAMPLE COLLECTION INFORMATION

HT

Sample Identification Number: NENENENE333325E Sample Type: SOIL  
Collection Site: SOIL #3 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1855

RESULTS OF ANALYSIS

PURGABLE ORGANICS	Concentration (MG/KG)	Detection Limit (MG/KG)
CHLOROMETHANE	NOT DETECTED	5.0
BROMOMETHANE	NOT DETECTED	1.2
VINYL CHLORIDE	NOT DETECTED	0.8
CHLOROETHANE	NOT DETECTED	3.7
DICHLOROMETHANE	NOT DETECTED	0.9
1,1-DICHLOROETHYLENE	NOT DETECTED	0.6
1,1-DICHLOROETHANE	NOT DETECTED	0.5
TRANS &/OR CIS 1,2-DICHLOROETHYLENE	NOT DETECTED	0.5
TRICHLOROMETHANE (THM)	NOT DETECTED	0.5
1,2-DICHLOROETHANE	NOT DETECTED	0.6
1,1,1-TRICHLOROETHANE	NOT DETECTED	0.7
TETRACHLOROMETHANE	NOT DETECTED	0.7
BROMODICHLOROMETHANE (THM)	NOT DETECTED	0.5
1,2-DICHLOROPROPANE	NOT DETECTED	0.5
TRANS 1,3-DICHLOROPROPENE	NOT DETECTED	0.8
TRICHLOROETHYLENE	NOT DETECTED	0.6
BENZENE	NOT DETECTED	0.5
DIBROMOCHLOROMETHANE (THM)	NOT DETECTED	0.7
CIS 1,3-DICHLOROPROPENE	NOT DETECTED	0.9
1,1,2-TRICHLOROETHANE	NOT DETECTED	0.6
BROMOFORM (THM)	NOT DETECTED	1.5
1,1,2,2-TETRACHLOROETHANE	NOT DETECTED	0.6
TETRACHLOROETHYLENE	NOT DETECTED	1.1
TOLUENE	NOT DETECTED	0.5
CHLOROBENZENE	NOT DETECTED	0.5
ETHYLBENZENE	NOT DETECTED	0.7
META-XYLENE	NOT DETECTED	0.6
ORTHO &/OR PARA-XYLENE	NOT DETECTED	0.6
1,3-DICHLOROBENZENE	NOT DETECTED	1.0
1,2-DICHLOROBENZENE	NOT DETECTED	1.0
1,4-DICHLOROBENZENE	NOT DETECTED	1.0

Analyst: RICHARD L. PIERCE *RLP*

Roger H. Carlson, Ph.D., Director

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Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

PESTICIDE ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024580C  
Report Date: 5-18-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENENENE333325E Sample Type: SOIL  
Collection Site: SOIL #3 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CK CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1855

RESULTS OF ANALYSIS

PRIORITY POLLUTANT PESTICIDES	Concentration (MG/KG)	Detection Limit (MG/KG)
ALDRIN	NOT DETECTED	0.13
ALPHA BHC	NOT DETECTED	0.12
BETA BHC	NOT DETECTED	0.12
DELTA BHC	NOT DETECTED	0.12
GAMMA BHC	NOT DETECTED	0.12
CHLORDANE	NOT DETECTED	1.0
P,P' DDD	NOT DETECTED	0.20
P,P' DDE	NOT DETECTED	0.10
P,P' DDT	NOT DETECTED	0.50
DIELDRIN	NOT DETECTED	0.25
ENDOSULFAN I	NOT DETECTED	0.10
ENDOSULFAN II	NOT DETECTED	0.10
ENDOSULFAN SULFATE	NOT DETECTED	0.50
ENDRIN	NOT DETECTED	0.50
HEPTACHLOR	NOT DETECTED	0.10
HEPTACHLOR EPOXIDE	NOT DETECTED	0.10
TOXAPHENE	NOT DETECTED	9.5
PCB-1016	NOT DETECTED	2.5
PCB-1221	NOT DETECTED	2.5
PCB-1232	NOT DETECTED	2.5
PCB-1242	NOT DETECTED	2.5
PCB-1248	NOT DETECTED	2.5
PCB-1254	NOT DETECTED	2.5
PCB-1260	NOT DETECTED	2.5

Comment: ALL RESULTS AND DET'N LEVELS ARE ON A DRY WT. BASIS.

Analyst: JOHN GOULD

Roger H. Carlson, Ph.D., Director

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 Kansas Health & Environmental Laboratory  
 Biochemical Analysis Laboratory  
 Bldg. 740, Forbes Field, Topeka, KS 66620-8420  
 (913) 296-1657

RESULTS OF LABORATORY ANALYSES

Report To: PAM CHAFFEE--BER  
 Address:

