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EXPANDED SITE INSPECTION

of the

Zykan Landfill Site

Prepared For:

U.S. Environmental Protection Agency Region 7 Superfund Division
Site Assessment and Cost Recovery Program

Prepared By:

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Superfund Technical Assessment and Response Team

CERCLIS No.: MO0001574680 **Contract No.:** 68-W6-0012

PAN: 0567ZLSRXX **TDD:** S07-9706-014

SEPTEMBER 1999

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1.0 INTRODUCTION

The Ecology and Environment, Inc. (E & E), Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Site Assessment and Cost Recovery (SACR) program to conduct an Expanded Site Inspection (ESI) at the Zykan Landfill site in Warren County, Missouri, under Technical Direction Document (TDD) S07-9706-014. Previously, START conducted a review of information related to the site. Specific objectives of the review included identification of data gaps in previous investigations. Based on the review, START was tasked to perform this ESI in order to fill the identified data gaps. ESI field work was conducted in April 1999.

The site consists of two adjacent former landfills: a sanitary landfill to the south and a hazardous waste landfill to the north. For the purposes of this investigation, both the sanitary landfill and the hazardous waste landfill will be investigated as a single site. In order to avoid confusion, the phrase "Zykan Landfill site" will refer to both landfills. The phrase "sanitary landfill" will refer to the former BHS Sanitary Landfill, while "hazardous waste landfill" will refer to the hazardous waste landfill.

2.0 SITE DESCRIPTION AND HISTORY

2.1 SITE LOCATION

The site is located within the south half of section 32, Township 47 North, Range 1 West (Figure 2-1: Site Location Map). The site lies in the northeast corner of Warren County, approximately 3 miles south-southwest of Wright City, Missouri, and approximately three-quarters of a mile south of the intersection of Highway M and Muenz Road. The site's geographic coordinates are latitude 38°47'15" N and longitude 91°02'53" W.

2.2 SITE DESCRIPTION

The site consists of two adjacent former landfills, a sanitary landfill to the south and a hazardous waste landfill to the north (Figure 2-2: Site Area Map). For this investigation, both the sanitary landfill and the hazardous waste landfill were investigated as a single site. Bob's Home Service, Inc. (BHS), owned by James Zykan, operated both landfills. The sanitary landfill operated from 1971 to 1977; the hazardous waste landfill operated from 1977 to 1985.

The Zykan Landfill site encompasses approximately 17 acres, including approximately 5 acres in the sanitary landfill (MDNR, 1996b) and approximately 12 acres in the hazardous waste landfill (EPA, 1986). Intermittent streams border the site to the south and east (Figure 2-2). To the west lies a junkyard that was a proposed landfill expansion area in 1986 (WCC, 1986). Though land use surrounding the site is primarily agricultural, a mixture of residential and recreational properties is also scattered around the site. The village of Innsbrook, a vacation home development, lies to the southwest of the site. Within this development lies Lake Lucern, into which the intermittent streams bordering the site empty. Geology beneath the site consists of an 80-180-foot-thick layer of glacial till, which overlies a limestone paleovalley. The upper portion of the till is oxidized and fractured to depths as great as 60 feet.

2.3 OPERATIONAL HISTORY

In 1971, BHS was granted approval by the Missouri Department of Health (MDOH) to operate a refuse disposal area (E & E, 1986). The landfill was owned and operated by James Zykan under the title, "BHS Sanitary Landfill." After the passage of the Missouri Solid Waste law in 1973, the sanitary landfill

operated under an agreement with the state until 1976, when BHS received a Solid Waste Disposal Area Operating Permit from the Missouri Department of Natural Resources (MDNR). While in operation, several MDNR inspections of the sanitary landfill noted unsatisfactory operating practices, including locating fill areas in areas of natural drainage and lack of sufficient cover. In 1977, the sanitary landfill ceased operation and BHS obtained a license from MDNR to operate a special industrial waste disposal facility (hazardous waste landfill) immediately to the north of the sanitary landfill (MDNR, 1996b).

In 1986, MDNR placed the sanitary landfill on the registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri (MDNR, 1986). Entry was made under the name "Zykan Site."

Closure of the sanitary landfill included the placement of a compacted clay cap atop the landfill and of a clay barrier on the downgradient side of the fill to prevent any leachate from entering surface water (MDNR, 1986). Despite the placement of those barriers, the landfill cap eroded, particularly along the south side of the landfill. In addition, areas of leachate release (see Figure 2-2) were documented by MDNR on at least six occasions from 1990 to 1995 (MDNR, 1995). In 1993, leachate was observed entering the intermittent stream south of the site. Because of concern over leachate entering surface water, the site status was changed from "properly closed" to "significant threat to the environment—action required" on the registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri (MDNR, 1996a).

In 1977, following closure of the sanitary landfill, the hazardous waste landfill began accepting waste under an MDNR license as a special industrial waste disposal facility. Several trenches were in use as of November 19, 1980, and therefore qualified for interim Resource Conservation and Recovery Act (RCRA) status. BHS submitted a number of unsuccessful Part B RCRA permit applications from 1983 to 1986. The hazardous waste landfill reached capacity in May 1985 and disposal of off-site-generated hazardous waste in the hazardous waste landfill ceased (E & E, 1986).

In 1986, another RCRA permit application was filed (WCC, 1986), which proposed a 20-acre expansion of the hazardous waste landfill to the southwest of the previous landfills. However, citing financial difficulties, BHS later requested that this application be withdrawn from consideration (Jacobs, 1989). A post-closure ground water monitoring plan for the hazardous waste landfill was approved by MDNR in 1986.

2.4 WASTE CHARACTERISTICS

In the hazardous waste landfill, wastes were buried in one of 33 trenches or drilled cell areas. Of these, seven trenches (trenches 21, 1N, 2N, 6N, 11N, 12N, and progressive trench area) were active after November 1980 and are therefore RCRA-regulated. Figure A-1 in Appendix A (Hazardous Waste Landfill Construction Maps) presents the locations of these trenches within the hazardous waste landfill. Of the seven regulated units, all but trench 21 were constructed with leachate collection systems.

The remaining non-RCRA-regulated trenches within the hazardous waste landfill were excavated to a depth of approximately 27 feet, after which waste was placed in the trench and local soil was used to backfill the trench. Drilled cells consist of 3-foot-diameter holes augered to a depth of approximately 27 feet. Drums were stacked vertically within the hole and local soil was used to backfill the remaining volume (EPA, 1986). It does no appear that any leachate collection system was constructed in the non-regulated trenches or drilled cell areas.

Three interceptor trenches were constructed along the southeastern and eastern boundary of the hazardous waste landfill (Appendix A: Figure A-2). The base of these trenches extends at least 2 feet below the interface between the oxidized and unoxidized till. The sand-filled trenches are designed to intercept leachate from the hazardous waste landfill and were constructed with individual gravel-filled sumps for leachate removal (E & E, 1986). Before closure of the hazardous waste landfill, leachate was pumped into an on-site surface water impoundment. Since closure, leachate has been pumped from the main leachate sump (MLS), which drains the progressive trench area, and been transported off-site for disposal (E & E, 1999a).

Waste disposal practices are not well documented in the sanitary landfill, but waste reportedly was disposed in relatively shallow (8-10 feet) trenches (MDNR, 1996b). While in operation, the sanitary landfill was to accept municipal solid waste, bulky waste, brush and untreated wood waste. However, in 1972, Zykan expressed interest in accepting industrial chemicals as well (MDOH, 1972). No permit to dispose of such wastes in the sanitary landfill was granted, but a letter from the Tretolite Division of Petrolite Corporation in St. Louis, Missouri, to the MDOH indicates that the sanitary landfill received 30 drums of industrial waste per month (Petrolite, 1974). Petrolite described this waste as "paper waste, woodscraps, polymers of condensed alanolamines (these should be biodegradable), other chemical wastes such as polyethylene oxide ethers not currently marketable."

The registry report of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri stated that the industrial waste accepted by the sanitary landfill was similar to that which was subsequently disposed of in the hazardous waste facility to the north. Waste categories included "toxic pesticides, organic hydrocarbons, inorganic heavy metals, paints, pigments, and trihalomethanes" (MDNR, 1986 and 1996a). A 1996 MDNR investigation detected pesticides, volatile organic compounds (VOCs), and several polynuclear aromatic hydrocarbons (PAHs) in the leachate, contaminated soil, or exposed drums near the south side of the sanitary landfill (MDNR, 1996b). The quantities of waste disposed of in the sanitary landfill are unknown.

Records of waste disposed of in the hazardous waste landfill indicate a wide range of constituents. A recent review of files and landfill records led to the creation of a table of wastes disposed of in the hazardous waste landfill during the first 3 years of its operation. Wastes included pesticides, paint sludge, wastewater treatment sludge, contaminated soils, and waste solvents (Dynamac, 1997).

Recent post-closure sampling of the MLS beneath the progressive trench area identified several VOCs and semi-volatile organic compounds (SVOCs) in the leachate (Burns and McDonnell, 1998). Table 4-1 in section 4.2 includes the post-closure sampling-detected compounds and their respective concentrations. No pesticides or polychlorinated biphenyls (PCBs) were detected in the MLS sample.

2.5 PREVIOUS INVESTIGATIONS

An integrated Preliminary Assessment/Site Inspection (PA/SI) of the sanitary landfill was initiated by MDNR in early 1996 (MDNR, 1996b). Citing the underlying thickness of low-permeability glacial till, the report concluded that ground water contamination is unlikely; however, the report also concluded that surface water contamination is a possibility. MDNR personnel observed both the aforementioned leachate outbreak and several 55-gallon drums exposed in an erosion gully along the south side of the sanitary landfill. At least one of the drums was leaking.

MDNR (1996b) sampling and analysis of the leachate indicated elevated concentrations of five metals, and several VOCs and SVOCs. In addition, the herbicide 2,4-D was detected. Sampling of the drums indicated the presence of ignitable hazardous waste; identified compounds included xylenes, ethylbenzene, 2-hexanone, and tetrachloroethylene. Analytical results for these samples are summarized in Tables 2-1 and 2-2.

Table 2-1

MDNR LEACHATE OUTBREAK ANALYTICAL DATA SUMMARY
ZYKAN LANDFILL SITE—WRIGHT CITY, MISSOURI
TDD: S07-9706-014A PAN: 0567ZLSRXX

Compound	Concentration	
	Leachate (µg/L)	Soil (µg/kg)
Metals		
Arsenic	10.3	11,100
Barium	913	123,000
Cadmium	10.7	< 500
Chromium	37.5	10,500
Lead	38.3	12,000
Selenium	<2	579
Volatile Organic Compounds (VOCs)		
Benzene	99.0	< 25.0
Toluene	5.8	< 25.0
Ethylbenzene	240	< 25.0
Total xylenes	560	< 25.0
Chlorobenzene	13.0	< 25.0
Semi-volatile Organic Compounds (SVOCs)		
Benzoic Acid	2.8	< 100
Bis(2-ethylhexyl) phthalate	2.8	130
Di-n-butylphthalate	< 2.0	420
2,4-Dimethylphenol	2.9	< 100
Naphthalene	2.1	< 100
Phenol	42	< 100
Pesticides/Herbicides		
2,4-D	2.33	< 50.0

NOTE: All data from MDNR (1996b).

Table 2-2

MDNR DRUM SAMPLING ANALYTICAL DATA SUMMARY
ZYKAN LANDFILL SITE—WRIGHT CITY, MISSOURI
TDD: S07-9706-014A PAN: 0567ZLSRXX

Compound	Concentration (µg/kg)				
	Drum 3	Drum 7	Drum 9	Drum Release	Drum Release
Total Metals					
Barium	< 10,000	17,500	< 10,000	< 10,000	< 10,000
Cadmium	< 500	613	< 500	< 500	< 500
Chromium	< 2,500	71,000	< 2,500	< 2,500	< 2,500
Lead	< 2,500	158,000	< 2,500	< 2,500	< 2,500
Mercury	< 100	1,430	< 100	< 100	< 100
Volatile Organic Compounds (VOCs)					
Ethylbenzene	< 500,000	< 500,000	190,000	150,000	< 500
Tetrachloroethylene	< 500,000	690,000	< 50,000	< 50,000	< 500
Total xylenes	3,000,000	1,600,000	9,200,000	6,700,000	3,900
Semi-volatile Organic Compounds (SVOCs)					
2-Methylnaphthalene					33,000

NOTE: All data from MDNR (1996b).

KEY: ▨ = Analyte not included in analysis.

At the time of the MDNR sampling, flowing water apparently existed in both the erosion gulley near the exposed drums and in the intermittent stream. Soil and/or water samples from the erosion gully immediately downgradient from the exposed drums showed elevated levels of both total xylenes and several PAH analytes with a high potential for food chain bioaccumulation (acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, di-n-butylpthalate, dibenzofuran, fluoranthene, fluorene, 2-methyl naphthalene, naphthalene, n-nitrosodiphenylamine). Soil and water samples from the intermittent stream indicate that the stream has been impacted by the release of contamination from the leachate outbreak and/or the leaking drums. Identified contaminants include total xylenes, 2-methylnaphthalene, phenol, and 2,4-D. Analytical results for the water and sediment sampling are summarized in Table 2-3. Concentrations exceeding three times the concentration of the respective background sample (or the detection limit of the background sample if the analyte was not detected) are noted.

Table 2-3

MDNR SOIL AND WATER SAMPLING ANALYTICAL DATA SUMMARY
ZYKAN LANDFILL SITE—WRIGHT CITY, MISSOURI
TDD: S07-9706-014A PAN: 0567ZLSRXX

Compound	Concentration			
	Erosion Gulley		Intermittent Stream	
	Soil (µg/kg)	Water (µg/L)	Soil (µg/kg)	Water (µg/L)
Total Metals				
Arsenic	7,660	<2	9,220	<2
Barium	66,700	117	73,400	164
Cadmium	<500	1.43	<500	1.11
Chromium	22,300	<6	17,800	<6
Lead	12,500	<10	19,300	<10
Selenium	<500	<2	585	<2
Volatile Organic Compounds (VOCs)				
Total xylenes	18,000	1,200	<25	24
Semi-volatile Organic Compounds (SVOCs)				
Acenaphthene	800	11	<100	<2
Anthracene	850	<2	<100	<2
Benzo(a)anthracene	260	<2	<100	<2
Benzo(a)pyrene	350	<2	<100	<2
Benzo(b)fluoranthene	160	<2	<100	<2
Benzo(k)fluoranthene	107	<2	<100	<2
Bis(2-chloroethyl)ether	<100	180	<100	<2
Bis(2-ethylhexyl)phthalate	<100	23	1,100	3.6
4-Chloroaniline	<250	<5	180	<5
Chrysene	106	<2	<100	<2
Di-n-butylphthalate	360	<2	1,400	<2
Dibenzofuran	110	<2	<100	<2
2,4-Dinitrotolueme	1,600	<2	<100	<2
Fluoranthene	220	<2	<100	<2

Table 2-3—(Continued)

MDNR SOIL AND WATER SAMPLING ANALYTICAL DATA SUMMARY
ZYKAN LANDFILL SITE—WRIGHT CITY, MISSOURI
TDD: S07-9706-014A PAN: 0567ZLSRXX

Compound	Concentration			
	Erosion Gulley		Intermittent Stream	
	Soil (µg/kg)	Water (µg/L)	Soil (µg/kg)	Water (µg/L)
Semi-volatile Organic Compounds (SVOCs)				
Fluorene	1,400	<2	<100	<2
2-Methylnaphthalene	59,000	920	970	<2
Naphthalene	7,000	810	190	<2
N-Nitrosodiphenylamine	3,700	14	<100	<2
Phenanthrene	1,900	7.1	130	<2
Phenol	<100	<2	<100	104
Pyrene	720	<2	<100	<2
Pesticides/Herbicides				
2,4-D	<50.0	<0.25	<50.0	1.22

NOTE: All data from MDNR (1996b).
KEY: [ ] = Result ≥ 3 x the greater of the respective background concentration or, if undetected in the background sample, the detection limit.

Though nine drums were removed from the erosion gully during the Integrated PA/SI, MDNR (1996b) suspected the presence of an unknown quantity of additional buried drums. A 1996 magnetometer survey (E & E, 1997a) indicated the presence of buried metal (possibly drums) within an approximately 1-acre area in the southwest corner of the sanitary landfill.

During a July 1997 site reconnaissance, START observed the continued flow of leachate near the southern boundary of the Zykan Landfill (Photo 1: Appendix B: Photographic Documentation Record). The area of leachate release covered approximately 2,000 square feet. During that reconnaissance, a flame ionization detector (FID) indicated organic vapors up to 180 parts per million (ppm) within 1 inch of the leachate outbreak surface. No levels above background were detected in the breathing zone (E & E, 1997b).

In response to both the leachate outbreak and potential erosion near the buried drums, EPA Region 7 performed a Removal Action along the southern boundary of the sanitary landfill. Response actions took place from November 1997 through February 1998 and included placing soil fill over both the erosion gully and the leachate outbreak (Appendix B: Photos 2, 3, and 4). In addition, soil fill was placed in sunken areas, and drainage control measures (silt fencing and vegetative seeding) were implemented to reduce infiltration into the landfill (EPA, 1997 and 1998).

Since early 1986, MDOH has been conducting annual sampling and analysis of water samples from several private wells in the vicinity of the site (MDNR, 1996b). Samples have been analyzed for 15

metals, 57 VOCs, 6 chlorinated pesticides, and 2 chlorophenoxy herbicides (MDOH, 1996). To date, MDOH has not detected any contamination in any of the private wells (E & E, 1998b). Locations of the sampled private wells are shown in Figure 2-3 (MDOH Private Well Sampling Program Map).

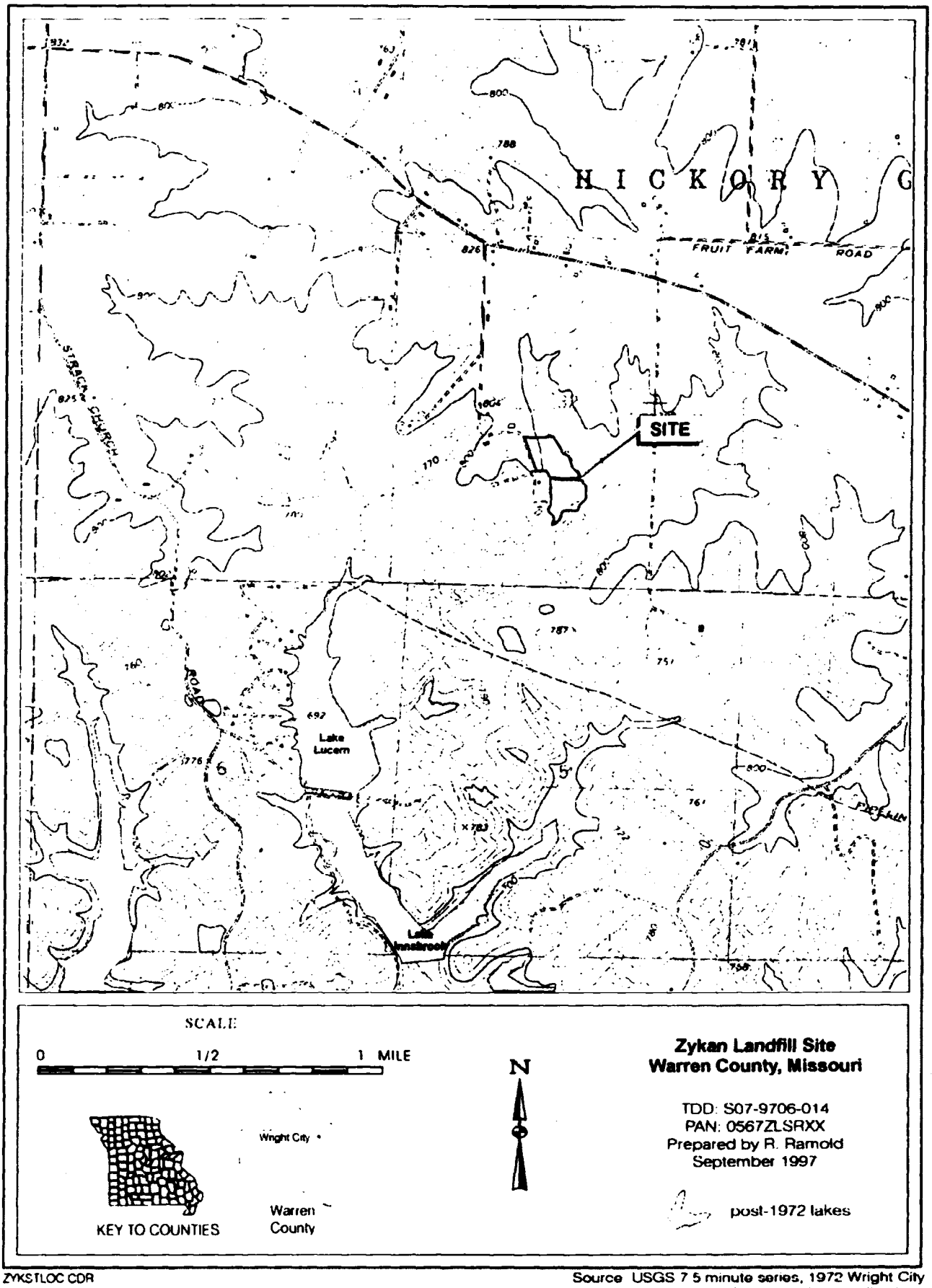
Throughout the history of the hazardous waste landfill, some form of ground water monitoring has been required by MDNR and/or EPA regulations. For the hazardous waste landfill, ground water monitoring began around the hazardous waste landfill in 1977. Several sets of monitoring wells have been installed to help fulfill the required ground water sampling and analysis. Ground water monitoring under RCRA regulations began in 1981 (EPA, 1986). Though well construction, sampling plans, and sampling practices do not appear to be consistent, there did not appear to be a documented release of contamination to ground water from the hazardous waste landfill through 1986.

As part of the post-closure ground water monitoring plan of the hazardous waste landfill, selected monitoring wells, the leachate collection system, and the intermittent stream were scheduled to be sampled semi-annually for contamination indicator parameters (pH, specific conductance, total organic carbon, total organic halide) and annually for several ground water quality parameters (i.e., chloride, iron, manganese, phenols, sodium, and sulfate) (Jacobs, 1989). In February 1986, an EPA task force sampled several monitoring wells around the hazardous waste landfill. Though analytical results did not indicate widespread ground water contamination, both 1,2-dichloroethane and acetone were detected in one of the sampled monitoring wells (GM-1) (EPA, 1986). However, more recent post-closure monitoring has not indicated such a release (E & E, 1999a; Burns and McDonnell, 1997 and 1998). Monitoring wells used in the post-closure monitoring plan are indicated in Figure 2-4 (Monitoring Well Location Map).

In 1997, START was tasked by Region 7 EPA to conduct a file review of information relating to the sanitary landfill. Objectives of this review included:

- characterization of human health and environmental risks associated with the sanitary landfill,
- evaluation of the existing ground water monitoring well network,
- identification of data gaps, and
- development of a preliminary Hazard Ranking System (HRS) score.

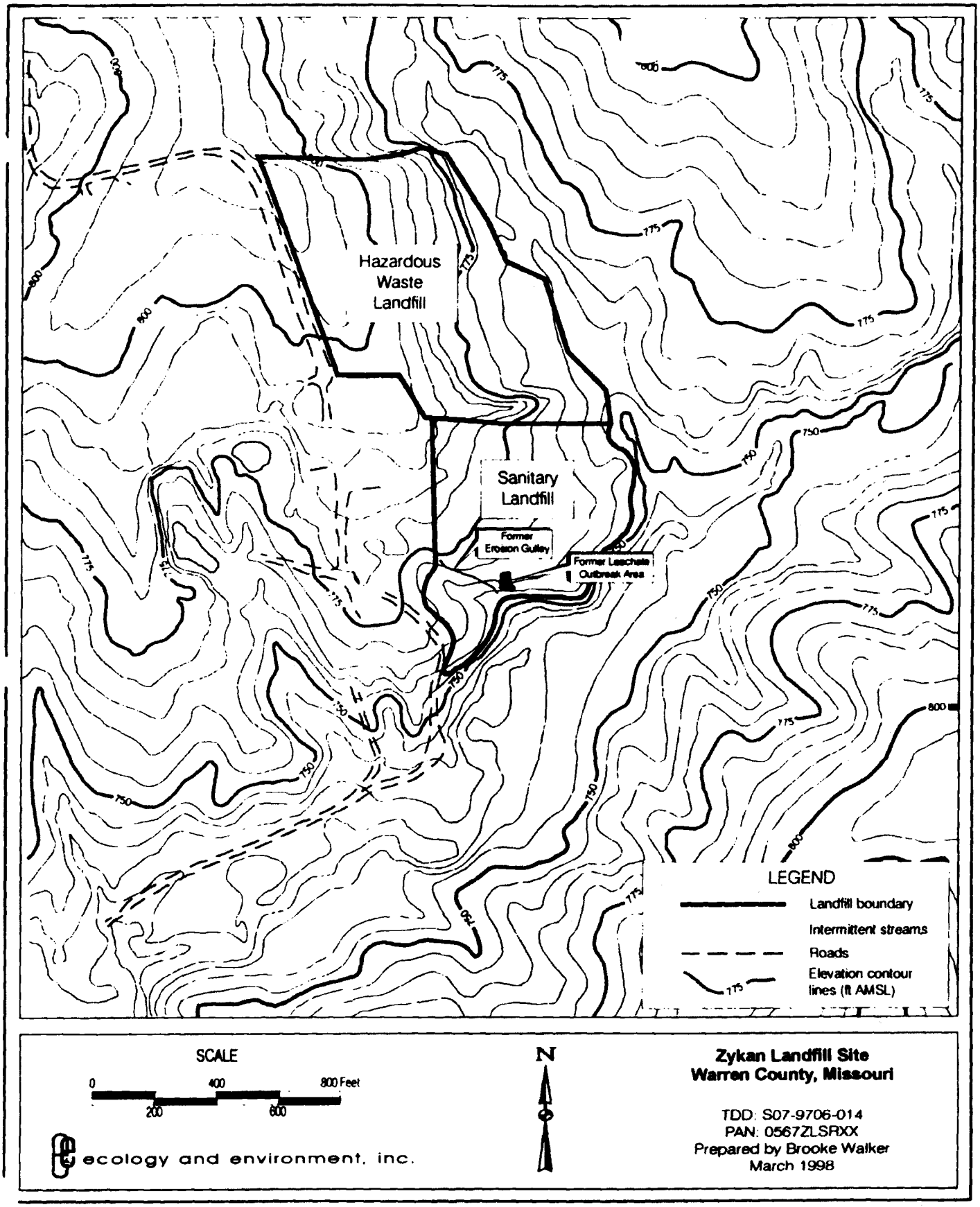
Based on this file review, START concluded that surface water contamination may pose the greatest potential threat to human health and the environment. START identified two mechanisms by which contamination could enter surface water. The first consists of landfill leachate reaching surface water by way of temporary surface water flow in the intermittent streams. A second possibility is that shallow contaminated ground water, apparently being topographically driven, could enter the alluvium of the



ZYKSTLOC CDR

Source USGS 7 5 minute series, 1972 Wright City Quadrangle, Missouri with modifications from Village of Innsbrook Map

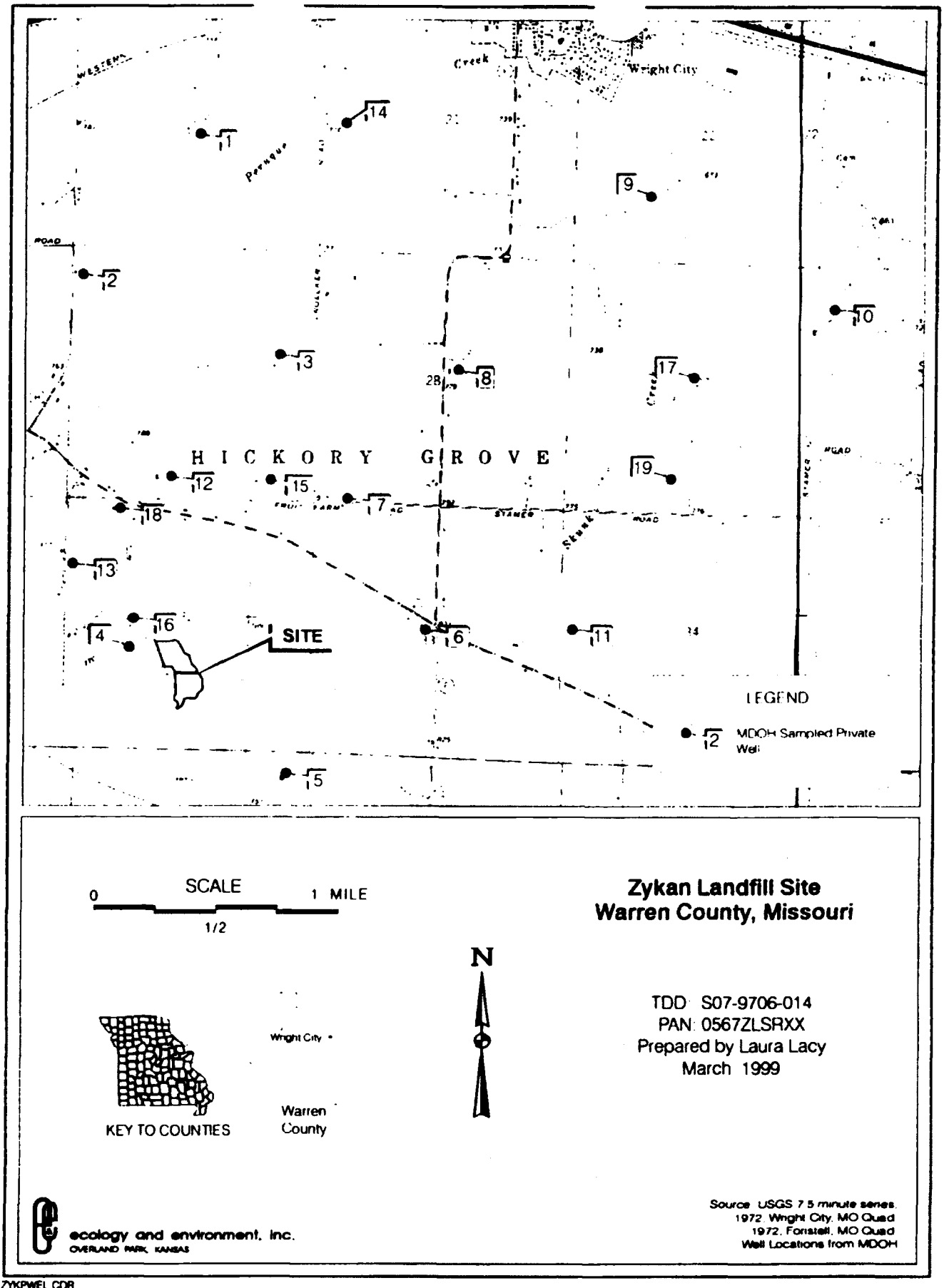
Figure 2-1: Site Location Map



ZYKSITE2.CDR

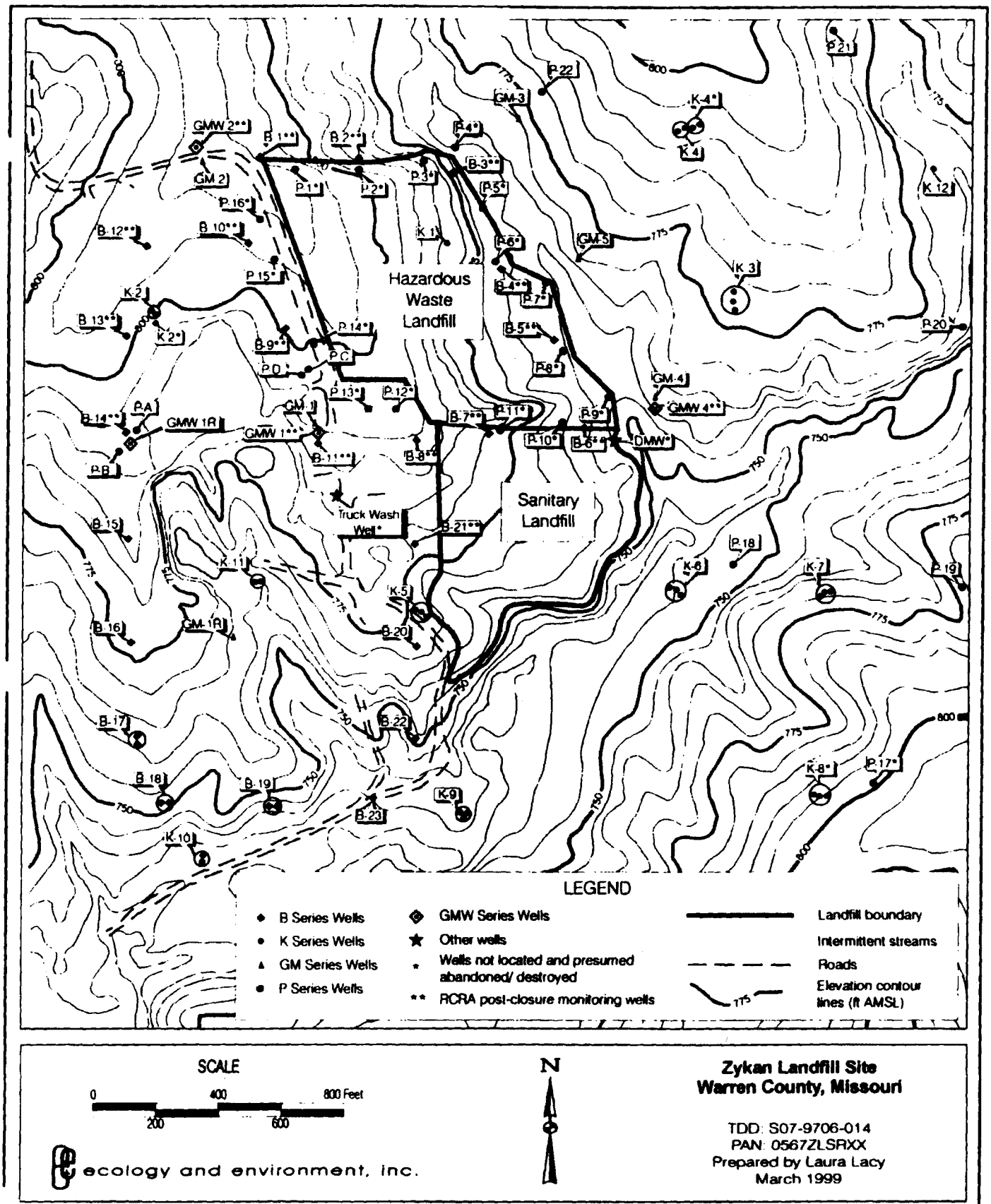
Source: Woodward Clyde (1986) RCRA Part B Application

Figure 2-2: Site Area Map



ZYKPWEL CDR

Figure 2-3: MDOH Private Well Sampling Program Map



ZYKWELL CDR

Source Woodward Clyde (1986) RCRA Part B Application

Figure 2-4: Monitoring Well Location Map

intermittent streams and flow downgradient to surface water (E & E, 1997d). These threats could be of particular concern given the high potential for bioaccumulation of some of the contaminants identified in soil samples along the southern boundary of the sanitary landfill (MDNR, 1996b).

In February 1998, START conducted a second site reconnaissance, the purpose of which was to document the construction specifications and current status of the existing monitoring wells. Over 100 monitoring wells have been installed in and around the site. Figure 2-4 shows the locations of these monitoring wells. Previous site visits have indicated that some of these monitoring wells are in disrepair. START inspected 53 of these wells during the monitoring well assessment. Due to poor construction and/or subsequent poor maintenance, several of these provide potential threats to ground water as direct conduits for vertical movement of any potential contaminant release to ground water (E & E, 1998a).

3.0 EXPANDED SITE INSPECTION ACTIVITIES

The primary objectives of this ESI, as agreed upon by EPA and START project managers, include the following:

- to identify and document any potential release to, and contamination of, surface water from either the sanitary landfill or the hazardous waste landfill,
- to identify and document any potential releases of contamination to ground water from either the sanitary landfill or the hazardous waste landfill,
- to identify and document any potential ground water targets subject to contamination,
- to determine whether additional ground water monitoring wells screened in the alluvium of the intermittent stream are necessary, and
- to characterize source contaminants in the hazardous waste landfill.

To achieve these objectives, START collected surface water, sediment, and ground water samples on and near the site. In addition, START collected samples from the hazardous waste landfill's leachate collection system and soil samples from the bed of the intermittent stream. START conducted the ESI sampling in April 1999. Table 3-1 summarizes the samples collected, their purpose in fulfilling these objectives, and the requested analyses.

Table 3-1
ESI SAMPLING STRATEGY SUMMARY
ZYKAN LANDFILL SITE—WRIGHT CITY, MISSOURI
TDD: S07-9706-014A PAN: 0567ZLSRXX

Type of Sample	Number of Samples	Sampling Location		Purpose	Requested Analysis						
		Description	Map		VOC	SVOC	Pest.	Herb.	Tot. Met.	Dis. Met	Dioxin
source (water)	3	leachate sumps	Figure 3-1	Source characterization at hazardous waste landfill	X	X	X	X	X	X	X
soil	9	intermittent stream soil	Figures 3-2 & 3-3	Attribution of potential surface water contamination to site	X	X	X	X	X		X*
ground water	14	existing monitoring wells	Figure 3-4	Documentation of observed release to ground water pathway	X	X	X	X	X	X	X*
	8	Geoprobe® monitoring wells in alluvium of intermittent stream	Figures 3-2 & 3-3	Determination of need for permanent monitoring wells to document an observed release to ground water and potential ground water-to-surface water transport of contamination	X	X	X	X	X	X	X*
	3	nearby private wells	Figure 3-5	Documentation of potential contamination of ground water pathway targets	X	X	X	X	X	X	
surface water	8	Lake Lucern, intermittent streams, and background	Figure 3-6	Documentation of potential contamination of surface water pathway.	X	X	X	X	X	X	X*
surface water sediment	8	Lake Lucern, intermittent streams, and background	Figure 3-6		X	X	X	X	X		X*
field blank	1	water	NA	QC Samples	X	X	X	X	X	X	
trip blank	2	water	NA		X						
trip blank	1	soil	NA		X						
rinsate blank	1	rinsate samples Geoprobe® ground water sampling equipment	NA		X	X	X	X	X	X	

KEY: * = Indicates that only selected samples were submitted for the requested analysis.

Due to a lack of perceived threat, the air pathway was not evaluated during the ESI.

3.1 SOURCE SAMPLING

3.1.1 Hazardous Waste Landfill Leachate Sampling

Previously, leachate from the MLS has been sampled and analyzed for VOCs, SVOCs, PCBs, and organochlorine pesticides. In addition, sumps draining the interceptor trenches were also sampled and analyzed for the same parameters. Due to the wide range of potential landfill contaminants, START expanded upon the analytical scope of previous sampling efforts to include analysis for total and dissolved metals, herbicides, and dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin). In order to more fully characterize source contaminants from the hazardous waste landfill, START sampled three leachate collection system sumps. These include the MLS, the sump draining interceptor trenches 1 and 2, and the sump draining interceptor trench 3 (Figure 3-1: Leachate Sump Sampling Location Map). Sampling particulars were recorded on sampling data sheets (Appendix C: Sampling Data). START collected the samples using new, disposable bailers. Leachate samples were submitted to the EPA Region 7 Laboratory for VOC, SVOC, pesticide, herbicide, total metals, dissolved metals, and dioxin analyses.

Due to the soil cover over the sanitary landfill, the lack of an accessible engineered leachate collection system, and the previously analyzed samples from the exposed drums and leachate outbreak (section 2.5), START did not attempt to collect samples to characterize source material from the sanitary landfill.

3.1.2 Attribution Sampling

Due to the previously documented leachate release from the sanitary landfill, START collected nine surface soil samples from the intermittent stream bed upstream from (location ISS-1), adjacent to, and downstream from the site. The purpose of this sampling is to document the existence and extent of potential soil contamination from the site in the intermittent stream bed and to show attribution of potential surface water contamination to the site. Soil sampling locations are shown in Figures 3-2 (Sampling Location Map-1) and 3-3 (Sampling Location Map-2). Surface soil samples were collected using disposable stainless steel spoons. Sampling particulars were recorded on sampling data sheets (Appendix C). All soil samples from the intermittent streambed were submitted to the EPA Region 7 Laboratory for VOC, SVOC, metals, pesticides, and herbicide analyses. Three selected samples were also submitted for dioxin analysis.

3.2 GROUND WATER PATHWAY SAMPLING

In order to characterize the ground water pathway, START collected ground water samples from permanent monitoring wells, nearby private wells, and temporary Geoprobe™ monitoring wells. Permanent monitoring wells were sampled to investigate potential ground water contamination near the site. Nearby private wells were sampled to document potential contamination of nearby ground water pathway targets. Temporary Geoprobe® monitoring wells were driven into the intermittent stream alluvium. Sampling of the temporary monitoring wells was used to help determine whether additional monitoring wells are necessary in the intermittent stream alluvium.

3.2.1 Permanent Monitoring Well Sampling

START collected ground water samples from 14 permanent monitoring wells screened in the saturated till beneath the site. The locations of these wells are shown in Figure 3-4 (Monitoring Well Sampling Location Map). These wells were chosen based on areal location and screened depth interval. Before sampling, all wells were purged by either removing three times the volume of standing water within the well or by bailing the well dry, whichever occurred first (Appendix B: Photo 5). Casing volumes were calculated by subtracting the measured depth to water in the well from the previously documented depth of the well (E & E, 1998a). Purging data were recorded on monitoring well purging data sheets (Appendix C). All purge water was collected and drummed on site. Purging and sampling were performed using either existing dedicated bailers or new disposable bailers.

Before sampling the monitoring wells, START measured the depth to water in each of the sampled monitoring wells. These data were used in conjunction with previously surveyed monitoring well elevations to determine ground water flow direction at the time of the investigation.

All permanent monitoring well samples were submitted to the EPA Region 7 Laboratory for lower detection limit (LDL) VOC, SVOC, pesticides, herbicides, total metals, and dissolved metals analysis. Four selected monitoring well samples were also submitted for dioxin analyses.

3.2.2 Geoprobe™ Temporary Monitoring Well Sampling

START collected ground water samples from eight temporary Geoprobe™ monitoring wells. Temporary monitoring wells were used to determine the necessity of permanent monitoring well installation in the intermittent stream alluvium. All temporary Geoprobe™ monitoring wells samples were taken from

ground water within the alluvium of the intermittent stream. Sampling locations are shown in Figures 3-2 and 3-3. These locations include an upgradient sampling point, two points adjacent to the landfills, and five points between the landfills and Lake Lucern.

Due to heavy rains prior to and during ESI field activities, surface water flow in the intermittent stream bed prevented access with the tracked Geoprobe™ unit. As a result, START installed the temporary wells by hand using a hand-driven post driver. Wells were driven to refusal [approximately 6 feet below ground surface (BGS)]. START then exposed the screen using a hand jack and collected the sample using a peristaltic pump. Within the intermittent stream bed, sampling locations were chosen so as to prevent direct surface water intrusion into the borehole (Appendix B: Photo 6). All samples adjacent to the landfill were taken from the landfill side of the stream bank. Due to the heterogeneous nature of the alluvial deposits, several attempts to obtain ground water were usually necessary. Sampling details were recorded on temporary monitoring well sampling data sheets (Appendix C: Sampling Data).

START submitted all temporary Geoprobe™ monitoring well samples to the Region 7 EPA Laboratory for LDL VOC, SVOC, total metals, pesticide, and herbicide analyses. Five selected samples were also submitted for dioxin analysis.

3.2.3 Private Well Sampling

Since 1986, the Missouri Department of Health has been engaged in an annual analysis of private drinking water wells surrounding the site. As of 1996, samples had been analyzed for 19 inorganic chemicals, 6 chlorinated pesticides, 57 volatile organic compounds, and 2 chlorophenoxy herbicides (MDNR, 1996b). Because no evidence of private well contamination has been discovered to date, START limited sampling to three nearby private wells to the north and northeast of the site. Because ground water flow is to the northeast within the bedrock aquifer (Ozark Aquifer), these private wells are downgradient from the site. The sampled private wells are shown in Figure 3-5 (Private Well Sampling Location Map). A fourth private well was proposed for sampling (MDOH private well 4) but is apparently no longer in use and possibly abandoned. START could not locate a well on the property and the resident of the property informed START that water is supplied from a rural water system (E & E, 1999b).

Field parameters, including specific conductance, pH, and temperature, were measured and recorded before sampling. Private well survey forms, which document available well construction and water use details, were completed for each sampled private well (Appendix C: Sampling Data).

START submitted all private well samples to the Region 7 EPA Laboratory for LDL VOC, SVOC, total metals, pesticide, and herbicide analyses.

3.3 SURFACE WATER PATHWAY SAMPLING

3.3.1 Surface Water Sampling

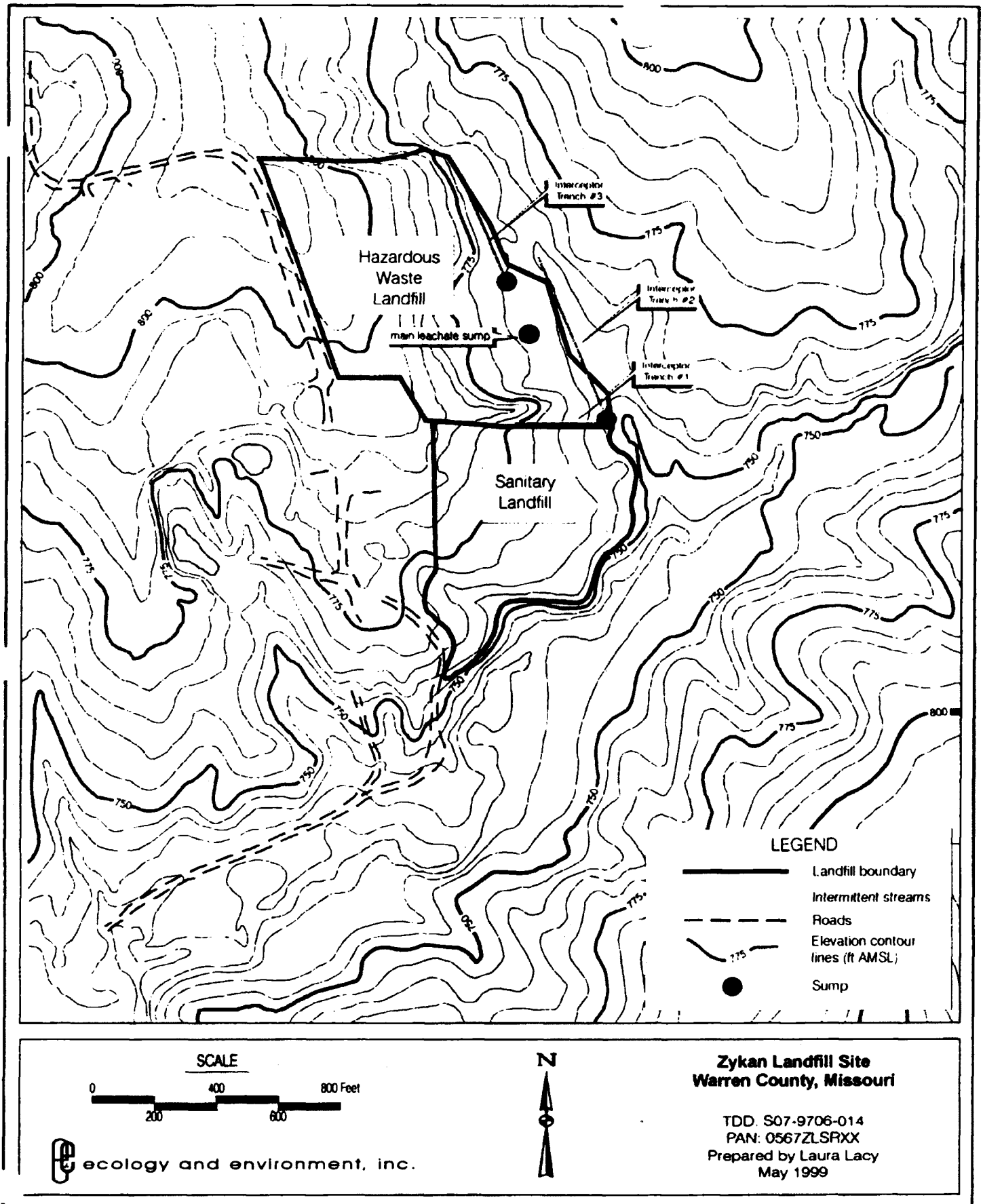
START collected surface water and surface water sediment samples from eight locations (Figure 3-6: Surface Water and Surface Water Sediment Sampling Location Map). These include a background sample and five samples from standing water in Lake Lucern. In addition, two samples were taken from two intermittent streams immediately upgradient of Lake Lucern. The first intermittent stream led upstream to the site; the second drained another lake to the north of Lake Lucern. As previously discussed, heavy precipitation resulted in temporary flow in the intermittent streambed. Access to the lake for sampling was gained either by wading or boating, depending on the depth of the water. Shallow surface water samples were collected by directly dipping the sampling containers into the water. In deeper portions of Lake Lucern, START used a Kemmerer sampler to obtain surface water samples. Field parameters, including specific conductance, pH, and temperature were measured and recorded before sampling (Appendix C).

All surface water samples were submitted to the EPA Region 7 Laboratory for VOC, SVOC, pesticides, herbicides, total metals, and dissolved metals analysis. Two surface water samples, including the background location sample, were also submitted for dioxin analysis.

3.3.2 Surface Water Sediment Sampling

In addition to the surface water samples, START also collected eight surface water sediment samples from the same locations (Figure 3-6). Shallow sediment samples were collected by scooping sediment from the bottom of the lake directly into the sample containers. Deeper sediment samples were collected from a boat using an Eckman dredge. Surface water sediment sampling data are included in Appendix C of this report.

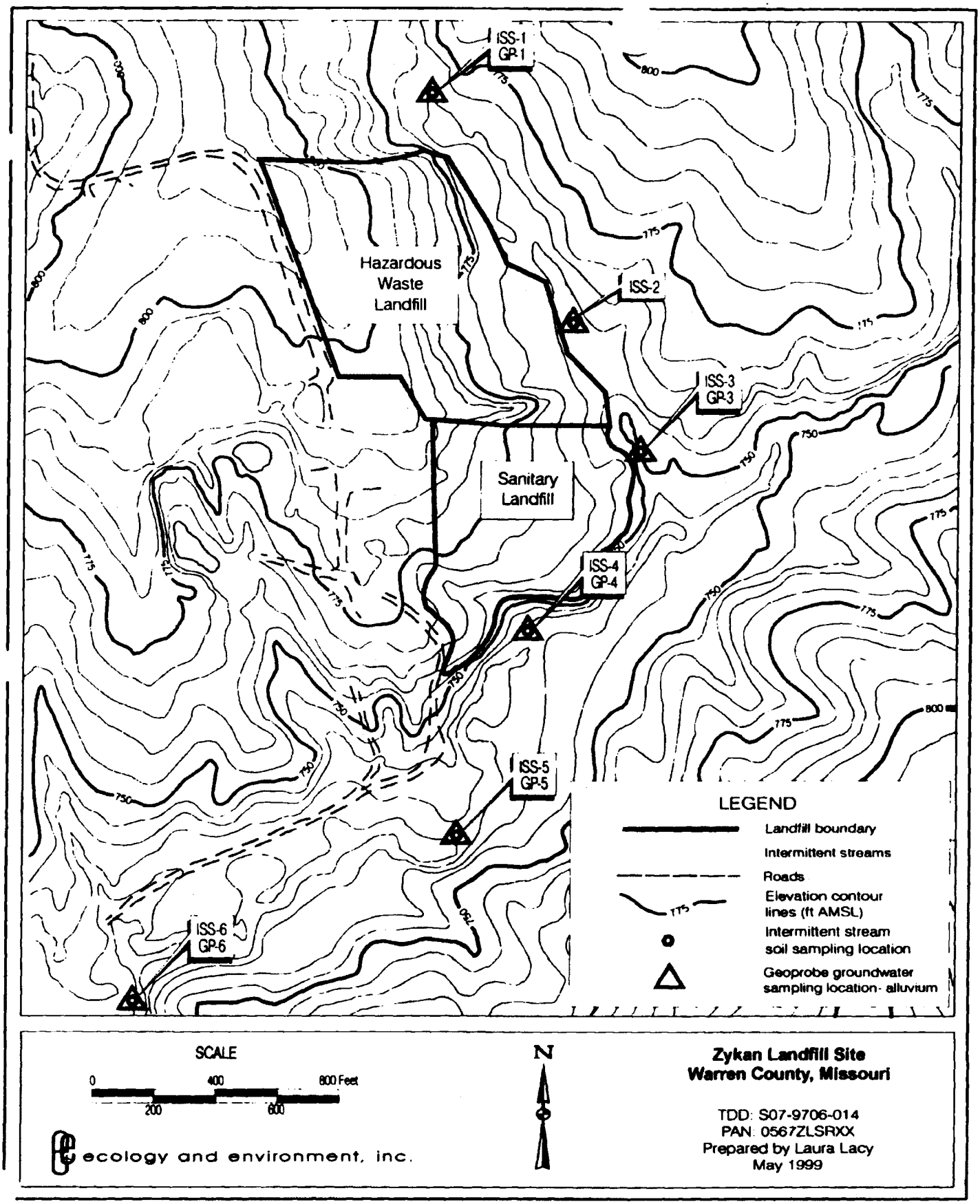
Surface water sediment samples were submitted to the EPA Region 7 Laboratory for VOC, SVOC, pesticides, herbicides, and metals analyses. Two surface water sediment samples, including the background location sample, were also submitted for dioxin analysis.



ZYKSUMPCDR

Source: Woodward Clyde (1986) RCRA Part B Application

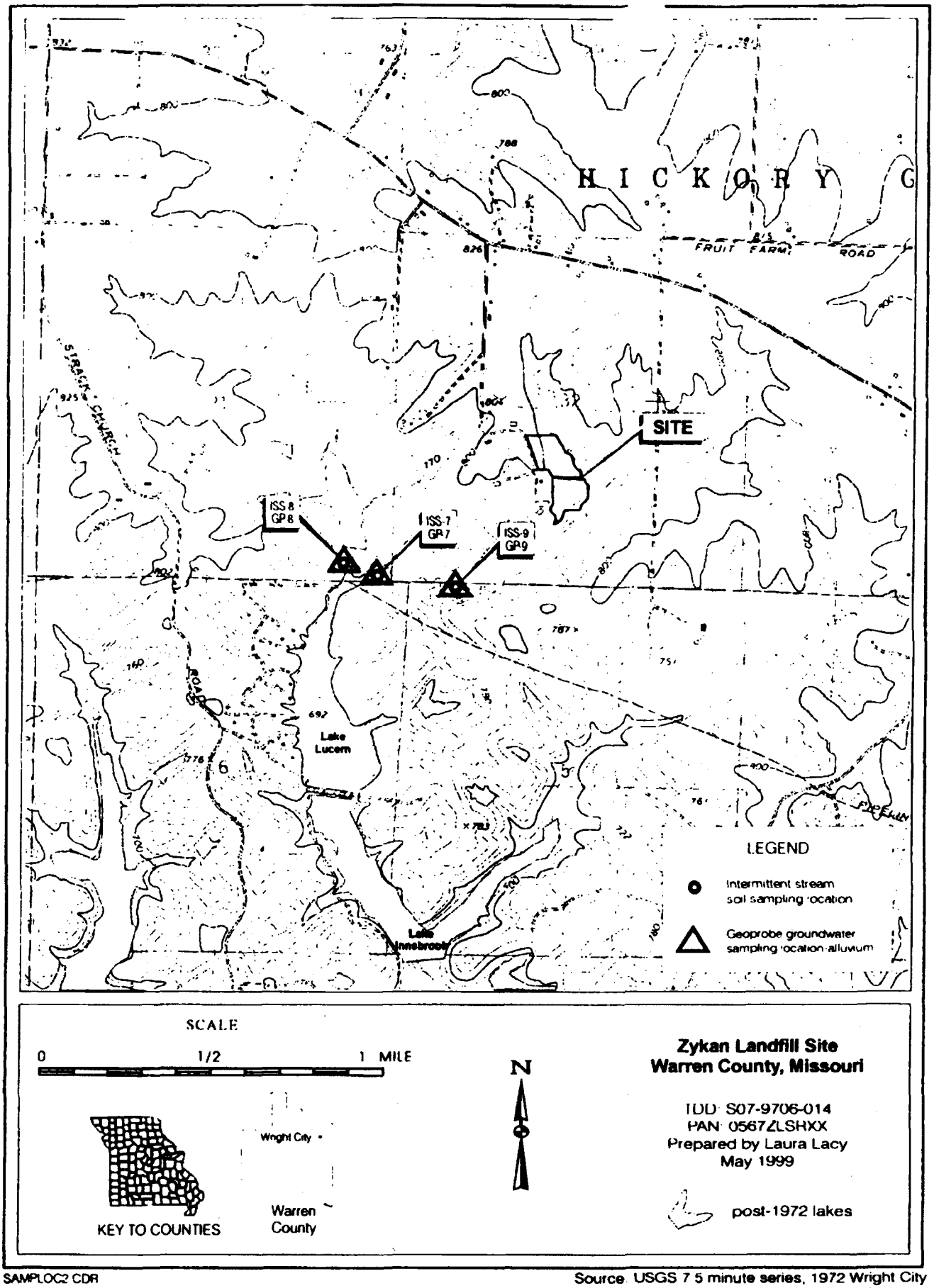
Figure 3-1: Leachate Sump Sampling Location Map



SAMPLOC1.CDR

Source: Woodward Clyde (1986) RCRA Part B Application

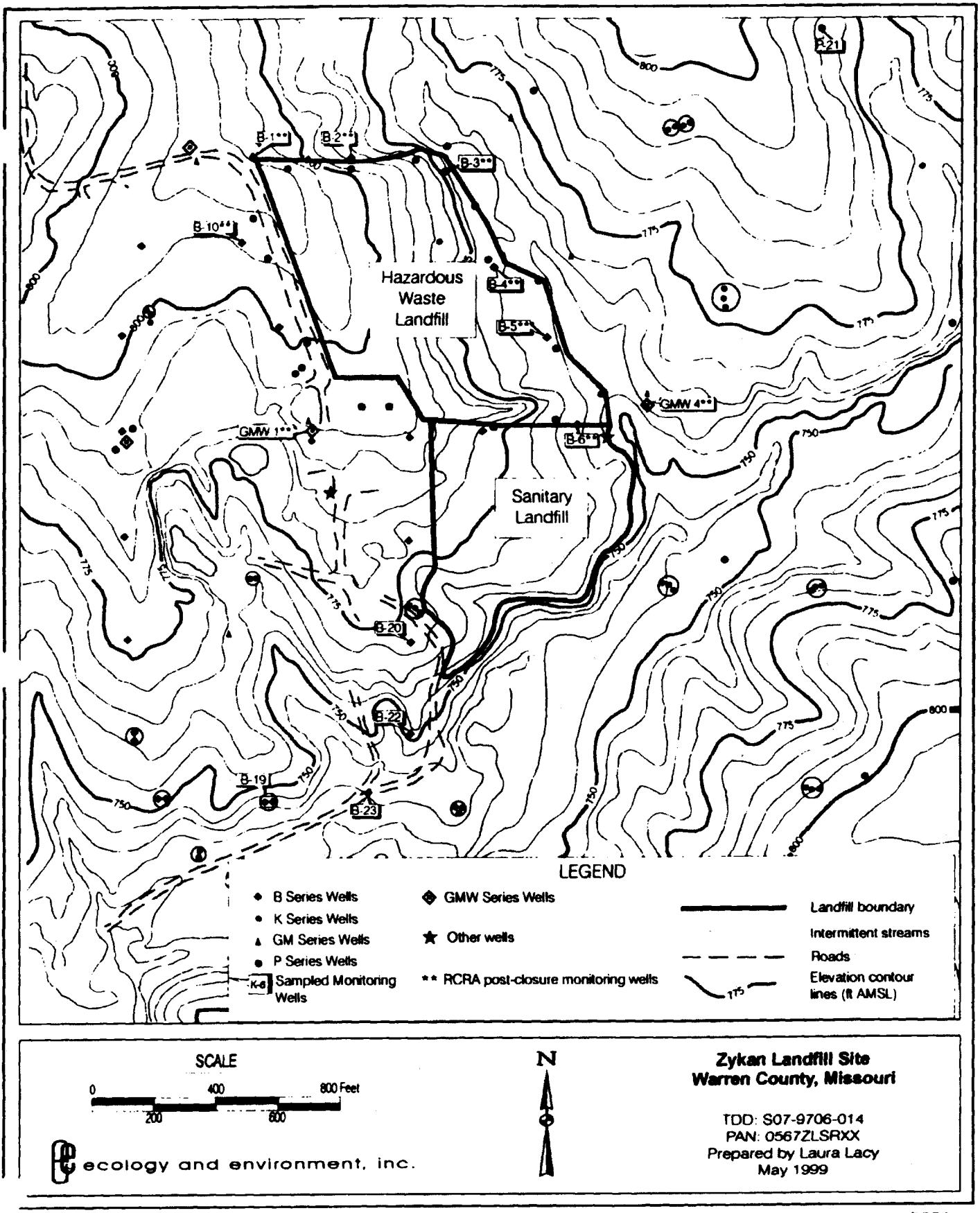
Figure 3-2: Sampling Location Map-1



SAMPLOC2.CDR

Source: USGS 7.5 minute series, 1972 Wright City Quadrangle, Missouri with modifications from Village of Innsbrook Map

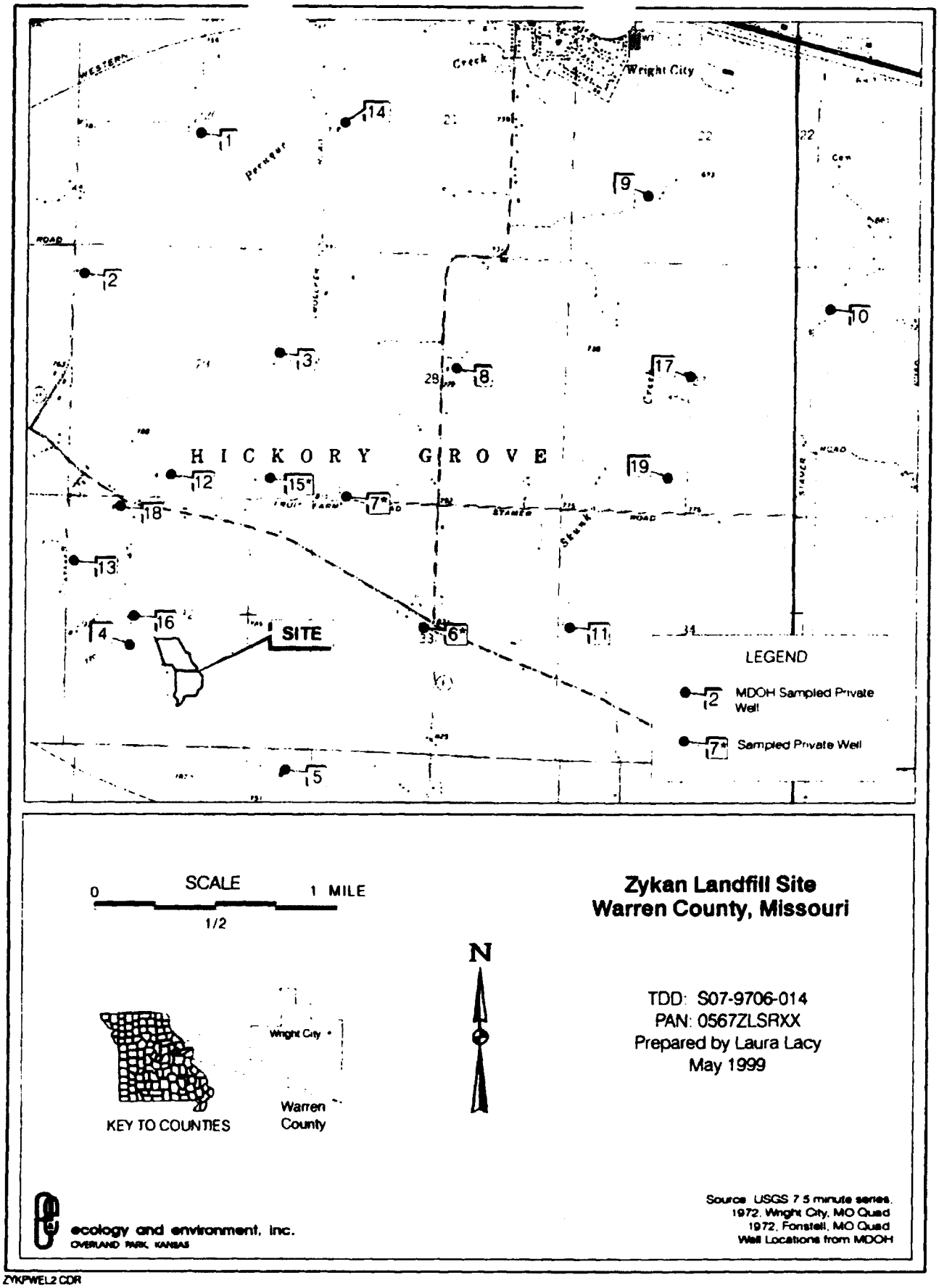
Figure 3-3: Sampling Location Map-2



ZYKWEL.S CDR

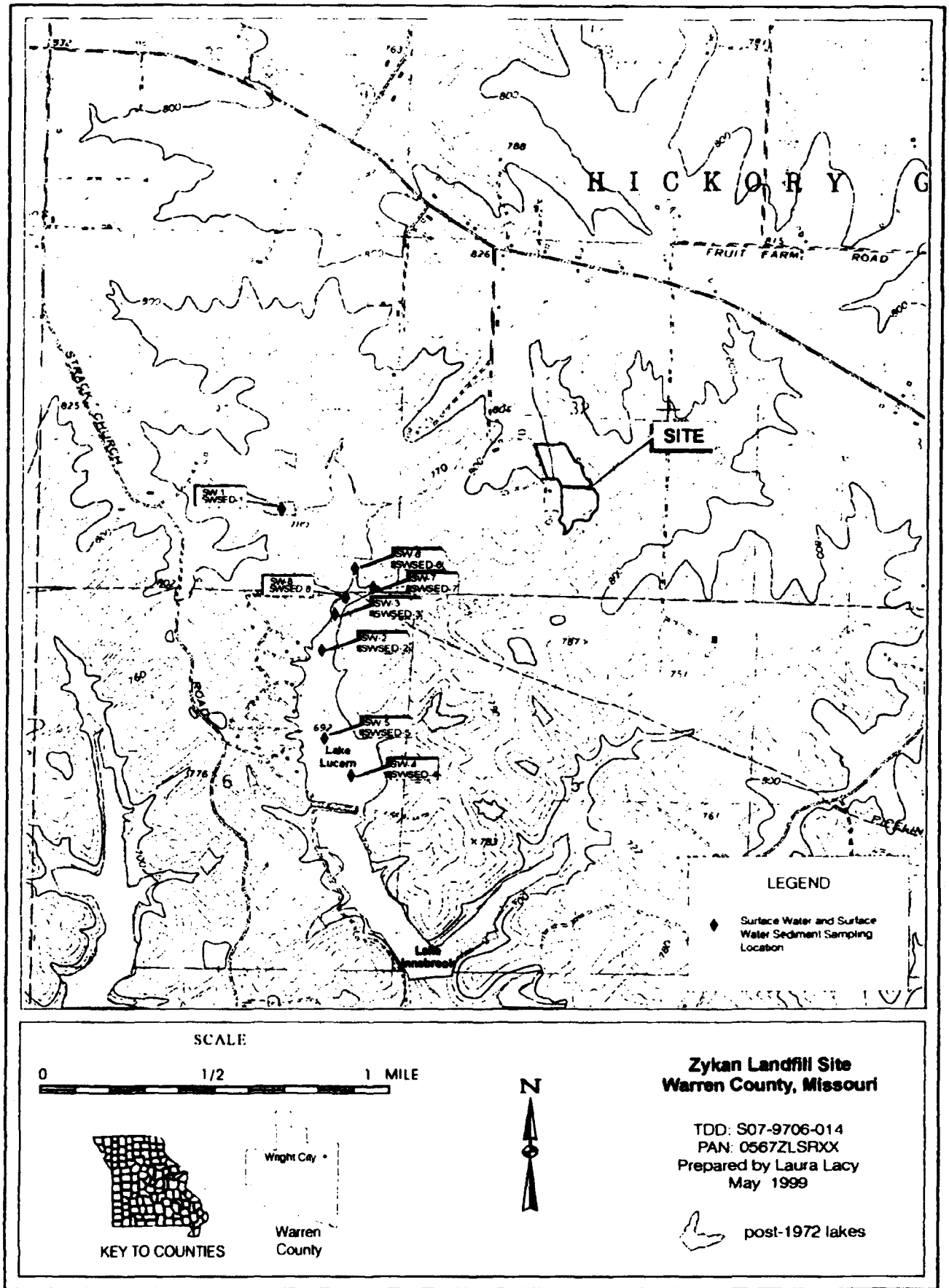
Source Woodward Clyde (1986) RCRA Part B Application

Figure 3-4: Monitoring Well Sampling Location Map



ZYKPWEL2.CDR

Figure 3-5: Private Well Sampling Location Map



ZYKSWCDR

Source: USGS 7 5 minute series, 1972 Wright City Quadrangle, Missouri with modifications from Village of Innsbrook Map

Figure 3-6: Surface Water and Surface Water Sediment Sampling Location Map

4.0 SOURCE CHARACTERIZATION

4.1 SOURCES

Both the sanitary and hazardous waste landfills were considered potential sources for the purposes of the ESI. Waste disposal practices, waste characteristics, and landfill dimensions were previously discussed in section 2.0 of this report.

4.2 SOURCE ANALYTICAL RESULTS

During the ESI, START sampled the MLS and two interceptor trench sumps of the hazardous waste landfill (Figure 3-1). Due to the soil cover over the sanitary landfill, the lack of an accessible engineered leachate collection system, and the previously analyzed samples from the exposed drums and leachate outbreak, START did not attempt to collect samples to characterize source material from the sanitary landfill. Samples from the sumps were submitted to the Region 7 EPA Laboratory for VOC, SVOC, pesticide, herbicide, total metals, dissolved metals, and dioxin analyses.

Table 4-1 summarizes the analytical results of the leachate sump samples. A complete listing of all ESI analytical results is included in Appendix D (Analytical Data Package) of this report. No dioxin, pesticides, or herbicides were detected in any of the leachate sump samples. No metals were detected at significantly elevated concentrations. No VOCs or SVOCs were detected in the samples from the sumps draining either interceptor trench 3 or interceptor trenches 1 and 2. Several VOCs and SVOCs were detected in the sample from the MLS. Detected VOCs and SVOCs and their respective concentrations are listed in table 4-1. Also shown are analytical results from a July 1998 post-closure monitoring sampling effort (Burns and McDonnell, 1998).

Table 4-1
VOC AND SVOC CONCENTRATIONS IN MAIN LEACHATE SUMP
ZYKAN LANDFILL SITE—WRIGHT CITY, MISSOURI
TDD: S07-9706-014A PAN: 0567ZLSRXX

Compound	Concentration (µg/L)	
	July 1998*	April 1999
Volatile Organic Compounds (VOCs)		
Acetone	3,120	200,000
Acrylonitrile	44.6	
Benzene	25.1	95
Carbon Disulfide	74.6	71
Chlorobenzene	5.52	21

Table 4-1—(Continued)

VOC AND SVOC CONCENTRATIONS IN MAIN LEACHATE SUMP
ZYKAN LANDFILL SITE—WRIGHT CITY, MISSOURI
TDD: S07-9706-014 PAN: 0567ZLSRXX

Compound	Concentration (µg/L)			
	July 1998*		April 1999	
Volatile Organic Compounds (VOCs)				
Chloroethane	11.2		22	U
1,1 -Dichloroethane	5	ND	310	
1,2-Dichloroethane	10.3		120	
1,1-Dichloroethene	338		16	U
cis-1,2-dichloroethene	35.7		23	
Ethylbenzene	118		280	
Methyl Ethyl Ketone	1,290		2,700	
4-Methyl-2-Pentanone	5	ND	3,200	
Toluene	717		2,900	
Trichloroethene	17.8		34	
Vinyl Chloride	20.3		13	U
Xylenes	449		1,170	
Semi-volatile Organic Compounds (SVOCs)				
Benzoic Acid	23.1		50	U
Benzyl Alcohol	121		3.2	U
2,4-Dimethylphenol	14.6		220	
Dimethylphthalate	27.2		2.5	U
2-Methylphenol	93.6		5.8	U
4-Methylphenol	85.7		8.2	U
Naphthalene	10	ND	560	
2-Nitroanaline	51.1		12	U
Nitrobenzene	29.3		3.8	U
Phenol	201		840	

KEY: U = The material was analyzed for, but was not detected. The associated numerical value is the sample detection limit.
▱ = Analyte not included in analysis. ND = Not detected. * = Data from Burns and McDonnell (1998).

4.3 ATTRIBUTION ANALYTICAL RESULTS

START collected nine surface soil samples from the intermittent stream. The purpose of this sampling was to document any potential soil contamination in the intermittent stream bed and to show attribution of potential surface water contamination to the site. All soil samples from the intermittent streambed were submitted for VOCs, SVOCs, metals, pesticides, and herbicide analyses. Three selected samples were also submitted for dioxin analysis. Aside from the exceptions discussed below, none of the requested analytes was detected in any of the intermittent stream bed soil samples. Analytical results are included in Appendix D.

Several metals were detected in the soil samples from the intermittent stream bed. With the exception of copper, the variation in detected metals concentrations is consistent with natural variation in the concentration of these elements; however, copper was detected at a concentration of 1,800 μg/kg in sample ISS-3. This is greater than 300 times the concentration of the background sample. Given the apparently limited extent of this high concentration and the fact that copper was not detected at elevated concentrations in any of the source samples, the elevated copper concentration at ISS-3 does not necessarily indicate a release from the landfills to the intermittent stream bed soil. A former vehicle path crosses the intermittent stream bed approximately 150 feet upgradient of sample location ISS-3. It is possible that construction waste, deposited across the stream bed as an apparent erosion control measure, may have contributed to this anomalously high copper concentration.

The pesticide endosulfan sulfate was detected at a concentration of 0.73 μg/kg in sample ISS-5. This concentration does not exceed three times the detection limit of the background intermittent stream bed sample for the same analyte.

4.4 SOURCE CONCLUSIONS

Sources at the Zykan Landfill site include both the sanitary landfill and hazardous waste landfill. The volume of buried wastes is not completely known, but approximate volumes can be estimated based on the physical dimensions and reported disposal practices. The sanitary and hazardous waste landfills encompass approximately 5 and 12 acres, respectively. In the sanitary landfill, wastes were deposited in shallow trenches approximately 8-10 feet deep. Wastes in the hazardous waste landfill were disposed of either in drilled cells or trenches, approximately 27 feet deep. Previous sampling of source material from the sanitary landfill indicates the presence of 2,4-D, VOCs, and SVOCs, including a number of PAHs (MDNR, 1996b). ESI sampling and analysis of the leachate collection system of the hazardous waste landfill indicate the presence of both VOCs and SVOCs.

Previous analyses of intermittent stream bed soil (MDNR, 1996b) indicated that contamination from the sanitary landfill had impacted the intermittent stream. ESI soil sampling of the stream bed did not confirm this impact. This apparent discrepancy could be accounted for by erosion of contaminated stream bed material, deposition of non-contaminated material over the contaminated material, or simply a limited extent of the previously identified contaminated soil.

5.0 GROUND WATER PATHWAY CHARACTERIZATION

5.1 GEOLOGY

5.1.1 Soils

As elevation generally decreases across the site from northwest to southeast, soil classification changes from soils belonging to the Hatton, Keswick, and Dockery Series. The upslope Hatton silt loam is a gently to moderately sloping, deep, moderately well drained soil that formed in loess and the underlying glacial till. Downslope from the Hatton lies the Keswick silt loam, a strongly sloping, moderately well drained soil. Permeability is slow and both organic matter content and natural fertility are low for the Hatton and Keswick soils. The Dockery silt loam is found near the intermittent streams bordering the site. It formed from alluvial deposits of the streams and consists of deep, somewhat poorly drained soil with moderate organic matter and high natural fertility (USDA, 1978).

5.1.2 Geology

The geologic and hydrogeologic regime beneath the sanitary landfill has not been explicitly investigated. However, a significant amount of information is available from investigations associated with the immediately adjacent hazardous waste landfill. The geology beneath the site consists of unconsolidated Holocene and Pleistocene deposits overlying Paleozoic bedrock. Pleistocene glacial till comprises the majority of the unconsolidated deposits; limestone, shale, and sandstone make up the bedrock. Figure 5-1 (Geologic/Hydrogeologic Column) presents the geologic units beneath the site and their respective thicknesses.

Depth of unconsolidated deposits ranges from 80 to greater than 180 feet below ground surface (BGS). This varying depth has been attributed to the presence of a buried bedrock paleovalley (WCC, 1986). From bedrock, and in ascending order, the unconsolidated deposits consist of pre-Pleistocene residual soil, glacial till, and a thin loess cap.

The residual clay is thin and discontinuous, possibly due to glacial erosion. Glacial till comprises the majority of the unconsolidated deposits. Woodward-Clyde Consultants (WCC, 1986) identified three components of the till: an older basal till, a younger basal till, and a younger supraglacial till. The older basal till is made up of homogeneous clays with little granular material. A paleosol separates this till from the younger basal till, which is similar but contains more granular material.

Above the two basal tills lies the relatively thick supraglacial till, which constitutes the majority of the till deposits. It consists of sandy and silty clays containing lenses of sand and gravel. Up to 60 feet below ground surface, the supraglacial till is oxidized and fractured due to weathering and desiccation. The interface between the lower unoxidized till and the upper oxidized till is distinct and observable by a change in color from dark grey (unoxidized) to yellowish-brown (oxidized) (WCC, 1986).

The continuity of the granular lenses within the till is an important issue due to their high permeability relative to that of the surrounding till. Based on borehole logs, WCC (1986) concluded that the lenses were discontinuous. Previous reports came to the same conclusion based on slow water level recovery in monitoring wells; however, an EPA task force stated that these conclusions have not been supported by adequate field testing (EPA, 1986).

A thin (2 to 5 feet) but discontinuous layer of loessal soils overlies the till. Alternatively, in surface drainage pathways the till may be overlain by alluvial stratified deposits of clay through gravel. These alluvial deposits are up to 15 feet thick in the intermittent stream valley to the south of the site (WCC, 1986).

Beneath the unconsolidated deposits lie Ordovician and Devonian bedrock deposits. Relatively little site-specific information is available on the nature and thicknesses of these units; however, some conclusions can be drawn based on limited bedrock coring and knowledge of regional geology. Based on previous cross-sections (WCC, 1986), depth to bedrock beneath the site ranges from 80 to greater than 180 feet. Pre-Pleistocene and/or glacial erosion apparently sculpted the underlying bedrock into a paleovalley trending north-northwest beneath the site (WCC, 1986). This resulted in the removal of some of the upper bedrock formations along the axis of the paleovalley. Along the walls of the paleovalley and west of the site, Devonian units (Sulphur Springs Group, Snyder Creek Formation, and Callaway Limestone) overlie the Ordovician Plattin Formation. However, these Devonian units are absent in bedrock borings along the axis of the paleovalley where the overlying till lies directly on the Ordovician Plattin Formation. Boring logs from a nearby well indicate that the Joachim Formation and St. Peter Sandstone underlie the Plattin Formation. Beneath these units lie Ordovician dolomites and sandstones (Powell-Cotter dolomite, Jefferson City Formation, and Roubidoux Formation).

In summary, it appears that the Zykan Landfill is situated over an 80-180-foot-thick layer of glacial till that overlies a bedrock paleovalley of Ordovician limestone.

5.2 HYDROGEOLOGY

WCC (1986) divided the subsurface into six hydrostratigraphic units (see Figure 5-1) based on stratigraphic position and hydraulic characteristics. Unit A consists of the saturated portion of the oxidized till and acts as the uppermost recipient of any potential contamination. Though composed of relatively impermeable material, this unit possesses a relatively high hydraulic conductivity (1×10^{-5} cm/sec) due to the observed fractures. The base of unit A is the oxidized/unoxidized till interface. This surface is irregular but generally follows surface topography.

Ground water flow in unit A is reported to be topographically driven to the southeast (WCC, 1986). During the ESI, START collected water level measurements in all sampled monitoring wells. Contoured water levels from the B-series monitoring wells, which are screened in the oxidized till (unit A), generally indicate a southeasterly flow direction within the boundaries of the landfills. Overall, comparison of the surface elevation contour lines (Figure 2-2) and contoured water level elevations from the ESI sampling event (Figure 5-2: Shallow Ground Water Level Contour Map) supports the theory that shallowest ground water beneath the site is topographically driven.

The underlying unoxidized till and residual clay make up unit B. Its basal surface is bedrock. Estimated hydraulic conductivity of this unit (1×10^{-7} cm/sec) (WCC, 1986) is at least two orders of magnitude less than that of the overlying unit A due to the general decrease in granular material with depth and to the absence of fractures. It has been proposed that ground water flows to the northeast in unit B (WCC, 1986); however, because this unit possesses such low permeability, monitoring wells have been slow to achieve equilibrium with the surrounding aquifer. This has resulted in potentiometric surfaces and proposed ground water flow directions of uncertain accuracy (EPA, 1986; Jacobs, 1989; WCC, 1986).

Units C through F consist of saturated bedrock. Unit C consists of the uppermost consolidated deposits above the St. Peter Formation. Though of relatively low permeability, Unit C can support low yield wells (Jacobs, 1989). The St. Peter Formation constitutes unit D. The top of this friable sandstone unit lies approximately 400 feet BGS. Numerous residential wells are screened in unit D. Unit E consists of the Powell-Cotter Dolomite and the Jefferson City formations. These units are generally less permeable than the strata lying above and below. Unit F consists of sandstone and limestone of the Roubidoux Formation, the top of which lies at approximately 1,000 feet BGS. Public drinking water wells draw water from Unit F. MDNR (1996b) referred to units C, D, E, and F collectively as the Ozark Aquifer.

Water levels in nearby private bedrock wells ranged from 100 to 260 feet BGS. Ground water flow in the bedrock is to the northeast (MDNR, 1996b; WCC, 1986).

Some general conclusions can be made regarding the hydrogeologic regime beneath the site.

- The site lies directly over an oxidized and fractured layer of glacial till. This layer is significantly more permeable than the underlying unoxidized till.
- Ground water flow in the oxidized unit appears to be topographically driven. This is reasonable, given that the oxidized/unoxidized surface generally follows surface topography.
- Ground water levels in the respective units indicate decreasing hydraulic head with depth, and possibly even zones of perched ground water at the oxidized/unoxidized interface.

Given these conclusions, it appears that any contamination from the hazardous waste and sanitary landfills that entered unit A (oxidized till) would flow towards the topographic lows (intermittent streams) rather than continue downward through the relatively impermeable unoxidized till (Unit B).

5.3 GROUND WATER USE AND TARGETS

No known private wells draw water from the till that underlies the site; however, several private and public water supply wells draw water from the Ozark Aquifer. Table 5-1, taken from MDNR's PA/SI, summarizes the distances from the site and populations served for the private and public wells (MDNR, 1996b). The nearest drinking water well lies approximately 0.25 miles northwest of the site (see Figure 3-5).

Table 5-1*

POPULATION SERVED BY WELLS WITHIN FOUR MILES OF ZYKAN LANDFILL
ZYKAN LANDFILL SITE—WRIGHT CITY, MISSOURI
TDD: S07-9706-014 PAN: 0567ZLSRXX

Distance from Site (miles)	Population Served by Private Wells	Population Survey by Public Wells		Total
		Name	Number of Persons	
0-1	27	--	--	27
1-2	57	ECM Water & Sewer/Innsbrook Area Wells (2)	750	1,147
		Innsbrook Estates Subd.	200	
		Maple Ridge MHP	140	
2-3	82	Glenbrook Estates	123	902
		Midway MHP	100	
		Oakview Estates	30	
		Wright City Well #5	567	

Table 5-1*—(Continued)

POPULATION SERVED BY WELLS WITHIN FOUR MILES OF ZYKAN LANDFILL
ZYKAN LANDFILL SITE—WRIGHT CITY, MISSOURI
TDD: S07-9706-014 PAN: 0567ZLSRXX

Distance from Site (miles)	Population Served by Private Wells	Population Survey by Public Wells		Total
		Name	Number of Persons	
3-4	90	Child Evangelism	100	1,573
		ECM Water & Sewer/North Oak Well	200	
		Pleasant Oak MHP	50	
		Shady Oaks Subd.	?	
		Wright City Well #3	567	
		Wright City Well #4	566	

KEY: * = Population data from MDNR (1996b).

5.4 GROUND WATER ANALYTICAL RESULTS

During the ESI, START collected ground water samples from permanent monitoring wells, temporary Geoprobe™ monitoring wells, and private wells. Ground water samples were analyzed for VOCs, SVOCs, pesticides, herbicides, total metals, and dissolved metals. Selected ground water samples were also analyzed for dioxin. All analytical results are included in Appendix D.

Analytical results do not indicate contamination of any of the three sampled private wells. From the total metals analyses, it appears that the permanent and monitoring wells provided samples with elevated metals concentrations. However, dissolved metals concentrations in the same wells were much lower, indicating that the high total metals concentrations were caused by suspended particulate matter. Given the nature of the saturated subsurface material, it is assumed that suspended particulates are not available for ground water transport. In addition, bis(2-ethylhexyl)phthalate was detected in several of the ground water samples. The source of this compound is assumed to be latex sampling gloves rather than the sampled ground water.

Limited VOC contamination was detected in two permanent monitoring wells and a temporary Geoprobe™ monitoring well. Table 5-2 summarizes the analytical results that indicate the limited release of this contamination. Health-based benchmarks, though not applicable to non-drinking water, are included for reference. Figure 3-4 illustrates the locations of the sampled monitoring wells. In monitoring well B-2 (#309), 1,1-dichloroethane (1,1-DCA), 1,2-dichloroethane (1,2-DCA), and 1,1,1-trichloroethane (1,1,1-TCA) were detected at respective concentrations of 5.1, 2.3, and 13 μg/L. These concentrations exceed the analyte-specific detection limits for the two background permanent monitoring wells (B-1 [#308] and B-10 [#307]), where these compounds were not detected. Benzene was also detected in B-2 at a

concentration of 0.37 μg/L, which was above the respective detection limits for the background monitoring wells. It should be noted that 1,1-DCA and 1,2-DCA were detected in the leachate samples from the MLS (see Table 4-1). Additionally, the aforementioned shallow ground water level contour map (Figure 5-2) indicates that monitoring well B-2 is downgradient of at least a portion of the landfill.

Table 5-2

ORGANIC COMPOUNDS DETECTED IN GROUND WATER
ZYKAN LANDFILL SITE—WRIGHT CITY, MISSOURI
TDD: S07-9706-014 PAN: 0567ZLSRXX

Compound	Concentration (μg/L)							
	B-1	B-2	B-10	GP-1	GP-3	Health-Based Benchmarks*		
EPA Sample #	ASYXG-308 (Background)	ASYXG-309	ASYXG-307 (Background)	ASYXG-401 (Background)	ASYXG-402	MCL	Reference Dose Screening Concentration	Cancer Risk Screening Concentration
Benzene	0.14 U	0.37	0.14 U	0.14 U	0.98	5		2.9
Chlorobenzene	0.23 U	0.23 U	0.23 U	0.23 U	35	100	730	
1,1-Dichloroethane	0.43 U	5.1	0.43 U	0.43 U	0.43 U		3,700	
1,2-Dichloroethane	0.37 U	2.3	0.37 U	0.37 U	0.37 U	5		0.94
1,1,1-Trichloroethane	0.58 U	13	0.58 U	0.58 U	0.58 U	200		

KEY: U = The material was analyzed for, but was not detected. The associated numerical value is the sample detection limit.
☒ = No listed benchmark. * = Benchmarks from Superfund Chemical Data Matrix (SCDM)—June 1996.

Though the pesticide endrin aldehyde was detected in monitoring well B-4 (#314) at an estimated concentration of 0.0070 μg/L, this concentration exceeded the detection limit (0.0040 μg/L) for this compound in the background permanent monitoring wells. Endrin aldehyde was not detected in any of the source leachate samples and this concentration was coded (J) and reported as an estimated quantity.

In the temporary Geoprobe™ monitoring well GP-3 (see Figure 3-2 for location), benzene and chlorobenzene were detected at concentrations of 0.98 and 35 μg/L, respectively. These concentrations exceeded the applicable detection limits for benzene (0.14 μg/L) and chlorobenzene (0.23 μg/L) in background sample location GP-1 (#401). Both of these compounds were detected in the MLS source sample and the former leachate outbreak area of the sanitary landfill (see Tables 2-1 and 4-1).

1,2-DCA at a concentration of 2.3 μg/L in ground water sample location B-2 (#309) was the only compound identified above a designated health-based benchmark (Cancer Risk of 0.94 μg/L).

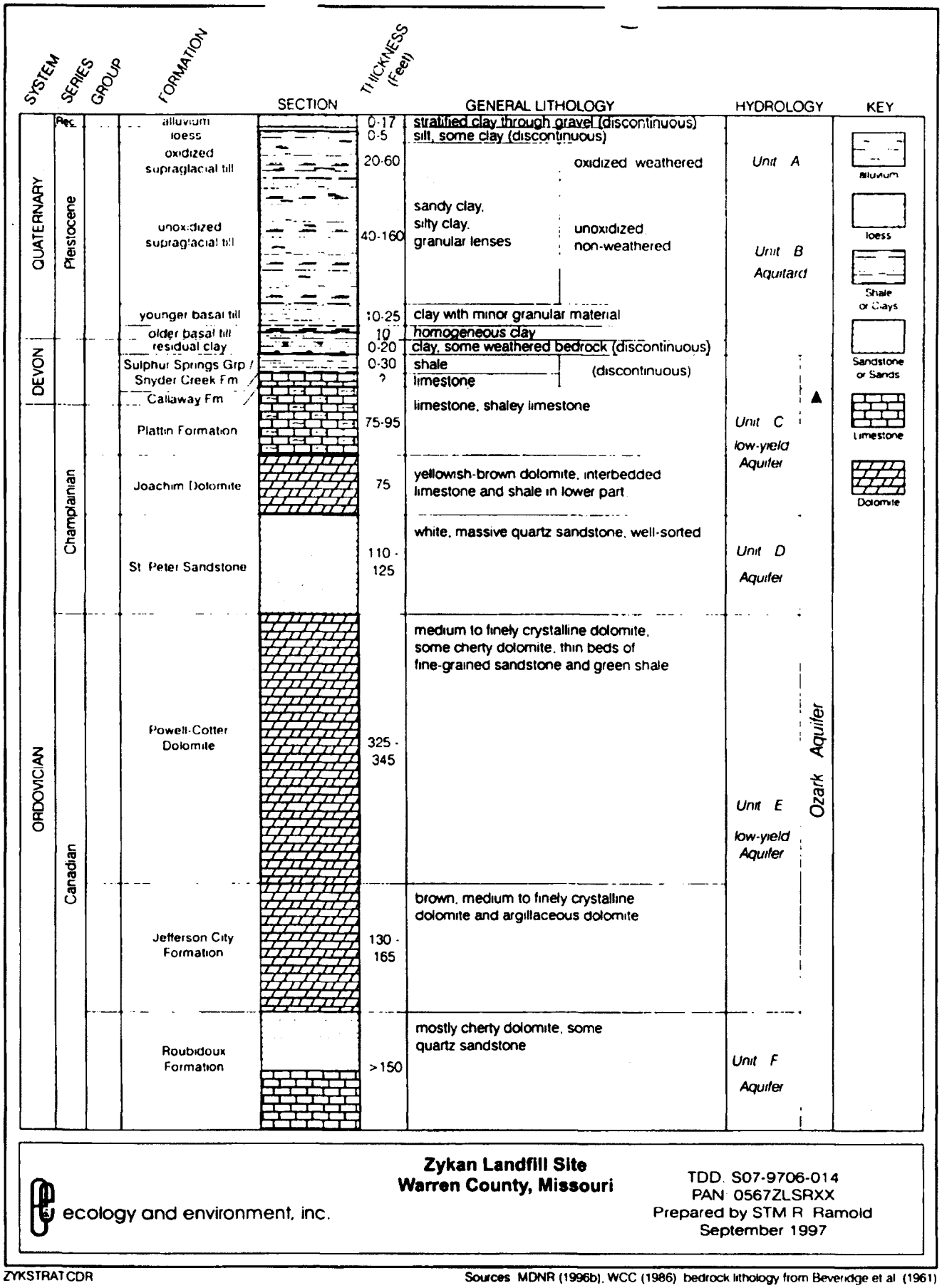
5.5 GROUND WATER CONCLUSIONS

Permanent monitoring well sampling indicates a limited release of VOC contamination to the saturated till from the hazardous waste landfill. Two compounds, 1,1-DCA and 1,2-DCA, were detected in

monitoring well B-2. Analytical results also indicate a VOC contaminant release to the intermittent stream alluvium. Two compounds, benzene and chlorobenzene, were detected in a sample from a Geoprobe™ temporary monitoring well. All four of these VOC compounds were detected in the MLS source sample. Despite this apparent release to the saturated till, ESI sampling and the ongoing MDOH sampling do not indicate contamination of nearby private wells screened in the underlying Ozark Aquifer.

The purpose of the Geoprobe™ temporary monitoring wells was to determine the necessity of additional monitoring wells in the alluvium of the intermittent stream. The previously discussed detections of chlorobenzene and benzene in temporary Geoprobe™ monitoring well GP-3 indicate a limited release of contamination to the ground water in the intermittent stream alluvium. This increases the need for permanent monitoring wells in the alluvium. However, any decision on whether to install additional permanent monitoring wells in the alluvium of the intermittent stream should also consider the following factors:

- The isolated nature of the possible release (no other Geoprobe™ temporary monitoring wells indicated such a release).
- The limited breadth and depth of the intermittent stream alluvium.
- The possibility that ground water in the intermittent stream alluvium may not be continuous or perennial.
- The accessibility of the intermittent stream alluvium to a drilling rig.
- The difficulty of installing and maintaining a monitoring well near an area that experiences intermittent surface water flow.



Zykan Landfill Site
Warren County, Missouri

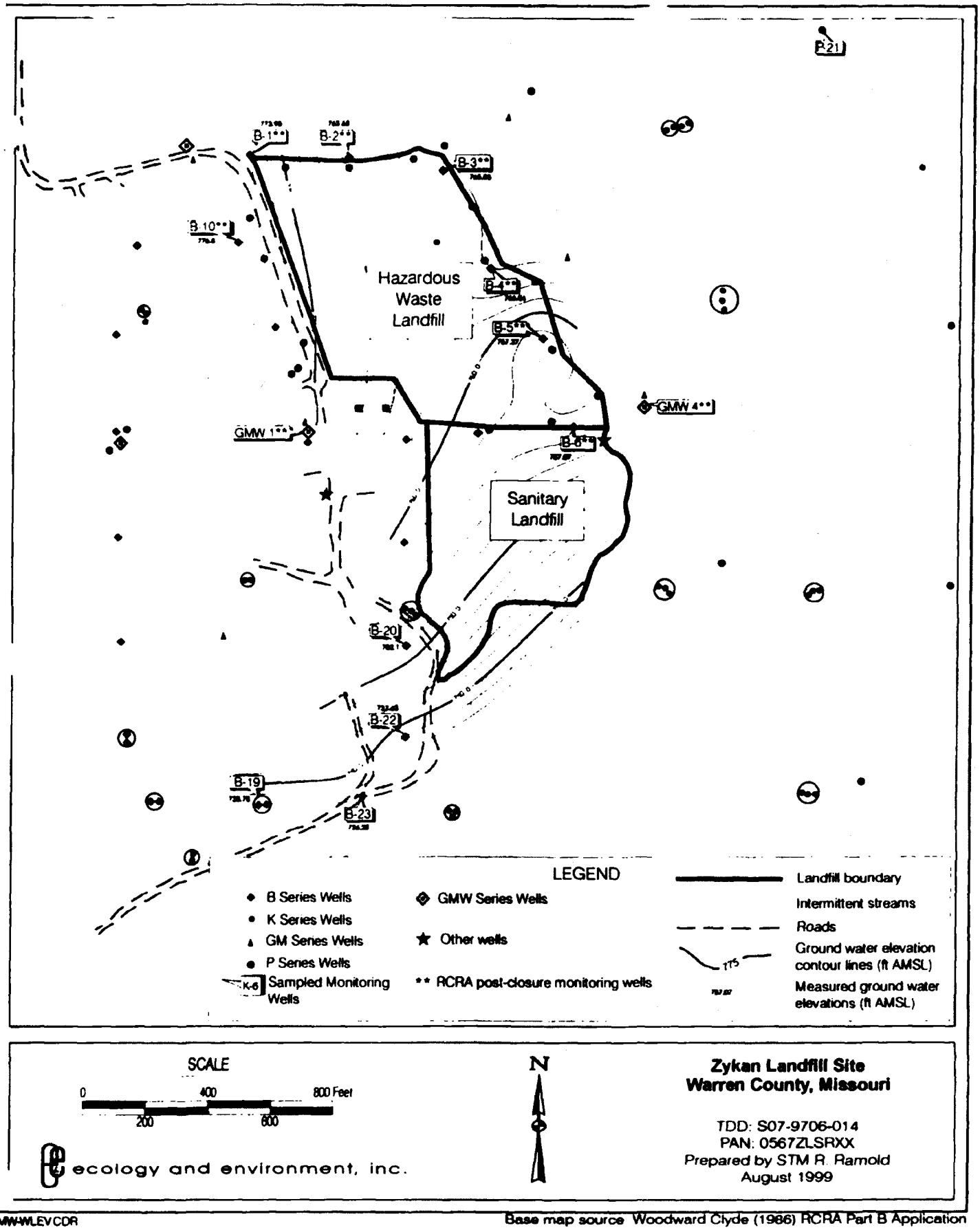
ecology and environment, inc.

TDD: S07-9706-014
PAN: 0567ZLSRXX
Prepared by STM R Ramold
September 1997

ZYKSTRAT.CDR

Sources: MDNR (1996b), WCC (1986), bedrock lithology from Beveridge et al (1961)

Figure 5-1: Geologic / Hydrogeologic Column



MW-WLEV.CDR

Base map source: Woodward Clyde (1986) RCRA Part B Application

Figure 5-2: Shallow Ground Water Level Contour Map

6.0 SURFACE WATER PATHWAY CHARACTERIZATION

6.1 HYDROLOGY

Two intermittent streams provide surface drainage of the site (see Figure 2-2). The first runs roughly south-southeast and lies immediately east of the hazardous waste landfill and the northern portion of the sanitary landfill. The second enters the site from the east and flows roughly southwest across the southern border of the sanitary landfill. The confluence of these two intermittent streams is located on the east boundary of the landfills and approximately 400 feet south of the boundary between the two landfills (Appendix B: Photo 7). After leaving the site, the intermittent stream runs approximately 4,000 feet southwest to Lake Lucern, the first of two downgradient man-made lakes (Figure 2-1). The depth of Lake Lucern ranges to 30 feet. Overflow from Lake Lucern drains into Lake Innsbrook (Appendix B: Photo 8), which ranges in depth to 35 feet. Overflow generally occurs only after heavy precipitation (E & E, 1997c). Discharge from Lake Innsbrook flows south to Charrette Creek, which runs south and eventually joins the Missouri River approximately 12 miles south of the lakes.

Site elevations range from 790 feet above mean sea level (MSL) at the northwest corner of the sanitary landfill to approximately 755 feet along southern border. WCC (1986) reported that the watershed in which the site is located drains 483 acres. Inspection of the topographic map in Figure 2-2 indicates that there is little or no land area continuously upgradient from either of the landfills. Since the EPA Removal Action, an engineered cover appears to be present over both the hazardous waste landfill and the sanitary landfill. The site is not located in a flood plain (MDNR, 1996b; E & E, 1999d).

6.2 SURFACE WATER USE AND TARGETS

The probable point of entry of potentially contaminated surface water is the uppermost reach of Lake Lucern where the intermittent stream joins perennial surface water, approximately 4,000 feet downstream from the site. Because of the intermittent nature of flow from Lake Lucern to Lake Innsbrook, evaluation of the surface water use and targets will be limited to Lake Lucern.

Lake Lucern is currently used for fishing, swimming, and boating. Approximately 40 pounds of fish are harvested from Lake Lucern per year (E & E, 1997c). No public water supply intakes are located on Lake Lucern. National Wetland Inventory maps indicate that Lake Lucern is classified as a L1UBHh

wetland (lacustrine, limnetic, unconsolidated bottom, permanently flooded, diked/impounded) (USDI, 1993). No non-plant sensitive environments are listed along the surface water pathway.

6.3 SURFACE WATER ANALYTICAL RESULTS

Collocated pairs of surface water and surface water sediment samples were taken from eight points during the ESI. Seven of these points were locations in Lake Lucern; background surface water and surface water sediment samples were taken from a lake to the northwest of Lake Lucern (Figure 3-6 and Appendix B: Photo 9). Requested analyses for the surface water samples included VOCs, SVOCs, pesticides, herbicides, total metals, and dissolved metals analysis. Two surface water samples, including the background location sample, were also submitted for dioxin analysis. Surface water sediment samples were submitted for VOC, SVOC, pesticides, herbicides, and metals analyses. Two surface water sediment samples, including the background location sample, were also submitted for dioxin analysis. Analytical results are included in Appendix D.

With the exception of metals, no requested analytes were detected in any of the surface water or surface water sediment samples. For the surface water samples, no metals were detected at concentrations exceeding three times the background value. In the surface water sediment samples, only copper, manganese, and calcium were detected at concentrations exceeding this criterion. These metals are naturally occurring and variations in detected concentrations are not likely to be a result of a contaminant release from the site to Lake Lucern.

Due to the previously documented leachate release from the sanitary landfill, START also collected nine surface soil samples from the intermittent stream bed upstream from, adjacent to, and downstream of the landfills to show attribution of potential surface water contamination. Soil sample locations are depicted in Figures 3-2 and 3-3 and samples were submitted for VOCs, SVOCs, metals, pesticides, and herbicides analysis. Three selected samples were also submitted for dioxin analysis. Only metals were detected in soil samples collected from the intermittent stream bed, with copper being the only metal detected significantly above background concentrations. However, copper was not identified at elevated concentrations in any source samples. See section 3.1.2 (Attribution Sampling) and 4.0 (Source Attribution Analytical Results) for more discussion concerning samples collected along the intermittent streambed.

6.4 SURFACE WATER CONCLUSIONS

Surface water use of Lake Lucern includes both whole body recreation and fishing. In addition, the lake is classified as a wetland. No analytical evidence from the ESI surface water pathway sampling indicates a release of contamination from the site to Lake Lucern.

7.0 SOIL EXPOSURE CHARACTERIZATION

7.1 PHYSICAL CONDITIONS AND TARGETS

Though the leachate outbreak, leaking drums, and related contaminated soil could have previously served as a soil exposure threat, the previously discussed EPA Removal Action (EPA, 1997 and 1998) effectively prevents these areas from being an immediate threat via soil exposure. During the Removal Action, the leachate outbreak and erosion gulley were covered with at least 2 feet of clean compacted soil (E & E, 1999c).

Both the hazardous waste and sanitary landfills are closed and no workers are on site. The site is not used recreationally and there are no schools, day cares, residences, or places of work within 200 feet of either landfill. A locked gate blocks entrance to the site along the entrance road. The hazardous waste landfill is fenced and access can be gained only through locked gates. The sanitary landfill is not fenced and overland pedestrian access can be gained. Previously, evidence of unauthorized persons on site has been documented (MDNR, 1996a).

Approximately 0.5 mile to the southwest lies the village of Innsbrook, in which over 900 recreational homes and 110 permanent residences, are located.

8.0 SUMMARY AND CONCLUSIONS

In May 1999, START conducted ESI field work at the Zykan Landfill site near Wright City, Missouri. The site consists of two closed landfills: a sanitary landfill to the south and an immediately adjacent hazardous waste landfill to the north. The primary purpose of this investigation was to characterize the threat that the site poses to human health and the environment. Specific elements of the ESI included sampling of the leachate collection system at the hazardous waste landfill, permanent monitoring wells, temporary Geoprobe™ monitoring wells, nearby private wells, intermittent stream bed soil, surface water, and surface water sediment.

The sanitary and hazardous waste landfills encompass areas of approximately 5 and 12 acres, respectively. Though the volume of landfilled waste is not completely known, reported depths of deposition in the sanitary and hazardous waste landfills are as great as 10 and 27 feet, respectively. Based on analytical results of samples from both the hazardous waste landfill's leachate collection system and from a former leachate outbreak and exposed drum area on the south boundary of the sanitary landfill, source material is known to contain numerous VOCs and SVOCs.

The site overlies approximately 80-180 feet of glacial till, which in turn overlies the Ozark Aquifer, a source of drinking water for both private and public water supply. There has apparently been a limited release of contamination from the hazardous waste landfill to ground water within the saturated till along the north side of the hazardous waste landfill. Two VOCs, (1,1-DCA and 1,2-DCA) were detected in both the MLS sample and in the sample from monitoring well B-2. In addition, there appears to be a release of contamination from the site to the alluvium of the intermittent stream bed. Two VOCs (benzene and chlorobenzene) were detected in both the MLS and in the sample from temporary Geoprobe™ monitoring well GP-3. In addition, these two compounds were identified in the former leachate outbreak area of the sanitary landfill. The extent and severity of the apparent releases appear to be limited. Due to the low permeability of the saturated till and the lack of drinking water wells drawing water from either the till or the alluvium, the threat this contamination currently poses to drinking water is low. Private well sampling, both by START and by MDOH, has not documented contamination of nearby drinking water wells, which draw water from the Ozark Aquifer beneath the till.

The landfills are bordered on the east and south by an intermittent stream that leads to Lake Lucern approximately 4,000 feet downstream. Lake Lucern is used for both fishing and whole body contact recreation. Surface water flow into and out of Lake Lucern occurs following significant precipitation

events. Based on analytical results there does not appear to be a release of contamination to the surface water pathway. Therefore, current conditions pose minimal or no threat to the surface water pathway. However, depending on the lateral continuity of the granular alluvium, the degree to which the alluvium is perennially saturated, and on whether the low levels of VOC contamination are the result of a one-time or a persistent release, the aforementioned contaminated ground water in the alluvium of the intermittent stream may migrate towards Lake Lucern and pose a threat to the surface water pathway.

The sanitary landfill's leachate outbreak and exposed drums have previously been shown to have impacted the intermittent stream bed with several SVOCs with a high potential for bioaccumulation due to the detection of PAHs. Though the former leachate outbreak and exposed drum area may have posed a threat via the soil exposure and surface water pathways, a recent EPA Removal Action effectively removed the area as a current threat. During the Removal Action, soil fill was placed over the leachate outbreak and exposed drums area. In addition, actions were taken to control erosion and infiltration of precipitation into the landfill. No contamination of the intermittent stream bed soil was detected during ESI. Therefore, based on current conditions, no soil exposure threat or surface water threat via overland flow exists.

Based on the analytical results of the ESI sampling, it appears that the site currently poses minimal or no threat to human health or the environment through the ground water, surface water, or soil exposure pathways. However, it does appear that ground water near the site has been impacted by releases of contaminants from the site. If unmonitored, it is possible that this release could eventually impact human health and the environment via the surface water pathway.

9.0 REFERENCES

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APPENDIX A

Hazardous Waste Landfill Construction Maps

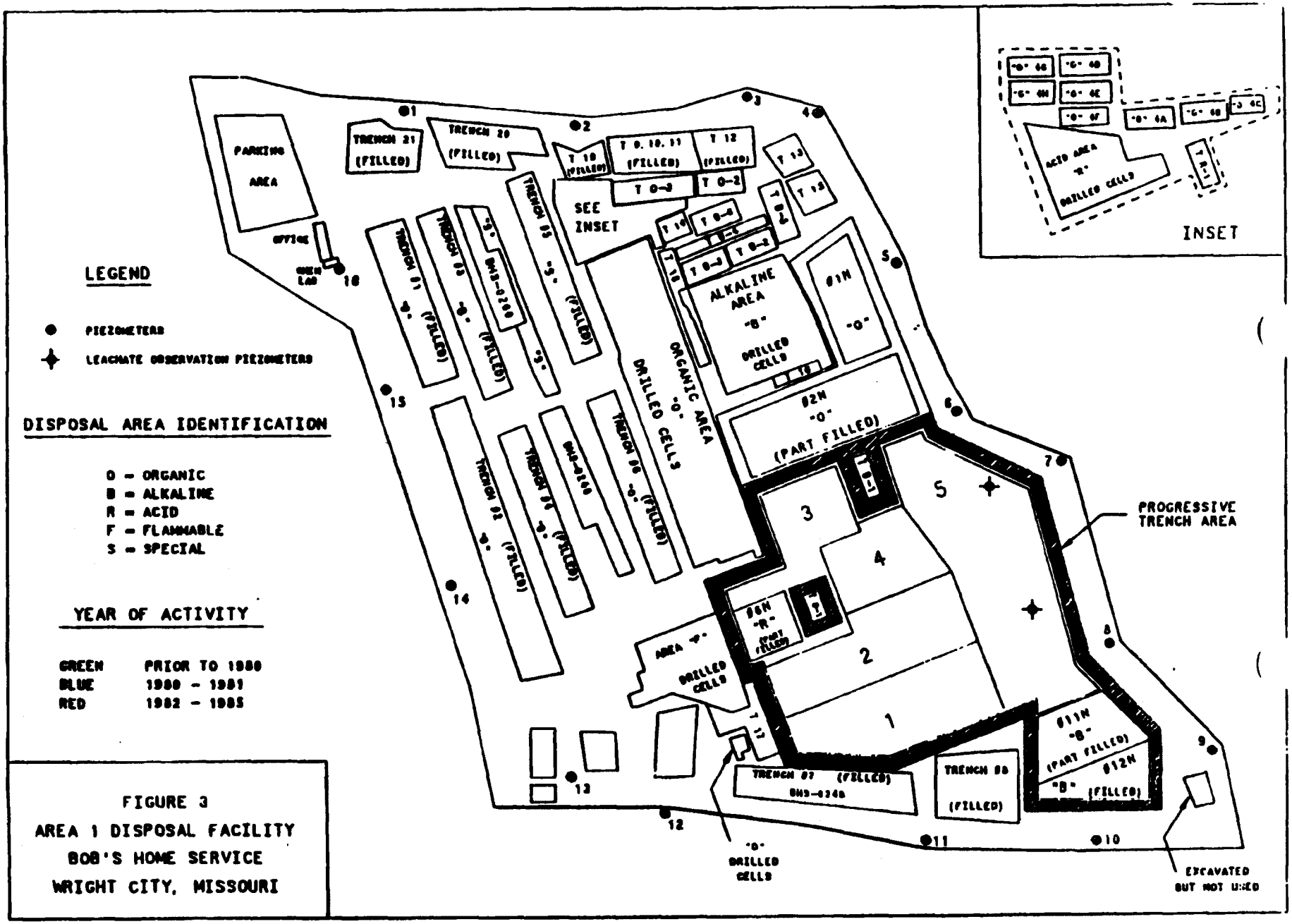


FIGURE 3
AREA 1 DISPOSAL FACILITY
BOB'S HOME SERVICE
WRIGHT CITY, MISSOURI

Figure A-1

Source: E & E, 1986

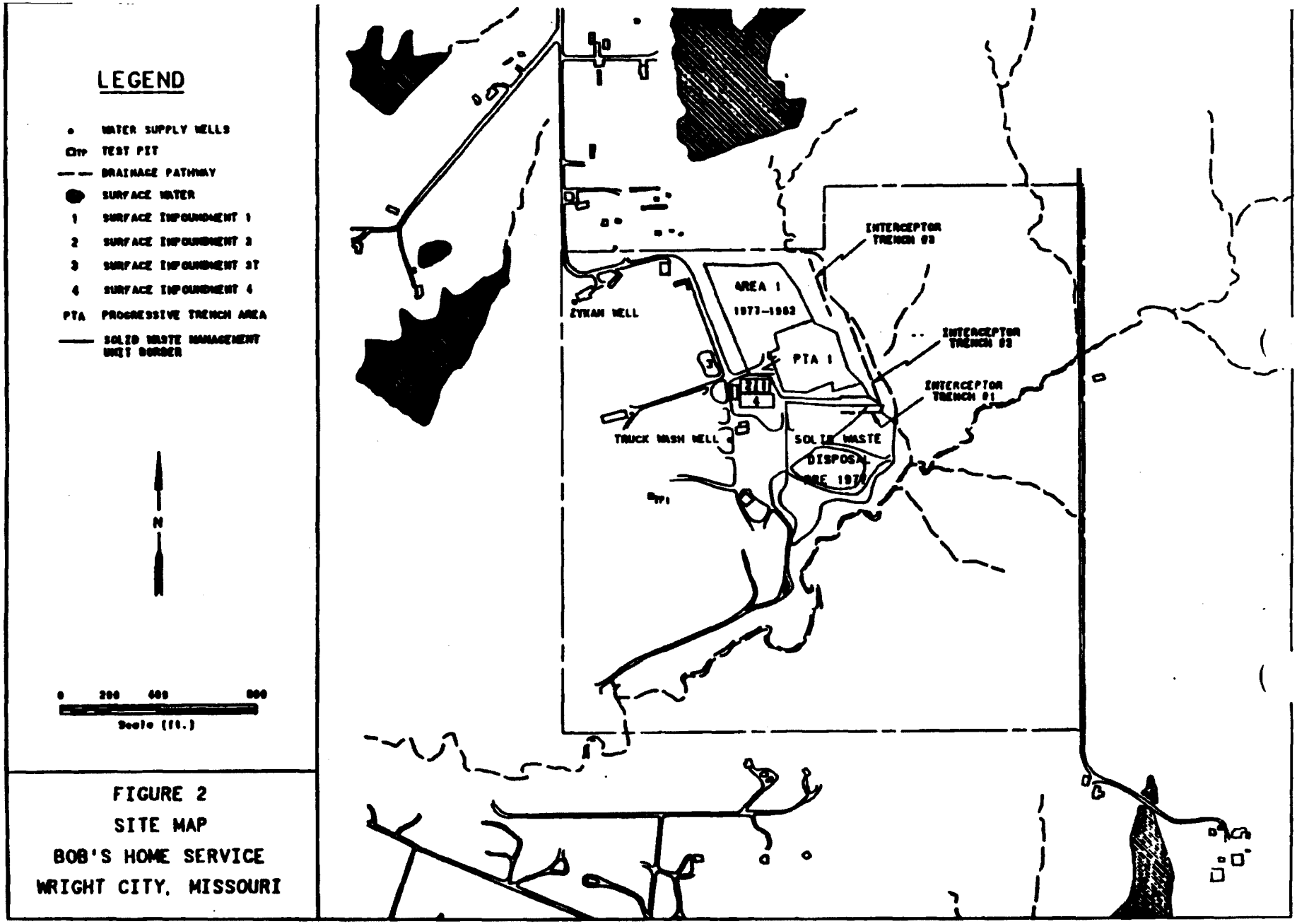


FIGURE 2
SITE MAP
BOB'S HOME SERVICE
WRIGHT CITY, MISSOURI

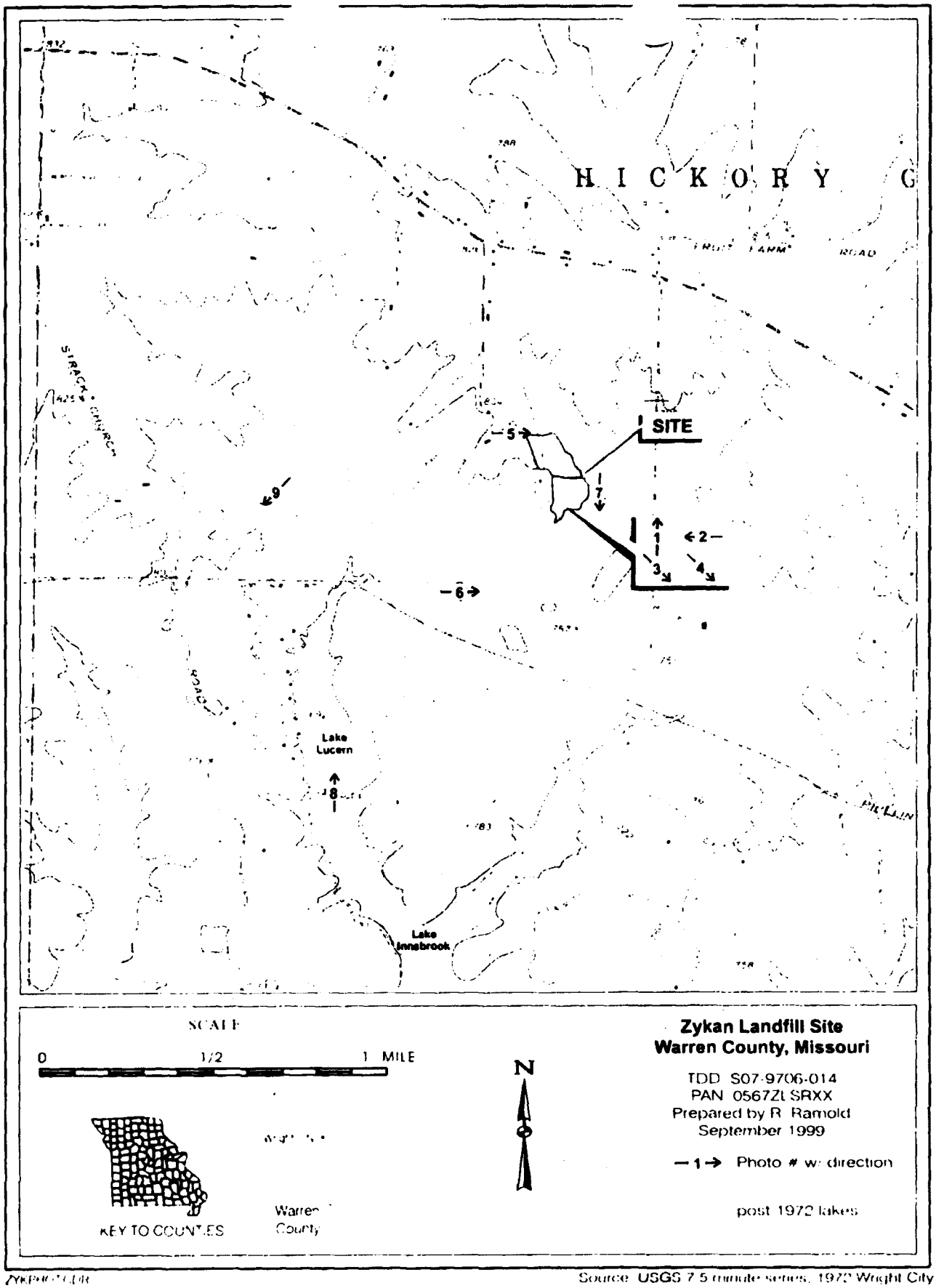
Figure A-2

Source: E & E, 1986

B

APPENDIX B

Photographic Documentation Record



Source: USGS 7.5 minute series, 1972 Wright City Quadrangle Missouri with modifications from Village of Innsbrook Map

Figure B-1: Photographic Documentation Map

PHOTOGRAPHIC RECORD
Ecology and Environment, Inc.
Superfund Technical Assessment and Response Team

SITE NAME: Zykan Landfill
SITE LOCATION: Wright City, Missouri
JOB#: KJ7104 **TDD:** S07-9706-014 **PAN:** 0567ZLSRXX

Photograph Number: 1
Photographer: R. Ramold
Date/Time: 7-29-97 1419
Roll/Frame No.: 4700 14
Direction: North
Comments: Leachate seep on south side of sanitary landfill.

Photograph Number: 2
Photographer:
J. Weatherford (EPA OSC)
Date: 10-97
Direction: West
Comments: Leachate seep area before EPA Removal Action.

PHOTOGRAPHIC RECORD
Ecology and Environment, Inc.
Superfund Technical Assessment and Response Team

SITE NAME: Zykan Landfill
SITE LOCATION: Wright City, Missouri
JOB#: KJ7104 **TDD:** S07-9706-014 **PAN:** 0567ZLSRXX

Photograph Number: 3
Photographer:
J. Weatherford (EPA OSC)
Date: 11 97
Direction: Southeast
Comments: Soil fill being placed over erosion gully and leachate outbreak area during EPA Removal Action.

Photograph Number: 4
Photographer:
J. Weatherford (EPA OSC)
Date: 11 97
Direction: Southeast
Comments: Emplaced soil fill over erosion gully and leachate outbreak area after EPA Removal Action

PHOTOGRAPHIC RECORD
Ecology and Environment, Inc.
Super~~fund~~ and Technical Assessment and Respo~~nse~~ Team

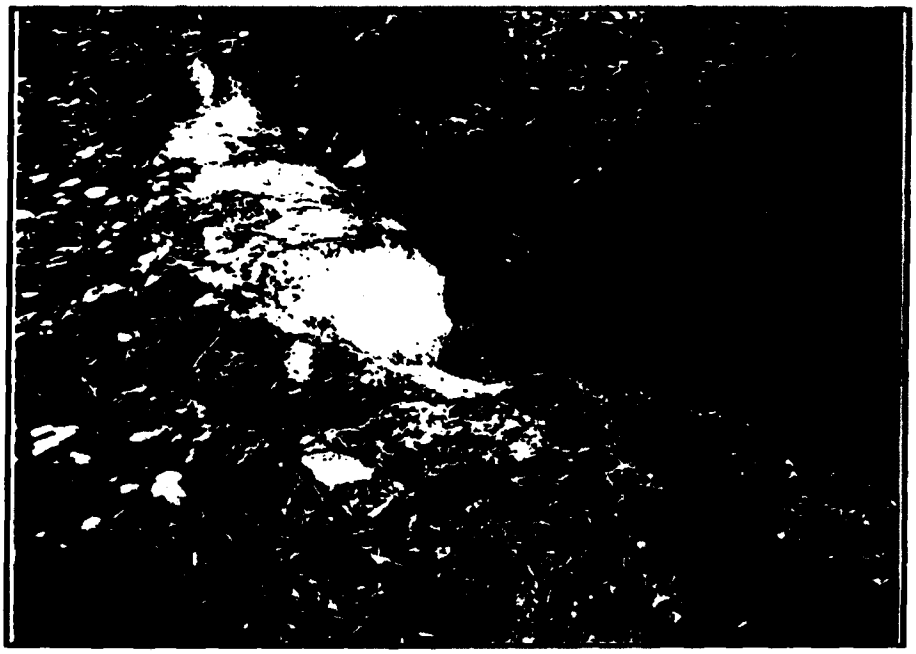
SITE NAME: Zykan Landfill
SITE LOCATION: Wright City, Missouri
JOB#: KJ7104 **TDD:** S07-9706-014 **PAN:** 0567ZLSRXX

Photograph Number: 5
Photographer: D. Cox
Date/Time: 4-28-99 1345
Roll/Frame No.: 375-666-16
Direction: East
Comments: STM P. Currier bailing monitoring well B-1.

PHOTOGRAPHIC RECORD
Ecology and Environment, Inc.
Superfund Technical Assessment and Response Team

SITE NAME: Zykan Landfill
SITE LOCATION: Wright City, Missouri
JOB#: KJ7104 **TDD:** S07 9706-014 **PAN:** 0567ZLSRXX

Photograph Number: 6
Photographer: C. Smith
Date/Time: 4-29-99 1215
Roll/Frame No.: 937274 14
Direction: West
Comments: Flagged location of Geoprobe™ temporary monitoring well location GP-9.



Photograph Number: 7
Photographer: S. Vaughn
Date/Time: 7-29-97 1233
Roll/Frame No.: 4700 4
Direction: South
Comments: Confluence of intermittent streams on east side of sanitary landfill during site reconnaissance. (Note dry stream bed.)

PHOTOGRAPHIC RECORD
Ecology and Environment, Inc.
Superfund Technical Assessment and Response Team

SITE NAME: Zykan Landfill
SITE LOCATION: Wright City, Missouri
JOB#: KJ7104 **TDD:** S07-9706-014 **PAN:** 0567ZLSRXX

Photograph Number: 8
Photographer: R. Ramold
Date/Time: 7-30-97 1110
Roll/Frame No.: 4700 20
Direction: North
Comments: Lake Lucern with drain to Lake Innsbrook in foreground.

Photograph Number: 9
Photographer: C. Smith
Date/Time: 4-27-99 1000
Roll/Frame No.: 937274 4
Direction: Southwest
Comments: Lake from which background surface water pathway samples were taken.

APPENDIX C

Sampling Data

including:

Leachate Sump Sampling Data
Intermittent Stream Soil Sampling Data
Surface Water Sampling Data
Surface Water Sediment Sampling Data
Geoprobe™ Ground Water Sampling Data
Ground Water Monitoring Well Purging Data Sheets
Water Supply Survey Forms

Leachate Sump Sampling Data

Leachate Sump Samp. , Data Sheet

Zykan Landfill Site
Wright City, MO
PAN: 0567ZLSRXX
ESI

Location #	Location	Date	Time	HNu (ppm)	Sampling Device	LDL VOC	SVOC	Pest	Herb	Total Metals	Diss. Metals	Dioxin	Photo Roll & #	Comments
1	int. trench #3 sump	04/28/99	1320	ND	disposable bailer	X	X	X	X	X	X	X	12	
2	MLS	04/28/99	1410	20000 ppm	disposable bailer	X	X	X	X	X	X	X	11	
3	int. trench #1 & 2 sump	04/28/99	1455	ND	disposable bailer	X	X	X	X	X	X	X		

Intermittent Stream Soil Sampling Data

Intermittent Stream Soil S[illegible]pling Data Sheet

Zykan Landfill Site
Wright City, MO
PAN: 0567ZLSRXX
ESI

Borehole #	Location	Date	Time	Sampled Interval (feet BGS)	Soil Description	VOC	SVOC	Pest	Herb	Metals	Dioxin	Photo Roll & #	Comments
ISS-1	GP-1 see map	04/29/99	818	0-6"	brown sand	X	X	X	X	X	X		sample ISS-1
ISS-2	GP-2 see map	04/29/99	845	0-6"	brown sand	X	X	X	X	X	X	frame 13	facing SW, sample ISS-2
ISS-3	GP-3 see map	04/29/99	903	0-6"	brown sand	X	X	X	X	X	X	frame 14	facing E, sample ISS-3
ISS-4	GP-4 see map	04/29/99	1022	0-6"	brown sand	X	X	X	X	X		frame 17	sample ISS-4
ISS-5	GP-5 see map	04/29/99	940	0-6"	brown sand	X	X	X	X	X		frame 15	sample ISS-5
ISS-6	GP-6 see map	04/29/99	958	0-6"	brown sand	X	X	X	X	X	X	frame 16	sample ISS-6
ISS-7	GP-7 see map	04/29/99	1200	0-6"	dark brown gravel and sand	X	X	X	X	X			sample ISS-7
ISS-8	GP-8 see map	04/29/99	1215	0-6"	olive brown sand	X	X	X	X	X			sample ISS-8
ISS-9	GP-9 see map	04/29/99	1140	0-6"	dark brown gravel	X	X	X	X	X			sample ISS-9

Surface Water Sampling Data

Surface Water Sampling .a Sheet

Zykan Landfill Site
Wright City, MO
PAN: 0567ZLSRXX
ESI

Location #	Location	Date	Time	Sample Depth	Sampling Device	pH	Cond. (mS/cm)	Temp. (°C)	Turb. (NTU)	LDL VOC	SVOC	Pest	Herb	Total Metals	Diss. Metals	Dioxin	Photo Roll #	Comments
SW-1	background lake	04/27/99	940	~5'	Kemmerer	6.59	0.125	14.5	>999	X	X	X	X	X	X	X	4, 5	middle of lake
SW-2	Lake Lucern - see map	04/27/99	1230	~5'	Kemmerer	7.41	0.139	16.8	N/A	X	X	X	X	X	X			
SW-3	Lake Lucern - see map	04/27/99	1305	<1'	none	7.77	0.14	16.6	N/A	X	X	X	X	X	X		6	filled at surface
SW-4	Lake Lucern - see map	04/27/99	1420	~22'	Kemmerer	7.25	0.138	13.8	N/A	X	X	X	X	X	X		7	
SW-5	LakeLucern - see map	04/27/99	1450	~22'	Kemmerer	7.46	0.138	12.2	N/A	X	X	X	X	X	X		7	
SW-6	outfall stream from lake north of Lake Lucern	04/28/99	750	<1'	none	7.5	0.13	14.7	N/A	X	X	X	X	X	X		9, 10, 11	60' north of confluence, filled at surface
SW-7	stream from landfill	04/28/99	820	<1'	none	7.7	0.189	13.1	N/A	X	X	X	X	X	X		9, 10, 11	60' east of confluence, filled at surface
SW-8	entrance to LakeLucern	04/28/99	748	<1'	none	6.68	0.193	14.1	N/A	X	X	X	X	X	X	X	8	filled at surface

Surface Water Sediment Sampling Data

Surface Water Sediment S ρling Data Sheet

Zykan Landfill Site
Wright City, MO
PAN: 0567ZLSRXX
ESI

Location #	Location	Date	Time	Water Depth	Sampling Device	Sediment Description	VOC	SVOC	Pest	Herb	Metals	Dioxin	Photo Roll & #	Comments
SW-SED-1	background lake	04/27/99	940	~5'	Eckman		X	X	X	X	X	X	4, 5	facing SW, middle of lake
SW-SED-2	Lake Lucern - see map	04/27/99	1230	~5'	Eckman	olive-brown sediment	X	X	X	X	X			
SW-SED-3	Lake Lucern - see map	04/27/99	1305	<1'	Eckman	olive-brown sediment	X	X	X	X	X		6	facing S, sample to left of island
SW-SED-4	LakeLucern - see map	04/27/99	1420	~22'	Eckman	grey-brown sediment	X	X	X	X	X		7	facing NE
SW-SED-5	Lake Lucern - see map	04/27/99	1450	~22'	Eckman	grey-brown sediment	X	X	X	X	X		7	facing NE
SW-SED-6	outfall stream fom lake north of L	04/28/99	750	<1'	spoon	gravel	X	X	X	X	X		9, 10, 11	facing N
SW-SED-7	stream from landfill	04/28/99	820	<1'	spoom	gravel and sand	X	X	X	X	X		9, 10, 11	facing N
SW-SED-8	entrance to Lake Lucern	04/28/99	748	~1.5'	Eckman	sand	X	X	X	X	X	X	8	facing S

Geoprobe™ Ground Water Sampling Data

Geoprobe Ground Water .npling Data Sheet

Zykan Landfill Site
Wright City, MO
PAN: 0567ZLSRXX
ESI

Borehole #	Location	Date	Time	Screened Interval (feet BGS)	pH	Cond. (mS/cm)	Temp. (°C)	Turb. (NTU)	LDL VOC	SVOC	Pest	Herb	Total Metals	Diss. Metals	Dioxin	Photo Roll & #	Comments
GP-1	see map	04/28/99	830	2'-5-	not operable	not operable	not operable	not operable	X	X	X	X	X	X	X		
GP-2	see map	04/27/99	1400	1'-5'	no sample	no sample	no sample	no sample	-	-	-	-	-	-	-		dry hole
GP-3	see map	04/28/99	1000	2'-5'	6.65	1.44	11.4	not operable	X	X	X	X	X	X	X		
GP-4	see map	04/28/99	1315	2'-6'	6.8	1.85	11.2	not operable	X	X	X	X	X	X	X		
GP-5	see map	04/28/99	1630	2'-4'	6.65	0.226	11.4	not operable	X	X	X	X	X	X	X		
GP-6	see map	04/28/99	1800	1'-4'	7.36	0.182	12.5	not operable	X	X	X	X	X	X			
GP-7	see map	04/29/99	900	2'-4'	6.51	0.339	11.8	103	X	X	X	X	X	X	X		
GP-8	see map	04/29/99	930	3'-4'	7.44	0.23	12.6	109	X	X	X	X	X	X			
GP-9	see map	04/29/99	1140	3'-7'	7.36	0.226	NA	156	X	X	X	X	X	X		12, 13, 14, 15	

Ground Water Monitoring Well Purging Data Sheets

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 1/28/99

Purging/Sampling Device: Disposable Bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☐ In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: Top of Casing

Well Identification: B-1

Static Water Level (feet): 37.8

Sample Number: 308

Final Pump Depth (feet): 63.0

Sample Time: _____

Total Well Depth (feet): 63.3

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: _____

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
1336	37.8	13.1	6.63	2.75	10	initial		
1343	45.5	13.2	6.65	2.71	10	2	2	
1354	54.2	12.7	6.68	2.03	236	2	4	
1402	63.0	13.3	6.67	2.83	999+	2	6	Baled dry after 6 gal.

Water column height (WCH) = Depth to bottom of well - depth to water = 63.3 - 37.8 = _____ ft.

Water column volume (WCV) = WCH (ft) x C = 4.16 gallons. 3 x WCV = 12.5 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: _____

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C — pH ± 0.1

Turbidity < 5 NTU's — Conductivity ± 5%

Water Level ± 0.1 foot

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 4/28/99

Purging/Sampling Device: Dedicated Bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☐ In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: Top of Casing

Well Identification: B2

Static Water Level (feet): 30.2

Sample Number: 309

Final Pump Depth (feet):_____

Sample Time:_____

Total Well Depth (feet): 49.0

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature:_____

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
1535	30.2	13.1	6.66	3.17	496			
1540	37.9	13.1	6.57	3.15	36.8	2	2	
1545	42	13	6.55	3.15	99.7	2	4	
1555	47.5	12.9	6.72	3.15	99.9	2	6	Bailed filtering

Water column height (WCH) = Depth to bottom of well - depth to water = 49.0 - 30.2 = 18.8 ft.

Water column volume (WCV) = WCH (ft) x C = 3.1 gallons. 3 x WCV = 9.2 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: SWL = 30.8' at the time of sampling

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C	pH ± 0.1
Turbidity < 5 NTU's	Conductivity ± 5%
Water Level ± 0.1 foot	

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 1/28/99

Purging/Sampling Device: Dedicated Bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☐ In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567X1.SRXX TDD: S07-9706-014

Measurement Point: Top of Casing

Well Identification: B-3

Static Water Level (feet): 9.2

Sample Number: 306

Final Pump Depth (feet): 39.6

Sample Time: 1527

Total Well Depth (feet): 40.2

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: _____

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
1436	9.2	12.0	6.89	2.56	10	Initial	–	
1939	21.8	11.5	7.3	2.37	763	2	2	
1943	26.6	12.9	7.19	2.35	398	2	4	
1951	37.6	12.9	6.75	2.65	425	2	6	
1953	39.2	13.0	6.69	2.80	670	1	7	Bailed dry after 8 gallons

Water column height (WCH) = Depth to bottom of well - depth to water = 40.21 - 9.2 = 31.01 ft.

Water column volume (WCV) = WCH (ft) x C = 5.1 gallons. 3 x WCV = 15.2 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: _____

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C	pH ± 0.1
Turbidity < 5 NTU's	Conductivity ± 5%
Water Level ± 0.1 foot	

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER ...ONITORING WELL
PURGING DATA SHEET

Date: 4/28/11

Purging/Sampling Device: Bennett Bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☐ In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: Top of Casing

Well Identification: B-4

Static Water Level (feet): 29

Sample Number: 310

Final Pump Depth (feet): 39.9

Sample Time: _____

Total Well Depth (feet): 40.78

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: _____

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
1626	29	13.3	~~6.87~~	2.52	10	initial		
1631	116.4	12.1	7.07	1.65	21	3	3	
1634	22.2	12.4	7.02	1.67	0	2	5	
1639	33.5	12.9	6.78	~~2.15~~	211	2	7	
1643	41.top 39.9	13.2	6.70	~~2.30~~	Silty	2	9	Bailed Dry

Water column height (WCH) = Depth to bottom of well - depth to water = 40.78 - 29 = ~~11.78~~ ft.

Water column volume (WCV) = WCH (ft) x C = 1.1 gallons. 3 x WCV = 18 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: SWL @ time of Sampling 5.6'

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C	pH ± 0.1
Turbidity < 5 NTU's	Conductivity ± 5%
Water Level ± 0.1 foot	

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 4/28/99

Purging/Sampling Device: Dedicated Bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☐ In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: Top of Casing

Well Identification: B-5

Static Water Level (feet): 5.4

Sample Number: 311

Final Pump Depth (feet):

Sample Time: 0955

Total Well Depth (feet): 30

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature:

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
1707	5.4	12.5	6.44	2.72	10			
1712	15.5	12.3	6.49	2.68	28	2	2	
1715	22.95	12.3	6.53	2.65	23	2	4	
1721	30	12.7	6.63	2.67	999	2	6	Bailed till Dry

Water column height (WCH) = Depth to bottom of well - depth to water = 30 - 5.4 = 24.6 ft.

Water column volume (WCV) = WCH (ft) x C = 4.00 gallons. 3 x WCV = 12 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: SWL=22.16 at time of Sampling

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C	pH ± 0.1
Turbidity < 5 NTU's	Conductivity ± 5%
Water Level ± 0.1 foot	

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 4/28/99

Purging/Sampling Device: dedicated bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☐ In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: Top of casing

Well Identification: B6

Static Water Level (feet): 6.1

Sample Number: 312

Final Pump Depth (feet): 35.4

Sample Time: 0926

Total Well Depth (feet): 36.3

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: _____

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
1743	6.1	11.1	6.91	1.41	10	initial	-	
1746	19.3	11.8	6.96	1.36	10	3.5	3.5	
1748	24.0	12.3	6.89	1.47	483	1.5	5	
1752	31.1	13.7	6.69	1.79	999+	1.5	7.5	Bailed Dry @ 8 gallons

Water column height (WCH) = Depth to bottom of well - depth to water = 36.3 - 6.1 = 30.2 ft.

Water column volume (WCV) = WCH (ft) x C = 4.9 gallons. 3 x WCV = 14.76 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: Swl = 21.35 at time of sampling

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C — pH ± 0.1

Turbidity < 5 NTU's — Conductivity ± 5%

Water Level ± 0.1 foot

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

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GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 4/26/99

Purging/Sampling Device: Dedicated Bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☐ In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: Top of Casing

Well Identification: B-10

Static Water Level (feet): 29.4

Sample Number: 207

Final Pump Depth (feet): 58

Sample Time: 832

Total Well Depth (feet): 58.5

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: _____

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
1040	29.4	13.1	6.07	3.08	10			
1045	40.2	13.0	6.07	3.06	76	2	2	
1050	47.7	12.9	6.04	3.12	562	2	4	
1100	54.9	12.8	6.02	3.16	999	2	6	Water level indicator
1105	58	12.9	6.09	3.21	453	2	8	Lifting Bailer on
								[redacted]
								& Bailed dry after
								8 gallons.

Water column height (WCH) = Depth to bottom of well - depth to water = 58.5 - 29.4 = 29.1 ft.

Water column volume (WCV) = WCH (ft) x C = 4.74 gallons. 3 x WCV = 14 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: _____

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C	pH ± 0.1
Turbidity < 5 NTU's	Conductivity ± 5%
Water Level ± 0.1 foot	

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER ...ONITORING WELL
PURGING DATA SHEET

Date: 4/27/99

Purging/Sampling Device: Bailer (dedicated)

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☑ In Casing (ppm) (Initial) 0 (vented to) 0

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: ~~Black Mark on casing~~ (TOC)

Well Identification: B-19B

Static Water Level (feet): 11.85 ft. ~~TOC~~ (bailer present)

Sample Number: 301

Final Pump Depth (feet): 19.01 TOC

Sample Time: 1310

Total Well Depth (feet): 24.72

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature:

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
8:51	11.85ft	12.5	6.58	2.96	130	initial	-	
8:57	15.85	12.1	6.72	2.91	130	1 gal.	1	
9:01	16.9	12.1	6.7	2.9	201	1 gal	2	
9:03	16.8	12.0	6.7	2.9	285	1 gal	3	
9:06	18.25	12.3	6.73	2.9	506	1 gal	4	
9:10	20.05	12.2	6.7	2.91	697	1 gal	5	
9:13	19.1	12.4	6.78	2.92	40*	1 gal	6	

Water column height (WCH) = Depth to bottom of well - depth to water = 24.72 - 11.85 = 12.87 ft.

Water column volume (WCV) = WCH (ft) x C = 2.09 gallons. 3 x WCV = 6.29 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: SWL at time of sampling = 12.0 Ft ~~BGS~~ PC TOC

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C
pH ± 0.1
Turbidity < 5 NTU's
Conductivity ± 5%
Water Level ± 0.1 foot

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER ...ONITORING WELL
PURGING DATA SHEET

Date: 9/27/99

Purging/Sampling Device: disposable bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☑ In Casing (ppm) (Initial) 0 (vented to) 0

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: Top of Casing

Well Identification: B-20

Static Water Level (feet): 20.2

Sample Number: 309

Final Pump Depth (feet): 55.4

Sample Time:

Total Well Depth (feet): 65.85

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature:

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
16:5	20.2	14.0	7.36	2.87	1	initial	-	
1724	53.5	14.1	6.71	3.11	782	8	8gal	
1726	53.5	14.0	6.83	3.06	999+	1	9gal	
1733	54.3	13.5	6.77	3.06	999+	.5	9.5gal	
1735	54.3	13.4	6.79	3.09	864	.5	10gal	
1740	55.4	13.4	6.87	3.08	109	.5	10.5	Bailed Dry after 10.5 gallons

Water column height (WCH) = Depth to bottom of well - depth to water = 55.85 - 20.2 = 35.65 ft.

Water column volume (WCV) = WCH (ft) x C = 5.81 gallons. 3 x WCV = 17.9 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: SWL = 22.3 at time of sampling

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C	pH ± 0.1
Turbidity < 5 NTU's	Conductivity ± 5%
Water Level ± 0.1 foot	

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 9/27/99

Purging/Sampling Device: Dedicated Bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☑ In Casing (ppm) (Initial) 1.5 (vented to) 0

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: TOC

Well Identification: B-22

Static Water Level (feet): 14.70

Sample Number: 303

Final Pump Depth (feet): 39.70

Sample Time: 0920

Total Well Depth (feet): 43.16

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: _____

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
1918	14.70	13.9	6.165	3.167	317	initial	—	
1920	19.0	14.0	6.167	3.165	520	1	1	
1923	21.2	13.9	6.164	3.167	691	1	2	
1926	23.3	13.9	6.165	3.163	*silty	1	3	
1929	25.9	13.7	6.167	3.167	999+	1	4	
1931	27.0	13.9	6.167	3.161	* silty	1	5	
1934	29.5	13.9	6.165	3.167	* "	1	6	
1439	30.95	13.9	6.165	3.169	999+	1	7	
1446	34.2	13.8	6.167	3.171	999+	1	8	
1450	37.5	14.0	6.163	3.169	999+	1	9	
1525	~~39~~ 37.5	14.5	6.162	3.173	999+	1	10	
1607	~~42.83~~	14.7	6.162	3.170	999+	2	12	
1612	39.7	13.9	6.167	3.171	629	2	14	

Water column height (WCH) = Depth to bottom of well - depth to water = 43.16 - 14.70 = 28.46 ft.

Water column volume (WCV) = WCH (ft) x C = 4.63 gallons. 3 x WCV = 13.92 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: Silt = 1.3 at time of sampling

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C — pH ± 0.1

Turbidity < 5 NTU's — Conductivity ± 5%

Water Level ± 0.1 foot

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 9/27/99

Purging/Sampling Device: disposable bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☑. In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: TOC

Well Identification: B-23

Static Water Level (feet): 2.5 TOC

Sample Number: 302

Final Pump Depth (feet): 23.2

Sample Time: 0830

Total Well Depth (feet): 23.43

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: _____

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity* (NTU)	Gallons Purged		Comments
						successive	cumulative	
1345	2.5	13.3	7.41	1.96	11	—		* Turbidity malfunctioning
1349	10.9	11.0	7.27	1.49	30	1	1	water very silty
1352	14.15	12.0	7.09	1.54	482	1	2	& cloudy
1355	16.5	11.8	7.02	1.55	97	1	3	
1358	20.05	11.9	7.06	1.56	999	1	4	
1401	23	12.5	7.09	1.55	99	1	6	Bailed Dry after 5 gallons

Water column height (WCH) = Depth to bottom of well - depth to water = 23.13 - 2.5 = 20.93 ft.

Water column volume (WCV) = WCH (ft) x C = 3.1 gallons. 3 x WCV = 10.23 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: SWL at time of sampling = 3.1 Ft

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C	pH ± 0.1
Turbidity < 5 NTU's	Conductivity ± 5%
Water Level ± 0.1 foot	

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 9/27/99

Purging/Sampling Device: dedicated bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☑ In Casing (ppm) (Initial) 3.5 (vented to) _____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: TOC

Well Identification: GMW-1

Static Water Level (feet): 84.9 TOC (w/ bailer)

Sample Number: _____

Final Pump Depth (feet): _____

Sample Time: _____

Total Well Depth (feet): 123.75

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: _____

Time	Water Level (feet) TOC	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
10:31	89.165	14.6	7.54	1.169	31	1	1	
10:39	93.8	14.5	7.39	1.164	204	1.5 ~~0.5~~	2.5	
10:44	98.25	14.5	7.37	1.163	91	1.5 ~~1~~ pc	~~5~~ 4	
10:51	102.15	14.5	7.34	1.161	55	1 ~~5~~ pc	5	
10:55	104.5	14.5	7.32	1.159	97	1	6	
1103	110.1	14.4	7.33	1.160	530	1.5	7.5	
1108	115.5	14.4	7.47	1.160	377	1.5	9	
1116	116.65	14.4	7.46	1.160	119	1.5	10.5	
1124	117.1	15.4	7.44	1.52	129	1.0	11.5	
1131	120.5	14.7	7.44	1.59	107	0.5	12	Bailed Dry after 12 gallons

Water column height (WCH) = Depth to bottom of well - depth to water = 123.75 - 84.9 = 38.85 ft.

Water column volume (WCV) = WCH (ft) x C = 6.33 gallons. 3 x WCV = 18.9 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: _____

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C — pH ± 0.1

Turbidity < 5 NTU's — Conductivity ± 5%

Water Level ± 0.1 foot

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 4/29/99 — Purging/Sampling Device: dedicated bailer

Site Name: Zykan Landfill site - Wright City, Missouri — OVA: FID ☐ PID ☐ In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014 — Measurement Point: Top of Casing

Well Identification: GMW-1 — Static Water Level (feet): 56.8

Sample Number: 314 — Final Pump Depth (feet): 106.4

Sample Time: 4-30-99 1000 — Total Well Depth (feet): 116.3

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: Ronda Rall

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
0901	56.3	12.2	6.77	3.01	6	initial		
0905	68.2	12.1	6.76	2.95	7	5.5	5.5	
0910	74.4	12.3	6.82	2.94	44	1.5	5	
0915	80.4	12.3	6.84	2.95	246	2	7	
0921	86.4	12.6	6.81	2.95	756	2	9	
0931	92.6	12.6	6.93	2.97	999+	1	10	
0936	98.16	12.4	6.72	2.93	999+	2	12	
0943	102.5	12.5	6.91	2.93	999+	2	14	bailed dry - 14.5 gallons

Water column height (WCH) = Depth to bottom of well - depth to water = 116.3 - 56.8 = 59.5 ft.

Water column volume (WCV) = WCH (ft) x C = 16.3 gallons. 3 x WCV = 48.3 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: 57 x 7.61 BTOC at time of sampling

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C — pH ± 0.1

Turbidity < 5 NTU's — Conductivity ± 5%

Water Level ± 0.1 foot

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 4/24/94

Purging/Sampling Device: _____

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☐ In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: Top of Casing

Well Identification: K-6 [redacted] OX

Static Water Level (feet): 3.5

Sample Number: _____

Final Pump Depth (feet): _____

Sample Time: _____

Total Well Depth (feet): 22.3

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: _____

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	

Water column height (WCH) = Depth to bottom of well - depth to water = 22.3 - 3.5 = 18.8 ft.

Water column volume (WCV) = WCH (ft) x C = 1.7 gallons. 3 x WCV = 5.1 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: Bailer stuck in well casing

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C — pH ± 0.1

Turbidity < 5 NTU's — Conductivity ± 5%

Water Level ± 0.1 foot

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

18.8
.0512
3
16920
0000
1.7296

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 1/27/99

Purging/Sampling Device: ~~Bailer~~ Peristaltic pump

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☑ In Casing (ppm) (Initial) 0 (vented to) 0

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: TOC

Well Identification: K-9 80

Static Water Level (feet): 14.5 TOC

Sample Number: N/A

Final Pump Depth (feet):

Sample Time:

Total Well Depth (feet): ~70

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature:

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
1552	29.25	14.0	7.01	.187	92	1.5	1.5	Pumped to ~30ft TOC

Water column height (WCH) = Depth to bottom of well - depth to water = ~~[illegible]~~ 25 - 14.5 = ~~[illegible]~~ 55.5 ft pc

Water column volume (WCV) = WCH (ft) x C = ~~6.08~~ 5.1 gallons. 3 x WCV = ~~18.25~~ 15.3 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: Bailer would not fit in ~~[illegible]~~ casing (1.5")

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C
pH ± 0.1
Turbidity < 5 NTU's
Conductivity ± 5%
Water Level ± 0.1 foot

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

GROUNDWATER MONITORING WELL
PURGING DATA SHEET

Date: 1/27/99

Purging/Sampling Device: Disposable bailer

Site Name: Zykan Landfill site - Wright City, Missouri

OVA: FID ☐ PID ☐ In Casing (ppm) (Initial)_____ (vented to)_____

Project Number: KJ7104 / 0567XLSRXX TDD: S07-9706-014

Measurement Point: Top of Casing

Well Identification: D-21

Static Water Level (feet): 45.14

Sample Number: 313

Final Pump Depth (feet):_____

Sample Time: 1119

Total Well Depth (feet): 54.73

Analytical Parameter(s): LDL VOC, SVOC, Pesticides, Herbicides, Total Metals, Dissolved Metals, Dioxin

Sampler's Signature: _____

Time	Water Level (feet)	Temperature (° C)	pH	EC (mS/cm)	Turbidity (NTU)	Gallons Purged		Comments
						successive	cumulative	
								BAILED DRY AFTER 15 GALLONS

Water column height (WCH) = Depth to bottom of well - depth to water = 54.73 - 45.14 = 9.54 ft.

Water column volume (WCV) = WCH (ft) x C = 6.27 gallons. 3 x WCV = 18.8 gallons.

1.5" diam well: C = 0.092, 2" diam. well: C = 0.163, 4" diam. well: C = 0.653

Comments: Swl = 52.78 at time of sampling

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature ± 1° C — pH ± 0.1

Turbidity < 5 NTU's — Conductivity ± 5%

Water Level ± 0.1 foot

Note: All immiscible layers, water levels and pump depths are measured from the notch in the top of the well casing or from the north side of the well casings.

Water Supply Survey Forms

TER SUPPLY SURVEY FO

Date: 4-29-99 Time: 1930 Surveyor: Ronald

roperty Owner(s): Tim Fuller MOCH #15

Address: 241 Fruit Farm Rd

Wright City MO 63390

Telephone: (314) 745-3659

WATER SOURCE

X Well _____ Cistern

_____ Surface Water

_____ Spring

___ Municipal Water Line (Specify District): _____

___ Other (Specify): _____

WATER USE

Number of Persons Using the Water Source: 5 Total Persons

_____ Infants (Less than 1 year) 2 Adults (19 to 65 years)

3 Children (1 to 18 years) _____ Adults (over 65 years)

Water Uses (Indicate the Water Source for Each Use)

✓ Drinking ✓ Bathing ✓ Washing

✓ Watering Lawn ✓ Watering Garden

_____ Livestock ✓ Cooking _____ Industrial

_____ Back-up Water Supply _____ Other (Specify):

WATER QUALITY (Only Required for Those Wells Sampled)

pH 7.07 17 4-29-99 Conductivity 0.592 ms/cm Temperature 16.4 °C Turb. 5 NTU

Sample Location (i.e., Kitchen Sink, Outside Faucet): _____

Relationship of Sample Location to Well Location (i.e., Before or after holding tank, distance from well, before or after treatment system, etc.): post - pressure tank - softener is bypassed

DRILLING INFORMATION

Year Well Drilled: 1963 Well Depth: 320' Depth to Water: _____

Property Owner at Time of Drilling: _____

Drilling Method: ___ Rotary ___ Auger ___ Cable Tool

___ Hand Dug ___ Other (Specify): _____

Depth Where Water Was Encountered During Drilling: _____

Distance of Well from Septic Tank/Leach Field: _____

TER SUPPLY SURVEY FO

Date: 5/29/97 Time: 1223 Surveyor: CHARLES SMITH

roperty Owner(s): WILLIAM J. MURPHY

Address: 12 WEST HIGHWAY M

WRIGHT CITY, MO 63390

Telephone: 314/745-3588

WATER SOURCE

X Well ____ Cistern

____ Surface Water

____ Spring

___ Municipal Water Line (Specify District): ____

___ Other (Specify): ____

WATER USE

Number of Persons Using the Water Source: ____ Total Persons

____ Infants (Less than 1 year) ____ Adults (19 to 65 years)

____ Children (1 to 18 years) ____ Adults (over 65 years)

Water Uses (Indicate the Water Source for Each Use)

____ Drinking ____ Bathing ____ Washing

____ Watering Lawn ____ Watering Garden

____ Livestock ____ Cooking ____ Industrial

____ Back-up Water Supply ____ Other (Specify):

WATER QUALITY (Only Required for Those Wells Sampled)

pH 7.17 Conductivity 0.482 mS/cm Temperature 14.9°C

Sample Location (i.e., Kitchen Sink, Outside Faucet): WELL IN YARD BEHIND HOUSE

Relationship of Sample Location to Well Location (i.e., Before or after holding tank, distance from well, before or after treatment system, etc.): ____

DRILLING INFORMATION

Year Well Drilled: ____ Well Depth: ____ Depth to Water: ____

Property Owner at Time of Drilling: ____

Drilling Method: ___ Rotary ___ Auger ___ Cable Tool

___ Hand Dug ___ Other (Specify): ____

Depth Where Water Was Encountered During Drilling: ____

Distance of Well from Septic Tank/Leach Field: ____

ATER SUPPLY SURVEY F(

Date: 4-28-99 Time: 1700 Surveyor: Ronald A Smith

Property Owner(s): Jeff Roberts

Address: 133 Fruit Farm Road

Wright City MO ~~63390~~ 63390

Telephone: _____

WATER SOURCE

X Well _____ Cistern

_____ Surface Water

_____ Spring

___ Municipal Water Line (Specify District): _____

___ Other (Specify): _____

WATER USE

Number of Persons Using the Water Source: _____ Total Persons

_____ Infants (Less than 1 year) _____ Adults (19 to 65 years)

_____ Children (1 to 18 years) _____ Adults (over 65 years)

Water Uses (Indicate the Water Source for Each Use)

_____ Drinking _____ Bathing _____ Washing

_____ Watering Lawn _____ Watering Garden

_____ Livestock _____ Cooking _____ Industrial

_____ Back-up Water Supply _____ Other (Specify):

WATER QUALITY (Only Required for Those Wells Sampled)

pH 6.96 Conductivity 0.97 ms/cm Temperature 16.0°C

Sample Location (i.e., Kitchen Sink, Outside Faucet): _____

_____

Relationship of Sample Location to Well Location (i.e., Before or after holding tank, distance from well, before or after treatment system, etc.): post pressure tank

DRILLING INFORMATION

Year Well Drilled: _____ Well Depth: _____ Depth to Water: _____

Property Owner at Time of Drilling: _____

Drilling Method: ___ Rotary ___ Auger ___ Cable Tool

___ Hand Dug ___ Other (Specify): _____

Depth Where Water Was Encountered During Drilling: _____

Distance of Well from Septic Tank/Leach Field: _____

D

APPENDIX D

Analytical Data Package

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
25 FUNSTON ROAD
KANSAS CITY, KANSAS 66115

DATE: JUN 8 1990

SUBJECT: Data Transmittal for Activity #: A SYXG
Site Description: Eyakan Landfill

FROM: For Andrea Jirka, Program Manager M. Thomas
Regional Laboratory, Environmental Services Division

TO: Bryant Burnett
SUPR

Attached is the data transmittal for the above-referenced site. The data contained in this transmittal have been approved by the Regional Laboratory. This should be considered a _____ Partial or X Complete data transmittal (completes transmittal of _____). The Project Leader should notify the Regional Laboratory with 14 days of any changes in the LAST analytical database. If you have any questions, comments, or data changes, please contact Dee Simmons at 551-5129.

Attachment

cc: Analytical Data File

RECYCLE

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 101

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/27/99 **Sample Time:** 0940 **Sampler:** SMITH/SCHAOEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (W/Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:** GRAB

Sample Location:
BACKGROUND LAKE
MIDDLE OF LAKE

APPROXIMATELY 5 FEET
BELOW SURFACE

SW-1

Sample Description:
pH: 6.59

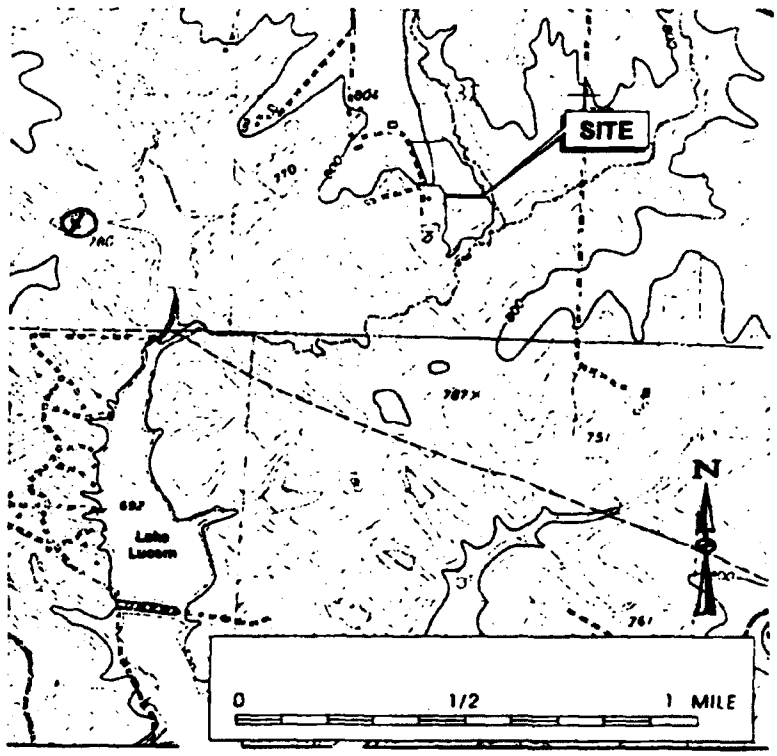
cond.: 0.125 mS / cm

temp.: 14.5 °C

turbidity: >999 NTU

Other Comments/Property Owner Information:
SW-1

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 102

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/27/99 **Sample Time:** 1250 **Sampler:** SMITH/SCHADEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (with Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ GAS 4/27/99

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:** GLAS

Sample Location:
LAKE LUCERN
~5' BELOW
SURFACE LEVEL
SW-2

Sample Description:
pH: 7.41

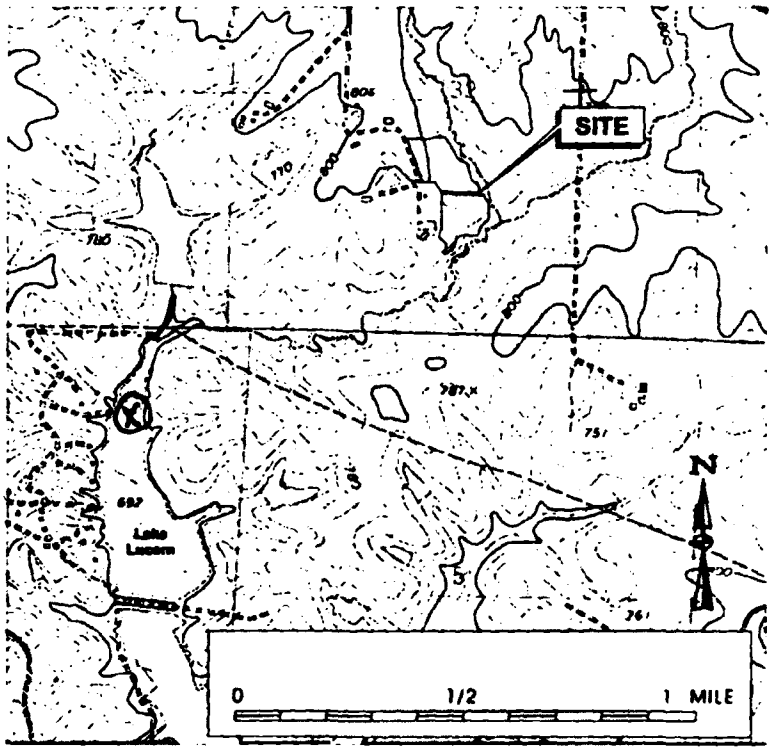
cond.: 0.139 **mS / cm**

temp.: 16.8 **°C**

turbidity: N/A **NTU**

Other Comments/Property Owner Information:
SW-2

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 103

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/27/99 **Sample Time: 1305** **Sampler: SMITH / SCHADEMANN**

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (with Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ GAS 4/27/99

SAMPLE DESCRIPTION

lia: water **Sample Area:** **Aliquots: GRAB**

Sample Location:
LAKE LUCERN
<1' BELOW SURFACE
SW-3

Sample Description:
pH: 7.77

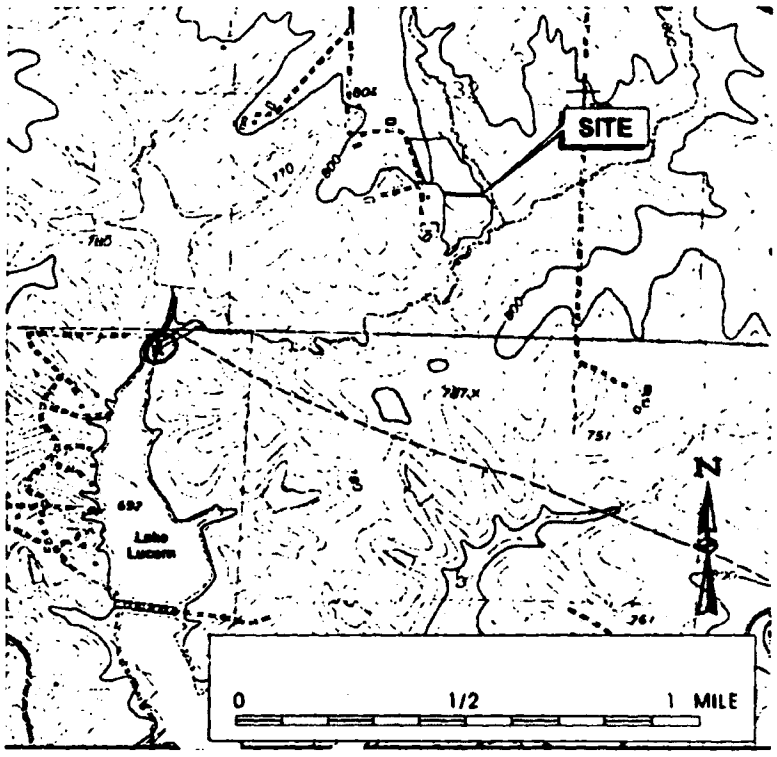
cond.: 0.140 **mS / cm**

temp.: 16.6 **°C**

turbidity: N/A **NTU**

Other Comments/Property Owner Information:
SW-3

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 104

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/27/99 **Sample Time:** 1420 **Sampler:** SMITH / SCHAEDEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (with Hg.)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ QAS 4/27/99

SAMPLE DESCRIPTION

Matrix: water **Sample Area:** **Aliquots:** GRAB

Sample Location:
LAKE LUCERN
APPROXIMATELY
22' BELOW SURFACE
SW-4

Sample Description:
pH: 7.25

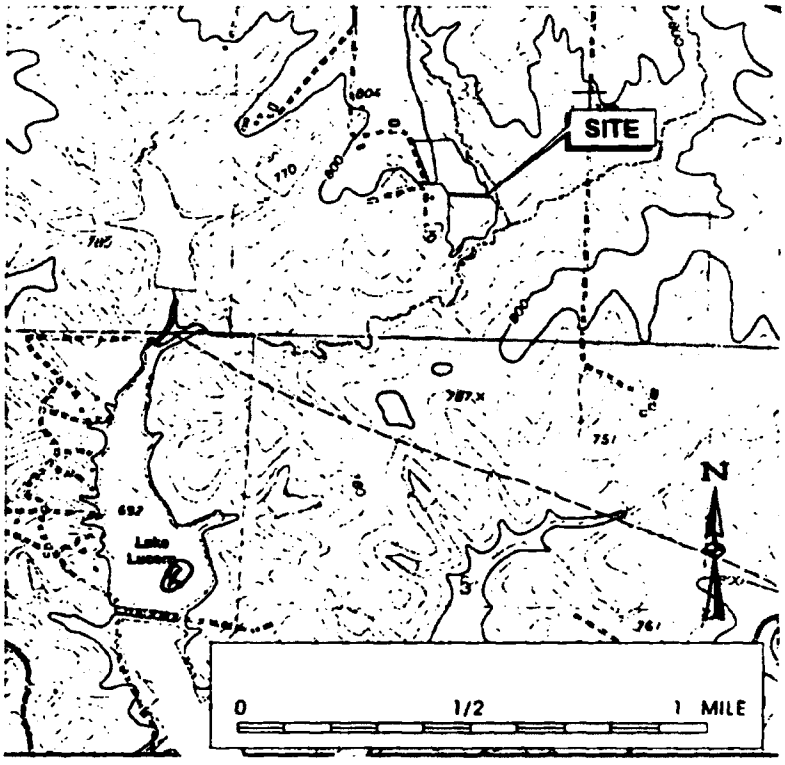
cond.: 0.138 **mS / cm**

temp.: 13.8 **°C**

turbidity: N/A **NTU**

Other Comments/Property Owner Information:
SW-4

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 105

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/27/99 **Sample Time:** 1450 **Sampler:** SMITH / SCHROEDMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (with Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ GLS 4/27/99

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:** GRAB

Sample Location:
LAKE LUCERN
APPROXIMATELY 25' BELOW SURFACE
SW-5

Sample Description:
pH: 7.46

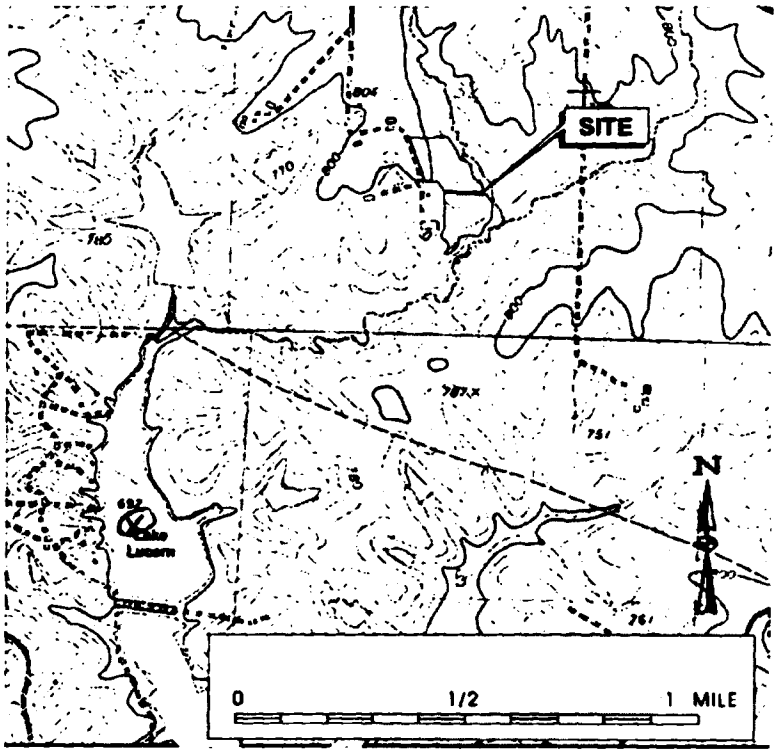
cond.: 0.138 mS / cm

temp.: 12.2 °C

turbidity: N/A NTU

Other Comments/Property Owner Information:
SW-5

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 106

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/28/99 **Sample Time:** 0750 **Sampler:** SMITH

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (with Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ GLS 4/30/99

SAMPLE DESCRIPTION

lia: water **Sample Area:** **Aliquots:** 6 MS

Sample Location:
SW-6
OUTFALL FROM LAKE TO THE MOUTH OF LAKE LUCERN
FILLED AT SURFACE

Sample Description:
pH: 7.50

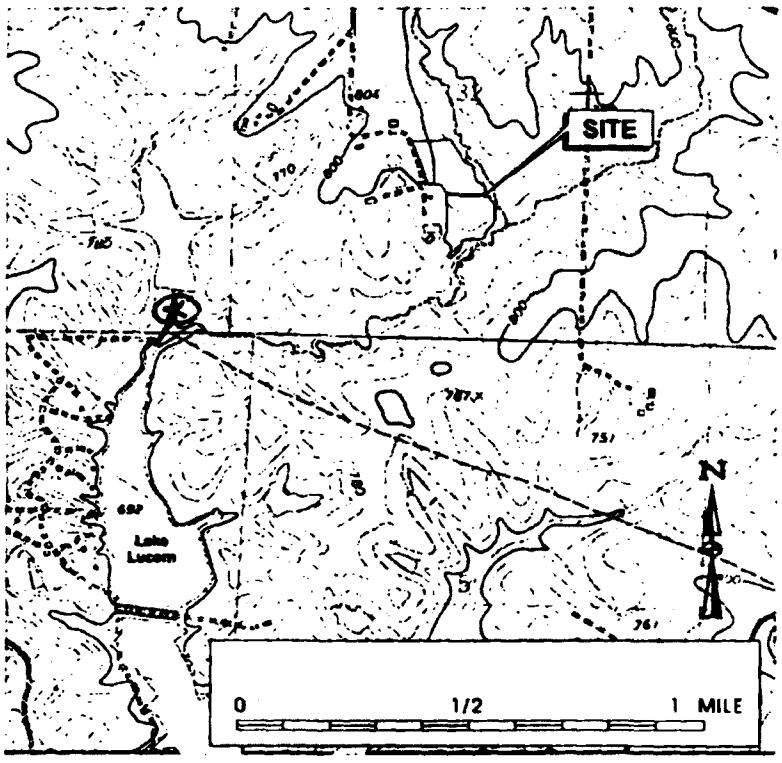
cond.: 0.130 **mS / cm**

temp.: 14.7 **°C**

turbidity: N/A **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 107

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 0920 **Sampler:** SMITH

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (with Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ GAS 4/29/99

SAMPLE DESCRIPTION

lia: water **Sample Area:** **Aliquots:** GRAB

Sample Location:
SW-7
STREAM FROM LANDFILL
FILLED AT SURFACE

Sample Description:
pH: 7.70

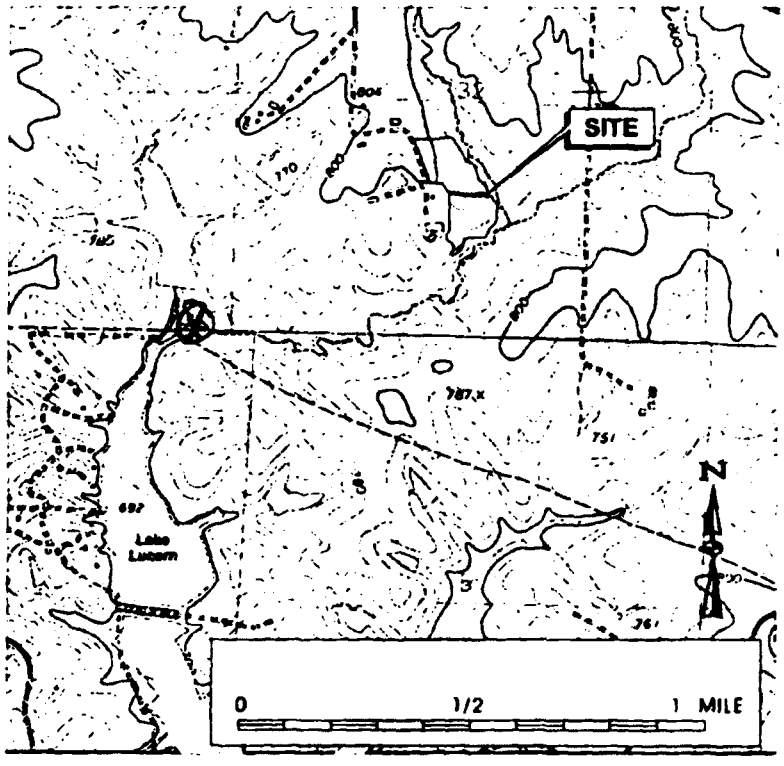
cond.: 0.187 **mS / cm**

temp.: 13.1 **°C**

turbidity: N/A **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 108

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/26/99 **Sample Time:** 0745 **Sampler:** SCHADEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (with Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

Matrix: water **Sample Area:** **Aliquots:** GRAB

Sample Location: SW-8
ENTRANCE TO LAKE LUCERN
FILLED AT SURFACE

Sample Description:
pH: 6.68

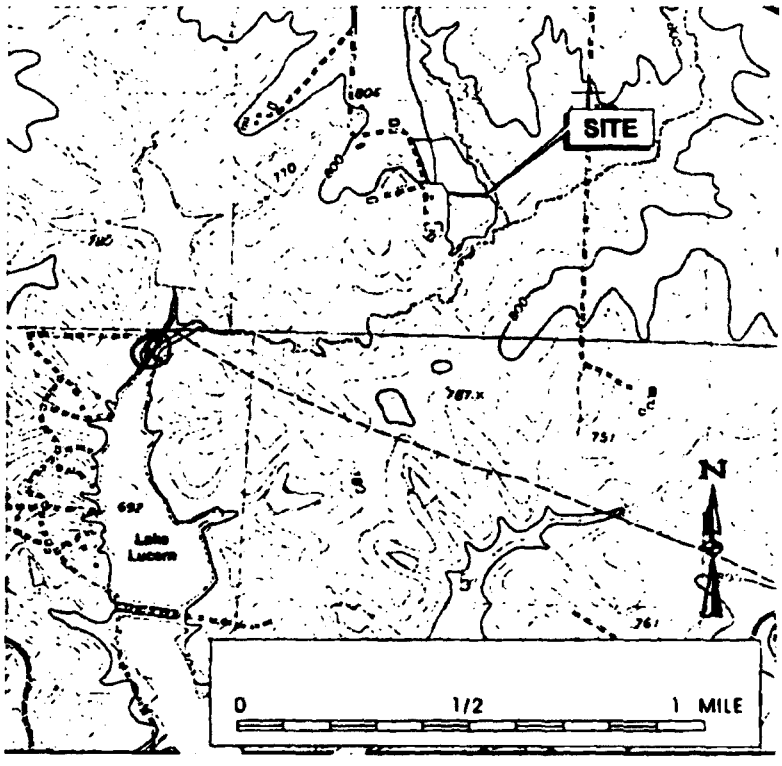
cond.: 0.193 mS / cm

temp.: 14.9 °C

turbidity: N/A NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 201

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 04/27/99 **Sample Time:** 0940 **Sampler:** SMITH / SCHADEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4/27/99 2 ea 3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
1 x 8-oz. jar	4° C	SD02	Dioxin

SAMPLE DESCRIPTION

Media: soil **Sample Area:** **Aliquots:** 1

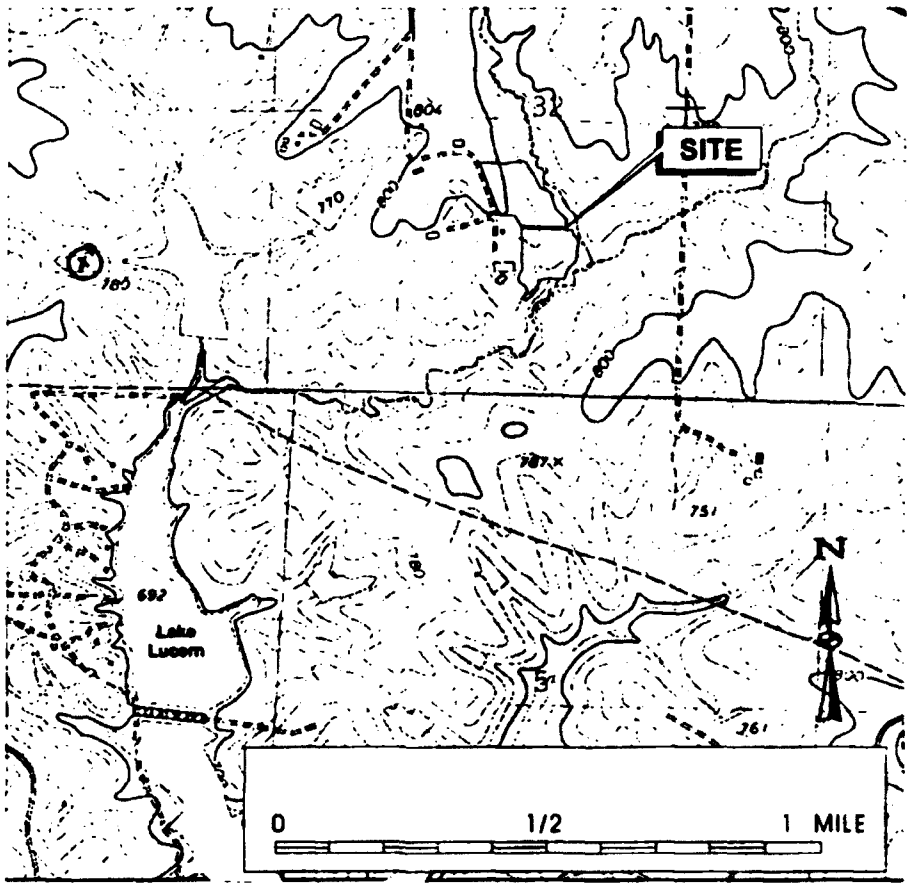
Sample Location:
CREEKBED LAKE - MIDDLE OF LAKE
SW-SED-1

Sample Description:
SURFACE WATER SEDIMENT

SW-SED-1

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 202

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/27/99 **Sample Time:** 1230 **Sampler:** SMITH/SCHADEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~ CAS 5/27/99

SAMPLE DESCRIPTION

[redacted] (6307) [illegible]

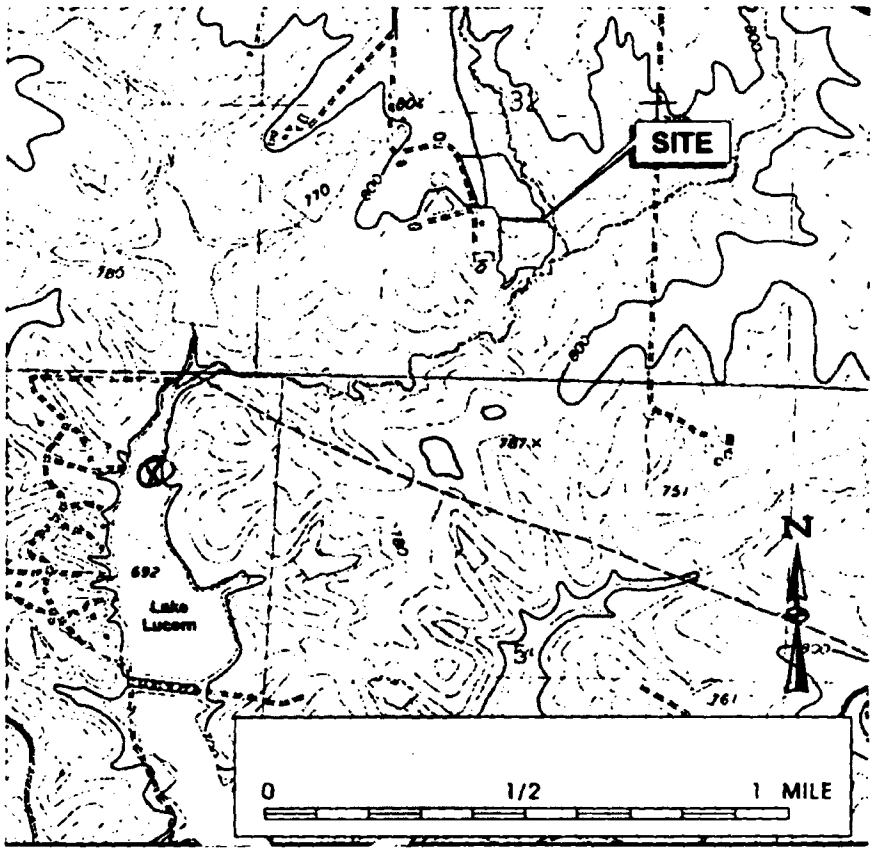
Media: soil **Sample Area:** **Aliquots:** GRAB

Sample Location:
LAKE LUCERN
APPROX. 5' BELOW SURFACE
SW-SED-2

Sample Description:
OLIVE BROWN SEDIMENT

Other Comments/Property Owner Information:
SW-2

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 203

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/27/99 **Sample Time: 1305** **Sampler: SMITH / SCHAOEMANN**

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~ EAS 4/27/99

SAMPLE DESCRIPTION

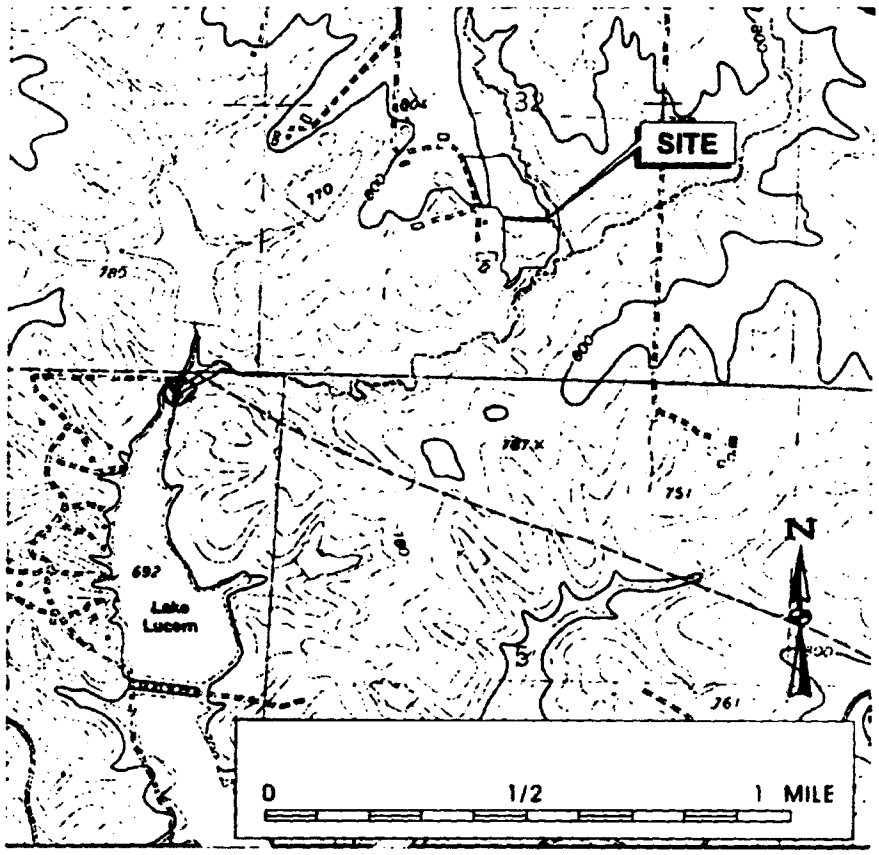
Media: soil **Sample Area:** **Aliquots: GRAB**

Sample Location:
LAKE LUCERN
L1'
FILLED AT SURFACE
SW-SED-3

Sample Description:
OLIVE BROWN
SEDIMENT

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



sheets -surface water sediment

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 204

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/27/99 **Sample Time:** 1420 **Sampler:** SMITH/SCHADEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~ CLS 4/27/99

SAMPLE DESCRIPTION

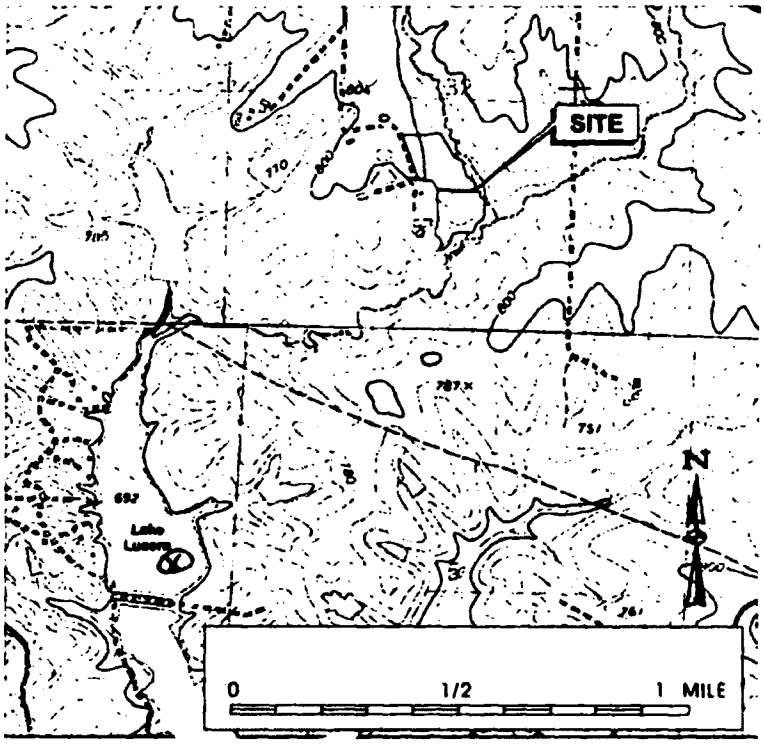
Media: soil **Sample Area:** **Aliquots:** GRAB

Sample Location:
LAKE LUCERN
SW-SED-4
APPROX. 22' BELOW SURFACE

Sample Description:
GRAY BROWN SEDIMENT

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 205

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/27/99 **Sample Time:** 1450 **Sampler:** SMITH / SCHAEFFMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~ CLS 4/27/99