Lab Number: 1961PT  
 Account Code: BER  
 Matrix: SOIL

Locality: GULF CHEMICAL 03011234 CRESTLINE

Time Collected: 1855

Collected By: CHAFFEE/COOPER

Depth Collected: 1

Sample ID: NENENENE333325E

Date Collected: 4- 4-90

Date Received: 4- 9-90

Date Reported: 4-24-90

Comments: SOIL #3  
 ACID LEACH; ANALYSIS COMPLETE

\* \* \* \* \*

Results expressed in Milligrams/Kilogram

Total Hard.	NA	pH	NA	Iron	572.47
(CaCO3)		Turbidity	NA	Manganese	151.54
Calcium	318.5	Specific Cond.	NA	Arsenic	5.943
Magnesium	63.0	T. Dissolved Solids	NA	Barium	39.35
Sodium	198.3	Total Phosphorus (P)	NA	Cadmium	0.099
Potassium	102.6	Silica (SiO2)	997.3	Chromium	1.189
		Boron	3.90	Copper	1.81
Total Alk.	NA	Dissolved Oxygen	NA	Lead	2.864
(CaCO3)		BOD	NA	Mercury	ND
Chloride	NA	COD	NA	Selenium	1.031
Sulfate	NA	Ammonia (N)	NA	Silver	ND
Nitrate (N)	NA	T. Sus. Solids	NA	Zinc	17.70
Fluoride	NA			Aluminum	1040.23
				Beryllium	0.24
Cyanides	NA	Carbonate Hardness	NA	Nickel	2.76
Oil/Grease	NA	Non-Carbonate Hard.	NA	Antimony	ND
Phenols	NA	NaHCO3 Alkalinity	NA	Thallium	0.54
TDP	NA	MBAS	NA		
Sulfide	NA	Flash Point	NA		

Chemist: FD

NA - Not Analyzed

ND - Not Detected

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024510C  
Report Date: 4-23-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENESENE043425E Sample Type: WATER  
Collection Site: SW1 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4-4-90 Time: 1117

RESULTS OF ANALYSIS

PRIORITY POLLUTANT	Concentration (UG/L)	Detection Limit (UG/L)
ACID EXTRACTABLES		
ORTHO-CHLOROPHENOL	NOT DETECTED	2.0
2-NITROPHENOL	NOT DETECTED	2.0
PHENOL	NOT DETECTED	2.0
2,4-DIMETHYLPHENOL	NOT DETECTED	2.0
2,4-DICHLOROPHENOL	NOT DETECTED	2.0
2,4,6-TRICHLOROPHENOL	NOT DETECTED	2.0
4-CHLORO-M-CRESOL	NOT DETECTED	2.0
2,4-DINITROPHENOL	NOT DETECTED	50.0
4,6-DINITRO-O-CRESOL	NOT DETECTED	10.0
PENTACHLOROPHENOL	NOT DETECTED	10.0
4-NITROPHENOL	NOT DETECTED	10.0

Note: 2,6-Dichlorophenol if present, is calculated as 2,4-Dichlorophenol.

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024500C  
Report Date: 4-23-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENESENE043425E Sample Type: WATER  
Collection Site: SW1 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1117

RESULTS OF ANALYSIS

PRIORITY POLLUTANT BASE NEUTRAL EXTRACTABLES	Concentration (UG/L)	Detection Limit (UG/L)
HEXACHLOROETHANE	NOT DETECTED	2.0
BIS(2-CHLOROETHYL)ETHER	NOT DETECTED	2.0
BIS(2-CHLOROISOPROPYL)ETHER	NOT DETECTED	2.0
HEXACHLOROBUTADIENE	NOT DETECTED	2.0
1,2,4-TRICHLOROBENZENE	NOT DETECTED	2.0
NAPHTHALENE	NOT DETECTED	2.0
BIS(2-CHLOROETHOXY)METHANE	NOT DETECTED	2.0
2-CHLORONAPHTHALENE	NOT DETECTED	2.0
ACENAPHTHYLENE	NOT DETECTED	2.0
ACENAPHTHENE	NOT DETECTED	2.0
DIMETHYL PHTHALATE	NOT DETECTED	2.0
2,6-DINITROTOLUENE	NOT DETECTED	2.0
FLUORENE	NOT DETECTED	2.0
4-CHLOROPHENYL PHENYL ETHER	NOT DETECTED	2.0
2,4-DINITROTOLUENE	NOT DETECTED	2.0
DIETHYL PHTHALATE	NOT DETECTED	2.0
HEXACHLOROBENZENE	NOT DETECTED	2.0
4-BROMOPHENYL PHENYL ETHER	NOT DETECTED	2.0
PHENANTHRENE &/OR ANTHRACENE	NOT DETECTED	2.0
DI-N-BUTYL PHTHALATE	NOT DETECTED	2.0
FLUORANTHENE	NOT DETECTED	2.0
PYRENE	NOT DETECTED	2.0
BUTYL BENZYL PHTHALATE	NOT DETECTED	2.0
BIS(2-ETHYLHEXYL) PHTHALATE	NOT DETECTED	10.0
CHRYSENE &/OR BENZO(A)ANTHRACENE	NOT DETECTED	2.0
DI-N-OCTYL PHTHALATE	NOT DETECTED	10.0
BENZO(B) &/OR (K) >FLUORANTHENE	NOT DETECTED	2.0
BENZO(A)PYRENE	NOT DETECTED	2.0
INDENO(1,2,3-C,D)PYRENE	NOT DETECTED	2.0
DIBENZO(A,H)ANTHRACENE	NOT DETECTED	2.0
BENZO(G,H,I)PERYLENE	NOT DETECTED	2.0

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

PESTICIDE ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024490C  
Report Date: 5- 7-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENESENE043425E Sample Type: WATER  
Collection Site: SW1 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1117