SAMPLE DESCRIPTION

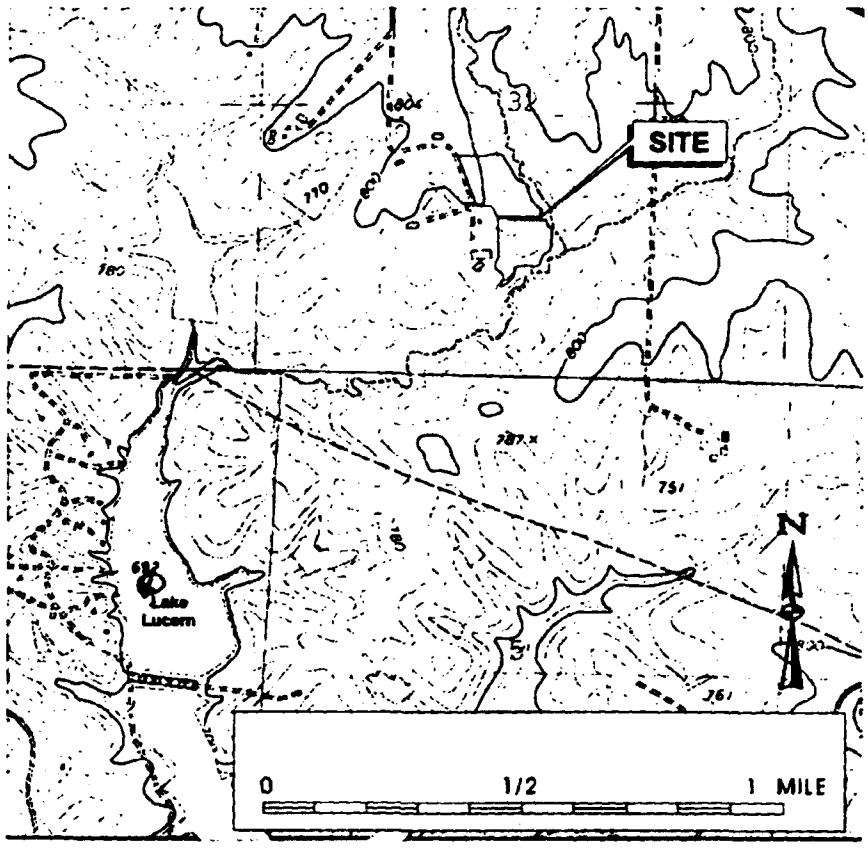
Media: soil **Sample Area:** **Aliquots:** GRAB

Sample Location:
LAKE LUCERN
SLU-SED-5
APPROX. 22' BELOW SURFACE

Sample Description:
GREY-BROWN SEDIMENT

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 206

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/28/99 **Sample Time:** 0750 **Sampler:** SMITH

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~ GAS 4/28/99

SAMPLE DESCRIPTION

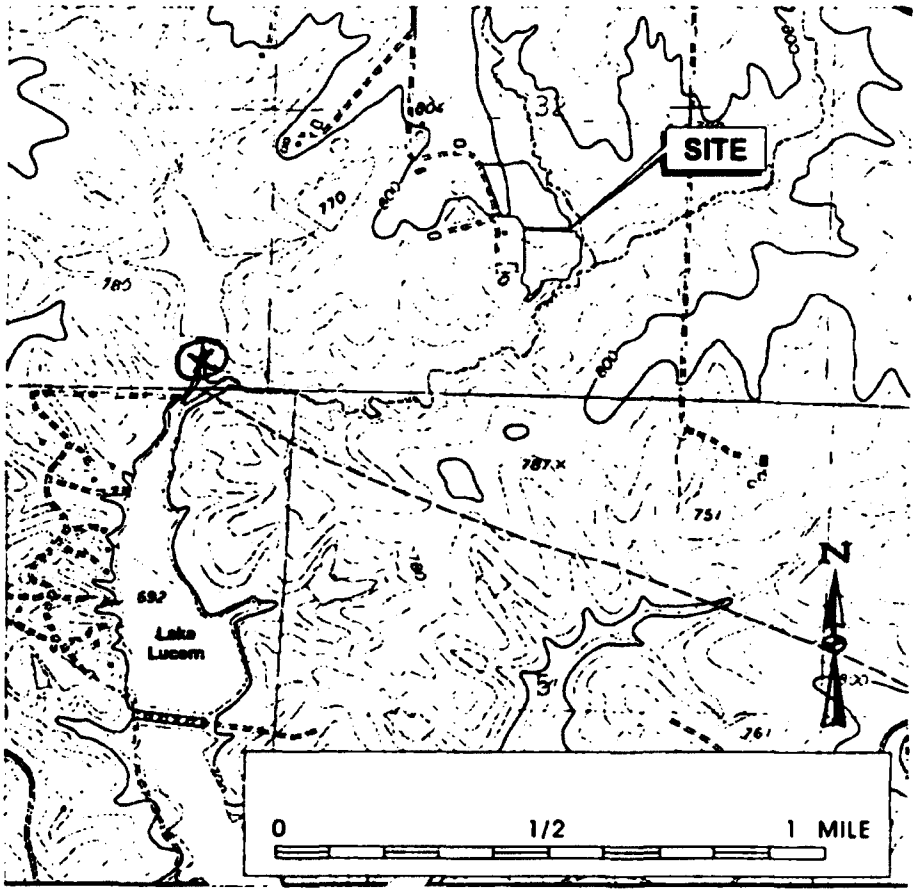
Media: soil **Sample Area:** **Aliquots:** GRAB

Sample Location:
SW-SED-206
OUTFALL FROM LAKE TO NORTH OF LAKE LUCERN

Sample Description:
GRAVEL

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



Field sheets -surface water sediment

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 207

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 0920 **Sampler:** SCHADEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~

SAMPLE DESCRIPTION

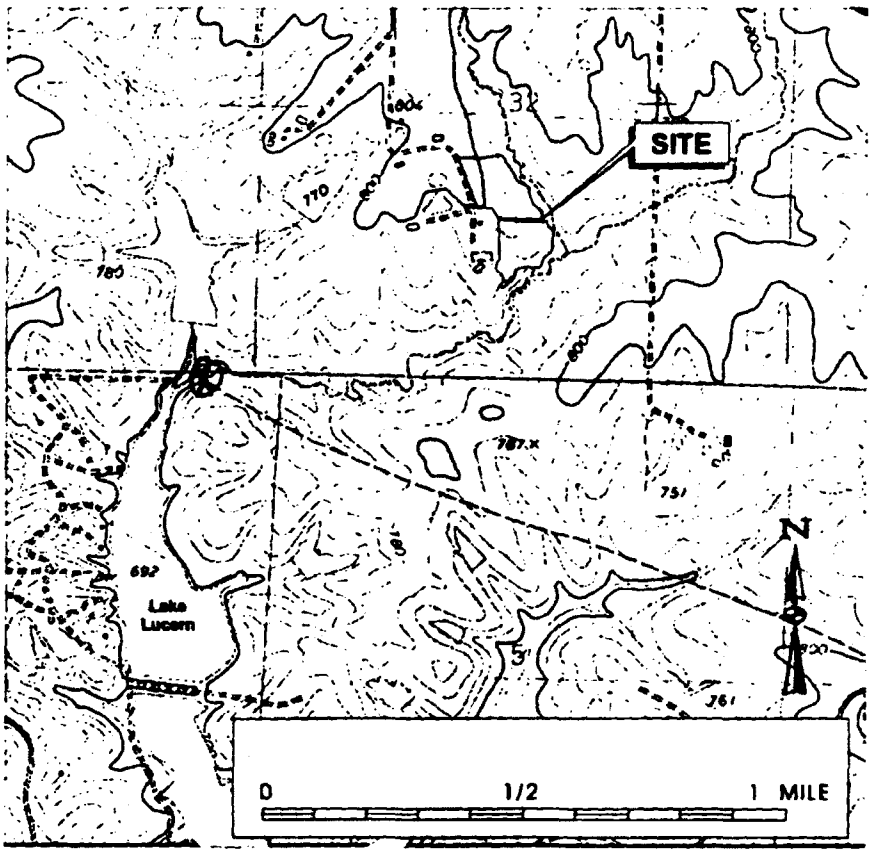
Media: soil **Sample Area:** **Aliquots:** 6 GRAB

Sample Location:
SW-SED-7
STREAM FROM LANDFILL

Sample Description:
GRAVEL AND SAND

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 209

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/28/99 **Sample Time:** 0748 **Sampler:** SCHADEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
1 x 8-oz. jar	4° C	SD02	Dioxin

SAMPLE DESCRIPTION

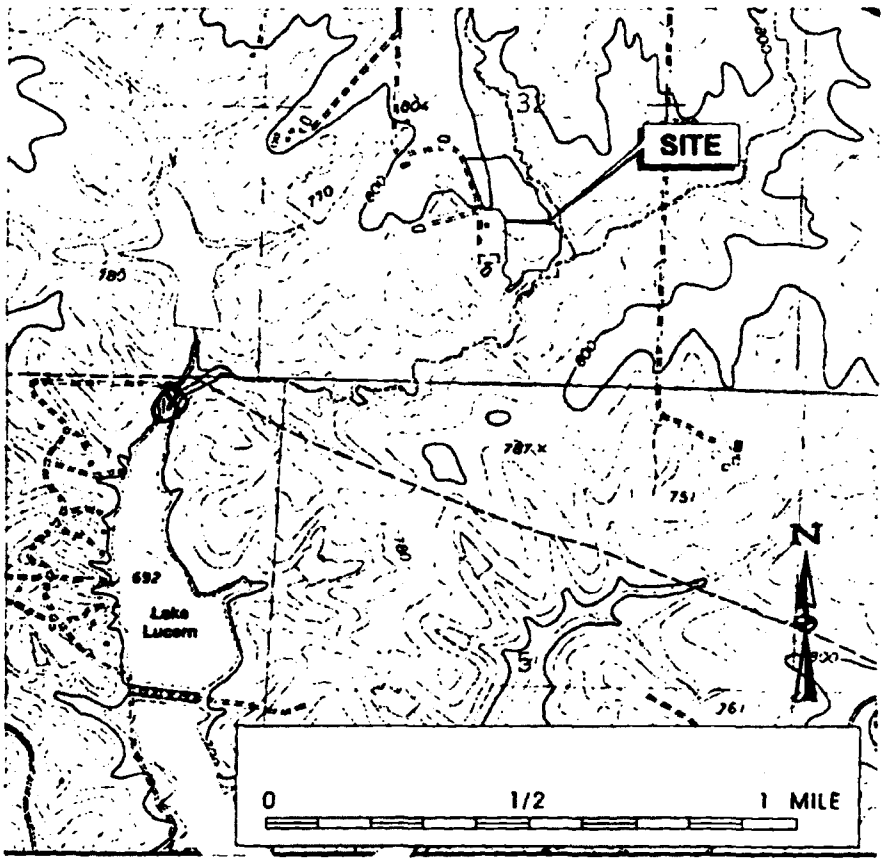
Media: soil **Sample Area:** **Aliquots:** GRAB

Sample Location:
W-SED-9
E. ENTRANCE TO LAKE LUCERN

Sample Description:
SAND

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 301

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager:** Ron Ramold

Sample Date: 9/27/99 **Sample Time:** 1310 **Sampler:** Currier / Cox

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (with Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

Media: water **Sample ~~Area~~ Depth:** 24.72 **Aliquots:**

Sample Location:
See map
B-198

Sample Description:
pH: 6.73

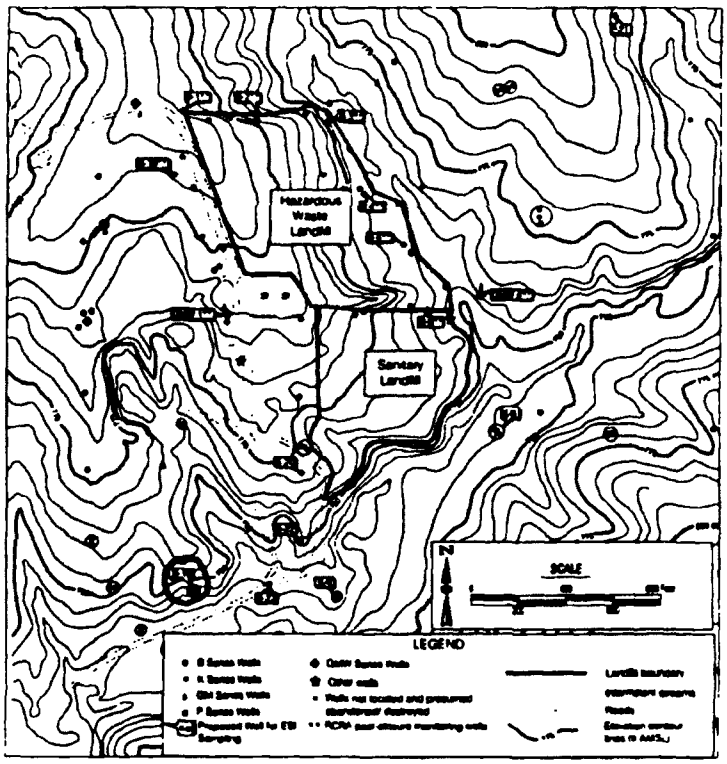
cond.: 2.81 mS / cm

temp.: 13.5 °C

turbidity: 133 NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

...tivity: Zykan Landfill site, Wright City, MO Activity #: ASYXG

Sample #: 302

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager:** Ron Ramold

Sample Date: 4/28/99 **Sample Time:** 0830 **Sampler:** Beals / Cox

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (with Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ DC

SAMPLE DESCRIPTION

...dia: water **Sample Area:** **Aliquots:**

Sample Location: B-23

Sample Description:

pH: 6.80

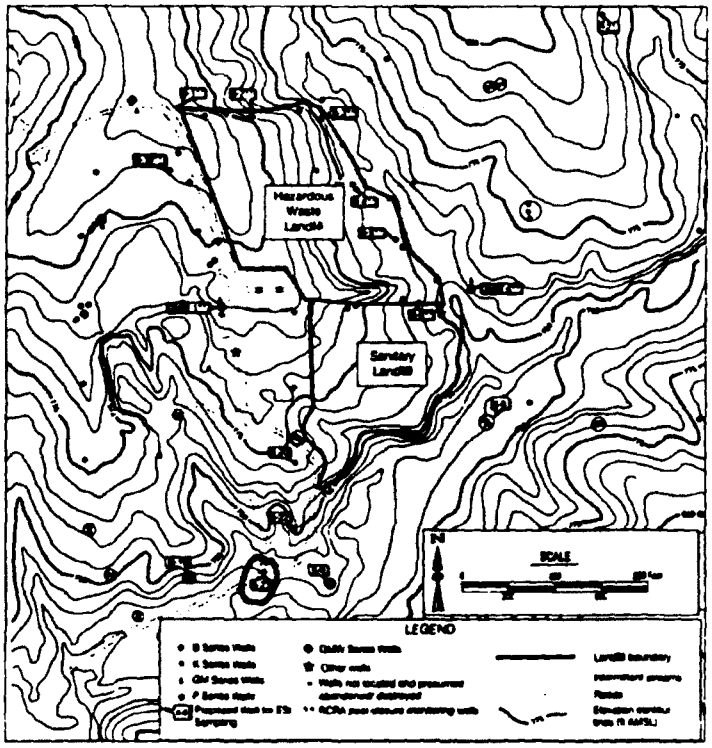
cond.: 1.55 mS / cm

temp.: 11.4 °C

turbidity: 32 NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 303

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/28/99 **Sample Time:** 0920 **Sampler:** BRAIG /COX

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (w/ Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

B 22

Sample Description:

pH: 6.63

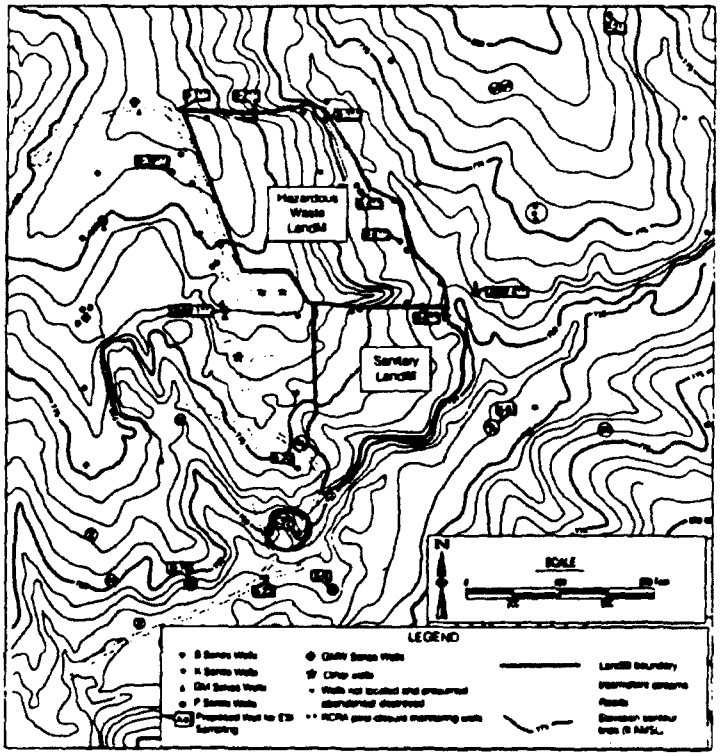
cond.: 3.88 mS / cm

temp.: 13.0 °C

turbidity: 10 NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 304

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/28/99 **Sample Time:** 9:54 **Sampler:** Courter/Brang

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (M/Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

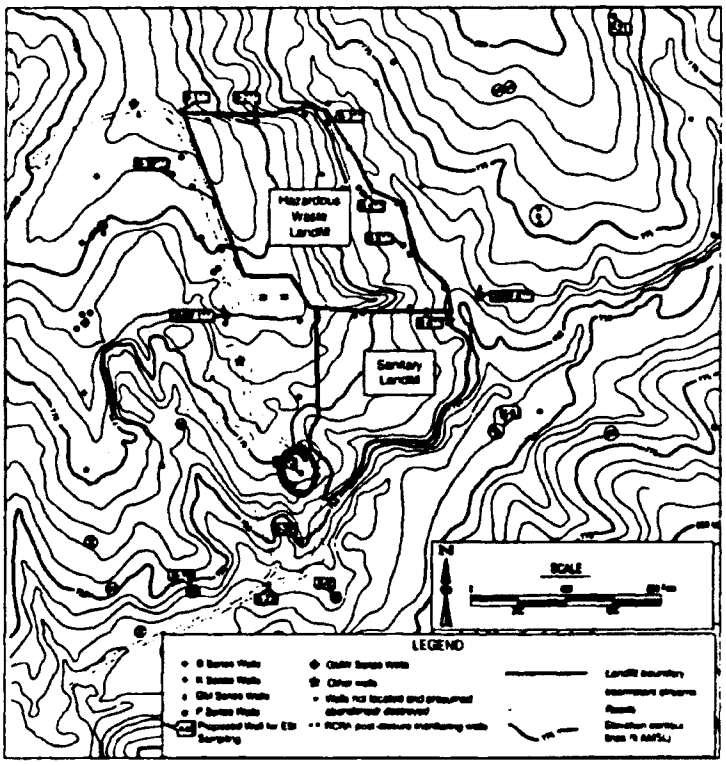
Media: water **Sample Area:** **Aliquots:**

Sample Location:
B-20

Sample Description:
pH: 6.62
cond.: 3.24 mS / cm
temp.: 12.8 °C
turbidity: 10 NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

.tivity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 305

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 1/29/99 **Sample Time:** 1436 **Sampler:** Ramold / Currier

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
2 x 1-L cubitainer (MS/MSD)	HNO_3, 4° C	W05	Total Metals (M/Hg)
2 x 1-L cubitainer (MS/MSD)	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

GMW-1

Sample Description:

pH: 7.36

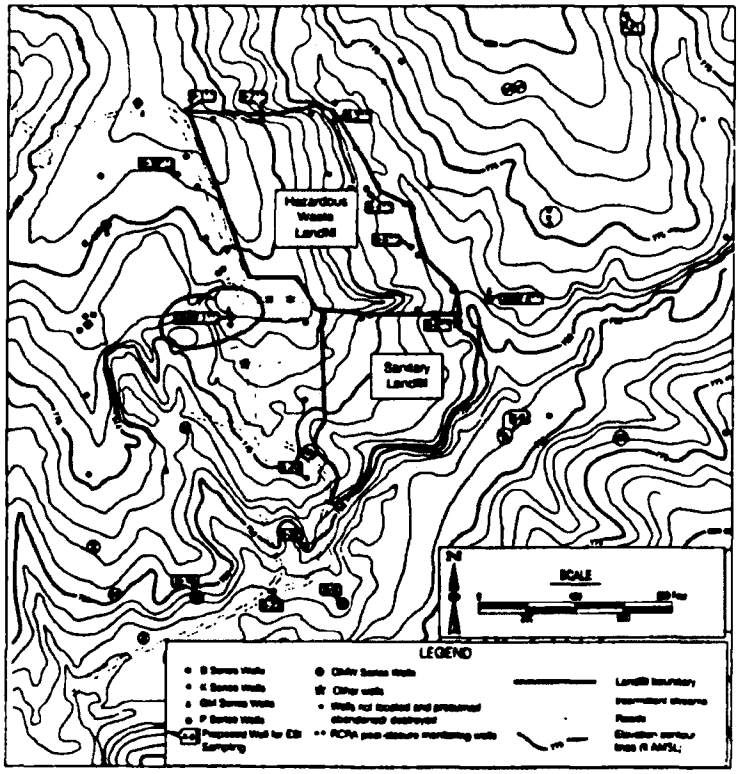
cond.: 1.75 **mS / cm**

temp.: 18.9 **°C**

turbidity: 59 **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

tivity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 306

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 9/29/99 **Sample Time:** 1527 **Sampler:** Ramold / Currier

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar ~~¾ Full~~	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (+ Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	4° C	WD01	Dioxin PC

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

B-3

Sample Description:

pH: 6.75

cond.: 2.87 mS / cm

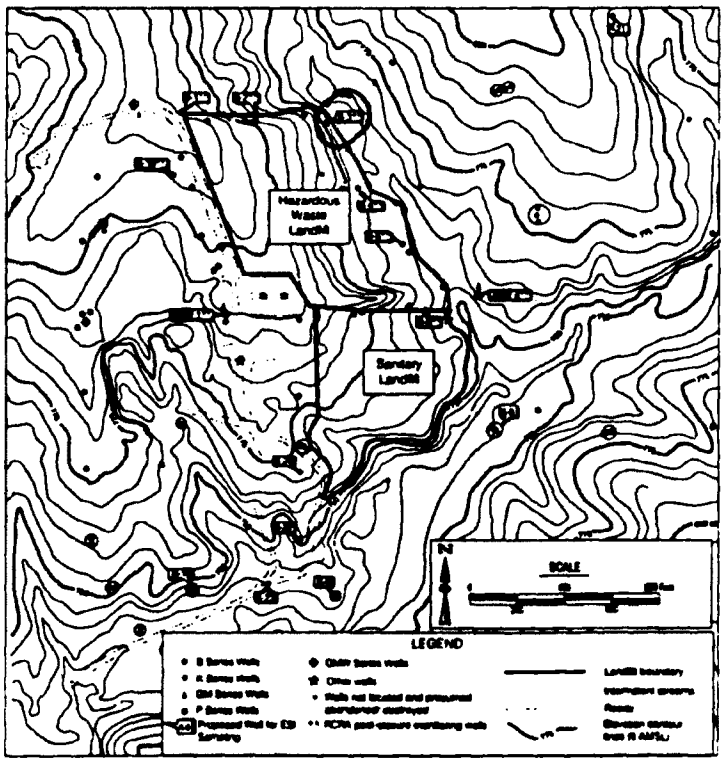
temp.: 16.8 °C

turbidity: 243 NTU

Other Comments/Property Owner Information:

well bailed dry before complete sample volume could be collected

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

.tivity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 307

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/30/99 **Sample Time:** 832 **Sampler:** Schademann / Currie

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WH~~	~~Herbicides~~ pc
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals /Hg
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass~~ jar	4° C	~~WD01~~	~~Dioxin~~ pc

SAMPLE DESCRIPTION

dia: water **Sample Area:** **Aliquots:**

Sample Location:

B-10

Sample Description:

pH: 6.99

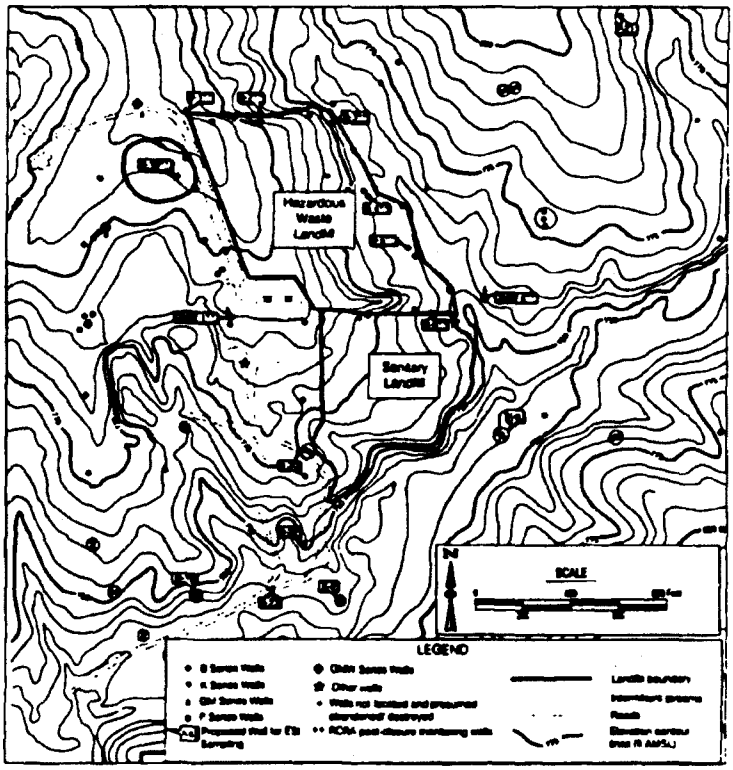
cond.: 3.25 **mS / cm**

temp.: 13.2 **°C**

turbidity: 26 **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 308

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/30/99 **Sample Time:** 0848 **Sampler:** Schademann / Currie

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WH~~	~~Herbicides~~ DE
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals / Hg
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ DC

SAMPLE DESCRIPTION

dia: water **Sample Area:** **Aliquots:**

Sample Location:

B-1

Sample Description:

pH: 6.77

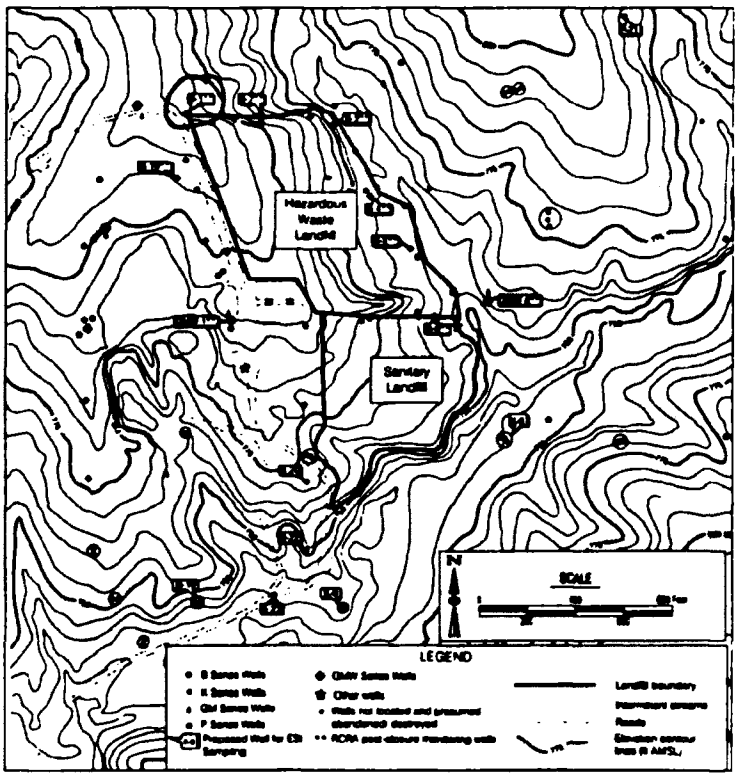
cond.: 2.90 mS / cm

temp.: 14.1 °C

turbidity: 202 NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: BP 309

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/30/99 **Sample Time:** 1039 **Sampler:** Ramold / Keller

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals 1/19
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ ars 4/30/99

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

B-2

Sample Description:
pH: 6.67

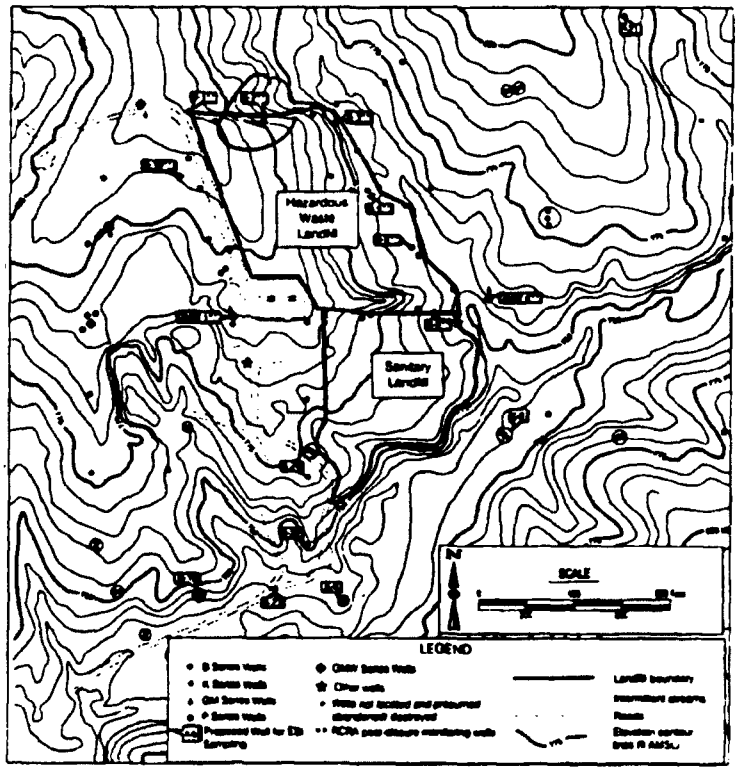
cond.: 3.31 mS / cm

temp.: N/A °C

turbidity: 705 NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

tivity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: ~~B-4~~ 310

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/30/99 **Sample Time:** 1015 **Sampler:** Ramold, Currier

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals / Hg
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ MK

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

B-4

Sample Description:

pH: 6.77

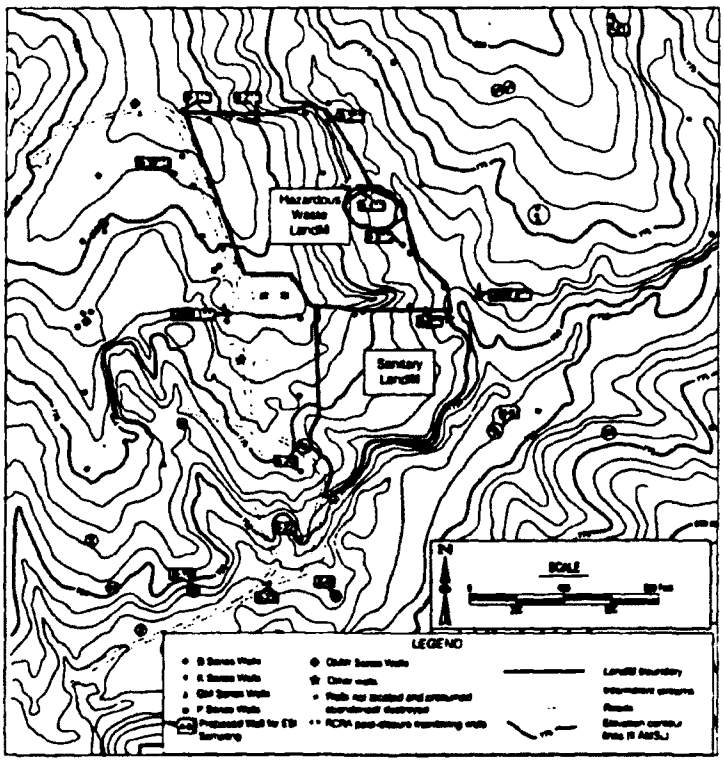
cond.: 2.13 **mS / cm**

temp.: N/A **°C**

turbidity: 94 **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 311

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/30/99 **Sample Time:** 0955 **Sampler:** Shademan / Currie

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals /Hg
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ CLS 4/30/99

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

B-5

Sample Description:

pH: 6.72

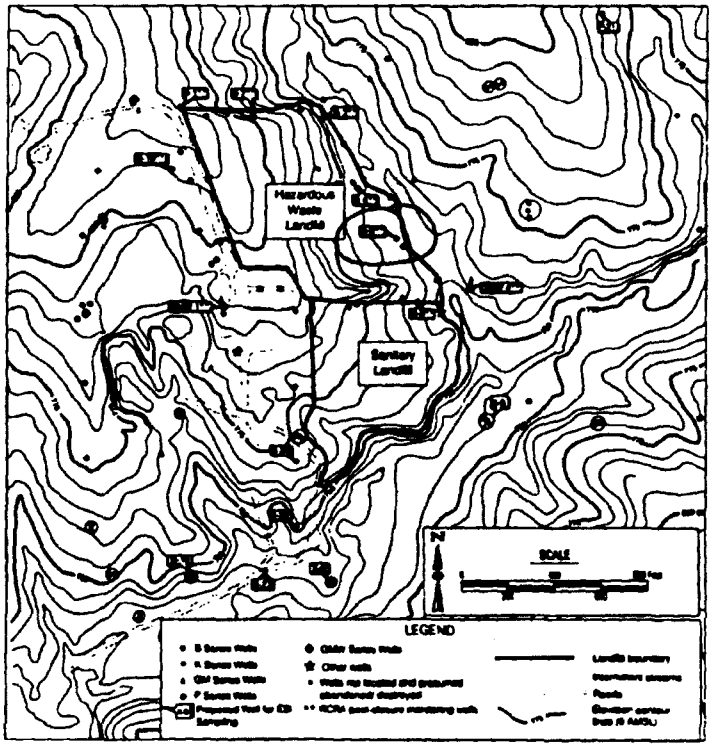
cond.: 2.77 mS / cm

temp.: N/A °C

turbidity: 587 NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

.tivity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 312

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/30/99 **Sample Time:** 0926 **Sampler:** Schademann / Currier

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals 11C
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

..dia: water **Sample Area:** **Aliquots:**

Sample Location:

B-6

Sample Description:
pH: 6.83

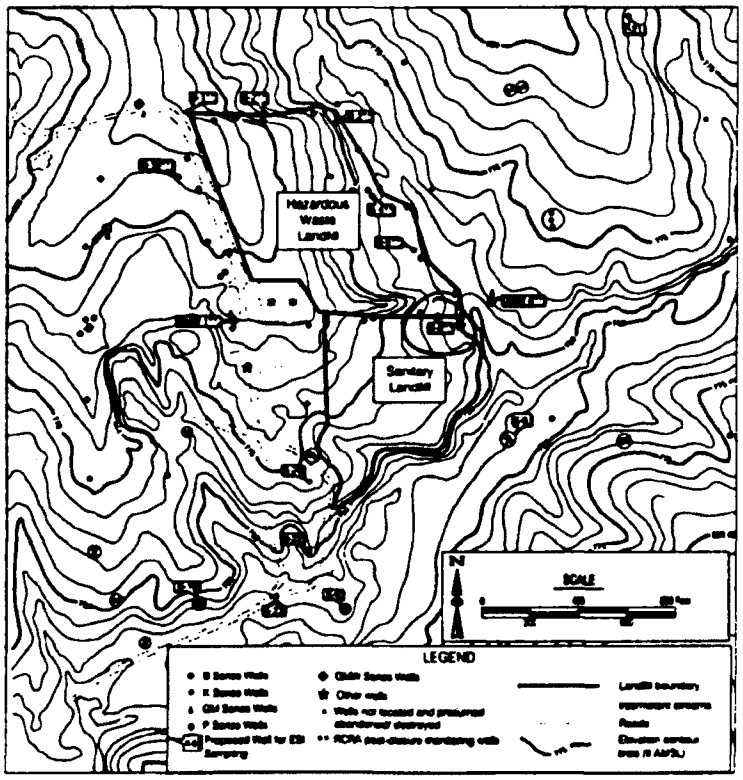
cond.: 1.97 **mS / cm**

temp.: N/A **°C**

turbidity: 108 **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 313

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 9/30/99 **Sample Time:** 1114 **Sampler:** Ramold/Keller

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WH~~	~~Herbicides~~ PC
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals / Hg
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ PC

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

P-21

Sample Description:

pH: 7.00

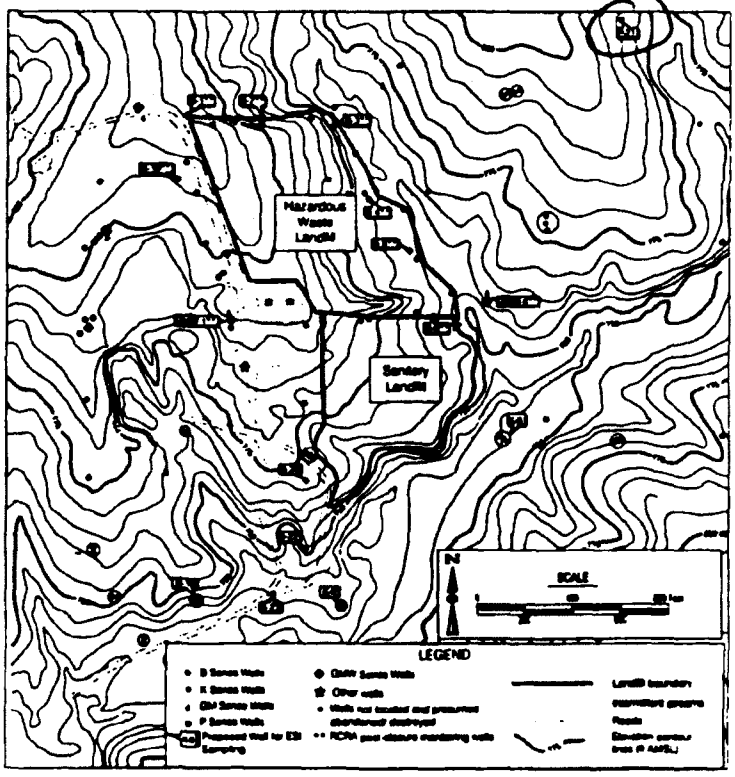
cond.: 2.98 **mS / cm**

temp.: N/A **°C**

turbidity: >999 **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

ctivity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 314

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4-30-99 **Sample Time:** 1000 **Sampler:** Keller / Ramold

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
2 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals / Hg
2 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ RR 4-30-99

SAMPLE DESCRIPTION

M dia: water **Sample Area:** **Aliquots:**

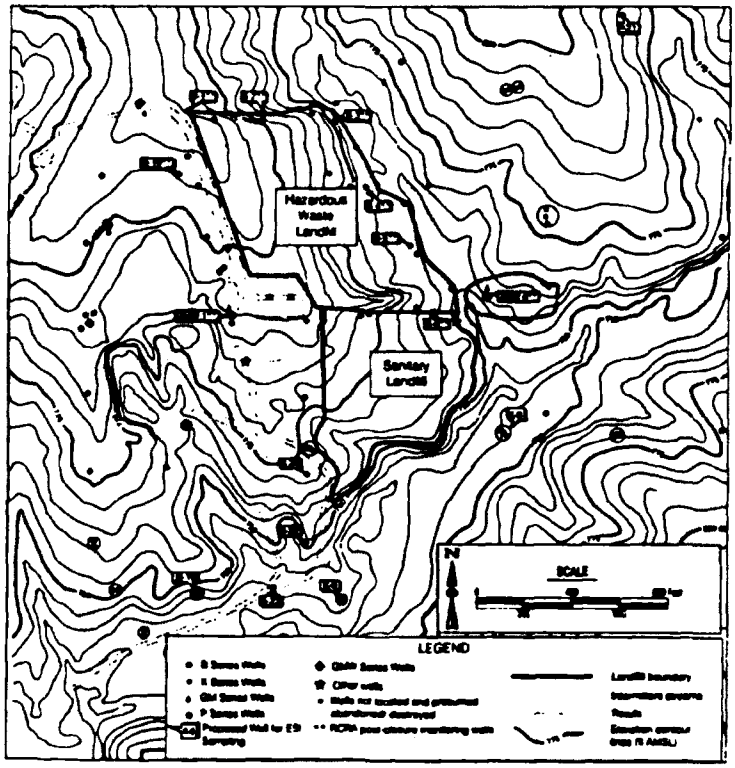
Sample Location:

GMW - 4

Sample Description:
pH: 7.07
cond.: 2.92 **mS / cm**
temp.: N/A **°C**
turbidity: 99 **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



eld sheets - monitoring wells

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 401

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/26/99 **Sample Time:** 0845 **Sampler:** FLETCHER/KELLER

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (with Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM 68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

lia: water **Sample Area:** **Aliquots:** GRAB

Sample Location:
GP-1
≈ 5' BELOW GROUND

Sample Description:
pH: N/A

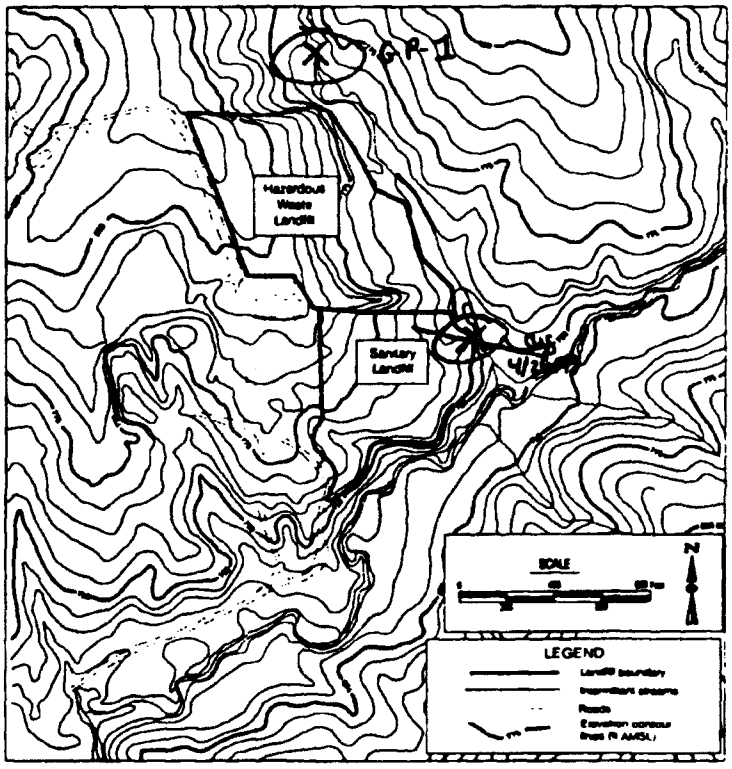
cond.: mS / cm

temp.: °C

turbidity: NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



field sheets -geoprobe on-site

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 402

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/26/99 **Sample Time:** 1000 **Sampler:** FLETCHER/KELLER

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (With Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM 68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

lia: water **Sample Area:** **Aliquots:** GLASS

Sample Location:
GP-3
25' BELOW GROUND

Sample Description:
pH: 6.65

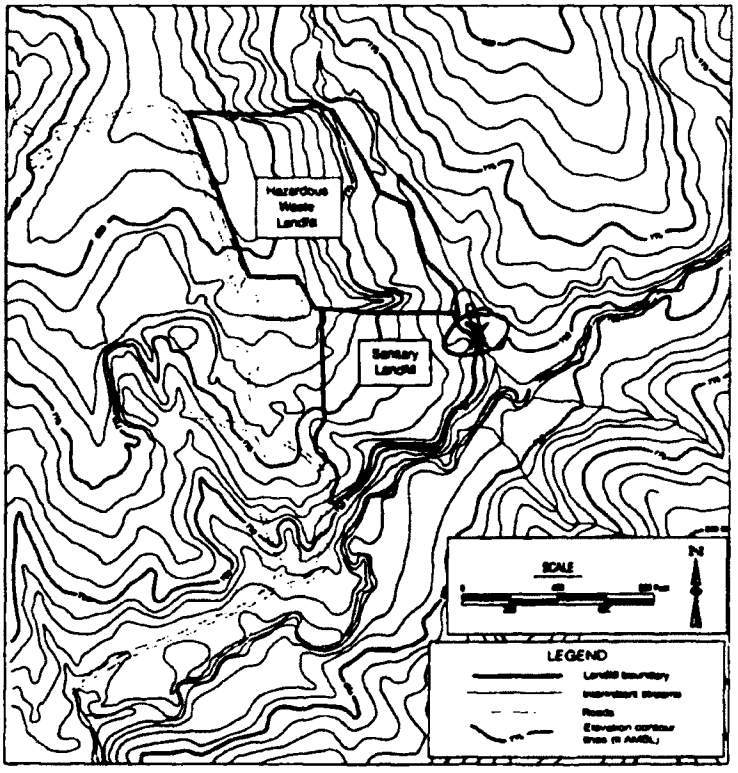
cond.: 1.44 **mS / cm**

temp.: 11.4 **°C**

turbidity: N/A **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



field sheets -geoprobe on-site

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 403

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/28/99 **Sample Time:** 1315 **Sampler:** FLETCHER/KELLER

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (+ W/Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM 68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

Jia: water **Sample Area:** **Aliquots:** GRAB

Sample Location:
GP-4
APPROX. 4½' BELOW SURFACE

Sample Description:
pH: 6.8

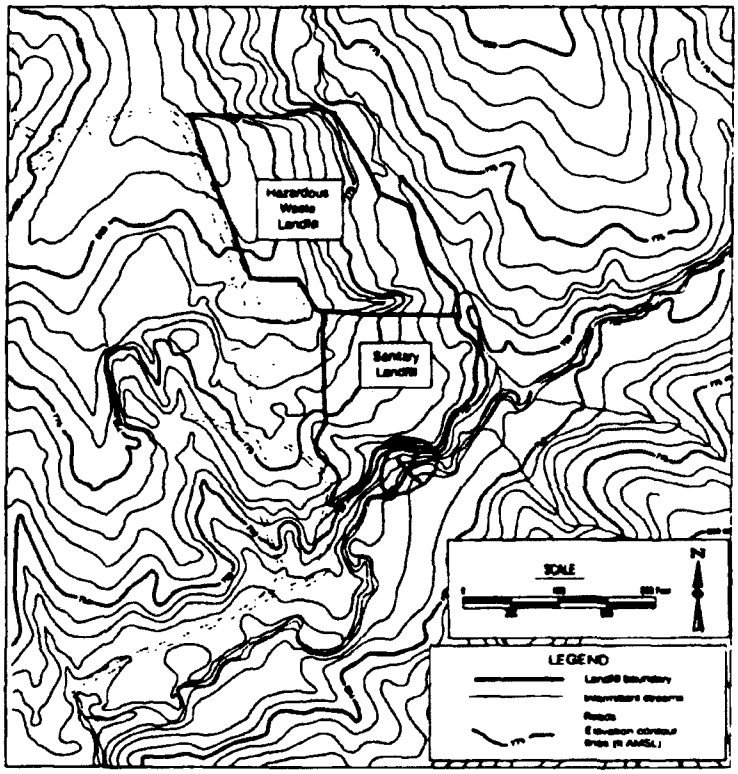
cond.: 1.85 **mS / cm**

temp.: 11.2 **°C**

turbidity: N/A **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



Field sheets -geoprobe on-site

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 404

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/28/99 **Sample Time:** 1630 **Sampler:** RAMOLD / SCHAEFFER

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (+ W/Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM 68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

Jia: water **Sample Area:** **Aliquots:** GRAB

Sample Location:
GP-5
2-4' BELOW GROUND SURFACE

Sample Description:
pH: 6.65

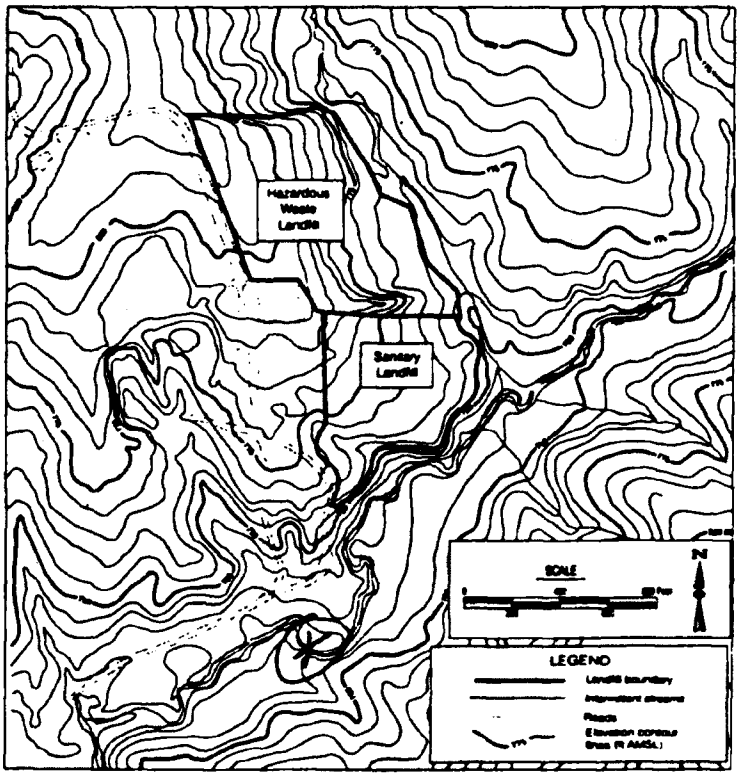
cond.: 0.226 **mS / cm**

temp.: 11.4 **°C**

turbidity: N/A **NTU**

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



field sheets -geoprobe on-site

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: ~~406~~ AK 11-29-94 405

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 11-28-94 **Sample Time:** 1800 **Sampler:** Ramold

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (+ Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM 68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	Dioxin AK 11-29-94

SAMPLE DESCRIPTION

Jia: water **Sample Area:** **Aliquots:**

Sample Location:

GP-6

approx 3' BGS

Sample Description:
pH:

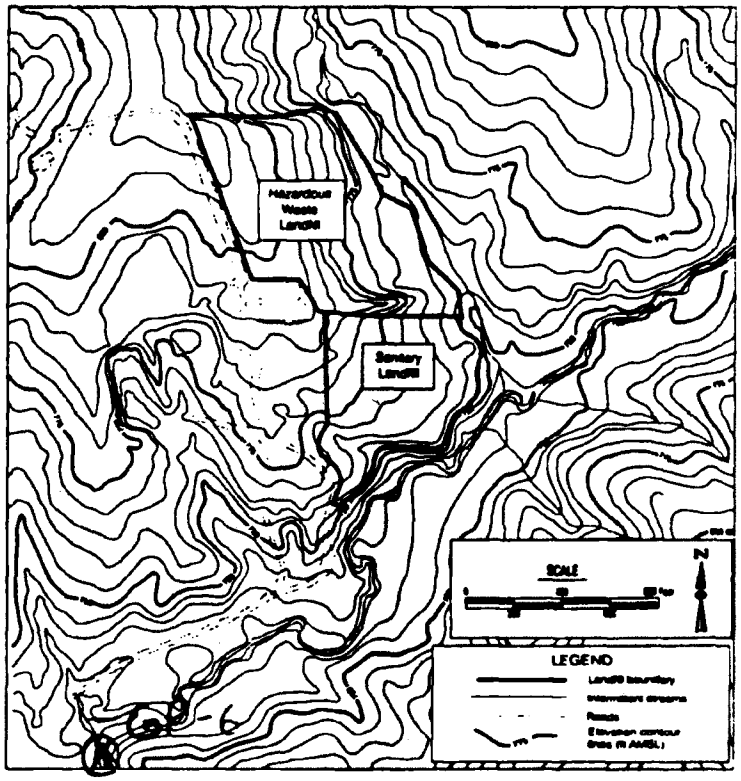
cond.: mS / cm

temp.: °C

turbidity: NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



field sheets -geoprobe on-site

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 406

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 1400 **Sampler:** Keith/S.Anderson

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (4 VP/Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~ Leave on Req

SAMPLE DESCRIPTION

Dioxin Do Not Delete.

Matrix: water **Sample Area:** **Aliquots:**

Sample Location:

GP-7
2-4' BGS

Sample Description:
pH: 6.51

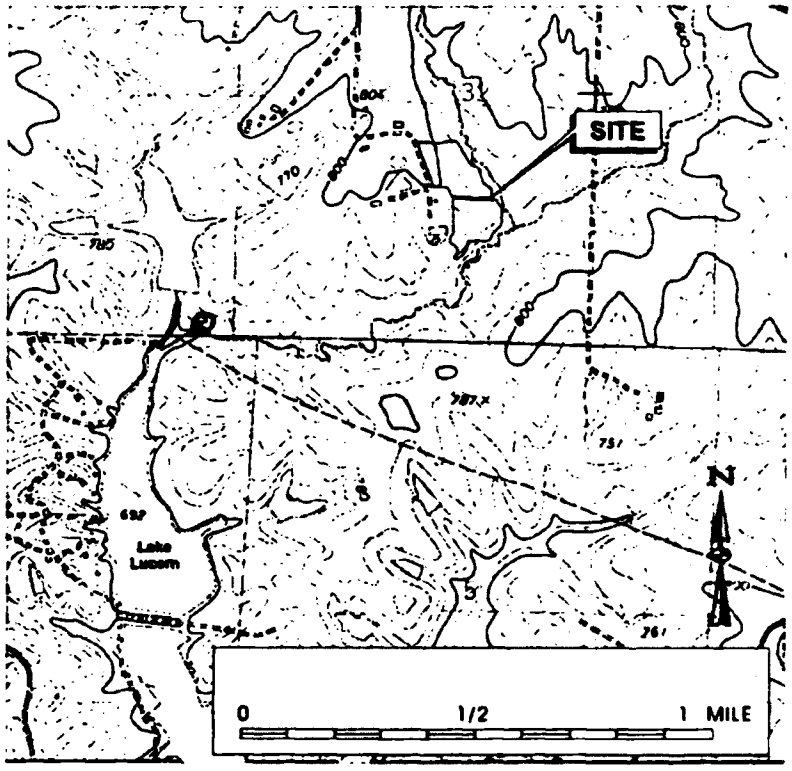
cond.: 0.339 mS / cm

temp.: 11.6 °C

turbidity: 103 NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



Field sheets -geoprobe off-site

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 407

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 0930 **Sampler:** Keller/Schiedeman

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (1W/1Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
~~1 x 128 oz amber glass jar~~	~~4° C~~	~~WD01~~	~~Dioxin~~

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

GP-8
3-4' BGS

Sample Description:
pH: 7.44

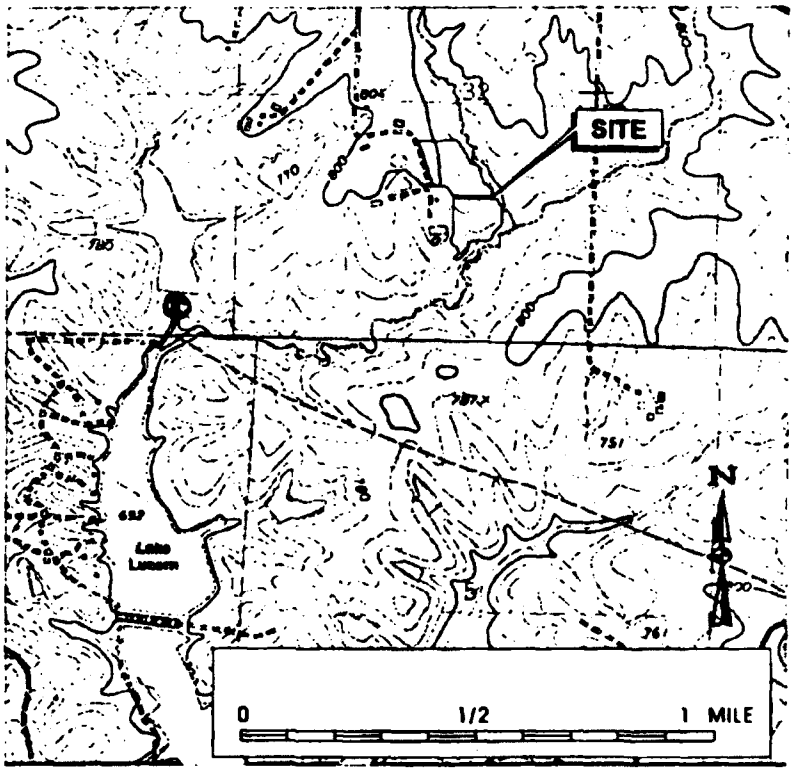
cond.: 0.23 mS / cm

temp.: 13.6 °C

turbidity: 109 NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



field sheets -geoprobe off-site

ENVIRONMENTAL PROTECTION AGENCY-REGION VII
FIELD SHEET

Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO — **Activity #: ASYXG**

EPA Project Leader: Bryant Burnett / EPA SAM — **Sample #: 408**

E&E/START Project Manager: Ron Ramold

Sample Date: 4/29/99 — **Sample Time: 1140** — **Sampler: SCHADEMANN/KELLER**

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
mL vial	HCL, 4° C	W13	LDL VOC
oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
z amber glass jar	4° C	WH	Herbicides
bitainer	HNO_3, 4° C	W05	Total Metals (# w/Hg)
itainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
iber glass jar	4° C	~~WD01~~	Dioxin 4/25/99 GS

r

ion:

GS

:

nS / cm

.

U

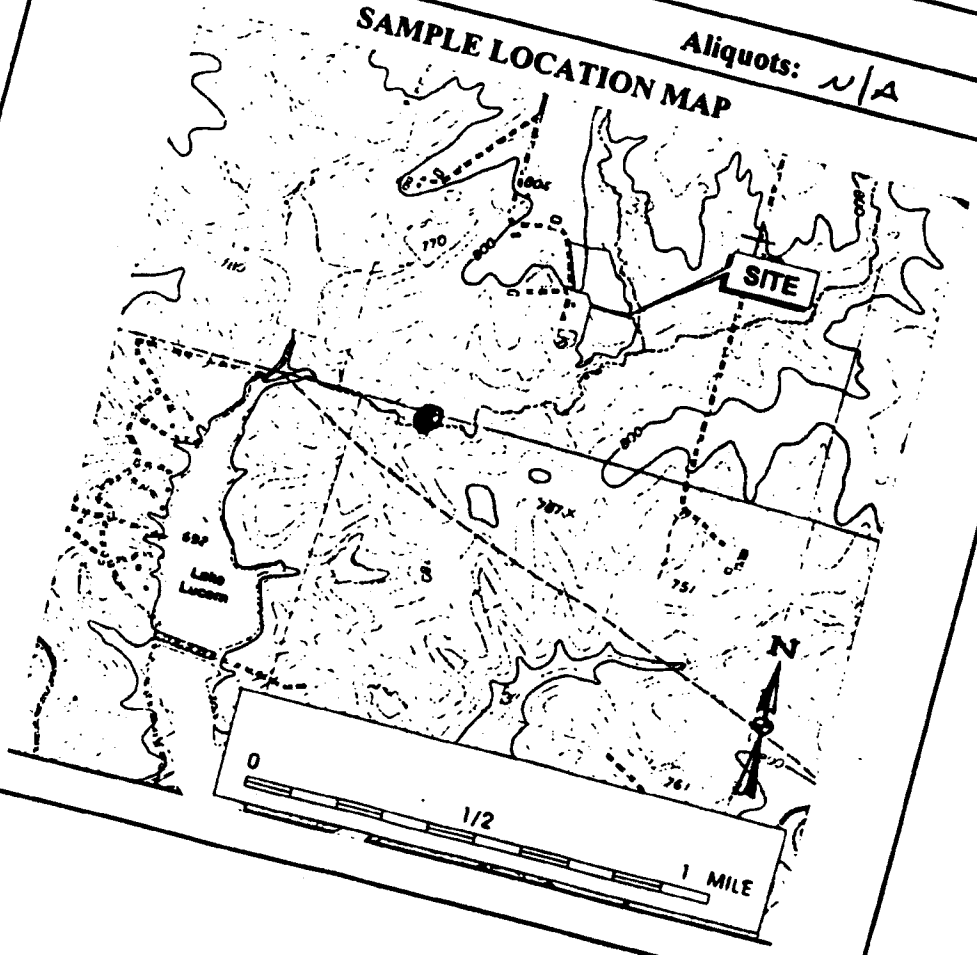
v

SAMPLE DESCRIPTION

Sample Area:

Aliquots: N/A

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 501

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/28/99 **Sample Time:** 1320 **Sampler:** SMITH / FLETCHER

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	~~WP~~ W13	SDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (W/Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

dia: water **Sample Area:** **Aliquots:** GRAB

Sample Location:
INTERCEPTOR TRENCH #3 SUMP

Sample Description:
pH: N/A

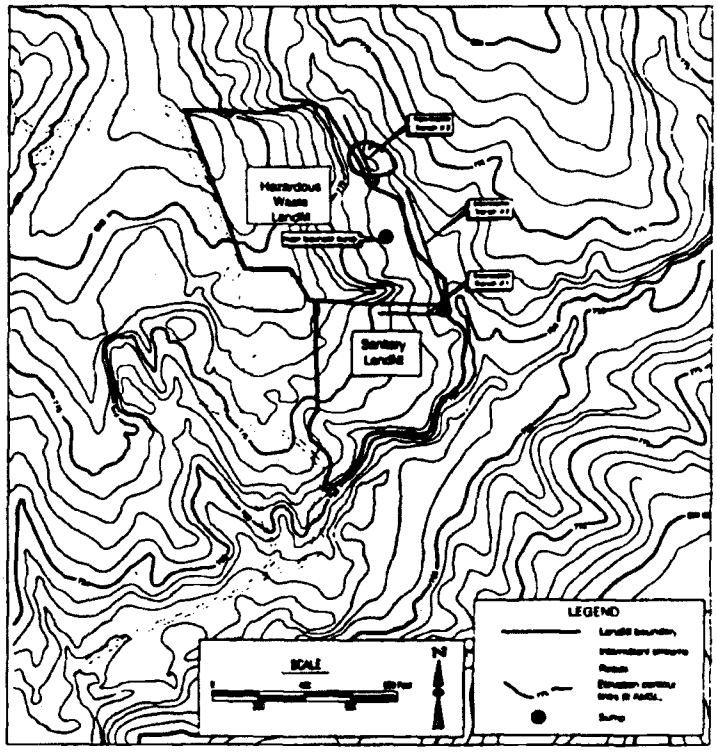
cond.: mS / cm

temp.: °C

turbidity: NTU

Other Comments/Property Owner Information:
HNu - ND

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 502

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/25/99 **Sample Time:** 1410 **Sampler:** SMITH/FLETCHER

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	~~WV~~ (W)	SDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (W/Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

Matrix: water **Sample Area:** **Aliquots:** GRAB

Sample Location:
MAIN LEACHATE SUMP

Sample Description:
pH: N/A

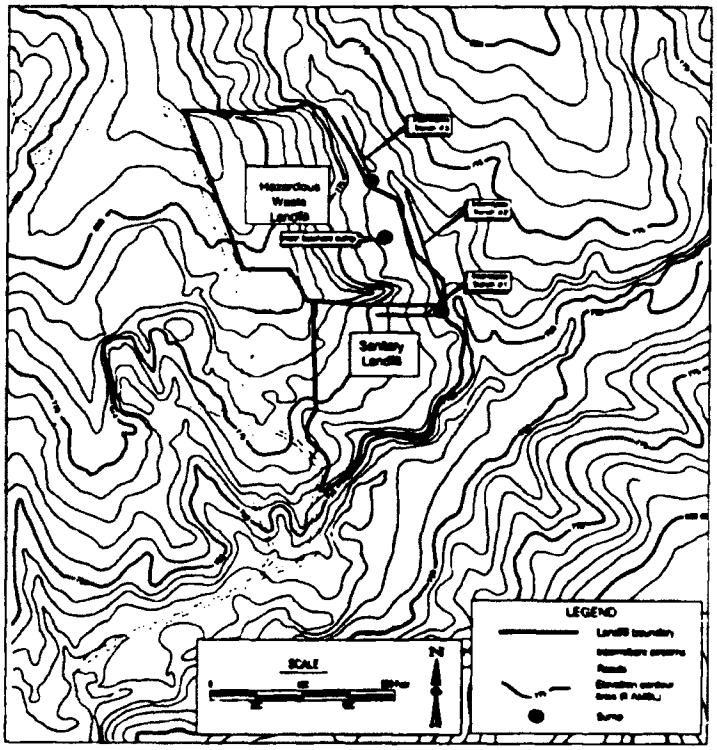
cond.: mS / cm

temp.: °C

turbidity: NTU

Other Comments/Property Owner Information:
HNU READING = 20,000 ppm

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 503

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/28/99 **Sample Time:** 1455 **Sampler:** SMITH/FLETCHER

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	~~W07~~ (W13)	SDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (W/Hg)
1 x 1-L cubitainer	filter, HNO_3, 4° C	W06, WM68	Dissolved Metals & Hg
1 x 128 oz amber glass jar	4° C	WD01	Dioxin

SAMPLE DESCRIPTION

Jia: water **Sample Area:** **Aliquots:** GRAB

Sample Location:
INTERCEPTOR TRENCHES #1 AND #2 SUMP

Sample Description:
pH: N/A

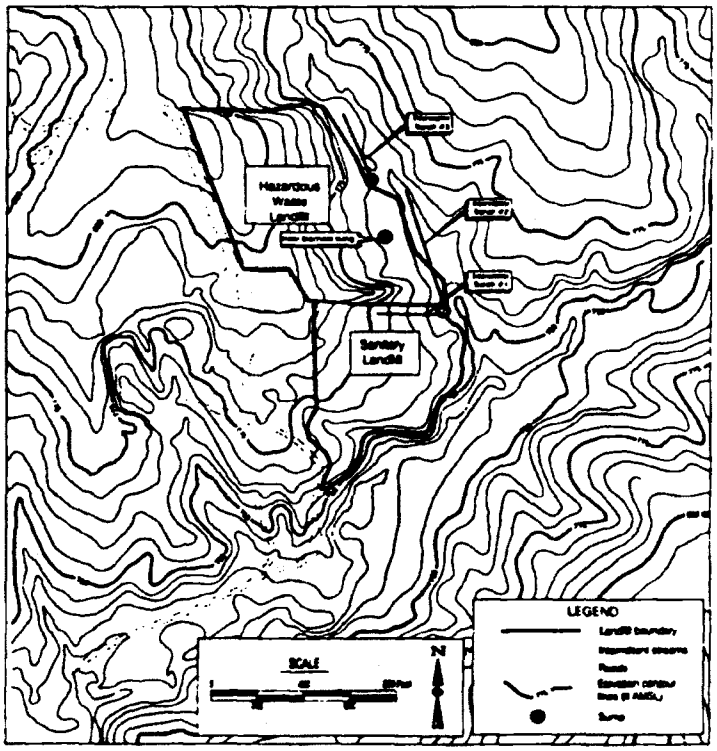
cond.: mS / cm

temp.: °C

turbidity: NTU

Other Comments/Property Owner Information:
HNu READING = ND

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: GC1

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 11-28-99 **Sample Time:** 0818 **Sampler:** Fletcher / Smith

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
1 x 8-oz. jar	4° C	SD02	Dioxin

SAMPLE DESCRIPTION

Media: soil **Sample Area:** **Aliquots:**

Sample Location:

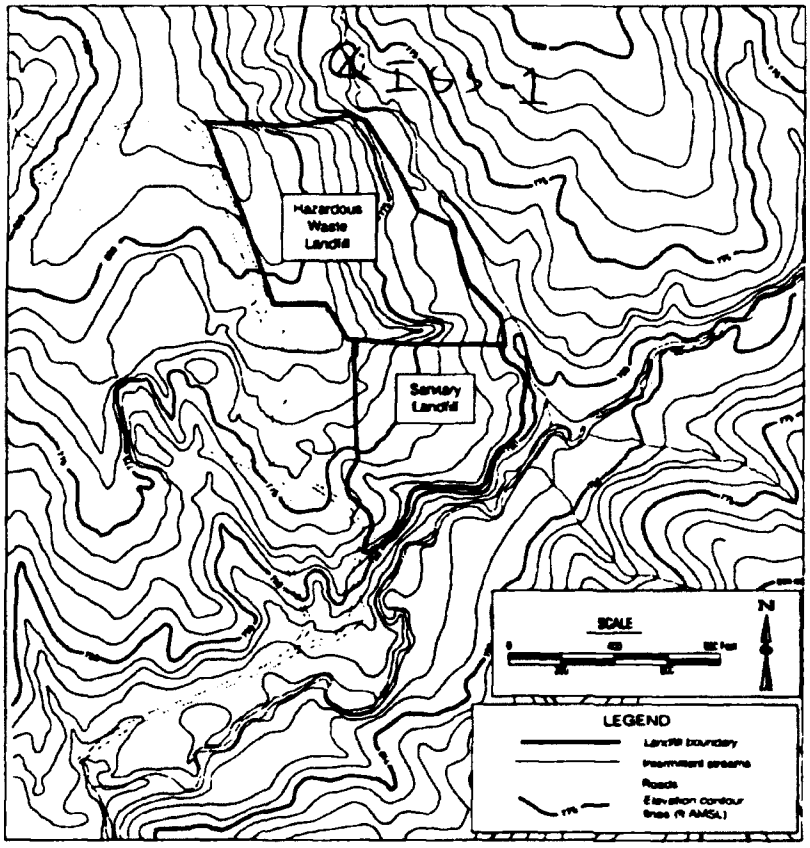
ISS-1
0'-2'

Sample Description:

olive brown silty clay
some sand

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 602

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4-29-99 **Sample Time:** 0845 **Sampler:** Fletcher / Smith

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~ AR 4-29-99

SAMPLE DESCRIPTION

Media: soil **Sample Area:** **Aliquots:**

Sample Location:

AR 4-29-99

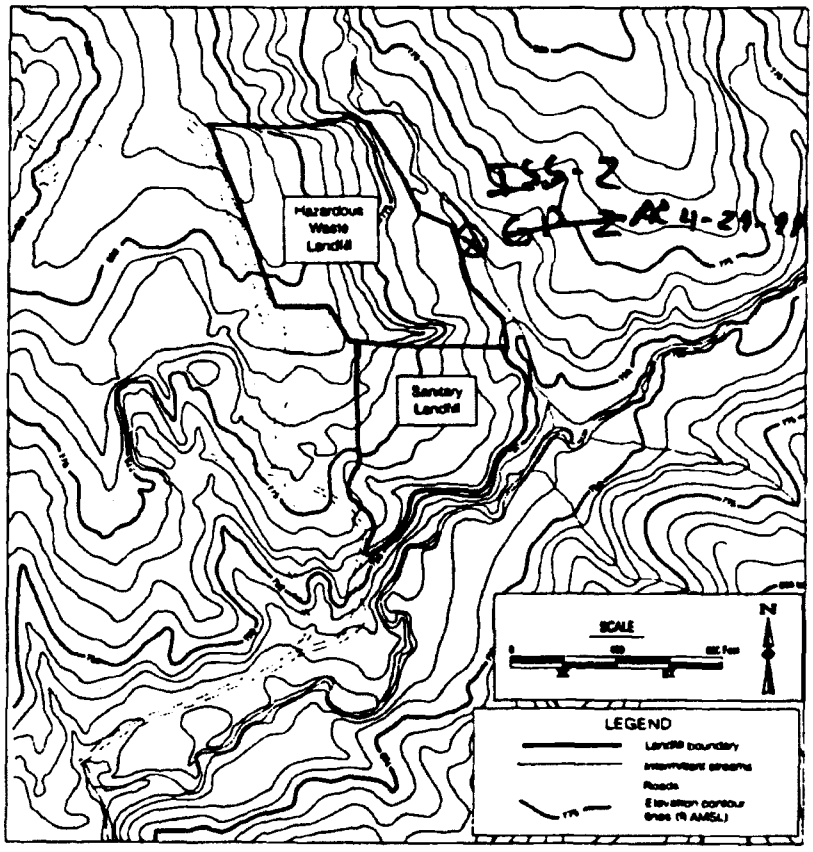
SS-2

Sample Description:

dark greenish grey silty clay

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 603

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4-28-99 **Sample Time:** 0903 **Sampler:** Fletcher / Smith

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
1 x 8-oz. jar	4° C	SD02	Dioxin

SAMPLE DESCRIPTION

Media: soil **Sample Area:** **Aliquots:**

Sample Location:

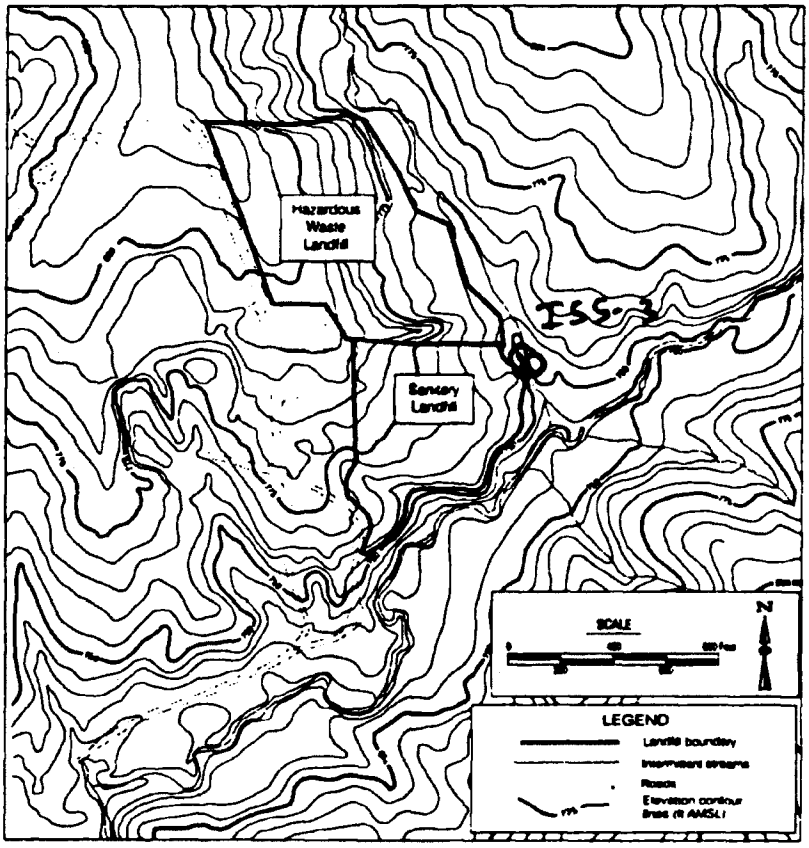
ISS-3

Sample Description:

tan silty sand

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



Field sheets -intermittent stream bed soil

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 604

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 1022 **Sampler:** FLETCHER/SMITH

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	SD02	~~Dioxin~~ AS 4/29/99

SAMPLE DESCRIPTION

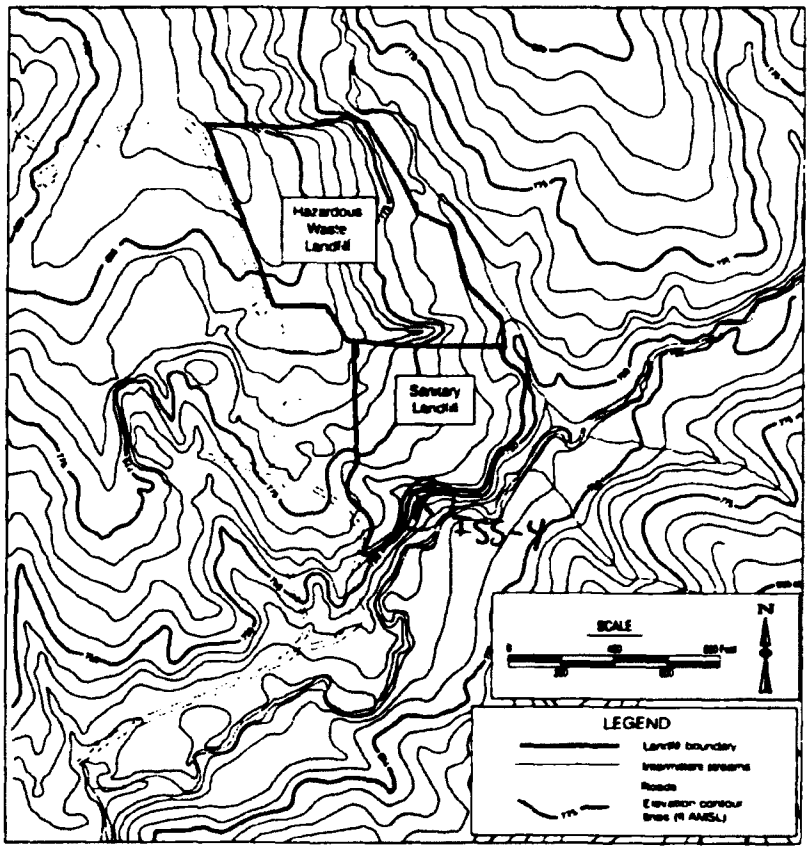
Media: soil **Sample Area:** **Aliquots:** N/A

Sample Location:
SS-4
0-2"

Sample Description:
BROWN SILTY SAND

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



Field sheets -intermittent stream bed soil

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 605

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 0940 **Sampler:** FLETCHER/SMITH

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~ CAS 4/29/99

SAMPLE DESCRIPTION

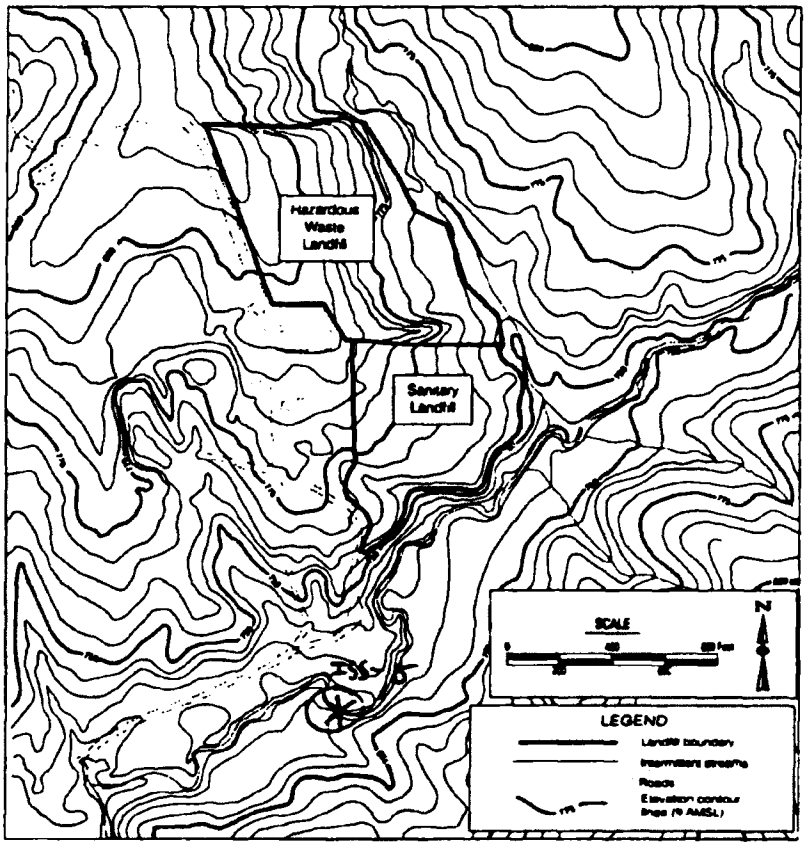
Media: soil **Sample Area:** **Aliquots:** N/A

Sample Location:
ISS-5
0-2"

Sample Description:
BROWN - SILTY SAND

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



Field sheets -intermittent stream bed soil

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 606

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 0958 **Sampler:** FLETCHER/SMITH

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
1 x 8-oz. jar	4° C	SD02	Dioxin

SAMPLE DESCRIPTION

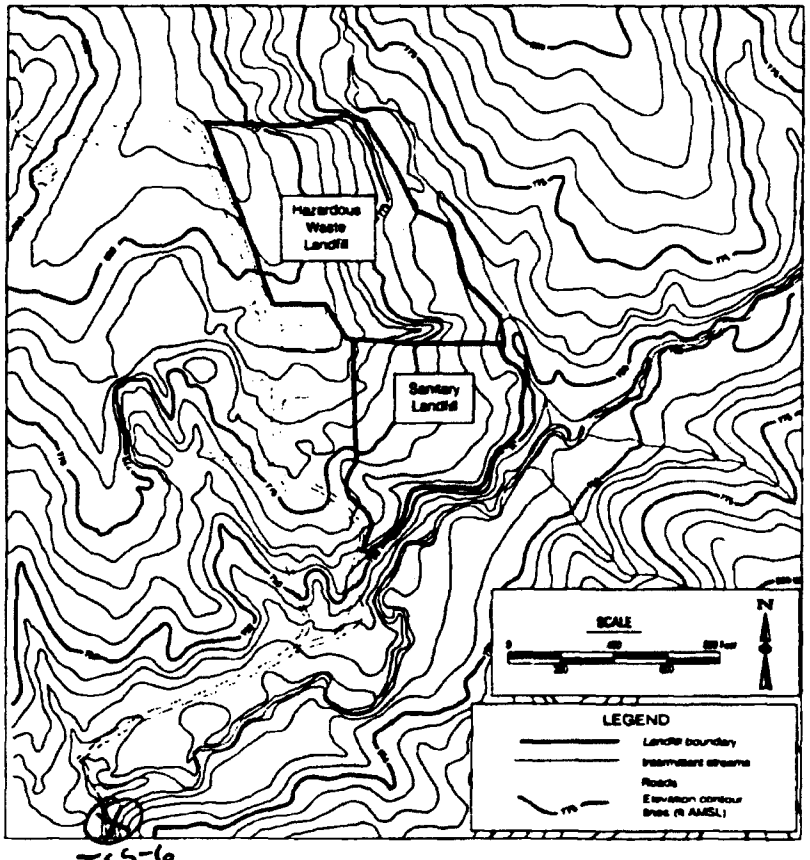
Media: soil **Sample Area:** **Aliquots:** N/A

Sample Location:
ISS-6
0-2"

Sample Description:
BROWN - SILTY SAND

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



field sheets -intermittent stream bed soil

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 607

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 1200 **Sampler:** KELLER/SCHAEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8 oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~ GS 4/29/99

SAMPLE DESCRIPTION

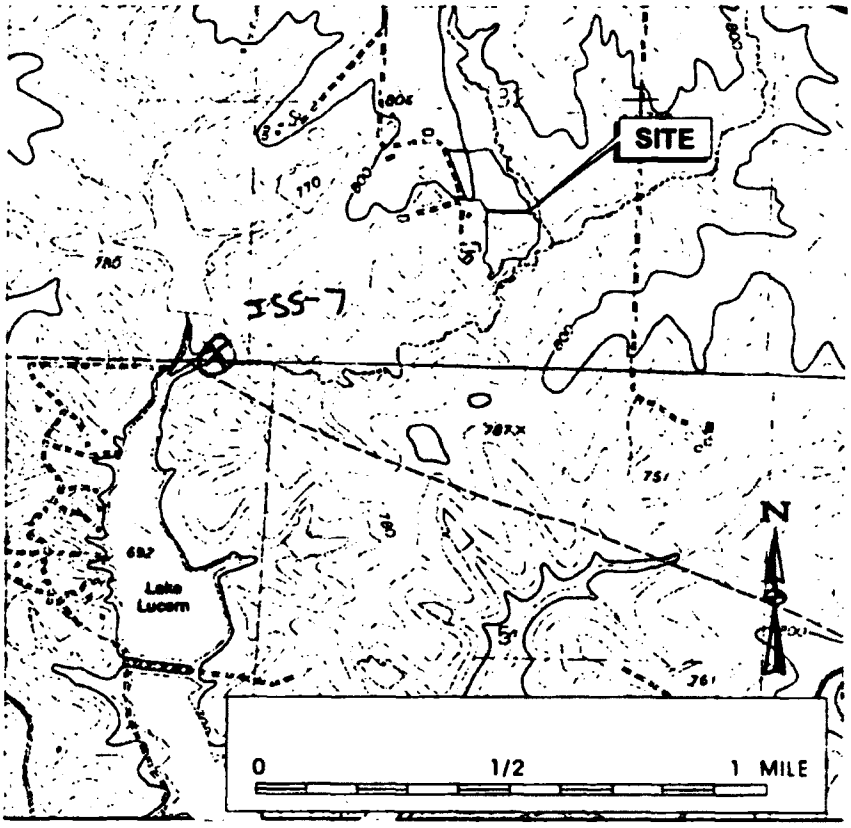
Media: soil **Sample Area:** **Aliquots:** N/A

Sample Location:
ISS-7 ~~SEE~~ GS 4/29/99

Sample Description:
DARK BROWN GRAVEL AND SAND

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



field sheets -intermittent stream bed soil off-site

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 608

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time: 1215** **Sampler: KELLER/SCHADEMANN**

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~ eas 4/29/99

SAMPLE DESCRIPTION

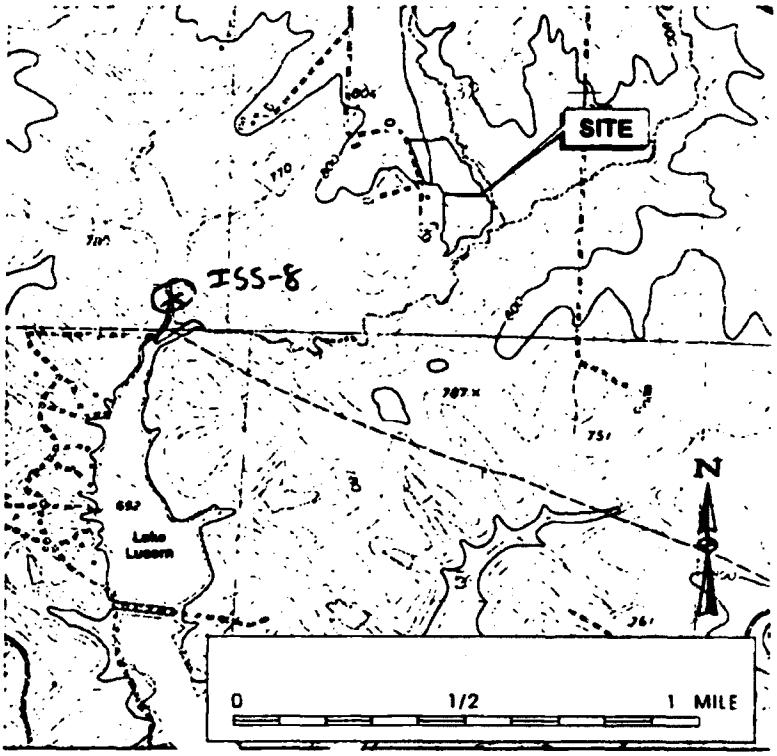
Media: soil **Sample Area:** **Aliquots: N/A**

Sample Location:
ISS-8

Sample Description:
OLIVE BROWN SAND

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



field sheets -intermittent stream bed soil off-site

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 609

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 1140 **Sampler:** KELLER / SCHADEMANN

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
3 x 20 mL vial	DI, 4° C	SV	VOC
1 x 8-oz. jar	4° C	SS, SP, SH	SVOC, Pesticides, Herbicides
1 x 8-oz. jar	4° C	SM, SM34	Metals, Hg
~~1 x 8-oz. jar~~	~~4° C~~	~~SD02~~	~~Dioxin~~ ES 4/29/99

SAMPLE DESCRIPTION

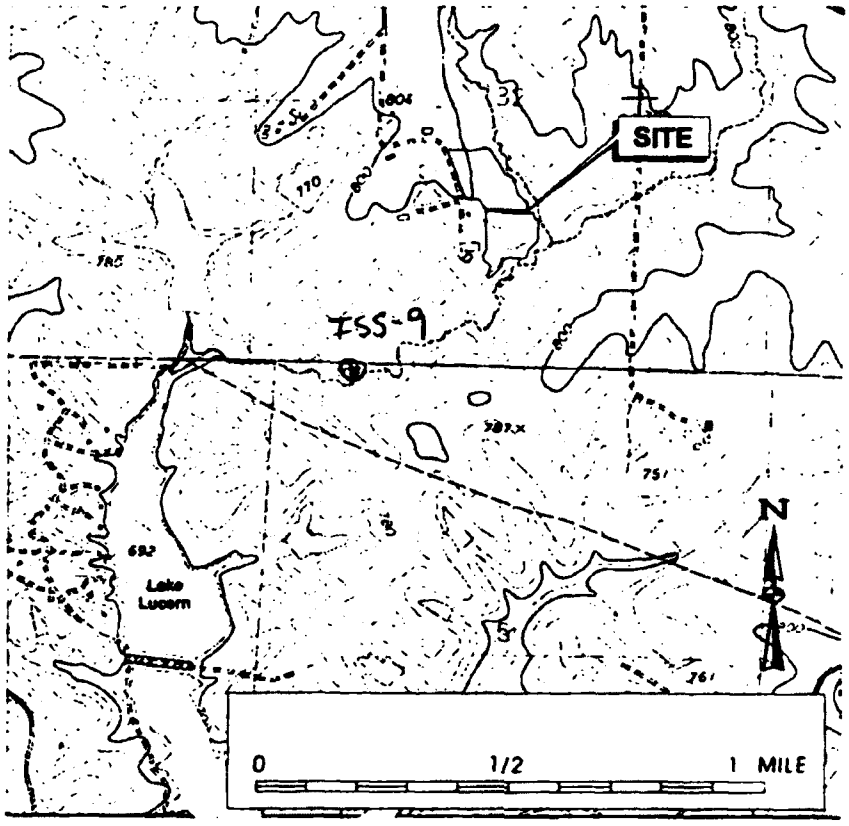
Media: soil **Sample Area:** **Aliquots:** N/A

Sample Location:
ISS-9

Sample Description:
DARK BROWN GRAVEL

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP



Field sheets -intermittent stream bed soil off-site

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 701

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 1223 **Sampler:** FLETCHER/SMITH

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals (W/Hg)
1X1-L CUBITAINER	HNO_3, 4°C	W06, WM68	DISSOLVED METALS + Hg

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:** N/A

Sample Location:
WELL FAUCET BEHIND HOUSE

Sample Description:
pH: 7.17

cond.: 0.482 mS / cm

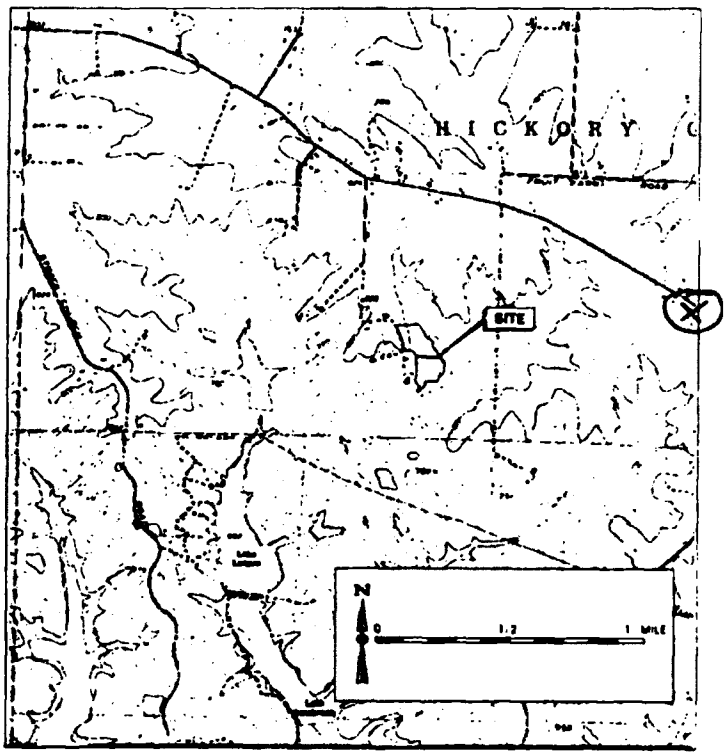
temp.: 14.9° °C

turbidity: N/A NTU

Other Comments/Property Owner Information:
WILLIAM J MURPHY
12 WEST HIGHWAY M
WRIGHT CITY, MO 63390

314/745-3588

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 702

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 1700 **Sampler:** SMITH / RAMOLD

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals 1-15
1X1-L CUBITAINER	HNO3, 4°C	W06, WM06	DISSOLVED METALS AND MERCURY

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:** N/A

Sample Location:
MOON WELL #7
EAST PRESSURE TANK
OUTSIDE FENCE

Sample Description:
pH: 6.96

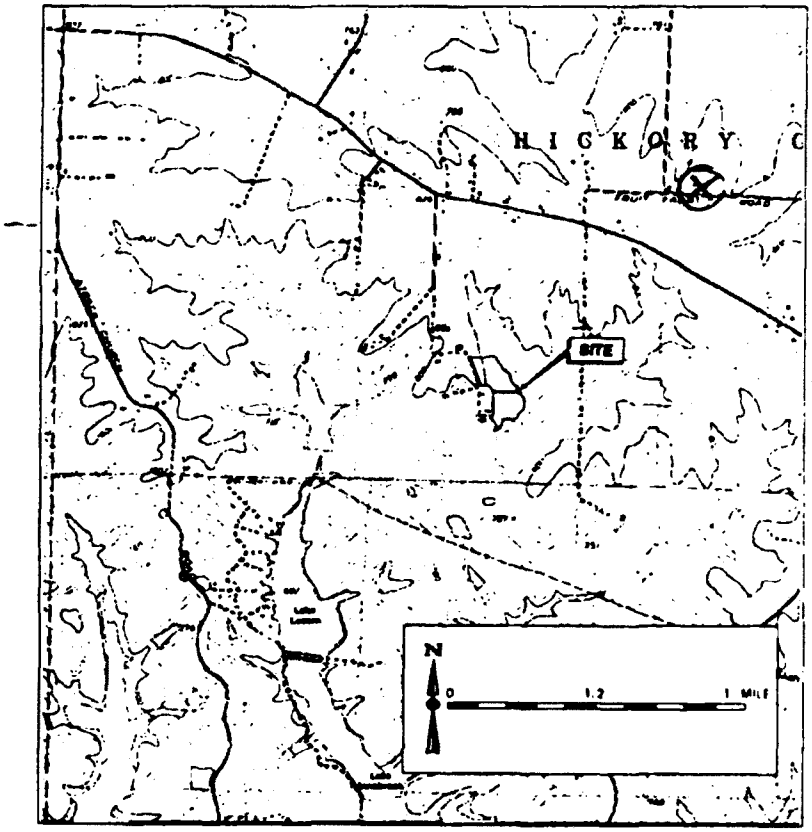
cond.: 0.97 **mS / cm**

temp.: 16.0 **°C**

turbidity: N/A **NTU**

Other Comments/Property Owner Information:
JEFF ROBERTS
133 FRUIT FARM ROAD
WRIGHT CITY, MO
63390

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 703

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/29/99 **Sample Time:** 1930 **Sampler:** RAMOLD

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 mL vial	HCL, 4° C	W13	LDL VOC
1 x 128 oz amber glass jar	4° C	WS, WP	SVOC, Pesticides
1 x 128 oz amber glass jar	4° C	WH	Herbicides
1 x 1-L cubitainer	HNO_3, 4° C	W05	Total Metals/Hg
1x1-L CUBITAINER	HNO_3, 4°C	W06, WM6A	DISSOLVED METALS AND MERCURY

SAMPLE DESCRIPTION

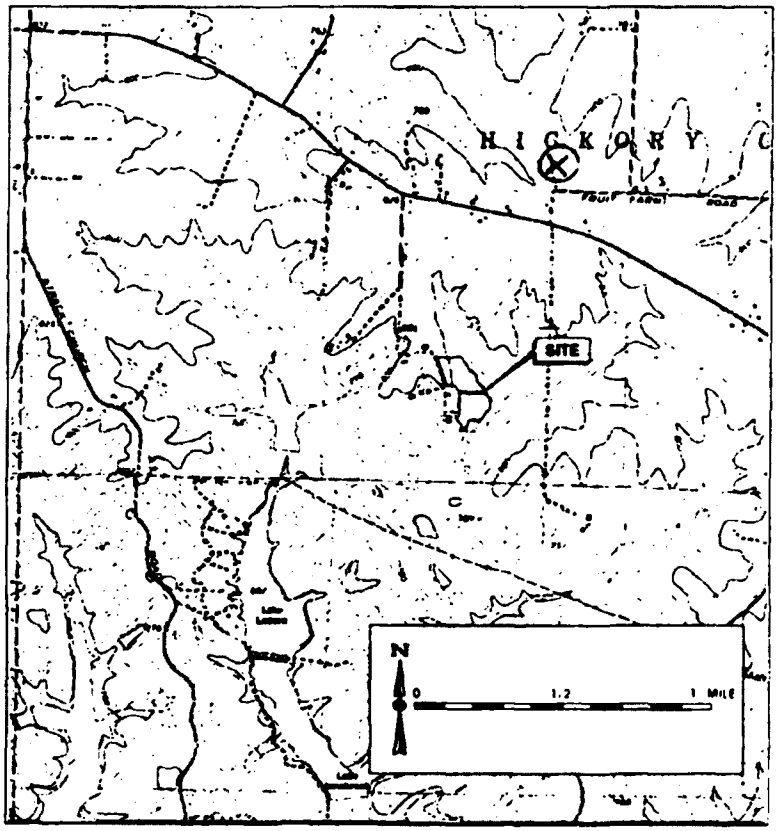
Media: water **Sample Area:** **Aliquots:** N/A

Sample Location:
MDOH WELL #15
OUTSIDE FAUCET
PAST PRESSURE TANK-
SOFTENER IS BYPASSED

Sample Description:
pH: 7.17
cond.: 0.592 mS / cm
temp.: 16.4 °C
turbidity: 5 NTU

Other Comments/Property Owner Information:
JIM FULLER
241 FRUIT FARM ROAD
WRIGHT CITY, MO
63390
314-745-3659

SAMPLE LOCATION MAP



FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 801-F

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4/28/99 **Sample Time:** 1138 **Sampler:** SMITH

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4X 40mL VOA	4°C	W13	LDL VOC

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

SAMPLE LOCATION MAP

TRIP BLANK

901F changed to 801F. No 900 "F" series field samples are to be used. 900 series reserved for lab QC number
4/29/99

Sample Description:
pH:

cond.: **mS / cm**

temp.: **°C**

turbidity: **NTU**

Other Comments/Property Owner Information:

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

tivity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 902

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4-29-99 **Sample Time:** 1400 **Sampler:** Keller/Cox

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40ml vial	HCl, 4°C	W13	LOL VOC
1 x 128 oz amber glass	4°C	W5, W9	SVOC, Pesticides
1 x 128 oz amber glass	4°C	W11	Herbicides
1 x 1-L cubitainer	HNO_3, 4°C	W05	Total Metals (W/ Hg)
1 x 1-L cubitainer	4°C, filter, HNO_3	W06, W068	Dissolved metals + Hg

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

SAMPLE LOCATION MAP

Rinsate of Geoprobe ground water sampling apparatus.

Sample Description:
pH:

cond.: mS / cm

temp.: °C

turbidity: NTU

Other Comments/Property Owner Information:

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

Activity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 403 - F

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4·29·99 **Sample Time:** 1425 **Sampler:** Keller / Cox

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 ml vial	HCl, 4°C	W13	LDL VOC
1 x 128 oz amber glass	4°C	W3, WP	SVOC, Pesticides
1 x 128 oz amber glass	4°C	WH	~~Pesticides~~ Herbicides
1 x 1-L cub:tainer	HNO_3, 4°C	W05	Total metals (W/ Hg)
1 x 1-L cub:tainer	4°C, HNO_3, Filtr	W06, WM6B	Dissolved metals : Hg

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

SAMPLE LOCATION MAP

Field Blank

Sample Description:
pH:

cond.: mS / cm

temp.: °C

turbidity: NTU

Other Comments/Property Owner Information:

FIELD SHEET
U.S. ENVIRONMEN..AL PROTECTION AGE..Y-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

tivity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 904

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4.29.99 **Sample Time:** 1435 **Sampler:** Keller/Cox

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4x40ml VOA	HCl, 4°C	W13	Low VOC
1x1280z amber glass	4°C	W5, W8	SVOC, Pesticides
1x1280z amber glass	4°C	W4	Pesticides
1x1-L container	HNO_3, 4°C	W05	Total metals (W/Hg)
1x1-L container	4°C, filter, HNO_3	W06, W68	Dissolved metals (W/Hg)

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

SAMPLE LOCATION MAP

Composite of 2 overpack drums w/ purge water & 1 overpack w/ decon water.

Sample Description:
pH: NA

cond.: NA mS / cm

temp.: NA °C

turbidity: NA NTU

Other Comments/Property Owner Information:

FIELD SHEET
U.S. ENVIRONMEN AL PROTECTION AGE Y-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

tivity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 105-F

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: 4.29.99 **Sample Time:** 1455 **Sampler:** Cox

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
4 x 40 ml VOA	4°C	W13	LOL VOC

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

Sample Location:

Sample Description:
pH: NA
cond.: NA mS / cm
temp.: NA °C
turbidity: NA NTU

Other Comments/Property Owner Information:

SAMPLE LOCATION MAP

~~Frett~~ Trip Blank

FIELD SHEET
U.S. ENVIRONMEI .L PROTECTION AGE .Y-REGION VII
Superfund Division, 726 Minnesota Avenue, K.C., KS 66101

tivity: Zykan Landfill site, Wright City, MO **Activity #: ASYXG**

Sample #: 906-F

EPA Project Leader: Bryant Burnett / EPA SAM **E&E/START Project Manager: Ron Ramold**

Sample Date: **Sample Time:** **Sampler:**

ANALYSIS REQUESTED

Container	Preservative	MGP Code	Analysis
2 x 40ml VOA	4°C	SV	So:1 VOC
			[illegible]

SAMPLE DESCRIPTION

Media: water **Sample Area:** **Aliquots:**

...mple Location:

SAMPLE LOCATION MAP

Trip Blank

Sample Description:
pH:
cond.: mS / cm
temp.: °C
turbidity: NTU

Other Comments/Property Owner Information:

Called Barry Mills
RESAT. ds

4/29/99: VOA - Resat VOA Refrig
in (W) - Back Dock Refrig
in (S) - Dioxin Lab
Herb, BNA, PES Back Dock

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
BRYANT BURNETT	ZYKAN LANDFILL	27-28 04 99	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	128 oz BOTTLE	8 oz BOTTLE	BOTTLE	VOA SET (~~12 VIALS EA~~) 4 VIALS	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt other sample numbers etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
ASYXG-101	2	3			1	X					
- 102	2	2			1	X					
- 103	2	2			1	X					
- 104	2	2			1	X					
- 105	2	2			1	X					
- 201			3		3 VIALS EA 1			X			
- 202			2		1			X			
- 203			2		1			X			
- 204			2		1			X			
- 205			2		1			X			
- 301	2	3			4 VIALS EA 1	X					
- 302	2	2			1	X					
- 106	2	2			4 1	X					
- 206			2		3 VIALS EA 1			X			
- 108	2	3			4 VIALS EA 1	X					
- 208			3		3 VIALS EA 1			X			
- 107	2	2			4 VIALS 1	X					
- 207			2		1			X			
- 402	2	3			4 VIALS 1	X					
- 401	2	3			1	X					
80 FF					1	X					
		MORE TO COME									
		Not Complete									Charles L Smith 4/28/99

DESCRIPTION OF SHIPMENT	MODE OF SHIPMENT
____ PIECE(S) CONSISTING OF ____ BOX(ES)	____ COMMERCIAL CARRIER ____
____ ICE CHEST(S). OTHER ____	____ COURIER
	____ SAMPLER CONVEYED ____ (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signature] SEALED UNSEALED ☑	4/28/99	4:15pm	D Simmons SEALED UNSEALED ☒	analyze
RELINQUISHED BY SEALED UNSEALED ☐	DATE	TIME	RECEIVED BY SEALED UNSEALED ☐	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY SEALED UNSEALED ☐	DATE	TIME	RECEIVED BY SEALED UNSEALED ☐	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

KE-SAT SOW notification sent

CHAIN OF CUSTODY RECORD
IRONMENTAL PROTECTION AGENCY REG

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (DAY / MONTH / YEAR)	SHEET
BRYANT BURNETT	ZYKAN	29-30 / 03 / 99	1 of 1

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	125ml BOTTLE	BOTTLE	BOTTLE	VOA SET	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER				4 VIALS EA						
ASYX6-702	2	2			1	X					
703	2	2			1	X					
307	2	1			1	X					
308	2	1			1	X					
312	2	3			1	X					
311	2	2			1	X					
314	4	2			1	X					
309	2	2			1	X					
310	2	2			1	X					
313	2	1			1	X					

NONE

Charles L Smith 4/3/99

DESCRIPTION OF SHIPMENT

____ PIECE(S) CONSISTING OF ____ BOX(ES)

6 ICE CHEST(S) OTHER ____

MODE OF SHIPMENT

____ COMMERCIAL CARRIER ____

____ COURIER

____ SAMPLER CONVEYED (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
RJ Burnett ☐ SEALED ☐ UNSEALED	4/3/99	1550	Tony Marchi ☐ SEALED ☒ UNSEALED	Lab analysis
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

7-EPA-9262 (Revised 5 85)

5/5/99

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION (2R-2) DAY / MONTH / YEAR	SHEET
BRYANT BURNETT	ZYKAN	4 / 99	1 of 2

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CONTAINER	(2R-2) BOTTLE	BOTTLE	BOTTLE	VOA SET (3-VIALS-EA)	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS OTHER INFORMATION (condition of samples upon receipt other sample numbers etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER				4 VIALS CA						
ASYXG-408	2	2			1	X					
405	2	2			1	X					
403	2	3			1	X					
802 (4/6/99)	2	2			1	X					
803-F	2	2			1	X					
805-F					4 VIALS 1	X					
806-F					2 VIALS 1		X				
503	2	3			4 VIALS 1	X					
502	2	3			1	X					
305	4	3			1	X					
701	2	2			1	X					
407	2	2			1	X					
406 (4/6/99)	2	3 (4/6/99)			1	X					
304	2	2			1	X					
303	2	3			1	X					
601			3		3 VIALS 1			X			
602			2		1			X			
603			3		1			X			
604			2		1			X			
605			2		1			X			
606			3		1			X			
607			2		1			X			
608			2		1			X			
609			2		1			X			

Not Complete

DESCRIPTION OF SHIPMENT	MODE OF SHIPMENT
____ PIECE(S) CONSISTING OF ____ BOX(ES)	____ COMMERCIAL CARRIER ____
____ ICE CHEST(S). OTHER ____	____ COURIER
	X SAMPLER CONVEYED (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
☐ SEALED ☒ UNSEALED	4/30/99	1239	Nicole Rolig ☐ SEALED ☒ UNSEALED	Analysis
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
☐ SEALED ☐ UNSEALED			☐ SEALED ☐ UNSEALED	
RELINQUISHED BY	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
☐ SEALED ☐ UNSEALED			☐ SEALED ☐ UNSEALED	

7-EPA-9262(Revised 5/85)

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION	SHEET
BRYANT BURNETT	ZYKAN	28-29 (DAY) 04 (MONTH) 99 (YEAR)	2 of 2

CONTENTS OF SHIPMENT

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	128 oz BOTTLE	BOTTLE	BOTTLE	VOA SET ~~(3 VIALS EA)~~ 4 VIALS	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS OTHER INFORMATION (condition of samples upon receipt other sample numbers etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
ASYXG-404	2	3			1	X					
804	2	2			1	X					
306	2	2			1	X					
501	2	3			1	X					

MORE TO COME

Not Complete

Charles L Smith 4/29/99

DESCRIPTION OF SHIPMENT

____ PIECE(S) CONSISTING OF ____ BOX(ES)

____ ICE CHEST(S). OTHER ____

MODE OF SHIPMENT

____ COMMERCIAL CARRIER ____

____ COURIER

X SAMPLER CONVEYED

(SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
[signature] SEALED UNSEALED X	4/30/99	12 30	Nicole Robledo SEALED UNSEALED X	Analysis
RELINQUISHED BY SEALED UNSEALED	DATE	TIME	RECEIVED BY SEALED UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY SEALED UNSEALED	DATE	TIME	RECEIVED BY SEALED UNSEALED	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

DATE: May 28, 1999

SUBJECT: Activity Number: ASYXG

Site Description: ZYKAN Landfill

FROM: Kevin Ludwikoski

TO: LABO Primary File

Comments regarding the subject activity are as follows:

Sample Numbers: 310 (Pesticides-WP)

Endrin Aldehyde recoveries were out of control in Method Standard ASYXG932G and Matrix Spike Duplicate ASYXG702W (high recoveries).As a result, sample ASYXG310 was "J" coded for Endrin Aldehyde. No other samples were affected.

LABORATORY CUSTOMER SATISFACTION SURVEY

Thanks for using our services, we would like to hear how we did. Please take a few minutes and complete the survey and let us know. Return completed surveys to Andrea Jirka, ENSV/RLAB.

Name:_____

Division/Branch/Section:_____

Activity Number: ASYXG **Date:**_____

Was your data received in a timely manner?					
1	2	3	4	5	
Data was very late		30 day (standard)		Results received before expected	
Was the data usable for its intended purpose?					
1	2	3	4	5	
Of little value		Meets my needs		Exceeded my expectations	
How was communication with the people in the laboratory?					
1	2	3	4	5	☐
Poor and hard to understand		Average		Clear and informative	No communication on this activity
What is your opinion of the RLAB's ability to resolve your problem?					
1	2	3	4	5	☐
Slow and uncaring		Average		Excellent, always available	No problem on this data set
What is your opinion of the process to obtain data (e.g., ASRs, etc.)?					
1	2	3	4	5	
Too much trouble		Neutral		Excellent, indispensable	
What is your confidence in the data results you received?					
1	2	3	4	5	
Troublesome		Acceptable		Very Comfortable	
Comments:					

Code: 2

ANALYSIS REQUEST REPORT — VALIDATED DATA

FOR ACTIVITY: ASYXG

BURNETT, BRYANT — 06/08/99 11:54:48 — ALL REAL SAMPLES AND FIELD Q.C.

* FINAL REPORT

FY: 99 ACTIVITY: ASYXG DESCRIPTION: ZYKAN LANDFILL LOCATION: WRIGHT CITY MISSOURI

STATUS: ACTIVE TYPE: SAMPLING - IN HOUSE ANALYSIS PROJECT: L30

LABO DUE DATE IS 5/30/99. REPORT DUE DATE IS 6/29/99.

INSPECTION DATE: 4/30/99 ALL SAMPLES RECEIVED DATE: 04/30/99

ALL DATA APPROVED BY LABO DATE: 06/04/99 FINAL REPORT TRANSMITTED DATE: 06/08/99

EXPECTED LABO TURNAROUND TIME IS 30 DAYS EXPECTED REPORT TURNAROUND TIME IS 60 DAYS

ACTUAL LABO TURNAROUND TIME IS 35 DAYS ACTUAL REPORT TURNAROUND TIME IS 39 DAYS

SITE CODE: XG SITE: ZYKAN LANDFILL

SAMP. NO.	QCC	M	DESCRIPTION	SAMPLE # STATUS	CITY	STATE	AIRS/ STORET LOC NO	SECT	LAY-ER	BEG. DATE	BEG. TIME	END. DATE	END. TIME
101		W	BACKGROUND/MIDDLE OF LAKE (SW-1)	1	WRIGHT CITY	MISSOURI				04/27/99	09:40	/ /	:
102		W	LAKE LUCERN-(SW-2)/5' BELOW SURFACE	1	WRIGHT CITY	MISSOURI				04/27/99	12:30	/ /	:
103		W	LAKE LUCERN-(SW-3)/1' BELOW SURFACE	1	WRIGHT CITY	MISSOURI				04/27/99	13:05	/ /	:
104		W	LAKE LUCERN-(SW-4)/22'BELOW SURFACE	1	WRIGHT CITY	MISSOURI				04/27/99	14:20	/ /	:
105		W	LAKE LUCERN-(SW-5)/25'BELOW SURFACE	1	WRIGHT CITY	MISSOURI				04/27/99	14:50	/ /	:
106		W	LAKE LUCERN-(SW-6)/OUTFALL LAKE TO N.	1	WRIGHT CITY	MISSOURI				04/28/99	07:50	/ /	:
107		W	STREAM FROM LANDFILL (SW-7)/FILLED	1	WRIGHT CITY	MISSOURI				04/28/99	08:20	/ /	:
108		W	ENTRANCE TO LAKE LUCERN (SW-8)	1	WRIGHT CITY	MISSOURI				04/28/99	07:48	/ /	:
201		S	BACKGROUND LAKE-MIDDLE (SW-SED-1)	1	WRIGHT CITY	MISSOURI				04/27/99	09:40	/ /	:
202		S	LAKE LUCERN-(SW-SED-2) 5'BELOW SURFACE	1	WRIGHT CITY	MISSOURI				04/27/99	12:30	/ /	:
203		S	LAKE LUCERN-(SW-SED-3) 1'BELOW SURFACE	1	WRIGHT CITY	MISSOURI				04/27/99	13:05	/ /	:
204		S	LAKE LUCERN-(SW-SED-4)22'BELOW SURFACE	1	WRIGHT CITY	MISSOURI				04/27/99	14:20	/ /	:
205		S	LAKE LUCERN-(SW-SED-5)22'BELOW SURFACE	1	WRIGHT CITY	MISSOURI				04/27/99	14:50	/ /	:
206		S	OUTFALL-FROM N.LAKE LUCERN(SW-SED-206)	1	WRIGHT CITY	MISSOURI				04/28/99	07:50	/ /	:
207		S	STREAM FROM LANDFILL (SW-SED-7)	1	WRIGHT CITY	MISSOURI				04/28/99	08:20	/ /	:
208		S	ENTRANCE TO LAKE LUCERN (SW-SED-8)	1	WRIGHT CITY	MISSOURI				04/28/99	07:48	/ /	:
301		W	B-19B LOCATION (24.72 DEPTH)	1	WRIGHT CITY	MISSOURI				04/27/99	13:10	/ /	:
302		W	B-23 LOCATION	1	WRIGHT CITY	MISSOURI				04/28/99	08:30	/ /	:
303		W	B22	1	WRIGHT CITY	MISSOURI				04/28/99	09:20	/ /	:
304		W	B20	1	WRIGHT CITY	MISSOURI				04/28/99	09:54	/ /	:
305		W	GMW-1	1	WRIGHT CITY	MISSOURI				04/29/99	14:36	/ /	:
306		W	B-3	1	WRIGHT CITY	MISSOURI				04/29/99	15:27	/ /	:
307		W	B-10	1	WRIGHT CITY	MISSOURI				04/30/99	08:32	/ /	:

VALIDATED DATA

SAMP. NO.	QCC	M	DESCRIPTION	SAMPLE STATUS	#	CITY	STATE	AIRS/ STORET LOC NO	SECT	LAY-ER	BEG. DATE	BEG. TIME	END. DATE	END. TIME
308		W	B-1	1		WRIGHT CITY	MISSOURI				04/30/99	08:48	/ /	:
309		W	B-2	1		WRIGHT CITY	MISSOURI				04/30/99	10:39	/ /	:
310		W	B-4	1		WRIGHT CITY	MISSOURI				04/30/99	10:15	/ /	:
311		W	B-5	1		WRIGHT CITY	MISSOURI				04/30/99	09:55	/ /	:
312		W	B-6	1		WRIGHT CITY	MISSOURI				04/30/99	09:26	/ /	:
313		W	P-21	1		WRIGHT CITY	MISSOURI				04/30/99	11:14	/ /	:
314		W	GMW-4	1		WRIGHT CITY	MISSOURI				04/30/99	10:00	/ /	:
401		W	GP-1/5' BELOW GROUND	1		WRIGHT CITY	MISSOURI				04/28/99	08:45	/ /	:
402		W	GP-3/5' BELOW GROUND	1		WRIGHT CITY	MISSOURI				04/28/99	10:00	/ /	:
403		W	GP-4 (4 1/2' BELOW SURFACE)	1		WRIGHT CITY	MISSOURI				04/28/99	13:15	/ /	:
404		W	GP-5 (2-4' BELOW GROUND SURFACE)	1		WRIGHT CITY	MISSOURI				04/28/99	16:30	/ /	:
405		W	GP-6 (APPROX. 3' BELOW GROUND SURFACE)	1		WRIGHT CITY	MISSOURI				04/28/99	18:00	/ /	:
406		W	GP-7 (2-4' BELOW GROUND SURFACE)	1		WRIGHT CITY	MISSOURI				04/29/99	09:00	/ /	:
407		W	GP-8 (3-4' BELOW GROUND SURFACE)	1		WRIGHT CITY	MISSOURI				04/29/99	09:30	/ /	:
408		W	GP-9 (3-7' BELOW GROUND SURFACE)	1		WRIGHT CITY	MISSOURI				04/29/99	11:40	/ /	:
501		W	INTERCEPTOR TRENCH #3 SUMP	1		WRIGHT CITY	MISSOURI				04/28/99	13:20	/ /	:
502		W	MAIN LEACHATE SUMP	1		WRIGHT CITY	MISSOURI				04/28/99	14:10	/ /	:
503		W	INTERCEPTOR TRENCHES #1 AND #2 SUMP	1		WRIGHT CITY	MISSOURI				04/28/99	14:55	/ /	:
601		S	ISS-1	1		WRIGHT CITY	MISSOURI				04/28/99	08:18	/ /	:
602		S	ISS-2	1		WRIGHT CITY	MISSOURI				04/29/99	08:45	/ /	:
603		S	ISS-3	1		WRIGHT CITY	MISSOURI				04/29/99	09:03	/ /	:
604		S	ISS-4 (0-2")	1		WRIGHT CITY	MISSOURI				04/29/99	10:22	/ /	:
605		S	ISS-5 (0-2")	1		WRIGHT CITY	MISSOURI				04/29/99	09:40	/ /	:
606		S	ISS-6 (0-2")	1		WRIGHT CITY	MISSOURI				04/29/99	09:58	/ /	:
607		S	ISS-7	1		WRIGHT CITY	MISSOURI				04/29/99	12:00	/ /	:
608		S	ISS-8	1		WRIGHT CITY	MISSOURI				04/29/99	12:15	/ /	:
609		S	ISS-9	1		WRIGHT CITY	MISSOURI				04/29/99	11:40	/ /	:
701		W	WELL FAUCET BEHIND HOUSE	1		WRIGHT CITY	MISSOURI				04/29/99	12:23	/ /	:
702		W	MDOH WELL #7 PAST PRESSURE TANK	1		WRIGHT CITY	MISSOURI				04/29/99	17:00	/ /	:
703		W	MDOH WELL #15 OUTSIDE FAUCET	1		WRIGHT CITY	MISSOURI				04/29/99	19:30	/ /	:
801	F	W	TRIP BLANK	1		WRIGHT CITY	MISSOURI				04/28/99	11:38	/ /	:
802		W	GW GEOPROBE RINSATE SAMPLE	1		WRIGHT CITY	MISSOURI				04/29/99	14:00	/ /	:
803	F	W	FIELD BLANK	1		WRIGHT CITY	MISSOURI				04/29/99	14:25	/ /	:
804		W	COMPOSITE OF 2 OVERPACK DRUMS W/PURGE	1		WRIGHT CITY	MISSOURI				04/29/99	14:35	/ /	:
805	F	W	TRIP BLANK	1		WRIGHT CITY	MISSOURI				04/29/99	14:55	/ /	:
806	F	S	TRIP BLANK	1		WRIGHT CITY	MISSOURI				04/30/99	:	/ /	:

EXPLANATION OF CODES AND INFORMATION ON ANALYSIS REQUEST DETAIL REPORT

SAMPLE INFORMATION:

SAMP. NO. = SAMPLE IDENTIFICATION NUMBER (A 3-DIGIT NUMBER WHICH IN COMBINATION WITH THE ACTIVITY NUMBER AND QCC, PROVIDES AN UNIQUE NUMBER FOR EACH SAMPLE FOR IDENTIFICATION PURPOSES)

QCC = QUALITY CONTROL CODE (A ONE-LETTER CODE USED TO DESIGNATE SPECIFIC QC SAMPLES. THIS FIELD WILL BE BLANK FOR ALL NON-QC OR ACTUAL SAMPLES):
- B = CAL INCREASED CONCENTRATION FOR A LAB SPIKED DUP SAMPLE
- D = MEASURED VALUE FOR FIELD DUPLICATE SAMPLE
- F = MEASURED VALUE FOR FIELD BLANK
- G = MEASURED VALUE FOR METHOD STANDARD
- H = TRUE VALUE FOR METHOD STANDARD
- K = CAL INCREASED CONCENTRATION FOR FIELD SPIKED DUP SAMPLE
- L = MEASURED VALUE FOR A LAB DUPLICATE SAMPLE
- M = MEASURED VALUE FOR LAB BLANK
- N = MEASURED CONCENTRATION OF FIELD SPIKED DUPLICATE
- P = MEASURED VALUE FOR PERFORMANCE STANDARD
- R = CAL INCREASED CONCENTRATION RESULTING FROM LAB SPIKE
- S = MEASURED CONCENTRATION OF LAB SPIKED SAMPLE
- T = TRUE VALUE OF PERFORMANCE STANDARD
- W = MEASURED CONCENTRATION OF LAB SPIKED DUPLICATE
- Y = MEASURED CONCENTRATION OF FIELD SPIKED SAMPLE
- Z = CAL INCREASED CONCENTRATION RESULTING FROM FIELD SPIKE
- 1 = MEASURED VALUE OF FIRST SPIKED REPLICATE
- 2 = MEASURED VALUE OF SECOND SPIKED REPLICATE
- 3 = MEASURED VALUE OF THIRD SPIKED REPLICATE
- 4 = MEASURED VALUE OF FOURTH SPIKED REPLICATE
- 5 = MEASURED VALUE OF FIFTH SPIKED REPLICATE
- 6 = MEASURED VALUE OF SIXTH SPIKED REPLICATE
- 7 = MEASURED VALUE OF SEVENTH SPIKED REPLICATE

M = MEDIA CODE (A ONE-LETTER CODE DESIGNATING THE MEDIA OF THE SAMPLE):
- A = AIR H = HAZARDOUS WASTE/OTHER
- S = SOLID (SOIL, SEDIMENT, SLUDGE)
- T = TISSUE (PLANT & ANIMAL)
- W = WATER (GROUND WATER, SURFACE WATER, WASTE WATER, DRINKING WATER)

DESCRIPTION = A SHORT DESCRIPTION OF THE LOCATION WHERE SAMPLE WAS COLLECTED

AIRS/STORET LOC. NO. = THE SPECIFIC LOCATION ID NUMBER OF EITHER OF THESE NATIONAL DATABASE SYSTEMS, AS APPROPRIATE

DATE/TIME INFORMATION = SPECIFIC INFORMATION REGARDING WHEN THE SAMPLE WAS COLLECTED
- BEG. DATE = DATE SAMPLING WAS STARTED
- BEG. TIME = TIME SAMPLING WAS STARTED
- END DATE = DATE SAMPLING WAS COMPLETED
- END TIME = TIME SAMPLING WAS COMPLETED
- NOTE: A GRAB SAMPLE WILL CONTAIN ONLY BEG. DATE/TIME
  A TIMED COMPOSITE SAMPLE WILL CONTAIN BOTH BEG AND END DATE/TIME TO DESIGNATE DURATION OF SAMPLE COLLECTION

OTHER CODES
- V = VALIDATED

ANALYTICAL RESULTS/MEASUREMENTS INFORMATION:

COMPOUND = MGP (MEDIA-GROUP-PARAMETER) CODE AND NAME OF THE MEASURED CONSTITUENT OR CHARACTERISTIC OF EACH SAMPLE

UNITS = SPECIFIC UNITS IN WHICH RESULTS ARE REPORTED:
- C = CENTIGRADE (CELSIUS) DEGREES
- CFS = CUBIC FEET PER SECOND
- GPM = GALLONS PER MINUTE
- IN = INCHES
- I.D. = SPECIES IDENTIFICATION
- KG = KILOGRAM
- L = LITER
- LB = POUNDS
- MG = MILLIGRAMS (1 X 10-3 GRAMS)
- MGD = MILLION GALLONS PER DAY
- MPH = MILES PER HOUR
- MV = MILLIVOLT
- M/F = MALE/FEMALE
- M2 = SQUARE METER
- M3 = CUBIC METER
- NA = NOT APPLICABLE
- NG = NANOGRAMS (1 X 10-9 GRAMS)
- NTU = NEPHELOMETRIC TURBIDITY UNITS
- PC/L = PICO (1 X 10-12) CURRIES PER LITER
- PG = PICOGRAMS (1 X 10-12 GRAMS)
- P/CM2 = PICOGRAMS PER SQUARE CENTIMETER
- SCM = STANDARD CUBIC METER (1 ATM, 25 C)
- SQ FT = SQUARE FEET
- SU = STANDARD UNITS (PH)
- UG = MICROGRAMS (1 X 10-6 GRAMS)
- UMHOS = MICROMHOS/CM (CONDUCTIVITY UNITS)
- U/CC2 = MICROGRAMS PER 100 SQUARE CENTIMETERS
- U/CM2 = MICROGRAMS PER SQUARE CENTIMETER
- 1000G = 1000 GALLONS
- +/- = POSITIVE/NEGATIVE
- # = NUMBER

DATA QUALIFIERS = SPECIFIC CODES USED IN CONJUNCTION WITH DATA VALUES TO PROVIDE ADDITIONAL INFORMATION ON THE REPORTED RESULTS, OR USED TO EXPLAIN THE ABSENCE OF A SPECIFIC VALUE:
- BLANK = IF FIELD IS BLANK, NO REMARKS OR QUALIFIERS ARE PERTINENT. FOR FINAL REPORTED DATA, THIS MEANS THAT THE VALUES HAVE BEEN REVIEWED AND FOUND TO BE ACCEPTABLE FOR USE.
- I = INVALID SAMPLE/DATA - VALUE NOT REPORTED
- J = THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
- K = ACTUAL VALUE OF SAMPLE IS < VALUE REPORTED
- L = ACTUAL VALUE OF SAMPLE IS > VALUE REPORTED
- N = DETECTED BUT BELOW THE LEVEL OF REPORTED VALUE FOR ACCURATE QUANTIFICATION
- O = PARAMETER NOT ANALYZED
- U = THE MATERIAL WAS ANALYZED FOR, BUT WAS NOT DETECTED. THE ASSOCIATED NUMERICAL VALUE IS THE SAMPLE DETECTION LIMIT.

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	101		102		103		104		105	
WD01 DIOXIN, 2378-TETRACHLORODIBENZO-P, HRMS	NG/L	1.00	U								
WF01 TEMPERATURE, WATER	'C	14.5		16.8		16.6		13.8		12.2	
WF05 PH, FIELD	SU	6.59		7.41		7.77		7.25		7.46	
WF10 CONDUCTIVITY (FIELD)	UMHOS	0.125		0.139		0.140		0.138		0.138	
WG30 TURBIDITY	NTU	999									
WH01 2,4-D	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
WH02 2,4,5-TP(SILVEX)	UG/L	0.17	U	0.17	U	0.17	U	0.17	U	0.17	U
WH03 2,4,5-T	UG/L	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
WM01 SILVER, TOTAL, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U	7.24	U	7.24	U
WM02 ALUMINUM, TOTAL, BY ICAP	UG/L	2030		1120		1670		1160		1050	
WM04 BARIUM, TOTAL, BY ICAP	UG/L	45.9		48.3		52.0		49.2		50.2	
WM05 BERYLLIUM, TOTAL, BY ICAP	UG/L	0.420	U	0.420	U	0.420	U	0.420	U	0.420	U
WM06 CADMIUM, TOTAL, BY ICAP	UG/L	0.592	U	1.30	U	0.698	U	1.81	U	1.65	U
WM07 COBALT, TOTAL, BY ICAP	UG/L	2.47	U	2.47	U	2.47	U	2.47	U	2.73	
WM08 CHROMIUM, TOTAL, BY ICAP	UG/L	3.69	U	3.69	U	3.69	U	3.69	U	3.69	U
WM09 COPPER, TOTAL, BY ICAP	UG/L	2.19	U	3.13	U	3.58	U	4.07	U	3.24	U
WM10 IRON, TOTAL, BY ICAP	UG/L	1930		1160		1540		1150		1130	
WM11 MANGANESE, TOTAL, BY ICAP	UG/L	170		72.9		112		57.9		102	
WM12 MOLYBDENUM, TOTAL, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U	4.41	U	4.41	U
WM13 NICKEL, TOTAL, BY ICAP	UG/L	6.23	U	6.23	U	6.23	U	6.23	U	6.23	U
WM17 TITANIUM, TOTAL, BY ICAP	UG/L	27.3		15.9		22.1		16.2		14.6	
WM19 VANADIUM, TOTAL, BY ICAP	UG/L	3.87		2.51	U	3.52		2.51	U	2.51	U
WM20 ZINC, TOTAL, BY ICAP	UG/L	4.07	U	4.07	U	4.07	U	4.07	U	4.07	U
WM21 CALCIUM, TOTAL, BY ICAP	MG/L	12.3		21.3		21.6		22.1		22.1	
WM22 MAGNESIUM, TOTAL, BY ICAP	MG/L	2.75		4.50		4.64		4.63		4.59	
WM23 SODIUM, TOTAL, BY ICAP	MG/L	2.52		4.14		4.24		4.37		4.37	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	101		102		103		104		105	
WM24 POTASSIUM, TOTAL, BY ICAP	MG/L	3.04		1.95		1.98		2.01		2.02	
WM27 ARSENIC, TOTAL, BY AA	UG/L	1.66	U	1.66	U	1.66	U	1.66	U	1.66	U
WM30 LEAD, TOTAL, BY AA	UG/L	3.37		3.18		2.42		2.61		2.07	
WM31 ANTIMONY, TOTAL, BY AA	UG/L	4.37	U	4.37	U	4.37	U	4.37	U	4.37	U
WM32 SELENIUM, TOTAL, BY AA	UG/L	1.81	U	1.81	U	1.81	U	1.81	U	1.81	U
WM33 THALLIUM, TOTAL, BY AA	UG/L	1.44	U	1.44	U	1.44	U	1.44	U	1.44	U
WM34 MERCURY, TOTAL, BY COLD VAPOR AA	UG/L	0.127	U	0.269		0.127	U	0.161		0.127	U
WM35 SILVER, DISSOLVED, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U	7.24	U	7.24	U
WM36 ALUMINUM, DISSOLVED, BY ICAP	UG/L	243		88.3		65.8		64.3		60.6	
WM38 BARIUM, DISSOLVED, BY ICAP	UG/L	41.6		48.0		47.9		47.5		47.1	
WM39 BERYLLIUM, DISSOLVED, BY ICAP	UG/L	0.420	U	0.420	U	0.420	U	0.420	U	0.420	U
WM40 CADMIUM, DISSOLVED, BY ICAP	UG/L	0.592	U	0.975	U	1.67	U	1.26	U	0.768	U
WM41 COBALT, DISSOLVED, BY ICAP	UG/L	2.47	U	2.47	U	2.47	U	2.76		2.47	U
WM42 CHROMIUM, DISSOLVED, BY ICAP	UG/L	3.69	U	3.69	U	3.69	U	3.69	U	3.69	U
WM43 COPPER, DISSOLVED, BY ICAP	UG/L	1.54	U	1.54	U	1.54	U	1.54	U	1.54	U
WM44 IRON, DISSOLVED, BY ICAP	UG/L	298		77.1		67.0		62.2		62.9	
WM45 MANGANESE, DISSOLVED, BY ICAP	UG/L	88.6		58.1		77.2		24.4		63.1	
WM46 MOLYBDENUM, DISSOLVED, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U	4.41	U	4.41	U
WM47 NICKEL, DISSOLVED, BY ICAP	UG/L	6.23	U	6.23	U	6.23	U	6.23	U	6.23	U
WM51 TITANIUM, DISSOLVED, BY ICAP	UG/L	9.63		4.18	U	4.18	U	4.18	U	4.18	U
WM53 VANADIUM, DISSOLVED, BY ICAP	UG/L	2.51	U	2.51	U	2.51	U	2.51	U	2.51	U
WM54 ZINC, DISSOLVED, BY ICAP	UG/L	17.5		13.2		15.2		12.3		12.4	
WM55 CALCIUM, DISSOLVED, BY ICAP	MG/L	14.3		23.7		23.4		24.3		23.7	
WM56 MAGNESIUM, DISSOLVED, BY ICAP	MG/L	2.90		4.65		4.65		4.75		4.60	
WM57 SODIUM, DISSOLVED, BY ICAP	MG/L	2.65		4.14		4.187		4.19		4.15	
WM58 POTASSIUM, DISSOLVED, BY ICAP	MG/L	3.81		2.03		1.96		2.06		2.04	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	101		102		103		104		105	
WM59 ANTIMONY, DISSOLVED, BY AA	UG/L	4.37	U	4.37	U	4.37	U	4.37	U	4.37	U
WM60 ARSENIC, DISSOLVED, BY AA	UG/L	1.66	U	1.66	U	1.66	U	1.66	U	1.66	U
WM63 LEAD, DISSOLVED, BY AA	UG/L	0.557	U	0.557	U	0.557	U	0.557	U	0.557	U
WM64 SELENIUM, DISSOLVED, BY AA	UG/L	1.81	U	1.81	U	1.81	U	1.81	U	1.81	U
WM66 THALLIUM, DISSOLVED, BY AA	UG/L	1.44	U	1.44	U	1.44	U	1.44	U	1.44	U
WM68 MERCURY, DISSOLVED, BY COLD VAPOR AA	UG/L	0.257		0.151		0.119		0.144		0.100	U
WP01 BHC, ALPHA, BY GC/EC	UG/L	0.0040	U	0.0080	U	0.0040	U	0.0040	U	0.0040	U
WP02 BHC, BETA, BY GC/EC	UG/L	0.0050	U	0.010	U	0.0050	U	0.0050	U	0.0050	U
WP03 BHC, DELTA	UG/L	0.0080	U	0.016	U	0.0080	U	0.0080	U	0.0080	U
WP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/L	0.0050	U	0.010	U	0.0050	U	0.0050	U	0.0050	U
WP05 ALDRIN, BY GC/EC	UG/L	0.0040	U	0.0080	U	0.0040	U	0.0040	U	0.0040	U
WP06 DIELDRIN, BY GC/EC	UG/L	0.0060	U	0.012	U	0.0060	U	0.0060	U	0.0060	U
WP07 ENDOSULFAN I, BY GC/EC	UG/L	0.0090	U	0.018	U	0.0090	U	0.0090	U	0.0090	U
WP08 ENDOSULFAN II, BY GC/EC	UG/L	0.070	U	0.14	U	0.070	U	0.070	U	0.070	U
WP09 ENDOSULFAN SULFATE, BY GC/EC	UG/L	0.0070	U	0.014	U	0.0070	U	0.0070	U	0.0070	U
WP10 ENDRIN, BY GC/EC	UG/L	0.020	U	0.040	U	0.020	U	0.020	U	0.020	U
WP11 ENDRIN ALDEHYDE, BY GC/EC	UG/L	0.0040	U	0.0080	U	0.0040	U	0.0040	U	0.0040	U
WP13 DDE, 4,4'-	UG/L	0.0060	U	0.012	U	0.0060	U	0.0060	U	0.0060	U
WP14 DDD, 4,4'-	UG/L	0.060	U	0.12	U	0.060	U	0.060	U	0.060	U
WP15 DDT, 4,4'-	UG/L	0.010	U	0.020	U	0.010	U	0.010	U	0.010	U
WP16 TOXAPHENE, BY GC/EC	UG/L	0.50	U	1.0	U	0.50	U	0.50	U	0.50	U
WP17 PCB-AROCLOR 1016	UG/L	0.40	U	0.80	U	0.40	U	0.40	U	0.40	U
WP18 PCB-AROCLOR 1221	UG/L	0.30	U	0.60	U	0.30	U	0.30	U	0.30	U
WP19 PCB-AROCLOR 1232	UG/L	0.10	U	0.20	U	0.10	U	0.10	U	0.10	U
WP20 PCB-AROCLOR 1242	UG/L	0.10	U	0.20	U	0.10	U	0.10	U	0.10	U
WP21 PCB-AROCLOR 1248	UG/L	0.20	U	0.40	U	0.20	U	0.20	U	0.20	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	101		102		103		104		105	
WP22 PCB-AROCLOR 1254	UG/L	0.22	U	0.10	U	0.13	U	0.050	U	0.10	U
WP23 PCB-AROCLOR 1260	UG/L	0.060	U	0.12	U	0.060	U	0.060	U	0.060	U
WP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/L	0.020	U	0.040	U	0.020	U	0.020	U	0.020	U
WP25 HEPTACHLOR, BY GC/EC	UG/L	0.0090	U	0.018	U	0.0090	U	0.0090	U	0.0090	U
WP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/L	0.0040	U	0.0080	U	0.0040	U	0.0040	U	0.0040	U
WP83 ENDRIN KETONE, BY GC/EC	UG/L	0.0050	U	0.010	U	0.0050	U	0.0050	U	0.0050	U
WP84 METHOXYCHLOR, BY GC/EC	UG/L	0.010	U	0.020	U	0.010	U	0.010	U	0.010	U
WP85 CHLORDANE, ALPHA	UG/L	0.025	U	0.050	U	0.025	U	0.025	U	0.025	U
WP86 CHLORDANE, GAMMA	UG/L	0.025	U	0.050	U	0.025	U	0.025	U	0.025	U
WS01 PHENOL, BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
WS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/L	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
WS04 CHLOROPHENOL, 2-	UG/L	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
WS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/L	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
WS06 DICHLOROBENZENE,1,4-	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
WS07 BENZYL ALCOHOL	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
WS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
WS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
WS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
WS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
WS12 N-NITROSODIPROPYLAMINE	UG/L	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
WS13 HEXACHLOROETHANE, BY GC/MS	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
WS14 NITROBENZENE, BY GC/MS	UG/L	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
WS15 ISOPHORONE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS16 NITROPHENOL,2-	UG/L	1	U	1	U	1	U	1	U	1	U
WS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/L	1	U	1	U	1	U	1	U	1	U
WS18 BENZOIC ACID, BY GC/MS	UG/L	10	U	10	U	10	U	10	U	10	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	101		102		103		104		105	
WS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
WS20 DICHLOROPHENOL, 2,4-	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
WS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS22 NAPHTHALENE, BY GC/MS	UG/L	1	U	1	U	1	U	1	U	1	U
WS23 CHLOROANILINE,4-	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/L	1	U	1	U	1	U	1	U	1	U
WS25 PHENOL,4-CHLORO-3-METHYL	UG/L	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
WS26 METHYLNAPHTHALENE, 2-	UG/L	0.9	U	0.9	U	0.9	U	0.9	U	0.9	U
WS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS28 TRICHLOROPHENOL,2,4,6	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
WS29 TRICHLOROPHENOL,2,4,5	UG/L	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
WS30 CHLORONAPHTHALENE, 2-	UG/L	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
WS31 NITROANILINE,2-(ORTHO)	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
WS33 ACENAPHTHYLENE, BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
WS34 NITROANILINE,3-	UG/L	5	U	5	U	5	U	5	U	5	U
WS35 ACENAPHTHENE, BY GC/MS	UG/L	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
WS36 DINITROPHENOL,2,4, BY GC/MS	UG/L	10	U	10	U	10	U	10	U	10	U
WS37 NITROPHENOL,4-	UG/L	6.8	U	6.8	U	6.8	U	6.8	U	6.8	U
WS38 DIBENZOFURAN	UG/L	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
WS39 DINITROTOLUENE,2,4, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS40 DINITROTOLUENE,2,6-	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS41 PHTHALATE, DIETHYL, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS43 FLUORENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS44 NITROANILINE,4-	UG/L	7.9	U	7.9	U	7.9	U	7.9	U	7.9	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	101		102		103		104		105	
WS45 PHENOL,4,6-DINITRO-2-METHYL	UG/L	5	U	5	U	5	U	5	U	5	U
WS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
WS47 ETHER, 4-BROMOPHENYL PHENYL	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS48 HEXACHLOROBENZENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS49 PENTACHLOROPHENOL, BY GC/MS	UG/L	10	U	10	U	10	U	10	U	10	U
WS50 PHENANTHRENE, BY GC/MS	UG/L	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
WS51 ANTHRACENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS53 FLUORANTHENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS54 PYRENE, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS55 PHTHALATE, BUTYL BENZYL	UG/L	5	U	5	U	5	U	5	U	5	U
WS56 DICHLOROBENZIDINE, 3,3'	UG/L	12	U	12	U	12	U	12	U	12	U
WS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS59 CHRYSENE, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS63 PYRENE, BENZO(A), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS64 PYRENE, INDENO(1,2,3-CD)	UG/L	5	U	5	U	5	U	5	U	5	U
WS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
WS67 CARBAZOLE	UG/L	5	U	5	U	5	U	5	U	5	U
WW40 CHLOROMETHANE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
WW41 BROMOMETHANE, BY GC/MS LDL	UG/L	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
WW42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	101		102		103		104		105	
VW43 CHLOROETHANE, BY GC/MS LDL	UG/L	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U
VW44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	6.2	U	5.5	U	5.6	U	5.6	U	1.6	U
VW45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
VW46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
VW48 CHLOROFORM, BY GC/MS LDL	UG/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
VW49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U
VW50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U
VW51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
VW52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	0.28	U	0.28	U	0.28	U	0.28	U	0.28	U
VW53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
VW54 BENZENE, BY GC/MS LDL	UG/L	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
VW55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
VW56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	0.63	U	0.63	U	0.63	U	0.63	U	0.63	U
VW57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U
VW58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
VW59 BROMOFORM, BY GC/MS LDL	UG/L	0.17	U	0.17	U	0.17	U	0.17	U	0.17	U
VW60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U
VW61 TOLUENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
VW62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	0.64	U	0.64	U	0.64	U	0.64	U	0.64	U
VW63 CHLOROBENZENE, BY GC/MS LDL	UG/L	0.23	U	0.23	U	0.23	U	0.23	U	0.23	U
VW64 ETHYLBENZENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U
VW65 ACETONE, BY GC/MS LDL	UG/L	9.0	U	9.0	U	9.0	U	9.0	U	9.0	U
VW66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
VW67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
VW68 HEXANONE, 2- BY GC/MS LDL	UG/L	3.2	U	3.2	U	3.2	U	3.2	U	3.2	U
VW69 4-METHYL-2-PENTANONE (MIBK) BY GC/MS LD	UG/L	0.79	U	0.79	U	0.79	U	0.79	U	0.79	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	101		102		103		104		105	
WW70 STYRENE, BY GC/MS LOL	UG/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U
WW72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	0.82	U	0.82	U	0.82	U	0.82	U	0.82	U
WW73 XYLENE, M AND/OR P BY GC/MS LOL	UG/L	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
WW74 XYLENE, ORTHO BY GC/MS LOL	UG/L	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U
WW75 DICHLOROBENZENE, 1,4- (PARA) BY GC/MS L	UG/L	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U
WW76 DICHLOROBENZENE, 1,3- (META) BY GC/MS L	UG/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
WW77 DICHLOROBENZENE, 1,2- (ORTHO) BY GC/MS	UG/L	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U
WW78 DICHLOROETHYLENE, 1,2- (TRANS) BY GC/MS	UG/L	0.84	U	0.84	U	0.84	U	0.84	U	0.84	U
WW79 DICHLOROETHYLENE, 1,2- (CIS) BY GC/MS L	UG/L	0.84	U	0.84	U	0.84	U	0.84	U	0.84	U
ZZ01 SAMPLE NUMBER	NA	101		102		103		104		105	
ZZ02 ACTIVITY CODE	NA	ASYXG		ASYXG		ASYXG		ASYXG		ASYXG	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106	107	108	201		202	
S002 DIOXIN, 2378-TETRACHLORODIBENZO-P, RAPI	NG/GM				0.300	U		
SG07 SOLIDS, PERCENT	%				34.4		49.0	
SH01 2,4-D(DICHLOROPHENOXYACETIC ACID)	UG/KG				1900	U	1400	U
SH02 2,4,5-TP(SILVEX)	UG/KG				2900	U	2000	U
SH03 2,4,5-T	UG/KG				2800	U	1900	U
SM01 SILVER, TOTAL, BY ICAP	MG/KG				0.512	U	0.512	U
SM02 ALUMINUM, TOTAL, BY ICAP	MG/KG				15000		8790	
SM04 BARIUM, TOTAL, BY ICAP	MG/KG				143		99.1	
SM05 BERYLLIUM, TOTAL, BY ICAP	MG/KG				1.11		0.835	
SM06 CADMIUM, TOTAL, BY ICAP	MG/KG				5.80		4.20	
SM07 COBALT, TOTAL, BY ICAP	MG/KG				11.5		7.69	
SM08 CHROMIUM, TOTAL, BY ICAP	MG/KG				19.7		13.5	
SM09 COPPER, TOTAL, BY ICAP	MG/KG				15.1		24.7	
SM10 IRON, TOTAL, BY ICAP	MG/KG				17800		13400	
SM11 MANGANESE, TOTAL, BY ICAP	MG/KG				549		503	
SM12 MOLYBDENUM, TOTAL, BY ICAP	MG/KG				0.820		0.470	
SM13 NICKEL, TOTAL, BY ICAP	MG/KG				20.1		15.1	
SM14 LEAD, TOTAL, BY ICAP	MG/KG				27.3		13.0	
SM18 THALLIUM, TOTAL, BY ICAP	MG/KG				2.11	U	2.11	U
SM19 VANADIUM, TOTAL, BY ICAP	MG/KG				40.0		27.3	
SM20 ZINC, TOTAL, BY ICAP	MG/KG				94.4		37.4	
SM21 CALCIUM, TOTAL, BY ICAP	MG/KG				3150		5980	
SM22 MAGNESIUM, TOTAL, BY ICAP	MG/KG				1830		2840	
SM23 SODIUM, TOTAL, BY ICAP	MG/KG				109		68.6	
SM24 POTASSIUM, TOTAL, BY ICAP	MG/KG				1400		762	
SM27 ARSENIC, TOTAL, BY AA	MG/KG				7.46		6.12	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106	107	108	201		202	
SM32 SELENIUM, TOTAL, BY AA	MG/KG				0.714		0.500	U
SM34 MERCURY, TOTAL, BY COLD VAPOR AA	MG/KG				0.0861		0.0443	
SM56 ANTIMONY, TOTAL, BY AA	MG/KG				0.200	U	0.200	U
SP01 BHC, ALPHA, BY GC/EC	UG/KG				48	U	3.4	U
SP02 BHC, BETA, BY GC/EC	UG/KG				48	U	3.4	U
SP03 BHC, DELTA	UG/KG				73	U	5.1	U
SP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/KG				48	U	3.4	U
SP05 ALDRIN, BY GC/EC	UG/KG				48	U	3.4	U
SP06 DIELDRIN, BY GC/EC	UG/KG				73	U	5.1	U
SP07 ENDOSULFAN I, BY GC/EC	UG/KG				97	U	6.8	U
SP08 ENDOSULFAN II, BY GC/EC	UG/KG				730	U	51	U
SP09 ENDOSULFAN SULFATE, BY GC/EC	UG/KG				73	U	5.1	U
SP10 ENDRIN, BY GC/EC	UG/KG				190	U	14	U
SP11 ENDRIN ALDEHYDE, BY GC/EC	UG/KG				48	U	3.4	U
SP13 DDE-4,4'-	UG/KG				73	U	5.1	U
SP14 DDD-4,4'-	UG/KG				730	U	51	U
SP15 DDT-4,4'-	UG/KG				97	U	6.8	U
SP16 TOXAPHENE, BY GC/EC	UG/KG				4800	U	340	U
SP17 PCB-AROCLOR 1016	UG/KG				4800	U	340	U
SP18 PCB-AROCLOR 1221	UG/KG				2400	U	170	U
SP19 PCB-AROCLOR 1232	UG/KG				970	U	68	U
SP20 PCB-AROCLOR 1242	UG/KG				970	U	68	U
SP21 PCB-AROCLOR 1248	UG/KG				1900	U	140	U
SP22 PCB-AROCLOR 1254	UG/KG				480	U	34	U
SP23 PCB-AROCLOR 1260	UG/KG				730	U	51	U
SP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/KG				190	U	14	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106	107	108	201		202	
SP25 HEPTACHLOR, BY GC/EC	UG/KG				97	U	6.8	U
SP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/KG				48	U	3.4	U
SP34 CHLORDANE, ALPHA	UG/KG				240	U	17	U
SP36 CHLORDANE, GAMMA	UG/KG				240	U	17	U
SP60 METHOXYCHLOR, BY GC/EC	UG/KG				120	U	8.5	U
SP61 ENDRIN KETONE, BY GC/EC	UG/KG				48	U	3.4	U
SS01 PHENOL, BY GC/MS	UG/KG				1000	U	710	U
SS02 CARBAZOLE	UG/KG				620	U	440	U
SS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/KG				570	U	400	U
SS04 CHLOROPHENOL, 2-	UG/KG				760	U	540	U
SS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/KG				380	U	270	U
SS06 DICHLOROBENZENE,1,4-	UG/KG				240	U	170	U
SS07 BENZYL ALCOHOL	UG/KG				480	U	340	U
SS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/KG				290	U	200	U
SS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/KG				1300	U	910	U
SS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/KG				240	U	170	U
SS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/KG				1100	U	780	U
SS12 N-NITROSODIPROPYLAMINE	UG/KG				570	U	400	U
SS13 HEXACHLOROETHANE, BY GC/MS	UG/KG				190	U	130	U
SS14 NITROBENZENE, BY GC/MS	UG/KG				240	U	170	U
SS15 ISOPHORONE, BY GC/MS	UG/KG				430	U	300	U
SS16 NITROPHENOL,2-	UG/KG				670	U	470	U
SS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/KG				620	U	440	U
SS18 BENZOIC ACID, BY GC/MS	UG/KG				2200	U	1600	U
SS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/KG				480	U	340	U
SS20 DICHLOROPHENOL, 2,4-	UG/KG				910	U	640	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	106	107	108	201		202	
SS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/KG				140	U	100	U
SS22 NAPHTHALENE, BY GC/MS	UG/KG				240	U	170	U
SS23 CHLOROANILINE,4-	UG/KG				1900	U	1300	U
SS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/KG				140	U	100	U
SS25 PHENOL,4-CHLORO-3-METHYL	UG/KG				910	U	640	U
SS26 METHYLNAPHTHALENE, 2-	UG/KG				290	U	200	U
SS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/KG				140	U	100	U
SS28 TRICHLOROPHENOL,2,4,6	UG/KG				860	U	610	U
SS29 TRICHLOROPHENOL,2,4,5	UG/KG				1000	U	710	U
SS30 CHLORONAPHTHALENE, 2-	UG/KG				330	U	240	U
SS31 NITROANILINE,2-	UG/KG				430	U	300	U
SS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/KG				380	U	270	U
SS33 ACENAPHTHYLENE, BY GC/MS	UG/KG				330	U	240	U
SS34 NITROANILINE,3-	UG/KG				1300	U	910	U
SS35 ACENAPHTHENE, BY GC/MS	UG/KG				330	U	240	U
SS36 DINITROPHENOL,2,4, BY GC/MS	UG/KG				2900	U	2000	U
SS37 NITROPHENOL,4-	UG/KG				140	U	100	U
SS38 DIBENZOFURAN	UG/KG				430	U	300	U
SS39 DINITROTOLUENE,2,4, BY GC/MS	UG/KG				1100	U	780	U
SS40 DINITROTOLUENE,2,6-	UG/KG				480	U	340	U
SS41 PHTHALATE, DIETHYL, BY GC/MS	UG/KG				810	U	570	U
SS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/KG				430	U	300	U
SS43 FLUORENE, GC/MS	UG/KG				760	U	540	U
SS44 NITROANILINE,4-	UG/KG				3100	U	2200	U
SS45 PHENOL,4,6-DINITRO-2-METHYL	UG/KG				1100	U	810	U
SS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/KG				96	U	67	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106	107	108	201		202	
SS47 ETHER, 4-BROMOPHENYL PHENYL	UG/KG				430	U	300	U
SS48 HEXACHLOROBENZENE, BY GC/MS	UG/KG				380	U	270	U
SS49 PENTACHLOROPHENOL, BY GC/MS	UG/KG				1000	U	710	U
SS50 PHENANTHRENE, BY GC/MS	UG/KG				380	U	270	U
SS51 ANTHRACENE, BY GC/MS	UG/KG				520	U	370	U
SS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/KG				620	U	440	U
SS53 FLUORANTHENE, BY GC/MS	UG/KG				190	U	130	U
SS54 PYRENE, BY GC/MS	UG/KG				570	U	400	U
SS55 PHTHALATE, BUTYL BENZYL	UG/KG				520	U	370	U
SS56 DICHLOROBENZIDINE, 3,3'	UG/KG				9600	U	6700	U
SS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/KG				720	U	500	U
SS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/KG				860	U	610	U
SS59 CHRYSENE, BY GC/MS	UG/KG				570	U	400	U
SS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/KG				330	U	240	U
SS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/KG				330	U	240	U
SS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/KG				620	U	440	U
SS63 PYRENE, BENZO(A), BY GC/MS	UG/KG				720	U	500	U
SS64 PYRENE, INDENO(1,2,3-CD)	UG/KG				1000	U	710	U
SS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/KG				1000	U	710	U
SS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/KG				670	U	470	U
SV03 CHLOROMETHANE, BY GC/MS	UG/KG				56	U	32	U
SV04 BROMOMETHANE, BY GC/MS	UG/KG				110	U	65	U
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG				84	U	49	U
SV06 CHLOROETHANE, BY GC/MS	UG/KG				84	U	49	U
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG				56	U	32	U
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG				28	U	16	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106	107	108	201		202	
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG				28	U	16	U
SV10 DICHLOROETHYLENE,TRANS-1,2	UG/KG				28	U	16	U
SV11 CHLOROFORM, BY GC/MS	UG/KG				28	U	16	U
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG				28	U	16	U
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG				28	U	16	U
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG				28	U	16	U
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG				28	U	16	U
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG				28	U	16	U
SV17 BENZENE, BY GC/MS	UG/KG				28	U	16	U
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG				28	U	16	U
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG				28	U	16	U
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG				28	U	16	U
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG				28	U	16	U
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG				28	U	16	U
SV24 BROMOFORM, BY GC/MS	UG/KG				28	U	16	U
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG				28	U	16	U
SV26 TOLUENE, BY GC/MS	UG/KG				28	U	16	U
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG				28	U	16	U
SV28 CHLOROBENZENE, BY GC/MS	UG/KG				28	U	16	U
SV29 ETHYL BENZENE, BY GC/MS	UG/KG				28	U	16	U
SV30 ACETONE, BY GC/MS	UG/KG				370	U	94	U
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG				28	U	16	U
SV32 METHYL ETHYL KETONE	UG/KG				100	U	32	U
SV34 HEXANONE, 2-	UG/KG				56	U	32	U
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG				56	U	32	U
SV36 STYRENE, BY GC/MS	UG/KG				28	U	16	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106		107		108		201		202	
SV44 DICHLOROBENZENE,1,4-	UG/KG							28	U	16	U
SV49 XYLENE, ORTHO	UG/KG							28	U	16	U
SV57 XYLENE, M AND/OR P	UG/KG							56	U	32	U
SV60 DICHLOROBENZENE, 1, 3-	UG/KG							28	U	16	U
SV61 DICHLOROBENZENE, 1, 2-	UG/KG							28	U	16	U
SV63 DICHLOROETHYLENE, CIS -1,2	UG/KG							28	U	16	U
WB01 DIOXIN, 2378-TETRACHLORODIBENZO-P, HRMS	NG/L					1.00	U				
WF01 TEMPERATURE, WATER	'C	14.7		13.1		14.4					
WF05 PH, FIELD	SU	7.50		7.70		6.68					
WF10 CONDUCTIVITY (FIELD)	UMHOS	0.130		0.189		0.193					
WH01 2,4-D	UG/L	1.2	U	1.2	U	1.2	U				
WH02 2,4,5-TP(SILVEX)	UG/L	0.17	U	0.17	U	0.17	U				
WH03 2,4,5-T	UG/L	0.20	U	0.20	U	0.20	U				
WM01 SILVER, TOTAL, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U				
WM02 ALUMINUM, TOTAL, BY ICAP	UG/L	807		916		854					
WM04 BARIUM, TOTAL, BY ICAP	UG/L	40.9		72.8		52.7					
WM05 BERYLLIUM, TOTAL, BY ICAP	UG/L	0.420	U	0.420	U	0.420	U				
WM06 CADMIUM, TOTAL, BY ICAP	UG/L	0.592	U	0.596	U	0.592	U				
WM07 COBALT, TOTAL, BY ICAP	UG/L	2.47	U	3.04		3.68					
WM08 CHROMIUM, TOTAL, BY ICAP	UG/L	3.69	U	3.69	U	3.69	U				
WM09 COPPER, TOTAL, BY ICAP	UG/L	1.93	U	3.33	U	4.16	U				
WM10 IRON, TOTAL, BY ICAP	UG/L	834		1100		905					
WM11 MANGANESE, TOTAL, BY ICAP	UG/L	55.8		35.9		46.7					
WM12 MOLYBDENUM, TOTAL, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U				
WM13 NICKEL, TOTAL, BY ICAP	UG/L	6.23	U	6.23	U	6.23	U				
WM17 TITANIUM, TOTAL, BY ICAP	UG/L	10.8		13.5		11.9					

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106		107		108		201	202
WM19 VANADIUM, TOTAL, BY ICAP	UG/L	2.51	U	2.51	U	2.51	U		
WM20 ZINC, TOTAL, BY ICAP	UG/L	4.07	U	4.07	U	4.07	U		
WM21 CALCIUM, TOTAL, BY ICAP	MG/L	19.5		32.2		24.2			
WM22 MAGNESIUM, TOTAL, BY ICAP	MG/L	3.85		6.02		4.65			
WM23 SODIUM, TOTAL, BY ICAP	MG/L	5.45		4.92		4.94			
WM24 POTASSIUM, TOTAL, BY ICAP	MG/L	2.11		1.61		1.78			
WM27 ARSENIC, TOTAL, BY AA	UG/L	1.66	U	1.66	U	1.66	U		
WM30 LEAD, TOTAL, BY AA	UG/L	2.36		2.60		1.81			
WM31 ANTIMONY, TOTAL, BY AA	UG/L	4.37	U	4.37	U	4.37	U		
WM32 SELENIUM, TOTAL, BY AA	UG/L	1.81	U	1.81	U	1.81	U		
WM33 THALLIUM, TOTAL, BY AA	UG/L	1.44	U	1.44	U	1.44	U		
WM34 MERCURY, TOTAL, BY COLD VAPOR AA	UG/L	0.127	U	0.127	U	0.127	U		
WM35 SILVER, DISSOLVED, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U		
WM36 ALUMINUM, DISSOLVED, BY ICAP	UG/L	91.6		55.3		64.8			
WM38 BARIUM, DISSOLVED, BY ICAP	UG/L	57.7		106		64.5			
WM39 BERYLLIUM, DISSOLVED, BY ICAP	UG/L	0.420	U	0.420	U	0.420	U		
WM40 CADMIUM, DISSOLVED, BY ICAP	UG/L	1.30	U	1.41	U	0.904	U		
WM41 COBALT, DISSOLVED, BY ICAP	UG/L	2.47	U	2.47	U	2.47	U		
WM42 CHROMIUM, DISSOLVED, BY ICAP	UG/L	3.69	U	3.69	U	3.69	U		
WM43 COPPER, DISSOLVED, BY ICAP	UG/L	1.54	U	1.54	U	1.54	U		
WM44 IRON, DISSOLVED, BY ICAP	UG/L	118		62.4		72.6			
WM45 MANGANESE, DISSOLVED, BY ICAP	UG/L	7.98		26.8		21.2			
WM46 MOLYBDENUM, DISSOLVED, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U		
WM47 NICKEL, DISSOLVED, BY ICAP	UG/L	6.23	U	6.23	U	6.23	U		
WM51 TITANIUM, DISSOLVED, BY ICAP	UG/L	4.18	U	4.18	U	4.18	U		
WM53 VANADIUM, DISSOLVED, BY ICAP	UG/L	2.51	U	2.51	U	2.51	U		

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106		107		108		201	202
WM54 ZINC, DISSOLVED, BY ICAP	UG/L	16.2		40.2		19.7			
WM55 CALCIUM, DISSOLVED, BY ICAP	MG/L	21.3		33.9		27.7			
WM56 MAGNESIUM, DISSOLVED, BY ICAP	MG/L	3.95		5.95		4.93			
WM57 SODIUM, DISSOLVED, BY ICAP	MG/L	5.70		5.06		5.37			
WM58 POTASSIUM, DISSOLVED, BY ICAP	MG/L	2.15		1.54		1.90			
WM59 ANTIMONY, DISSOLVED, BY AA	UG/L	4.37	U	4.37	U	4.37	U		
WM60 ARSENIC, DISSOLVED, BY AA	UG/L	1.66	U	1.66	U	1.66	U		
WM63 LEAD, DISSOLVED, BY AA	UG/L	0.557	U	0.557	U	0.557	U		
WM64 SELENIUM, DISSOLVED, BY AA	UG/L	1.81	U	1.81	U	1.81	U		
WM66 THALLIUM, DISSOLVED, BY AA	UG/L	1.44	U	1.44	U	1.44	U		
WM68 MERCURY, DISSOLVED, BY COLD VAPOR AA	UG/L	0.100	U	0.100	U	0.106			
WP01 BHC, ALPHA, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U		
WP02 BHC, BETA, BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U		
WP03 BHC, DELTA	UG/L	0.0080	U	0.0080	U	0.0080	U		
WP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U		
WP05 ALDRIN, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U		
WP06 DIELDRIN, BY GC/EC	UG/L	0.0060	U	0.0060	U	0.0060	U		
WP07 ENDOSULFAN I, BY GC/EC	UG/L	0.0090	U	0.0090	U	0.0090	U		
WP08 ENDOSULFAN II, BY GC/EC	UG/L	0.070	U	0.070	U	0.070	U		
WP09 ENDOSULFAN SULFATE, BY GC/EC	UG/L	0.0070	U	0.0070	U	0.0070	U		
WP10 ENDRIN, BY GC/EC	UG/L	0.020	U	0.020	U	0.020	U		
WP11 ENDRIN ALDEHYDE, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U		
WP13 DDE, 4,4'-	UG/L	0.0060	U	0.0060	U	0.0060	U		
WP14 DDD, 4,4'-	UG/L	0.060	U	0.060	U	0.060	U		
WP15 DDT, 4,4'-	UG/L	0.010	U	0.010	U	0.010	U		
WP16 TOXAPHENE, BY GC/EC	UG/L	0.50	U	0.50	U	0.50	U		

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106		107		108		201	202
WP17 PCB-AROCLOR 1016	UG/L	0.40	U	0.40	U	0.40	U		
WP18 PCB-AROCLOR 1221	UG/L	0.30	U	0.30	U	0.30	U		
WP19 PCB-AROCLOR 1232	UG/L	0.10	U	0.10	U	0.10	U		
WP20 PCB-AROCLOR 1242	UG/L	0.10	U	0.10	U	0.10	U		
WP21 PCB-AROCLOR 1248	UG/L	0.20	U	0.20	U	0.20	U		
WP22 PCB-AROCLOR 1254	UG/L	0.14	U	0.097	U	0.081	U		
WP23 PCB-AROCLOR 1260	UG/L	0.060	U	0.060	U	0.060	U		
WP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/L	0.020	U	0.020	U	0.020	U		
WP25 HEPTACHLOR, BY GC/EC	UG/L	0.0090	U	0.0090	U	0.0090	U		
WP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U		
WP83 ENDRIN KETONE, BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U		
WP84 METHOXYCHLOR, BY GC/EC	UG/L	0.010	U	0.010	U	0.010	U		
WP85 CHLORDANE, ALPHA	UG/L	0.025	U	0.025	U	0.025	U		
WP86 CHLORDANE, GAMMA	UG/L	0.025	U	0.025	U	0.025	U		
WS01 PHENOL, BY GC/MS	UG/L	0.7	U	1.3	U	0.7	U		
WS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/L	1.5	U	3	U	1.5	U		
WS04 CHLOROPHENOL, 2-	UG/L	1.4	U	2.7	U	1.4	U		
WS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/L	1.1	U	2.2	U	1.1	U		
WS06 DICHLOROBENZENE,1,4-	UG/L	1.2	U	2.3	U	1.2	U		
WS07 BENZYL ALCOHOL	UG/L	0.7	U	1.3	U	0.7	U		
WS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/L	1.2	U	2.5	U	1.2	U		
WS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/L	1.2	U	2.3	U	1.2	U		
WS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/L	0.7	U	1.4	U	0.7	U		
WS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/L	1.6	U	3.3	U	1.6	U		
WS12 N-NITROSODIPROPYLAMINE	UG/L	0.8	U	1.5	U	0.8	U		
WS13 HEXACHLOROETHANE, BY GC/MS	UG/L	1.2	U	2.4	U	1.2	U		

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106		107		108		201	202
WS14 NITROBENZENE, BY GC/MS	UG/L	0.8	U	1.5	U	0.8	U		
WS15 ISOPHORONE, BY GC/MS	UG/L	2.5	U	5	U	2.5	U		
WS16 NITROPHENOL,2-	UG/L	1	U	2.1	U	1	U		
WS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/L	1	U	2.1	U	1	U		
WS18 BENZOIC ACID, BY GC/MS	UG/L	10	U	20	U	10	U		
WS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/L	0.7	U	1.4	U	0.7	U		
WS20 DICHLOROPHENOL, 2,4-	UG/L	1.6	U	3.1	U	1.6	U		
WS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/L	2.5	U	5	U	2.5	U		
WS22 NAPHTHALENE, BY GC/MS	UG/L	1	U	2	U	1	U		
WS23 CHLOROANILINE,4-	UG/L	2.5	U	5	U	2.5	U		
WS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/L	1	U	1.9	U	1	U		
WS25 PHENOL,4-CHLORO-3-METHYL	UG/L	1.4	U	2.8	U	1.4	U		
WS26 METHYLNAPHTHALENE, 2-	UG/L	0.9	U	1.8	U	0.9	U		
WS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/L	5	U	10	U	5	U		
WS28 TRICHLOROPHENOL,2,4,6	UG/L	1.2	U	2.5	U	1.2	U		
WS29 TRICHLOROPHENOL,2,4,5	UG/L	1.5	U	3	U	1.5	U		
WS30 CHLORONAPHTHALENE, 2-	UG/L	0.8	U	1.5	U	0.8	U		
WS31 NITROANILINE,2-(ORTHO)	UG/L	2.5	U	5	U	2.5	U		
WS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/L	0.5	U	1	U	0.5	U		
WS33 ACENAPHTHYLENE, BY GC/MS	UG/L	0.7	U	1.3	U	0.7	U		
WS34 NITROANILINE,3-	UG/L	5	U	10	U	5	U		
WS35 ACENAPHTHENE, BY GC/MS	UG/L	0.6	U	1.1	U	0.6	U		
WS36 DINITROPHENOL,2,4, BY GC/MS	UG/L	10	U	20	U	10	U		
WS37 NITROPHENOL,4-	UG/L	6.8	U	14	U	6.8	U		
WS38 DIBENZOFURAN	UG/L	0.6	U	1.2	U	0.6	U		
WS39 DINITROTOLUENE,2,4, BY GC/MS	UG/L	5	U	10	U	5	U		

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106		107		108		201	202
WS40 DINITROTOLUENE,2,6-	UG/L	2.5	U	5	U	2.5	U		
WS41 PHTHALATE, DIETHYL, BY GC/MS	UG/L	2.5	U	5	U	2.5	U		
WS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/L	2.5	U	5	U	2.5	U		
WS43 FLUORENE, BY GC/MS	UG/L	2.5	U	5	U	2.5	U		
WS44 NITROANILINE,4-	UG/L	7.9	U	16	U	7.9	U		
WS45 PHENOL,4,6-DINITRO-2-METHYL	UG/L	5	U	10	U	5	U		
WS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/L	0.5	U	1	U	0.5	U		
WS47 ETHER, 4-BROMOPHENYL PHENYL	UG/L	2.5	U	5	U	2.5	U		
WS48 HEXACHLOROBENZENE, BY GC/MS	UG/L	2.5	U	5	U	2.5	U		
WS49 PENTACHLOROPHENOL, BY GC/MS	UG/L	10	U	20	U	10	U		
WS50 PHENANTHRENE, BY GC/MS	UG/L	0.6	U	1.1	U	0.6	U		
WS51 ANTHRACENE, BY GC/MS	UG/L	2.5	U	5	U	2.5	U		
WS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/L	2.5	U	5	U	2.5	U		
WS53 FLUORANTHENE, BY GC/MS	UG/L	2.5	U	5	U	2.5	U		
WS54 PYRENE, BY GC/MS	UG/L	5	U	10	U	5	U		
WS55 PHTHALATE, BUTYL BENZYL	UG/L	5	U	10	U	5	U		
WS56 DICHLOROBENZIDINE, 3,3'	UG/L	12	U	25	U	12	U		
WS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/L	5	U	10	U	5	U		
WS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/L	2.5	U	5	U	2.5	U		
WS59 CHRYSENE, BY GC/MS	UG/L	5	U	10	U	5	U		
WS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/L	5	U	10	U	5	U		
WS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/L	5	U	10	U	5	U		
WS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/L	5	U	10	U	5	U		
WS63 PYRENE, BENZO(A), BY GC/MS	UG/L	5	U	10	U	5	U		
WS64 PYRENE, INDENO(1,2,3-CD)	UG/L	5	U	10	U	5	U		
WS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/L	5	U	10	U	5	U		

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	106		107		108		201	202
WS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/L	5	U	10	U	5	U		
WS67 CARBAZOLE	UG/L	5	U	10	U	5	U		
WW40 CHLOROMETHANE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U		
WW41 BROMOMETHANE, BY GC/MS LDL	UG/L	1.7	U	1.7	U	1.7	U		
WW42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U		
WW43 CHLOROETHANE, BY GC/MS LDL	UG/L	2.2	U	2.2	U	2.2	U		
WW44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	1.3	U	1.6	U	1.8	U		
WW45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1.6	U	1.6	U	1.6	U		
WW46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U		
WW48 CHLOROFORM, BY GC/MS LDL	UG/L	0.36	U	0.36	U	0.36	U		
WW49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	0.37	U	0.37	U	0.37	U		
WW50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	0.58	U	0.58	U	0.58	U		
WW51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	0.19	U	0.19	U	0.19	U		
WW52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	0.28	U	0.28	U	0.28	U		
WW53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U		
WW54 BENZENE, BY GC/MS LDL	UG/L	0.14	U	0.14	U	0.14	U		
WW55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U		
WW56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	0.63	U	0.63	U	0.63	U		
WW57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	0.29	U	0.29	U	0.29	U		
WW58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	0.38	U	0.38	U	0.38	U		
WW59 BROMOFORM, BY GC/MS LDL	UG/L	0.17	U	0.17	U	0.17	U		
WW60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U		
WW61 TOLUENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U		
WW62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	0.64	U	0.64	U	0.64	U		
WW63 CHLOROBENZENE, BY GC/MS LDL	UG/L	0.23	U	0.23	U	0.23	U		
WW64 ETHYLBENZENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U		

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	106		107		108		201	202
VV65 ACETONE, BY GC/MS LDL	UG/L	9.0	U	9.0	U	9.0	U		
VV66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1.1	U	1.1	U	1.1	U		
VV67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	3.0	U	3.0	U	3.0	U		
VV68 HEXANONE, 2- BY GC/MS LDL	UG/L	3.2	U	3.2	U	3.2	U		
VV69 4-METHYL-2-PENTANONE (MIBK) BY GC/MS LD	UG/L	0.79	U	0.79	U	0.79	U		
VV70 STYRENE, BY GC/MS LDL	UG/L	0.34	U	0.34	U	0.34	U		
VV72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	0.82	U	0.82	U	0.82	U		
VV73 XYLENE, M AND/OR P BY GC/MS LDL	UG/L	0.22	U	0.22	U	0.22	U		
VV74 XYLENE, ORTHO BY GC/MS LDL	UG/L	0.40	U	0.40	U	0.40	U		
VV75 DICHLOROBENZENE, 1,4- (PARA) BY GC/MS L	UG/L	0.46	U	0.46	U	0.46	U		
VV76 DICHLOROBENZENE, 1,3- (META) BY GC/MS L	UG/L	0.36	U	0.36	U	0.36	U		
VV77 DICHLOROBENZENE, 1,2- (ORTHO) BY GC/MS	UG/L	0.35	U	0.35	U	0.35	U		
VV78 DICHLOROETHYLENE, 1,2- (TRANS) BY GC/MS	UG/L	0.84	U	0.84	U	0.84	U		
VV79 DICHLOROETHYLENE, 1,2- (CIS) BY GC/MS L	UG/L	0.84	U	0.84	U	0.84	U		
ZZ01 SAMPLE NUMBER	NA	106		107		108		201	202
ZZ02 ACTIVITY CODE	NA	ASYXG		ASYXG		ASYXG		ASYXG	ASYXG
ZZ11 ANALYSIS DATE (MM/DD/YY) - ANALYSIS TIM								05/04/99 1524	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	203	204	205	206	207
SG07 SOLIDS, PERCENT	%	57.1	24.1	19.7	77.0	73.8
SH01 2,4-D(DICHLOROPHENOXYACETIC ACID)	UG/KG	1200 U	2800 U	3400 U	860 U	900 U
SH02 2,4,5-TP(SILVEX)	UG/KG	1700 U	4100 U	5000 U	1300 U	1300 U
SH03 2,4,5-T	UG/KG	1700 U	3900 U	4800 U	1200 U	1300 U
SM01 SILVER, TOTAL, BY ICAP	MG/KG	0.512 U	0.512 U	0.512 U	0.512 U	0.512 U
SM02 ALUMINUM, TOTAL, BY ICAP	MG/KG	6310	34300	34700	4480	3870
SM04 BARIUM, TOTAL, BY ICAP	MG/KG	74.9	252	278	42.3	245
SM05 BERYLLIUM, TOTAL, BY ICAP	MG/KG	0.606	2.31	2.29	0.542	0.643
SM06 CADMIUM, TOTAL, BY ICAP	MG/KG	3.37	11.5	13.1	3.47	4.04
SM07 COBALT, TOTAL, BY ICAP	MG/KG	6.19	16.8	17.3	14.7	29.0
SM08 CHROMIUM, TOTAL, BY ICAP	MG/KG	10.5	45.4	44.7	8.28	7.92
SM09 COPPER, TOTAL, BY ICAP	MG/KG	26.3	47.2	47.2	12.6	6.45
SM10 IRON, TOTAL, BY ICAP	MG/KG	10500	35800	40800	10600	14200
SM11 MANGANESE, TOTAL, BY ICAP	MG/KG	515	1070	1740	761	1470
SM12 MOLYBDENUM, TOTAL, BY ICAP	MG/KG	0.297	1.37	2.04	0.211 U	0.277
SM13 NICKEL, TOTAL, BY ICAP	MG/KG	11.8	38.0	40.1	22.4	12.8
SM14 LEAD, TOTAL, BY ICAP	MG/KG	10.1	28.6	31.9	6.14	17.0
SM18 THALLIUM, TOTAL, BY ICAP	MG/KG	2.11 U	2.11 U	2.11 U	2.11 U	2.11 U
SM19 VANADIUM, TOTAL, BY ICAP	MG/KG	20.5	80.8	83.9	11.7	21.3
SM20 ZINC, TOTAL, BY ICAP	MG/KG	28.0	101	105	36.6	20.3
SM21 CALCIUM, TOTAL, BY ICAP	MG/KG	5200	6440	6970	54600	2530
SM22 MAGNESIUM, TOTAL, BY ICAP	MG/KG	2670	4400	4470	12900	758
SM23 SODIUM, TOTAL, BY ICAP	MG/KG	60.8	160	303	132	77.3
SM24 POTASSIUM, TOTAL, BY ICAP	MG/KG	554	2880	2870	1050	280
SM27 ARSENIC, TOTAL, BY AA	MG/KG	4.85	16.3	20.1	6.01	6.51
SM32 SELENIUM, TOTAL, BY AA	MG/KG	0.500 U	1.67	1.71	0.500 U	0.500 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	203		204		205		206		207	
SM34 MERCURY, TOTAL, BY COLD VAPOR AA	MG/KG	0.0355		0.0895		0.0978		0.00893		0.0209	
SM56 ANTIMONY, TOTAL, BY AA	MG/KG	0.200	U	0.200	U	0.200	U	0.268		0.200	U
SP01 BHC, ALPHA, BY GC/EC	UG/KG	2.9	U	6.9	U	8.5	U	0.43	U	0.45	U
SP02 BHC, BETA, BY GC/EC	UG/KG	2.9	U	6.9	U	8.5	U	0.43	U	0.45	U
SP03 BHC, DELTA	UG/KG	4.4	U	10	U	13	U	0.65	U	0.68	U
SP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/KG	2.9	U	6.9	U	8.5	U	0.43	U	0.45	U
SP05 ALDRIN, BY GC/EC	UG/KG	2.9	U	6.9	U	8.5	U	0.43	U	0.45	U
SP06 DIELDRIN, BY GC/EC	UG/KG	4.4	U	10	U	13	U	0.65	U	0.68	
SP07 ENDOSULFAN I, BY GC/EC	UG/KG	5.8	U	14	U	17	U	0.86	U	0.90	U
SP08 ENDOSULFAN II, BY GC/EC	UG/KG	44	U	100	U	130	U	6.5	U	6.8	U
SP09 ENDOSULFAN SULFATE, BY GC/EC	UG/KG	4.4	U	10	U	13	U	0.65	U	0.68	U
SP10 ENDRIN, BY GC/EC	UG/KG	12	U	28	U	34	U	1.7	U	1.8	U
SP11 ENDRIN ALDEHYDE, BY GC/EC	UG/KG	2.9	U	6.9	U	8.5	U	0.43	U	0.45	U
SP13 DDE-4,4'-	UG/KG	4.4	U	10	U	13	U	0.65	U	0.68	U
SP14 DDD-4,4'-	UG/KG	44	U	100	U	130	U	6.5	U	6.8	U
SP15 DDT-4,4'-	UG/KG	5.8	U	14	U	17	U	0.86	U	0.90	U
SP16 TOXAPHENE, BY GC/EC	UG/KG	290	U	690	U	850	U	43	U	45	U
SP17 PCB-AROCLOR 1016	UG/KG	290	U	690	U	850	U	43	U	45	U
SP18 PCB-AROCLOR 1221	UG/KG	150	U	350	U	420	U	22	U	23	
SP19 PCB-AROCLOR 1232	UG/KG	58	U	140	U	170	U	8.6	U	9.0	
SP20 PCB-AROCLOR 1242	UG/KG	58	U	140	U	170	U	8.6	U	9.0	U
SP21 PCB-AROCLOR 1248	UG/KG	120	U	280	U	340	U	17	U	18	U
SP22 PCB-AROCLOR 1254	UG/KG	29	U	69	U	85	U	4.3	U	4.5	U
SP23 PCB-AROCLOR 1260	UG/KG	44	U	100	U	130	U	6.5	U	6.8	U
SP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/KG	12	U	28	U	34	U	1.7	U	1.8	U
SP25 HEPTACHLOR, BY GC/EC	UG/KG	5.8	U	14	U	17	U	0.86	U	0.90	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	203		204		205		206		207	
SP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/KG	2.9	U	6.9	U	8.5	U	0.43	U	0.45	U
SP34 CHLORDANE, ALPHA	UG/KG	15	U	35	U	42	U	2.2	U	2.3	U
SP36 CHLORDANE, GAMMA	UG/KG	15	U	35	U	42	U	2.2	U	2.3	U
SP60 METHOXYCHLOR, BY GC/EC	UG/KG	7.3	U	17	U	21	U	1.1	U	1.1	U
SP61 ENDRIN KETONE, BY GC/EC	UG/KG	2.9	U	6.9	U	8.5	U	0.43	U	0.45	U
SS01 PHENOL, BY GC/MS	UG/KG	610	U	580	U	350	U	180	U	190	U
SS02 CARBAZOLE	UG/KG	380	U	360	U	220	U	110	U	120	U
SS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/KG	350	U	330	U	200	U	100	U	110	
SS04 CHLOROPHENOL, 2-	UG/KG	460	U	440	U	270	U	140	U	140	U
SS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/KG	230	U	220	U	130	U	68	U	71	U
SS06 DICHLOROBENZENE,1,4-	UG/KG	140	U	140	U	84	U	43	U	44	U
SS07 BENZYL ALCOHOL	UG/KG	290	U	270	U	170	U	86	U	89	U
SS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/KG	170	U	160	U	100	U	51	U	53	U
SS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/KG	780	U	740	U	450	U	230	U	240	U
SS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/KG	140	U	140	U	84	U	43	U	44	U
SS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/KG	660	U	630	U	390	U	200	U	200	U
SS12 N-NITROSODIPROPYLAMINE	UG/KG	350	U	330	U	200	U	100	U	110	U
SS13 HEXACHLOROETHANE, BY GC/MS	UG/KG	120	U	110	U	67	U	34	U	36	U
SS14 NITROBENZENE, BY GC/MS	UG/KG	140	U	140	U	84	U	43	U	44	
SS15 ISOPHORONE, BY GC/MS	UG/KG	260	U	250	U	150	U	77	U	80	
SS16 NITROPHENOL,2-	UG/KG	400	U	380	U	240	U	120	U	120	U
SS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/KG	380	U	360	U	220	U	110	U	120	U
SS18 BENZOIC ACID, BY GC/MS	UG/KG	1300	U	1300	U	770	U	390	U	410	U
SS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/KG	290	U	270	U	170	U	86	U	89	U
SS20 DICHLOROPHENOL, 2,4-	UG/KG	550	U	520	U	320	U	160	U	170	U
SS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/KG	87	U	82	U	50	U	26	U	27	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	203		204		205		206		207	
SS22 NAPHTHALENE, BY GC/MS	UG/KG	140	U	140	U	84	U	43	U	44	U
SS23 CHLOROANILINE,4-	UG/KG	1200	U	1100	U	670	U	340	U	360	U
SS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/KG	87	U	82	U	50	U	26	U	27	U
SS25 PHENOL,4-CHLORO-3-METHYL	UG/KG	550	U	520	U	320	U	160	U	170	U
SS26 METHYLNAPHTHALENE, 2-	UG/KG	170	U	160	U	100	U	51	U	53	U
SS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/KG	87	U	82	U	50	U	26	U	27	U
SS28 TRICHLOROPHENOL,2,4,6	UG/KG	520	U	490	U	300	U	150	U	160	U
SS29 TRICHLOROPHENOL,2,4,5	UG/KG	610	U	580	U	350	U	180	U	190	
SS30 CHLORONAPHTHALENE, 2-	UG/KG	200	U	190	U	120	U	60	U	62	
SS31 NITROANILINE,2-	UG/KG	260	U	250	U	150	U	77	U	80	U
SS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/KG	230	U	220	U	130	U	68	U	71	U
SS33 ACENAPHTHYLENE, BY GC/MS	UG/KG	200	U	190	U	120	U	60	U	62	U
SS34 NITROANILINE,3-	UG/KG	780	U	740	U	450	U	230	U	240	U
SS35 ACENAPHTHENE, BY GC/MS	UG/KG	200	U	190	U	120	U	60	U	62	U
SS36 DINITROPHENOL,2,4, BY GC/MS	UG/KG	1700	U	1600	U	1000	U	510	U	530	U
SS37 NITROPHENOL,4-	UG/KG	87	U	82	U	50	U	26	U	27	U
SS38 DIBENZOFURAN	UG/KG	260	U	250	U	150	U	77	U	80	U
SS39 DINITROTOLUENE,2,4, BY GC/MS	UG/KG	660	U	630	U	390	U	200	U	200	U
SS40 DINITROTOLUENE,2,6-	UG/KG	290	U	270	U	170	U	86	U	89	U
SS41 PHTHALATE, DIETHYL, BY GC/MS	UG/KG	490	U	460	U	280	U	140	U	150	
SS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/KG	260	U	250	U	150	U	77	U	80	U
SS43 FLUORENE, GC/MS	UG/KG	460	U	440	U	270	U	140	U	140	U
SS44 NITROANILINE,4-	UG/KG	1900	U	1800	U	1100	U	560	U	580	U
SS45 PHENOL,4,6-DINITRO-2-METHYL	UG/KG	690	U	660	U	400	U	200	U	210	U
SS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/KG	58	U	55	U	34	U	17	U	18	U
SS47 ETHER, 4-BROMOPHENYL PHENYL	UG/KG	260	U	250	U	150	U	77	U	80	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	203		204		205		206		207	
SS48 HEXACHLOROBENZENE, BY GC/MS	UG/KG	230	U	220	U	130	U	68	U	71	U
SS49 PENTACHLOROPHENOL, BY GC/MS	UG/KG	610	U	580	U	350	U	180	U	190	U
SS50 PHENANTHRENE, BY GC/MS	UG/KG	230	U	220	U	130	U	68	U	71	U
SS51 ANTHRACENE, BY GC/MS	UG/KG	320	U	300	U	180	U	94	U	98	U
SS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/KG	380	U	360	U	220	U	110	U	120	U
SS53 FLUORANTHENE, BY GC/MS	UG/KG	120	U	110	U	67	U	34	U	36	U
SS54 PYRENE, BY GC/MS	UG/KG	350	U	330	U	200	U	100	U	110	U
SS55 PHTHALATE, BUTYL BENZYL	UG/KG	320	U	300	U	180	U	94	U	98	
SS56 DICHLOROBENZIDINE, 3,3'	UG/KG	5800	U	5500	U	3400	U	1700	U	1800	U
SS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/KG	430	U	410	U	250	U	130	U	130	U
SS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/KG	520	U	490	U	300	U	150	U	160	U
SS59 CHRYSENE, BY GC/MS	UG/KG	350	U	330	U	200	U	100	U	110	U
SS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/KG	200	U	190	U	120	U	60	U	62	U
SS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/KG	200	U	190	U	120	U	60	U	62	U
SS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/KG	380	U	360	U	220	U	110	U	120	U
SS63 PYRENE, BENZO(A), BY GC/MS	UG/KG	430	U	410	U	250	U	130	U	130	U
SS64 PYRENE, INDENO(1,2,3-CD)	UG/KG	610	U	580	U	350	U	180	U	190	U
SS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/KG	610	U	580	U	350	U	180	U	190	U
SS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/KG	400	U	380	U	240	U	120	U	120	
SV03 CHLOROMETHANE, BY GC/MS	UG/KG	30	U	130	U	110	U	21	U	24	
SV04 BROMOMETHANE, BY GC/MS	UG/KG	60	U	260	U	210	U	42	U	48	U
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG	45	U	200	U	160	U	32	U	36	U
SV06 CHLOROETHANE, BY GC/MS	UG/KG	45	U	200	U	160	U	32	U	36	U
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG	30	U	130	U	110	U	21	U	24	U
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	203		204		205		206		207	
SV10 DICHLOROETHYLENE,TRANS-1,2	UG/KG	15	U	66	U	54	U	11	U	12	U
SV11 CHLOROFORM, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV17 BENZENE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG	15	U	66	U	54	U	11	U	12	
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV24 BROMOFORM, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV26 TOLUENE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV28 CHLOROBENZENE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV29 ETHYL BENZENE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV30 ACETONE, BY GC/MS	UG/KG	140	U	560	U	390	U	21	U	26	
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV32 METHYL ETHYL KETONE	UG/KG	30	U	130	U	110	U	21	U	24	U
SV34 HEXANONE, 2-	UG/KG	30	U	130	U	110	U	21	U	24	U
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG	30	U	130	U	110	U	21	U	24	U
SV36 STYRENE, BY GC/MS	UG/KG	15	U	66	U	54	U	11	U	12	U
SV44 DICHLOROBENZENE,1,4-	UG/KG	15	U	66	U	54	U	11	U	12	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	203	204	205	206	207
SV49 XYLENE, ORTHO	UG/KG	15 U	66 U	54 U	11 U	12 U
SV57 XYLENE, M AND/OR P	UG/KG	30 U	130 U	110 U	21 U	24 U
SV60 DICHLOROBENZENE, 1, 3-	UG/KG	15 U	66 U	54 U	11 U	12 U
SV61 DICHLOROBENZENE, 1, 2-	UG/KG	15 U	66 U	54 U	11 U	12 U
SV63 DICHLOROETHYLENE, CIS -1,2	UG/KG	15 U	66 U	54 U	11 U	12 U
ZZ01 SAMPLE NUMBER	NA	203	204	205	206	207
ZZ02 ACTIVITY CODE	NA	ASYXG	ASYXG	ASYXG	ASYXG	ASYXG