RESULTS OF ANALYSIS

PRIORITY POLLUTANT PESTICIDES	Concentration (UG/L)	Detection Limit (UG/L)
ALDRIN	NOT DETECTED	0.025
ALPHA BHC	NOT DETECTED	0.025
BETA BHC	NOT DETECTED	0.050
DELTA BHC	NOT DETECTED	0.050
GAMMA BHC	NOT DETECTED	0.025
CHLORDANE	NOT DETECTED	0.20
P,P' DDD	NOT DETECTED	0.040
P,P' DDE	NOT DETECTED	0.020
P,P' DDT	NOT DETECTED	0.10
DIELDRIN	NOT DETECTED	0.050
ENDOSULFAN I	NOT DETECTED	0.020
ENDOSULFAN II	NOT DETECTED	0.020
ENDOSULFAN SULFATE	NOT DETECTED	0.10
ENDRIN	NOT DETECTED	0.10
HEPTACHLOR	NOT DETECTED	0.020
HEPTACHLOR EPOXIDE	NOT DETECTED	0.020
TOXAPHENE	NOT DETECTED	2.0
PCB-1016	NOT DETECTED	0.50
PCB-1221	NOT DETECTED	2.5
PCB-1232	NOT DETECTED	0.50
PCB-1242	NOT DETECTED	0.50
PCB-1248	NOT DETECTED	0.50
PCB-1254	NOT DETECTED	0.50
PCB-1260	NOT DETECTED	0.50
ATRAZINE	NOT DETECTED	2.5
RAMROD	NOT DETECTED	1.3

Analyst: JOHN GOULD *JD*

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Division of Laboratories and Research  
Radiation Chemistry Laboratory  
Bldg. 740, Forbes Field, Topeka, KS 66620-8420  
(913) 296-1630

REPORT OF LABORATORY ANALYSES

Report To: Radiation Control      Acct Code: RT      Sample ID:

Location: GULF CHEMICAL SW1  
Source: NENESENE S04T34R25E  
Type: Surface Water  
Coll By: CHAFFEE/COOPER  
Del By: CHAFFEE

Lab Number: 6824RC  
Date Collected: 4- 4-90  
Date Received: 4- 9-90  
Date Reported: 4-18-90

Remarks:

ANALYTICAL RESULTS

Results are in Units of Picocuries per Liter

Parameter	Concentration	Error	Det. Limit	Confidence Level
Gross Alpha	12	3		
Gross Beta	NA			
Tritium	NA			
Total Solid	NA			
Chromium-51	NA			
Manganese-54	NA			
Iron-55	NA			
Iron-59	NA			
Cobalt-57	NA			
Cobalt-58	NA			
Cobalt-60	NA			
Nickel-63	NA			
Zinc-65	NA			
Gallium-67	NA			
Strontium-89	NA			
Strontium-90	NA			
Zirconium-95	NA			
Molybdenum-99	NA			
Technetium-99m	NA			
Ruthenium-103	NA			
Ruthenium-106	NA			
Indium-111	NA			
Iridium-192	NA			
Iodine-123	NA			
Iodine-125	NA			

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Sample Number:

Lab Number: 6824RC

Parameter	Concentration	Error	Det. Limit	Confidence Level
Iodine-129	NA			
Iodine-131	NA			
Cesium-134	NA			
Cesium-137	NA			
Barium-140	NA			
Ytterbium-169	NA			
Carbon-14	NA			
Phosphorus-32	NA			
Radium-226	NA			
Radium-228	NA			
Gross Uranium	ND			
Potassium	NA		1	

All results are expressed at the 95% confidence level except as noted.

NA - Not Analyzed  
ND - Not Detected

Analyst: FZ

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Biochemical Analysis Laboratory  
Bldg. 740, Forbes Field, Topeka, KS 66620-8420  
(913) 296-1657

RESULTS OF LABORATORY ANALYSES

Report To: PAM CHAFFEE--BER  
Address:

Lab Number: 1969PT  
Account Code: BER  
Matrix: WATER

Locality: GULF CHEMICAL 03011234 CRESTLINE

Time Collected: 1117

Collected By: CHAFFEE/COOPER

Depth Collected: \*\*\*\*

Sample ID: NENESENE043425E

Date Collected: 4- 4-90

Date Received: 4- 9-90

Comments: SW1 DISSOLVED HEAVY METALS

Date Reported: 4-24-90

\* \* \* \* \*

Results expressed in Milligrams/Liter

Total Hard.	562	pH	NA	Iron	0.03
(CaCO <sub>3</sub> )		Turbidity	NA	Manganese	6.89
Calcium	181.0	Specific Cond.	NA	Arsenic	0.002
Magnesium	26.9	T. Dissolved Solids	NA	Barium	0.03
Sodium	35.5	Total Phosphorus (P)	NA	Cadmium	0.016
Potassium	NA	Silica (SiO <sub>2</sub> )	NA	Chromium	ND
		Boron	NA	Copper	ND
Total Alk.	62	Dissolved Oxygen	NA	Lead	0.001
(CaCO <sub>3</sub> )		BOD	NA	Mercury	ND
Chloride	4.1	COD	NA	Selenium	ND
Sulfate	149	Ammonia (N)	NA	Silver	ND
Nitrate (N)	465.00	T. Sus. Solids	NA	Zinc	1.54
Fluoride	0.87			Aluminum	NA
				Beryllium	NA
Cyanides	NA	Carbonate Hardness	62.0	Nickel	NA
Oil/Grease	NA	Non-Carbonate Hard.	NA	Antimony	NA
Phenols	NA	NaHCO <sub>3</sub> Alkalinity	NA	Thallium	NA
TDP	NA	MBAS	NA		
Sulfide	NA	Flash Point	NA		

Chemist: FD

NA - Not Analyzed

ND - Not Detected

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024450C  
Report Date: 4-26-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: SWSESESE333325E Sample Type: WATER  
Collection Site: SW2 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4-4-90 Time: 1135

RESULTS OF ANALYSIS

PRIORITY POLLUTANT	Concentration (UG/L)	Detection Limit (UG/L)
ACID EXTRACTABLES		
ORTHO-CHLOROPHENOL	NOT DETECTED	2.0
2-NITROPHENOL	NOT DETECTED	2.0
PHENOL	NOT DETECTED	2.0
2,4-DIMETHYLPHENOL	NOT DETECTED	2.0
2,4-DICHLOROPHENOL	NOT DETECTED	2.0
2,4,6-TRICHLOROPHENOL	NOT DETECTED	2.0
4-CHLORO-M-CRESOL	NOT DETECTED	2.0
2,4-DINITROPHENOL	NOT DETECTED	50.0
4,6-DINITRO-O-CRESOL	NOT DETECTED	10.0
PENTACHLOROPHENOL	NOT DETECTED	10.0
4-NITROPHENOL	NOT DETECTED	10.0

Note: 2,6-Dichlorophenol if present, is calculated as 2,4-Dichlorophenol.