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208		301	302	303	304
SD02 DIOXIN, 2378-TETRACHLORODIBENZO-P, RAPI	NG/GM	0.300	U				
SG07 SOLIDS, PERCENT	%	64.2					
SH01 2,4-D(DICHLOROPHENOXYACETIC ACID)	UG/KG	1000	U				
SH02 2,4,5-TP(SILVEX)	UG/KG	1500	U				
SH03 2,4,5-T	UG/KG	1500	U				
SM01 SILVER, TOTAL, BY ICAP	MG/KG	0.512	U				
SM02 ALUMINUM, TOTAL, BY ICAP	MG/KG	3520					
SM04 BARIUM, TOTAL, BY ICAP	MG/KG	58.8					
SM05 BERYLLIUM, TOTAL, BY ICAP	MG/KG	0.429					
SM06 CADMIUM, TOTAL, BY ICAP	MG/KG	2.48					
SM07 COBALT, TOTAL, BY ICAP	MG/KG	5.70					
SM08 CHROMIUM, TOTAL, BY ICAP	MG/KG	7.39					
SM09 COPPER, TOTAL, BY ICAP	MG/KG	12.7					
SM10 IRON, TOTAL, BY ICAP	MG/KG	8110					
SM11 MANGANESE, TOTAL, BY ICAP	MG/KG	394					
SM12 MOLYBDENUM, TOTAL, BY ICAP	MG/KG	0.219					
SM13 NICKEL, TOTAL, BY ICAP	MG/KG	8.72					
SM14 LEAD, TOTAL, BY ICAP	MG/KG	7.86					
SM18 THALLIUM, TOTAL, BY ICAP	MG/KG	2.11	U				
SM19 VANADIUM, TOTAL, BY ICAP	MG/KG	15.3					
SM20 ZINC, TOTAL, BY ICAP	MG/KG	17.0					
SM21 CALCIUM, TOTAL, BY ICAP	MG/KG	5460					
SM22 MAGNESIUM, TOTAL, BY ICAP	MG/KG	1610					
SM23 SODIUM, TOTAL, BY ICAP	MG/KG	81.2					
SM24 POTASSIUM, TOTAL, BY ICAP	MG/KG	331					
SM27 ARSENIC, TOTAL, BY AA	MG/KG	3.99					

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208		301	302	303	304
SM32 SELENIUM, TOTAL, BY AA	MG/KG	0.500	U				
SM34 MERCURY, TOTAL, BY COLD VAPOR AA	MG/KG	0.0123					
SM56 ANTIMONY, TOTAL, BY AA	MG/KG	0.200	U				
SP01 BHC, ALPHA, BY GC/EC	UG/KG	2.6	U				
SP02 BHC, BETA, BY GC/EC	UG/KG	2.6	U				
SP03 BHC, DELTA	UG/KG	3.9	U				
SP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/KG	2.6	U				
SP05 ALDRIN, BY GC/EC	UG/KG	2.6	U				
SP06 DIELDRIN, BY GC/EC	UG/KG	3.9	U				
SP07 ENDOSULFAN I, BY GC/EC	UG/KG	5.2	U				
SP08 ENDOSULFAN II, BY GC/EC	UG/KG	39	U				
SP09 ENDOSULFAN SULFATE, BY GC/EC	UG/KG	3.9	U				
SP10 ENDRIN, BY GC/EC	UG/KG	10	U				
SP11 ENDRIN ALDEHYDE, BY GC/EC	UG/KG	2.6	U				
SP13 DDE-4,4'-	UG/KG	3.9	U				
SP14 DDD-4,4'-	UG/KG	39	U				
SP15 DDT-4,4'-	UG/KG	5.2	U				
SP16 TOXAPHENE, BY GC/EC	UG/KG	260	U				
SP17 PCB-AROCLOR 1016	UG/KG	260	U				
SP18 PCB-AROCLOR 1221	UG/KG	130	U				
SP19 PCB-AROCLOR 1232	UG/KG	52	U				
SP20 PCB-AROCLOR 1242	UG/KG	52	U				
SP21 PCB-AROCLOR 1248	UG/KG	100	U				
SP22 PCB-AROCLOR 1254	UG/KG	26	U				
SP23 PCB-AROCLOR 1260	UG/KG	39	U				
SP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/KG	10	U				

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208		301	302	303	304
SP25 HEPTACHLOR, BY GC/EC	UG/KG	5.2	U				
SP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/KG	2.6	U				
SP34 CHLORDANE, ALPHA	UG/KG	13	U				
SP36 CHLORDANE, GAMMA	UG/KG	13	U				
SP60 METHOXYCHLOR, BY GC/EC	UG/KG	6.5	U				
SP61 ENDRIN KETONE, BY GC/EC	UG/KG	2.6	U				
SS01 PHENOL, BY GC/MS	UG/KG	540	U				
SS02 CARBAZOLE	UG/KG	330	U				
SS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/KG	310	U				
SS04 CHLOROPHENOL, 2-	UG/KG	410	U				
SS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/KG	200	U				
SS06 DICHLOROBENZENE,1,4-	UG/KG	130	U				
SS07 BENZYL ALCOHOL	UG/KG	260	U				
SS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/KG	150	U				
SS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/KG	690	U				
SS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/KG	130	U				
SS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/KG	590	U				
SS12 N-NITROSODIPROPYLAMINE	UG/KG	310	U				
SS13 HEXACHLOROETHANE, BY GC/MS	UG/KG	100	U				
SS14 NITROBENZENE, BY GC/MS	UG/KG	130	U				
SS15 ISOPHORONE, BY GC/MS	UG/KG	230	U				
SS16 NITROPHENOL,2-	UG/KG	360	U				
SS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/KG	330	U				
SS18 BENZOIC ACID, BY GC/MS	UG/KG	1200	U				
SS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/KG	260	U				
SS20 DICHLOROPHENOL, 2,4-	UG/KG	490	U				

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208		301	302	303	304
SS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/KG	77	U				
SS22 NAPHTHALENE, BY GC/MS	UG/KG	130	U				
SS23 CHLOROANILINE,4-	UG/KG	1000	U				
SS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/KG	77	U				
SS25 PHENOL,4-CHLORO-3-METHYL	UG/KG	490	U				
SS26 METHYLNAPHTHALENE, 2-	UG/KG	150	U				
SS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/KG	77	U				
SS28 TRICHLOROPHENOL,2,4,6	UG/KG	460	U				
SS29 TRICHLOROPHENOL,2,4,5	UG/KG	540	U				
SS30 CHLORONAPHTHALENE, 2-	UG/KG	180	U				
SS31 NITROANILINE,2-	UG/KG	230	U				
SS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/KG	200	U				
SS33 ACENAPHTHYLENE, BY GC/MS	UG/KG	180	U				
SS34 NITROANILINE,3-	UG/KG	690	U				
SS35 ACENAPHTHENE, BY GC/MS	UG/KG	180	U				
SS36 DINITROPHENOL,2,4, BY GC/MS	UG/KG	1500	U				
SS37 NITROPHENOL,4-	UG/KG	77	U				
SS38 DIBENZOFURAN	UG/KG	230	U				
SS39 DINITROTOLUENE,2,4, BY GC/MS	UG/KG	590	U				
SS40 DINITROTOLUENE,2,6-	UG/KG	260	U				
SS41 PHTHALATE, DIETHYL, BY GC/MS	UG/KG	440	U				
SS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/KG	230	U				
SS43 FLUORENE, GC/MS	UG/KG	410	U				
SS44 NITROANILINE,4-	UG/KG	1700	U				
SS45 PHENOL,4,6-DINITRO-2-METHYL	UG/KG	620	U				
SS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/KG	51	U				

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208		301	302	303	304
SS47 ETHER, 4-BROMOPHENYL PHENYL	UG/KG	230	U				
SS48 HEXACHLOROBENZENE, BY GC/MS	UG/KG	200	U				
SS49 PENTACHLOROPHENOL, BY GC/MS	UG/KG	540	U				
SS50 PHENANTHRENE, BY GC/MS	UG/KG	200	U				
SS51 ANTHRACENE, BY GC/MS	UG/KG	280	U				
SS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/KG	330	U				
SS53 FLUORANTHENE, BY GC/MS	UG/KG	100	U				
SS54 PYRENE, BY GC/MS	UG/KG	310	U				
SS55 PHTHALATE, BUTYL BENZYL	UG/KG	280	U				
SS56 DICHLOROBENZIDINE, 3,3'	UG/KG	5100	U				
SS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/KG	380	U				
SS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/KG	460	U				
SS59 CHRYSENE, BY GC/MS	UG/KG	310	U				
SS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/KG	180	U				
SS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/KG	180	U				
SS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/KG	330	U				
SS63 PYRENE, BENZO(A), BY GC/MS	UG/KG	380	U				
SS64 PYRENE, INDENO(1,2,3-CD)	UG/KG	540	U				
SS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/KG	540	U				
SS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/KG	360	U				
SV03 CHLOROMETHANE, BY GC/MS	UG/KG	25	U				
SV04 BROMOMETHANE, BY GC/MS	UG/KG	49	U				
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG	37	U				
SV06 CHLOROETHANE, BY GC/MS	UG/KG	37	U				
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG	25	U				
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG	12	U				

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208		301	302	303	304
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG	12	U				
SV10 DICHLOROETHYLENE,TRANS-1,2	UG/KG	12	U				
SV11 CHLOROFORM, BY GC/MS	UG/KG	12	U				
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG	12	U				
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG	12	U				
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG	12	U				
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG	12	U				
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG	12	U				
SV17 BENZENE, BY GC/MS	UG/KG	12	U				
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG	12	U				
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG	12	U				
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG	12	U				
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG	12	U				
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG	12	U				
SV24 BROMOFORM, BY GC/MS	UG/KG	12	U				
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG	12	U				
SV26 TOLUENE, BY GC/MS	UG/KG	12	U				
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG	12	U				
SV28 CHLOROBENZENE, BY GC/MS	UG/KG	12	U				
SV29 ETHYL BENZENE, BY GC/MS	UG/KG	12	U				
SV30 ACETONE, BY GC/MS	UG/KG	50	U				
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG	12	U				
SV32 METHYL ETHYL KETONE	UG/KG	25	U				
SV34 HEXANONE, 2-	UG/KG	25	U				
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG	25	U				
SV36 STYRENE, BY GC/MS	UG/KG	12	U				

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208	301	302	303	304
SV44 DICHLOROBENZENE,1,4-	UG/KG	12 U				
SV49 XYLENE, ORTHO	UG/KG	12 U				
SV57 XYLENE, M AND/OR P	UG/KG	25 U				
SV60 DICHLOROBENZENE, 1, 3-	UG/KG	12 U				
SV61 DICHLOROBENZENE, 1, 2-	UG/KG	12 U				
SV63 DICHLOROETHYLENE, CIS -1,2	UG/KG	12 U				
WD01 DIOXIN, 2378-TETRACHLORODIBENZO-P, HRMS	NG/L		1.00 U		1.00 U	
WF01 TEMPERATURE, WATER	'C		13.5	11.4	13.0	12.8
WF05 PH, FIELD	SU		6.73	6.80	6.63	6.62
WF10 CONDUCTIVITY (FIELD)	UMHOS		2.81	1.55	3.88	3.24
WG30 TURBIDITY	NTU		133	32		10
WH01 2,4-D	UG/L		1.2 U	1.2 U	1.2 U	1.2 U
WH02 2,4,5-TP(SILVEX)	UG/L		0.17 U	0.17 U	0.17 U	0.17 U
WH03 2,4,5-T	UG/L		0.20 U	0.20 U	0.20 U	0.20 U
WM01 SILVER, TOTAL, BY ICAP	UG/L		7.24 U	7.24 U	7.24 U	7.24 U
WM02 ALUMINUM, TOTAL, BY ICAP	UG/L		3440	11600	2190	450
WM04 BARIUM, TOTAL, BY ICAP	UG/L		67.4	375	54.8	17.3
WM05 BERYLLIUM, TOTAL, BY ICAP	UG/L		0.420 U	0.420 U	0.420 U	0.420 U
WM06 CADMIUM, TOTAL, BY ICAP	UG/L		2.89 U	1.22 U	3.19 U	0.592
WM07 COBALT, TOTAL, BY ICAP	UG/L		8.24	13.7	2.47 U	7.44
WM08 CHROMIUM, TOTAL, BY ICAP	UG/L		6.82	42.7	24.7	9.25
WM09 COPPER, TOTAL, BY ICAP	UG/L		15.8	88.7	30.7	16.0
WM10 IRON, TOTAL, BY ICAP	UG/L		7960	17700	13500	1120
WM11 MANGANESE, TOTAL, BY ICAP	UG/L		600	3990	3130	4750
WM12 MOLYBDENUM, TOTAL, BY ICAP	UG/L		4.41 U	4.41 U	4.41 U	4.41 U
WM13 NICKEL, TOTAL, BY ICAP	UG/L		18.3	60.9	22.2	24.2

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208	301		302		303		304	
WM17 TITANIUM, TOTAL, BY ICAP	UG/L		85.1		321		69.0		13.0	
WM19 VANADIUM, TOTAL, BY ICAP	UG/L		12.2		39.2		6.61		2.51	U
WM20 ZINC, TOTAL, BY ICAP	UG/L		55.3		109		68.4		40.6	
WM21 CALCIUM, TOTAL, BY ICAP	MG/L		451		365		471		445	
WM22 MAGNESIUM, TOTAL, BY ICAP	MG/L		163		86.3		237		228	
WM23 SODIUM, TOTAL, BY ICAP	MG/L		128		50.7		267		114	
WM24 POTASSIUM, TOTAL, BY ICAP	MG/L		4.62		3.97		6.91		6.15	
WM27 ARSENIC, TOTAL, BY AA	UG/L		4.04		9.22		7.19		1.66	
WM30 LEAD, TOTAL, BY AA	UG/L		19.1		38.0		11.5		2.73	
WM31 ANTIMONY, TOTAL, BY AA	UG/L		4.37	U	4.37	U	4.37	U	4.37	U
WM32 SELENIUM, TOTAL, BY AA	UG/L		1.81	U	1.81	U	1.81	U	1.81	U
WM33 THALLIUM, TOTAL, BY AA	UG/L		1.44	U	1.44	U	1.44	U	1.44	U
WM34 MERCURY, TOTAL, BY COLD VAPOR AA	UG/L		0.127	U	0.127	U	0.127	U	0.127	U
WM35 SILVER, DISSOLVED, BY ICAP	UG/L		7.24	U	7.24	U	7.24	U	7.24	U
WM36 ALUMINUM, DISSOLVED, BY ICAP	UG/L		33.5	U	33.5	U	33.5	U	33.5	U
WM38 BARIUM, DISSOLVED, BY ICAP	UG/L		12.9		38.8		13.6		11.9	
WM39 BERYLLIUM, DISSOLVED, BY ICAP	UG/L		0.420	U	0.420	U	0.420	U	0.420	U
WM40 CADMIUM, DISSOLVED, BY ICAP	UG/L		1.61	U	1.05	U	2.12	U	1.24	U
WM41 COBALT, DISSOLVED, BY ICAP	UG/L		3.00		2.47	U	5.19		8.82	
WM42 CHROMIUM, DISSOLVED, BY ICAP	UG/L		3.69	U	3.69	U	3.69	U	3.69	
WM43 COPPER, DISSOLVED, BY ICAP	UG/L		1.54	U	1.54	U	1.54	U	1.54	U
WM44 IRON, DISSOLVED, BY ICAP	UG/L		29.3	U	29.3	U	1040		38.7	
WM45 MANGANESE, DISSOLVED, BY ICAP	UG/L		73.3		379		3320		5390	
WM46 MOLYBDENUM, DISSOLVED, BY ICAP	UG/L		4.41	U	4.41	U	4.41	U	4.41	U
WM47 NICKEL, DISSOLVED, BY ICAP	UG/L		6.23	U	6.23	U	6.23	U	18.1	
WM51 TITANIUM, DISSOLVED, BY ICAP	UG/L		4.18	U	4.18	U	4.18	U	4.18	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208	301		302		303		304	
WM53 VANADIUM, DISSOLVED, BY ICAP	UG/L		2.51	U	2.51	U	2.51	U	2.51	U
WM54 ZINC, DISSOLVED, BY ICAP	UG/L		111		101		123		128	
WM55 CALCIUM, DISSOLVED, BY ICAP	MG/L		524		292		526		487	
WM56 MAGNESIUM, DISSOLVED, BY ICAP	MG/L		175		76.6		238		233	
WM57 SODIUM, DISSOLVED, BY ICAP	MG/L		149		54.9		294		129	
WM58 POTASSIUM, DISSOLVED, BY ICAP	MG/L		4.45		1.74		6.56		6.46	
WM59 ANTIMONY, DISSOLVED, BY AA	UG/L		4.37	U	4.37	U	4.37	U	4.37	
WM60 ARSENIC, DISSOLVED, BY AA	UG/L		1.66	U	1.66	U	1.66	U	1.66	
WM63 LEAD, DISSOLVED, BY AA	UG/L		0.557	U	0.557	U	0.557	U	0.557	U
WM64 SELENIUM, DISSOLVED, BY AA	UG/L		1.81	U	1.81	U	1.81	U	1.81	U
WM66 THALLIUM, DISSOLVED, BY AA	UG/L		1.44	U	1.44	U	1.44	U	1.44	U
WM68 MERCURY, DISSOLVED, BY COLD VAPOR AA	UG/L		0.100	U	0.100	U	0.100	U	0.100	U
WP01 BHC, ALPHA, BY GC/EC	UG/L		0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP02 BHC, BETA, BY GC/EC	UG/L		0.0050	U	0.0050	U	0.0050	U	0.0050	U
WP03 BHC, DELTA	UG/L		0.0080	U	0.0080	U	0.0080	U	0.0080	U
WP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/L		0.0050	U	0.0050	U	0.0050	U	0.0050	U
WP05 ALDRIN, BY GC/EC	UG/L		0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP06 DIELDRIN, BY GC/EC	UG/L		0.0060	U	0.0060	U	0.0060	U	0.0060	U
WP07 ENDOSULFAN I, BY GC/EC	UG/L		0.0090	U	0.0090	U	0.0090	U	0.0090	
WP08 ENDOSULFAN II, BY GC/EC	UG/L		0.070	U	0.070	U	0.070	U	0.070	
WP09 ENDOSULFAN SULFATE, BY GC/EC	UG/L		0.0070	U	0.0070	U	0.0070	U	0.0070	U
WP10 ENDRIN, BY GC/EC	UG/L		0.020	U	0.020	U	0.020	U	0.020	U
WP11 ENDRIN ALDEHYDE, BY GC/EC	UG/L		0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP13 DDE, 4,4'-	UG/L		0.0060	U	0.0060	U	0.0060	U	0.0060	U
WP14 DDD, 4,4'-	UG/L		0.060	U	0.060	U	0.060	U	0.060	U
WP15 DDT, 4,4'-	UG/L		0.010	U	0.010	U	0.010	U	0.010	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208	301		302		303		304	
WP16 TOXAPHENE, BY GC/EC	UG/L		0.50	U	0.50	U	0.50	U	0.50	U
WP17 PCB-AROCLOR 1016	UG/L		0.40	U	0.40	U	0.40	U	0.40	U
WP18 PCB-AROCLOR 1221	UG/L		0.30	U	0.30	U	0.30	U	0.30	U
WP19 PCB-AROCLOR 1232	UG/L		0.10	U	0.10	U	0.10	U	0.10	U
WP20 PCB-AROCLOR 1242	UG/L		0.10	U	0.10	U	0.10	U	0.10	U
WP21 PCB-AROCLOR 1248	UG/L		0.20	U	0.20	U	0.20	U	0.20	U
WP22 PCB-AROCLOR 1254	UG/L		0.11	U	0.14	U	0.083	U	0.050	U
WP23 PCB-AROCLOR 1260	UG/L		0.060	U	0.060	U	0.060	U	0.060	
WP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/L		0.020	U	0.020	U	0.020	U	0.020	U
WP25 HEPTACHLOR, BY GC/EC	UG/L		0.0090	U	0.0090	U	0.0090	U	0.0090	U
WP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/L		0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP83 ENDRIN KETONE, BY GC/EC	UG/L		0.0050	U	0.0050	U	0.0050	U	0.0050	U
WP84 METHOXYCHLOR, BY GC/EC	UG/L		0.010	U	0.010	U	0.010	U	0.010	U
WP85 CHLORDANE, ALPHA	UG/L		0.025	U	0.025	U	0.025	U	0.025	U
WP86 CHLORDANE, GAMMA	UG/L		0.025	U	0.025	U	0.025	U	0.025	U
WS01 PHENOL, BY GC/MS	UG/L		0.7	U	0.7	U	0.7	U	0.7	U
WS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/L		1.5	U	1.5	U	1.5	U	1.5	U
WS04 CHLOROPHENOL, 2-	UG/L		1.4	U	1.4	U	1.4	U	1.4	U
WS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/L		1.1	U	1.1	U	1.1	U	1.1	
WS06 DICHLOROBENZENE,1,4-	UG/L		1.2	U	1.2	U	1.2	U	1.2	
WS07 BENZYL ALCOHOL	UG/L		0.7	U	0.7	U	0.7	U	0.7	U
WS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/L		1.2	U	1.2	U	1.2	U	1.2	U
WS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/L		1.2	U	1.2	U	1.2	U	1.2	U
WS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/L		0.7	U	0.7	U	0.7	U	0.7	U
WS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/L		1.6	U	1.6	U	1.6	U	1.6	U
WS12 N-NITROSODIPROPYLAMINE	UG/L		0.8	U	0.8	U	0.8	U	0.8	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208	301		302		303		304	
WS13 HEXACHLOROETHANE, BY GC/MS	UG/L		1.2	U	1.2	U	1.2	U	1.2	U
WS14 NITROBENZENE, BY GC/MS	UG/L		0.8	U	0.8	U	0.8	U	0.8	U
WS15 ISOPHORONE, BY GC/MS	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS16 NITROPHENOL,2-	UG/L		1	U	1	U	1	U	1	U
WS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/L		1	U	1	U	1	U	1	U
WS18 BENZOIC ACID, BY GC/MS	UG/L		10	U	10	U	10	U	10	U
WS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/L		0.7	U	0.7	U	0.7	U	0.7	"
WS20 DICHLOROPHENOL, 2,4-	UG/L		1.6	U	1.6	U	1.6	U	1.6	
WS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS22 NAPHTHALENE, BY GC/MS	UG/L		1	U	1	U	1	U	1	U
WS23 CHLOROANILINE,4-	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/L		1	U	1	U	1	U	1	U
WS25 PHENOL,4-CHLORO-3-METHYL	UG/L		1.4	U	1.4	U	1.4	U	1.4	U
WS26 METHYLNAPHTHALENE, 2-	UG/L		0.9	U	0.9	U	0.9	U	0.9	U
WS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/L		5	U	5	U	5	U	5	U
WS28 TRICHLOROPHENOL,2,4,6	UG/L		1.2	U	1.2	U	1.2	U	1.2	U
WS29 TRICHLOROPHENOL,2,4,5	UG/L		1.5	U	1.5	U	1.5	U	1.5	U
WS30 CHLORONAPHTHALENE, 2-	UG/L		0.8	U	0.8	U	0.8	U	0.8	U
WS31 NITROANILINE,2-(ORTHO)	UG/L		2.5	U	2.5	U	2.5	U	2.5	
WS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/L		0.5	U	0.5	U	0.5	U	0.5	
WS33 ACENAPHTHYLENE, BY GC/MS	UG/L		0.7	U	0.7	U	0.7	U	0.7	U
WS34 NITROANILINE,3-	UG/L		5	U	5	U	5	U	5	U
WS35 ACENAPHTHENE, BY GC/MS	UG/L		0.6	U	0.6	U	0.6	U	0.6	U
WS36 DINITROPHENOL,2,4, BY GC/MS	UG/L		10	U	10	U	10	U	10	U
WS37 NITROPHENOL,4-	UG/L		6.8	U	6.8	U	6.8	U	6.8	U
WS38 DIBENZOFURAN	UG/L		0.6	U	0.6	U	0.6	U	0.6	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208	301		302		303		304	
WS39 DINITROTOLUENE,2,4, BY GC/MS	UG/L		5	U	5	U	5	U	5	U
WS40 DINITROTOLUENE,2,6-	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS41 PHTHALATE, DIETHYL, BY GC/MS	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS43 FLUORENE, BY GC/MS	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS44 NITROANILINE,4-	UG/L		7.9	U	7.9	U	7.9	U	7.9	U
WS45 PHENOL,4,6-DINITRO-2-METHYL	UG/L		5	U	5	U	5	U	5	"
WS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/L		0.5	U	0.5	U	0.5	U	0.5	
WS47 ETHER, 4-BROMOPHENYL PHENYL	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS48 HEXACHLOROBENZENE, BY GC/MS	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS49 PENTACHLOROPHENOL, BY GC/MS	UG/L		10	U	10	U	10	U	10	U
WS50 PHENANTHRENE, BY GC/MS	UG/L		0.6	U	0.6	U	0.6	U	0.6	U
WS51 ANTHRACENE, BY GC/MS	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS53 FLUORANTHENE, BY GC/MS	UG/L		2.5	U	2.5	U	2.5	U	2.5	U
WS54 PYRENE, BY GC/MS	UG/L		5	U	5	U	5	U	5	U
WS55 PHTHALATE, BUTYL BENZYL	UG/L		5	U	5	U	5	U	5	U
WS56 DICHLOROBENZIDINE, 3,3'	UG/L		12	U	12	U	12	U	12	U
WS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/L		5	U	5	U	5	U	5	
WS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/L		8.8		12		6.5		12	
WS59 CHRYSENE, BY GC/MS	UG/L		5	U	5	U	5	U	5	U
WS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/L		5	U	5	U	5	U	5	U
WS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/L		5	U	5	U	5	U	5	U
WS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/L		5	U	5	U	5	U	5	U
WS63 PYRENE, BENZO(A), BY GC/MS	UG/L		5	U	5	U	5	U	5	U
WS64 PYRENE, INDENO(1,2,3-CD)	UG/L		5	U	5	U	5	U	5	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208	301		302		303		304	
WS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/L		5	U	5	U	5	U	5	U
WS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/L		5	U	5	U	5	U	5	U
WS67 CARBAZOLE	UG/L		5	U	5	U	5	U	5	U
WW40 CHLOROMETHANE, BY GC/MS LDL	UG/L		1.3	U	1.3	U	1.3	U	1.3	U
WW41 BROMOMETHANE, BY GC/MS LDL	UG/L		1.7	U	1.7	U	1.7	U	1.7	U
WW42 VINYL CHLORIDE, BY GC/MS LDL	UG/L		1.3	U	1.3	U	1.3	U	1.3	U
WW43 CHLOROETHANE, BY GC/MS LDL	UG/L		2.2	U	2.2	U	2.2	U	2.2	"
WW44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L		1.7	U	1.7	U	2.4	U	2.4	
WW45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L		1.6	U	1.6	U	1.6	U	1.6	U
WW46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L		0.43	U	0.43	U	0.43	U	0.43	U
WW48 CHLOROFORM, BY GC/MS LDL	UG/L		0.36	U	0.36	U	0.36	U	0.36	U
WW49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L		0.37	U	0.37	U	0.37	U	0.37	U
WW50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L		0.58	U	0.58	U	0.58	U	0.58	U
WW51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L		0.19	U	0.19	U	0.19	U	0.19	U
WW52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L		0.28	U	0.28	U	0.28	U	0.28	U
WW53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L		0.43	U	0.43	U	0.43	U	0.43	U
WW54 BENZENE, BY GC/MS LDL	UG/L		0.14	U	0.14	U	0.14	U	0.14	U
WW55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L		0.54	U	0.54	U	0.54	U	0.54	U
WW56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L		0.63	U	0.63	U	0.63	U	0.63	
WW57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L		0.29	U	0.29	U	0.29	U	0.29	
WW58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L		0.38	U	0.38	U	0.38	U	0.38	U
WW59 BROMOFORM, BY GC/MS LDL	UG/L		0.17	U	0.17	U	0.17	U	0.17	U
WW60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L		0.31	U	0.31	U	0.31	U	0.31	U
WW61 TOLUENE, BY GC/MS LDL	UG/L		0.54	U	0.54	U	0.54	U	0.54	U
WW62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L		0.64	U	0.64	U	0.64	U	0.64	U
WW63 CHLOROBENZENE, BY GC/MS LDL	UG/L		0.23	U	0.23	U	0.23	U	0.23	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	208	301		302		303		304	
VW64 ETHYLBENZENE, BY GC/MS LDL	UG/L		0.31	U	0.31	U	0.31	U	0.31	U
VW65 ACETONE, BY GC/MS LDL	UG/L		9.0	U	9.0	U	9.0	U	9.0	U
VW66 CARBON DISULFIDE, BY GC/MS LDL	UG/L		1.1	U	1.1	U	1.1	U	1.1	U
VW67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L		3.0	U	3.0	U	3.0	U	3.0	U
VW68 HEXANONE, 2- BY GC/MS LDL	UG/L		3.2	U	3.2	U	3.2	U	3.2	U
VW69 4-METHYL-2-PENTANONE (MIBK) BY GC/MS LD	UG/L		0.79	U	0.79	U	0.79	U	0.79	U
VW70 STYRENE, BY GC/MS LDL	UG/L		0.34	U	0.34	U	0.34	U	0.34	
VW72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L		0.82	U	0.82	U	0.82	U	0.82	
VW73 XYLENE, M AND/OR P BY GC/MS LDL	UG/L		0.22	U	0.22	U	0.22	U	0.22	U
VW74 XYLENE, ORTHO BY GC/MS LDL	UG/L		0.40	U	0.40	U	0.40	U	0.40	U
VW75 DICHLOROBENZENE, 1,4- (PARA) BY GC/MS L	UG/L		0.46	U	0.46	U	0.46	U	0.46	U
VW76 DICHLOROBENZENE, 1,3- (META) BY GC/MS L	UG/L		0.36	U	0.36	U	0.36	U	0.36	U
VW77 DICHLOROBENZENE, 1,2- (ORTHO) BY GC/MS	UG/L		0.35	U	0.35	U	0.35	U	0.35	U
VW78 DICHLOROETHYLENE, 1,2- (TRANS) BY GC/MS	UG/L		0.84	U	0.84	U	0.84	U	0.84	U
VW79 DICHLOROETHYLENE, 1,2- (CIS) BY GC/MS L	UG/L		0.84	U	0.84	U	0.84	U	0.84	U
Z201 SAMPLE NUMBER	NA	208	301		302		303		304	
Z202 ACTIVITY CODE	NA	ASYXG	ASYXG		ASYXG		ASYXG		ASYXG	
Z211 ANALYSIS DATE (MM/DD/YY) - ANALYSIS TIM		05/04/99 1540								

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	305	306	307	308	309
WD01 DIOXIN, 2378-TETRACHLORODIBENZO-P, HRMS	NG/L	1.00 U				
WF01 TEMPERATURE, WATER	'C	18.9	16.8	13.2	14.1	
WF05 PH, FIELD	SU	7.36	6.75	6.49	6.77	6.67
WF10 CONDUCTIVITY (FIELD)	UMHOS	1.75	2.87	13.2	2.90	3.31
WG30 TURBIDITY	NTU	59	243	26	202	705
WH01 2,4-D	UG/L	1.2 U	1.2 U			1.2 U
WH02 2,4,5-TP(SILVEX)	UG/L	0.17 U	0.17 U			0.17 "
WH03 2,4,5-T	UG/L	0.20 U	0.20 U			0.20
WM01 SILVER, TOTAL, BY ICAP	UG/L	7.24 U	7.24 U	7.24 U	7.24 U	7.24 U
WM02 ALUMINUM, TOTAL, BY ICAP	UG/L	122000	1610	53200	1230	1840
WM04 BARIUM, TOTAL, BY ICAP	UG/L	1790	62.3	775	52.3	42.4
WM05 BERYLLIUM, TOTAL, BY ICAP	UG/L	10.2	0.420 U	2.59	0.420 U	0.420 U
WM06 CADMIUM, TOTAL, BY ICAP	UG/L	23.2	3.21 U	3.61 U	2.84 U	2.66 U
WM07 COBALT, TOTAL, BY ICAP	UG/L	138	14.4	38.4	30.4	5.97
WM08 CHROMIUM, TOTAL, BY ICAP	UG/L	649	15.9	134	20.5	18.7
WM09 COPPER, TOTAL, BY ICAP	UG/L	1060	75.9	133	159	69.2
WM10 IRON, TOTAL, BY ICAP	UG/L	248000	3220	62300	7920	2510
WM11 MANGANESE, TOTAL, BY ICAP	UG/L	5840	2280	2360	4500	1670
WM12 MOLYBDENUM, TOTAL, BY ICAP	UG/L	49.5	4.41 U	4.41 U	4.41 U	4.41
WM13 NICKEL, TOTAL, BY ICAP	UG/L	619	29.4	136	59.1	38.6
WM17 TITANIUM, TOTAL, BY ICAP	UG/L	1680	37.4	746	25.5	38.0
WM19 VANADIUM, TOTAL, BY ICAP	UG/L	410	4.62	152	3.70	5.07
WM20 ZINC, TOTAL, BY ICAP	UG/L	2990	108	410	89.4	95.2
WM21 CALCIUM, TOTAL, BY ICAP	MG/L	466	532	527	433	484
WM22 MAGNESIUM, TOTAL, BY ICAP	MG/L	128	187	224	151	236
WM23 SODIUM, TOTAL, BY ICAP	MG/L	114	56.6	123	103	85.6

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	305		306		307		308		309	
WM24 POTASSIUM, TOTAL, BY ICAP	MG/L	19.0		7.52		15.2		4.81		7.22	
WM27 ARSENIC, TOTAL, BY AA	UG/L	78.9		2.33		23.0		10.4		1.68	
WM30 LEAD, TOTAL, BY AA	UG/L	760		9.95		122		19.4		13.7	
WM31 ANTIMONY, TOTAL, BY AA	UG/L	4.37	U	4.37	U	4.37	U	4.37	U	4.37	U
WM32 SELENIUM, TOTAL, BY AA	UG/L	2.58		1.81	U	1.81	U	1.81	U	1.81	U
WM33 THALLIUM, TOTAL, BY AA	UG/L	1.55		1.44	U	1.44	U	1.44	U	1.44	U
WM34 MERCURY, TOTAL, BY COLD VAPOR AA	UG/L	0.127	U	0.127	U	0.127	U	0.127	U	0.127	U
WM35 SILVER, DISSOLVED, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U	7.24	U	7.24	
WM36 ALUMINUM, DISSOLVED, BY ICAP	UG/L	33.5	U	33.5	U	33.5	U	33.5	U	33.5	U
WM38 BARIUM, DISSOLVED, BY ICAP	UG/L	53.8		19.7		30.7		30.7		12.8	
WM39 BERYLLIUM, DISSOLVED, BY ICAP	UG/L	0.420	U	0.420	U	0.420	U	0.420	U	0.420	U
WM40 CADMIUM, DISSOLVED, BY ICAP	UG/L	0.592	U	1.02	U	2.96	U	3.22	U	0.592	U
WM41 COBALT, DISSOLVED, BY ICAP	UG/L	7.33		14.4		11.4		26.9		8.08	
WM42 CHROMIUM, DISSOLVED, BY ICAP	UG/L	3.69	U	3.69	U	3.69	U	3.69	U	3.69	U
WM43 COPPER, DISSOLVED, BY ICAP	UG/L	1.54	U	1.54	U	1.54	U	1.54	U	1.54	U
WM44 IRON, DISSOLVED, BY ICAP	UG/L	67.1		29.3	U	29.3	U	3500		50.4	
WM45 MANGANESE, DISSOLVED, BY ICAP	UG/L	512		2140		1480		3640		1790	
WM46 MOLYBDENUM, DISSOLVED, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U	4.41	U	4.41	U
WM47 NICKEL, DISSOLVED, BY ICAP	UG/L	19.0		15.3		32.9		38.7		33.1	
WM51 TITANIUM, DISSOLVED, BY ICAP	UG/L	4.18	U	4.18	U	4.18	U	4.18	U	4.18	
WM53 VANADIUM, DISSOLVED, BY ICAP	UG/L	2.51	U	2.51	U	2.51	U	2.51	U	2.51	U
WM54 ZINC, DISSOLVED, BY ICAP	UG/L	90.5		139		140		147		152	
WM55 CALCIUM, DISSOLVED, BY ICAP	MG/L	233		534		515		462		549	
WM56 MAGNESIUM, DISSOLVED, BY ICAP	MG/L	80.3		177		202		147		234	
WM57 SODIUM, DISSOLVED, BY ICAP	MG/L	104		59.6		127		116		87.9	
WM58 POTASSIUM, DISSOLVED, BY ICAP	MG/L	3.98		8.24		5.96		4.90		7.27	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	305		306		307		308		309	
WM59 ANTIMONY, DISSOLVED, BY AA	UG/L	4.37	U	4.37	U	4.37	U	4.37	U	4.37	U
WM60 ARSENIC, DISSOLVED, BY AA	UG/L	1.66	U	1.66	U	1.66	U	6.18		1.66	U
WM63 LEAD, DISSOLVED, BY AA	UG/L	0.557	U	0.557	U	0.557	U	0.557	U	0.557	U
WM64 SELENIUM, DISSOLVED, BY AA	UG/L	1.81	U	1.81	U	1.81	U	1.81	U	1.81	U
WM66 THALLIUM, DISSOLVED, BY AA	UG/L	1.44	U	1.44	U	1.44	U	1.44	U	1.44	U
WM68 MERCURY, DISSOLVED, BY COLD VAPOR AA	UG/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
WP01 BHC, ALPHA, BY GC/EC	UG/L	0.016	U	0.0040	U	0.0040	U	0.0040	U	0.020	
WP02 BHC, BETA, BY GC/EC	UG/L	0.020	U	0.0050	U	0.0050	U	0.0050	U	0.025	
WP03 BHC, DELTA	UG/L	0.032	U	0.0080	U	0.0080	U	0.0080	U	0.040	U
WP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/L	0.020	U	0.0050	U	0.0050	U	0.0050	U	0.025	U
WP05 ALDRIN, BY GC/EC	UG/L	0.016	U	0.0040	U	0.0040	U	0.0040	U	0.020	U
WP06 DIELDRIN, BY GC/EC	UG/L	0.024	U	0.0060	U	0.0060	U	0.0060	U	0.030	U
WP07 ENDOSULFAN I, BY GC/EC	UG/L	0.036	U	0.0090	U	0.0090	U	0.0090	U	0.045	U
WP08 ENDOSULFAN II, BY GC/EC	UG/L	0.28	U	0.070	U	0.070	U	0.070	U	0.35	U
WP09 ENDOSULFAN SULFATE, BY GC/EC	UG/L	0.028	U	0.0070	U	0.0070	U	0.0070	U	0.035	U
WP10 ENDRIN, BY GC/EC	UG/L	0.080	U	0.020	U	0.020	U	0.020	U	0.10	U
WP11 ENDRIN ALDEHYDE, BY GC/EC	UG/L	0.016	U	0.0040	U	0.0040	U	0.0040	U	0.020	U
WP13 DDE, 4,4'-	UG/L	0.024	U	0.0060	U	0.0060	U	0.0060	U	0.030	U
WP14 DDD, 4,4'-	UG/L	0.24	U	0.060	U	0.060	U	0.060	U	0.30	
WP15 DDT, 4,4'-	UG/L	0.040	U	0.010	U	0.010	U	0.010	U	0.050	
WP16 TOXAPHENE, BY GC/EC	UG/L	2.0	U	0.50	U	0.50	U	0.50	U	2.5	U
WP17 PCB-AROCLOR 1016	UG/L	1.6	U	0.40	U	0.40	U	0.40	U	2.0	U
WP18 PCB-AROCLOR 1221	UG/L	1.2	U	0.30	U	0.30	U	0.30	U	1.5	U
WP19 PCB-AROCLOR 1232	UG/L	0.40	U	0.10	U	0.10	U	0.10	U	0.50	U
WP20 PCB-AROCLOR 1242	UG/L	0.40	U	0.10	U	0.10	U	0.10	U	0.50	U
WP21 PCB-AROCLOR 1248	UG/L	0.80	U	0.20	U	0.20	U	0.20	U	1.0	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	305		306		307		308		309	
WP22 PCB-AROCLOR 1254	UG/L	0.20	U	0.080	U	0.050	U	0.050	U	0.25	U
WP23 PCB-AROCLOR 1260	UG/L	0.24	U	0.060	U	0.060	U	0.060	U	0.30	U
WP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/L	0.080	U	0.020	U	0.020	U	0.020	U	0.10	U
WP25 HEPTACHLOR, BY GC/EC	UG/L	0.036	U	0.0090	U	0.0090	U	0.0090	U	0.045	U
WP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/L	0.016	U	0.0040	U	0.0040	U	0.0040	U	0.020	U
WP83 ENDRIN KETONE, BY GC/EC	UG/L	0.020	U	0.0050	U	0.0050	U	0.0050	U	0.025	U
WP84 METHOXYCHLOR, BY GC/EC	UG/L	0.040	U	0.010	U	0.010	U	0.010	U	0.050	
WP85 CHLORDANE, ALPHA	UG/L	0.025	U	0.025	U	0.025	U	0.025	U	0.13	
WP86 CHLORDANE, GAMMA	UG/L	0.025	U	0.025	U	0.025	U	0.025	U	0.13	U
WS01 PHENOL, BY GC/MS	UG/L	1.3	U	3.2	U	0.7	U	0.7	U	0.7	U
WS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/L	3	U	7.5	U	1.5	U	1.5	U	1.5	U
WS04 CHLOROPHENOL, 2-	UG/L	2.7	U	6.8	U	1.4	U	1.4	U	1.4	U
WS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/L	2.2	U	5.5	U	1.1	U	1.1	U	1.1	U
WS06 DICHLOROBENZENE,1,4-	UG/L	2.3	U	5.8	U	1.2	U	1.2	U	1.2	U
WS07 BENZYL ALCOHOL	UG/L	1.3	U	3.2	U	0.7	U	0.7	U	0.7	U
WS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/L	2.5	U	6.2	U	1.2	U	1.2	U	1.2	U
WS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/L	2.3	U	5.8	U	1.2	U	1.2	U	1.2	U
WS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/L	1.4	U	3.5	U	0.7	U	0.7	U	0.7	U
WS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/L	3.3	U	8.2	U	1.6	U	1.6	U	1.6	
WS12 N-NITROSODIPROPYLAMINE	UG/L	1.5	U	3.8	U	0.8	U	0.8	U	0.8	
WS13 HEXACHLOROETHANE, BY GC/MS	UG/L	2.4	U	6	U	1.2	U	1.2	U	1.2	U
WS14 NITROBENZENE, BY GC/MS	UG/L	1.5	U	3.8	U	0.8	U	0.8	U	0.8	U
WS15 ISOPHORONE, BY GC/MS	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS16 NITROPHENOL,2-	UG/L	2.1	U	5.2	U	1	U	1	U	1	U
WS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/L	2.1	U	5.2	U	1	U	1	U	1	U
WS18 BENZOIC ACID, BY GC/MS	UG/L	20	U	50	U	10	U	10	U	10	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	305		306		307		308		309	
WS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/L	1.4	U	3.5	U	0.7	U	0.7	U	0.7	U
WS20 DICHLOROPHENOL, 2,4-	UG/L	3.1	U	7.8	U	1.6	U	1.6	U	1.6	U
WS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS22 NAPHTHALENE, BY GC/MS	UG/L	2	U	5	U	1	U	1	U	1	U
WS23 CHLOROANILINE,4-	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/L	1.9	U	4.8	U	1	U	1	U	1	U
WS25 PHENOL,4-CHLORO-3-METHYL	UG/L	2.8	U	7	U	1.4	U	1.4	U	1.4	U
WS26 METHYLNAPHTHALENE, 2-	UG/L	1.8	U	4.5	U	0.9	U	0.9	U	0.9	
WS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	U
WS28 TRICHLOROPHENOL,2,4,6	UG/L	2.5	U	6.2	U	1.2	U	1.2	U	1.2	U
WS29 TRICHLOROPHENOL,2,4,5	UG/L	3	U	7.5	U	1.5	U	1.5	U	1.5	U
WS30 CHLORONAPHTHALENE, 2-	UG/L	1.5	U	3.8	U	0.8	U	0.8	U	0.8	U
WS31 NITROANILINE,2-(ORTHO)	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/L	1	U	2.5	U	0.5	U	0.5	U	0.5	U
WS33 ACENAPHTHYLENE, BY GC/MS	UG/L	1.3	U	3.2	U	0.7	U	0.7	U	0.7	U
WS34 NITROANILINE,3-	UG/L	10	U	25	U	5	U	5	U	5	U
WS35 ACENAPHTHENE, BY GC/MS	UG/L	1.1	U	2.8	U	0.6	U	0.6	U	0.6	U
WS36 DINITROPHENOL,2,4, BY GC/MS	UG/L	20	U	50	U	10	U	10	U	10	U
WS37 NITROPHENOL,4-	UG/L	14	U	34	U	6.8	U	6.8	U	6.8	
WS38 DIBENZOFURAN	UG/L	1.2	U	3	U	0.6	U	0.6	U	0.6	
WS39 DINITROTOLUENE,2,4, BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	U
WS40 DINITROTOLUENE,2,6-	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS41 PHTHALATE, DIETHYL, BY GC/MS	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS43 FLUORENE, BY GC/MS	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS44 NITROANILINE,4-	UG/L	16	U	40	U	7.9	U	7.9	U	7.9	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	305		306		307		308		309	
WS45 PHENOL,4,6-DINITRO-2-METHYL	UG/L	10	U	25	U	5	U	5	U	5	U
WS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/L	1	U	2.5	U	0.5	U	0.5	U	0.5	U
WS47 ETHER, 4-BROMOPHENYL PHENYL	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS48 HEXACHLOROBENZENE, BY GC/MS	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS49 PENTACHLOROPHENOL, BY GC/MS	UG/L	20	U	50	U	10	U	10	U	10	U
WS50 PHENANTHRENE, BY GC/MS	UG/L	1.1	U	2.8	U	0.6	U	0.6	U	0.6	U
WS51 ANTHRACENE, BY GC/MS	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	
WS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	
WS53 FLUORANTHENE, BY GC/MS	UG/L	5	U	12	U	2.5	U	2.5	U	2.5	U
WS54 PYRENE, BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	U
WS55 PHTHALATE, BUTYL BENZYL	UG/L	10	U	25	U	5	U	5	U	5	U
WS56 DICHLOROBENZIDINE, 3,3'	UG/L	25	U	62	U	12	U	12	U	12	U
WS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	U
WS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/L	12		12	U	2.5	U	2.5	U	20	
WS59 CHRYSENE, BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	U
WS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	U
WS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	U
WS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	U
WS63 PYRENE, BENZO(A), BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	
WS64 PYRENE, INDENO(1,2,3-CD)	UG/L	10	U	25	U	5	U	5	U	5	
WS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	U
WS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/L	10	U	25	U	5	U	5	U	5	U
WS67 CARBAZOLE	UG/L	10	U	25	U	5	U	5	U	5	U
WW40 CHLOROMETHANE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
WW41 BROMOMETHANE, BY GC/MS LDL	UG/L	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
WW42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	305		306		307		308		309	
VW43 CHLOROETHANE, BY GC/MS LDL	UG/L	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U
VW44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	1.2	U	2.0	U	1.2	U	1.2	U	3.6	U
VW45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
VW46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	5.1	
VW48 CHLOROFORM, BY GC/MS LDL	UG/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
VW49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	0.37	U	0.37	U	0.37	U	0.37	U	2.3	
VW50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	0.58	U	0.58	U	0.58	U	0.58	U	13	
VW51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	0.19	U	0.19	U	0.19	U	0.19	U	0.19	
VW52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	0.28	U	0.28	U	0.28	U	0.28	U	0.28	U
VW53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
VW54 BENZENE, BY GC/MS LDL	UG/L	0.14	U	0.14	U	0.14	U	0.14	U	0.37	
VW55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
VW56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	0.63	U	0.63	U	0.63	U	0.63	U	0.63	U
VW57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U
VW58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
VW59 BROMOFORM, BY GC/MS LDL	UG/L	0.17	U	0.17	U	0.17	U	0.17	U	0.17	U
VW60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U
VW61 TOLUENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
VW62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	0.64	U	0.64	U	0.64	U	0.64	U	0.64	
VW63 CHLOROBENZENE, BY GC/MS LDL	UG/L	0.23	U	0.23	U	0.23	U	0.23	U	0.23	
VW64 ETHYLBENZENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U
VW65 ACETONE, BY GC/MS LDL	UG/L	9.0	U	9.0	U	9.0	U	9.0	U	9.0	U
VW66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
VW67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
VW68 HEXANONE, 2- BY GC/MS LDL	UG/L	3.2	U	3.2	U	3.2	U	3.2	U	3.2	U
VW69 4-METHYL-2-PENTANONE (MIBK) BY GC/MS LD	UG/L	0.79	U	0.79	U	0.79	U	0.79	U	0.79	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	305		306		307		308		309	
VW70 STYRENE, BY GC/MS LDL	UG/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U
VW72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	0.82	U	0.82	U	0.82	U	0.82	U	0.82	U
VW73 XYLENE, M AND/OR P BY GC/MS LDL	UG/L	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
VW74 XYLENE, ORTHO BY GC/MS LDL	UG/L	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U
VW75 DICHLOROBENZENE, 1,4- (PARA) BY GC/MS L	UG/L	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U
VW76 DICHLOROBENZENE, 1,3- (META) BY GC/MS L	UG/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
VW77 DICHLOROBENZENE, 1,2- (ORTHO) BY GC/MS	UG/L	0.35	U	0.35	U	0.35	U	0.35	U	0.35	
VW78 DICHLOROETHYLENE, 1,2- (TRANS) BY GC/MS	UG/L	0.84	U	0.84	U	0.84	U	0.84	U	0.84	
VW79 DICHLOROETHYLENE, 1,2- (CIS) BY GC/MS L	UG/L	0.84	U	0.84	U	0.84	U	0.84	U	0.84	U
ZZ01 SAMPLE NUMBER	NA	305		306		307		308		309	
ZZ02 ACTIVITY CODE	NA	ASYXG		ASYXG		ASYXG		ASYXG		ASYXG	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	310	311	312	313	314
WD01 DIOXIN, 2378-TETRACHLORODIBENZO-P, HRMS	NG/L			1.00 U		
WF05 PH, FIELD	SU	6.7	6.72	6.83	7.00	7.07
WF10 CONDUCTIVITY (FIELD)	UMHOS	2.13	2.77	1.97	2.98	2.92
WG30 TURBIDITY	NTU	94	587	108	999	99
WH01 2,4-D	UG/L	1.2 U	1.2 U	1.2 U		1.2 U
WH02 2,4,5-TP(SILVEX)	UG/L	0.17 U	0.17 U	0.17 U		0.17 U
WH03 2,4,5-T	UG/L	0.20 U	0.20 U	0.20 U		0.20
WM01 SILVER, TOTAL, BY ICAP	UG/L	7.24 U	7.24 U	7.24 U	7.24 U	7.24
WM02 ALUMINUM, TOTAL, BY ICAP	UG/L	382	4300	3810	51200	1390
WM04 BARIUM, TOTAL, BY ICAP	UG/L	33.7	105	127	230	53.7
WM05 BERYLLIUM, TOTAL, BY ICAP	UG/L	0.420 U	0.420 U	0.420 U	3.02	0.576
WM06 CADMIUM, TOTAL, BY ICAP	UG/L	0.970 U	2.02 U	1.82 U	3.04 U	0.705 U
WM07 COBALT, TOTAL, BY ICAP	UG/L	3.32	18.0	2.47 U	7.75	6.50
WM08 CHROMIUM, TOTAL, BY ICAP	UG/L	3.69 U	41.5	23.4	8.30	17.8
WM09 COPPER, TOTAL, BY ICAP	UG/L	1.54 U	48.1	19.0	29.2	22.5
WM10 IRON, TOTAL, BY ICAP	UG/L	903	8650	6080	21600	2620
WM11 MANGANESE, TOTAL, BY ICAP	UG/L	560	4370	265	1310	1210
WM12 MOLYBDENUM, TOTAL, BY ICAP	UG/L	4.41 U	4.41 U	4.41 U	4.41 U	4.41 U
WM13 NICKEL, TOTAL, BY ICAP	UG/L	11.2	34.0	20.2	30.6	19.6
WM17 TITANIUM, TOTAL, BY ICAP	UG/L	10.2	98.1	88.3	137	36.8
WM19 VANADIUM, TOTAL, BY ICAP	UG/L	2.51 U	11.7	11.2	10.5	3.64
WM20 ZINC, TOTAL, BY ICAP	UG/L	4.07 U	139	4.07 U	358	49.7 U
WM21 CALCIUM, TOTAL, BY ICAP	MG/L	243	559	241	481	501
WM22 MAGNESIUM, TOTAL, BY ICAP	MG/L	69.9	156	61.6	198	158
WM23 SODIUM, TOTAL, BY ICAP	MG/L	112	37.9	51.6	75.1	115
WM24 POTASSIUM, TOTAL, BY ICAP	MG/L	3.36	5.96	3.14	9.35	4.77

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	310		311		312		313		314	
VM27 ARSENIC, TOTAL, BY AA	UG/L	1.66	U	8.32		2.87		43.0		1.66	U
VM30 LEAD, TOTAL, BY AA	UG/L	6.40		28.3		19.2		227		7.38	
VM31 ANTIMONY, TOTAL, BY AA	UG/L	4.37	U	4.37	U	4.37	U	4.37	U	4.37	U
VM32 SELENIUM, TOTAL, BY AA	UG/L	1.81	U	1.81	U	1.81	U	4.15		1.81	U
VM33 THALLIUM, TOTAL, BY AA	UG/L	1.44	U	1.44	U	1.44	U	1.44	U	1.44	U
VM34 MERCURY, TOTAL, BY COLD VAPOR AA	UG/L	0.127	U	0.127	U	0.127	U	0.127	U	0.127	U
VM35 SILVER, DISSOLVED, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U	7.24	U	7.24	U
VM36 ALUMINUM, DISSOLVED, BY ICAP	UG/L	33.5	U	33.5	U	33.5	U	33.5	U	33.5	(
VM38 BARIUM, DISSOLVED, BY ICAP	UG/L	24.1		15.1		17.6		36.2		16.6	
VM39 BERYLLIUM, DISSOLVED, BY ICAP	UG/L	0.420	U	0.420	U	0.420	U	0.420	U	0.420	U
VM40 CADMIUM, DISSOLVED, BY ICAP	UG/L	0.819	U	2.29	U	0.592	U	1.11	U	0.592	U
VM41 COBALT, DISSOLVED, BY ICAP	UG/L	2.47	U	14.4		9.62		3.26		5.87	
VM42 CHROMIUM, DISSOLVED, BY ICAP	UG/L	3.69	U	3.69	U	3.69	U	4.09		3.69	U
VM43 COPPER, DISSOLVED, BY ICAP	UG/L	1.54	U	1.54	U	1.54	U	1.54	U	1.54	U
VM44 IRON, DISSOLVED, BY ICAP	UG/L	29.3	U	29.3	U	382		29.3	U	29.3	U
VM45 MANGANESE, DISSOLVED, BY ICAP	UG/L	566		3740		3280		1140		1140	
VM46 MOLYBDENUM, DISSOLVED, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U	4.41	U	4.41	U
VM47 NICKEL, DISSOLVED, BY ICAP	UG/L	10.8		13.9		10.4		12.1		9.46	
VM51 TITANIUM, DISSOLVED, BY ICAP	UG/L	4.18	U	4.18	U	4.18	U	4.18	U	4.18	
VM53 VANADIUM, DISSOLVED, BY ICAP	UG/L	2.51	U	2.51	U	2.51	U	2.51	U	2.51	(
VM54 ZINC, DISSOLVED, BY ICAP	UG/L	113		149		141		149		120	
VM55 CALCIUM, DISSOLVED, BY ICAP	MG/L	277		586		520		551		495	
VM56 MAGNESIUM, DISSOLVED, BY ICAP	MG/L	72.7		151		113		195		158	
VM57 SODIUM, DISSOLVED, BY ICAP	MG/L	122		36.1		46.1		83.0		121	
VM58 POTASSIUM, DISSOLVED, BY ICAP	MG/L	3.39		5.06		4.06		9.20		4.46	
VM59 ANTIMONY, DISSOLVED, BY AA	UG/L	4.37	U	4.37	U	4.37	U	4.37	U	4.37	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	310		311		312		313		314	
WM60 ARSENIC, DISSOLVED, BY AA	UG/L	1.66	U	1.66	U	1.66	U	7.32		1.66	U
WM63 LEAD, DISSOLVED, BY AA	UG/L	0.557	U	0.557	U	0.557	U	0.557	U	0.557	U
WM64 SELENIUM, DISSOLVED, BY AA	UG/L	1.81	U	1.81	U	1.81	U	3.24		1.81	U
WM66 THALLIUM, DISSOLVED, BY AA	UG/L	1.44	U	1.44	U	1.44	U	1.44	U	1.44	U
WM68 MERCURY, DISSOLVED, BY COLD VAPOR AA	UG/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
WP01 BHC, ALPHA, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP02 BHC, BETA, BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	
WP03 BHC, DELTA	UG/L	0.0080	U	0.0080	U	0.0080	U	0.0080	U	0.0080	
WP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U
WP05 ALDRIN, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP06 DIELDRIN, BY GC/EC	UG/L	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
WP07 ENDOSULFAN I, BY GC/EC	UG/L	0.0090	U	0.0090	U	0.0090	U	0.0090	U	0.0090	U
WP08 ENDOSULFAN II, BY GC/EC	UG/L	0.070	U	0.070	U	0.070	U	0.070	U	0.070	U
WP09 ENDOSULFAN SULFATE, BY GC/EC	UG/L	0.0070	U	0.0070	U	0.0070	U	0.0070	U	0.0070	U
WP10 ENDRIN, BY GC/EC	UG/L	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U
WP11 ENDRIN ALDEHYDE, BY GC/EC	UG/L	0.0070	J	0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP13 DDE, 4,4'-	UG/L	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
WP14 DDD, 4,4'-	UG/L	0.060	U	0.060	U	0.060	U	0.060	U	0.060	U
WP15 DDT, 4,4'-	UG/L	0.010	U	0.010	U	0.010	U	0.010	U	0.010	
WP16 TOXAPHENE, BY GC/EC	UG/L	0.50	U	0.50	U	0.50	U	0.50	U	0.50	
WP17 PCB-AROCLOR 1016	UG/L	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U
WP18 PCB-AROCLOR 1221	UG/L	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U
WP19 PCB-AROCLOR 1232	UG/L	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
WP20 PCB-AROCLOR 1242	UG/L	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
WP21 PCB-AROCLOR 1248	UG/L	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
WP22 PCB-AROCLOR 1254	UG/L	0.050	U	0.064	U	0.13	U	0.14	U	0.050	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	310		311		312		313		314	
WP23 PCB-AROCLOR 1260	UG/L	0.060	U	0.060	U	0.060	U	0.060	U	0.060	U
WP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/L	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U
WP25 HEPTACHLOR, BY GC/EC	UG/L	0.0090	U	0.0090	U	0.0090	U	0.0090	U	0.0090	U
WP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP83 ENDRIN KETONE, BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U
WP84 METHOXYCHLOR, BY GC/EC	UG/L	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
WP85 CHLORDANE, ALPHA	UG/L	0.025	U	0.025	U	0.025	U	0.025	U	0.025	"
WP86 CHLORDANE, GAMMA	UG/L	0.025	U	0.025	U	0.025	U	0.025	U	0.025	
WS01 PHENOL, BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	3.2	U	0.7	U
WS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/L	1.5	U	1.5	U	1.5	U	7.5	U	1.5	U
WS04 CHLOROPHENOL, 2-	UG/L	1.4	U	1.4	U	1.4	U	6.8	U	1.4	U
WS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/L	1.1	U	1.1	U	1.1	U	5.5	U	1.1	U
WS06 DICHLOROBENZENE,1,4-	UG/L	1.2	U	1.2	U	1.2	U	5.8	U	1.2	U
WS07 BENZYL ALCOHOL	UG/L	0.7	U	0.7	U	0.7	U	3.2	U	0.7	U
WS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/L	1.2	U	1.2	U	1.2	U	6.2	U	1.2	U
WS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/L	1.2	U	1.2	U	1.2	U	5.8	U	1.2	U
WS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	3.5	U	0.7	U
WS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/L	1.6	U	1.6	U	1.6	U	8.2	U	1.6	U
WS12 N-NITROSODIPROPYLAMINE	UG/L	0.8	U	0.8	U	0.8	U	3.8	U	0.8	
WS13 HEXACHLOROETHANE, BY GC/MS	UG/L	1.2	U	1.2	U	1.2	U	6	U	1.2	
WS14 NITROBENZENE, BY GC/MS	UG/L	0.8	U	0.8	U	0.8	U	3.8	U	0.8	U
WS15 ISOPHORONE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS16 NITROPHENOL,2-	UG/L	1	U	1	U	1	U	5.2	U	1	U
WS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/L	1	U	1	U	1	U	5.2	U	1	U
WS18 BENZOIC ACID, BY GC/MS	UG/L	10	U	10	U	10	U	50	U	10	U
WS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	3.5	U	0.7	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	310		311		312		313		314	
WS20 DICHLOROPHENOL, 2,4-	UG/L	1.6	U	1.6	U	1.6	U	7.8	U	1.6	U
WS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS22 NAPHTHALENE, BY GC/MS	UG/L	1	U	1	U	1	U	5	U	1	U
WS23 CHLOROANILINE,4-	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/L	1	U	1	U	1	U	4.8	U	1	U
WS25 PHENOL,4-CHLORO-3-METHYL	UG/L	1.4	U	1.4	U	1.4	U	7	U	1.4	U
WS26 METHYLNAPHTHALENE, 2-	UG/L	0.9	U	0.9	U	0.9	U	4.5	U	0.9	U
WS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	
WS28 TRICHLOROPHENOL,2,4,6	UG/L	1.2	U	1.2	U	1.2	U	6.2	U	1.2	U
WS29 TRICHLOROPHENOL,2,4,5	UG/L	1.5	U	1.5	U	1.5	U	7.5	U	1.5	U
WS30 CHLORONAPHTHALENE, 2-	UG/L	0.8	U	0.8	U	0.8	U	3.8	U	0.8	U
WS31 NITROANILINE,2-(ORTHO)	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/L	0.5	U	0.5	U	0.5	U	2.5	U	0.5	U
WS33 ACENAPHTHYLENE, BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	3.2	U	0.7	U
WS34 NITROANILINE,3-	UG/L	5	U	5	U	5	U	25	U	5	U
WS35 ACENAPHTHENE, BY GC/MS	UG/L	0.6	U	0.6	U	0.6	U	2.8	U	0.6	U
WS36 DINITROPHENOL,2,4, BY GC/MS	UG/L	10	U	10	U	10	U	50	U	10	U
WS37 NITROPHENOL,4-	UG/L	6.8	U	6.8	U	6.8	U	34	U	6.8	U
WS38 DIBENZOFURAN	UG/L	0.6	U	0.6	U	0.6	U	3	U	0.6	
WS39 DINITROTOLUENE,2,4, BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	
WS40 DINITROTOLUENE,2,6-	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS41 PHTHALATE, DIETHYL, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS43 FLUORENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS44 NITROANILINE,4-	UG/L	7.9	U	7.9	U	7.9	U	40	U	7.9	U
WS45 PHENOL,4,6-DINITRO-2-METHYL	UG/L	5	U	5	U	5	U	25	U	5	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	310		311		312		313		314	
WS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/L	0.5	U	0.5	U	0.5	U	2.5	U	0.5	U
WS47 ETHER, 4-BROMOPHENYL PHENYL	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS48 HEXACHLOROBENZENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS49 PENTACHLOROPHENOL, BY GC/MS	UG/L	10	U	10	U	10	U	50	U	10	U
WS50 PHENANTHRENE, BY GC/MS	UG/L	0.6	U	0.6	U	0.6	U	2.8	U	0.6	U
WS51 ANTHRACENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	U
WS53 FLUORANTHENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	12	U	2.5	
WS54 PYRENE, BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	U
WS55 PHTHALATE, BUTYL BENZYL	UG/L	5	U	5	U	5	U	25	U	5	U
WS56 DICHLOROBENZIDINE, 3,3'	UG/L	12	U	12	U	12	U	62	U	12	U
WS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	U
WS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/L	2.5	U	5.3		2.5	U	12	U	13	
WS59 CHRYSENE, BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	U
WS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	U
WS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	U
WS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	U
WS63 PYRENE, BENZO(A), BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	U
WS64 PYRENE, INDENO(1,2,3-CD)	UG/L	5	U	5	U	5	U	25	U	5	
WS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	
WS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/L	5	U	5	U	5	U	25	U	5	U
WS67 CARBAZOLE	UG/L	5	U	5	U	5	U	25	U	5	U
WW40 CHLOROMETHANE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
WW41 BROMOMETHANE, BY GC/MS LDL	UG/L	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
WW42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
WW43 CHLOROETHANE, BY GC/MS LDL	UG/L	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	310		311		312		313		314	
VV44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
VV45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
VV46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
VV48 CHLOROFORM, BY GC/MS LDL	UG/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
VV49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U
VV50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U
VV51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	0.19	U	0.19	U	0.19	U	0.19	U	0.19	"
VV52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	0.28	U	0.28	U	0.28	U	0.28	U	0.28	
VV53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
VV54 BENZENE, BY GC/MS LDL	UG/L	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
VV55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
VV56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	0.63	U	0.63	U	0.63	U	0.63	U	0.63	U
VV57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U
VV58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
VV59 BROMOFORM, BY GC/MS LDL	UG/L	0.17	U	0.17	U	0.17	U	0.17	U	0.17	U
VV60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U
VV61 TOLUENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
VV62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	0.64	U	0.64	U	0.64	U	0.64	U	0.64	U
VV63 CHLOROBENZENE, BY GC/MS LDL	UG/L	0.23	U	0.23	U	0.23	U	0.23	U	0.23	
VV64 ETHYLBENZENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	
VV65 ACETONE, BY GC/MS LDL	UG/L	9.0	U	9.0	U	9.0	U	9.0	U	9.0	U
VV66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
VV67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
VV68 HEXANONE, 2- BY GC/MS LDL	UG/L	3.2	U	3.2	U	3.2	U	3.2	U	3.2	U
VV69 4-METHYL-2-PENTANONE (MIBK) BY GC/MS LD	UG/L	0.79	U	0.79	U	0.79	U	0.79	U	0.79	U
VV70 STYRENE, BY GC/MS LDL	UG/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	310		311		312		313		314	
VW72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	0.82	U	0.82	U	0.82	U	0.82	U	0.82	U
VW73 XYLENE, M AND/OR P BY GC/MS LOL	UG/L	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
VW74 XYLENE, ORTHO BY GC/MS LOL	UG/L	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U
VW75 DICHLOROBENZENE, 1,4- (PARA) BY GC/MS L	UG/L	0.46	U	0.46	U	0.46	U	0.46	U	0.46	U
VW76 DICHLOROBENZENE, 1,3- (META) BY GC/MS L	UG/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
VW77 DICHLOROBENZENE, 1,2- (ORTHO) BY GC/MS	UG/L	0.35	U	0.35	U	0.35	U	0.35	U	0.35	U
VW78 DICHLOROETHYLENE, 1,2- (TRANS) BY GC/MS	UG/L	0.84	U	0.84	U	0.84	U	0.84	U	0.84	
VW79 DICHLOROETHYLENE, 1,2- (CIS) BY GC/MS L	UG/L	0.84	U	0.84	U	0.84	U	0.84	U	0.84	
ZZ01 SAMPLE NUMBER	NA	310		311		312		313		314	
ZZ02 ACTIVITY CODE	NA	ASYXG		ASYXG		ASYXG		ASYXG		ASYXG	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	401	402	403	404	405
WD01 DIOXIN, 2378-TETRACHLORODIBENZO-P, HRMS	NG/L	1.00 U	1.00 U	1.00 U	1.00 U	
WF01 TEMPERATURE, WATER	'C		11.4	11.2	11.4	
WF05 PH, FIELD	SU		6.65	6.8	6.65	
WF10 CONDUCTIVITY (FIELD)	UMHOS		1.44	1.85	0.226	
WH01 2,4-D	UG/L	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
WH02 2,4,5-TP(SILVEX)	UG/L	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
WH03 2,4,5-T	UG/L	0.20 U	0.20 U	0.20 U	0.20 U	0.20 "
WM01 SILVER, TOTAL, BY ICAP	UG/L	7.24 U	7.24 U	7.24 U	7.24 U	7.24
WM02 ALUMINUM, TOTAL, BY ICAP	UG/L	30200	9620	5150	5250	3930
WM04 BARIUM, TOTAL, BY ICAP	UG/L	392	179	318	136	96.9
WM05 BERYLLIUM, TOTAL, BY ICAP	UG/L	2.48	0.660	0.642	0.686	0.420 U
WM06 CADMIUM, TOTAL, BY ICAP	UG/L	1.94 U	2.63 U	3.03 U	3.31	1.41 U
WM07 COBALT, TOTAL, BY ICAP	UG/L	131	125	67.0	9.33	6.83
WM08 CHROMIUM, TOTAL, BY ICAP	UG/L	54.9	17.5	12.2	9.54	4.69
WM09 COPPER, TOTAL, BY ICAP	UG/L	21.6	27.3	18.3	15.8	8.10
WM10 IRON, TOTAL, BY ICAP	UG/L	61600	26800	52500	9310	3990
WM11 MANGANESE, TOTAL, BY ICAP	UG/L	6200	14500	6360	267	694
WM12 MOLYBDENUM, TOTAL, BY ICAP	UG/L	4.41 U	4.41 U	4.41 U	4.41 U	4.41 U
WM13 NICKEL, TOTAL, BY ICAP	UG/L	66.9	42.8	33.9	8.61	6.23
WM17 TITANIUM, TOTAL, BY ICAP	UG/L	415	159	82.3	82.2	46.4
WM19 VANADIUM, TOTAL, BY ICAP	UG/L	101	28.5	22.4	20.4	8.22
WM20 ZINC, TOTAL, BY ICAP	UG/L	62.1	4.07 U	4.07 U	4.07 U	4.07 U
WM21 CALCIUM, TOTAL, BY ICAP	MG/L	20.4	218	228	42.3	31.6
WM22 MAGNESIUM, TOTAL, BY ICAP	MG/L	8.33	56.3	64.4	6.42	4.85
WM23 SODIUM, TOTAL, BY ICAP	MG/L	4.23	36.8	82.8	3.97	4.70
WM24 POTASSIUM, TOTAL, BY ICAP	MG/L	4.63	2.10	7.08	0.700	2.19

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	401		402		403		404		405	
VM27 ARSENIC, TOTAL, BY AA	UG/L	21.0		10.1		16.2		4.82		2.35	
VM30 LEAD, TOTAL, BY AA	UG/L	49.4		12.1		19.5		12.8		2.68	
VM31 ANTIMONY, TOTAL, BY AA	UG/L	4.37	U	4.37	U	4.37	U	4.37	U	4.37	U
VM32 SELENIUM, TOTAL, BY AA	UG/L	2.12		1.81	U	1.81	U	1.81	U	1.81	U
VM33 THALLIUM, TOTAL, BY AA	UG/L	1.44	U	1.44	U	1.44	U	1.44	U	1.44	U
VM34 MERCURY, TOTAL, BY COLD VAPOR AA	UG/L	0.127	U	0.127	U	0.127	U	0.127	U	0.127	U
VM35 SILVER, DISSOLVED, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U	7.24	U	7.24	U
VM36 ALUMINUM, DISSOLVED, BY ICAP	UG/L	33.5	U	33.5	U	33.5	U	33.5	U	33.5	
VM38 BARIUM, DISSOLVED, BY ICAP	UG/L	174		73.5		107		75.3		75.0	
VM39 BERYLLIUM, DISSOLVED, BY ICAP	UG/L	0.420	U	0.420	U	0.420	U	0.420	U	0.420	U
VM40 CADMIUM, DISSOLVED, BY ICAP	UG/L	3.43	U	5.19	U	11.3		0.592	U	1.89	U
VM41 COBALT, DISSOLVED, BY ICAP	UG/L	92.3		119		54.3		5.40		4.03	
VM42 CHROMIUM, DISSOLVED, BY ICAP	UG/L	3.69	U	3.69	U	3.69	U	3.69	U	3.69	U
VM43 COPPER, DISSOLVED, BY ICAP	UG/L	1.54	U	1.54	U	1.54	U	1.54	U	1.54	U
VM44 IRON, DISSOLVED, BY ICAP	UG/L	6720		9500		32800		413		29.3	U
VM45 MANGANESE, DISSOLVED, BY ICAP	UG/L	4820		13800		4700		161		572	
VM46 MOLYBDENUM, DISSOLVED, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U	4.41	U	4.41	U
VM47 NICKEL, DISSOLVED, BY ICAP	UG/L	21.5		26.4		21.9		6.23	U	6.23	U
VM51 TITANIUM, DISSOLVED, BY ICAP	UG/L	4.18	U	4.18	U	4.18	U	4.18	U	4.18	
VM53 VANADIUM, DISSOLVED, BY ICAP	UG/L	2.51	U	2.51	U	2.51	U	2.51	U	2.51	
VM54 ZINC, DISSOLVED, BY ICAP	UG/L	42.7		114		107		26.1		19.3	
VM55 CALCIUM, DISSOLVED, BY ICAP	MG/L	19.0		227		241		43.3		33.0	
VM56 MAGNESIUM, DISSOLVED, BY ICAP	MG/L	5.16		56.7		63.9		5.73		4.48	
VM57 SODIUM, DISSOLVED, BY ICAP	MG/L	4.02		40.6		86.3		3.14		4.27	
VM58 POTASSIUM, DISSOLVED, BY ICAP	MG/L	1.24		0.811		6.78		0.510	U	1.79	
VM59 ANTIMONY, DISSOLVED, BY AA	UG/L	4.37	U	4.37	U	4.37	U	4.37	U	4.37	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	401		402		403		404		405	
WM60 ARSENIC, DISSOLVED, BY AA	UG/L	1.66	U	2.43		6.59		1.66	U	1.66	U
WM63 LEAD, DISSOLVED, BY AA	UG/L	0.557	U	0.557	U	0.557	U	0.557	U	0.557	U
WM64 SELENIUM, DISSOLVED, BY AA	UG/L	1.81	U	1.81	U	1.81	U	1.81	U	1.81	U
WM66 THALLIUM, DISSOLVED, BY AA	UG/L	1.44	U	1.44	U	1.44	U	1.44	U	1.44	U
WM68 MERCURY, DISSOLVED, BY COLD VAPOR AA	UG/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
WP01 BHC, ALPHA, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP02 BHC, BETA, BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U
WP03 BHC, DELTA	UG/L	0.0080	U	0.0080	U	0.0080	U	0.0080	U	0.0080	
WP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U
WP05 ALDRIN, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP06 DIELDRIN, BY GC/EC	UG/L	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
WP07 ENDOSULFAN I, BY GC/EC	UG/L	0.0090	U	0.0090	U	0.0090	U	0.0090	U	0.0090	U
WP08 ENDOSULFAN II, BY GC/EC	UG/L	0.070	U	0.070	U	0.070	U	0.070	U	0.070	U
WP09 ENDOSULFAN SULFATE, BY GC/EC	UG/L	0.0070	U	0.0070	U	0.0070	U	0.0070	U	0.0070	U
WP10 ENDRIN, BY GC/EC	UG/L	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U
WP11 ENDRIN ALDEHYDE, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP13 DDE, 4,4'-	UG/L	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.0060	U
WP14 DDD, 4,4'-	UG/L	0.060	U	0.060	U	0.060	U	0.060	U	0.060	U
WP15 DDT, 4,4'-	UG/L	0.010	U	0.010	U	0.010	U	0.010	U	0.010	
WP16 TOXAPHENE, BY GC/EC	UG/L	0.50	U	0.50	U	0.50	U	0.50	U	0.50	
WP17 PCB-AROCLOR 1016	UG/L	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U
WP18 PCB-AROCLOR 1221	UG/L	0.30	U	0.30	U	0.30	U	0.30	U	0.30	U
WP19 PCB-AROCLOR 1232	UG/L	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
WP20 PCB-AROCLOR 1242	UG/L	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
WP21 PCB-AROCLOR 1248	UG/L	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
WP22 PCB-AROCLOR 1254	UG/L	0.14	U	0.084	U	0.12	U	0.076	U	0.081	U

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COMPOUND	UNITS	401		402		403		404		405	
WP23 PCB-AROCLOR 1260	UG/L	0.060	U	0.060	U	0.060	U	0.060	U	0.060	U
WP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/L	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U
WP25 HEPTACHLOR, BY GC/EC	UG/L	0.0090	U	0.0090	U	0.0090	U	0.0090	U	0.0090	U
WP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.0040	U
WP83 ENDRIN KETONE, BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U
WP84 METHOXYCHLOR, BY GC/EC	UG/L	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
WP85 CHLORDANE, ALPHA	UG/L	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
WP86 CHLORDANE, GAMMA	UG/L	0.025	U	0.025	U	0.025	U	0.025	U	0.025	
WS01 PHENOL, BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
WS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/L	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
WS04 CHLOROPHENOL, 2-	UG/L	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
WS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/L	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
WS06 DICHLOROBENZENE,1,4-	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
WS07 BENZYL ALCOHOL	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
WS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
WS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
WS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
WS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
WS12 N-NITROSODIPROPYLAMINE	UG/L	0.8	U	0.8	U	0.8	U	0.8	U	0.8	
WS13 HEXACHLOROETHANE, BY GC/MS	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	
WS14 NITROBENZENE, BY GC/MS	UG/L	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
WS15 ISOPHORONE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
WS16 NITROPHENOL,2-	UG/L	1	U	1	U	1	U	1	U	1	U
WS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/L	1	U	1	U	1	U	1	U	1	U
WS18 BENZOIC ACID, BY GC/MS	UG/L	10	U	10	U	10	U	10	U	10	U
WS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U

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COMPOUND	UNITS	401	402	403	404	405
WS20 DICHLOROPHENOL, 2,4-	UG/L	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
WS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
WS22 NAPHTHALENE, BY GC/MS	UG/L	1 U	1 U	1 U	1 U	1 U
WS23 CHLOROANILINE,4-	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
WS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/L	1 U	1 U	1 U	1 U	1 U
WS25 PHENOL,4-CHLORO-3-METHYL	UG/L	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
WS26 METHYLNAPHTHALENE, 2-	UG/L	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
WS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/L	5 U	5 U	5 U	5 U	5
WS28 TRICHLOROPHENOL,2,4,6	UG/L	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
WS29 TRICHLOROPHENOL,2,4,5	UG/L	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
WS30 CHLORONAPHTHALENE, 2-	UG/L	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
WS31 NITROANILINE,2-(ORTHO)	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
WS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
WS33 ACENAPHTHYLENE, BY GC/MS	UG/L	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
WS34 NITROANILINE,3-	UG/L	5 U	5 U	5 U	5 U	5 U
WS35 ACENAPHTHENE, BY GC/MS	UG/L	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
WS36 DINITROPHENOL,2,4, BY GC/MS	UG/L	10 U	10 U	10 U	10 U	10 U
WS37 NITROPHENOL,4-	UG/L	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U
WS38 DIBENZOFURAN	UG/L	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
WS39 DINITROTOLUENE,2,4, BY GC/MS	UG/L	5 U	5 U	5 U	5 U	5
WS40 DINITROTOLUENE,2,6-	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
WS41 PHTHALATE, DIETHYL, BY GC/MS	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
WS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
WS43 FLUORENE, BY GC/MS	UG/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
WS44 NITROANILINE,4-	UG/L	7.9 U	7.9 U	7.9 U	7.9 U	7.9 U
WS45 PHENOL,4,6-DINITRO-2-METHYL	UG/L	5 U	5 U	5 U	5 U	5 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	401		402		403		404		405	
VS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
VS47 ETHER, 4-BROMOPHENYL PHENYL	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
VS48 HEXACHLOROBENZENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
VS49 PENTACHLOROPHENOL, BY GC/MS	UG/L	10	U	10	U	10	U	10	U	10	U
VS50 PHENANTHRENE, BY GC/MS	UG/L	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
VS51 ANTHRACENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
VS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
VS53 FLUORANTHENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	
VS54 PYRENE, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
VS55 PHTHALATE, BUTYL BENZYL	UG/L	5	U	5	U	5	U	5	U	5	U
VS56 DICHLOROBENZIDINE, 3,3'	UG/L	12	U	12	U	12	U	12	U	12	U
VS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
VS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
VS59 CHRYSENE, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
VS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
VS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
VS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
VS63 PYRENE, BENZO(A), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
VS64 PYRENE, INDENO(1,2,3-CD)	UG/L	5	U	5	U	5	U	5	U	5	
VS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	
VS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	5	U
VS67 CARBAZOLE	UG/L	5	U	5	U	5	U	5	U	5	U
VW40 CHLOROMETHANE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
VW41 BROMOMETHANE, BY GC/MS LDL	UG/L	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
VW42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
VW43 CHLOROETHANE, BY GC/MS LDL	UG/L	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U

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COMPOUND	UNITS	401		402		403		404		405	
VW44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
VW45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
VW46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
VW48 CHLOROFORM, BY GC/MS LDL	UG/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
VW49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U
VW50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U
VW51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
VW52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	0.28	U	0.28	U	0.28	U	0.28	U	0.28	
VW53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	
VW54 BENZENE, BY GC/MS LDL	UG/L	0.14	U	0.98		0.14	U	0.14	U	0.14	U
VW55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
VW56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	0.63	U	0.63	U	0.63	U	0.63	U	0.63	U
VW57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U
VW58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
VW59 BROMOFORM, BY GC/MS LDL	UG/L	0.17	U	0.17	U	0.17	U	0.17	U	0.17	U
VW60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U
VW61 TOLUENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
VW62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	0.64	U	0.64	U	0.64	U	0.64	U	0.64	U
VW63 CHLOROBENZENE, BY GC/MS LDL	UG/L	0.23	U	35		0.23	U	0.23	U	0.23	
VW64 ETHYLBENZENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	
VW65 ACETONE, BY GC/MS LDL	UG/L	9.0	U	9.0	U	9.0	U	9.0	U	9.0	U
VW66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
VW67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
VW68 HEXANONE, 2- BY GC/MS LDL	UG/L	3.2	U	3.2	U	3.2	U	3.2	U	3.2	U
VW69 4-METHYL-2-PENTANONE (MIBK) BY GC/MS LD	UG/L	0.79	U	0.79	U	0.79	U	0.79	U	0.79	U
VW70 STYRENE, BY GC/MS LDL	UG/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U

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COMPOUND	UNITS	401	402	403	404	405
VW72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U
VW73 XYLENE, M AND/OR P BY GC/MS LDL	UG/L	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
VW74 XYLENE, ORTHO BY GC/MS LDL	UG/L	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
VW75 DICHLOROBENZENE, 1,4- (PARA) BY GC/MS L	UG/L	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U
VW76 DICHLOROBENZENE, 1,3- (META) BY GC/MS L	UG/L	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
VW77 DICHLOROBENZENE, 1,2- (ORTHO) BY GC/MS	UG/L	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
VW78 DICHLOROETHYLENE, 1,2- (TRANS) BY GC/MS	UG/L	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U
VW79 DICHLOROETHYLENE, 1,2- (CIS) BY GC/MS L	UG/L	0.84 U	0.84 U	0.84 U	0.84 U	0.84
Z201 SAMPLE NUMBER	NA	401	402	403	404	405
Z202 ACTIVITY CODE	NA	ASYXG	ASYXG	ASYXG	ASYXG	ASYXG