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024440C  
Report Date: 4-26-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: SWSESESE333325E Sample Type: WATER  
Collection Site: SW2 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1135

RESULTS OF ANALYSIS

PRIORITY POLLUTANT BASE NEUTRAL EXTRACTABLES	Concentration (UG/L)	Detection Limit (UG/L)
HEXACHLOROETHANE	NOT DETECTED	2.0
BIS(2-CHLOROETHYL)ETHER	NOT DETECTED	2.0
BIS(2-CHLOROISOPROPYL)ETHER	NOT DETECTED	2.0
HEXACHLOROBUTADIENE	NOT DETECTED	2.0
1,2,4-TRICHLOROBENZENE	NOT DETECTED	2.0
NAPHTHALENE	NOT DETECTED	2.0
BIS(2-CHLOROETHOXY)METHANE	NOT DETECTED	2.0
2-CHLORONAPHTHALENE	NOT DETECTED	2.0
ACENAPHTHYLENE	NOT DETECTED	2.0
ACENAPHTHENE	NOT DETECTED	2.0
DIMETHYL PHTHALATE	NOT DETECTED	2.0
2,6-DINITROTOLUENE	NOT DETECTED	2.0
FLUORENE	NOT DETECTED	2.0
4-CHLOROPHENYL PHENYL ETHER	NOT DETECTED	2.0
2,4-DINITROTOLUENE	NOT DETECTED	2.0
DIETHYL PHTHALATE	NOT DETECTED	2.0
HEXACHLOROBENZENE	NOT DETECTED	2.0
4-BROMOPHENYL PHENYL ETHER	NOT DETECTED	2.0
PHENANTHRENE &/OR ANTHRACENE	NOT DETECTED	2.0
DI-N-BUTYL PHTHALATE	NOT DETECTED	2.0
FLUORANTHENE	NOT DETECTED	2.0
PYRENE	NOT DETECTED	2.0
BUTYL BENZYL PHTHALATE	NOT DETECTED	2.0
BIS(2-ETHYLHEXYL) PHTHALATE	15.6	10.0
CHRYSENE &/OR BENZO(A)ANTHRACENE	NOT DETECTED	2.0
DI-N-OCTYL PHTHALATE	NOT DETECTED	10.0
BENZO(B) &/OR (K) >FLUORANTHENE	NOT DETECTED	2.0
BENZO(A)PYRENE	NOT DETECTED	2.0
INDENO(1,2,3-C,D)PYRENE	NOT DETECTED	2.0
DIBENZO(A,H)ANTHRACENE	NOT DETECTED	2.0
BENZO(G,H,I)PERYLENE	NOT DETECTED	2.0

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

PESTICIDE ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024430C  
Report Date: 5-11-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: SWSESESE333325E Sample Type: WATER  
Collection Site: SW2 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4-4-90 Time: 1135

RESULTS OF ANALYSIS

PRIORITY POLLUTANT PESTICIDES	Concentration (UG/L)	Detection Limit (UG/L)
ALDRIN	NOT DETECTED	0.025
ALPHA BHC	NOT DETECTED	0.025
BETA BHC	NOT DETECTED	0.050
DELTA BHC	NOT DETECTED	0.050
GAMMA BHC	NOT DETECTED	0.025
CHLORDANE	NOT DETECTED	0.20
P,P' DDD	NOT DETECTED	0.040
P,P' DDE	NOT DETECTED	0.020
P,P' DDT	NOT DETECTED	0.10
DIELDRIN	NOT DETECTED	0.050
ENDOSULFAN I	NOT DETECTED	0.020
ENDOSULFAN II	NOT DETECTED	0.020
ENDOSULFAN SULFATE	NOT DETECTED	0.10
ENDRIN	NOT DETECTED	0.10
HEPTACHLOR	NOT DETECTED	0.020
HEPTACHLOR EPOXIDE	NOT DETECTED	0.020
TOXAPHENE	NOT DETECTED	2.0
PCB-1016	NOT DETECTED	0.50
PCB-1221	NOT DETECTED	2.5
PCB-1232	NOT DETECTED	0.50
PCB-1242	NOT DETECTED	0.50
PCB-1248	NOT DETECTED	0.50
PCB-1254	NOT DETECTED	0.50
PCB-1260	NOT DETECTED	0.50
DUAL	NOT DETECTED	0.40

Analyst: JOHN GOULD *JB*

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Division of Laboratories and Research  
Radiation Chemistry Laboratory  
Bldg. 740, Forbes Field, Topeka, KS 66620-8420  
(913) 296-1630

REPORT OF LABORATORY ANALYSES

Report To: Radiation Control      Acct Code: RT      Sample ID:  
Location: GULF CHEMICAL SW2      Lab Number: 6825RC  
Source: SWSESESE S33T33R25E  
Type: Surface Water      Date Collected: 4- 4-90  
Coll By: CHAFFEE/COOPER      Date Received: 4- 9-90  
Del By: CHAFFEE      Date Reported: 4-18-90

Remarks:

\* \* \* \* \*  
ANALYTICAL RESULTS

Results are in Units of Picocuries per Liter

Parameter	Concentration	Error	Det. Limit	Confidence Level
Gross Alpha	5	1		
Gross Beta	NA			
Tritium	NA			
Total Solid	NA			
Chromium-51*	NA			
Manganese-54	NA			
Iron-55	NA			
Iron-59	NA			
Cobalt-57	NA			
Cobalt-58	NA			
Cobalt-60	NA			
Nickel-63	NA			
Zinc-65	NA			
Gallium-67	NA			
Strontium-89	NA			
Strontium-90	NA			
Zirconium-95	NA			
Molybdenum-99	NA			
Technetium-99m	NA			
Ruthenium-103	NA			
Ruthenium-106	NA			
Indium-111	NA			
Iridium-192	NA			
Iodine-123	NA			
Iodine-125	NA			

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Sample Number:

Lab Number: 6825RC

Parameter	Concentration	Error	Det. Limit	Confidence Level
Iodine-129	NA			
Iodine-131	NA			
Cesium-134	NA			
Cesium-137	NA			
Barium-140	NA			
Ytterbium-169	NA			
Carbon-14	NA			
Phosphorus-32	NA			
Radium-226	NA			
Radium-228	NA			
Gross Uranium	1	1		
Potassium	NA			

All results are expressed at the 95% confidence level except as noted.

NA - Not Analyzed

ND - Not Detected

Analyst: FZ

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Kansas Health & Environmental Laboratory  
Biochemical Analysis Laboratory  
Bldg. 740, Forbes Field, Topeka, KS 66620-8420  
(913) 296-1657

RESULTS OF LABORATORY ANALYSES

Report To: PAM CHAFFEE--BER  
Address:

Lab Number: 1967PT  
Account Code: BER  
Matrix: WATER

Locality: GULF CHEMICAL 03011234 CRESTLINE

Time Collected: 1135

Collected By: CHAFFEE/COOPER

Depth Collected: \*\*\*\*

Sample ID: SWSESESE333325E

Date Collected: 4- 4-90

Date Received: 4- 9-90

Comments: SW2 DISSOLVED HEAVY METALS

Date Reported: 4-27-90

\* \* \* \* \*

Results expressed in Milligrams/Liter

Total Hard.	467	pH	NA	Iron	0.25
(CaCO3)		Turbidity	NA	Manganese	20.25
Calcium	149.5	Specific Cond.	NA	Arsenic	0.001
Magnesium	22.9	T. Dissolved Solids	NA	Barium	0.05
Sodium	24.2	Total Phosphorus (P)	NA	Cadmium	0.046
Potassium	NA	Silica (SiO2)	NA	Chromium	ND
		Boron	NA	Copper	0.03
Total Alk.	ND	Dissolved Oxygen	NA	Lead	0.018
(CaCO3)		BOD	NA	Mercury	ND
Chloride	13.8	COD	NA	Selenium	ND
Sulfate	500	Ammonia (N)	NA	Silver	ND
Nitrate (N)	46.00	T. Sus. Solids	NA	Zinc	5.10
Fluoride	0.44			Aluminum	NA
				Beryllium	NA
Cyanides	NA	Carbonate Hardness	0.0	Nickel	NA
Oil/Grease	NA	Non-Carbonate Hard.	NA	Antimony	NA
Phenols	NA	NaHCO3 Alkalinity	NA	Thallium	NA
TDP	NA	MBAS	NA		
Sulfide	NA	Flash Point	NA		

Chemist: FD

NA - Not Analyzed

ND - Not Detected

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024480C  
Report Date: 4-23-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: SWSWSENW033425E Sample Type: WATER  
Collection Site: SW3 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4-4-90 Time: 1200

RESULTS OF ANALYSIS

PRIORITY POLLUTANT	Concentration (UG/L)	Detection Limit (UG/L)
ACID EXTRACTABLES	NOT DETECTED	2.0
ORTHO-CHLOROPHENOL	NOT DETECTED	2.0
2-NITROPHENOL	NOT DETECTED	2.0
PHENOL	NOT DETECTED	2.0
2,4-DIMETHYLPHENOL	NOT DETECTED	2.0
2,4-DICHLOROPHENOL	NOT DETECTED	2.0
2,4,6-TRICHLOROPHENOL	NOT DETECTED	2.0
4-CHLORO-M-CRESOL	NOT DETECTED	2.0
2,4-DINITROPHENOL	NOT DETECTED	50.0
4,6-DINITRO-O-CRESOL	NOT DETECTED	10.0
PENTACHLOROPHENOL	NOT DETECTED	10.0
4-NITROPHENOL	NOT DETECTED	10.0

Note: 2,6-Dichlorophenol if present, is calculated as 2,4-Dichlorophenol.