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	406		407		408		501		502	
WD01 DIOXIN, 2378-TETRACHLORODIBENZO-P, HRMS	NG/L	1.00	U					1.00	U	1.00	U
WF01 TEMPERATURE, WATER	'C	11.8		12.6							
WF05 PH, FIELD	SU	6.51		7.44		7.36					
WF10 CONDUCTIVITY (FIELD)	UMHOS	0.339		0.23		0.226					
WG30 TURBIDITY	NTU	103		109		156					
WH01 2,4-D	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	24	U
WH02 2,4,5-TP(SILVEX)	UG/L	0.17	U	0.17	U	0.17	U	0.17	U	3.4	U
WH03 2,4,5-T	UG/L	0.20	U	0.20	U	0.20	U	0.20	U	4.0	
WM01 SILVER, TOTAL, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U	7.24	U	7.24	U
WM02 ALUMINUM, TOTAL, BY ICAP	UG/L	1680		6700		2560		798		449	
WM04 BARIUM, TOTAL, BY ICAP	UG/L	74.9		113		169		25.1		699	
WM05 BERYLLIUM, TOTAL, BY ICAP	UG/L	0.420	U	0.472		0.420	U	0.420	U	0.932	
WM06 CADMIUM, TOTAL, BY ICAP	UG/L	1.05	U	3.81		1.48	U	0.592	U	0.592	U
WM07 COBALT, TOTAL, BY ICAP	UG/L	6.65		8.12		7.38		24.7		7.69	
WM08 CHROMIUM, TOTAL, BY ICAP	UG/L	3.69	U	6.20		4.68		3.99		35.1	
WM09 COPPER, TOTAL, BY ICAP	UG/L	1.54	U	5.78	U	6.32	U	38.3		27.2	
WM10 IRON, TOTAL, BY ICAP	UG/L	2140		8920		5170		17100		645	
WM11 MANGANESE, TOTAL, BY ICAP	UG/L	495		1130		987		1920		205	
WM12 MOLYBDENUM, TOTAL, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U	4.41	U	25.3	
WM13 NICKEL, TOTAL, BY ICAP	UG/L	6.23	U	15.4		6.45		46.7		207	
WM17 TITANIUM, TOTAL, BY ICAP	UG/L	27.6		64.4		39.6		15.1		13.9	
WM19 VANADIUM, TOTAL, BY ICAP	UG/L	4.03		16.2		9.09		2.51	U	26.7	
WM20 ZINC, TOTAL, BY ICAP	UG/L	4.07	U	4.07	U	4.07	U	30.0	U	4.07	U
WM21 CALCIUM, TOTAL, BY ICAP	MG/L	56.6		53.5		62.0		299		96.4	
WM22 MAGNESIUM, TOTAL, BY ICAP	MG/L	9.60		10.9		9.75		82.6		133	
WM23 SODIUM, TOTAL, BY ICAP	MG/L	6.60		5.34		4.64		29.5		3060	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	406		407		408		501		502	
WM24 POTASSIUM, TOTAL, BY ICAP	MG/L	2.12		4.33		1.39		5.42		3890	
WM27 ARSENIC, TOTAL, BY AA	UG/L	1.66	U	2.74		1.97		9.23		35.0	
WM30 LEAD, TOTAL, BY AA	UG/L	2.48		2.84		4.65		14.5		1.24	
WM31 ANTIMONY, TOTAL, BY AA	UG/L	4.37	U	4.37	U	4.37	U	4.37	U	4.37	U
WM32 SELENIUM, TOTAL, BY AA	UG/L	1.81	U	1.81	U	1.81	U	1.81	U	9.05	U
WM33 THALLIUM, TOTAL, BY AA	UG/L	1.44	U	1.44	U	1.44	U	1.44	U	1.44	U
WM34 MERCURY, TOTAL, BY COLD VAPOR AA	UG/L	0.127	U	0.127	U	0.127	U	0.127	U	0.127	"
WM35 SILVER, DISSOLVED, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U	7.24	U	7.24	
WM36 ALUMINUM, DISSOLVED, BY ICAP	UG/L	33.5	U	33.5	U	33.5	U	33.5	U	33.5	U
WM38 BARIUM, DISSOLVED, BY ICAP	UG/L	68.5		55.5		128		15.0		664	
WM39 BERYLLIUM, DISSOLVED, BY ICAP	UG/L	0.420	U	0.420	U	0.420	U	0.420	U	0.808	
WM40 CADMIUM, DISSOLVED, BY ICAP	UG/L	2.59	U	1.04	U	1.08	U	1.86	U	0.829	U
WM41 COBALT, DISSOLVED, BY ICAP	UG/L	2.47	U	2.47	U	3.57		12.7		4.97	
WM42 CHROMIUM, DISSOLVED, BY ICAP	UG/L	3.69	U	3.69	U	3.69	U	3.69	U	22.4	
WM43 COPPER, DISSOLVED, BY ICAP	UG/L	1.54	U	1.54	U	1.54	U	1.54	U	9.50	
WM44 IRON, DISSOLVED, BY ICAP	UG/L	29.3	U	29.3	U	29.3	U	4990		70.1	
WM45 MANGANESE, DISSOLVED, BY ICAP	UG/L	487		18.5		707		1520		176	
WM46 MOLYBDENUM, DISSOLVED, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U	4.41	U	42.7	
WM47 NICKEL, DISSOLVED, BY ICAP	UG/L	6.23	U	6.23	U	6.23	U	20.7		140	
WM51 TITANIUM, DISSOLVED, BY ICAP	UG/L	4.18	U	4.18	U	4.18	U	4.18	U	4.18	"
WM53 VANADIUM, DISSOLVED, BY ICAP	UG/L	2.51	U	2.51	U	2.51	U	2.51	U	19.8	
WM54 ZINC, DISSOLVED, BY ICAP	UG/L	34.1		26.9		39.2		121		46.9	
WM55 CALCIUM, DISSOLVED, BY ICAP	MG/L	60.9		41.7		62.1		300		88.8	
WM56 MAGNESIUM, DISSOLVED, BY ICAP	MG/L	9.79		6.91		9.08		80.1		115	
WM57 SODIUM, DISSOLVED, BY ICAP	MG/L	6.48		5.00		3.87		33.0		3110	
WM58 POTASSIUM, DISSOLVED, BY ICAP	MG/L	1.99		1.84		1.01		6.05		3950	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	406		407		408		501		502	
WM59 ANTIMONY, DISSOLVED, BY AA	UG/L	4.37	U	4.37	U	4.37	U	4.37	U	4.37	U
WM60 ARSENIC, DISSOLVED, BY AA	UG/L	1.66	U	1.66	U	1.66	U	3.35		27.4	
WM63 LEAD, DISSOLVED, BY AA	UG/L	0.557	U	0.557	U	0.557	U	0.557	U	2.10	
WM64 SELENIUM, DISSOLVED, BY AA	UG/L	1.81	U	1.81	U	1.81	U	1.81	U	3.62	U
WM66 THALLIUM, DISSOLVED, BY AA	UG/L	1.44	U	1.44	U	1.44	U	1.44	U	2.88	U
WM68 MERCURY, DISSOLVED, BY COLD VAPOR AA	UG/L	0.100	U	0.100	U	0.100	U	0.100	U	0.100	U
WP01 BHC, ALPHA, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.40	
WP02 BHC, BETA, BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.50	
WP03 BHC, DELTA	UG/L	0.0080	U	0.0080	U	0.0080	U	0.0080	U	0.80	U
WP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.50	U
WP05 ALDRIN, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.40	U
WP06 DIELDRIN, BY GC/EC	UG/L	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.60	U
WP07 ENDOSULFAN I, BY GC/EC	UG/L	0.0090	U	0.0090	U	0.0090	U	0.0090	U	0.90	U
WP08 ENDOSULFAN II, BY GC/EC	UG/L	0.070	U	0.070	U	0.070	U	0.070	U	7.0	U
WP09 ENDOSULFAN SULFATE, BY GC/EC	UG/L	0.0070	U	0.0070	U	0.0070	U	0.0070	U	0.70	U
WP10 ENDRIN, BY GC/EC	UG/L	0.020	U	0.020	U	0.020	U	0.020	U	2.0	U
WP11 ENDRIN ALDEHYDE, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.40	U
WP13 DDE, 4,4'-	UG/L	0.0060	U	0.0060	U	0.0060	U	0.0060	U	0.60	U
WP14 DDD, 4,4'-	UG/L	0.060	U	0.060	U	0.060	U	0.060	U	6.0	
WP15 DDT, 4,4'-	UG/L	0.010	U	0.010	U	0.010	U	0.010	U	1.0	U
WP16 TOXAPHENE, BY GC/EC	UG/L	0.50	U	0.50	U	0.50	U	0.50	U	50	U
WP17 PCB-AROCLOR 1016	UG/L	0.40	U	0.40	U	0.40	U	0.40	U	40	U
WP18 PCB-AROCLOR 1221	UG/L	0.30	U	0.30	U	0.30	U	0.30	U	30	U
WP19 PCB-AROCLOR 1232	UG/L	0.10	U	0.10	U	0.10	U	0.10	U	10	U
WP20 PCB-AROCLOR 1242	UG/L	0.10	U	0.10	U	0.10	U	0.10	U	10	U
WP21 PCB-AROCLOR 1248	UG/L	0.20	U	0.20	U	0.20	U	0.20	U	20	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	406		407		408		501		502	
WP22 PCB-AROCLOR 1254	UG/L	0.050	U	0.085	U	0.090	U	0.089	U	5.0	U
WP23 PCB-AROCLOR 1260	UG/L	0.060	U	0.060	U	0.060	U	0.060	U	6.0	U
WP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/L	0.020	U	0.020	U	0.020	U	0.020	U	2.0	U
WP25 HEPTACHLOR, BY GC/EC	UG/L	0.0090	U	0.0090	U	0.0090	U	0.0090	U	0.90	U
WP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U	0.0040	U	0.40	U
WP83 ENDRIN KETONE, BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.50	U
WP84 METHOXYCHLOR, BY GC/EC	UG/L	0.010	U	0.010	U	0.010	U	0.010	U	1.0	
WP85 CHLORDANE, ALPHA	UG/L	0.025	U	0.025	U	0.025	U	0.025	U	2.5	
WP86 CHLORDANE, GAMMA	UG/L	0.025	U	0.025	U	0.025	U	0.025	U	2.5	U
WS01 PHENOL, BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	840	
WS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/L	1.5	U	1.5	U	1.5	U	1.5	U	7.5	U
WS04 CHLOROPHENOL, 2-	UG/L	1.4	U	1.4	U	1.4	U	1.4	U	6.8	U
WS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/L	1.1	U	1.1	U	1.1	U	1.1	U	5.5	U
WS06 DICHLOROBENZENE,1,4-	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	5.8	U
WS07 BENZYL ALCOHOL	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	3.2	U
WS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	6.2	U
WS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	5.8	U
WS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	3.5	U
WS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	8.2	
WS12 N-NITROSODIPROPYLAMINE	UG/L	0.8	U	0.8	U	0.8	U	0.8	U	3.8	U
WS13 HEXACHLOROETHANE, BY GC/MS	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	6	U
WS14 NITROBENZENE, BY GC/MS	UG/L	0.8	U	0.8	U	0.8	U	0.8	U	3.8	U
WS15 ISOPHORONE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
WS16 NITROPHENOL,2-	UG/L	1	U	1	U	1	U	1	U	5.2	U
WS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/L	1	U	1	U	1	U	1	U	220	
WS18 BENZOIC ACID, BY GC/MS	UG/L	10	U	10	U	10	U	10	U	50	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	406		407		408		501		502	
WS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	3.5	U
WS20 DICHLOROPHENOL, 2,4-	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	7.8	U
WS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
WS22 NAPHTHALENE, BY GC/MS	UG/L	1	U	1	U	1	U	1	U	560	
WS23 CHLOROANILINE,4-	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
WS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/L	1	U	1	U	1	U	1	U	4.8	U
WS25 PHENOL,4-CHLORO-3-METHYL	UG/L	1.4	U	1.4	U	1.4	U	1.4	U	7	
WS26 METHYLNAPHTHALENE, 2-	UG/L	0.9	U	0.9	U	0.9	U	0.9	U	4.5	
WS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
WS28 TRICHLOROPHENOL,2,4,6	UG/L	1.2	U	1.2	U	1.2	U	1.2	U	6.2	U
WS29 TRICHLOROPHENOL,2,4,5	UG/L	1.5	U	1.5	U	1.5	U	1.5	U	7.5	U
WS30 CHLORONAPHTHALENE, 2-	UG/L	0.8	U	0.8	U	0.8	U	0.8	U	3.8	U
WS31 NITROANILINE,2-(ORTHO)	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
WS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/L	0.5	U	0.5	U	0.5	U	0.5	U	2.5	U
WS33 ACENAPHTHYLENE, BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U	0.7	U	3.2	U
WS34 NITROANILINE,3-	UG/L	5	U	5	U	5	U	5	U	25	U
WS35 ACENAPHTHENE, BY GC/MS	UG/L	0.6	U	0.6	U	0.6	U	0.6	U	2.8	U
WS36 DINITROPHENOL,2,4, BY GC/MS	UG/L	10	U	10	U	10	U	10	U	50	U
WS37 NITROPHENOL,4-	UG/L	6.8	U	6.8	U	6.8	U	6.8	U	34	
WS38 DIBENZOFURAN	UG/L	0.6	U	0.6	U	0.6	U	0.6	U	3	
WS39 DINITROTOLUENE,2,4, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
WS40 DINITROTOLUENE,2,6-	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
WS41 PHTHALATE, DIETHYL, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
WS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
WS43 FLUORENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
WS44 NITROANILINE,4-	UG/L	7.9	U	7.9	U	7.9	U	7.9	U	40	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	406		407		408		501		502	
VS45 PHENOL,4,6-DINITRO-2-METHYL	UG/L	5	U	5	U	5	U	5	U	25	U
VS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/L	0.5	U	0.5	U	0.5	U	0.5	U	2.5	U
VS47 ETHER, 4-BROMOPHENYL PHENYL	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
VS48 HEXACHLOROBENZENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
VS49 PENTACHLOROPHENOL, BY GC/MS	UG/L	10	U	10	U	10	U	10	U	50	U
VS50 PHENANTHRENE, BY GC/MS	UG/L	0.6	U	0.6	U	0.6	U	0.6	U	2.8	U
VS51 ANTHRACENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
VS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	
VS53 FLUORANTHENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
VS54 PYRENE, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
VS55 PHTHALATE, BUTYL BENZYL	UG/L	5	U	5	U	5	U	5	U	25	U
VS56 DICHLOROBENZIDINE, 3,3'	UG/L	12	U	12	U	12	U	12	U	62	U
VS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
VS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U	2.5	U	12	U
VS59 CHRYSENE, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
VS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
VS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
VS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
VS63 PYRENE, BENZO(A), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
VS64 PYRENE, INDENO(1,2,3-CD)	UG/L	5	U	5	U	5	U	5	U	25	L
VS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
VS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/L	5	U	5	U	5	U	5	U	25	U
VS67 CARBAZOLE	UG/L	5	U	5	U	5	U	5	U	25	U
VV40 CHLOROMETHANE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U	1.3	U	13	U
VV41 BROMOMETHANE, BY GC/MS LDL	UG/L	1.7	U	1.7	U	1.7	U	1.7	U	17	U
VV42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U	1.3	U	13	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	406		407		408		501		502	
WW43 CHLOROETHANE, BY GC/MS LDL	UG/L	2.2	U	2.2	U	2.2	U	2.2	U	22	U
WW44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	1.2	U	1.2	U	1.2	U	1.6	U	2300	
WW45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	16	U
WW46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	310	
WW48 CHLOROFORM, BY GC/MS LDL	UG/L	0.36	U	0.36	U	0.36	U	0.36	U	3.6	U
WW49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	0.37	U	0.37	U	0.37	U	0.37	U	120	
WW50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	0.58	U	0.58	U	0.58	U	0.58	U	5.8	
WW51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	0.19	U	0.19	U	0.19	U	0.19	U	1.9	
WW52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	0.28	U	0.28	U	0.28	U	0.28	U	2.8	U
WW53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	4.3	U
WW54 BENZENE, BY GC/MS LDL	UG/L	0.14	U	0.14	U	0.14	U	0.14	U	95	
WW55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	34	
WW56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	0.63	U	0.63	U	0.63	U	0.63	U	6.3	U
WW57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	0.29	U	0.29	U	0.29	U	0.29	U	2.9	U
WW58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	0.38	U	0.38	U	0.38	U	0.38	U	3.8	U
WW59 BROMOFORM, BY GC/MS LDL	UG/L	0.17	U	0.17	U	0.17	U	0.17	U	1.7	U
WW60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	3.1	U
WW61 TOLUENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	2900	
WW62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	0.64	U	0.64	U	0.64	U	0.64	U	6.4	
WW63 CHLOROBENZENE, BY GC/MS LDL	UG/L	0.23	U	0.23	U	0.23	U	0.23	U	21	
WW64 ETHYLBENZENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	280	
WW65 ACETONE, BY GC/MS LDL	UG/L	9.0	U	9.0	U	9.0	U	9.0	U	200000	
WW66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1.1	U	1.1	U	1.1	U	1.1	U	71	
WW67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	3.0	U	3.0	U	3.0	U	3.0	U	2700	
WW68 HEXANONE, 2- BY GC/MS LDL	UG/L	3.2	U	3.2	U	3.2	U	3.2	U	32	U
WW69 4-METHYL-2-PENTANONE (MIBK) BY GC/MS LD	UG/L	0.79	U	0.79	U	0.79	U	0.79	U	3200	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	406		407		408		501		502	
WW70 STYRENE, BY GC/MS LDL	UG/L	0.34	U	0.34	U	0.34	U	0.34	U	3.4	U
WW72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	0.82	U	0.82	U	0.82	U	0.82	U	8.2	U
WW73 XYLENE, M AND/OR P BY GC/MS LDL	UG/L	0.22	U	0.22	U	0.22	U	0.22	U	880	
WW74 XYLENE, ORTHO BY GC/MS LDL	UG/L	0.40	U	0.40	U	0.40	U	0.40	U	290	
WW75 DICHLOROBENZENE, 1,4- (PARA) BY GC/MS L	UG/L	0.46	U	0.46	U	0.46	U	0.46	U	4.6	U
WW76 DICHLOROBENZENE, 1,3- (META) BY GC/MS L	UG/L	0.36	U	0.36	U	0.36	U	0.36	U	3.6	U
WW77 DICHLOROBENZENE, 1,2- (ORTHO) BY GC/MS	UG/L	0.35	U	0.35	U	0.35	U	0.35	U	3.5	U
WW78 DICHLOROETHYLENE, 1,2- (TRANS) BY GC/MS	UG/L	0.84	U	0.84	U	0.84	U	0.84	U	8.4	
WW79 DICHLOROETHYLENE, 1,2- (CIS) BY GC/MS L	UG/L	0.84	U	0.84	U	0.84	U	0.84	U	23	
ZZ01 SAMPLE NUMBER	NA	406		407		408		501		502	
ZZ02 ACTIVITY CODE	NA	ASYXG		ASYXG		ASYXG		ASYXG		ASYXG	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	503	601		602		603		604	
SD02 DIOXIN, 2378-TETRACHLORODIBENZO-P, RAPI	NG/GM		0.300	U			0.300	U		
SG07 SOLIDS, PERCENT	%		71.1		76.5		70.7		70.7	
SH01 2,4-D(DICHLOROPHENOXYACETIC ACID)	UG/KG		940	U	870	U	940	U	940	U
SH02 2,4,5-TP(SILVEX)	UG/KG		1400	U	1300	U	1400	U	1400	U
SH03 2,4,5-T	UG/KG		1300	U	1200	U	1300	U	1300	U
SM01 SILVER, TOTAL, BY ICAP	MG/KG		0.512	U	0.512	U	0.512	U	0.512	U
SM02 ALUMINUM, TOTAL, BY ICAP	MG/KG		6020		5940		5840		4900	
SM04 BARIUM, TOTAL, BY ICAP	MG/KG		49.1		71.9		85.3		83.8	
SM05 BERYLLIUM, TOTAL, BY ICAP	MG/KG		0.753		0.649		0.741		0.597	
SM06 CADMIUM, TOTAL, BY ICAP	MG/KG		4.00		3.52		4.26		3.55	
SM07 COBALT, TOTAL, BY ICAP	MG/KG		7.85		7.10		7.74		8.02	
SM08 CHROMIUM, TOTAL, BY ICAP	MG/KG		10.9		9.98		30.0		10.7	
SM09 COPPER, TOTAL, BY ICAP	MG/KG		4.78		5.97		1800		150	
SM10 IRON, TOTAL, BY ICAP	MG/KG		12700		11000		12300		10700	
SM11 MANGANESE, TOTAL, BY ICAP	MG/KG		277		451		381		351	
SM12 MOLYBDENUM, TOTAL, BY ICAP	MG/KG		0.656		0.481		0.562		0.852	
SM13 NICKEL, TOTAL, BY ICAP	MG/KG		7.06		10.2		15.4		12.9	
SM14 LEAD, TOTAL, BY ICAP	MG/KG		12.2		9.93		21.9		11.3	
SM18 THALLIUM, TOTAL, BY ICAP	MG/KG		2.11	U	2.11	U	2.11	U	2.11	
SM19 VANADIUM, TOTAL, BY ICAP	MG/KG		30.3		23.7		24.2		20.7	
SM20 ZINC, TOTAL, BY ICAP	MG/KG		16.1		22.8		66.7		26.3	
SM21 CALCIUM, TOTAL, BY ICAP	MG/KG		1200		3390		21300		9660	
SM22 MAGNESIUM, TOTAL, BY ICAP	MG/KG		604		1020		2970		1180	
SM23 SODIUM, TOTAL, BY ICAP	MG/KG		73.0		66.1		101		86.3	
SM24 POTASSIUM, TOTAL, BY ICAP	MG/KG		319		457		454		442	
SM27 ARSENIC, TOTAL, BY AA	MG/KG		7.70		6.46		7.66		6.81	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	503	601		602		603		604	
SM32 SELENIUM, TOTAL, BY AA	MG/KG		0.500	U	0.500	U	0.500	U	0.500	U
SM34 MERCURY, TOTAL, BY COLD VAPOR AA	MG/KG		0.0191		0.0189		0.0321		0.0169	
SM56 ANTIMONY, TOTAL, BY AA	MG/KG		0.200	U	0.200	U	0.286		0.206	
SP01 BHC, ALPHA, BY GC/EC	UG/KG		0.44	U	0.44	U	0.47	U	0.47	U
SP02 BHC, BETA, BY GC/EC	UG/KG		0.44	U	0.44	U	0.47	U	0.47	U
SP03 BHC, DELTA	UG/KG		0.65	U	0.65	U	0.71	U	0.71	U
SP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/KG		0.44	U	0.44	U	0.47	U	0.47	
SP05 ALDRIN, BY GC/EC	UG/KG		0.44	U	0.44	U	0.47	U	0.47	
SP06 DIELDRIN, BY GC/EC	UG/KG		0.65	U	0.65	U	0.71	U	0.71	U
SP07 ENDOSULFAN I, BY GC/EC	UG/KG		0.87	U	0.87	U	0.94	U	0.94	U
SP08 ENDOSULFAN II, BY GC/EC	UG/KG		6.5	U	6.5	U	7.1	U	7.1	U
SP09 ENDOSULFAN SULFATE, BY GC/EC	UG/KG		0.65	U	0.65	U	0.71	U	0.71	U
SP10 ENDRIN, BY GC/EC	UG/KG		1.7	U	1.7	U	1.9	U	1.9	U
SP11 ENDRIN ALDEHYDE, BY GC/EC	UG/KG		0.44	U	0.44	U	0.47	U	0.47	U
SP13 DDE-4,4'-	UG/KG		0.65	U	0.65	U	0.71	U	0.71	U
SP14 DDD-4,4'-	UG/KG		6.5	U	6.5	U	7.1	U	7.1	U
SP15 DDT-4,4'-	UG/KG		0.87	U	0.87	U	0.94	U	0.94	U
SP16 TOXAPHENE, BY GC/EC	UG/KG		44	U	44	U	47	U	47	U
SP17 PCB-AROCLOR 1016	UG/KG		44	U	44	U	47	U	47	
SP18 PCB-AROCLOR 1221	UG/KG		22	U	22	U	24	U	24	U
SP19 PCB-AROCLOR 1232	UG/KG		8.7	U	8.7	U	9.4	U	9.4	U
SP20 PCB-AROCLOR 1242	UG/KG		8.7	U	8.7	U	9.4	U	9.4	U
SP21 PCB-AROCLOR 1248	UG/KG		17	U	17	U	19	U	19	U
SP22 PCB-AROCLOR 1254	UG/KG		4.4	U	4.4	U	4.7	U	4.7	U
SP23 PCB-AROCLOR 1260	UG/KG		6.5	U	6.5	U	7.1	U	7.1	U
SP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/KG		1.7	U	1.7	U	1.9	U	1.9	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX8 VALIDATED DATA

COMPOUND	UNITS	503	601		602		603		604	
SP25 HEPTACHLOR, BY GC/EC	UG/KG		0.87	U	0.87	U	0.94	U	0.94	U
SP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/KG		0.44	U	0.44	U	0.47	U	0.47	U
SP34 CHLORDANE, ALPHA	UG/KG		2.2	U	2.2	U	2.4	U	2.4	U
SP36 CHLORDANE, GAMMA	UG/KG		2.2	U	2.2	U	2.4	U	2.4	U
SP60 METHOXYCHLOR, BY GC/EC	UG/KG		1.1	U	1.1	U	1.2	U	1.2	U
SP61 ENDRIN KETONE, BY GC/EC	UG/KG		0.44	U	0.44	U	0.47	U	0.47	U
SS01 PHENOL, BY GC/MS	UG/KG		97	U	90	U	98	U	98	
SS02 CARBAZOLE	UG/KG		60	U	56	U	61	U	61	
SS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/KG		55	U	52	U	56	U	56	U
SS04 CHLOROPHENOL, 2-	UG/KG		74	U	69	U	75	U	75	U
SS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/KG		37	U	34	U	37	U	37	U
SS06 DICHLOROBENZENE,1,4-	UG/KG		23	U	22	U	23	U	23	U
SS07 BENZYL ALCOHOL	UG/KG		46	U	43	U	47	U	47	U
SS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/KG		28	U	26	U	28	U	28	U
SS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/KG		120	U	120	U	130	U	130	U
SS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/KG		23	U	22	U	23	U	23	U
SS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/KG		100	U	99	U	110	U	110	U
SS12 N-NITROSODIPROPYLAMINE	UG/KG		55	U	52	U	56	U	56	U
SS13 HEXACHLOROETHANE, BY GC/MS	UG/KG		18	U	17	U	19	U	19	
SS14 NITROBENZENE, BY GC/MS	UG/KG		23	U	22	U	23	U	23	
SS15 ISOPHORONE, BY GC/MS	UG/KG		41	U	39	U	42	U	42	U
SS16 NITROPHENOL,2-	UG/KG		64	U	60	U	65	U	65	U
SS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/KG		60	U	56	U	61	U	61	U
SS18 BENZOIC ACID, BY GC/MS	UG/KG		210	U	200	U	210	U	210	U
SS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/KG		46	U	43	U	47	U	47	U
SS20 DICHLOROPHENOL, 2,4-	UG/KG		87	U	82	U	89	U	89	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	503	601	602	603	604
SS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/KG		14 U	13 U	14 U	14 U
SS22 NAPHTHALENE, BY GC/MS	UG/KG		23 U	22 U	23 U	23 U
SS23 CHLOROANILINE,4-	UG/KG		180 U	170 U	190 U	190 U
SS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/KG		14 U	13 U	14 U	14 U
SS25 PHENOL,4-CHLORO-3-METHYL	UG/KG		87 U	82 U	89 U	89 U
SS26 METHYLNAPHTHALENE, 2-	UG/KG		28 U	26 U	28 U	28 U
SS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/KG		14 U	13 U	14 U	14 "
SS28 TRICHLOROPHENOL,2,4,6	UG/KG		83 U	78 U	84 U	84
SS29 TRICHLOROPHENOL,2,4,5	UG/KG		97 U	90 U	98 U	98 U
SS30 CHLORONAPHTHALENE, 2-	UG/KG		32 U	30 U	33 U	33 U
SS31 NITROANILINE,2-	UG/KG		41 U	39 U	42 U	42 U
SS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/KG		37 U	34 U	37 U	37 U
SS33 ACENAPHTHYLENE, BY GC/MS	UG/KG		32 U	30 U	33 U	33 U
SS34 NITROANILINE,3-	UG/KG		120 U	120 U	130 U	130 U
SS35 ACENAPHTHENE, BY GC/MS	UG/KG		32 U	30 U	33 U	33 U
SS36 DINITROPHENOL,2,4, BY GC/MS	UG/KG		280 U	260 U	280 U	280 U
SS37 NITROPHENOL,4-	UG/KG		14 U	13 U	14 U	14 U
SS38 DIBENZOFURAN	UG/KG		41 U	39 U	42 U	42 U
SS39 DINITROTOLUENE,2,4, BY GC/MS	UG/KG		100 U	99 U	110 U	110 '
SS40 DINITROTOLUENE,2,6-	UG/KG		46 U	43 U	47 U	47 .
SS41 PHTHALATE, DIETHYL, BY GC/MS	UG/KG		78 U	73 U	79 U	79 U
SS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/KG		41 U	39 U	42 U	42 U
SS43 FLUORENE, GC/MS	UG/KG		74 U	69 U	75 U	75 U
SS44 NITROANILINE,4-	UG/KG		300 U	280 U	300 U	300 U
SS45 PHENOL,4,6-DINITRO-2-METHYL	UG/KG		110 U	100 U	110 U	110 U
SS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/KG		9.2 U	8.6 U	9.3 U	9.3 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	503	601		602		603		604	
SS47 ETHER, 4-BROMOPHENYL PHENYL	UG/KG		41	U	39	U	42	U	42	U
SS48 HEXACHLOROBENZENE, BY GC/MS	UG/KG		37	U	34	U	37	U	37	U
SS49 PENTACHLOROPHENOL, BY GC/MS	UG/KG		97	U	90	U	98	U	98	U
SS50 PHENANTHRENE, BY GC/MS	UG/KG		37	U	34	U	37	U	37	U
SS51 ANTHRACENE, BY GC/MS	UG/KG		51	U	47	U	51	U	51	U
SS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/KG		60	U	56	U	61	U	61	U
SS53 FLUORANTHENE, BY GC/MS	UG/KG		18	U	17	U	19	U	19	
SS54 PYRENE, BY GC/MS	UG/KG		55	U	52	U	56	U	56	
SS55 PHTHALATE, BUTYL BENZYL	UG/KG		51	U	47	U	51	U	51	U
SS56 DICHLOROBENZIDINE, 3,3'	UG/KG		920	U	860	U	930	U	930	U
SS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/KG		69	U	65	U	70	U	70	U
SS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/KG		83	U	78	U	84	U	84	U
SS59 CHRYSENE, BY GC/MS	UG/KG		55	U	52	U	56	U	56	U
SS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/KG		32	U	30	U	33	U	33	U
SS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/KG		32	U	30	U	33	U	33	U
SS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/KG		60	U	56	U	61	U	61	U
SS63 PYRENE, BENZO(A), BY GC/MS	UG/KG		69	U	65	U	70	U	70	U
SS64 PYRENE, INDENO(1,2,3-CD)	UG/KG		97	U	90	U	98	U	98	U
SS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/KG		97	U	90	U	98	U	98	U
SS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/KG		64	U	60	U	65	U	65	U
SV03 CHLOROMETHANE, BY GC/MS	UG/KG		24	U	24	U	23	U	20	U
SV04 BROMOMETHANE, BY GC/MS	UG/KG		49	U	47	U	46	U	40	U
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG		37	U	36	U	35	U	30	U
SV06 CHLOROETHANE, BY GC/MS	UG/KG		37	U	36	U	35	U	30	U
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG		24	U	24	U	23	U	20	U
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG		12	U	12	U	12	U	10	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	503	601	602	603	604
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV10 DICHLOROETHYLENE,TRANS-1,2	UG/KG		12 U	12 U	12 U	10 U
SV11 CHLOROFORM, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG		12 U	12 U	12 U	10
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG		12 U	12 U	12 U	10
SV17 BENZENE, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG		12 U	12 U	12 U	10 U
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV24 BROMOFORM, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV26 TOLUENE, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV28 CHLOROBENZENE, BY GC/MS	UG/KG		12 U	12 U	12 U	10
SV29 ETHYL BENZENE, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV30 ACETONE, BY GC/MS	UG/KG		24 U	31 U	23 U	25 U
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U
SV32 METHYL ETHYL KETONE	UG/KG		24 U	24 U	23 U	20 U
SV34 HEXANONE, 2-	UG/KG		24 U	24 U	23 U	20 U
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG		24 U	24 U	23 U	20 U
SV36 STYRENE, BY GC/MS	UG/KG		12 U	12 U	12 U	10 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	503		601		602		603		604	
SV44 DICHLOROBENZENE,1,4-	UG/KG			12	U	12	U	12	U	10	U
SV49 XYLENE, ORTHO	UG/KG			12	U	12	U	12	U	10	U
SV57 XYLENE, M AND/OR P	UG/KG			24	U	24	U	23	U	20	U
SV60 DICHLOROBENZENE, 1, 3-	UG/KG			12	U	12	U	12	U	10	U
SV61 DICHLOROBENZENE, 1, 2-	UG/KG			12	U	12	U	12	U	10	U
SV63 DICHLOROETHYLENE, CIS -1,2	UG/KG			12	U	12	U	12	U	10	U
WD01 DIOXIN, 2378-TETRACHLORODIBENZO-P, HRMS	NG/L	1.00	U								
~~WH01 2,4-D~~	~~UG/L~~	~~1.2~~	~~U~~								
WH02 2,4,5-TP(SILVEX)	UG/L	0.17	U								
WH03 2,4,5-T	UG/L	0.20	U								
WM01 SILVER, TOTAL, BY ICAP	UG/L	7.24	U								
WM02 ALUMINUM, TOTAL, BY ICAP	UG/L	92.9	U								
WM04 BARIUM, TOTAL, BY ICAP	UG/L	13.7									
WM05 BERYLLIUM, TOTAL, BY ICAP	UG/L	0.420	U								
WM06 CADMIUM, TOTAL, BY ICAP	UG/L	22.3									
WM07 COBALT, TOTAL, BY ICAP	UG/L	29.1									
WM08 CHROMIUM, TOTAL, BY ICAP	UG/L	3.69	U								
WM09 COPPER, TOTAL, BY ICAP	UG/L	41.9									
WM10 IRON, TOTAL, BY ICAP	UG/L	2370									
WM11 MANGANESE, TOTAL, BY ICAP	UG/L	2170									
WM12 MOLYBDENUM, TOTAL, BY ICAP	UG/L	4.41	U								
WM13 NICKEL, TOTAL, BY ICAP	UG/L	71.1									
WM17 TITANIUM, TOTAL, BY ICAP	UG/L	4.18	U								
WM19 VANADIUM, TOTAL, BY ICAP	UG/L	2.51	U								
WM20 ZINC, TOTAL, BY ICAP	UG/L	60.5									
WM21 CALCIUM, TOTAL, BY ICAP	MG/L	457									

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	503		601	602	603	604
WM22 MAGNESIUM, TOTAL, BY ICAP	MG/L	139					
WM23 SODIUM, TOTAL, BY ICAP	MG/L	44.9					
WM24 POTASSIUM, TOTAL, BY ICAP	MG/L	7.16					
WM27 ARSENIC, TOTAL, BY AA	UG/L	1.74					
WM30 LEAD, TOTAL, BY AA	UG/L	10.5					
WM31 ANTIMONY, TOTAL, BY AA	UG/L	4.37	U				
WM32 SELENIUM, TOTAL, BY AA	UG/L	1.81	U				
WM33 THALLIUM, TOTAL, BY AA	UG/L	1.44	U				
WM34 MERCURY, TOTAL, BY COLD VAPOR AA	UG/L	0.127	U				
WM35 SILVER, DISSOLVED, BY ICAP	UG/L	7.24	U				
WM36 ALUMINUM, DISSOLVED, BY ICAP	UG/L	33.5	U				
WM38 BARIUM, DISSOLVED, BY ICAP	UG/L	12.2					
WM39 BERYLLIUM, DISSOLVED, BY ICAP	UG/L	0.431					
WM40 CADMIUM, DISSOLVED, BY ICAP	UG/L	1.03	U				
WM41 COBALT, DISSOLVED, BY ICAP	UG/L	23.1					
WM42 CHROMIUM, DISSOLVED, BY ICAP	UG/L	3.69	U				
WM43 COPPER, DISSOLVED, BY ICAP	UG/L	1.54	U				
WM44 IRON, DISSOLVED, BY ICAP	UG/L	29.3	U				
WM45 MANGANESE, DISSOLVED, BY ICAP	UG/L	2050					
WM46 MOLYBDENUM, DISSOLVED, BY ICAP	UG/L	4.41	U				
WM47 NICKEL, DISSOLVED, BY ICAP	UG/L	76.3					
WM51 TITANIUM, DISSOLVED, BY ICAP	UG/L	4.18	U				
WM53 VANADIUM, DISSOLVED, BY ICAP	UG/L	2.51	U				
WM54 ZINC, DISSOLVED, BY ICAP	UG/L	161					
WM55 CALCIUM, DISSOLVED, BY ICAP	MG/L	556					
WM56 MAGNESIUM, DISSOLVED, BY ICAP	MG/L	151					

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	503		601	602	603	604
WM57 SODIUM, DISSOLVED, BY ICAP	MG/L	46.0					
WM58 POTASSIUM, DISSOLVED, BY ICAP	MG/L	7.23					
WM59 ANTIMONY, DISSOLVED, BY AA	UG/L	4.37	U				
WM60 ARSENIC, DISSOLVED, BY AA	UG/L	1.66	U				
WM63 LEAD, DISSOLVED, BY AA	UG/L	0.557	U				
WM64 SELENIUM, DISSOLVED, BY AA	UG/L	1.81	U				
WM66 THALLIUM, DISSOLVED, BY AA	UG/L	1.44	U				
WM68 MERCURY, DISSOLVED, BY COLD VAPOR AA	UG/L	0.100	U				
WP01 BHC, ALPHA, BY GC/EC	UG/L	0.0040	U				
WP02 BHC, BETA, BY GC/EC	UG/L	0.0050	U				
WP03 BHC, DELTA	UG/L	0.0080	U				
WP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/L	0.0050	U				
WP05 ALDRIN, BY GC/EC	UG/L	0.0040	U				
WP06 DIELDRIN, BY GC/EC	UG/L	0.0060	U				
WP07 ENDOSULFAN I, BY GC/EC	UG/L	0.0090	U				
WP08 ENDOSULFAN II, BY GC/EC	UG/L	0.070	U				
WP09 ENDOSULFAN SULFATE, BY GC/EC	UG/L	0.0070	U				
WP10 ENDRIN, BY GC/EC	UG/L	0.020	U				
WP11 ENDRIN ALDEHYDE, BY GC/EC	UG/L	0.0040	U				
WP13 DDE, 4,4'-	UG/L	0.0060	U				
WP14 DDD, 4,4'-	UG/L	0.060	U				
WP15 DDT, 4,4'-	UG/L	0.010	U				
WP16 TOXAPHENE, BY GC/EC	UG/L	0.50	U				
WP17 PCB-AROCLOR 1016	UG/L	0.40	U				
WP18 PCB-AROCLOR 1221	UG/L	0.30	U				
WP19 PCB-AROCLOR 1232	UG/L	0.10	U				

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	503		601	602	603	604
VP20 PCB-AROCLOR 1242	UG/L	0.10	U				
VP21 PCB-AROCLOR 1248	UG/L	0.20	U				
VP22 PCB-AROCLOR 1254	UG/L	0.073	U				
VP23 PCB-AROCLOR 1260	UG/L	0.060	U				
VP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/L	0.020	U				
VP25 HEPTACHLOR, BY GC/EC	UG/L	0.0090	U				
VP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/L	0.0040	U				
VP83 ENDRIN KETONE, BY GC/EC	UG/L	0.0050	U				
VP84 METHOXYCHLOR, BY GC/EC	UG/L	0.010	U				
VP85 CHLORDANE, ALPHA	UG/L	0.025	U				
VP86 CHLORDANE, GAMMA	UG/L	0.025	U				
VS01 PHENOL, BY GC/MS	UG/L	0.7	U				
VS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/L	1.5	U				
VS04 CHLOROPHENOL, 2-	UG/L	1.4	U				
VS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/L	1.1	U				
VS06 DICHLOROBENZENE,1,4-	UG/L	1.2	U				
VS07 BENZYL ALCOHOL	UG/L	0.7	U				
VS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/L	1.2	U				
VS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/L	1.2	U				
VS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/L	0.7	U				
VS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/L	1.6	U				
VS12 N-NITROSODIPROPYLAMINE	UG/L	0.8	U				
VS13 HEXACHLOROETHANE, BY GC/MS	UG/L	1.2	U				
VS14 NITROBENZENE, BY GC/MS	UG/L	0.8	U				
VS15 ISOPHORONE, BY GC/MS	UG/L	2.5	U				
VS16 NITROPHENOL,2-	UG/L	1	U				

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	503		601	602	603	604
VW41 BROMOMETHANE, BY GC/MS LDL	UG/L	1.7	U				
VW42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	1.3	U				
VW43 CHLOROETHANE, BY GC/MS LDL	UG/L	2.2	U				
VW44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	1.9	U				
VW45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1.6	U				
VW46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	0.43	U				
VW48 CHLOROFORM, BY GC/MS LDL	UG/L	0.36	U				
VW49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	0.37	U				
VW50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	0.58	U				
VW51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	0.19	U				
VW52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	0.28	U				
VW53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	0.43	U				
VW54 BENZENE, BY GC/MS LDL	UG/L	0.14	U				
VW55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	0.54	U				
VW56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	0.63	U				
VW57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	0.29	U				
VW58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	0.38	U				
VW59 BROMOFORM, BY GC/MS LDL	UG/L	0.17	U				
VW60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	0.31	U				
VW61 TOLUENE, BY GC/MS LDL	UG/L	0.54	U				
VW62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	0.64	U				
VW63 CHLOROBENZENE, BY GC/MS LDL	UG/L	0.23	U				
VW64 ETHYLBENZENE, BY GC/MS LDL	UG/L	0.31	U				
VW65 ACETONE, BY GC/MS LDL	UG/L	9.0	U				
VW66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1.1	U				
VW67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	3.0	U				

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	503	601	602	603	604
WW68 HEXANONE, 2- BY GC/MS LDL	UG/L	3.2 U				
WW69 4-METHYL-2-PENTANONE (MIBK) BY GC/MS LD	UG/L	0.79 U				
WW70 STYRENE, BY GC/MS LDL	UG/L	0.34 U				
WW72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	0.82 U				
WW73 XYLENE, M AND/OR P BY GC/MS LDL	UG/L	0.22 U				
WW74 XYLENE, ORTHO BY GC/MS LDL	UG/L	0.40 U				
WW75 DICHLOROBENZENE, 1,4- (PARA) BY GC/MS L	UG/L	0.46 U				
WW76 DICHLOROBENZENE, 1,3- (META) BY GC/MS L	UG/L	0.36 U				
WW77 DICHLOROBENZENE, 1,2- (ORTHO) BY GC/MS	UG/L	0.35 U				
WW78 DICHLOROETHYLENE, 1,2- (TRANS) BY GC/MS	UG/L	0.84 U				
WW79 DICHLOROETHYLENE, 1,2- (CIS) BY GC/MS L	UG/L	0.84 U				
ZZ01 SAMPLE NUMBER	NA	503	601	602	603	604
ZZ02 ACTIVITY CODE	NA	ASYXG	ASYXG	ASYXG	ASYXG	ASYXG
ZZ11 ANALYSIS DATE (MM/DD/YY) - ANALYSIS TIM			05/04/99 1555		05/04/99 1611	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	605		606		607		608		609	
SM32 SELENIUM, TOTAL, BY AA	MG/KG	0.500	U	0.500	U	0.500	U	0.500	U	0.655	
SM34 MERCURY, TOTAL, BY COLD VAPOR AA	MG/KG	0.0253		0.00389	U	0.00752		0.0166		0.0134	
SM56 ANTIMONY, TOTAL, BY AA	MG/KG	0.200	U	0.442		0.760		0.200	U	0.602	
SP01 BHC, ALPHA, BY GC/EC	UG/KG	0.48	U	0.43	U	0.45	U	0.43	U	0.38	U
SP02 BHC, BETA, BY GC/EC	UG/KG	0.48	U	0.43	U	0.45	U	0.43	U	0.38	U
SP03 BHC, DELTA	UG/KG	0.72	U	0.65	U	0.68	U	0.65	U	0.56	U
SP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/KG	0.48	U	0.43	U	0.45	U	0.43	U	0.38	U
SP05 ALDRIN, BY GC/EC	UG/KG	0.48	U	0.43	U	0.45	U	0.43	U	0.38	
SP06 DIELDRIN, BY GC/EC	UG/KG	0.72	U	0.65	U	0.68	U	0.65	U	0.56	U
SP07 ENDOSULFAN I, BY GC/EC	UG/KG	0.96	U	0.86	U	0.90	U	0.86	U	0.75	U
SP08 ENDOSULFAN II, BY GC/EC	UG/KG	7.2	U	6.5	U	6.7	U	6.5	U	5.6	U
SP09 ENDOSULFAN SULFATE, BY GC/EC	UG/KG	0.73		0.65	U	0.68	U	0.65	U	0.56	U
SP10 ENDRIN, BY GC/EC	UG/KG	1.9	U	1.7	U	1.8	U	1.7	U	1.5	U
SP11 ENDRIN ALDEHYDE, BY GC/EC	UG/KG	0.48	U	0.43	U	0.45	U	0.43	U	0.38	U
SP13 DDE-4,4'-	UG/KG	0.72	U	0.65	U	0.68	U	0.65	U	0.56	U
SP14 DDD-4,4'-	UG/KG	7.2	U	6.5	U	6.7	U	6.5	U	5.6	U
SP15 DDT-4,4'-	UG/KG	0.96	U	0.86	U	0.90	U	0.86	U	0.75	U
SP16 TOXAPHENE, BY GC/EC	UG/KG	48	U	43	U	45	U	43	U	38	U
SP17 PCB-AROCLOR 1016	UG/KG	48	U	43	U	45	U	43	U	38	
SP18 PCB-AROCLOR 1221	UG/KG	24	U	22	U	22	U	22	U	19	
SP19 PCB-AROCLOR 1232	UG/KG	9.6	U	8.6	U	9.0	U	8.6	U	7.5	U
SP20 PCB-AROCLOR 1242	UG/KG	9.6	U	8.6	U	9.0	U	8.6	U	7.5	U
SP21 PCB-AROCLOR 1248	UG/KG	19	U	17	U	18	U	17	U	15	U
SP22 PCB-AROCLOR 1254	UG/KG	4.8	U	4.3	U	4.5	U	4.3	U	3.8	U
SP23 PCB-AROCLOR 1260	UG/KG	7.2	U	6.5	U	6.7	U	6.5	U	5.6	U
SP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/KG	1.9	U	1.7	U	1.8	U	1.7	U	1.5	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	605		606		607		608		609	
SP25 HEPTACHLOR, BY GC/EC	UG/KG	0.96	U	0.86	U	0.90	U	0.86	U	0.75	U
SP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/KG	0.48	U	0.43	U	0.45	U	0.43	U	0.38	U
SP34 CHLORDANE, ALPHA	UG/KG	2.4	U	2.2	U	2.2	U	2.2	U	1.9	U
SP36 CHLORDANE, GAMMA	UG/KG	2.4	U	2.2	U	2.2	U	2.2	U	1.9	U
SP60 METHOXYCHLOR, BY GC/EC	UG/KG	1.2	U	1.1	U	1.1	U	1.1	U	0.94	U
SP61 ENDRIN KETONE, BY GC/EC	UG/KG	0.48	U	0.43	U	0.45	U	0.43	U	0.38	U
SS01 PHENOL, BY GC/MS	UG/KG	100	U	450	U	470	U	89	U	78	"
SS02 CARBAZOLE	UG/KG	62	U	280	U	290	U	55	U	48	
SS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/KG	57	U	260	U	270	U	51	U	44	U
SS04 CHLOROPHENOL, 2-	UG/KG	76	U	340	U	360	U	68	U	59	U
SS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/KG	38	U	170	U	180	U	34	U	30	U
SS06 DICHLOROBENZENE,1,4-	UG/KG	24	U	110	U	110	U	21	U	18	U
SS07 BENZYL ALCOHOL	UG/KG	47	U	210	U	220	U	43	U	37	U
SS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/KG	28	U	130	U	130	U	26	U	22	U
SS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/KG	130	U	580	U	600	U	120	U	100	U
SS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/KG	24	U	110	U	110	U	21	U	18	U
SS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/KG	110	U	490	U	510	U	98	U	85	U
SS12 N-NITROSODIPROPYLAMINE	UG/KG	57	U	260	U	270	U	51	U	44	U
SS13 HEXACHLOROETHANE, BY GC/MS	UG/KG	19	U	86	U	89	U	17	U	15	
SS14 NITROBENZENE, BY GC/MS	UG/KG	24	U	110	U	110	U	21	U	18	
SS15 ISOPHORONE, BY GC/MS	UG/KG	43	U	190	U	200	U	38	U	33	U
SS16 NITROPHENOL,2-	UG/KG	66	U	300	U	310	U	60	U	52	U
SS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/KG	62	U	280	U	290	U	55	U	48	U
SS18 BENZOIC ACID, BY GC/MS	UG/KG	220	U	980	U	1000	U	200	U	170	U
SS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/KG	47	U	210	U	220	U	43	U	37	U
SS20 DICHLOROPHENOL, 2,4-	UG/KG	90	U	410	U	420	U	81	U	70	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	605		606		607		608		609	
SS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/KG	14	U	64	U	67	U	13	U	11	U
SS22 NAPHTHALENE, BY GC/MS	UG/KG	24	U	110	U	110	U	21	U	18	U
SS23 CHLOROANILINE,4-	UG/KG	190	U	860	U	890	U	170	U	150	U
SS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/KG	14	U	64	U	67	U	13	U	11	U
SS25 PHENOL,4-CHLORO-3-METHYL	UG/KG	90	U	410	U	420	U	81	U	70	U
SS26 METHYLNAPHTHALENE, 2-	UG/KG	28	U	130	U	130	U	26	U	22	U
SS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/KG	14	U	64	U	67	U	13	U	11	U
SS28 TRICHLOROPHENOL,2,4,6	UG/KG	85	U	380	U	400	U	77	U	67	
SS29 TRICHLOROPHENOL,2,4,5	UG/KG	100	U	450	U	470	U	89	U	78	U
SS30 CHLORONAPHTHALENE, 2-	UG/KG	33	U	150	U	160	U	30	U	26	U
SS31 NITROANILINE,2-	UG/KG	43	U	190	U	200	U	38	U	33	U
SS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/KG	38	U	170	U	180	U	34	U	30	U
SS33 ACENAPHTHYLENE, BY GC/MS	UG/KG	33	U	150	U	160	U	30	U	26	U
SS34 NITROANILINE,3-	UG/KG	130	U	580	U	600	U	120	U	100	U
SS35 ACENAPHTHENE, BY GC/MS	UG/KG	33	U	150	U	160	U	30	U	26	U
SS36 DINITROPHENOL,2,4, BY GC/MS	UG/KG	280	U	1300	U	1300	U	260	U	220	U
SS37 NITROPHENOL,4-	UG/KG	14	U	64	U	67	U	13	U	11	U
SS38 DIBENZOFURAN	UG/KG	43	U	190	U	200	U	38	U	33	U
SS39 DINITROTOLUENE,2,4, BY GC/MS	UG/KG	110	U	490	U	510	U	98	U	85	
SS40 DINITROTOLUENE,2,6-	UG/KG	47	U	210	U	220	U	43	U	37	
SS41 PHTHALATE, DIETHYL, BY GC/MS	UG/KG	80	U	360	U	380	U	72	U	63	U
SS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/KG	43	U	190	U	200	U	38	U	33	U
SS43 FLUORENE, GC/MS	UG/KG	76	U	340	U	360	U	68	U	59	U
SS44 NITROANILINE,4-	UG/KG	310	U	1400	U	1400	U	280	U	240	U
SS45 PHENOL,4,6-DINITRO-2-METHYL	UG/KG	110	U	510	U	540	U	100	U	89	U
SS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/KG	9.5	U	43	U	45	U	8.5	U	7.4	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	605		606		607		608		609	
SS47 ETHER, 4-BROMOPHENYL PHENYL	UG/KG	43	U	190	U	200	U	38	U	33	U
SS48 HEXACHLOROBENZENE, BY GC/MS	UG/KG	38	U	170	U	180	U	34	U	30	U
SS49 PENTACHLOROPHENOL, BY GC/MS	UG/KG	100	U	450	U	470	U	89	U	78	U
SS50 PHENANTHRENE, BY GC/MS	UG/KG	38	U	170	U	180	U	34	U	30	U
SS51 ANTHRACENE, BY GC/MS	UG/KG	52	U	240	U	240	U	47	U	41	U
SS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/KG	62	U	280	U	290	U	55	U	93	
SS53 FLUORANTHENE, BY GC/MS	UG/KG	19	U	86	U	89	U	17	U	15	"
SS54 PYRENE, BY GC/MS	UG/KG	57	U	260	U	270	U	51	U	44	
SS55 PHTHALATE, BUTYL BENZYL	UG/KG	52	U	240	U	240	U	47	U	41	U
SS56 DICHLOROBENZIDINE, 3,3'	UG/KG	950	U	4300	U	4500	U	850	U	740	U
SS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/KG	71	U	320	U	330	U	64	U	56	U
SS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/KG	85	U	380	U	400	U	77	U	67	U
SS59 CHRYSENE, BY GC/MS	UG/KG	57	U	260	U	270	U	51	U	44	U
SS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/KG	33	U	150	U	160	U	30	U	26	U
SS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/KG	33	U	150	U	160	U	30	U	26	U
SS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/KG	62	U	280	U	290	U	55	U	48	U
SS63 PYRENE, BENZO(A), BY GC/MS	UG/KG	71	U	320	U	330	U	64	U	56	U
SS64 PYRENE, INDENO(1,2,3-CD)	UG/KG	100	U	450	U	470	U	89	U	78	U
SS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/KG	100	U	450	U	470	U	89	U	78	
SS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/KG	66	U	300	U	310	U	60	U	52	
SV03 CHLOROMETHANE, BY GC/MS	UG/KG	28	U	25	U	20	U	28	U	16	U
SV04 BROMOMETHANE, BY GC/MS	UG/KG	56	U	49	U	39	U	55	U	32	U
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG	42	U	37	U	30	U	41	U	24	U
SV06 CHLOROETHANE, BY GC/MS	UG/KG	42	U	37	U	30	U	41	U	24	U
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG	28	U	25	U	20	U	28	U	16	U
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG	14	U	12	U	10	U	14	U	8	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	605	606	607	608	609
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV10 DICHLOROETHYLENE,TRANS-1,2	UG/KG	14 U	12 U	10 U	14 U	8 U
SV11 CHLOROFORM, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8
SV17 BENZENE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG	14 U	12 U	10 U	14 U	8 U
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV24 BROMOFORM, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV26 TOLUENE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV28 CHLOROBENZENE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8
SV29 ETHYL BENZENE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8
SV30 ACETONE, BY GC/MS	UG/KG	39 U	56 U	22 U	29 U	16 U
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U
SV32 METHYL ETHYL KETONE	UG/KG	28 U	25 U	20 U	28 U	16 U
SV34 HEXANONE, 2-	UG/KG	28 U	25 U	20 U	28 U	16 U
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG	28 U	25 U	20 U	28 U	16 U
SV36 STYRENE, BY GC/MS	UG/KG	14 U	12 U	10 U	14 U	8 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	605	606	607	608	609
SV44 DICHLOROBENZENE,1,4-	UG/KG	14 U	12 U	10 U	14 U	8 U
SV49 XYLENE, ORTHO	UG/KG	14 U	12 U	10 U	14 U	8 U
SV57 XYLENE, M AND/OR P	UG/KG	28 U	25 U	20 U	28 U	16 U
SV60 DICHLOROBENZENE, 1, 3-	UG/KG	14 U	12 U	10 U	14 U	8 U
SV61 DICHLOROBENZENE, 1, 2-	UG/KG	14 U	12 U	10 U	14 U	8 U
SV63 DICHLOROETHYLENE, CIS -1,2	UG/KG	14 U	12 U	10 U	14 U	8 U
ZZ01 SAMPLE NUMBER	NA	605	606	607	608	609
ZZ02 ACTIVITY CODE	NA	ASYXG	ASYXG	ASYXG	ASYXG	ASYXG
ZZ11 ANALYSIS DATE (MM/DD/YY) - ANALYSIS TIM			05/04/99 1626			

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	701		702		703		801 F	802	
WF01 TEMPERATURE, WATER	'C	14.9		16.0		16.4				
WF05 PH, FIELD	SU	7.17		6.96		7.17				
WF10 CONDUCTIVITY (FIELD)	UMHOS	0.482		0.97		0.592				
WG30 TURBIDITY	NTU					5				
WH01 2,4-D	UG/L	1.2	U	1.2	U	1.2	U		1.2	U
WH02 2,4,5-TP(SILVEX)	UG/L	0.17	U	0.17	U	0.17	U		0.17	U
WH03 2,4,5-T	UG/L	0.20	U	0.20	U	0.20	U		0.20	U
WM01 SILVER, TOTAL, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U		7.24	
WM02 ALUMINUM, TOTAL, BY ICAP	UG/L	33.5	U	33.5	U	33.5	U		33.5	U
WM04 BARIUM, TOTAL, BY ICAP	UG/L	88.9		180		97.7			2.09	U
WM05 BERYLLIUM, TOTAL, BY ICAP	UG/L	0.420	U	0.420	U	0.420	U		0.420	U
WM06 CADMIUM, TOTAL, BY ICAP	UG/L	0.592	U	0.592	U	1.49	U		1.05	U
WM07 COBALT, TOTAL, BY ICAP	UG/L	2.47	U	2.47	U	2.47	U		2.47	U
WM08 CHROMIUM, TOTAL, BY ICAP	UG/L	3.98		3.69	U	3.69	U		3.69	U
WM09 COPPER, TOTAL, BY ICAP	UG/L	1.54	U	1.54	U	33.5			1.54	U
WM10 IRON, TOTAL, BY ICAP	UG/L	1380		220		379			523	
WM11 MANGANESE, TOTAL, BY ICAP	UG/L	17.8		165		4.65			4.25	
WM12 MOLYBDENUM, TOTAL, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U		4.41	U
WM13 NICKEL, TOTAL, BY ICAP	UG/L	6.23	U	6.23	U	6.23	U		6.23	U
WM17 TITANIUM, TOTAL, BY ICAP	UG/L	4.18	U	4.18	U	4.18	U		4.18	U
WM19 VANADIUM, TOTAL, BY ICAP	UG/L	2.51	U	2.51	U	2.51	U		2.51	U
WM20 ZINC, TOTAL, BY ICAP	UG/L	32.4	U	4.07	U	126			43.2	U
WM21 CALCIUM, TOTAL, BY ICAP	MG/L	55.2		88.0		52.2			0.530	U
WM22 MAGNESIUM, TOTAL, BY ICAP	MG/L	24.6		43.7		27.0			0.500	U
WM23 SODIUM, TOTAL, BY ICAP	MG/L	29.2		74.0		64.5			1.50	U
WM24 POTASSIUM, TOTAL, BY ICAP	MG/L	2.98		2.87		3.82			0.510	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	701		702		703		801 F	802	
WM27 ARSENIC, TOTAL, BY AA	UG/L	1.66	U	1.66	U	1.66	U		1.66	U
WM30 LEAD, TOTAL, BY AA	UG/L	0.557	U	0.557	U	0.557	U		0.557	U
WM31 ANTIMONY, TOTAL, BY AA	UG/L	4.37	U	4.37	U	4.37	U		4.37	U
WM32 SELENIUM, TOTAL, BY AA	UG/L	1.81	U	1.81	U	1.81	U		1.81	U
WM33 THALLIUM, TOTAL, BY AA	UG/L	1.44	U	1.44	U	1.44	U		1.44	U
WM34 MERCURY, TOTAL, BY COLD VAPOR AA	UG/L	0.127	U	0.127	U	0.127	U		0.127	U
WM35 SILVER, DISSOLVED, BY ICAP	UG/L	7.24	U	7.24	U	7.24	U		7.24	U
WM36 ALUMINUM, DISSOLVED, BY ICAP	UG/L	33.5	U	33.5	U	33.5	U		33.5	
WM38 BARIUM, DISSOLVED, BY ICAP	UG/L	91.7		181		99.3			0.743	U
WM39 BERYLLIUM, DISSOLVED, BY ICAP	UG/L	0.420	U	0.420	U	0.420	U		0.420	U
WM40 CADMIUM, DISSOLVED, BY ICAP	UG/L	2.17	U	1.28	U	0.592	U		1.88	U
WM41 COBALT, DISSOLVED, BY ICAP	UG/L	2.47	U	2.47	U	2.47	U		3.93	
WM42 CHROMIUM, DISSOLVED, BY ICAP	UG/L	3.69	U	3.69	U	3.69	U		3.69	U
WM43 COPPER, DISSOLVED, BY ICAP	UG/L	1.54	U	1.54	U	23.7			1.54	U
WM44 IRON, DISSOLVED, BY ICAP	UG/L	55.6		61.2		29.3	U		29.3	U
WM45 MANGANESE, DISSOLVED, BY ICAP	UG/L	13.8		160		2.01			1.45	U
WM46 MOLYBDENUM, DISSOLVED, BY ICAP	UG/L	4.41	U	4.41	U	4.41	U		4.41	U
WM47 NICKEL, DISSOLVED, BY ICAP	UG/L	6.23	U	6.23	U	6.23	U		6.23	U
WM51 TITANIUM, DISSOLVED, BY ICAP	UG/L	4.18	U	4.18	U	4.18	U		4.18	
WM53 VANADIUM, DISSOLVED, BY ICAP	UG/L	2.51	U	2.51	U	2.51	U		2.51	
WM54 ZINC, DISSOLVED, BY ICAP	UG/L	46.3		54.6		185			4.07	U
WM55 CALCIUM, DISSOLVED, BY ICAP	MG/L	59.6		90.8		54.6			0.530	U
WM56 MAGNESIUM, DISSOLVED, BY ICAP	MG/L	25.0		42.9		26.6			0.500	U
WM57 SODIUM, DISSOLVED, BY ICAP	MG/L	30.2		73.9		64.4			1.50	U
WM58 POTASSIUM, DISSOLVED, BY ICAP	MG/L	2.99		2.68		3.62			0.510	U
WM59 ANTIMONY, DISSOLVED, BY AA	UG/L	4.37	U	4.37	U	4.37	U		4.37	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	701		702		703		801 F	802	
WN60 ARSENIC, DISSOLVED, BY AA	UG/L	1.66	U	1.66	U	1.66	U		1.66	U
WN63 LEAD, DISSOLVED, BY AA	UG/L	0.557	U	0.557	U	0.557	U		0.557	U
WN64 SELENIUM, DISSOLVED, BY AA	UG/L	1.81	U	1.81	U	1.81	U		1.81	U
WN66 THALLIUM, DISSOLVED, BY AA	UG/L	1.44	U	1.44	U	1.44	U		1.44	U
WN68 MERCURY, DISSOLVED, BY COLD VAPOR AA	UG/L	0.100	U	0.100	U	0.100	U		0.100	U
WP01 BHC, ALPHA, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U		0.0040	U
WP02 BHC, BETA, BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U		0.0050	U
WP03 BHC, DELTA	UG/L	0.0080	U	0.0080	U	0.0080	U		0.0080	
WP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U		0.0050	U
WP05 ALDRIN, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U		0.0040	U
WP06 DIELDRIN, BY GC/EC	UG/L	0.0060	U	0.0060	U	0.0060	U		0.0060	U
WP07 ENDOSULFAN I, BY GC/EC	UG/L	0.0090	U	0.0090	U	0.0090	U		0.0090	U
WP08 ENDOSULFAN II, BY GC/EC	UG/L	0.070	U	0.070	U	0.070	U		0.070	U
WP09 ENDOSULFAN SULFATE, BY GC/EC	UG/L	0.0070	U	0.0070	U	0.0070	U		0.0070	U
WP10 ENDRIN, BY GC/EC	UG/L	0.020	U	0.020	U	0.020	U		0.020	U
WP11 ENDRIN ALDEHYDE, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U		0.0040	U
WP13 DDE, 4,4'-	UG/L	0.0060	U	0.0060	U	0.0060	U		0.0060	U
WP14 DDD, 4,4'-	UG/L	0.060	U	0.060	U	0.060	U		0.060	U
WP15 DDT, 4,4'-	UG/L	0.010	U	0.010	U	0.010	U		0.010	
WP16 TOXAPHENE, BY GC/EC	UG/L	0.50	U	0.50	U	0.50	U		0.50	
WP17 PCB-AROCLOR 1016	UG/L	0.40	U	0.40	U	0.40	U		0.40	U
WP18 PCB-AROCLOR 1221	UG/L	0.30	U	0.30	U	0.30	U		0.30	U
WP19 PCB-AROCLOR 1232	UG/L	0.10	U	0.10	U	0.10	U		0.10	U
WP20 PCB-AROCLOR 1242	UG/L	0.10	U	0.10	U	0.10	U		0.10	U
WP21 PCB-AROCLOR 1248	UG/L	0.20	U	0.20	U	0.20	U		0.20	U
WP22 PCB-AROCLOR 1254	UG/L	0.067	U	0.091	U	0.074	U		0.050	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	701		702		703		801 F	802	
WP23 PCB-AROCLOR 1260	UG/L	0.060	U	0.060	U	0.060	U		0.060	U
WP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/L	0.020	U	0.020	U	0.020	U		0.020	U
WP25 HEPTACHLOR, BY GC/EC	UG/L	0.0090	U	0.0090	U	0.0090	U		0.0090	U
WP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/L	0.0040	U	0.0040	U	0.0040	U		0.0040	U
WP83 ENDRIN KETONE, BY GC/EC	UG/L	0.0050	U	0.0050	U	0.0050	U		0.0050	U
WP84 METHOXYCHLOR, BY GC/EC	UG/L	0.010	U	0.010	U	0.010	U		0.010	U
WP85 CHLORDANE, ALPHA	UG/L	0.025	U	0.025	U	0.025	U		0.025	"
WP86 CHLORDANE, GAMMA	UG/L	0.025	U	0.025	U	0.025	U		0.025	
WS01 PHENOL, BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U		0.7	U
WS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/L	1.5	U	1.5	U	1.5	U		1.5	U
WS04 CHLOROPHENOL, 2-	UG/L	1.4	U	1.4	U	1.4	U		1.4	U
WS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/L	1.1	U	1.1	U	1.1	U		1.1	U
WS06 DICHLOROBENZENE,1,4-	UG/L	1.2	U	1.2	U	1.2	U		1.2	U
WS07 BENZYL ALCOHOL	UG/L	0.7	U	0.7	U	0.7	U		0.7	U
WS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/L	1.2	U	1.2	U	1.2	U		1.2	U
WS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/L	1.2	U	1.2	U	1.2	U		1.2	U
WS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U		0.7	U
WS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/L	1.6	U	1.6	U	1.6	U		1.6	U
WS12 N-NITROSODIPROPYLAMINE	UG/L	0.8	U	0.8	U	0.8	U		0.8	
WS13 HEXACHLOROETHANE, BY GC/MS	UG/L	1.2	U	1.2	U	1.2	U		1.2	
WS14 NITROBENZENE, BY GC/MS	UG/L	0.8	U	0.8	U	0.8	U		0.8	U
WS15 ISOPHORONE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U		2.5	U
WS16 NITROPHENOL,2-	UG/L	1	U	1	U	1	U		1	U
WS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/L	1	U	1	U	1	U		1	U
WS18 BENZOIC ACID, BY GC/MS	UG/L	10	U	10	U	10	U		10	U
WS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U		0.7	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	701		702		703		801 F	802	
WS20 DICHLOROPHENOL, 2,4-	UG/L	1.6	U	1.6	U	1.6	U		1.6	U
WS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U		2.5	U
WS22 NAPHTHALENE, BY GC/MS	UG/L	1	U	1	U	1	U		1	U
WS23 CHLOROANILINE,4-	UG/L	2.5	U	2.5	U	2.5	U		2.5	U
WS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/L	1	U	1	U	1	U		1	U
WS25 PHENOL,4-CHLORO-3-METHYL	UG/L	1.4	U	1.4	U	1.4	U		1.4	U
WS26 METHYLNAPHTHALENE, 2-	UG/L	0.9	U	0.9	U	0.9	U		0.9	"
WS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/L	5	U	5	U	5	U		5	
WS28 TRICHLOROPHENOL,2,4,6	UG/L	1.2	U	1.2	U	1.2	U		1.2	U
WS29 TRICHLOROPHENOL,2,4,5	UG/L	1.5	U	1.5	U	1.5	U		1.5	U
WS30 CHLORONAPHTHALENE, 2-	UG/L	0.8	U	0.8	U	0.8	U		0.8	U
WS31 NITROANILINE,2-(ORTHO)	UG/L	2.5	U	2.5	U	2.5	U		2.5	U
WS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/L	0.5	U	0.5	U	0.5	U		0.5	U
WS33 ACENAPHTHYLENE, BY GC/MS	UG/L	0.7	U	0.7	U	0.7	U		0.7	U
WS34 NITROANILINE,3-	UG/L	5	U	5	U	5	U		5	U
WS35 ACENAPHTHENE, BY GC/MS	UG/L	0.6	U	0.6	U	0.6	U		0.6	U
WS36 DINITROPHENOL,2,4, BY GC/MS	UG/L	10	U	10	U	10	U		10	U
WS37 NITROPHENOL,4-	UG/L	6.8	U	6.8	U	6.8	U		6.8	U
WS38 DIBENZOFURAN	UG/L	0.6	U	0.6	U	0.6	U		0.6	
WS39 DINITROTOLUENE,2,4, BY GC/MS	UG/L	5	U	5	U	5	U		5	
WS40 DINITROTOLUENE,2,6-	UG/L	2.5	U	2.5	U	2.5	U		2.5	U
WS41 PHTHALATE, DIETHYL, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U		2.5	U
WS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/L	2.5	U	2.5	U	2.5	U		2.5	U
WS43 FLUORENE, BY GC/MS	UG/L	2.5	U	2.5	U	2.5	U		2.5	U
WS44 NITROANILINE,4-	UG/L	7.9	U	7.9	U	7.9	U		7.9	U
WS45 PHENOL,4,6-DINITRO-2-METHYL	UG/L	5	U	5	U	5	U		5	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	701	702	703	801 F	802
WS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/L	0.5 U	0.5 U	0.5 U		0.5 U
WS47 ETHER, 4-BROMOPHENYL PHENYL	UG/L	2.5 U	2.5 U	2.5 U		2.5 U
WS48 HEXACHLOROBENZENE, BY GC/MS	UG/L	2.5 U	2.5 U	2.5 U		2.5 U
WS49 PENTACHLOROPHENOL, BY GC/MS	UG/L	10 U	10 U	10 U		10 U
WS50 PHENANTHRENE, BY GC/MS	UG/L	0.6 U	0.6 U	0.6 U		0.6 U
WS51 ANTHRACENE, BY GC/MS	UG/L	2.5 U	2.5 U	2.5 U		2.5 U
WS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/L	2.5 U	2.5 U	2.5 U		3
WS53 FLUORANTHENE, BY GC/MS	UG/L	2.5 U	2.5 U	2.5 U		2.5
WS54 PYRENE, BY GC/MS	UG/L	5 U	5 U	5 U		5 U
WS55 PHTHALATE, BUTYL BENZYL	UG/L	5 U	5 U	5 U		5 U
WS56 DICHLOROBENZIDINE, 3,3'	UG/L	12 U	12 U	12 U		12 U
WS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/L	5 U	5 U	5 U		5 U
WS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/L	2.5 U	2.5 U	2.5 U		2.5 U
WS59 CHRYSENE, BY GC/MS	UG/L	5 U	5 U	5 U		5 U
WS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/L	5 U	5 U	5 U		5 U
WS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/L	5 U	5 U	5 U		5 U
WS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/L	5 U	5 U	5 U		5 U
WS63 PYRENE, BENZO(A), BY GC/MS	UG/L	5 U	5 U	5 U		5 U
WS64 PYRENE, INDENO(1,2,3-CD)	UG/L	5 U	5 U	5 U		5
WS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/L	5 U	5 U	5 U		5
WS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/L	5 U	5 U	5 U		5 U
WS67 CARBAZOLE	UG/L	5 U	5 U	5 U		5 U
WW40 CHLOROMETHANE, BY GC/MS LOL	UG/L	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
WW41 BROMOMETHANE, BY GC/MS LOL	UG/L	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
WW42 VINYL CHLORIDE, BY GC/MS LOL	UG/L	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
WW43 CHLOROETHANE, BY GC/MS LOL	UG/L	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	701		702		703		801 F		802	
VW44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	1.2	U	1.2	U	1.2	U	3.8	U	1.2	U
VW45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
VW46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
VW48 CHLOROFORM, BY GC/MS LDL	UG/L	0.36	U	0.36	U	0.36	U	0.36	U	0.36	U
VW49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	0.37	U	0.37	U	0.37	U	0.37	U	0.37	U
VW50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	0.58	U	0.58	U	0.58	U	0.58	U	0.58	U
VW51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U
VW52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	0.28	U	0.28	U	0.28	U	0.28	U	0.28	
VW53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U	0.43	U	0.43	U
VW54 BENZENE, BY GC/MS LDL	UG/L	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
VW55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
VW56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	0.63	U	0.63	U	0.63	U	0.63	U	0.63	U
VW57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	0.29	U	0.29	U	0.29	U	0.29	U	0.29	U
VW58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	0.38	U	0.38	U	0.38	U	0.38	U	0.38	U
VW59 BROMOFORM, BY GC/MS LDL	UG/L	0.17	U	0.17	U	0.17	U	0.17	U	0.17	U
VW60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	U
VW61 TOLUENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U	0.54	U	0.54	U
VW62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	0.64	U	0.64	U	0.64	U	0.64	U	0.64	U
VW63 CHLOROBENZENE, BY GC/MS LDL	UG/L	0.23	U	0.23	U	0.23	U	0.23	U	0.41	
VW64 ETHYLBENZENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U	0.31	U	0.31	
VW65 ACETONE, BY GC/MS LDL	UG/L	9.0	U	9.0	U	9.0	U	9.0	U	9.0	U
VW66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
VW67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	3.0	U	3.0	U	3.0	U	6.4		3.0	U
VW68 HEXANONE, 2- BY GC/MS LDL	UG/L	3.2	U	3.2	U	3.2	U	3.2	U	3.2	U
VW69 4-METHYL-2-PENTANONE (MIBK) BY GC/MS LD	UG/L	0.79	U	0.79	U	0.79	U	0.79	U	0.79	U
VW70 STYRENE, BY GC/MS LDL	UG/L	0.34	U	0.34	U	0.34	U	0.34	U	0.34	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	701	702	703	801 F	802
VW72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U
VW73 XYLENE, M AND/OR P BY GC/MS LOL	UG/L	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
VW74 XYLENE, ORTHO BY GC/MS LOL	UG/L	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
VW75 DICHLOROBENZENE, 1,4- (PARA) BY GC/MS L	UG/L	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U
VW76 DICHLOROBENZENE, 1,3- (META) BY GC/MS L	UG/L	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
VW77 DICHLOROBENZENE, 1,2- (ORTHO) BY GC/MS	UG/L	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U
VW78 DICHLOROETHYLENE, 1,2- (TRANS) BY GC/MS	UG/L	0.84 U	0.84 U	0.84 U	0.84 U	0.84 "
VW79 DICHLOROETHYLENE, 1,2- (CIS) BY GC/MS L	UG/L	0.84 U	0.84 U	0.84 U	0.84 U	0.84
ZZ01 SAMPLE NUMBER	NA	701	702	703	801	802
ZZ02 ACTIVITY CODE	NA	ASYXG	ASYXG	ASYXG	ASYXG	ASYXG

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	803 F	804	805 F	806 F	
SG07 SOLIDS, PERCENT	%				99.3	
SV03 CHLOROMETHANE, BY GC/MS	UG/KG				14 U	
SV04 BROMOMETHANE, BY GC/MS	UG/KG				29 U	
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG				22 U	
SV06 CHLOROETHANE, BY GC/MS	UG/KG				22 U	
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG				14 U	
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG				7 U	
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG				7 U	
SV10 DICHLOROETHYLENE,TRANS-1,2	UG/KG				7 U	
SV11 CHLOROFORM, BY GC/MS	UG/KG				7 U	
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG				7 U	
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG				7 U	
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG				7 U	
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG				7 U	
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG				7 U	
SV17 BENZENE, BY GC/MS	UG/KG				7 U	
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG				7 U	
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG				7 U	
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG				7 U	
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG				7 U	
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG				7 U	
SV24 BROMOFORM, BY GC/MS	UG/KG				7 U	
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG				7 U	
SV26 TOLUENE, BY GC/MS	UG/KG				7 U	
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG				7 U	
SV28 CHLOROBENZENE, BY GC/MS	UG/KG				7 U	

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	803	F	804		805	F	806	F	
SV29 ETHYL BENZENE, BY GC/MS	UG/KG							7	U	
SV30 ACETONE, BY GC/MS	UG/KG							79	U	
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG							7	U	
SV32 METHYL ETHYL KETONE	UG/KG							14	U	
SV34 HEXANONE, 2-	UG/KG							14	U	
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG							14	U	
SV36 STYRENE, BY GC/MS	UG/KG							7	U	
SV44 DICHLOROBENZENE,1,4-	UG/KG							7	U	
SV49 XYLENE, ORTHO	UG/KG							7	U	
SV57 XYLENE, M AND/OR P	UG/KG							14	U	
SV60 DICHLOROBENZENE, 1, 3-	UG/KG							7	U	
SV61 DICHLOROBENZENE, 1, 2-	UG/KG							7	U	
SV63 DICHLOROETHYLENE, CIS -1,2	UG/KG							7	U	
WH01 2,4-D	UG/L	1.2	U	1.2	U					
WH02 2,4,5-TP(SILVEX)	UG/L	0.17	U	0.17	U					
WH03 2,4,5-T	UG/L	0.20	U	0.20	U					
WM01 SILVER, TOTAL, BY ICAP	UG/L	7.24	U	7.24	U					
WM02 ALUMINUM, TOTAL, BY ICAP	UG/L	717		370						
WM04 BARIUM, TOTAL, BY ICAP	UG/L	1.65	U	51.4						
WM05 BERYLLIUM, TOTAL, BY ICAP	UG/L	0.420	U	0.420	U					
WM06 CADMIUM, TOTAL, BY ICAP	UG/L	0.592	U	0.852	U					
WM07 COBALT, TOTAL, BY ICAP	UG/L	2.47	U	2.47	U					
WM08 CHROMIUM, TOTAL, BY ICAP	UG/L	3.69	U	3.69	U					
WM09 COPPER, TOTAL, BY ICAP	UG/L	1.54	U	1.54	U					
WM10 IRON, TOTAL, BY ICAP	UG/L	35.9	U	2920						
WM11 MANGANESE, TOTAL, BY ICAP	UG/L	1.45	U	617						

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	803	F	804		805	F	806	F	
WW12 MOLYBDENUM, TOTAL, BY ICAP	UG/L	4.41	U	4.41	U					
WW13 NICKEL, TOTAL, BY ICAP	UG/L	6.23	U	6.23	U					
WW17 TITANIUM, TOTAL, BY ICAP	UG/L	4.18	U	6.31						
WW19 VANADIUM, TOTAL, BY ICAP	UG/L	2.51	U	2.51	U					
WW20 ZINC, TOTAL, BY ICAP	UG/L	8.32	U	4.07	U					
WW21 CALCIUM, TOTAL, BY ICAP	MG/L	0.530	U	151						
WW22 MAGNESIUM, TOTAL, BY ICAP	MG/L	0.500	U	68.4						
WW23 SODIUM, TOTAL, BY ICAP	MG/L	1.50	U	75.8						
WW24 POTASSIUM, TOTAL, BY ICAP	MG/L	0.510	U	6.75						
WW27 ARSENIC, TOTAL, BY AA	UG/L	1.66	U	1.66	U					
WW30 LEAD, TOTAL, BY AA	UG/L	0.557	U	4.36						
WW31 ANTIMONY, TOTAL, BY AA	UG/L	4.37	U	4.37	U					
WW32 SELENIUM, TOTAL, BY AA	UG/L	1.81	U	1.81	U					
WW33 THALLIUM, TOTAL, BY AA	UG/L	1.44	U	1.44	U					
WW34 MERCURY, TOTAL, BY COLD VAPOR AA	UG/L	0.127	U	0.127	U					
WW35 SILVER, DISSOLVED, BY ICAP	UG/L	7.24	U	7.24	U					
WW36 ALUMINUM, DISSOLVED, BY ICAP	UG/L	33.5	U	33.5	U					
WW38 BARIUM, DISSOLVED, BY ICAP	UG/L	0.743	U	42.4						
WW39 BERYLLIUM, DISSOLVED, BY ICAP	UG/L	0.420	U	0.420	U					
WW40 CADMIUM, DISSOLVED, BY ICAP	UG/L	1.26	U	2.55	U					
WW41 COBALT, DISSOLVED, BY ICAP	UG/L	2.47	U	3.55						
WW42 CHROMIUM, DISSOLVED, BY ICAP	UG/L	3.69	U	3.69	U					
WW43 COPPER, DISSOLVED, BY ICAP	UG/L	1.54	U	1.54	U					
WW44 IRON, DISSOLVED, BY ICAP	UG/L	29.3	U	624						
WW45 MANGANESE, DISSOLVED, BY ICAP	UG/L	1.45	U	1020						
WW46 MOLYBDENUM, DISSOLVED, BY ICAP	UG/L	4.41	U	4.41	U					

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	803 F	804	805 F	806 F	
WM47 NICKEL, DISSOLVED, BY ICAP	UG/L	6.23 U	6.23 U			
WM51 TITANIUM, DISSOLVED, BY ICAP	UG/L	4.18 U	4.18 U			
WM53 VANADIUM, DISSOLVED, BY ICAP	UG/L	2.51 U	2.51 U			
WM54 ZINC, DISSOLVED, BY ICAP	UG/L	4.07 U	116			
WM55 CALCIUM, DISSOLVED, BY ICAP	MG/L	0.530 U	267			
WM56 MAGNESIUM, DISSOLVED, BY ICAP	MG/L	0.500 U	107			
WM57 SODIUM, DISSOLVED, BY ICAP	MG/L	1.50 U	97.8			
WM58 POTASSIUM, DISSOLVED, BY ICAP	MG/L	0.510 U	6.55			
WM59 ANTIMONY, DISSOLVED, BY AA	UG/L	4.37 U	4.37 U			
WM60 ARSENIC, DISSOLVED, BY AA	UG/L	1.66 U	1.66 U			
WM63 LEAD, DISSOLVED, BY AA	UG/L	0.557 U	0.557 U			
WM64 SELENIUM, DISSOLVED, BY AA	UG/L	1.81 U	1.81 U			
WM66 THALLIUM, DISSOLVED, BY AA	UG/L	1.44 U	1.44 U			
WM68 MERCURY, DISSOLVED, BY COLD VAPOR AA	UG/L	0.100 U	0.100 U			
WP01 BHC, ALPHA, BY GC/EC	UG/L	0.0040 U	0.0040 U			
WP02 BHC, BETA, BY GC/EC	UG/L	0.0050 U	0.0050 U			
WP03 BHC, DELTA	UG/L	0.0080 U	0.0080 U			
WP04 BHC, GAMMA-(LINDANE), BY GC/EC	UG/L	0.0050 U	0.0050 U			
WP05 ALDRIN, BY GC/EC	UG/L	0.0040 U	0.0040 U			
WP06 DIELDRIN, BY GC/EC	UG/L	0.0060 U	0.0060 U			
WP07 ENDOSULFAN I, BY GC/EC	UG/L	0.0090 U	0.0090 U			
WP08 ENDOSULFAN II, BY GC/EC	UG/L	0.070 U	0.070 U			
WP09 ENDOSULFAN SULFATE, BY GC/EC	UG/L	0.0070 U	0.0070 U			
WP10 ENDRIN, BY GC/EC	UG/L	0.020 U	0.020 U			
WP11 ENDRIN ALDEHYDE, BY GC/EC	UG/L	0.0040 U	0.0040 U			
WP13 DDE, 4,4'-	UG/L	0.0060 U	0.0060 U			

ANALYSIS REQUEST DETA REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	803	F	804		805	F	806	F	
WP14 DDD, 4,4'-	UG/L	0.060	U	0.060	U					
WP15 DDT, 4,4'-	UG/L	0.010	U	0.010	U					
WP16 TOXAPHENE, BY GC/EC	UG/L	0.50	U	0.50	U					
WP17 PCB-AROCLOR 1016	UG/L	0.40	U	0.40	U					
WP18 PCB-AROCLOR 1221	UG/L	0.30	U	0.30	U					
WP19 PCB-AROCLOR 1232	UG/L	0.10	U	0.10	U					
WP20 PCB-AROCLOR 1242	UG/L	0.10	U	0.10	U					
WP21 PCB-AROCLOR 1248	UG/L	0.20	U	0.20	U					
WP22 PCB-AROCLOR 1254	UG/L	0.050	U	0.13	U					
WP23 PCB-AROCLOR 1260	UG/L	0.060	U	0.060	U					
WP24 CHLORDANE, TECHNICAL, BY GC/EC	UG/L	0.020	U	0.020	U					
WP25 HEPTACHLOR, BY GC/EC	UG/L	0.0090	U	0.0090	U					
WP26 HEPTACHLOR EPOXIDE, BY GC/EC	UG/L	0.0040	U	0.0040	U					
WP83 ENDRIN KETONE, BY GC/EC	UG/L	0.0050	U	0.0050	U					
WP84 METHOXYCHLOR, BY GC/EC	UG/L	0.010	U	0.010	U					
WP85 CHLORDANE, ALPHA	UG/L	0.025	U	0.025	U					
WP86 CHLORDANE, GAMMA	UG/L	0.025	U	0.025	U					
WS01 PHENOL, BY GC/MS	UG/L	0.7	U	0.7	U					
WS03 ETHER,BIS(2-CHLOROETHYL), BY GC/MS	UG/L	1.5	U	1.5	U					
WS04 CHLOROPHENOL, 2-	UG/L	1.4	U	1.4	U					
WS05 DICHLOROBENZENE,1,3-, BY GC/MS	UG/L	1.1	U	1.1	U					
WS06 DICHLOROBENZENE,1,4-	UG/L	1.2	U	1.2	U					
WS07 BENZYL ALCOHOL	UG/L	0.7	U	0.7	U					
WS08 DICHLOROBENZENE,1,2-, BY GC/MS	UG/L	1.2	U	1.2	U					
WS09 CRESOL, ORTHO(2-METHYLPHENOL)	UG/L	1.2	U	1.2	U					
WS10 ETHER,BIS(2-CHLOROISOPROPYL), BY GC/MS	UG/L	0.7	U	0.7	U					

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	803	F	804		805	F	806	F	
WS11 CRESOL, PARA-(4-METHYLPHENOL)	UG/L	1.6	U	1.6	U					
WS12 N-NITROSODIPROPYLAMINE	UG/L	0.8	U	0.8	U					
WS13 HEXACHLOROETHANE, BY GC/MS	UG/L	1.2	U	1.2	U					
WS14 NITROBENZENE, BY GC/MS	UG/L	0.8	U	0.8	U					
WS15 ISOPHORONE, BY GC/MS	UG/L	2.5	U	2.5	U					
WS16 NITROPHENOL,2-	UG/L	1	U	1	U					
WS17 DIMETHYLPHENOL,2,4, BY GC/MS	UG/L	1	U	1	U					
WS18 BENZOIC ACID, BY GC/MS	UG/L	10	U	10	U					
WS19 METHANE, BIS(2-CHLOROETHYOXY), BY GC/MS	UG/L	0.7	U	0.7	U					
WS20 DICHLOROPHENOL, 2,4-	UG/L	1.6	U	1.6	U					
WS21 TRICHLOROBENZENE,1,2,4, BY GC/MS	UG/L	2.5	U	2.5	U					
WS22 NAPHTHALENE, BY GC/MS	UG/L	1	U	1	U					
WS23 CHLOROANILINE,4-	UG/L	2.5	U	2.5	U					
WS24 HEXACHLOROBUTADIENE, BY GC/MS	UG/L	1	U	1	U					
WS25 PHENOL,4-CHLORO-3-METHYL	UG/L	1.4	U	1.4	U					
WS26 METHYLNAPHTHALENE, 2-	UG/L	0.9	U	0.9	U					
WS27 HEXACHLOROCYCLOPENTADIENE, BY GC/MS	UG/L	5	U	5	U					
WS28 TRICHLOROPHENOL,2,4,6	UG/L	1.2	U	1.2	U					
WS29 TRICHLOROPHENOL,2,4,5	UG/L	1.5	U	1.5	U					
WS30 CHLORONAPHTHALENE, 2-	UG/L	0.8	U	0.8	U					
WS31 NITROANILINE,2-(ORTHO)	UG/L	2.5	U	2.5	U					
WS32 PHTHALATE, DIMETHYL, BY GC/MS	UG/L	0.5	U	0.5	U					
WS33 ACENAPHTHYLENE, BY GC/MS	UG/L	0.7	U	0.7	U					
WS34 NITROANILINE,3-	UG/L	5	U	5	U					
WS35 ACENAPHTHENE, BY GC/MS	UG/L	0.6	U	0.6	U					
WS36 DINITROPHENOL,2,4, BY GC/MS	UG/L	10	U	10	U					

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	803	F	804		805	F	806	F	
WS37 NITROPHENOL,4-	UG/L	6.8	U	6.8	U					
WS38 DIBENZOFURAN	UG/L	0.6	U	0.6	U					
WS39 DINITROTOLUENE,2,4, BY GC/MS	UG/L	5	U	5	U					
WS40 DINITROTOLUENE,2,6-	UG/L	2.5	U	2.5	U					
WS41 PHTHALATE, DIETHYL, BY GC/MS	UG/L	2.5	U	2.5	U					
WS42 ETHER, 4-CHLOROPHENYL PHENYL	UG/L	2.5	U	2.5	U					
WS43 FLUORENE, BY GC/MS	UG/L	2.5	U	2.5	U					
WS44 NITROANILINE,4-	UG/L	7.9	U	7.9	U					
WS45 PHENOL,4,6-DINITRO-2-METHYL	UG/L	5	U	5	U					
WS46 N-NITROSODIPHENYLAMINE, BY GC/MS	UG/L	0.5	U	0.5	U					
WS47 ETHER, 4-BROMOPHENYL PHENYL	UG/L	2.5	U	2.5	U					
WS48 HEXACHLOROBENZENE, BY GC/MS	UG/L	2.5	U	2.5	U					
WS49 PENTACHLOROPHENOL, BY GC/MS	UG/L	10	U	10	U					
WS50 PHENANTHRENE, BY GC/MS	UG/L	0.6	U	0.6	U					
WS51 ANTHRACENE, BY GC/MS	UG/L	2.5	U	2.5	U					
WS52 PHTHALATE, DI-N-BUTYL-, BY GC/MS	UG/L	2.8		2.5	U					
WS53 FLUORANTHENE, BY GC/MS	UG/L	2.5	U	2.5	U					
WS54 PYRENE, BY GC/MS	UG/L	5	U	5	U					
WS55 PHTHALATE, BUTYL BENZYL	UG/L	5	U	5	U					
WS56 DICHLOROBENZIDINE, 3,3'	UG/L	12	U	12	U					
WS57 ANTHRACENE, BENZO(A), BY GC/MS	UG/L	5	U	5	U					
WS58 PHTHALATE, BIS(2-ETHYLHEXYL), BY GC/MS	UG/L	2.5	U	2.5	U					
WS59 CHRYSENE, BY GC/MS	UG/L	5	U	5	U					
WS60 PHTHALATE, DI-N-OCTYL-, BY GC/MS	UG/L	5	U	5	U					
WS61 FLUORANTHENE, BENZO(B), BY GC/MS	UG/L	5	U	5	U					
WS62 FLUORANTHENE, BENZO(K), BY GC/MS	UG/L	5	U	5	U					

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYXG VALIDATED DATA

COMPOUND	UNITS	803	F	804		805	F	806	F	
VS63 PYRENE, BENZO(A), BY GC/MS	UG/L	5	U	5	U					
VS64 PYRENE, INDENO(1,2,3-CD)	UG/L	5	U	5	U					
VS65 ANTHRACENE, DIBENZO(A,H), BY GC/MS	UG/L	5	U	5	U					
VS66 PERYLENE,BENZO(G,H,I), BY GC/MS	UG/L	5	U	5	U					
VS67 CARBAZOLE	UG/L	5	U	5	U					
VW40 CHLOROMETHANE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U			
VW41 BROMOMETHANE, BY GC/MS LDL	UG/L	1.7	U	1.7	U	1.7	U			
VW42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	1.3	U	1.3	U	1.3	U			
VW43 CHLOROETHANE, BY GC/MS LDL	UG/L	2.2	U	2.2	U	2.2	U			
VW44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	4.2	U	1.2	U	5.2	U			
VW45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1.6	U	1.6	U	1.6	U			
VW46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U			
VW48 CHLOROFORM, BY GC/MS LDL	UG/L	0.36	U	0.36	U	0.36	U			
VW49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	0.37	U	0.37	U	0.37	U			
VW50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	0.58	U	0.58	U	0.58	U			
VW51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	0.19	U	0.19	U	0.19	U			
VW52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	0.28	U	0.28	U	0.28	U			
VW53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	0.43	U	0.43	U	0.43	U			
VW54 BENZENE, BY GC/MS LDL	UG/L	0.14	U	0.14	U	0.14	U			
VW55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U			
VW56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	0.63	U	0.63	U	0.63	U			
VW57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	0.29	U	0.29	U	0.29	U			
VW58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	0.38	U	0.38	U	0.38	U			
VW59 BROMOFORM, BY GC/MS LDL	UG/L	0.17	U	0.17	U	0.17	U			
VW60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	0.31	U	0.31	U	0.31	U			
VW61 TOLUENE, BY GC/MS LDL	UG/L	0.54	U	0.54	U	0.54	U			

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 9-ASYX6 VALIDATED DATA

COMPOUND	UNITS	803	F	804		805	F	806	F	
VW62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	0.64	U	0.64	U	0.64	U			
VW63 CHLOROBENZENE, BY GC/MS LOL	UG/L	0.48		0.23	U	0.23	U			
VW64 ETHYLBENZENE, BY GC/MS LOL	UG/L	0.31	U	0.31	U	0.31	U			
VW65 ACETONE, BY GC/MS LOL	UG/L	9.0	U	9.0	U	9.0	U			
VW66 CARBON DISULFIDE, BY GC/MS LOL	UG/L	1.1	U	1.1	U	1.1	U			
VW67 METHYL ETHYL KETONE (2-BUTANONE) LOL	UG/L	3.0	U	3.0	U	3.0	U			
VW68 HEXANONE, 2- BY GC/MS LOL	UG/L	3.2	U	3.2	U	3.2	U			
VW69 4-METHYL-2-PENTANONE (MIBK) BY GC/MS LO	UG/L	0.79	U	0.79	U	0.79	U			
VW70 STYRENE, BY GC/MS LOL	UG/L	0.34	U	0.34	U	0.34	U			
VW72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	0.82	U	0.82	U	0.82	U			
VW73 XYLENE, M AND/OR P BY GC/MS LOL	UG/L	0.22	U	0.22	U	0.22	U			
VW74 XYLENE, ORTHO BY GC/MS LOL	UG/L	0.40	U	0.40	U	0.40	U			
VW75 DICHLOROBENZENE, 1,4- (PARA) BY GC/MS L	UG/L	0.46	U	0.46	U	0.46	U			
VW76 DICHLOROBENZENE, 1,3- (META) BY GC/MS L	UG/L	0.36	U	0.36	U	0.36	U			
VW77 DICHLOROBENZENE, 1,2- (ORTHO) BY GC/MS	UG/L	0.35	U	0.35	U	0.35	U			
VW78 DICHLOROETHYLENE, 1,2- (TRANS) BY GC/MS	UG/L	0.84	U	0.84	U	0.84	U			
VW79 DICHLOROETHYLENE, 1,2- (CIS) BY GC/MS L	UG/L	0.84	U	0.84	U	0.84	U			
ZZ01 SAMPLE NUMBER	NA	803		804		805		806		
ZZ02 ACTIVITY CODE	NA	ASYX6		ASYX6		ASYX6		ASYX6		

ACTIVITY ASYX6 ZYKAN LANDFILL

THE PROJECT LEADER SHOULD CIRCLE ONE - STORET, AIRS, OR ARCHIVE.

CIRCLE ONE: STORET AIRS ARCHIVE

DATA APPROVED BY LABO FOR TRANSMISSION TO PROJECT LEADER ON 06/04/99 17:38:31 BY .

APPENDIX E

Cited References

Beveridge, T. R., et al., pp. 20-41

The Stratigraphic Succession in Missouri

Coordinated by

WALLACE B. HOWE

Edited by

JOHN W. KOENIG

Vol. XL, Second Series

September 1961

STATE OF MISSOURI
Department of Business and Administration

Division of

GEOLOGICAL SURVEY AND WATER RESOURCES
THOMAS R. BEVERIDGE, *State Geologist*
Rolla, Missouri

Burns and McDonnell, 1998.

Se ber 18, 1998

M aVerne Zykan, President
Bl Inc.
11 Jefferson - B
W gton, Missouri 63090

An ical Results of July 8, 1998 Groundwater Sampling
Bl Inc. Area 1 - Progressive Trench Area

De Ms. Zykan:

En d are the laboratory analytical results of the groundwater wells sampling event we cor ted on July 8, 1998. There were no organic contaminants detected in the gro water wells sampled. The inorganic analytes results are summarized below.

We	umber	PH	CONDUCTANCE	TOC	TOH
GM	-1	7.30	1900 umhos	17.1 ug/l	18.83 mg/l
GM	-3	6.75	1700 umhos	21.2 ug/l	86.56 mg/l
GM	4	6.97	3200 umhos	11.1 ug/l	6.065 mg/l
GM	5	9 37	1500 umhos	23.4 ug/l	3 179 mg/l
B-4		6.55	2600 umhos	28.6 ug/l	67.51 mg/l
B-6		6.54	2400 umhos	18.96 ug/l	50.13 mg/l
B-8		6 80	3700 umhos	<5.0 ug/l	53.35 mg/l
B-9		6 81	3600 umhos	8.91 ug/l	95.15 mg/l
B-1		6 56	3500 umhos	<5.0 ug/l	50.02 mg/l
B-1		6.79	2900 umhos	<5.0 ug/l	53.57 mg/l
ITS		7 43	2800 umhos	8.51 ug/l	15.29 mg/l

"IT. nterceptor Trench Sump

A sa le of the leachate in the main leachate sump was also collected and analyzed for the pur of characterizing it. These results are also enclosed. We will use the main leac e sump sample analysis to secure disposal bids for leachate transportation and disp at a permitted hazardous waste treatment facility

9400 West Parkway
Kansas City, Missouri 6
Tel 816 333-8787
Fax 816 822-3463
http://www.burnsmcd...
A Burns & McDonnell Company

Waste Consultants, Inc.

If you have any question about the sampling or results, you may call me at 816-822-3449. The results do not indicate a release of contaminants from the closed landfill to the groundwater. GMW-5 has an unusually high PH value which the laboratory has confirmed was accurately reported. I do not know what could have caused this to occur. This was consistent with the PH we measured in the field at this well also.

Sincerely,

Rickie L. Roberts, P.E.
Project Manager

Enclosures

cc. Ms Darleen Westcott

ANALYTICAL LABORATORIES, INC.

2911 ROTARY TERRACE, P.O. BOX 562/PITTSBURG, KS 66762/(316)232-1970

LABORATORY REPORT: REFERENCE #: 9807357

SENT TO: BURNS & MCDONNELL
P.O. BOX 419173
KANSAS CITY, MO 64141-6173
MR. RICK ROBERTS

DATE REPORTED: 07/24/98
DATE COLLECTED: 07/08/98
DATE RECEIVED: 07/10/98
P.O. #: 962131

PROJECT: BHS1HWLF

Sample ID: BHS1HWLF/MLS
Collection Date: 07/08/98 12:35:00

Sample Matrix: WATER

TEST	METHOD-CAS #	RESULT	UNITS	DL	ANALYZED	EXTRACTED
APPENDIX I VOLATILES	SW 846 8260					
Acetone	67-61-4	3120	UG/L	5.0	07/22/98TK	
Acrolein	107-02-8	ND	UG/L	5.0	07/22/98TK	
Acrylonitrile	107-13-1	44.6	UG/L	5.0	07/22/98TK	
Benzene	71-43-2	25.1	UG/L	5.0	07/22/98TK	
Bromochloromethane	74-97-5	ND	UG/L	5.0	07/22/98TK	
Bromodichloromethane	75-27-4	ND	UG/L	5.0	07/22/98TK	
Bromoform	75-25-2	ND	UG/L	5.0	07/22/98TK	
Carbon disulfide	75-15-0	74.6	UG/L	5.0	07/22/98TK	
Carbon tetrachloride	56-23-5	ND	UG/L	5.0	07/22/98TK	
Chlorobenzene	108-90-7	5.52	UG/L	5.0	07/22/98TK	
Chloroethane	75-00-3	11.2	UG/L	5.0	07/22/98TK	
Chloroform	67-66-3	ND	UG/L	5.0	07/22/98TK	
Chlorodibromomethane	124-48-1	ND	UG/L	5.0	07/22/98TK	
1,2-Dibromo-3-chloropropa	96-12-8	ND	UG/L	5.0	07/22/98TK	
1,2-Dibromoethane	106-93-4	ND	UG/L	5.0	07/22/98TK	
1,2-Dichlorobenzene	95-50-1	ND	UG/L	5.0	07/22/98TK	
1,4-Dichlorobenzene	106-46-7	ND	UG/L	5.0	07/22/98TK	
trans-1,4-Dichloro-2-bute	110-57-6	ND	UG/L	5.0	07/22/98TK	
1,1-Dichloroethane	75-34-3	ND	UG/L	5.0	07/22/98TK	
1,2-Dichloroethane	107-06-2	10.3	UG/L	5.0	07/22/98TK	
1,1-Dichloroethene	75-34-4	338	UG/L	5.0	07/22/98TK	
cis-1,2-Dichloroethene	156-59-2	35.7	UG/L	5.0	07/22/98TK	
trans-1,2-Dichloroethene	156-60-5	ND	UG/L	5.0	07/22/98TK	
1,2-Dichloropropane	78-87-5	ND	UG/L	5.0	07/22/98TK	
cis-1,3-Dichloropropene	10061-01-5	ND	UG/L	5.0	07/22/98TK	
trans-1,3-Dichloropropene	10061-02-6	ND	UG/L	5.0	07/22/98TK	
Ethylbenzene	100-41-4	118	UG/L	5.0	07/22/98TK	
2-Hexanone	91-78-6	ND	UG/L	5.0	07/22/98TK	
Methyl bromide	74-83-9	ND	UG/L	5.0	07/22/98TK	
Methyl chloride	74-87-3	ND	UG/L	5.0	07/22/98TK	
Methyl ethyl ketone	78-93-3	1290	UG/L	5.0	07/22/98TK	
Methyl iodide	74-88-4	ND	UG/L	5.0	07/22/98TK	
Methyl isobutyl ketone	108-10-1	ND	UG/L	5.0	07/22/98TK	
Methylene bromide	74-95-3	ND	UG/L	5.0	07/22/98TK	

Sample ID: BRS1EWLP/MLS Sample Matrix: WATER
Collection Date: 07/08/98 12:35:00

TEST	METHOD-CAS #	RESULT	UNITS	DL	ANALYSED	EXTRACTED
Methylene chloride	75-09-2	ND	UG/L	5.0	07/22/98TK	
Styrene	100-42-5	ND	UG/L	5.0	07/22/98TK	
1,1,1,2-Tetrachloroethane	630-20-6	ND	UG/L	5.0	07/22/98TK	
1,1,2,2-Tetrachloroethane	79-34-5	ND	UG/L	5.0	07/22/98TK	
Tetrachloroethene	127-18-4	ND	UG/L	5.0	07/22/98TK	
Toluene	108-88-3	717	UG/L	5.0	07/22/98TK	
1,1,1-Trichloroethane	71-55-6	ND	UG/L	5.0	07/22/98TK	
1,1,2-Trichloroethane	79-00-5	ND	UG/L	5.0	07/22/98TK	
Trichloroethene	79-01-6	17.8	UG/L	5.0	07/22/98TK	
Trichlorofluoromethane	75-69-4	ND	UG/L	5.0	07/22/98TK	
1,2,3-Trichloropropane	96-18-4	ND	UG/L	5.0	07/22/98TK	
Vinyl acetate	108-05-4	ND	UG/L	5.0	07/22/98TK	
Vinyl chloride	75-01-4	20.3	UG/L	3.4	07/22/98TK	
Xylenes	1330-20-7	449	UG/L	5.0	07/22/98TK	
2-Chloroethyl vinyl ether	110-75-8	ND	UG/L	5.0	07/22/98TK	
4-Bromofluorobenzene (sur)	-	109	125	75		
Toluene-d8 (Sur)	-	115	125	75		
1,2-Dichloroethane-d4 (Su	-	117	125	75		
SEMIVOLATILES	SW 846 8270					
ACENAPTHENE	83-32-9	ND	UG/L	10	07/21/98SKW	07/15/98
ACENAPHTHYLENE	208-96-8	ND	UG/L	10	07/21/98SKW	07/15/98
ANTHRACENE	120-12-7	ND	UG/L	10	07/21/98SKW	07/15/98
BENZIDINE	92-87-5	ND	UG/L	50	07/21/98SKW	07/15/98
BENZO(A)ANTHRACENE	56-55-3	ND	UG/L	10	07/21/98SKW	07/15/98
BENZO(B)FLUORANTHENE	205-99-2	ND	UG/L	10	07/21/98SKW	07/15/98
BENZO(K)FLUORANTHENE	207-08-9	ND	UG/L	10	07/21/98SKW	07/15/98
BENZOIC ACID	65-85-0	23.1	UG/L	50	07/21/98SKW	07/15/98
BENZO(G,H,I)PERYLENE	50-32-8	ND	UG/L	10	07/21/98SKW	07/15/98
BENZO(A)PYRENE	191-24-2	ND	UG/L	10	07/21/98SKW	07/15/98
BENZYL ALCOHOL	100-51-6	121	UG/L	20	07/21/98SKW	07/15/98
BIS(2-CHLOROETHOXY)METHAN	111-91-1	ND	UG/L	10	07/21/98SKW	07/15/98
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	UG/L	10	07/21/98SKW	07/15/98
BIS(2-CHLOROISOPROPYL)ETH	39638-32-9	ND	UG/L	10	07/21/98SKW	07/15/98
BIS(2-ETHYLHEXYL)PHTHALAT	117-81-7	ND	UG/L	10	07/21/98SKW	07/15/98
4-BROMOPHENYL PHENYL ETHE	101-55-3	ND	UG/L	10	07/21/98SKW	07/15/98
BUTYL BENZYL PHTHALATE	85-68-7	ND	UG/L	10	07/21/98SKW	07/15/98
4-CHLOROANILINE	106-47-8	ND	UG/L	20	07/21/98SKW	07/15/98
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	UG/L	20	07/21/98SKW	07/15/98
2-CHLORONAPHTHALENE	91-58-7	ND	UG/L	10	07/21/98SKW	07/15/98
2-CHLOROPHENOL	95-57-8	ND	UG/L	10	07/21/98SKW	07/15/98
4-CHLOROPHENYL PHENYL ETH	7005-72-3	ND	UG/L	10	07/21/98SKW	07/15/98
CHRYSENE	218-01-9	ND	UG/L	10	07/21/98SKW	07/15/98
DIBENZ(A,H)ANTHRACENE	53-70-3	ND	UG/L	10	07/21/98SKW	07/15/98
DIBENZOFURAN	132-64-9	ND	UG/L	10	07/21/98SKW	07/15/98
1,2-DICHLOROBENZENE	95-50-1	ND	UG/L	10	07/21/98SKW	07/15/98
1,3-DICHLOROBENZENE	541-73-1	ND	UG/L	10	07/21/98SKW	07/15/98
1,4-DICHLOROBENZENE	106-46-7	ND	UG/L	10	07/21/98SKW	07/15/98
3,3'-DICHLOROBENZIDINE	91-94-1	ND	UG/L	20	07/21/98SKW	07/15/98

Sample ID: SB51WGLF/MLS Sample Matrix: WATER
Collection Date: 07/08/98 12:35:00

TEST	METHOD-CAS #	RESULT	UNITS	DL	ANALYZED	EXTRACTED
2,4-DICHLOROPHENOL	120-83-2	ND	UG/L	10	07/21/98SKW	07/15/98
DIETHYL PHTHALATE	84-66-2	ND	UG/L	10	07/21/98SKW	07/15/98
2,4-DIMETHYLPHENOL	105-67-9	14.6	UG/L	10	07/21/98SKW	07/15/98
DIMETHYLPHTHALATE	131-11-3	27.2	UG/L	10	07/21/98SKW	07/15/98
ISOPHORONE	78-59-1	ND	UG/L	10	07/21/98SKW	07/15/98
DI-N-BUTYLPHTHALATE	84-74-2	ND	UG/L	10	07/21/98SKW	07/15/98
4,6-DINITRO-2-METHYLPHENO	534-52-1	ND	UG/L	50	07/21/98SKW	07/15/98
2,4-DINITROPHENOL	51-28-5	ND	UG/L	50	07/21/98SKW	07/15/98
2,4-DINITROTOLUENE	121-14-2	ND	UG/L	10	07/21/98SKW	07/15/98
2,6-DINITROTOLUENE	606-20-2	ND	UG/L	10	07/21/98SKW	07/15/98
DI-N-OCTYLPHTHALATE	117-84-0	ND	UG/L	10	07/21/98SKW	07/15/98
1,2-DIPHENYL HYDRAZINE	122-66-7	ND	UG/L	10	07/21/98SKW	07/15/98
FLUORANTHENE	206-44-0	ND	UG/L	10	07/21/98SKW	07/15/98
FLUORENE	86-73-7	ND	UG/L	10	07/21/98SKW	07/15/98
HEXACHLOROBENZENE	118-74-1	ND	UG/L	10	07/21/98SKW	07/15/98
HEXACHLOROBUTADIENE	87-68-3	ND	UG/L	10	07/21/98SKW	07/15/98
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	UG/L	10	07/21/98SKW	07/15/98
HEXACHLOROETHANE	67-72-1	ND	UG/L	10	07/21/98SKW	07/15/98
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	UG/L	10	07/21/98SKW	07/15/98
2-METHYLNAPHTHALENE	91-57-6	ND	UG/L	10	07/21/98SKW	07/15/98
2-METHYLPHENOL	95-48-7	93.6	UG/L	10	07/21/98SKW	07/15/98
4-METHYLPHENOL	106-44-5	85.7	UG/L	10	07/21/98SKW	07/15/98
NAPHTHALENE	91-20-3	ND	UG/L	10	07/21/98SKW	07/15/98
2-NITROANILINE	88-74-4	51.1	UG/L	50	07/21/98SKW	07/15/98
3-NITROANILINE	99-09-2	ND	UG/L	50	07/21/98SKW	07/15/
4-NITROANILINE	100-01-6	ND	UG/L	50	07/21/98SKW	07/15/
NITROBENZENE	98-95-3	29.3	UG/L	10	07/21/98SKW	07/15/98
2-NITROPHENOL	88-75-5	ND	UG/L	50	07/21/98SKW	07/15/98
4-NITROPHENOL	100-02-7	ND	UG/L	50	07/21/98SKW	07/15/98
N-NITROSO-DI-N-PROPYLAMIN	621-64-7	ND	UG/L	10	07/21/98SKW	07/15/98
N-NITROSODIPHENYLAMINE(1)	86-30-6	ND	UG/L	10	07/21/98SKW	07/15/98
N-NITROSODIMETHYLAMINE	62-75-9	ND	UG/L	10	07/21/98SKW	07/15/98
PENTACHLOROPHENOL	87-86-5	ND	UG/L	50	07/21/98SKW	07/15/98
PHENANTHRENE	85-01-8	ND	UG/L	10	07/21/98SKW	07/15/98
PHENOL	108-95-2	201	UG/L	10	07/21/98SKW	07/15/98
PYRENE	129-00-0	ND	UG/L	10	07/21/98SKW	07/15/98
1,2,4-TRICHLOROBENZENE	120-82-1	ND	UG/L	10	07/21/98SKW	07/15/98
2,4,5-TRICHLOROPHENOL	95-95-4	ND	UG/L	10	07/21/98SKW	07/15/98
2,4,6-TRICHLOROPHENOL	88-06-2	ND	UG/L	10	07/21/98SKW	07/15/98
2-FLUOROBIPHENYL (SUR)	-	43.4	150	10		07/15/98
NITROBENZENE-D5 (SUR)	-	39.6	150	10		07/15/98
2-FLUOROPHENOL (SUR)	-	18.5	150	10		07/15/98
2,4,6-TRIBROMOPHENOL (SUR)	-	65.1	150	10		07/15/98
TERPHENYL-D14 (SUR)	-	60.5	150	10		07/15/98
PHENOL-D5 (SUR)	-	13.8	150	10		07/15/98
ORGANOCHLORINE PESTI	SW 846 8081					
ALDRIN	309-00-2	ND	UG/L	0.020	07/23/98DN	07/14/98
a-BHC	319-84-6	ND	UG/L	0.020	07/23/98DN	07/14/98

REFERENCE #: 9807357 PAGE: 3

Sample ID: [illegible] Sample Matrix: WATER
Collection Date: 07/08/98 12:35:00

TEST	METHOD-CAS #	RESULT	UNITS	DL	ANALYSED	EXTRACTED
p-BHC	319-85-7	ND	UG/L	0.020	07/23/98DN	07/14/98
d-BHC	319-86-8	ND	UG/L	0.020	07/23/98DN	07/14/98
LINDANE	58-89-9	ND	UG/L	0.020	07/23/98DN	07/14/98
CHLORDANE	57-74-9	ND	UG/L	0.50	07/23/98DN	07/14/98
4,4'-DDD	72-54-8	ND	UG/L	0.020	07/23/98DN	07/14/98
4,4'-DDE	72-55-9	ND	UG/L	0.020	07/23/98DN	07/14/98
4,4'-DDT	50-29-3	ND	UG/L	0.020	07/23/98DN	07/14/98
DIELDRIN	60-257-1	ND	UG/L	0.020	07/23/98DN	07/14/98
ENDOSULFAN I	959-98-8	ND	UG/L	0.020	07/23/98DN	07/14/98
ENDOSULFAN II	33212-65-9	ND	UG/L	0.020	07/23/98DN	07/14/98
ENDOSULFAN SULFATE	1031-07-8	ND	UG/L	0.020	07/23/98DN	07/14/98
ENDRIN	72-20-8	ND	UG/L	0.020	07/23/98DN	07/14/98
ENDRIN ALDEHYDE	7421-93-4	ND	UG/L	0.020	07/23/98DN	07/14/98
HEPTACHLOR	76-44-8	ND	UG/L	0.020	07/23/98DN	07/14/98
HEPTACHLOR EPOXIDE	1024-57-3	ND	UG/L	0.020	07/23/98DN	07/14/98
METHOXYCHLOR	72-43-5	ND	UG/L	0.20	07/23/98DN	07/14/98
TOXAPHENE	8001-35-2	ND	UG/L	0.50	07/23/98DN	07/14/98
TCMX (SURR)	-	144	150	60		07/14/98
DECACHLOROBIPHENYL (SURR)	-	75.1	150	60		07/14/98
PCBS	SW846 8082					
PCB-1016	12674-11-2	ND	UG/L	0.50	07/23/98DN	07/14/98
PCB-1221	11104-28-2	ND	UG/L	0.50	07/23/98DN	07/14/98
PCB-1232	11141-16-5	ND	UG/L	0.50	07/23/98DN	07/14/98
PCB-1242	53469-21-9	ND	UG/L	0.50	07/23/98DN	07/14/98
PCB-1248	12672-29-6	ND	UG/L	0.50	07/23/98DN	07/14/98
PCB-1254	11097-69-1	ND	UG/L	0.50	07/23/98DN	07/14/98
PCB-1260	11096-82-5	ND	UG/L	0.50	07/23/98DN	07/14/98
DCB (SUR)	-	75.1	150	50		07/14/98
TCMX (SUR)	-	144	150	50		07/14/98
PH	SW 846 9040	7.82	SU		07/10/98LLE	
CONDUCTANCE	SW 846 9050	9000	UMHOS	0.1	07/16/98AB	
BOD [5]	EPA 405.1	225	MG/L	1.0	07/16/98KS	
COLOR	EPA 110.2	10	ALPHA	0	07/10/98KW	
DENSITY	DENSITY	1.00	G/CC	0.01	07/10/98KW	
FLASH CLOSED CUP	1010 D56	>212	DEG F		07/17/98KW	
SULFIDE	EPA 376.2	0.117	MG/L	0.005	07/11/98KW	
NITRATE AS N	EPA 353.1	<0.10	MG/L	0.10	07/13/98AB	
SPECIFIC GRAVITY	EPA 210.4	1.00	G/CC	0.01	07/10/98KW	
TOTAL DISSOLVED SOLI	EPA 160.1	4,306	MG/L	1.0	07/15/98DA	
TOTAL SOLIDS	EPA 160.3	4312	MG/L	1.0	07/20/98KW	
TOTAL ORGANIC HALOGE	SW 846 9020	181	UG/L	5.0	07/22/98KW	
TOTAL ORGANIC CARBON	SW 846 9060	241.0	MG/L	0.10	07/14/98AB	
PHENOL	EPA 420.2	3282	UG/L	2.0	07/13/98KW	
COD	EPA 410.1	844	MG/L	2.5	07/16/98AB	
AMMONIA AS N	EPA 350.1	23.75	MG/L	0.03	07/15/98KW	
CYANIDE, TOTAL	EPA 335.3	0.064	MG/L	0.001	07/14/98KW	
SILVER, TOTAL	SW 846 6010	<0.01	MG/L	0.01	07/15/98DO	
ARSENIC, TOTAL	SW 846 7060	<0.005	MG/L	0.005	07/17/98AC	

Sample ID: SESLEWLF/MLS Sample Matrix: WATER
Collection Date: 07/08/98 12:35:00

TEST	METHOD-CAS #	RESULT	UNITS	DL	ANALYZED	EXTRACTED
BARIUM, TOTAL	SW 846 6010	0.245	MG/L	0.005	07/16/98MS	
CADMIUM, TOTAL	SW 846 6010	<0.005	MG/L	0.005	07/16/98MS	
CHROMIUM, TOTAL	SW 846 6010	0.035	MG/L	0.01	07/16/98MS	
COPPER, TOTAL	SW 846 6010	0.015	MG/L	0.01	07/16/98MS	
MERCURY, TOTAL	SW 846 7470	<0.0002	MG/L	0.0002	07/15/98MS2	
NICKEL, TOTAL	SW 846 6010	0.155	MG/L	0.01	07/16/98MS	
LEAD, TOTAL	SW 846 7420	0.296	MG/L	0.10	07/16/98MS	
SELENIUM, TOTAL	SW 846 7740	<0.005	MG/L	0.005	07/20/98AC	
THALLIUM, TOTAL	SW 846 6010	<0.05	MG/L	0.05	07/20/98MS	
ZINC, TOTAL	SW 846 6010	0.034	MG/L	0.005	07/16/98MS	

ND=NONE DETECTED
DL=DETECTION LIMIT
SU=STANDARD UNITS
*BACKGROUND CONTAMINATION
SUR=SURROGATE
Q=OUTSIDE LIMITS
B=DETECTED IN METHOD BLANK

APPROVED BY: [signature]
HENRY ROESTER
LABORATORY DIRECTOR

REFERENCE #: 9807357 PAGE: 5

CAL LABORATORIES, INC.

2911 ROTARY TERRACE, P.O. BOX 562/PITTSBURG, KS 66762/(316)232-1970

LABORATORY REPORT: **REFERENCE #:** 9807276

SENT TO: *BURNS & MCDONNELL*
P.O. BOX 419173
KANSAS CITY, MO 64141-6173
MR. RICK ROBERTS

DATE REPORTED:
DATE COLLECTED: 07/08/98
DATE RECEIVED: 07/09/98
P.O. #: 96-213-1

PROJECT: BHS

Sample ID: BHS MLS
Sample Date Collected: 07/08/98

Sample Matrix: WATER

TEST	METHOD	RESULT	UNITS	DL	ANALYSED	BY
BOD [5]	EPA 405.1	250	MG/L	1.0	07/09/98	KS
HOLD UNTIL NOTIFIED	NONE		NONE			

ND=NONE DETECTED
DL=DETECTION LIMIT
SU=STANDARD UNITS
B=DETECTED IN METHOD BLANK

APPROVED BY: _____
TERRY KOESTER
LABORATORY DIRECTOR

Burns & McDonnell

Burns and McDonnell, 1997.

SEP 10 1997

September 5, 1997

Ms. Darleen Westcott
Environmental Engineer
Hazardous Waste Program
Division of Environmental Quality
P. O. Box 176
Jefferson City, MO 65102-0176

BHS, Inc. Hazardous Waste TSD Facility, Warren County, Missouri
Post-Closure Maintenance Raw Data
Project Number 96-213-1

Dear Ms. Westcott:

Enclosed with this letter is a copy of the raw data which was previously faxed to you in summary tables. In the near future we will be submitting to Ms. Zykan and to the department our final report of the completion of our scope of services to be rendered under our contract with Ms. Zykan. As your most recent inspection report from the St. Louis Regional Office indicates the closed facility continues to experience settlement and to generate leachate and will require post-closure maintenance to minimize the potential for a significant environmental impact to occur.

As you will see by reviewing our groundwater sampling data, it does not appear that any significant release to groundwater has occurred to date. Water level recovery rates in the main leachate sump and in the groundwater monitoring wells indicate that the systems are functioning as designed and there does not appear to be any short circuiting. However, for the leachate collection system to minimize the potential for contaminant release and migration it should be maintained at a minimum hydraulic head. During the time period of our project the main leachate sump maintained a consistent although reducing recovery rate after leachate was removed and disposed of off-site.

9400 Ward Parkway
Kansas City, Missouri 64114
Tel: 816 333-9400
Fax: 816 333-3690
http://www.burnsmcd.com

Dynamac Corporation Environmental Services, 1997, Appendix B.

ZYKAN SANITARY LANDFILL SITE
WRIGHT CITY, MISSOURI

POTENTIALLY RESPONSIBLE PARTY SEARCH
PHASE ONE REPORT

CONTRACT NO. 68-W4-0039
WORK ASSIGNMENT NO. C07020

Prepared For

U.S. Environmental Protection Agency
Region VII
Kansas City, Kansas 66101

Prepared By

Dynamac Corporation Environmental Services
5700 Broadmoor
Mission, Kansas 66202

April 1997

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WASTE GENERATOR LIST

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B. Sorted by Date and Generator Name B-1

ATTACHMENT

Memorandum dated September 3, 1980 from Robert Robinson, Director of the Solid Waste Management Unit to Fred Lafser, Director of the Missouri Department of Natural Resources, regarding Zykan Landfill Waste Categories

Ecology and Environment, Inc. (E & E), 1986

98

RCRA Facility Assessment
Preliminary Review
Bob's Home Service, Inc.

December 19, 1986

Prepared by: Mark Mayo
Ecology & Environment, Inc.
For the
U.S. Environmental Protection Agency
U.S. EPA Contract No. 68-01-7251
Work Assignment 39-7L00
CH_2M HILL No. W63712.SI

RECEIVED
DEC 22 1986
PRMT SECTION

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SECTION 1: INTRODUCTION

Through the U.S. Environmental Protection Agency (EPA) REM IV contract (Contract no. 68-01-7251 with CH_2M Hill, a work assignment (WA no. 39-7L00) was issued to Ecology and Environment, Inc., (E&E), a subcontractor to CH_2M Hill. This task was to perform a series of Resource Conversation Recovery Act (RCRA) preliminary reviews (PR), visual site inspections (VSI), and sampling visits (SV) cummulatively referred to as RCRA Facility Assessments (RFA). This document constitutes the preliminary review portion of the RFA for Bob's Home Service, Inc (BHS) in Wright City, Missouri. This PR summarizes the results of past studies conducted at BHS; evidence of the release or potential for release of contaminants attributable to the past and present operation of solid waste management units.

The Hazardous and Solid Waste Amendments of 1984 (HSWA) provided EPA with the authority to require corrective action at RCRA treatment, storage and disposal (TSD) facilities. The new authorities are:

- Section 3004 (u)

  This section requires corrective action for releases from solid waste management units (SWMU) as a condition of a RCRA TSD facility permit regardless of when the waste was placed in the unit. Compliance schedules can be incorporated in the Operating or Post-Closure Permit.

- Section 3004 (v)

  This section requires corrective action beyond the facility boundary as a condition of a RCRA permit. Compliance schedules can be incorporated in the Operating or Post-Closure Permit.

- Section 3008 (h)

  This section authorizes EPA to issue enforcement orders to compel corrective action for releases of hazardous waste from interim status TSD facilities. These corrective actions can extends beyond the facility boundary.

Solid waste management units (SWMU) are defined as any unit, which handles, stores, treats or disposes of solid waste (solid waste is defined in 40 CFR 261.2). These units include: landfills; surface impoundments; waste piles; land treatment units; injection wells; incinerators; tanks; container storage units; and other physical and chemical waste treatment units. However, Section 3008 (h) authority applies to any release from an interim status TSD facility.

Other authorities under RCRA which apply include the following:

- Section 3005 (c)

  This section authorizes EPA to issue permits to TSD facilities, which have applied upon a determination that the facility is in compliances with Sections 3004 & 3005 of RCRA. Also, this section specifies issue or denial deadlines for existing facility permit applications, by type of facility.

- Section 3013

  This section authorizes EPA to order hazardous waste TSD facility to perform monitoring, analysis and testing at that site if there is a potential for a substantial hazard to human health or the environment. If the facility cannot perform the work, either EPA may perform or EPA may authorize the state to perform the monitoring.

- Section 7003

  This section authorizes EPA to bring suit to stop handling transportation, treatment, storage or disposal of solid or hazardous waste if an "imminent or substantial endangerment to health or the environment" is present. Also, other action as necessary may be taken.

SECTION 2: SITE LOCATION AND DESCRIPTION

Bob's Home Service, Inc. (BHS) is located approximately three miles southwest of Wright City in Warren County, Missouri (Figure 1). As shown in Figure 2, BHS occupies approximately 158 acres in the south 1/2 of Section 32, Township 47N, Range 1W (USGS, 1972).

BHS is situated on what is known as the Zykan Farm (Woodward-Clyde,1986). The majority owner of BHS is Mrs. Lavern Zykan. The mailing address of BHS is Route 1 Box 116-F, Wright City, Missouri 63390. Daily operations are under the management of Mr. Michael Gill, Vice President of Operation.

On November 16, 1971, BHS obtained approval from the Missouri Department of Health to operate a "Refuse Disposal Area" (See Figure 2). Waste disposed at this refuse area was primarily residential and commercial in origin (Woodward-Clyde,1986). Operation at the landfill ceased in early 1977.

In June 1977, BHS began operations of a state-regulated hazardous waste disposal area (Woodward-Clyde, 1986). The area consisted of a 12 acre hazardous waste burial area, designated as Hazardous Waste Disposal Area 1, and four surface impoundments (See Figure 2). Area 1, which includes a progressive trench disposal area (PTA), reached full capacity in May 1985. At this time, the disposal of off-site generated hazardous waste ceased at BHS (Woodward-Clyde, 1985).

Currently, hazardous waste activities at BHS involve the collection, storage and transport for disposed of leachate from Area 1 and drain water from the covered truck wash. The liquids are stored in two 50,000 gallon surface impoundments. When the impoundments reach capacity BHS pumps the liquids into tanker trucks and transports it to Rock Creek Waste Water Treatment Plant in Independence, Missouri, for disposal (E&E, 1986).

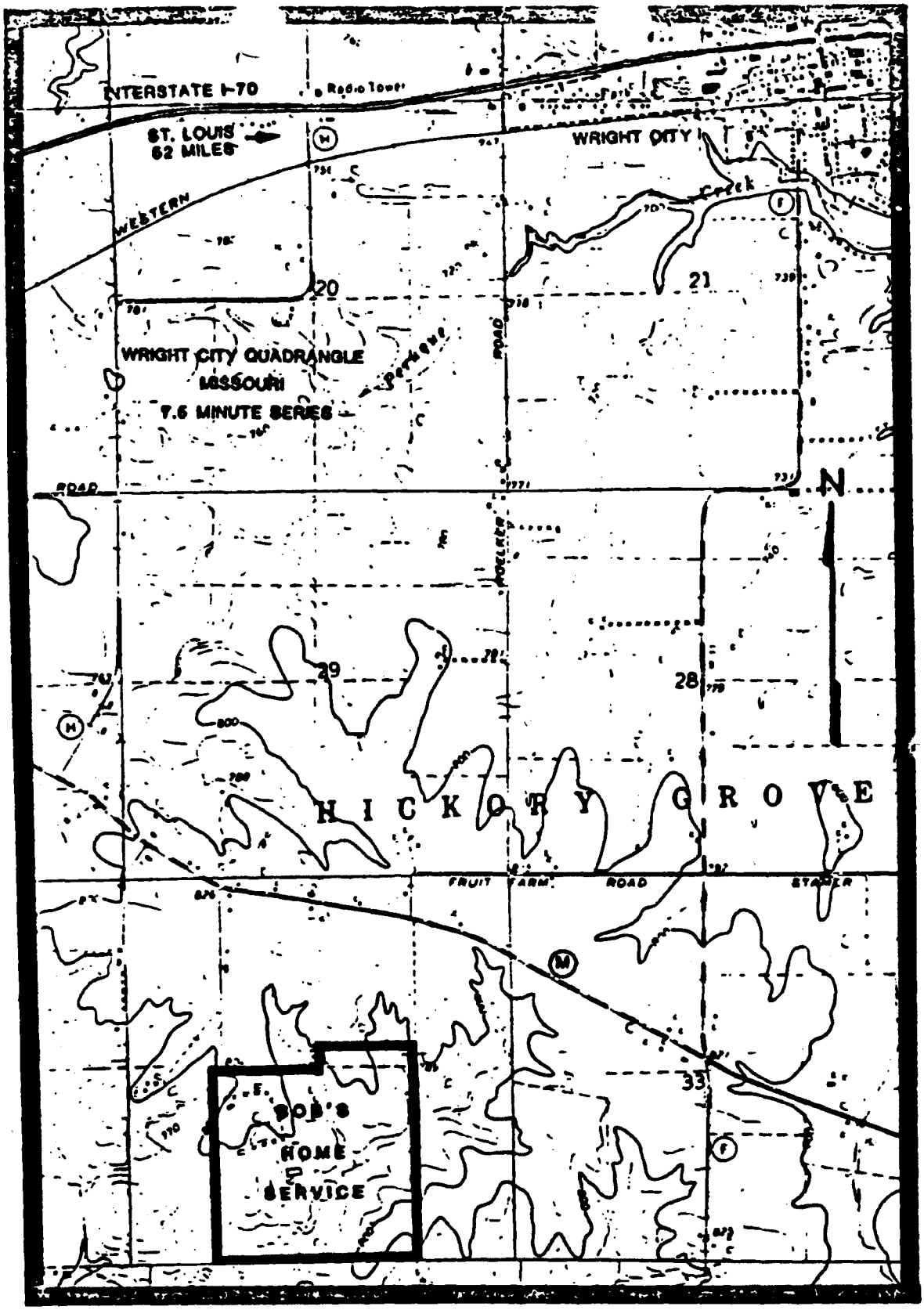

FIGURE 1
TOPOGRAPHIC MAP
SCALE 1 24000

1 0 1 MILE

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

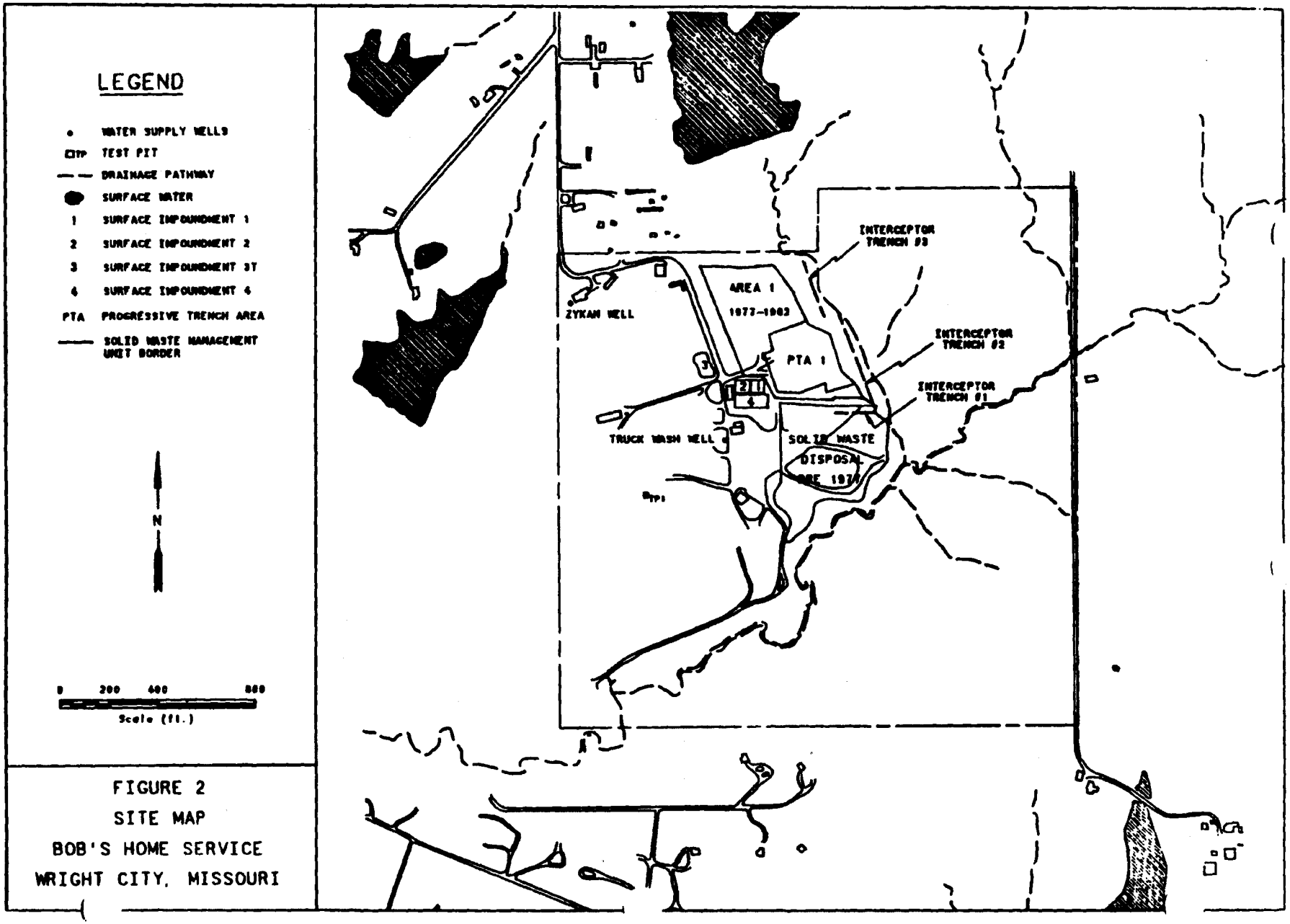

FIGURE 2
SITE MAP
BOB'S HOME SERVICE
WRIGHT CITY, MISSOURI

At present a number of structures and solid waste management units exist at the 158 acre facility (See Figure 2). The following are present on-site:

Structures

Office and Employee Facilities
Maintenance Building
Covered Truck Wash
General Storage Area

Solid Waste Management Units

Area 1 - Hazardous Waste Disposal Area
Progress Trench Area (located within Area 1)
Surface Impoundments SI-1, SI-2, SI-3T, and SI-4
Refuse Disposal Area (Pre-1977)

A total of 33 disposal trenches and drilled cells compose Area 1 (Woodward Clyde, 1986). Under the Resource Conservation and Recovery Act, trenches active after November 19, 1980 are regulated as Hazardous Waste Management Units and trenches active after July 26, 1982 are defined as "regulated units". The hazardous waste management units within Area 1 are:

Regulated Units
Trench 1N
Trench 2N
Trench 6N
Trench 11N
Trench 12N

Only one "regulated unit" exist within the confines of Area 1 and that is the PTA. The location of the hazardous waste management and "regulated" units within Area 1 are presented in Figure 3.

The surface impoundments SI-1 and SI-2 are still active and currently receiving leachate from the PTA's and N-series trenches/leachate collection systems. Accordingly, both impoundments are are classified by Missouri Department of Natural Resources as "regulated unit" (MDNR, 1986) (as of November 20, 1985 the state of Missouri received final authorization to administrate the RCRA program).

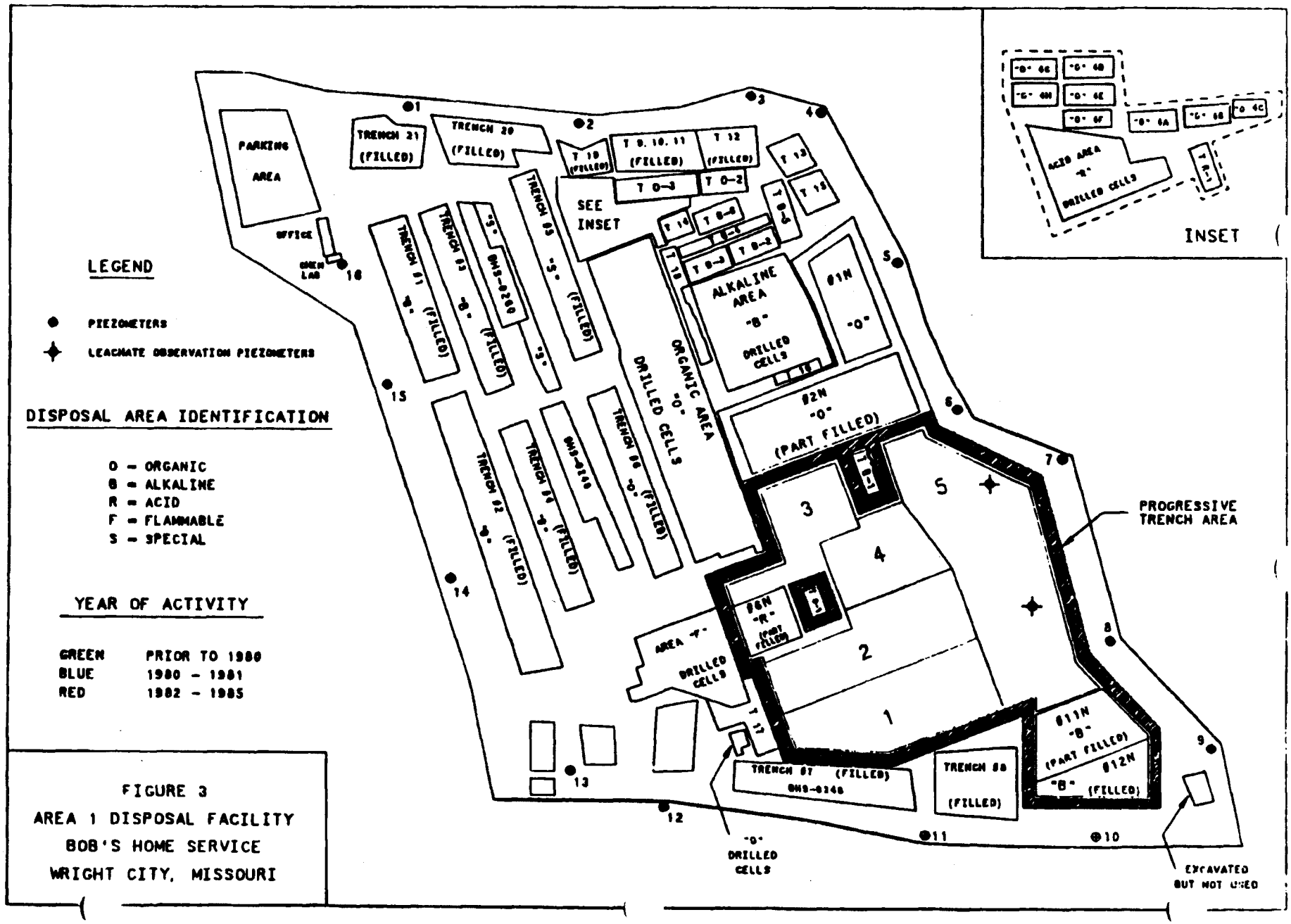

FIGURE 3
AREA 1 DISPOSAL FACILITY
BOB'S HOME SERVICE
WRIGHT CITY, MISSOURI

BHS's approval for operation of hazardous waste disposal Area 1 was granted by the Missouri Department of Natural Resources under two permits, SWDAOP # 721901 and T.S.D. # 122282001. The Solid Waste Disposal Area Operating Permit was issued on May 25, 1977. It was replaced on December 22, 1982 by the Hazardous Waste Facility permit TSD 122282001 which will expire on December 22, 1987.

BHS has reached capacity and is not receiving waste pending expansion; however, BHS has interim status under 40 CFR Part 265. BHS submitted their Part B application on February 1986. In the Part B application, BHS proposes a 20 acre hazardous waste disposal Area 2 southwest of Area 1 (Woodward Clyde, 1986).

SECTION 3: POTENTIAL ON-SITE WASTES

3.1 WASTE QUANTITY AND CHARACTERISTICS

A variety of hazardous and nonhazardous waste types have been handled and disposed of at BHS. From 1977 until 1985 BHS received an estimated 190,000 cubic yards of wastes (Woodward Clyde, 1986). BHS required generators to provide a description and basic analysis of materials shipped for disposal. Review of EPA RCRA files and the BHS 1986 Part B Permit Application have provided a list of some of the wastes identified as having been disposed of on-site. These wastes are listed on Table 1A and 1B.

Table 1A

WASTE TYPES ACCEPTED AT BHS
(From 1977 to 1985)

Paint sludges - heavy metals, traces of solvents
Heavy metal wastes (metals 10% or less by weight)
Pesticide wastes (pesticides 10% or less by weight)
Dust collector residue
Spill clean-up wastes
Expended safety equipment and wastes
Contaminated soil from lagoon closures
Contaminated wastes
Industrial wastewater treatment sludges
Non-hazardous wastes

3.2 WASTE HANDLING PRACTICES

Prior to 1977 BHS operated as a commercial/residential waste sanitary landfill operation. At this time, the history, wastes handled and the waste handling practices of this operation have not been determined.

TABLE 1B

COMPOUNDS ACCEPTED AT BHS
1977-1986

Arsenic
Acetic anhydride
Aspon
Asbestos
Acetone
Aminomethane arsonate
Aluminum sulfamate
Antimony
Antimony trichloride
Arachlor(s)
Acetophenone
Beryllium
Benzene
Benzaldehyde
Bolero
Borax
Biphenyl
Cyanide
Chromium
Cadmium
Cadmium chloride
Cobalt(ous) acetate
Cobaltous nitrate
Cacodylic acid
Copper
Chlordane
Chlorflurenol (Maintain It-3456)
Cacodylic acid
Cyclohexanone
Captan
Cupric acetoarsenate
Dye-Rodamine Red
Dibrom (Naled)
Dimethyl Formamide
Dursban (Chlorpyrifos)
Disulfoton
Diethylaniline
Dimethyl disulfide
Diazinon
Difolatan
Dacthal
Dicambra
Diquat
Endrine
Ethyl benzene
Ether
Formaldehyde
Fumaric acid
Glyphosate
Glyphosphate (roundup)
Iron
Isophorone
Indigo carmine
Isopropanol
Isophorone
Isooctyl ester of MCPP
Kelthane
Kerosene
Lead
Lead naphenates
Lindane
Lithium chloride
Magnesium
Malathion
Mercury
Methylene chloride
Methyl violet
Methoxychlor
Methanol
Mineral oils
Metasystox R
Methoxyclor
Methylchlorophenoxy propionic acid
Nickel
Naphthalene
Nickel sulfate
Nickel chloride
Orethene
Phenol
Phosphate/phthalate esters
Petroleum hydrocarbons
Paraquat
Potassium hydroxide
Phaltan
Primatol
Polyvinylpolymers
Pramitol
Pentachlorophenol
Rotenone
Selenium

TABLE 1B
(Continued)
COMPOUNDS ACCEPTED AT BHS
1977-1986

Sevin (carbaryl)
Silver
Sodium molybdate
Sodium pentachlorophenate
Sodium bichromate
Silicon anti foam agents
Sodium arsenate
Sulfuric acid
Strychnine sulfonate
Strychnine sulfate alkoid
Streptomycin
Thallium
Toluene
Toluenesulfonyl chloride
Terphenyl
Trichloroethene
Trans-1,2 dichlorethylene
Tetrachloroethylene
Toxaphene
Triclopyr
Tricalcium arsenate
Tributyl phosphate
Triforine
Valeric acid
Zinc
Zinc oxide
Zinc phosphate
Xylene
Xylene glycol
O,O,O-ethyl phosphorotriester
2,4-D
2,4-Dichlorophenoxy acetic acid
2,4,5-TP (Silvex)
(N-3-Pyriymethyl)-N-4nitrophenyl-lurea)

Compounds and contaminants listed vary in reported concentration from a trace to as much as 70% concentrations. All compound and contaminants which may be present may not be listed (Woodward-Clyde, 1985).

In 1977, after receiving the Solid Waste Disposal Area Operating Permit from the Missouri Department of Natural Resources, BHS began disposing industrial waste at Hazardous Waste Disposal Area 1. Area 1 consists of 12 acres in the north central portion of the property. The area is divided into an area used between 1977 and 1982 and the progressive trench (See Figure 3). The progressive trench is located in the southeast portion of Area 1 and was used from 1982 to 1985. Pre-1982 disposal methods consisted of burying drums in 3 foot diameter holes drilled 27 feet deep and bulk waste in deep trenches varying in length. Prior to 1982 organic, alkaline and acid wastes were separated for disposal (Woodward Clyde, 1986). After 1982 the disposal method changed to non-segregated waste disposal in the progressive trenches area (PTA) (Woodward Clyde, 1986). These trenches were excavated within the PTA and progressively filled as waste arrived. Dates when each unit received waste units are included in Table 2. Benchmarks and monuments installed around the perimeter of Area 1 allowed the hazardous waste area to be divided into a coordinate system. The sectionalization of Area 1 allowed a method of locating burial areas and thus identifying hazardous waste buried at specified locations in the cell.

The PTA and N-series trenches have individual leachate collection systems. The remainder of Area 1 has no liners or leachate collection system. The N-series trenches all have leachate collection systems of common design (EPA, 1986). The collection system consisted of a four feet deep by two feet wide trench excavated below the bottom grade of each N Trench. A layer of sand was placed in the bottom of the trench to depth of one foot (EPA, 1986). A four inch diameter perforated PVC pipe wrapped in a filter fabric lays on the one foot of sand and is backfilled with an additional one foot of sand. The last two feet are backfilled with a one foot gravel under one foot of compacted soil. The trench slopes down to a sump area backfilled with sand and gravel. A 6" diameter pipe extends from the sump to above the ground's surface. The pipe serves as a means to withdraw leachate.

The PTA system consists of two lateral trenches and one main trench (EPA, 1986). The two laterals run east and west and drain into the main that runs north and south along the east border of Area 1. The trenches are two feet deep by three feet wide, and excavated below

Table 2
STATUS OF WASTE DISPOSAL UNITS
AREA 1

Facility Designation Number	Opened	Date Last Waste Accepted	RCRA Hazardous Waste Management Unit
1	07/77	09/78	No
2	07/77	09/77	No
3	07/78	06/79	No
4	09/77	07/78	No
5	02/78	10/80	No
6	08/77	08/78	No
7	02/79	03/79	No
8	06/79	06/79	No
9	06/79	07/79	No
10	07/79	08/79	No
11	08/79	09/79	No
12	10/79	11/79	No
13	11/79	01/80	No
14	12/79	12/79	No
15	01/80	04/80	No
16	04/80	07/80	No
17	04/80	06/80	No
18	04/80	06/80	No
19	05/80	05/80	No
20	06/80	09/80	No
21	09/80	12/80	Yes
1N	10/80	03/81	Yes
2N	03/81	12/81	Yes
6N	11/80	03/81	Yes
11N	12/80	06/81	Yes
12N	12/80	06/81	Yes
Drilled Cells	03/78	06/80	No
Trench Cells (O-2 through O-4)	11/79	08/80	No
Flammable drilled cells	03/78	06/80	No
Alkaline drilled cells	04/78	06/80	No
Alkaline trench cells (B-2 thru B-6)	11/79	06/80	No
Acid Cells	04/78	06/80	No
PTA *	01/82	05/85	No

(Woodward-Clyde, 1986)
* - "Regulated Unit"

the base of the PTA. Each trench is lined with filter fabric and backfilled with sand. All three trenches have sumps and leachate removal pipes but leachate is removed only from the main trench's sump.

Three intercepter trenches are located on the east border and the east half of the south borders of Area 1. The trenches are filled with sand and designed to intercept leachate migrating from Area 1. The trenches are constructed so the base of each trench sets two feet into the unoxidized glacial till zone. The trenches are two feet in width and vary in vertical dimensions. Trenches 2 and 3 extend 18'-20' vertically up from their bases. Trench #1 extends 8' vertically from its base. Each trench has a gravel-filled sump and each sump is pumped once or twice a year (E&E, 1986).

Four surface impoundments exist at the BHS facility (SI1, SI2 SI3T, SI4). The impoundments were constructed for the storage of surface runoff and leachate waste generated from Area 1 (See Figure 2). Surface impoundments 1 and 2 were constructed in 1977 and have a capacity of 50,000 gallons (Woodward Clyde, 1986). Both impoundments were retrofitted with liners and leachate collection systems in 1983. SI3 was constructed in 1981 (Woodward Clyde, 1986) and SI3T was constructed in 1983. In 1983, water from SI3 was transfered to SI3T so a new impoundment (SI4) could be built at the location of SI3. SI4 was constructed with a liner and leachate collection system. When construction was completed, SI3T was drained and taken out-of-service. SI4 was used for storage of non-contaminated surface runoff. In 1984 SI1, SI2 and SI4 were fitted with translucent covers. These covers reduced impoundment recharge from precipitation and facilitate evaporation. In an effort to increase evaporation SI1 and SI2 have an aeration system. At present only SI 1 and SI 2 are in use. Both impoundments are used for the storage of Area 1 leachate and the covered truck wash drain water.

The closurer plan for Area 1 and the surface impoundments was approved by MDNR on December 10, 1986 (MDNR, 1986).

Eco and Environment, Inc. (E & E), 1:

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MEMORANDUM

TO: Paul Doherty, EPA/START PO

FROM: Joe Parish, E & E/STM

THRU: Hieu Q. Vu, P.E., CHMM, E & E/START PM

DATE: January 13, 1997

SUBJECT: Removal Assessment: Zykan Landfill Site, Warren County, Missouri

CERCLIS I.D.: MOD20348819
SSID: 07XG
TDD: S07-9610-014
PAN: 0315ZLSFXX
OSC: Jeff Weatherford

INTRODUCTION

The Ecology and Environment, Inc. (E & E), Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region VII Enforcement Fund-Lead Removal (EFLR) program to perform a geophysical survey at the Zykan Landfill site, Warren County, Missouri, to delineate an area of alleged buried drums. START member (STM) Joe Parish was selected as the project manager. The survey was performed on November 13 and 14, 1996.

BACKGROUND

The Zykan Landfill site, AKA Bob's Home Service (BHS) Landfill, is a closed sanitary landfill, which is approximately 5 acres in size. The site is located at the foot of Muenz Road off of Highway M, west of Wright City in Warren County, Missouri. The present site owner is Laverne Zykan, widow of the former site operator, James Zykan.

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The site began operation in 1971 as BHS Sanitary Landfill. The landfill operated until 1977, serving local residences in Lincoln, Montgomery, St. Charles, and Warren counties. The landfill ceased operation in 1977, following several inspections by the Missouri Department of Natural Resources (MDNR), which documented unsatisfactory conditions. After the sanitary landfill closed, Zykan operated a hazardous waste landfill just north of the former area. The hazardous waste landfill ceased operation in 1985. That same year, the MDNR placed the sanitary landfill on the Missouri Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites, after information was gathered that suggested that some of the materials placed in the landfill were classified as hazardous. Records indicated that BHS was accepting 30 55-gallon drums per month from Petrolite Corporation. Petrolite alleged that the drums contained paper waste, wood scraps, polymers of condensed alkanolamines, polyethylene oxide ethers, and other chemical wastes.

Further investigations by the MDNR have revealed leachate problems, and more recently, a number of leaking buried drums were discovered in an erosional area south of the sanitary landfill. Analyses of samples collected in August of 1996 indicated that those drums contained ignitable hazardous wastes, including xylenes and ethylbenzene. Samples of the leachate contained heavy metals and volatile organic compounds.

SITE ACTIVITIES

On November 13, 1996, STMs Joe Parish and Kim Robertson met with EPA On-Scene Coordinator (OSC) Jeff Weatherford and Valerie Harding from the MDNR. Harding directed the team to the area south of the sanitary landfill where the drums had been unearthed. The START team scanned the area for buried metal with a Geonics EM31 terrain conductivity meter to establish the approximate boundary of the burial area. The instrument's responses indicated that the buried metal covered an area approximately 1 acre in size. This was confirmed by taking several readings with an EG & G Geometrics G856 proton precession magnetometer. The team then proceeded to mark out a grid system, utilizing wooden stakes to mark survey lines at 20-foot intervals, beginning at the northeast corner of the area. Eleven survey lines running north to south were established, ranging in length from 130 feet to 280 feet. Instrument stations were marked with survey paint at 10-foot intervals to establish a grid system of 20 by 10 feet, covering an irregularly shaped area of approximately 200 feet by 280 feet (Attachment B).

On November 14, 1996, STMs Joe Parish and Kirby Rogers arrived on site to perform a total field magnetometer survey and ground penetrating radar (GPR) survey. The purpose of the magnetometer survey was to delineate the drum burial areas, and the purpose of the GPR survey was to delineate the extent of the fill associated with trenching. There were no other personnel on site that day. Before the survey began, a base station was established in an area west of the grid system that was relatively free of anomalies. The base station was occupied at regular intervals (every 10 to 15 minutes) throughout the day to monitor for the effects of daily magnetic variation. The survey was performed by occupying each station beginning at the northeast corner and taking magnetometer readings, which were automatically recorded in the instruments internal data logger. The survey was expanded along the perimeter in anomalous areas to establish a good background boundary for better anomaly definition. After the magnetometer survey was completed, several ground penetrating radar traverses were performed, utilizing both a high frequency and low frequency antennae. The ground proved to be too conductive for good signal penetration, so the GPR survey was abandoned after the initial traverses.

FOLLOWUP ACTIVITIES

The survey data is presented as Attachment C in the form of a color-fill isopleth map made using Golden Surfer Software. Anomalies, showing areas of buried ferrous metal, are defined by both positive and negative peaks. Positive peaks are yellow to orange in color, and the corresponding negative peaks are intense blue. Background readings (approximately 54,500 to 55,000 nanoTesla) are greenish in color. The orange and yellow areas approximately define the areas of buried metal.

An interpretation map, taking into account the described characteristics of the anomalies, is provided as Attachment D. Areas of suspected drum burial are identified, as well as an area of uninterpreted buried metal. The burials do not appear to extend to the landfill, but appear to be parallel to it. This suggests that the drum burials occurred separate from the landfill and after the landfill boundaries were already defined, either late in the operation or after landfill closure. The area to the south shown in pink, was not conclusively identified as a drum burial area because the anomalies appear broader, hence the anomalous sources are likely deeper, and do not appear linear or "trench-like". The site history and previous investigations suggest that the drums were buried in trenches, at a depth of 5 feet or less to the top of the source. Exploratory trenching is recommended for all suspected areas of buried metal.

CONCLUSIONS AND RECOMMENDATIONS

E & E/START was tasked by the Region VII EPA/ER&R program to perform a geophysical survey at the Zykan Landfill site, Warren County, Missouri, to delineate an area of alleged buried drums. A magnetometer survey was performed on November 13 and 14, 1996. The results of the survey delineated at least two areas that are suspected to contain buried drums. The drum burial does not appear to extend to the sanitary landfill to the north.

Removal Considerations

Based on both the geophysical survey and previous site investigations and recommendations from the MDNR, a removal action is recommended for the Zykan Landfill site. Drums have already been unearthed and found to contain hazardous materials based on ignitability. It is further recommended that exploratory trenching be performed prior to a removal in the anomalous areas that are not already known to contain buried drums, to better evaluate the extent of removal.

Preremedial Considerations

The MDNR investigations have already identified the significant exposure pathways of contaminants from the drum burial area. Removal of drums and contaminated soil from the areas identified by the geophysical survey will likely reduce further threats to human health and the environment posed by this site. However, this investigation did not address the leachate problem from the landfill. Since the leachate shares the same drainage pathways as the drum burial areas, it is recommended that the leachate problem be further investigated to evaluate remediation measures.

REFERENCE

SITE HISTORY: Valerie A. Harding, Environmental Specialist, Missouri Department of Natural Resources (MDNR) Hazardous Waste Program, August 30, 1996 *Integrated Preliminary Assessment/ Site Inspection Report, Zykan Landfill Site (AKA Bob's Home Service Sanitary Landfill).*

ATTACHMENTS:

A: Site Locator Map

B: Survey Layout

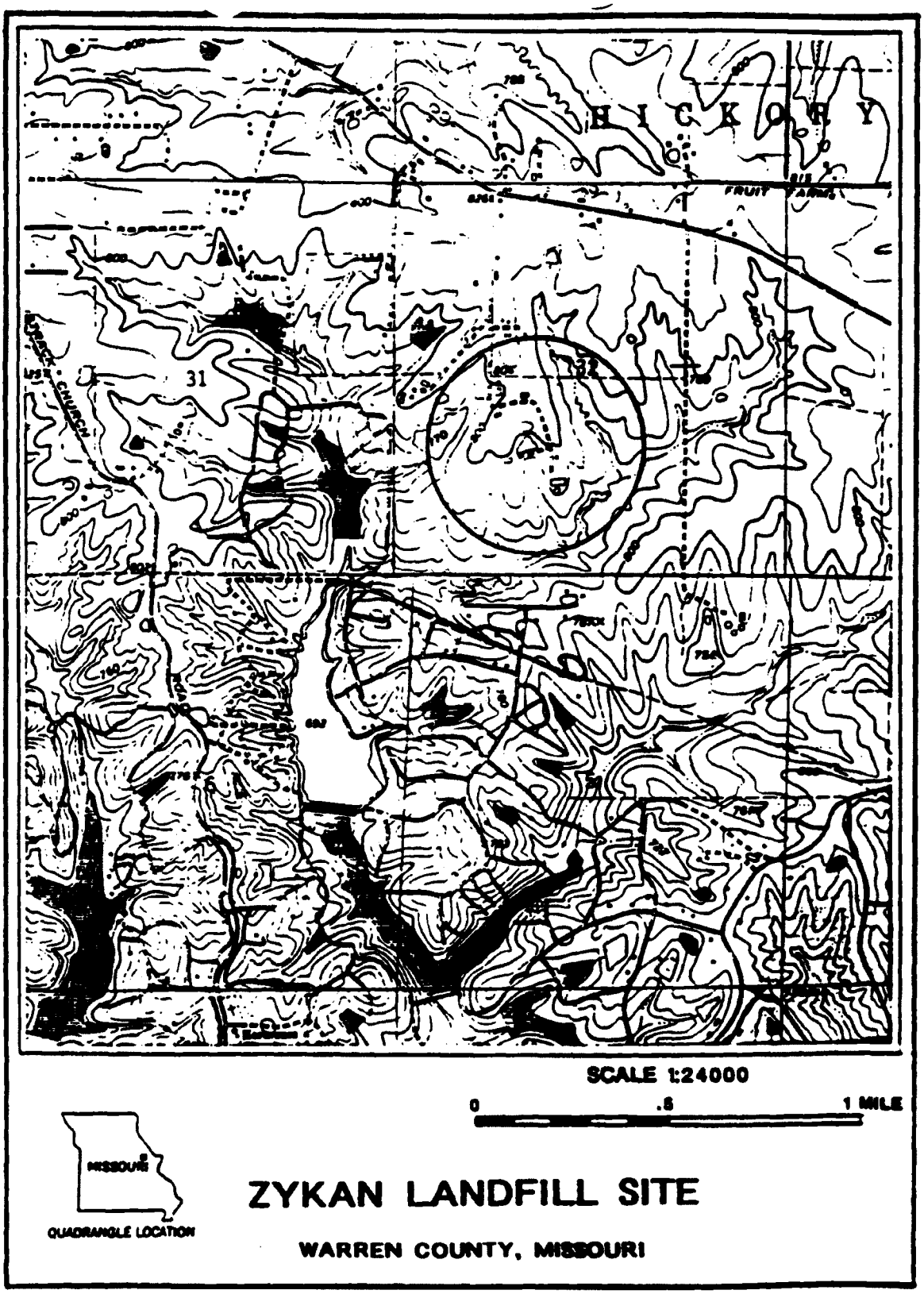
C: Isopleth Color-Fill Map

D: Interpretation Map

E: Removal Site Evaluation Form

ATTACHMENT A

SITE LOCATOR MAP

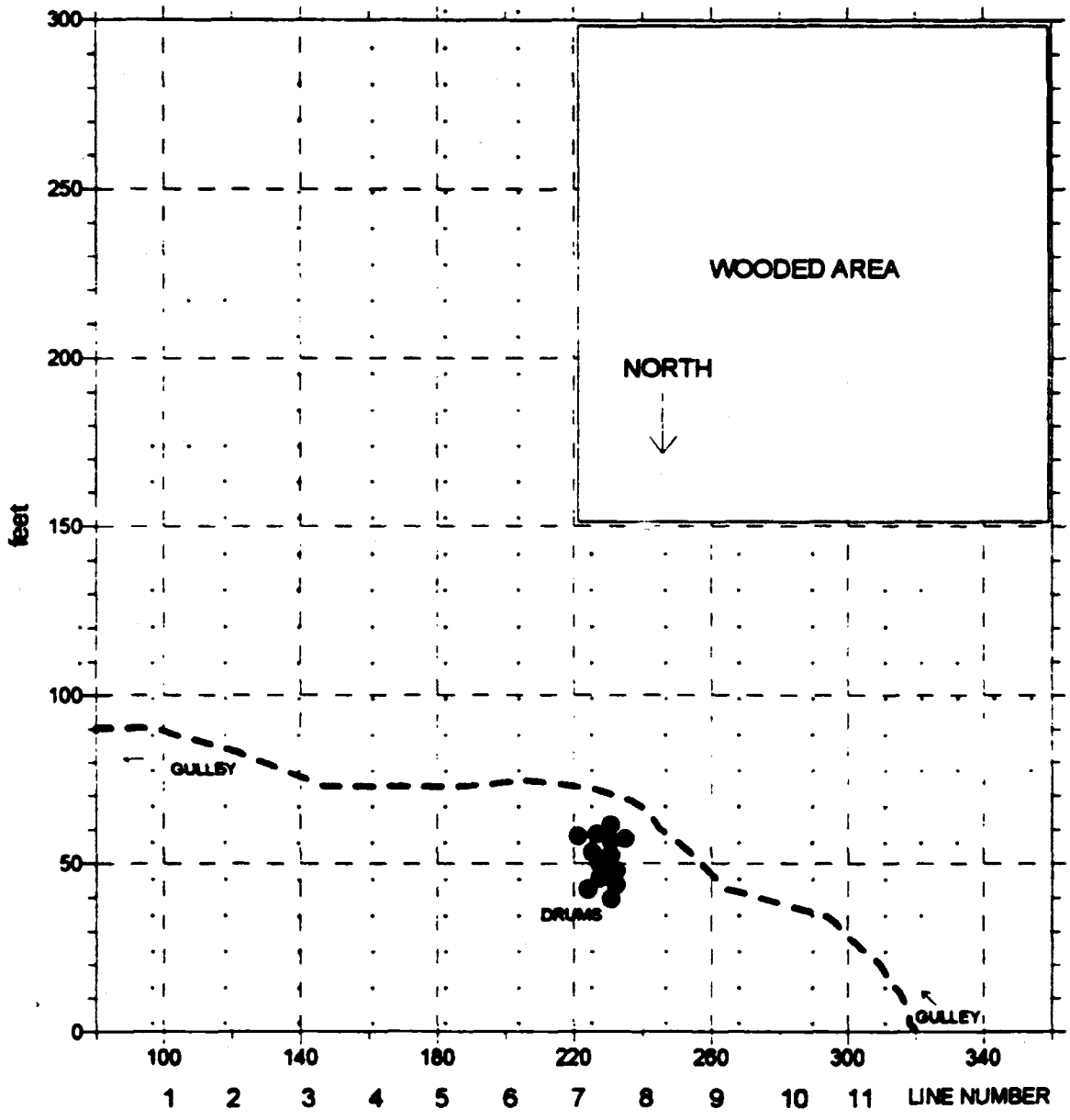

HICKORY
FRUIT
31
32
SCALE 1:24000
0
.5
1 MILE
MISSOURI
QUADRANGLE LOCATION
ZYKAN LANDFILL SITE
WARREN COUNTY, MISSOURI

ATTACHMENT B

SURVEY LAYOUT

ZYKAN LANDFILL SITE, WARREN COUNTY, MISSOURI

TOTAL FIELD MAGNETOMETER SURVEY, NOVEMBER 14, 1996



GRID LAYOUT AND STATION POINTS

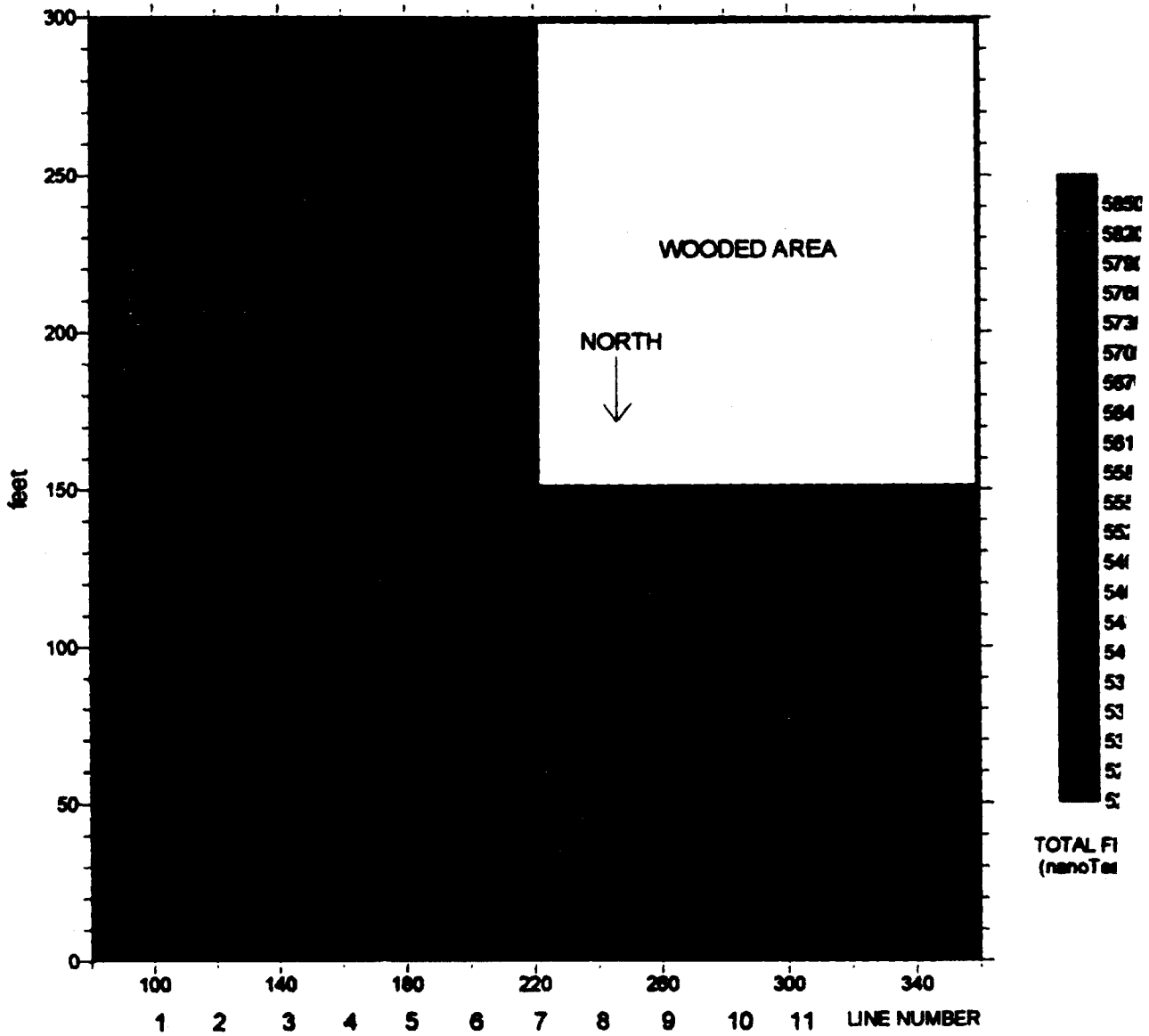
0315ZLSFXX/S07-9610-014

ATTACHMENT C

ISOPLETH COLOR-FILL MAP

ZYKAN LANDFILL SITE, WARREN COUNTY, MISSOURI

TOTAL FIELD MAGNETOMETER SURVEY, NOVEMBER 14, 1996



CONTOUR INTERVAL = 300 nT

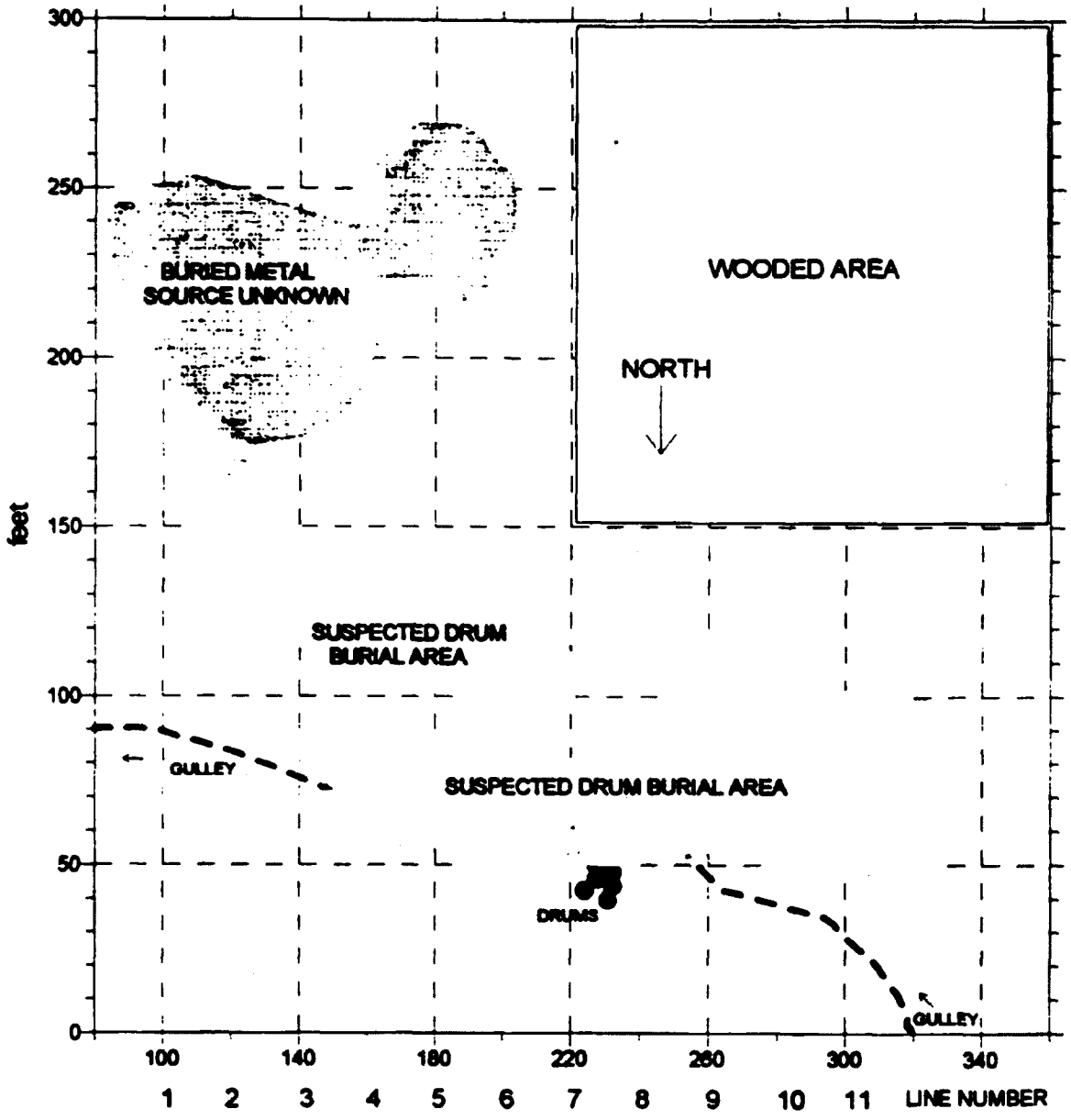
0315ZLSFXX/S07-9610-(

ATTACHMENT D

INTERPRETATION MAP

ZYKAN LANDFILL SITE, WARREN COUNTY, MISSOURI

TOTAL FIELD MAGNETOMETER SURVEY, NOVEMBER 14, 1996



INTERPRETATION MAP

0315ZLSFXX/S07-9610-014

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MEMORANDUM

TO: Paul Doherty, EPA/START PO

FROM: Ron Ramold, E & E/STM

THRU: Hieu Q. Vu, P.E., CHMM, E & E/START PM

DATE: August 6, 1997

SUBJECT: Site Reconnaissance Trip Report for Zykan Landfill, Wright City, Missouri

TDD: S07-9706-014
PAN: 0567ZLSRXX
EPA OSC: Jeff Weatherford
EPA SAM: Bryant Burnett

The Ecology and Environment, Inc. (E & E) Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Site Assessment and Cost Recovery (SACR) Branch to conduct an Expanded Site Inspection (ESI) at the Zykan Landfill Site in Wright City, Missouri. Specific tasks are to include characterization of potential risk to human health and/or environmental risks and determination of data gaps in assessing the threat to groundwater. The START is currently conducting a review of available files from EPA, Missouri Department of Natural Resources (MDNR), and E & E. In addition, the START conducted a reconnaissance of the Zykan Landfill and the immediately surrounding area. The purpose of this trip was to confirm and supplement information gathered from the ongoing file review. Specific goals were to:

- Assess surface water pathway.
- Confirm and assess reported leachate seep from landfill.
- Evaluate the existing groundwater monitoring network.
- Evaluate the potential for exposure to residents.
- Evaluate site for potential sampling locations and monitoring wells.

START member Ron Ramold was assigned as project manager for the Zykan Landfill site.

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START members Steven Vaughn and Ron Ramold conducted the site reconnaissance on July 29 and 30, 1997. Jeff Weatherford (EPA OSC) arranged site access but was unable to attend due to scheduling conflicts.

Upon arrival at the site on July 29th, START conducted a reconnaissance of the surface water pathway. Intermittent streams lie to the east and south of the landfill. The creek bed was mostly dry, though moist conditions, including limited pools of standing water, were encountered. The team observed apparent dark grey stains covering several cobbles and boulders in the creek bed. At one point, a red stain on the landfill-side bank of the creek was evident, possibly emanating from a thin layer of coarse sediment immediately above the stain. The team followed the creek bed approximately to the boundary of the landfill property.

The landfill cover was mostly vegetated. However, the team observed desiccation cracks in the soil cover up to 0.75 inches across and 1 foot deep. On the southern bank of the landfill, five seeps were located within an approximate 50-feet radius. The liquid possessed an oily sheen and has apparently stained the nearby sediment an orange-red color. Within an inch of the seep fluid, an organic vapor analyzer (OVA) indicated readings of up to 180 ppm. Approximately 100 feet to the east of the seeps, START observed six overpacked and five 55-gallon drums. Apparently, these were the drums that were removed and sampled during the preliminary assessment/site inspection conducted by MDNR in 1996.

START identified several of the monitoring wells indicated on file maps. It appeared that many of the wells ("P" series) have been abandoned or destroyed. The team was able to locate seventeen monitoring wells, the majority of which are located in and around the former BHS Hazardous Waste Landfill, immediately north of the site. However, nine monitoring wells lie on the northern and western boundaries of the site. Boring logs indicate that the majority of these wells are screened from approximately 20' to 70' below ground surface. Three of these wells ("K" series) lack any surface protection and one was without any cap or cover. These three wells consist of 3/4" ID casing surrounded by 2" ID PVC casing.

Burns and McDonnel performs quarterly sampling on selected monitoring wells on the former BHS Hazardous Waste Landfill site. Prior to the reconnaissance, Rick Roberts, of Burns and McDonnell, informed START that shallow groundwater flow beneath the BHS site is towards the intermittent creek, which runs along the eastern boundary of both the BHS site and the Zykan Landfill site. START did not locate any monitoring wells along the southern or eastern boundaries of the site.

Initially, the team planned on measuring OVA headspace readings and water levels in all the monitoring wells. However, several of the well padlocks were rusted shut or would not open with the padlock key

provided by Burns and McDonnell personnel. Headspace OVA readings were taken from three wells. No measurement greater than 2.0 ppm was recorded.

On July 30th, START visited the offices of the Warren County Assessor and Clerk, where the team obtained copies of a proposed rural water district and a land ownership aerial photo for the area. The START later met with Charlie Boyce and Dutch Buechele of the Innsbrook Corporation, which operates the vacation home complex downstream from the site. Mr. Buechele provided START with information regarding:

- Site history.
- Innsbrook's water supply.
- The extent and use of surface water.
- Population distribution.

Mr. Buechele also indicated that Innsbrook would not likely have a problem with any future sampling, should it be necessary.

The START members returned to Kansas City the evening of July 30, 1997.

Ec and Environment, Inc. (E & E),
TELEPHONE CONVERSATION RECORD

DATE OF CALL 9-22-97 TIME OF CALL 09 CC

PERSON CONTACTED Jeff Yegge

COMPANY Innsbrook Corporation TITLE Biologist

SUBJECT OF CALL Fish take poundage TELEPHONE # (314) 928-3586 ext 15-3

CONVERSATION

Jeff Yegge (JY) called from Innsbrook at request of Les "Butch" Buechele, the president of Innsbrook Corp

JY informed me that

1) ~ 40-50 lbs of fish were taken from Lake Lucerne / year.

2) the fish are usually bass, bluegill or catfish

3) the lake has not been stocked recently, in fact, some fish have been taken from Lake Lucerne & Innsbrook as stock for other ponds

Regarding lake depth JY informed me that

4) Lake Innsbrook is C- 35' deep & Lake Lucerne is C- 30' deep

5) Lake Lucerne was dredged to remove sediment last year. Dredging took place from the low water bridge at the head of Lake Lucerne out to "the island" in Lake Lucerne

NAME (printed) Ronald Ramold

SIGNATURE Ronald Ramold DATE 9-22-97

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MEMORANDUM

TO: Paul Doherty, EPA/START PO

FROM: Ron Ramold, E & E/STM RR

THRU: Hieu Q. Vu, P.E., CHMM, E & E/START PM

DATE: September 30, 1997

SUBJECT: Site Summary and HRS Evaluation: Zykan Landfill Site, Warren County, Missouri

CERCLIS No.: MO0001574680
TDD: S07-9706-014
PAN: 0567ZLSRXX
EPA OSC: Jeff Weatherford
EPA SAM: Bryant Burnett

INTRODUCTION

The Ecology and Environment, Inc. (E & E), Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Site Assessment and Cost Recovery (SACR) program to conduct a review of existing information related to the former Zykan Landfill Site in Warren County, Missouri under Technical Direction Document (TDD) S07-9706-014. Specific objectives of the review included characterization of human health and environmental risks associated with the site, evaluation of the existing ground water monitoring network, development of a preliminary Hazard Ranking System (HRS) score, and identification of data gaps. Work conducted in pursuit of these objectives included a site reconnaissance and a review of EPA, Missouri Department of Natural Resources (MDNR), and E & E files.

SITE LOCATION AND DESCRIPTION

The site is located within the south half of section 32, Township 47 North, Range 1 West (Attachment 1: Figure 1: Site Location Map). The site lies in the northeast corner of Warren County, approximately three miles south-southwest of Wright City, Missouri and approximately three-quarters of a mile south of the intersection of Highway M and Muenz Road. The site's geographic coordinates are 38°47'14" N latitude and 91°19'48" W longitude.

The Zykan Landfill encompasses approximately 5 acres (Attachment 2: Figure 2: Site Area Map). Intermittent streams border the site to the south and east. To the west lies a junkyard that was a proposed landfill expansion area in 1986 (WCC, 1986). Land use surrounding the site is a mixture of agricultural, residential, and recreational.

SITE HISTORY

In 1971, Bob's Home Service (BHS), Inc. was granted approval by the Missouri Department of Health (MDOH) to operate a refuse disposal area (E & E, 1986). The landfill was owned and operated by James Zykan under the title, "BHS Sanitary Landfill." Immediately to the north lies a hazardous waste landfill, BHS Industrial Waste Disposal Facility, which operated from 1977 until 1985 under an interim RCRA permit. Zykan was also the owner of the hazardous waste landfill. To avoid confusion between the two landfills, BHS Sanitary Landfill is referred to as the Zykan Landfill. After the passage of the Missouri Solid Waste law in 1973, the Zykan Landfill operated under an operating agreement with the state until 1976, when BHS received a Solid Waste Disposal Area Operating Permit from the Missouri Department of Natural Resources (MDNR). In 1977, the Zykan Landfill ceased operation and BHS obtained a license to operate a special industrial waste disposal facility immediately to the north of the sanitary landfill (BHS Industrial Waste Disposal Facility).

BHS Industrial Waste Disposal Facility began accepting waste in 1977 and reached capacity in May 1985 (Jacobs, 1989). In 1986, a RCRA Part B Permit Application was filed (WCC, 1986) which proposed a 20-acre expansion of the hazardous waste landfill. Due to financial difficulties, BHS requested that this application be withdrawn from consideration (Jacobs, 1989).

While in operation, several MDNR inspections of the Zykan Landfill revealed unsatisfactory operating practices, including locating fill areas in areas of natural drainage and lack of sufficient cover. In the

Zykan Landfill, waste was disposed of in relatively shallow (8-10 feet) trenches (MDNR, 1996b). While in operation, the sanitary landfill was to accept municipal solid waste, bulky waste, brush and untreated wood waste (Kleberger, 1974). However, in 1972, Zykan expressed interest in accepting industrial chemicals as well (MDOH, 1972). No permit to dispose of such wastes in the Zykan Landfill was granted. However, a letter from the Tretolite Division of Petrolite Corporation in St. Louis, Missouri to the MDOH indicates that the sanitary landfill received 30 drums of industrial waste per month (Petrolite, 1974). Petrolite describes this waste as "paper waste, woodscraps, polymers of condensed alanolamines (these should be biodegradable), other chemical wastes such as polyethylene oxide ethers not currently marketable."

In 1986, MDNR placed the former BHS Sanitary Landfill (Zykan Landfill) on the registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri (MDNR, 1986). Entry was made under the name "Zykan Site" to avoid confusion between BHS Sanitary Landfill and BHS Industrial Waste Disposal Facility. The registry report stated that the industrial wastes accepted by the sanitary landfill was similar to that which was subsequently disposed of in the hazardous waste facility to the north. Waste categories included "toxic pesticides, organic hydrocarbons, inorganic heavy metals, paints, pigments, and trihalomethanes" (MDNR, 1986; MDNR, 1996a).

Closure of the Zykan Landfill included the placement of a compacted clay cap on the top of the landfill and of a clay barrier on the downstream side of the fill to prevent any leachate from entering surface water (MDNR, 1986). Despite the placement of these barriers, the landfill cap has eroded, particularly along the south side of the landfill. In addition, areas of leachate release were documented by MDNR on at least six occasions from 1990 to 1995 (MDNR, 1995). The observed area of leachate covers an area of at least 900 square feet. In 1993, leachate was observed entering the intermittent stream south of the site. Because of concern over leachate entering surface water, the site status was changed from "properly closed" to "significant threat to the environment—action required" on the registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri (MDNR, 1996a).

An integrated Preliminary Assessment / Site Inspection (PA/SI) was initiated by MDNR in early 1996 (MDNR, 1996b). Citing the underlying thickness of low permeability glacial till, the report concluded that the ground water contamination is unlikely. However, the report also concluded that surface water contamination is a possibility. MDNR personnel observed both the aforementioned leachate outbreak and several 55-gallon drums exposed along an erosion gulley. At least one of the drums was leaking.

MDNR (1996b) sampling and analysis of the leachate and the surrounding stained soil indicated the presence of benzene, ethylbenzene, xylenes, and 2, 4-D. Sampling of the drums indicated the presence of ignitable hazardous waste and included xylenes, ethylbenzene, 2-hexanone, and tetrachloroethene. Sediment samples from the erosion gulley immediately downgradient from the exposed drums showed elevated levels of both xylenes and several analytes with a foodchain bioaccumulation potential factor value over 500 (acanaphthene, anthrancene, benzo(a)anthrancene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, di-n-butylpthalate, dibenzofuran, fluoranthene, fluorene, 2-methyl naphthalene, naphthalene, n-nitrosodiphenylamine).

Though nine drums were removed from the erosion gulley during the Integrated PA/SI, MDNR (1996b) suspected the presence of an unknown quantity of further buried drums. A 1996 magnetometer survey (E & E, 1996) indicated the presence of presence of buried metal (possibly drums) within an approximately 1 acre area in the southwest corner of the landfill. A recent site reconnaissance by START revealed the continued presence of the leachate outbreak. A flame ionization detector (FID) indicated organic vapors up to 180 parts per million (ppm) within one inch of the leachate outbreak surface. No levels above background were detected in the breathing zone.

GEOLOGY

The geologic and hydrogeologic regime beneath the Zykan Landfill has not been explicitly investigated. However, a significant amount of information is available from investigations associated with the immediately adjacent BHS Industrial Waste Disposal Facility. The geology beneath the site consists of unconsolidated Holocene and Pleistocene deposits overlying Paleozoic bedrock. Pleistocene glacial till comprises the majority of the unconsolidated deposits; limestone, shale, and sandstone make up the bedrock. Figure 3 (Attachment 3) presents the geologic units beneath the site and their respective thicknesses.

Depth of unconsolidated deposits ranges from 80 to greater than 180 feet below ground surface. This non-uniform depth has been attributed to the presence of a buried bedrock paleovalley (WCC, 1986). From bedrock, and in ascending order, the unconsolidated deposits consist of pre-Pleistocene residual soil, glacial till, and a thin loess cap.

The residual clay is thin and discontinuous, possibly due to glacial erosion. Glacial till comprises the majority of the unconsolidated deposits. Woodward-Clyde Consultants (WCC, 1986) identified three

components of the till; an older basal till, a younger basal till, and a younger supraglacial till. The older basal till is made up of homogeneous clays with little granular material. A paleosol separates this till from the younger basal till, which is similar but contains more granular material.

Above the two basal tills lies the relatively thick supraglacial till, which constitutes the majority of the till deposits. It consists of sandy and silty clays containing lenses of sand and gravel. Up to 60 feet below ground surface, the supraglacial till is oxidized and fractured due to oxidation weathering and desiccation. The interface between the lower unoxidized till and the upper oxidized till is distinct and observable by a change in color from dark grey (unoxidized) to yellowish-brown (oxidized) (WCC, 1986).

The continuity of the granular lenses within the till is an important issue due to their high permeability relative to that of the surrounding till. Based on borehole logs, WCC (1986) concluded that the lenses were discontinuous. Previous reports came to the same conclusion based on slow water level recovery in monitoring wells. However, an EPA task force stated that these conclusions have not been supported by adequate field testing (EPA, 1986).

A thin (2 to 5 feet) but discontinuous layer of loessal soils overlies the till. Alternatively, in surface drainage pathways the till may be overlain by alluvial stratified deposits of clay through gravel. These alluvial deposits are up to 15 feet thick in the intermittent stream valley to the south of the site (WCC, 1986).

Beneath the unconsolidated deposits lie Ordovician and Devonian bedrock deposits. Relatively little site-specific information is available on the nature and thicknesses of these units. However, some conclusions can be drawn based on limited bedrock coring and knowledge of regional geology. Based on previous cross-sections (WCC, 1986), depth to bedrock beneath the site ranges from 80 to greater than 180 feet. Pre-Pleistocene and/or glacial erosion apparently sculpted the underlying bedrock into a paleovalley trending north-northwest beneath the site (WCC, 1986). This resulted in the removal of some of the upper bedrock formations along the axis of the paleovalley. Along the walls of the paleovalley and west of the site, Devonian units (Sulphur Springs Group, Snyder Creek Formation, and Callaway Limestone) overlie the Ordovician Plattin Formation. However, these Devonian units are absent in bedrock borings along the axis of the paleovalley where the overlying till lies directly on the Ordovician Plattin Formation. Boring logs from a nearby well indicate that the Joachim Formation and St. Peter Sandstone underlie the Plattin Formation. Beneath these units lie Ordovician dolomites and sandstones (Powell-Cotter dolomite, Jefferson City Formation, and Roubidoux Formation).

In summary, it appears that the Zykan Landfill is situated over a 80 to 180 feet thick layer of glacial till which overlies a bedrock paleovalley of Ordovician limestone.

HYDROGEOLOGY

WCC (1986) divided the subsurface into six hydrostratigraphic units (see Figure 3) based on stratigraphic position and hydraulic characteristics. Unit A consists of the saturated portion of the oxidized till and acts as the uppermost recipient of any potential contamination. Though composed of relatively impermeable material, this unit possesses a relatively high hydraulic conductivity (1×10^{-5} cm / sec) due to the observed fractures. The base of unit A is the oxidized / unoxidized till interface. This surface is irregular but generally follows surface topography.

Ground water flow in unit A is to the southeast and appears to be topographically driven. Hydrographs of wells screened this unit indicate water levels ranging from 10 to 60 feet below ground surface. Water levels in one of these monitoring wells rose over three feet in response to heavy precipitation (WCC, 1986).

The underlying unoxidized till and residual clay make up unit B. Its basal surface is bedrock. Estimated hydraulic conductivity of this unit (1×10^{-7} cm / sec) (WCC, 1986) is at least two orders of magnitude less than that of the overlying unit A due to the general decrease in granular material with depth and to the absence of fractures. It has been proposed that ground water flows to the northeast in unit B (WCC, 1986). However, because this unit possess such low permeability, monitoring wells have been slow to achieve equilibrium with the surrounding aquifer. This has resulted in potentiometric surfaces and proposed ground water flow directions of uncertain accuracy (EPA, 1986; Jacobs, 1989; WCC, 1986).

Units C through F consist of saturated bedrock. Unit C consists of the uppermost consolidated deposits above the St. Peter Formation. Though of relatively low permeability, this unit can support low yield wells (Jacobs, 1989). The St. Peter Formation constitutes unit D. The top of this friable sandstone unit lies approximately 400 feet below ground surface. Numerous residential wells are screened in unit D. Unit E consists of the Powell-Cotter Dolomite and the Jefferson City Formations. These units are generally less permeable than the strata lying above and below. Unit F consists of sandstone and limestone of the Roubidoux Formation, the top of which lies at approximately 1000 feet below ground surface. Public drinking water wells draw water from Unit F. MDNR (1996a) referred to units D, E, and F collectively as the Ozark Aquifer.

Water levels in nearby private bedrock wells ranged from 100 to 260 feet below ground surface. Ground water flow in the bedrock is to the northeast (MDNR, 1996b; WCC, 1986).

Some general conclusions can be made regarding the hydrogeologic regime beneath the site.

- The site lies directly over an oxidized and fractured layer of glacial till. This layer is significantly more permeable than the underlying unoxidized till.
- Ground water flow in the oxidized unit appears to be topographically driven to the southeast. This is reasonable given that the oxidized/unoxidized surface generally follows surface topography.
- Ground water levels in the respective units indicate decreasing hydraulic head with depth, and possibly even zones of perched ground water at the oxidized/unoxidized interface.

Given these conclusions, it appears that any contamination from the sanitary landfill that entered unit A (oxidized till) would flow towards the topographic lows (intermittent streams) rather than continue downward through the relatively impermeable unoxidized till (unit B).

SURFACE WATER HYDROLOGY

Two intermittent streams provide surface drainage of the site (see Figures 1). The first runs roughly south-southeast and borders both the Zykan Landfill and the hazardous waste landfill immediately to the north. The second enters the site from the east and flows roughly southwest across the southern border of the Zykan Landfill. The confluence of these two intermittent streams is located on the east boundary of the landfill approximately 400 feet south of the boundary between the two landfills. After leaving the site, the intermittent stream runs approximately 4,000 feet southwest to Lake Lucern, the first of two man-made lakes. Overflow from Lake Lucern drains into Lake Innsbrook. This generally occurs only after heavy precipitation. Discharge from Lakes Innsbrook flows south to Charrette Creek which runs south and eventually joins the Missouri River approximately 12 miles south of the lakes.

Site elevations range from 790 feet above mean sea level (MSL) at the northwest corner of the sanitary landfill to approximately 755 feet along southern border. WCC (1986) reported that the watershed in which the site is located drains 483 acres.

HRS EVALUATION

Ground Water Pathway

To date, there has been no documented release from the Zykan Landfill to the ground water pathway. Over 100 monitoring wells have been installed within the unconsolidated units as part of the ground water monitoring program at BHS Industrial Waste Disposal Facility to the north. However, based on historical static water levels, ground water flow beneath the site is to the southeast. Therefore, none of these wells are positioned to detect contamination from the Zykan Landfill. Attachment 4, taken from EPA (1986), shows monitoring well positions. Monitoring wells to the north and west of the site are apparently upgradient. There are twelve monitoring wells southeast of the site. However, from the site they are located across a topographic low, which would presumably serve as a ground water divide. There are no drinking water wells drawing water from the unconsolidated till (MDNR, 1996b).