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024470C  
Report Date: 4-23-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: SWSWSENW033425E Sample Type: WATER  
Collection Site: SW3 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4-4-90 Time: 1200

RESULTS OF ANALYSIS

PRIORITY POLLUTANT BASE NEUTRAL EXTRACTABLES	Concentration (UG/L)	Detection Limit (UG/L)
HEXACHLOROETHANE	NOT DETECTED	2.0
BIS(2-CHLOROETHYL)ETHER	NOT DETECTED	2.0
BIS(2-CHLOROISOPROPYL)ETHER	NOT DETECTED	2.0
HEXACHLOROBUTADIENE	NOT DETECTED	2.0
1,2,4-TRICHLOROBENZENE	NOT DETECTED	2.0
NAPHTHALENE	NOT DETECTED	2.0
BIS(2-CHLOROETHOXY)METHANE	NOT DETECTED	2.0
2-CHLORONAPHTHALENE	NOT DETECTED	2.0
ACENAPHTHYLENE	NOT DETECTED	2.0
ACENAPHTHENE	NOT DETECTED	2.0
DIMETHYL PHTHALATE	NOT DETECTED	2.0
2,6-DINITROTOLUENE	NOT DETECTED	2.0
FLUORENE	NOT DETECTED	2.0
4-CHLOROPHENYL PHENYL ETHER	NOT DETECTED	2.0
2,4-DINITROTOLUENE	NOT DETECTED	2.0
DIETHYL PHTHALATE	NOT DETECTED	2.0
HEXACHLOROBENZENE	NOT DETECTED	2.0
4-BROMOPHENYL PHENYL ETHER	NOT DETECTED	2.0
PHENANTHRENE &/OR ANTHRACENE	NOT DETECTED	2.0
DI-N-BUTYL PHTHALATE	NOT DETECTED	2.0
FLUORANTHENE	NOT DETECTED	2.0
PYRENE	NOT DETECTED	2.0
BUTYL BENZYL PHTHALATE	NOT DETECTED	2.0
BIS(2-ETHYLHEXYL) PHTHALATE	NOT DETECTED	10.0
CHRYSENE &/OR BENZO(A)ANTHRACENE	NOT DETECTED	2.0
DI-N-OCTYL PHTHALATE	NOT DETECTED	10.0
BENZO(B) &/OR (K) >FLUORANTHENE	NOT DETECTED	2.0
BENZO(A)PYRENE	NOT DETECTED	2.0
INDENO(1,2,3-C,D)PYRENE	NOT DETECTED	2.0
DIBENZO(A,H)ANTHRACENE	NOT DETECTED	2.0
BENZO(G,H,I)PERYLENE	NOT DETECTED	2.0

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

PESTICIDE ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024460C  
Report Date: 4-23-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: SWSWSENW033425E Sample Type: WATER  
Collection Site: SW3 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4-4-90 Time: 1200

RESULTS OF ANALYSIS

PRIORITY POLLUTANT PESTICIDES	Concentration (UG/L)	Detection Limit (UG/L)
ALDRIN	NOT DETECTED	0.025
ALPHA BHC	NOT DETECTED	0.025
BETA BHC	NOT DETECTED	0.050
DELTA BHC	NOT DETECTED	0.050
GAMMA BHC	NOT DETECTED	0.025
CHLORDANE	NOT DETECTED	0.20
P,P' DDD	NOT DETECTED	0.040
P,P' DDE	NOT DETECTED	0.020
P,P' DDT	NOT DETECTED	0.10
DIELDRIN	NOT DETECTED	0.050
ENDOSULFAN I	NOT DETECTED	0.020
ENDOSULFAN II	NOT DETECTED	0.020
ENDOSULFAN SULFATE	NOT DETECTED	0.10
ENDRIN	NOT DETECTED	0.10
HEPTACHLOR	NOT DETECTED	0.020
HEPTACHLOR EPOXIDE	NOT DETECTED	0.020
TOXAPHENE	NOT DETECTED	2.0
PCB-1016	NOT DETECTED	0.50
PCB-1221	NOT DETECTED	2.5
PCB-1232	NOT DETECTED	0.50
PCB-1242	NOT DETECTED	0.50
PCB-1248	NOT DETECTED	0.50
PCB-1254	NOT DETECTED	0.50
PCB-1260	NOT DETECTED	0.50

Analyst: JOHN GOULD *yg*

Roger H. Carlson, Ph.D., Director

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 Kansas Health & Environmental Laboratory  
 Biochemical Analysis Laboratory  
 Bldg. 740, Forbes Field, Topeka, KS 66620-8420  
 (913) 296-1657

RESULTS OF LABORATORY ANALYSES

Report To: PAM CHAFFEE--~~BER~~  
 Address:

Lab Number: 1968PT  
 Account Code: BER  
 Matrix: WATER

Locality: GULF CHEMICAL 03011234 CRESTLINE

Time Collected: 1200

Collected By: CHAFFEE/COOPER

Depth Collected: \*\*\*\*

Sample ID: SWSWSEMW033425E

Date Collected: 4- 4-90

Date Received: 4- 9-90

Comments: SW3 DISSOLVED HEAVY METALS

Date Reported: 4-27-90

\* \* \* \* \*

Results expressed in Milligrams/Liter

Total Hard.	174	pH	NA	Iron	0.06
(CaCO <sub>3</sub> )		Turbidity	NA	Manganese	0.02
Calcium	51.0	Specific Cond.	NA	Arsenic	0.004
Magnesium	11.4	T. Dissolved Solids	NA	Barium	0.01
Sodium	40.0	Total Phosphorus (P)	NA	Cadmium	ND
Potassium	NA	Silica (SiO <sub>2</sub> )	NA	Chromium	ND
		Boron	NA	Copper	ND
Total Alk.	108	Dissolved Oxygen	NA	Lead	0.002
(CaCO <sub>3</sub> )		BOD	NA	Mercury	ND
Chloride	39.5	COD	NA	Selenium	ND
Sulfate	82	Ammonia (N)	NA	Silver	ND
Nitrate (N)	0.80	T. Sus. Solids	NA	Zinc	0.08
Fluoride	0.27			Aluminum	NA
				Beryllium	NA
Cyanides	NA	Carbonate Hardness	108.0	Nickel	NA
Oil/Grease	NA	Non-Carbonate Hard.	NA	Antimony	NA
Phenols	NA	NaHCO <sub>3</sub> Alkalinity	NA	Thallium	NA
TDP	NA	MBAS	NA		
Sulfide	NA	Flash Point	NA		

Chemist: FD

NA - Not Analyzed

ND - Not Detected

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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

PESTICIDE ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024400C  
Report Date: 4-23-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENWNWNW343325E Sample Type: WATER  
Collection Site: SW4 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4-4-90 Time: 1135

RESULTS OF ANALYSIS

PRIORITY POLLUTANT PESTICIDES	Concentration (UG/L)	Detection Limit (UG/L)
ALDRIN	NOT DETECTED	0.025
ALPHA BHC	NOT DETECTED	0.025
BETA BHC	NOT DETECTED	0.050
DELTA BHC	NOT DETECTED	0.050
GAMMA BHC	NOT DETECTED	0.025
CHLORDANE	NOT DETECTED	0.20
P,P' DDD	NOT DETECTED	0.040
P,P' DDE	NOT DETECTED	0.020
P,P' DDT	NOT DETECTED	0.10
DIELDRIN	NOT DETECTED	0.050
ENDOSULFAN I	NOT DETECTED	0.020
ENDOSULFAN II	NOT DETECTED	0.020
ENDOSULFAN SULFATE	NOT DETECTED	0.10
ENDRIN	NOT DETECTED	0.10
HEPTACHLOR	NOT DETECTED	0.020
HEPTACHLOR EPOXIDE	NOT DETECTED	0.020
TOXAPHENE	NOT DETECTED	2.0
PCB-1016	NOT DETECTED	0.50
PCB-1221	NOT DETECTED	2.5
PCB-1232	NOT DETECTED	0.50
PCB-1242	NOT DETECTED	0.50
PCB-1248	NOT DETECTED	0.50
PCB-1254	NOT DETECTED	0.50
PCB-1260	NOT DETECTED	0.50

Analyst: JOHN GOULD *JS*

Roger H. Carlson, Ph.D., Director

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Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024410C  
Report Date: 4-23-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENWNWNW343325E Sample Type: WATER  
Collection Site: SW4 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4-4-90 Time: 1135

RESULTS OF ANALYSIS

PRIORITY POLLUTANT BASE NEUTRAL EXTRACTABLES	Concentration (UG/L)	Detection Limit (UG/L)
HEXACHLOROETHANE	NOT DETECTED	2.0
BIS(2-CHLOROETHYL)ETHER	NOT DETECTED	2.0
BIS(2-CHLOROISOPROPYL)ETHER	NOT DETECTED	2.0
HEXACHLOROBUTADIENE	NOT DETECTED	2.0
1,2,4-TRICHLOROBENZENE	NOT DETECTED	2.0
NAPHTHALENE	NOT DETECTED	2.0
BIS(2-CHLOROETHOXY)METHANE	NOT DETECTED	2.0
2-CHLORONAPHTHALENE	NOT DETECTED	2.0
ACENAPHTHYLENE	NOT DETECTED	2.0
ACENAPHTHENE	NOT DETECTED	2.0
DIMETHYL PHTHALATE	NOT DETECTED	2.0
2,6-DINITROTOLUENE	NOT DETECTED	2.0
FLUORENE	NOT DETECTED	2.0
4-CHLOROPHENYL PHENYL ETHER	NOT DETECTED	2.0
2,4-DINITROTOLUENE	NOT DETECTED	2.0
DIETHYL PHTHALATE	NOT DETECTED	2.0
HEXACHLOROBENZENE	NOT DETECTED	2.0
4-BROMOPHENYL PHENYL ETHER	NOT DETECTED	2.0
PHENANTHRENE &/OR ANTHRACENE	NOT DETECTED	2.0
DI-N-BUTYL PHTHALATE	NOT DETECTED	2.0
FLUORANTHENE	NOT DETECTED	2.0
PYRENE	NOT DETECTED	2.0
BUTYL BENZYL PHTHALATE	NOT DETECTED	2.0
BIS(2-ETHYLHEXYL) PHTHALATE	NOT DETECTED	10.0
CHRYSENE &/OR BENZO(A)ANTHRACENE	NOT DETECTED	2.0
DI-N-OCTYL PHTHALATE	NOT DETECTED	10.0
BENZO(B) &/OR (K)FLUORANTHENE	NOT DETECTED	2.0
BENZO(A)PYRENE	NOT DETECTED	2.0
INDENO(1,2,3-C,D)PYRENE	NOT DETECTED	2.0
DIBENZO(A,H)ANTHRACENE	NOT DETECTED	2.0
BENZO(G,H,I)PERYLENE	NOT DETECTED	2.0

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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Kansas Health & Environmental Laboratory  
Organic Chemistry Laboratory  
Topeka, Kansas 66620

GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024420C  
Report Date: 4-23-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENWNWNW343325E Sample Type: WATER  
Collection Site: SW4 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4-4-90 Time: 1135

RESULTS OF ANALYSIS

PRIORITY POLLUTANT	Concentration (UG/L)	Detection Limit (UG/L)
ACID EXTRACTABLES		
ORTHO-CHLOROPHENOL	NOT DETECTED	2.0
2-NITROPHENOL	NOT DETECTED	2.0
PHENOL	NOT DETECTED	2.0
2,4-DIMETHYLPHENOL	NOT DETECTED	2.0
2,4-DICHLOROPHENOL	NOT DETECTED	2.0
2,4,6-TRICHLOROPHENOL	NOT DETECTED	2.0
4-CHLORO-M-CRESOL	NOT DETECTED	2.0
2,4-DINITROPHENOL	NOT DETECTED	50.0
4,6-DINITRO-O-CRESOL	NOT DETECTED	10.0
PENTACHLOROPHENOL	NOT DETECTED	10.0
4-NITROPHENOL	NOT DETECTED	10.0

Note: 2,6-Dichlorophenol if present, is calculated as 2,4-Dichlorophenol.

Analyst: DENNIS L. DOBSON

Roger H. Carlson, Ph.D., Director

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GC/MS ANALYSIS REPORT

Report To: PAM CHAFFEE  
Address: FORBES BLDG. 740, TOPEKA, KS. 66620

Lab Number: 0024240C  
Report Date: 4-13-90

SAMPLE COLLECTION INFORMATION

Sample Identification Number: NENWNWNW343325E Sample Type: WATER  
Collection Site: SW4 - GULF CHEMICAL 03011234, CRESTLINE, KS. (CHEROKEE CO.)  
Collected By: CHAFFEE/COOPER Date: 4- 4-90 Time: 1135

RESULTS OF ANALYSIS

PURGABLE ORGANICS	Concentration (UG/L)	Detection Limit (UG/L)
CHLOROMETHANE	NOT DETECTED	5.0
BROMOMETHANE	NOT DETECTED	1.2
VINYL CHLORIDE	NOT DETECTED	0.8
CHLOROETHANE	NOT DETECTED	3.7
DICHLOROMETHANE	NOT DETECTED	0.9
1,1-DICHLOROETHYLENE	NOT DETECTED	0.6
1,1-DICHLOROETHANE	NOT DETECTED	0.5
TRANS &/OR CIS 1,2-DICHLOROETHYLENE	NOT DETECTED	0.5
TRICHLOROMETHANE (THM)	NOT DETECTED	0.5
1,2-DICHLOROETHANE	NOT DETECTED	0.6
1,1,1-TRICHLOROETHANE	NOT DETECTED	0.7
TETRACHLOROMETHANE	NOT DETECTED	0.7
BROMODICHLOROMETHANE (THM)	NOT DETECTED	0.5
1,2-DICHLOROPROPANE	NOT DETECTED	0.5
TRANS 1,3-DICHLOROPROPENE	NOT DETECTED	0.8
TRICHLOROETHYLENE	NOT DETECTED	0.6
BENZENE	NOT DETECTED	0.5
DIBROMOCHLOROMETHANE (THM)	NOT DETECTED	0.7
CIS 1,3-DICHLOROPROPENE	NOT DETECTED	0.9
1,1,2-TRICHLOROETHANE	NOT DETECTED	0.6
BROMOFORM (THM)	NOT DETECTED	1.5
1,1,2,2-TETRACHLOROETHANE	NOT DETECTED	0.6
TETRACHLOROETHYLENE	NOT DETECTED	1.1
TOLUENE	NOT DETECTED	0.5
CHLOROBENZENE	NOT DETECTED	0.5
ETHYLBENZENE	NOT DETECTED	0.7
META-XYLENE	NOT DETECTED	0.6
ORTHO &/OR PARA-XYLENE	NOT DETECTED	0.6
1,3-DICHLOROBENZENE	NOT DETECTED	1.0
1,2-DICHLOROBENZENE	NOT DETECTED	1.0
1,4-DICHLOROBENZENE	NOT DETECTED	1.0

Analyst: RICHARD L. PIERCE *ALP*

Roger H. Carlson, Ph.D., Director

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Kansas Health & Environmental Laboratory  
Biochemical Analysis Laboratory  
Bldg. 740, Forbes Field, Topeka, KS 66620-8420  
(913) 296-1657

RESULTS OF LABORATORY ANALYSES

Report To: PAM CHAFFEE--~~BER~~  
Address:

Lab Number: 1966PT  
Account Code: BER  
Matrix: WATER

Locality: GULF CHEMICAL 03011234 CRESTLINE

Time Collected: 1135

Collected By: CHAFFEE/COOPER

Depth Collected: \*\*\*\*

Sample ID: NENWNWNW343325E

Date Collected: 4- 4-90

Date Received: 4- 9-90

Comments: SW4 DISSOLVED HEAVY METALS

Date Reported: 4-27-90

\* \* \* \* \*

Results expressed in Milligrams/Liter

Total Hard.	161	pH	NA	Iron	0.12
(CaCO3)		Turbidity	NA	Manganese	0.14
Calcium	55.0	Specific Cond.	NA	Arsenic	0.002
Magnesium	5.9	T. Dissolved Solids	NA	Barium	0.05
Sodium	8.4	Total Phosphorus (P)	NA	Cadmium	ND
Potassium	NA	Silica (SiO2)	NA	Chromium	ND
		Boron	NA	Copper	ND
Total Alk.	102	Dissolved Oxygen	NA	Lead	0.002
(CaCO3)		BOD	NA	Mercury	ND
Chloride	8.6	COD	NA	Selenium	0.001
Sulfate	49	Ammonia (N)	NA	Silver	ND
Nitrate (N)	1.90	T. Sus. Solids	NA	Zinc	0.08
Fluoride	0.12			Aluminum	NA
				Beryllium	NA
Cyanides	NA	Carbonate Hardness	102.0	Nickel	NA
Oil/Grease	NA	Non-Carbonate Hard.	NA	Antimony	NA
Phenols	NA	NaHCO3 Alkalinity	NA	Thallium	NA
TDP	NA	MBAS	NA		
Sulfide	NA	Flash Point	NA		

Chemist: FD

NA - Not Analyzed

ND - Not Detected

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