Regardless of the direction of shallow ground water flow, any potential contamination would still have to penetrate the full thickness of the unoxidized till before reaching the bedrock Ozark Aquifer. Currently, there are no bedrock monitoring wells which could detect such contamination.

Should contamination of the Ozark Aquifer occur, targets of potential ground water contamination would include nearby private and public water supply wells. Table 1 (Attachment 5) summarizes the distances from the site and populations served for these wells (MDNR, 1996b). These wells draw water from the Ozark Aquifer. A private well located at the entrance to the property and approximately 0.25 miles northwest of the site serves as the nearest well (MDNR, 1996b).

Since 1986, the Missouri Department of Health has been engaged in an annual analysis of private drinking water wells surrounding the site. As of 1996, samples were analyzed for 19 inorganic chemicals, 6 chlorinated pesticides, 57 volatile organic compounds, and 2 chlorophenoxy herbicides (MDNR, 1996b). No evidence of ground water contamination has been discovered.

Surface Water Pathway

Surface water is also a potential recipient of site contamination. MDNR has documented on several occasions the presence of a leachate outbreak on the south side of the sanitary landfill. Approximately 150 feet west of the leachate outbreak, a number of buried drums were exposed by erosion of the landfill cap. At least one of these drums was leaking and the competency of the remaining drums was suspect. MDNR sampling of the drums, leachate outbreak and downgradient sediment indicate that site contamination has

impacted the intermittent stream bordering the site to the south. However, for HRS purposes, intermittent streams can not serve as surface water bodies in areas with greater than 20 inches of precipitation per year. Therefore, an observed release to surface water can not be documented.

The probable point of entry (PPE) of contaminated surface water is the uppermost reach of Lake Lucern where the intermittent stream joins perennial surface water, approximately 4,000 feet downgradient from the site (see Figure 1). The resulting 15 mile target distance limit (TDL) lies in Charrette Creek within the NE ¼ of section 22, Township 45 North, Range 12 West. Lakes Lucern and Innsbrook are used recreationally for swimming and fishing. No public water supply intakes are located along the surface water pathway within the TDL. However, uses do include livestock and wildlife watering, protection of warm water aquatic life, human health-fish consumption, and whole body contact recreation (MDNR, 1996b). Approximately 40 pounds of fish are harvested from Lake Lucern and Lake Innsbrook per year (E & E, 1997). No non-plant sensitive environments are listed along the surface water pathway.

Soil Exposure Pathway

The leachate outbreaks, buried drums, and related contaminated soil also serve as a soil exposure threat. Currently, both the hazardous waste and sanitary landfills are closed and no workers are on- site. The site is not used recreationally and there are no schools, day cares, residences, or places of work within 200 feet of the site. A locked gate blocks entrance to the site along the entrance road. However, vehicular access, as well as overland pedestrian access, can still be gained. MDNR (1996a) documented evidence of unauthorized persons on-site. Unlike BHS Industrial Waste Disposal Facility to the north, the Zykan Landfill is not fenced. Approximately 0.5 mile to the southwest lies the Village of Innsbrook, in which over 900 recreational homes and 110 permanent residences, are located.

HRS SCORING PACKAGE

Prescore 4.1 was used to calculate pathway and site scores. Several HRS evaluations have been prepared. The first is based on data obtained during the file review, primarily the MDNR Integrated PA/SI (MDNR, 1996b). Table 2 (Attachment 6) presents the input data used for this base case evaluation. This base case is limited by several data gaps, most significant of which are the lack of surface water and ground water analytical data. Therefore other potential scenarios were also investigated by modifying the input data from the base case. All potential scenarios were scored using contaminants documented to be present

at the site (MDNR, 1996b). Table 3 (Attachment 7) provides the resulting HRS pathway and site scores for both the base case and modified case scenarios.

Due to a lack of data and lack of perceived threat, the air pathway was not considered. The soil exposure pathway did not score above zero due to the lack of targets. Base case scenario input resulted in a ground water pathway, surface water pathway, and site scores of 2.77, 4.47, and 2.63, respectively.

The following HRS scores are based on potential conditions rather than documented data. An observed release to ground water (scenario 1) increased the ground water pathway score to 7.27 but did not significantly increase the site score (4.27). The next two scenarios were based on actual contamination of a drinking water well. No public water supply wells are located within a mile of the site. Therefore, it appears more likely that the target population would obtain drinking water from private wells. For scenarios 2 and 3, the target population was set at 10 people. Level II contamination (scenario 2) resulted in a ground water pathway score of 17.28 and a site score of 8.92. Level I contamination (scenario 3) resulted in a ground water pathway score of 28.68 and a site score of 14.51. Though it appears unlikely, scenario 4 was evaluated to investigate the effect of an increase in the target population to 100 people (Level I) contamination. This significantly increased the ground water pathway and site scores to 100 and 50.05, respectively.

The remaining scenarios were scored by returning the ground water input to the base case scenario and evaluating the effects of changes in surface water pathway input. Due to the presence of a fishery in the surface water pathway, scores were highly affected by the bioaccumulation potential factor value of the chosen contaminant. Scenario 5 assumes an observed release to surface water of a contaminant with a bioaccumulation potential factor value (BPFV) of less than 500. As a result, the surface water pathway score increased to 24.60 and the site score increased to 12.38. Substituting a surface water contaminant with a BPFV of greater than 500 (scenario 6) resulted in a level II human food chain concentration. The resulting surface water pathway and site scores were 97.13 and 48.59 respectively. Scenario 7 evaluated the addition of a high-BPFV fish tissue sample to scenario 6. This increased the surface water pathway score to 100 and the site score to 50.02.

SUMMARY AND CONCLUSIONS

A review of available files indicates that hazardous waste has been disposed of in the Zykan Landfill. Limited sampling of both exposed drums and a leachate outbreak area confirm this. However, the full nature and extent of the waste is not certain.

An observed release to ground water has not been documented. Currently, Burns and McDonnell is providing quarterly sampling of ground water at BHS Industrial Waste Disposal Facility immediately to the north. Neither water levels nor analytical results were available at the time of this report. This information might be helpful in predicting shallow ground water flow more accurately. However, the placement of the current monitoring well network is not adequate to detect a release from the Zykan Landfill. Though the 80 to 180 feet of low permeability glacial till beneath the site may prevent contamination of the underlying bedrock aquifer, there are currently no monitoring wells to detect such contamination should it occur. Within four miles of the site the bedrock aquifer is tapped as a source of both public and private drinking water.

Should shallow ground water, which is apparently topographically driven, be contaminated, the potential exists for contaminated ground water to enter the alluvium and possibly the intermittent streams during periods of flow. In addition, contaminated leachate has been documented as entering the intermittent stream to the south of the site. Furthermore, sediment samples near the exposed drums indicated contamination by chemicals with a high bioaccumulation potential. A recent geophysical survey indicated the potential drum burial area to be approximately one acre in area. Downgradient surface water is used for both whole-body contact recreation and fishing. Therefore, it appears that surface water contamination may pose the greatest potential threat to human health and the environment. However, data has not been collected to determine whether any contamination has reached the PPE at Lake Lucern.

As a result of the aforementioned data gaps, it is difficult to adequately assess the potential threat the site poses to human health and the environment. However, based on the above HRS evaluations, some conclusions can be made regarding the effect of given assumptions on the resulting HRS score. It appears that scoring the site with currently available but limited data will result in a score of less than 3. The following conclusions can be made based on the evaluation of potential scenarios. An observed release to ground water without any actual contamination of drinking water wells would not increase the ground water pathway score significantly. Level I actual contamination of a nearby drinking water well would increase the score significantly. However, offsite contamination would be difficult to attribute to the Zykan

Landfill given the proximity of BHS Industrial Waste Disposal Facility. Scoring an observed release to the ground water pathway (pathway score = 7.27) alone or with actual surface water contamination by a low-BPFV contaminant (pathway score = 24.60) would not result in a site score above 13. In contrast, a documented surface water release of some of the high-BPFV contaminants (known to be on site) would increase the site score above 48.

RECOMMENDATIONS

In order to adequately assess the potential threat to human health and the environment, START recommends the following:

- Evaluation of quarterly sampling data from the post-closure monitoring program at BHS Industrial Waste Disposal Facility to more accurately determine ground water flow direction in the unconsolidated till and to assess the likelihood of a release from the Zykan Landfill.
- Review of MDOH annual sampling protocol to determine the adequacy of this program to detect contamination of the bedrock aquifer.
- Collection and analysis of additional downgradient sediment samples between the site and the PPE, Lake Lucern, to determine the extent of contamination in the intermittent stream.
- Collection and analysis of aqueous, sediment, and fish tissue samples from Lakes Lucern and Innsbrook to assess the potential threat to human health and the environment via the surface water pathway.

Though it does not appear that a documented ground water release from the landfill will significantly affect HRS scoring, installation of monitoring wells in the unconsolidated till and possibly the underlying bedrock aquifer should be considered for future monitoring purposes.

ATTACHMENTS:

1. Figure 1. Site Location Map
2. Figure 2. Site Area Map
3. Figure 3. Geologic / Hydrogeologic Stratigraphy
4. Monitoring Well Location Maps
5. Table 1. Population Served by Ground Water Wells Within Four Miles of Zykan Landfill
6. Table 2. Base Case HRS Data
7. Table 3. HRS Evaluation Scenarios

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Beveridge, T.R., et al., 1961, The Stratigraphic Succession in Missouri, Missouri Geological Survey and Water Resources, Rolla, Missouri.

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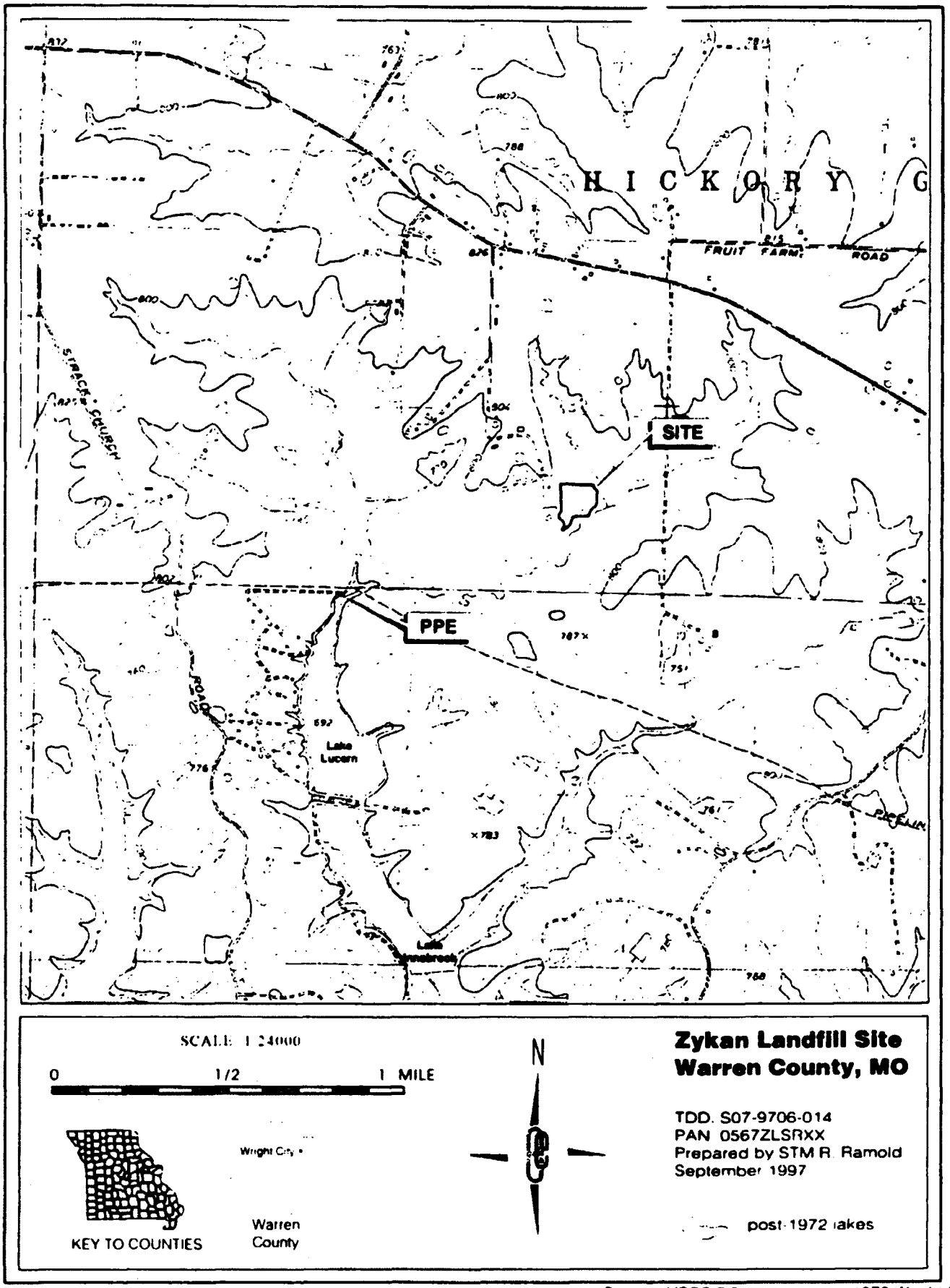
ATTACHMENT 1

Figure 1. Site Location Map



Source: USGS 7 5 minute series. 1972 Wright City Quadrangle, Missouri with modifications from Village of Innsbrook Map

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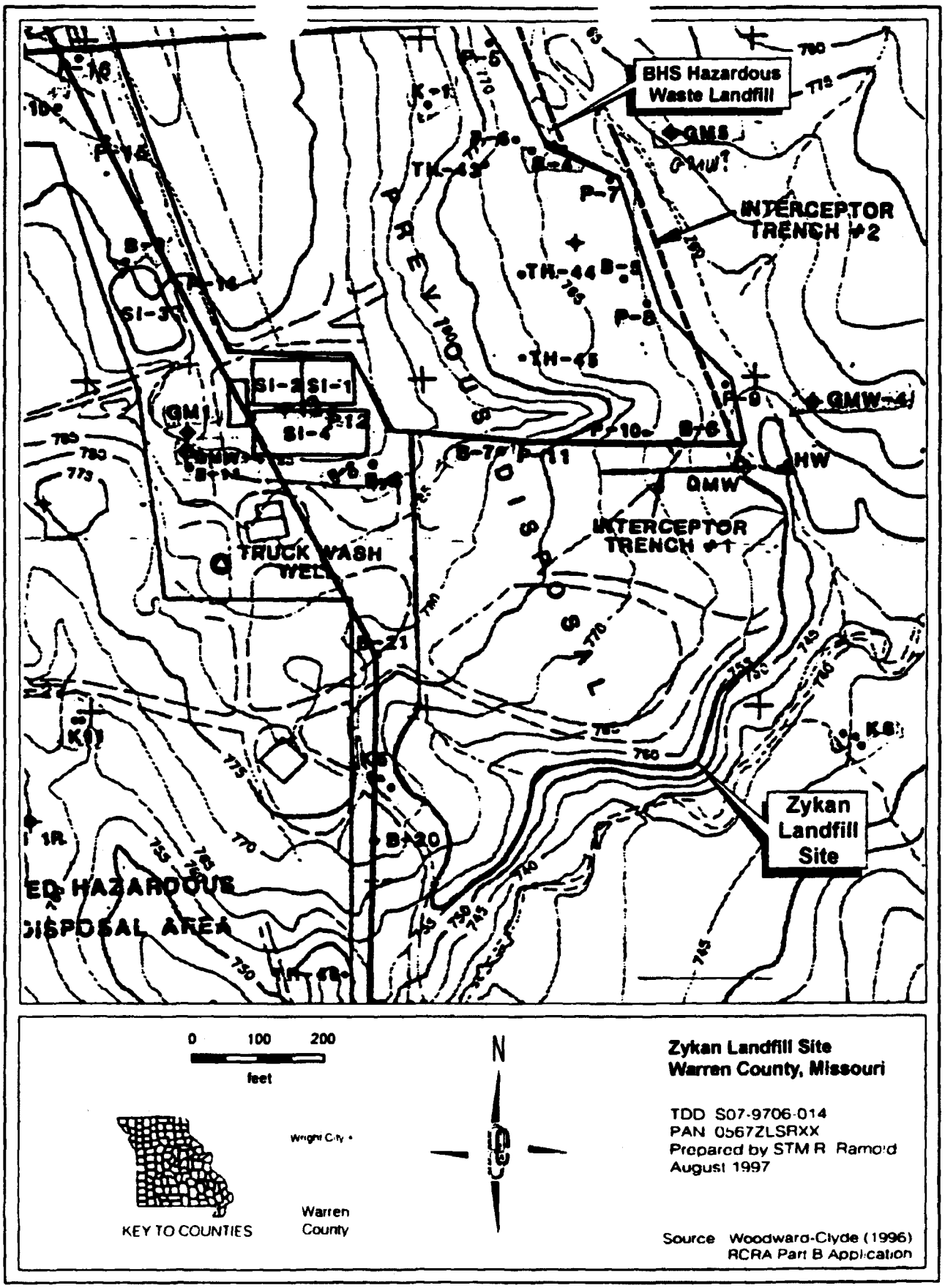
Figure 1: Site Location Map

ATTACHMENT 2

Figure 2. Site Area Map

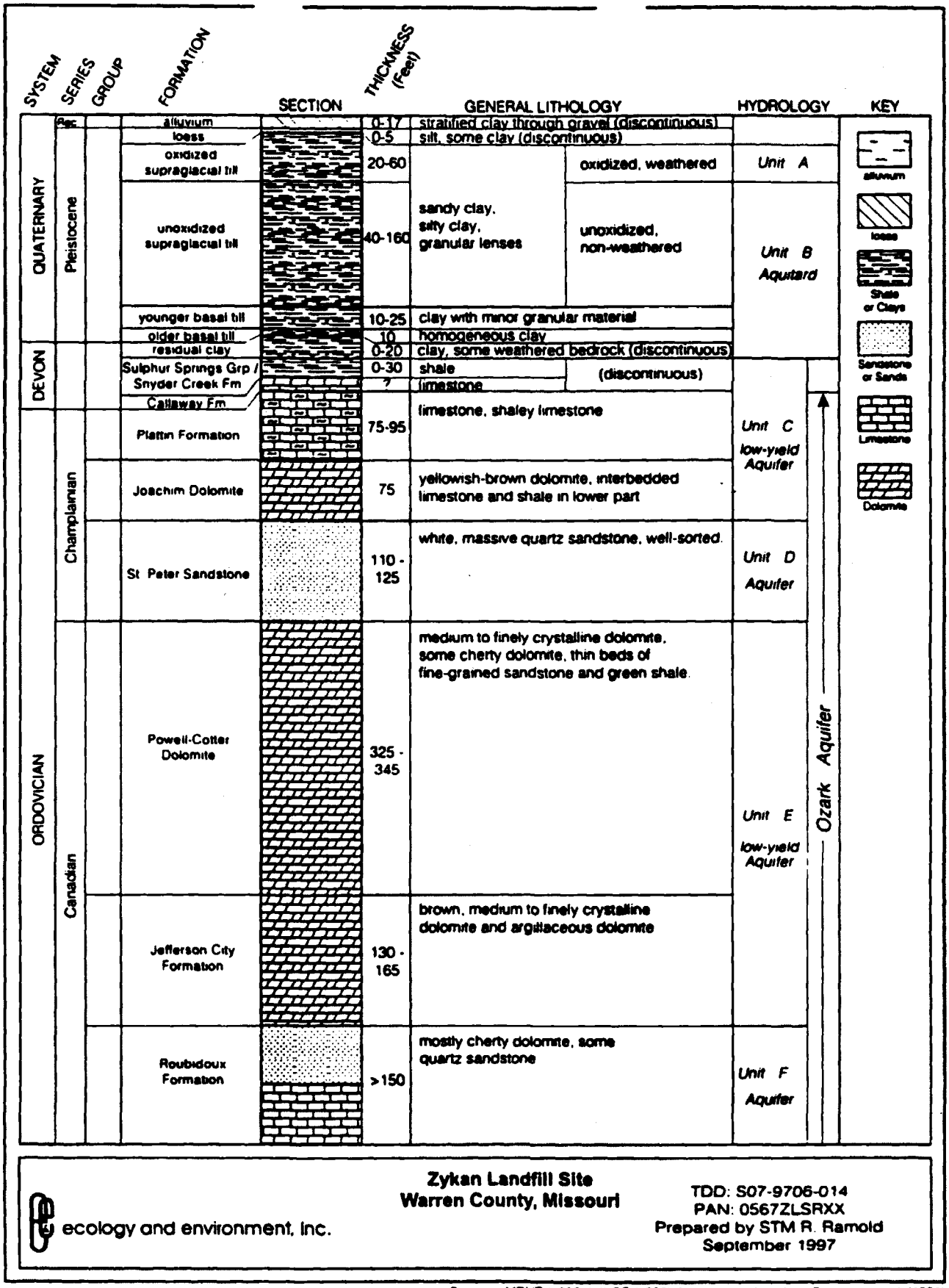


9706 014 zyksite CDR

Figure 2: Site Area Map

ATTACHMENT 3

Figure 3. Geologic/Hydrogeologic Column



Sources: MDNR (1996b), WCC (1986), bedrock lithology from Beveridge et al. (1961)

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Figure 3: Geologic / Hydrogeologic Column

ATTACHMENT 4

Monitoring Well Location Maps from EPA (1986)

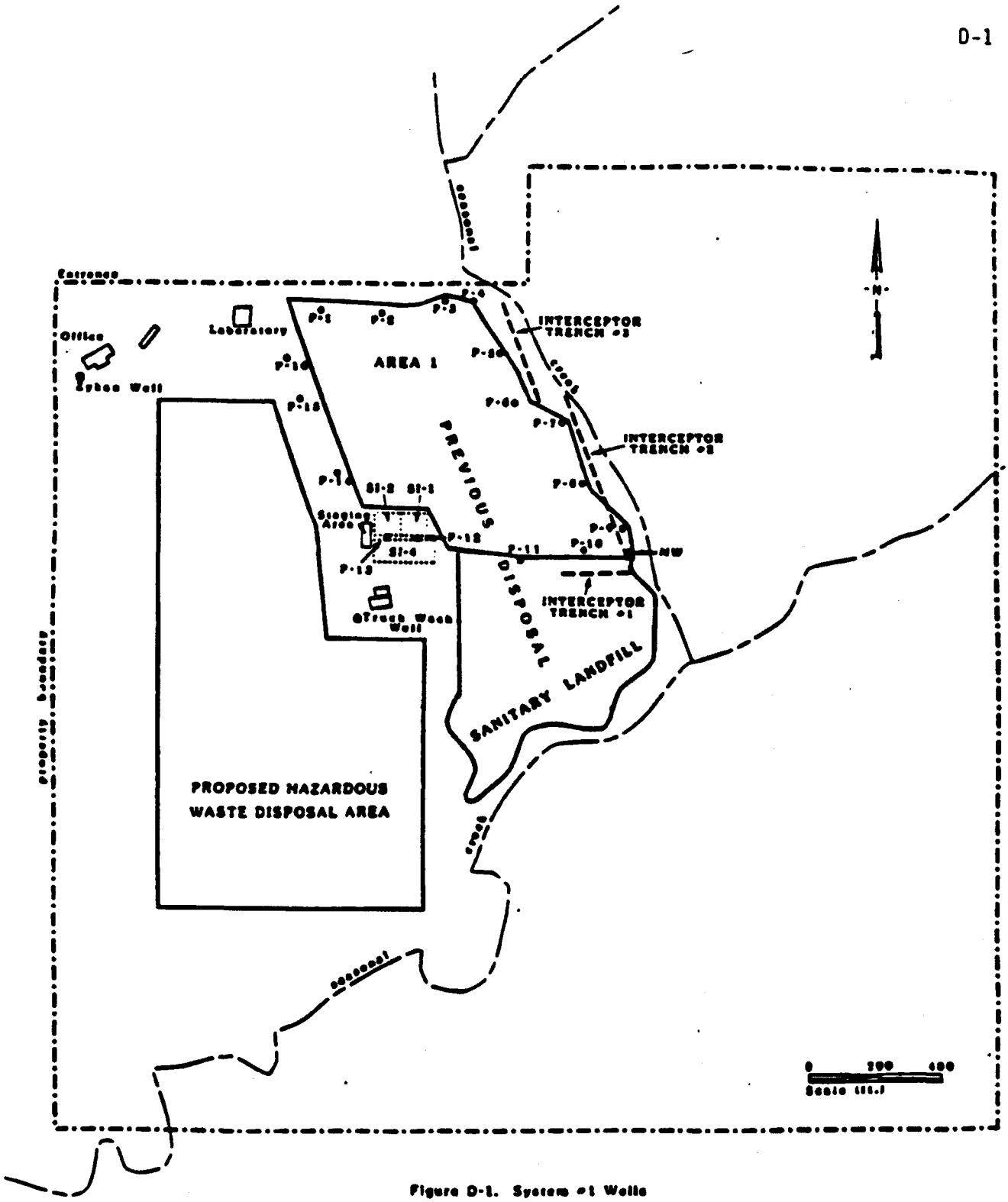


Figure D-1. System #1 Wells

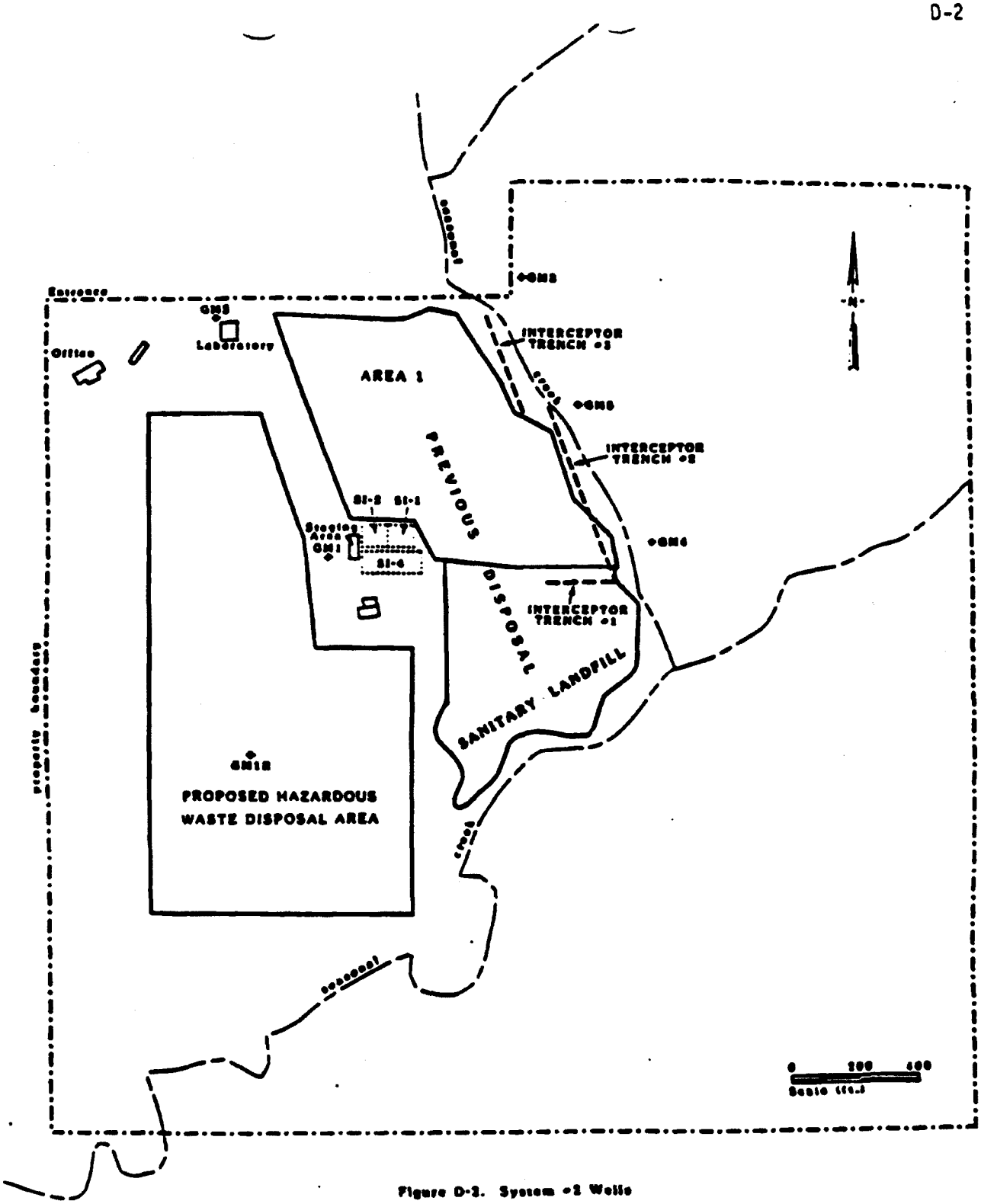
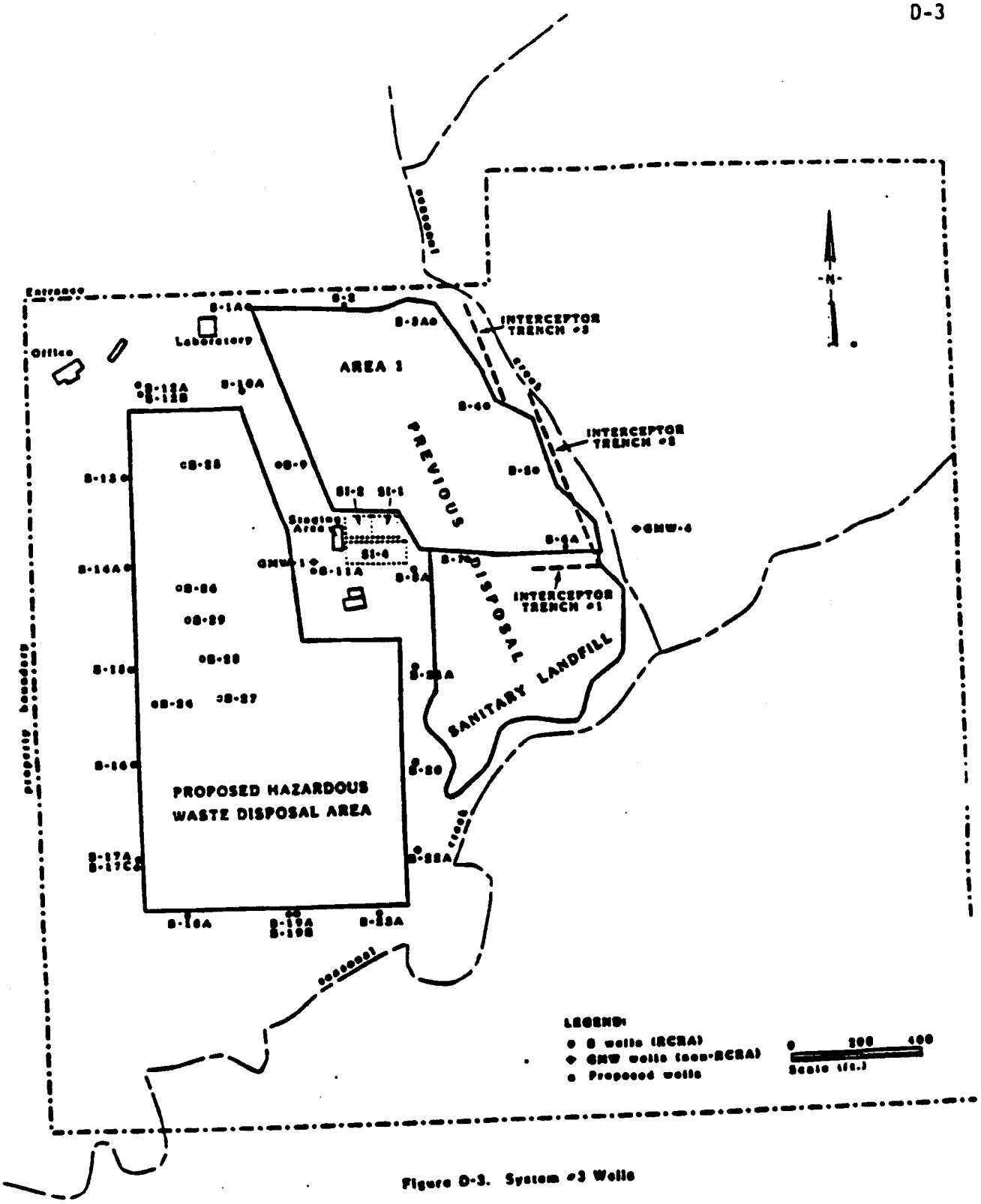


Figure D-3. System #2 Wells


Entrance
Office
Laboratory
AREA 1
INTERCEPTOR TRENCH #3
INTERCEPTOR TRENCH #2
INTERCEPTOR TRENCH #1
PREVIOUS DISPOSAL
SANITARY LANDFILL
Staging Area
PROPOSED HAZARDOUS WASTE DISPOSAL AREA
B-1A
B-2
B-3A
B-4
B-5
B-6A
B-7A
B-8A
B-9A
B-10A
B-11A
B-12A
B-12B
B-13
B-14A
B-15
B-16
B-17A
B-17C
B-18A
B-19A
B-19B
B-20
B-21A
B-22A
GMW-1
GMW-4
SB-5
SB-6
SB-7
SB-8
SB-9
SB-24
SB-25
SB-26
SB-27
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SB-63

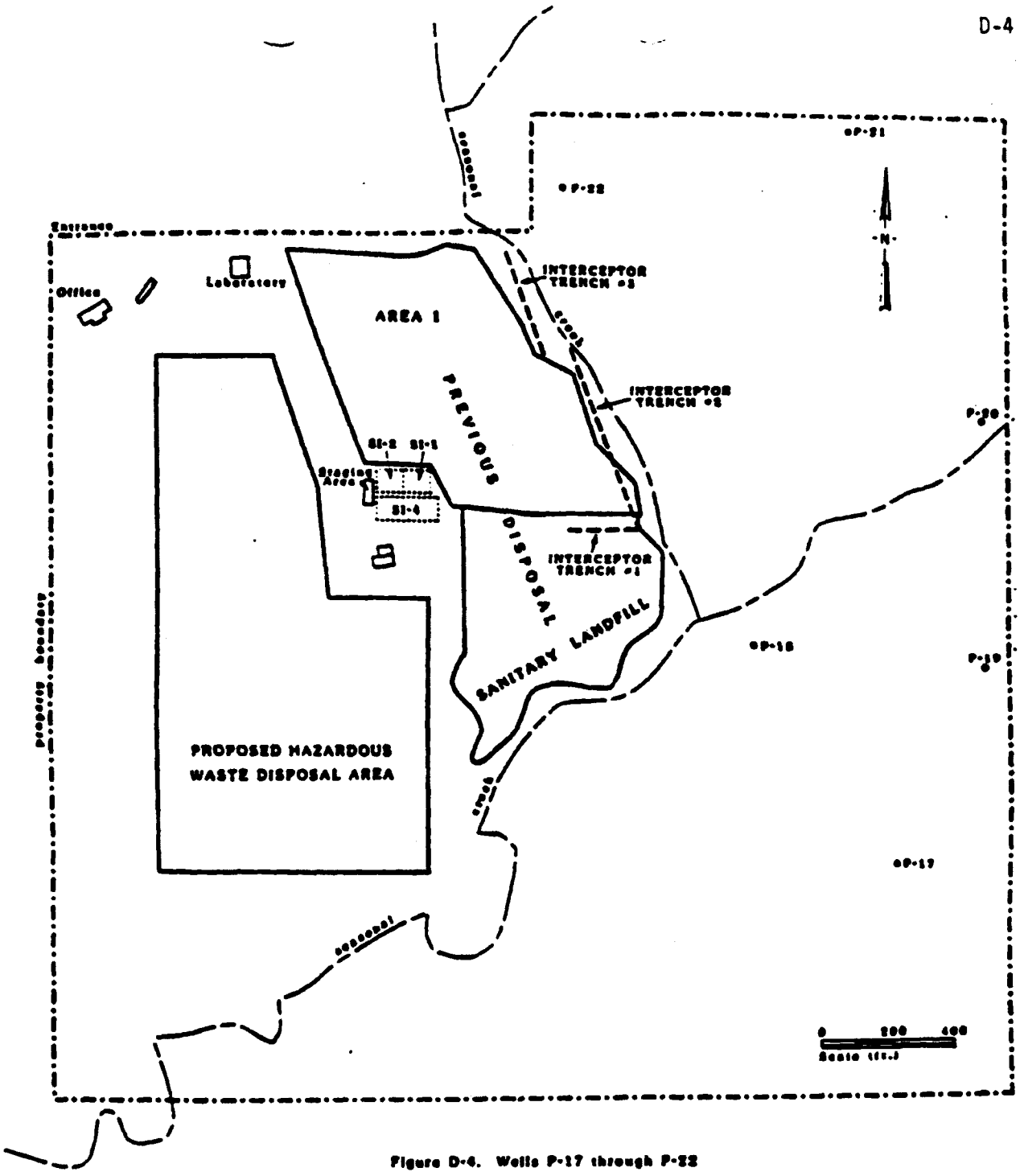

Figure D-4. Wells P-17 through P-22

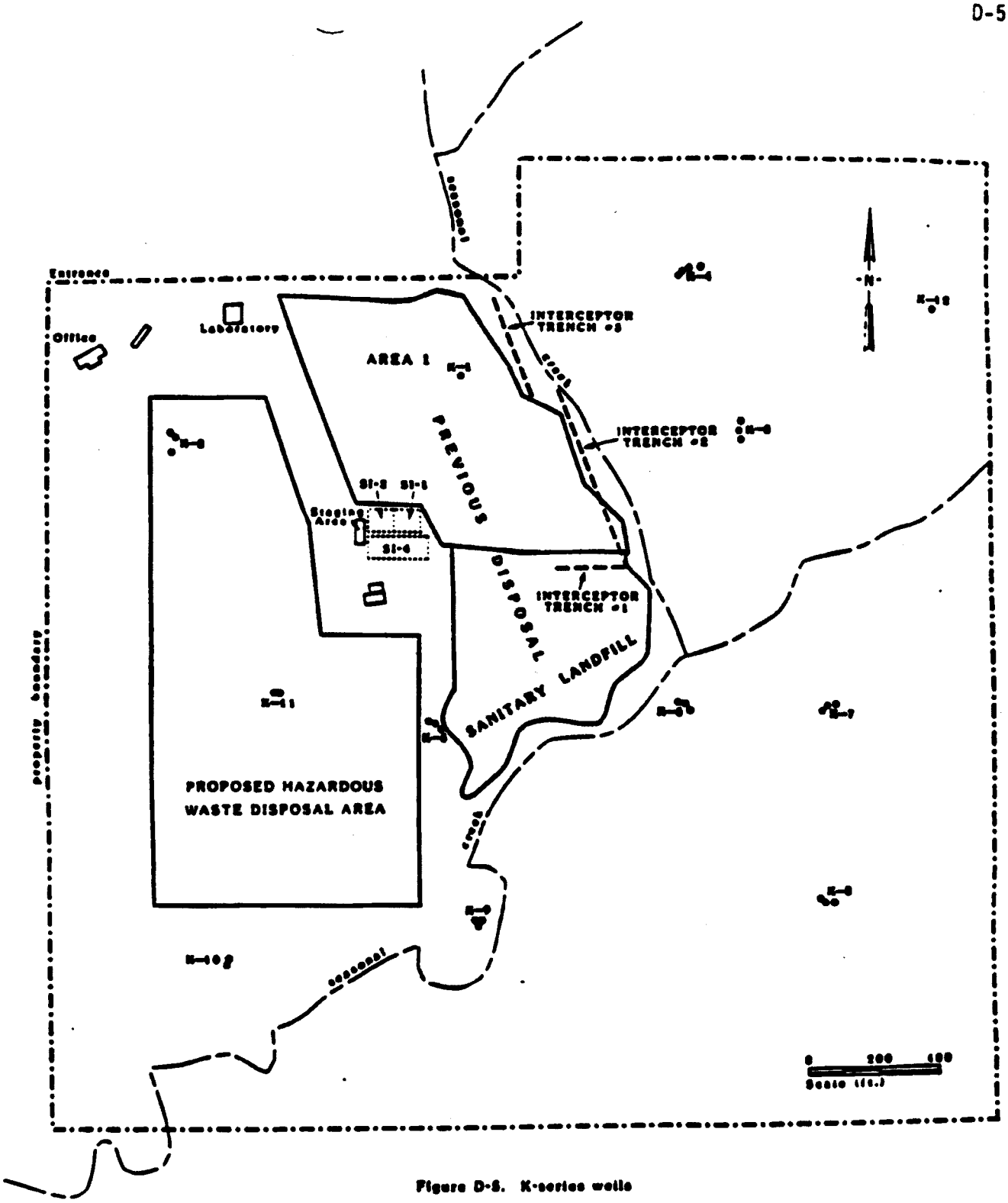

Figure D-5. K-series wells

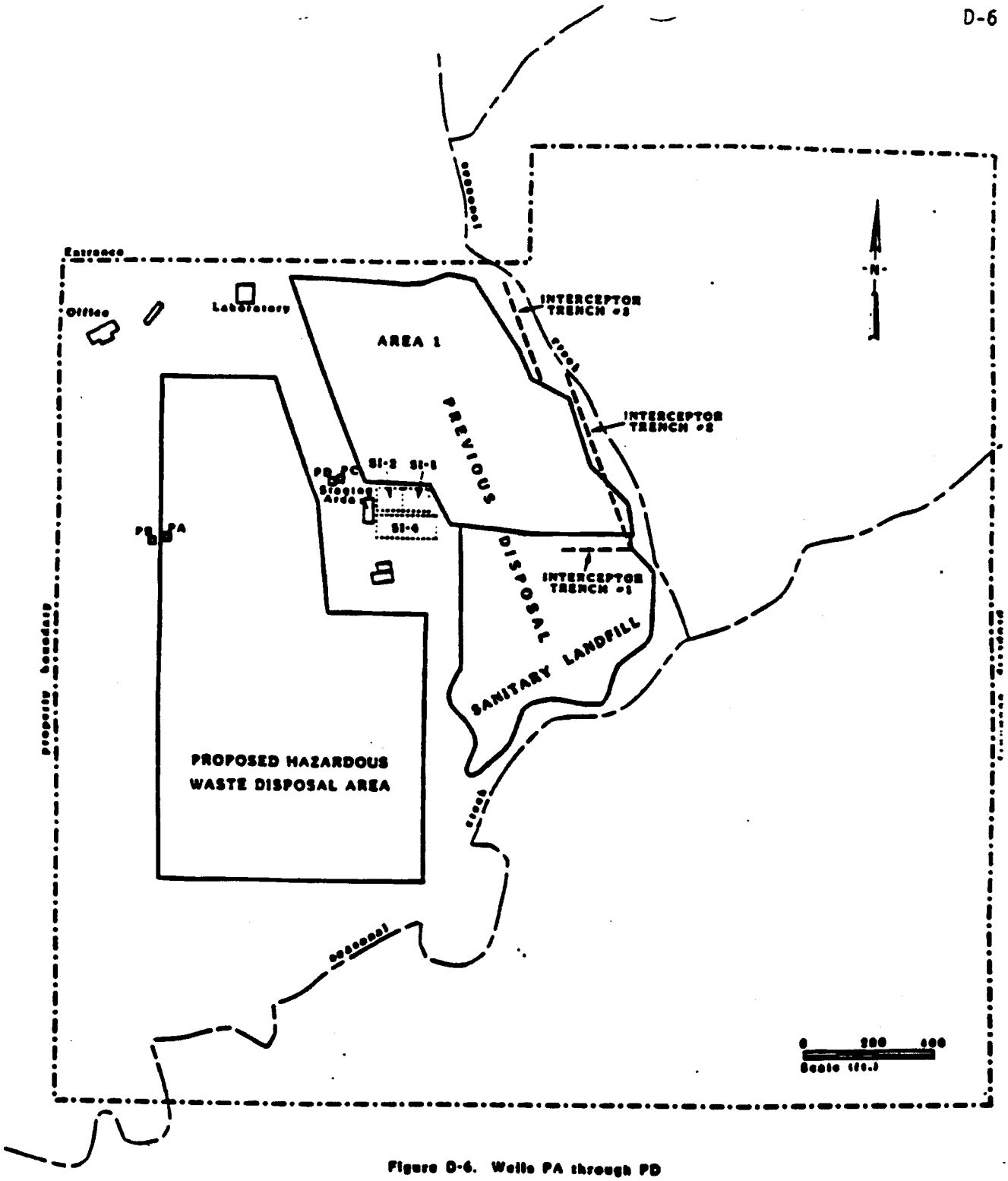

Figure D-6. Wells PA through PD

ATTACHMENT 5

Table 1. Population Served by Ground Water Wells Within Four Miles of Zykan Landfill

Table 1

POPULATION SERVED BY GROUND WATER WELLS WITHIN FOUR MILES OF ZYKAN LANDFILL

Distance from Site (miles)	Population Served by Private Wells	Population Survey by Public Wells		Total
		Name	Number of Persons	
0-1	27	–	–	27
1-2	57	ECM Water & Sewer/Innsbrook Area Wells (2)	750	1,147
		Innsbrook Estates Subd.	200	
		Maple Ridge MHP	140	
2-3	82	Glenbrook Estates	123	902
		Midway MHP	100	
		Oakview Estates	30	
		Wright City Well #5	567	
3-4	90	Child Evangelism	100	1,573
		ECM Water & Sewer/North Oak Well	200	
		Pleasant Oak MHP	50	
		Shady Oaks Subd.	?	
		Wright city Well #3	567	
		Wright City Well #4	566	

ATTACHMENT 6

Table 2. Base Case HRS Data

Table 2 BASE CASE HRS DATA			
HRS Scoring Element	**Value/Entry**		**Comments**
Waste Volume.	72,600 yard^3		Tier C (5 acres x 10 feet)
Ground Water Pathway			
Ground water containment factor value.	10		Lack of liner
Precipitation factor value.	3		HRS Figure 3-2
Depth of contamination.	10 feet		Reported landfill design
Depth of aquifer from surface.	80 feet		Boring logs
Total thickness of layer with lowest hydraulic conductivity.	45 feet		Boring logs
Hydraulic conductivity.	1 x 10^{-7} cm / sec		
Ground water target population data.	see Table ?		
Ground water evaluated as a resource.	Yes		
Wellhead protection area.	No		
Level of contaminant concentration.	Potential		No observed release
Surface Water Pathway			
Containment for overland flow factor value.	10		No engineered cap or overland flow management system
Rainfall, 2-year, 24-hour.	3.5 inches		
Drainage area.	80 acres		
Soil group designation.	Fine-textured, very low infiltration		
Distance to surface water.	4,000 feet		
Flood containment factor value.	Not contained for any flood		
Flood frequency factor value.	Source not in a flood plain		
Nearest intake.	None		
Surface water treated as resource.	yes		Livestock watering
Fishery production.	40 lbs./year		Personal communication, Innsbrook Corporation biologist
Surface water segment type.	Lake		
Average flow.	0 cfs		
Endpoint from PPE.	0.75 miles		
Level of concentration.	Potential		
Soil Exposure Pathway			
Attractiveness/accessibility factor value.	10		Accessible, no public recreation use
Level of concentration.	Drum area	Level I	Data taken from MDNR PA/SI analytical results
	Leachate	Level II	
Area of contamination.	Drum area	1000 feet^2	
	Leachate	900 feet^2	
Resident population.	0		
Number of workers.	0		
Terrestrial sensitive environments.	None		
Nearby population.	< ¼ mile	0	
	¼ to ½ mile	27	
	½ to 1 mile	106	

ATTACHMENT 7

Table 3. HRS Evaluation Scenarios

Table 3

HRS Evaluation Scenarios

Scenario	Pathway Scores		Site Score
	Ground Water	Surface Water	
Base case	2.77	4.47	2.63
1) Observed ground water release.	7.27	4.47	4.27
2) Level II actual contamination in drinking water well serving 10 people.	17.28	4.47	8.92
3) Level I actual contamination in drinking water well serving 10 people.	28.68	4.47	14.51
4) Level I actual contamination in drinking water well serving 100 people.	100	4.47	50.05
5) Observed release to surface water, bpfv* < 500.	2.77	24.60	12.38
6) Observed release to surface water, bpfv* > 500, level II aqueous sample.	2.77	97.13	48.59
7) Observed release to surface water, bpfv* > 500, level II aqueous sample, level I fish tissue sample.	2.77	100	50.02

Key:

*bpfv = Bioaccumulation potential factor value.

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MEMORANDUM

TO: Paul Doherty, EPA/START PO

FROM: Ron Ramold, E & E/STM RR

THRU: Hieu Q. Vu, P.E., CHMM, E & E/START PM

DATE: March 6, 1998

SUBJECT: Monitoring Well Assessment Trip Report for Zykan Landfill, Wright City, Missouri

TDD: S07-9706-014
PAN: 0567ZLSRXX
EPA OSC: Jeff Weatherford
EPA SAM: Bryant Burnett

The Ecology and Environment, Inc. (E & E), Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Site Assessment and Cost Recovery (SACR) Program to conduct an Expanded Site Inspection (ESI) at the Zykan Landfill Site in Wright City, Missouri (Attachment 1: Figure 1. Site Location Map). START has previously submitted a preliminary report which characterized potential risk to human health and/or the environment. This report was based on a review of available files, a site reconnaissance, and a Hazard Ranking System (HRS) evaluation using Prescore 4.1. Due to the incomplete nature of the existing data, Prescore 4.1 was used to identify critical data gaps by evaluating possible but undocumented scenarios. After receipt of the report, START was further tasked to develop and implement the ESI. Specifically, tasks are to include:

- Development of a site sampling plan to provide HRS critical data.
- Installation and sampling of monitoring well(s) near area of former leachate outbreak.
- Development of ESI report and preliminary HRS score based on the above investigatory work.
- Repair or abandonment of existing monitoring wells.

recycled paper

'ogy and Environment, Inc. (E & T 98b.

ECOLOGY & ENVIRONMENT, INC.
Cloverleaf Building 3, 6405 Metcalf Avenue, Overland Park, KS 66202
Phone: 913.432.9961; Fax: 913.432.0670

TELEPHONE CONVERSATION RECORD

DATE OF CALL: 12/7/98
TIME OF CALL: 1140
COMPANY: Missouri Department of Health
PERSON CONTACTED: Angela Baker
TITLE:
SUBJECT OF CALL: Private well sampling near former Zykan landfills
TELEPHONE #: (314) 877-2800
FAX #:

CONVERSATION NOTES

Angela Baker (AB) had previously sent me a memo with the following items:

1) a map showing the locations of the 19 private wells sampled annually by MDOH,
2) a list of analytical parameters for the private well sampling program,
3) table of information on the sampled private wells including well depth and location.

After receiving this information, I called AB with the following questions:

1) What is the time scale of this sampling? When did it start? Is it ongoing?
2) Has there been any indication of contamination in these private wells during the annual private well sampling?

To these questions, AB responded that the sampling began in the early 1990's and continues to the present. In addition, AB stated that some of the sampled wells showed elevated levels of iron and manganese but that there has been no indication of contamination from the nearby landfills.

SIGNATURE: Ronald Ronald
DATE: 12-7-98

F:\SHARE\9706\9706-014\TCR-AB.WPD

ECOLOGY & ENVIRONMENT, INC.
Cloverleaf Building 3, 6405 Metcalf Avenue, Overland Park, KS 66202
Phone: 913.432.9961; Fax: 913.432.0670

TELEPHONE CONVERSATION RECORD

DATE OF CALL: 1/8/99
TIME OF CALL: 1450
COMPANY: Missouri Department of Natural Resources
PERSON CONTACTED: Rob Morrison
TITLE:
SUBJECT OF CALL: Zykan Landfill and BHS Landfill - ground water monitoring results and site history.
TELEPHONE #: (573) 751-3191
FAX #:

CONVERSATION NOTES

I called Rob Morrison (RB) with questions regarding MDNR's post closure monitoring of ground water at the BHS hazardous waste landfill. Specifically, I asked RB the following:

1) What was the fate of leachate from the hazardous waste landfill?
2) Does MDNR consider a release to ground water from the hazardous waste landfill to have occurred?

To question 1, RB stated that before closure, leachate was pumped to an on-site surface impoundment. No leachate was removed for approximately 10 years until 1994 when leachate from the main leachate sump, which drains the progressive trench area, was again pumped and disposed of off-site.

To question 2, RB stated that MDNR post closure monitoring does not indicate any release to ground water.

RB also stated that the main leachate sump is available for sampling and that Byrant Burnett had mentioned to him the possibility of meeting to discuss the hydrogeology, history, and waste characteristics of the hazardous waste landfill.

SIGNATURE: Ronald Rundell
DATE: 1-8-99

Ecol and Environment, Inc. (E & E), 19

ecology and environment, inc.

International Specialists in the Environment

Job Number KJ7182/0567ZLSRXX

Zykan Landfill - Wright City, MO

TDD S07-9706-014

Th. 4-29-99 Zykan Landfill site C567 2L SRXX

10: 1600 continuing sample management & COC for samples to be delivered to EPA lab in KC tomorrow

10: NOTE: due to slow recovery of MWs after purging & large required sample volume, further MW sampling will be postponed until tomorrow. If sample volume is still lacking, dioxin & herbicides will be removed from requested analysis. This was discussed w/ Bryant Burnett (EPA SAM) during phone conversation.

11:1 1630 all STMs depart site. STMs Smith & Ramold to attempt private well sampling. Remaining STMs to condo.

11: 1650 Renting resident (Mike) at 1257 Muene Rd reports that the house is supplied w/ water from Wright City. This was to have been private well #4 (MDCA designation).

8: 20 1705 take private well sample from Jeff Roberts residence (MDCA well #7)

1745 arrive back at condo

1900 STMs Keller & Ramold depart condo to attempt private well sampling

2000 return to condo after sampling private well at Jim Fuller residence (MDCA 9.5).

NOTE: None of the K series MWs that were proposed to be sampled were able to be sampled due to the small diam of the wells & an apparent obstruction (KA)

Ramold Ramold
4-29-99

Eco ınd Environment, Inc. (E & E), 1'

ECOLOGY & ENVIRONMENT, INC.
Cloverleaf Building 3, 6405 Metcalf Avenue, Overland Park, KS 66202
Phone: 913.432.9961; Fax: 913.432.0670

TELEPHONE CONVERSATION RECORD

DATE OF CALL: 9/10/99
TIME OF CALL: 0945
COMPANY: USEPA
PERSON CONTACTED: Jeff Weatherford
TITLE: OSC
SUBJECT OF CALL: Zykan Landfill Removal Action
TELEPHONE #: (913) 551-7695

CONVERSATION NOTES

STM Ron Ramold called EPA OSC Jeff Weatherford to obtain details of the Removal Action at the Zykan Landfill site. OSC Weatherford stated that 2-5 feet of clean compacted soil had been placed over the area of the former leachate outbreak and the eroded gulley where drums had been exposed. **EOC.**

SIGNATURE: Ronald Ramold
DATE: 9/10/99
W:\SHARE\9706\9706-014\TCR\TCR-JW1.WPD

ECOLOGY & ENVIRONMENT, INC.
Cloverleaf Building 3, 6405 Metcalf Avenue, Overland Park, KS 66202
Phone: 913.432.9961; Fax: 913.432.0670

TELEPHONE CONVERSATION RECORD

DATE OF CALL: 9/15/99
TIME OF CALL: 1010
COMPANY: Warren County Planning and Zoning Office
PERSON CONTACTED: Lori Haupt
TITLE: Planning and Zoning Office employee
SUBJECT OF CALL: Zykan Landfill site - flood plain.
TELEPHONE #: (636) 456-3044
FAX #:

CONVERSATION NOTES

I called the Warren County Planning and Zoning Office to confirm that the Zykan Landfill site is not located in a flood plain, as reported in MDNR's 1996 PA/SI. After providing Haupt with site location information, Haupt consulted FEMA's Flood Insurance Rate Maps and confirmed that the site is not in a flood plain. Haupt agreed to fax me information pertaining to the particular map she consulted (i.e. panel #). EOC

SIGNATURE: [illegible]
DATE: [illegible]

W:\SHARE\9706\9706-014\TCR\TCR-WC1.WPD

FAX TRANSMISSION

WARREN COUNTY PLANNING AND ZONING
105 South Market
Warrenton, MO. 63383
1-636-456-3044
Fax: 1-636-456-9024

To: Ron Ramold

Fax #: 913-432-0670

From: Lori Haupt
636-456-3044

Subject: Flood Plain

Date: September 16, 1999

Pages: 1, including this cover sheet.

COMMENTS:

Dear Mr. Ramold:

Per our conversation the property (Parcel ID 4-32-33) is not located in the flood plain according to the FIRM, Flood Insurance Rate Map provided to us by FEMA. The map is panel 75 of 150 and the Community Panel Number is 290443 0075 C dated revision June 16, 1999.

If you have any further questions, please contact our office at 636-456-3044.

Sincerely,

Lori Haupt

Jacobs F- -neering Group Inc., 1989, Chapters ? -nd 3.

ENVIRONMENTAL PROTECTION AGENCY
TECHNICAL ENFORCEMENT SUPPORT
AT
HAZARDOUS WASTE SITES

TES X

CONTRACT NO. 68-W9-0007
WORK ASSIGNMENT NO. R07004

OPERATION AND MAINTENANCE INSPECTION

FOR
BOB'S HOME SERVICE
AT
WRIGHT CITY, MISSOURI
U.S. EPA REGION VII

METCALF & EDDY, INC.
PROJECT NO. 10-E007-00

WORK PERFORMED BY:

JACOBS ENGINEERING GROUP INC.
12600 WEST COLFAX, SUITE A-300
LAKEWOOD, COLORADO 80215

FINAL

DECEMBER 1989

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Mi ri Division of Health (MDOH), 1
THE DIVISION OF HEALTH
OF MISSOURI

ZYKAN LANDFILL SITE
AKA BOB'S HOME SERVICE
SANITARY LANDFILL
WARREN COUNTY, MO
PA/SI REFERENCE 12

March 10, 1972

San-Refuse
Warren

Mr. James Zykan
Bob's Home Service
R. F. D.
Wright City, Missouri 63390

Dear Mr. Zykan:

At the time of my visit with you, February 25, 1972, you indicated an interest in contracting disposal of industrial chemicals at your landfill site. In order to make an evaluation of the above, it is recommended that you contact the manufacturers and get the exact composition of these chemicals and forward the information to this office.

If these chemicals are recommended for landfilling, a separate trench may be dug four to five feet deep. A minimum of four feet of clay below the trench bottom is to be maintained as a barrier against possible contamination of ground water in the area. The Division of Health should be notified in advance when more than one barrel of chemical is to be disposed.

You also indicated on the above date that you were proposing to bid a contract for disposing of solid waste from the Permaneer Corporation of Wright City and Union, Missouri.

The burning of untreated wood may be conducted without a permit from the Missouri Air Conservation Commission. If, however, the wood has been chemically treated with preservatives, etc., a permit would be required.

If you have any questions concerning the above, please feel free to contact this office.

By direction of E. R. Price, D.V.M., Acting Director, District Three Health Unit.

Yours truly,

F. G. Unnewehr
Environmental Health Sanitarian

FGU:pdi

SSOURI DIVISION OF HEALTH
RECEIVED BY
3/14/72

ouri Division of Health (MDOH)

MISSOURI DEPARTMENT OF HEALTH

Mel Carnahan
Governor

Coleen Kivlahan, M.D., M.S.P.H.
Director

P.O. Box 570, Jefferson City, MO 65102-0570 • 573/751-6400 • FAX 573/751-6010

April 12, 1996

RECEIVED
APR - 6 1996
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Mr. Walter Gerdeman
1666 Highway H
Wright City, Missouri 63390

Dear Mr. Gerdeman:

The purpose of this letter is to inform you of the test results on the water that was taken from your well on March 4, 1996. This testing was done as a part of our regular monitoring program to see if any chemicals are leaching out of Bob's Home Service waste disposal site and into the surrounding groundwater.

The water was tested for 19 inorganic chemicals, 6 chlorinated pesticides, 57 volatile organic compounds, and 2 chlorophenoxy herbicides. The amount of iron in your water (1.9 parts per million [ppm]) may cause it to turn brownish, but this amount is not harmful to your health. Your water is considered very hard (399 ppm or 23.1 grains per gallon). All the other chemicals are within normal limits for drinking water. Thus, there is no indication that wastes from the site are contaminating your well. A copy of your water analysis report is attached.

If you have any questions regarding this test, please contact me at (573) 751-6111 or (800) 392-7245.

Sincerely,

Scott A. Clardy

Scott A. Clardy
Environmental Specialist
Bureau of Environmental Epidemiology

ZYKAN LANDFILL SITE
AKA BOB'S HOME SERVICE
SANITARY LANDFILL
WARREN COUNTY, MO
PA/SI REFERENCE 42

SAC:egd
Enclosure

cc: Gary Behrns

The Missouri Department of Health is responsible for the promotion and protection of the public's health through education, disease and injury prevention, regulation, and direct delivery of health care services in order that all Missourians may achieve their fullest health potential.
AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER — Services provided on a nondiscriminatory basis

Missouri D[illegible]rtment of Natural Resources (MDNR) 1986

ZYKAN LANDFILL SITE
AKA BOB'S HOME SERVICE
SANITARY LANDFILL
WARREN COUNTY, MO
PA/SI REFERENCE 41

Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri

January 1, 1986

Annual Report

MISSOURI
DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

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APPENDIX A - Missouri Hazardous Waste Management Law

APPENDIX B - Missouri Hazardous Waste Management Regulation 10 CSR 25-10.010

* Change of use or transfer of site property.

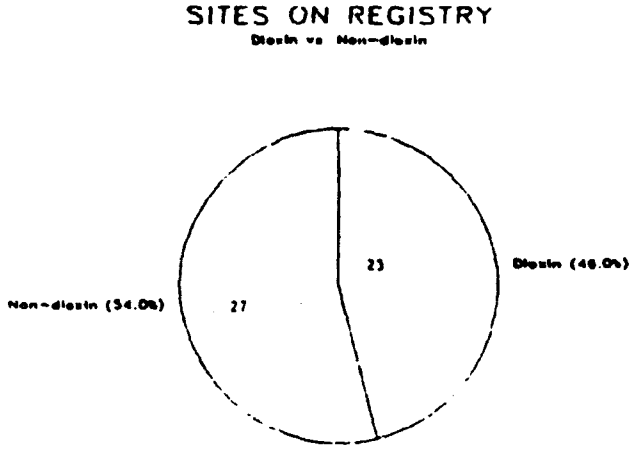
* Recording of sites placed on or removed from the registry.

When a site is placed on the registry, information about the property's history as a hazardous waste disposal area is filed with the county recorder of deeds. If a site is properly closed, with no evidence of a potentially adverse impact, this finding also is filed with the county recorder of deeds. These actions notify any purchasers of the property that the site is or has been on the registry.

Once a site is placed on the registry, it is subject to certain restrictions. The use of the site may not change substantially without the written approval of the director of the Department of Natural Resources. Regulation 10 CSR 25-10.010 specifies that the change in use is substantial if it may result in the spread of contamination, increases human exposure to hazardous materials, increases adverse environmental impacts, or makes potential remedial actions to correct problems at the site more difficult. Changes of ownership also must have written approval from the director of the Department of Natural Resources.

In the event these restrictions are violated, or there is reason to believe they will be violated, the department may institute civil action in any court of competent jurisdiction. Decisions issued by the department's director regarding a change in the use or ownership of a site may be appealed to the Missouri Hazardous Waste Management Commission.

Based on investigations, the Department of Natural Resources has proposed 81 sites be placed on the registry. Currently, 50 sites are already listed. Thirty-one other listings have been appealed to the commission and cannot be placed on the registry until the appeal is resolved. Of the 50 sites on the registry, 23 are contaminated with 2,3,7,8-TCDD (dioxin), although some of these sites also have other contaminants.



ZYKAN SITE

Classification: Class IV, Priority 2

Site Name: Zykan Site

Address: Bob's Home Service, Inc., Route 1, Box 116F, Wright City, MO 63390
S 1/2, S 1/4, Sec. 32, T 47 N, R 1 W, Warren County

Waste Type: Organics, inorganics, heavy metals, paints and pigments
Quantity: Unknown

Site Description:

The landfill site is located approximately 40 miles west of St. Louis in Warren County, five miles south of Wright City, Missouri. The disposal area is located on a 150 acre farm of which 12 acres were permitted for hazardous waste disposal. The disposal area being used could handle a net volume of 40,000 cubic yards of industrial waste.

Present Owner: Mrs. L. Z. Zykan

Environmental Problems Related to Site:

Potential for contaminants to migrate into the environment from materials landfilled prior to regulation.

Remedial Actions at the Site:

The site has been covered and seeded to prevent erosion.

Area of Concern Related to Site:

Leachate may migrate laterally and contaminate surface waters.

General Geologic and Hydrologic Setting:

The old landfill is located in an upland setting in the watershed of a tributary to Charrett Creek. Soils on-site are composed of 10 to 20 feet of loess (CL-ML) over thick deposits of glacial drift. The upper 50 to 75 feet of drift is composed of till characterized by dense, low-permeability sandy and silty clay (CL). This material would be expected to provide an effective barrier to downward percolation of contaminants. Groundwater supplies are extremely limited in the glacial till and there is no significant danger to groundwater supplies. Lateral leakage from the filled area would be the primary concern at this site. A compacted clay pad has been placed on top of the old filled area to reduce infiltration of surface water and a clay barrier has been installed on the downstream side of the fill to cut off shallow movement of contaminants through the moderately permeable loess which is present near the surface.

Health Assessment:

The Zykan site, located approximately three miles southwest of Wright City, Warren County, Missouri, is a closed sanitary waste disposal facility that was in operation from approximately 1971 to 1977. During this time, materials disposed of at the site included miscellaneous trash, household garbage, and a variety of unidentified industrial wastes. Since its closing, many of the suspected industrial wastes have been classified as hazardous substances. It has been learned that some of the waste disposed of at the Zykan site is similar to the type now disposed of at Bob's Home Service, Inc. (BHS). These wastes can be categorized as follows: toxic metals; pesticides; organic hydrocarbons; and trihalomethanes.

Depending on the concentrations and amount of exposure, all the above groups can produce symptoms ranging from mild to severe, affecting virtually all systems of the body. High concentrations for short periods usually produce acute symptoms that may be as mild as a rash or as severe as death. Low concentrations for prolonged periods of time usually produce chronic symptoms. These may also range from low level discomforts to severe irreversible damage and death.

Since the Zykan site has restricted access, and the materials disposed of are buried, the probable route of exposure is through ingestion of contaminated surface or ground water. The surface and ground water are regularly monitored at BHS, and have so far revealed no evidence of ground water or surface water contamination. The Missouri Department of Health is also engaged in an ongoing surveillance of private drinking water wells in the area surrounding the BHS-Zykan site. This surveillance has not revealed any ground water contamination either.

Based on available information, there is no current exposure to hazardous substances at the Zykan site. However, because of the unknown types and concentrations of hazardous substances possibly disposed of at this site, a serious health risk must be presumed to be possible until sampling can better determine the types and extent of hazardous substances at the site.

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

MEMORANDUM

DATE: August 31, 1995

TO: Julie Warren, Acting Chief, Site Evaluation Unit
Superfund Section, Hazardous Waste Program

THROUGH: Joe Gassner, Environmental Specialist, Site Evaluation Unit, Superfund Section, Hazardous Waste Program

FROM: John Jurgensmeyer, Environmental Specialist, Site Evaluation Unit, Superfund Section, Hazardous Waste Program

SUBJECT: Zykan Site - Registry status change

I recommend that the Zykan Property, once used as a landfill, now closed and capped, be moved from a Class-4 to a Class-2 *Registry* site, and be considered for a Preliminary Assessment/Site Inspection to determine the impact of the suspected contaminates within the leachate. My reasons for increasing the site classification and requesting a PA/SI are:

1. Documentation on Registry Site Inspection Reports from 1989 to present indicate that leachate has been routinely observed leaving the landfill and depositing into a nearby stream.

Summary of *Registry* Site Inspection Reports:

1989 - Site covered with grass and wheat. Operators intend to harvest wheat. Will the heavy equipment adversely impact the leachate?

1990 - Leachate may migrate laterally and contaminate surface water. The area of leachate is about 25X25 feet. Dead grass noted. An oily leachate was observed flowing into a creek and some erosion ditches as deep as 2 feet. Without proper care these ditches will only get worse.

1991 - Leachate and erosion are reported to be about the same as previous year.

1992 - Leachate continues to exit the landfill and the erosion ditches are getting deeper.

1993 - Leachate flow is constant and enters into a tributary of Charrett Creek. No efforts have been made to correct problem. Vegetation has died in areas of leachate outbreaks. Several leachate outbreaks have been identified on the South slope of landfill.

1994 - Leachate has the potential to enter into a tributary of Charrett Creek. Flow into the creek has been observed in the past. This has been noted in annual inspections for approximately 4 years.

1995 - Leachate outbreak enters tributary of Charrett Creek. The area of leachate is about 40X40 feet.

2. An Enforcement Action Request was submitted by the SWMP on January 30, 1992 to address the gullies, leachate and dead vegetation. However, the results indicate that due to a lack of money by the property owners that the Enforcement Action was dropped.

In summary, the Zykan Site leachate problem is getting bigger. The leachate from the landfill is entering a nearby tributary of Charrett Creek therefore impacting the environment and exposing risk to public health. No attempt has been made, by the owners, to address the leachate problems.

Therefore, leaving one conclusion to increase the priority of the Zykan Site from a Class-4 to a Class-2 *Registry* site and conduct a PA/SI to determine the extent of contamination.

JDJ:dal

c: Julie Bloss, HWP, Superfund Section

ZYPAN LANDFILL SITE
AKA BOB'S HOME SERVICE
SANITARY LANDFILL
WARREN COUNTY, MO
PA/SI REFERENCE 24

Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites In Missouri

and

Hazardous Waste Remedial Fund Statement of Revenue, Expenditures, and Changes in Fund Balance

Fiscal Year 1995
Annual Report

July 1, 1994 to June 30, 1995
Published January 1996

Published by:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality
Hazardous Waste Program
P.O. Box 176
Jefferson City, Missouri 65102
(573) 751-3176

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INTRODUCTION

Since the mid-1800s, Americans have added the fruits of technology and industry to their recipe for a better life. They have found lately, however, that byproducts of some achievements often are unsafe when dumped. Solvents can contaminate drinking water. Waste chemicals can mix and interact, producing a toxic stew far worse than any one ingredient.

In 1980 the United States Congress established the Comprehensive Environmental Response, Compensation and Liability Act, better known as "Superfund" or CERCLA. The federal statute provided both response and funding mechanisms for the cleanup of hazardous substance disposal sites. After CERCLA became federal law, many states including Missouri, developed Superfund programs of their own, with each having their own unique authorities and capabilities.

In June 1983 a "Superfund" bill was approved at the state level in Missouri. The 1983 state "Superfund Law" directed the Missouri Department of Natural Resources (DNR) to prepare a *Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites* (Registry) for the state and to publish a report each January evaluating sites on the Registry. The law also authorized emergency response activities be established in the state to respond to hazardous substance releases. Lastly, the bill created a Hazardous Waste Remedial Fund to be utilized for the implementation of these programs and other expenditures such as financing the non-federal share of cleanups and the investigation and assessment of potential hazardous waste sites. The law requires that each January a full account of the Hazardous Waste Remedial Fund also be reported.

This annual report has been developed not only to comply with the statutory obligations mandated by the state "Superfund Law," but also to provide an understanding of how the state and federal Superfund programs work together to provide financial, legal, and technical aid for hazardous substance response and cleanups in the State of Missouri.

STATE SUPERFUND ACTIVITIES

ANNUAL REPORTS

Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites

The Missouri "Superfund Law" (Section 260.445 RSMo, 1986, Missouri Hazardous Waste Management Law, see Appendix B) requires the DNR to transmit each January 1 a report to the General Assembly and Governor regarding those sites listed on the Registry. The statute also requires the report be provided to the Missouri Hazardous Waste Management Commission and the governing body of each county containing a Registry site. Each site on the Registry is described in detail in this annual report and includes the following information: (Site summaries of registered sites begins on page 32.)

- a general description of the site, including the name and address of the site, the type and quantity of the hazardous waste disposed of at the site, and the name of the owner of the site;
- a summary of any significant environmental problems at and near the site;
- a summary of any serious health problems in the immediate vicinity of the site and any health problems deemed by the Department to be related to conditions at the site;

- the status of any testing, monitoring, or remedial actions in progress or recommended by the Department;

- the status of any pending legal actions and any federal, state, or local government permits concerning the site;

- the relative priority for remedial action at each site; and

- the proximity of the site to private residences, public buildings or property, school facilities, places of work, or other areas where individuals may regularly be present.

Within the DNR and the Missouri Department of Health (DOH), a Site Assessment Committee has been formed to evaluate the sites on the Registry and to recommend cleanup priorities to the director of the DNR.

The Site Assessment Committee is currently composed of representatives from the DNR's Hazardous Waste Program, Public Drinking Water Program, Environmental Services Program, and Division of Geology and Land Survey. A fifth member represents the DOH.

The members of the Committee analyze the sites in terms of the potential for fires and explosions, and for groundwater, surface water, and air contamination. Members of the Committee draw upon their own special expertise when assessing the site. For instance, the DOH representative is responsible for identifying the possible effects of a site on human health.

The Committee's recommendations affect not only the sites where the state has assumed responsibility for initiating action, but also sites where the United States Environmental Protection Agency (EPA) is designated the "lead agency." The committee invites EPA representatives to attend its meetings and provide comments as appropriate.

In the past year the Site Assessment Committee met and reassessed sites in the January 1995 report based upon new information available concerning a site or upon remedial measures taken at a site to reduce potential risk. According to the state law, sites placed in Class V may be deleted from subsequent annual reports and the Registry.

According to the state Superfund Law, the sites are placed in one of the following categories:

Class I: Sites that are causing or presenting an imminent danger of causing irreversible or irreparable damage to the public health or environment--immediate action required;

Class II: Sites that are a significant threat to the environment--action required;

Class III: Sites that do not present a significant threat to the public health or the environment--action may be deferred;

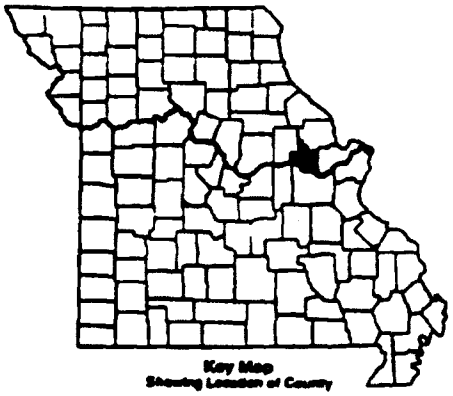
Class IV: Sites that have been properly closed--require continued management;

Class V: Sites that have been properly closed with no evidence of present or potential adverse impact--no further action required.

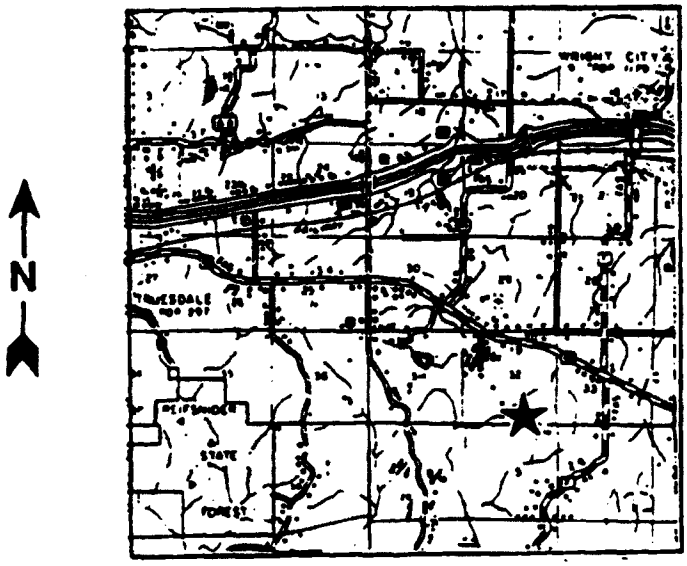
The relative need for action at each site is based solely upon the potential impact of the site on public health and the environment. The type of action required, the feasibility of such an action, and its cost/benefit are not the primary factors in deciding whether action is needed.

recycled paper

ecology and environment



Key Map
Showing Location of County



Classification: Class II, Priority 6

Site Name: Zykan Site

Address: Bob's Home Service, Inc., Route 1, Box 116F, Wright City, Missouri 63390, S 1/2, S 1/4, Sec. 32, T. 47N, R. 1W, Warren County, Wright City Quadrangle

Waste Type: Inorganics, Ingredients, Heavy Metals, Paints, and Pigments

Quantity: Not determined.

Site Description:

The Zykan site [formerly permitted as Bob's Home Service (BHS) Sanitary Landfill], located approximately three miles southwest of Wright City, Warren County, Missouri, is a closed sanitary waste disposal facility that operated from approximately 1971 to 1977. This landfill is due south and contiguous to the closed BHS Hazardous Waste Landfill (Area 1). During this time, materials disposed of at the site included miscellaneous trash, household garbage, and a variety of unidentified industrial wastes. Since its closing, many of the suspected industrial wastes have been classified as hazardous substances. It has been learned that some of the waste disposed of at the Zykan site is similar to the type disposed of at BHS. These wastes can be categorized as toxic pesticides, organic hydrocarbons, inorganic heavy metals, paints, pigments, and trihalomethanes.

Present Property Owner: Mrs. La Verne A. Zykan

Environmental Problems Related to Site:

Potential for contaminants to migrate into the environment via leachate outbreaks.

Remedial Actions at the Site:

The site has been covered and seeded to prevent erosion. The Missouri Department of Natural Resources (DNR) is the lead agency for this site.

Area of Concern Related to Site:

During a 1995 DNR inspection, leachate outbreaks were again noted. Leachate is migrating laterally and may impact surface waters. This leachate outbreak has been observed on the south end of the landfill. The leachate area measuring approximately 40 feet by 40 feet has been documented. This area is

marked by dead vegetation. The DNR plans to assess the extent of contamination.

General Geologic and Hydrologic Setting:

The old landfill is located in an upland setting in the watershed of a tributary to Charrett Creek. Soils on-site are composed of 10 to 20 feet of loess over thick deposits of glacial drift. The upper 50 to 75 feet of drift is composed of till characterized by dense, low-permeability sandy and silty clay. This material would be expected to provide an effective barrier to downward percolation of contaminants. Groundwater supplies are extremely limited in the glacial till and there is no significant danger to groundwater supplies. Lateral leakage from the filled area would be the primary concern at this site.

There is little likelihood of a significant groundwater release from this site. Natural conditions are well suited for the prevention of groundwater contamination.

Public Drinking Water Advisory:

Several deep wells are located within three miles of the Zykan site: Wright City has four wells which serve a population of 1,200; Midway Trailer Park has one well which serves 140; Warren County PWSD #2 has two wells which serve 400 persons; Innsbrook Estates has one well which serves 200; and Cedars Mobile Home Park has one well which serves 45 persons.

The Zykan site may pose a potential threat to nearby wells due to the quantity and type of wastes present, however, natural geologic conditions tend to lessen the possibility of contamination.

Health Assessment:

Depending on the concentrations and amount of exposure, all wastes at the site can produce symptoms ranging from mild to severe, affecting virtually all systems of the body. High concentrations for short periods usually produce acute symptoms that may be as mild as a rash or as severe as death. Low concentrations for prolonged periods of time usually produce chronic symptoms. These may also range from low levels of discomfort to severe irreversible damage and death

Since the Zykan site has restricted access, and the materials disposed at the site are buried, the probable route of exposure is through ingestion of contaminated surface or groundwater. The surface and groundwater are regularly monitored at BHS, and have so far revealed no evidence of groundwater or surface water contamination. The Missouri Department of Health (DOH) is also engaged in an ongoing surveillance of private drinking water wells in the area surrounding the BHS/Zykan sites. This surveillance has revealed no groundwater contamination. The latest round of sampling was completed in 1995.

Based on available information, there is no current exposure to hazardous substances at the Zykan site. However, because of the unknown types and concentrations of hazardous substances possibly disposed of at this site, a potential health risk must be presumed to be possible as there is a potential for contaminants to migrate into the environment.

For information regarding health related issues, please contact the Missouri Department of Health, P.O. Box 570, Jefferson City, MO 65102, (573) 751-6404.

Missouri D ment of Natural Resources (MDN 1996b.

INTEGRATED PRELIMINARY ASSESSMENT/ SITE INSPECTION REPORT

ZYKAN LANDFILL SITE (AKA BOB'S HOME SERVICE SANITARY LANDFILL)

WARREN COUNTY, MISSOURI

August 30, 1996

Missouri Department of Natural Resources

Hazardous Waste Program

Prepared By	Reviewed By	Approved By
Valerie A. Harding	Julie Warren	Gary T. Behrns
Environmental Specialist	Chief Site Evaluation Unit	Chief Superfund Section

DATE:	**August 30, 1996**
PREPARED BY:	**Valerie A. Harding** **Missouri Department of Natural Resources**
SITE:	**Zykan Landfill** **AKA Bob's Home Service Sanitary Landfill** **Wright City, Missouri**
CERCLIS NUMBER:	**N/A**
C.A. NUMBER:	**007587-03**

1. INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Missouri Department of Natural Resources (DNR), through a cooperative agreement with the U.S. Environmental Protection Agency (EPA), conducted an Integrated Preliminary Assessment/Site Inspection (PA/SI) at the Zykan Lanfill site in Warren County. The purpose of this investigation was to collect sufficient information concerning conditions at the site to assess the threat posed to human health and the environment, and to determine the need for additional investigation under CERCLA/SARA or other authority. The scope of the investigation included review of previous file information, sampling of waste and environmental media to document Hazard Ranking System (HRS) factors, collecting additional non-sampling information. The investigation included site visits on March 14 and April 12, 1996, and site sampling on May 9 and May 22-23, 1996.

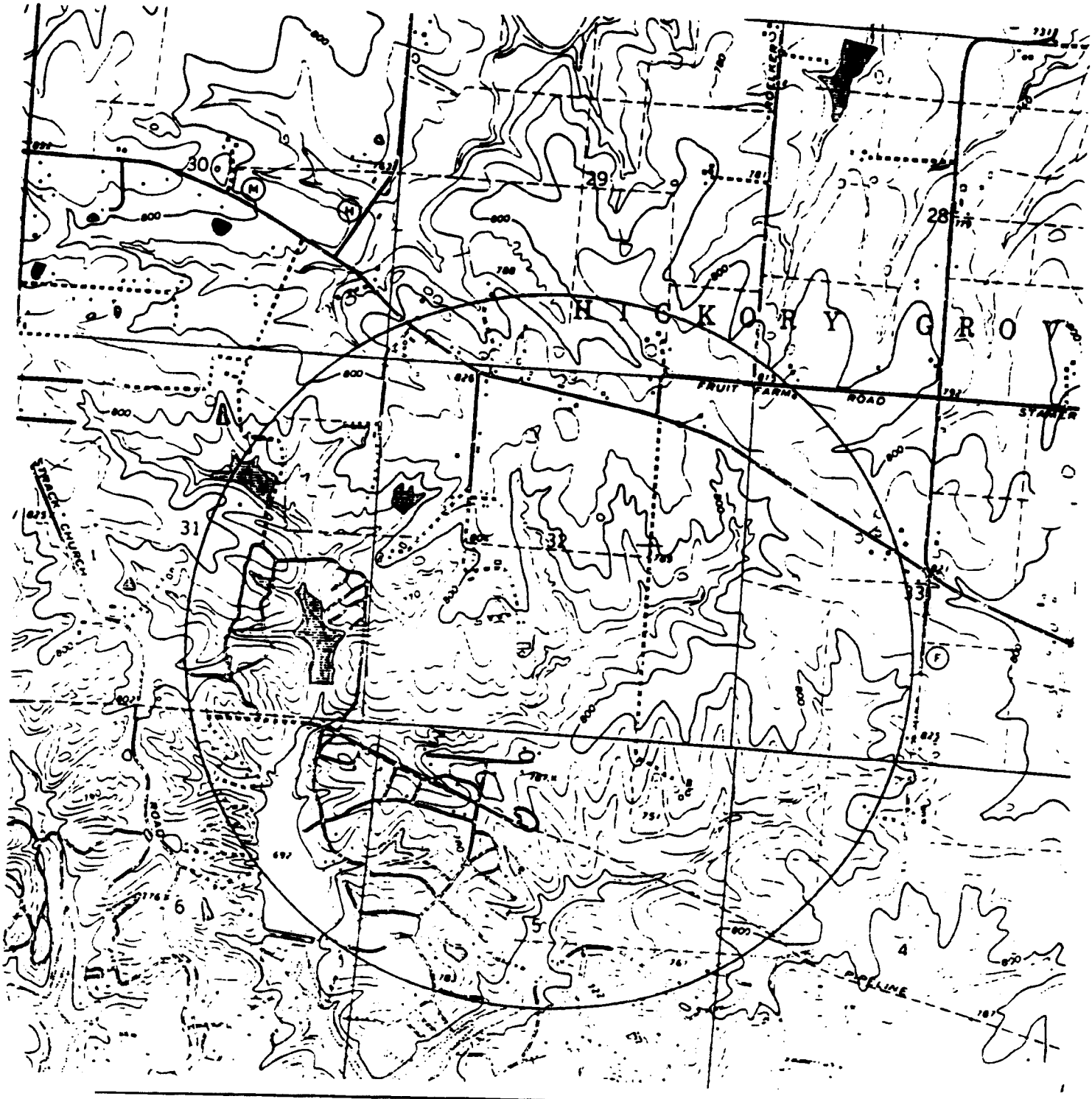
2. SITE DESCRIPTION

2.1 Location

The Zykan Landfill site, also known as Bob's Home Service (BHS) Sanitary Landfill, is approximately five acres in size located in a rural area approximately three miles south-southwest of Wright City off Highway M and Muenz Road (Figure 1). It is located in the center of the south half (S 1/2) of Section 32, Township 47 North, Range 1 West in Warren County (Reference 3). The site can be accessed by traveling west on I-70 out of St. Louis to Wright City; in Wright City take Highway F south to Highway M; proceed west on Highway M for 1.4 miles to Muenz Road; take Muenz Road south for approximately one mile; there is a gate to the BHS Hazardous Waste Landfill near the end of the road; the Zykan Landfill is located immediately south of the hazardous waste landfill (References 3; 4). The geographic coordinates of the site are 38°47'14" N latitude and 91°19'48" W longitude (Reference 5).

Zykan Landfill (BHS Sanitary Landfill)
Integrated PA/SI
August 30, 1996

FIGURE 1: SITE LOCATION MAP
ZYKAN LANDFILL



The climate of Warren County is quite variable during all seasons. Air from the northern part of the continent frequently invades the county, while warm and humid air from the Gulf of Mexico is not uncommon. In summer the temperatures are more uniform than in winter (Reference 6, p. 81). In January the average temperature is 30°F. In July the average temperature is 78°F. The mean annual total precipitation for that area of the state is 36.5 inches. The mean annual total snowfall for the area is approximately 20 inches. The mean relative humidity for the year is approximately 69%. The prevailing wind is from the south-southwest at 10 mph (Reference 7, pp. 1, 13, 48, 53, 62, 74). The two-year 24-hour rainfall for this area is 3.5 inches (Reference 8).

2.2 Site Description (References 4; 47)

The site is a closed sanitary landfill, formerly owned and operated by Mr. James R. Zykan as Bob's Home Service, Inc. Sanitary Landfill. The site is currently owned by Mrs. Laverne A. Zykan, widow of Mr. Zykan. Figure 1 is a site sketch. The site is approximately five acres in size and covered with heavy fescue vegetation (Photos 1 & 2). The majority of the level portion of the site has good vegetative cover. The eastern sloping side has begun to experience slight erosion with a few gullies forming. The gullies are approximately one foot in depth. The southern slope has several severe erosion gullies forming. These gullies are one to three feet in depth (Photo 3 & 4). One particular gully contains five buried drums that have been partially exposed. There is a strong organic vapor odor near the drums, and one of the drums is leaking (Photo 5, 6, 7, 8).

There is a leachate outbreak on the central portion of the south slope. The outbreak is reddish-orange in color, has an oily sheen on the surface and a strong organic odor. The area of the outbreak covers an area approximately 30 x 30 feet, and is void of vegetation (Photo 9, 10, 11). The leachate flows to the south into an intermittent stream that is a tributary of Charrett Creek. During the site visit in April and site sampling in May 1996, the leachate was flowing directly into the creek (Photo 12).

The site is bordered on the north by a trench which separates BHS Sanitary Landfill from BHS Hazardous Waste Landfill (closed in 1985) (Photo 13); on the east and south by a tributary of Charrett Creek; on the west by a dirt road and a junk yard area (Photo 14). There is little site security. There is a locked gate at the road entrance to the hazardous waste landfill, but the gate only blocks the roadway (Photo 15). Access can by gained to the site by walking around the gate. There is evidence of vehicles driving around the gate, and there have been fresh tire tracks in the road on several site visits. Two persons were also observed on-site salvaging metal from the junk yard area. There is a chain link fence around the north and western portion of the hazardous waste landfill, but none around the sanitary landfill. There have been reports of unauthorized vehicles entering the landfill area by local residents.

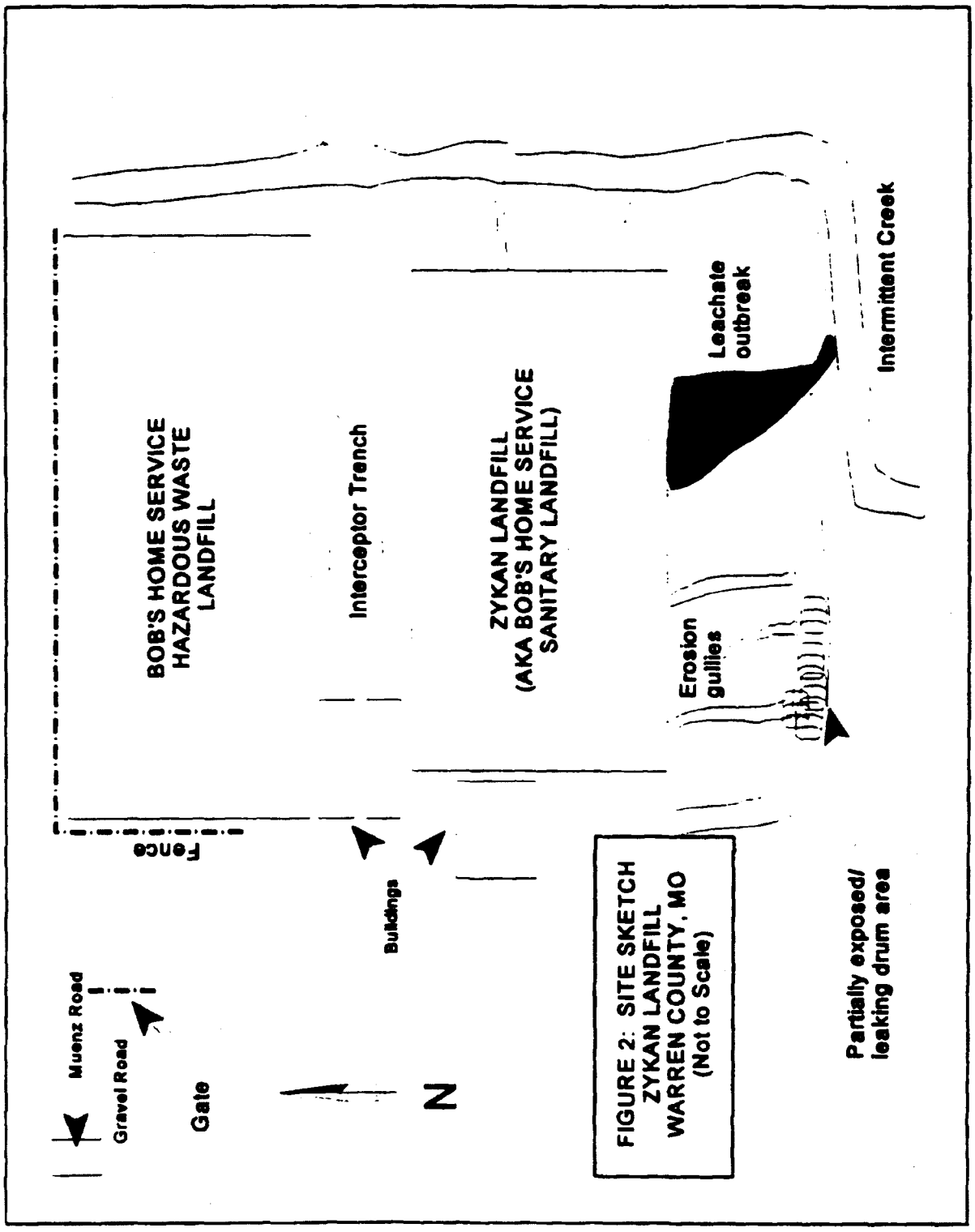


FIGURE 2: SITE SKETCH
ZYKAN LANDFILL
WARREN COUNTY, MO
(Not to Scale)

2.3 Operational History

The Bob's Home Service, Inc. Sanitary Landfill began operation in 1971. After the passage of the Solid Waste law in 1973, the landfill was operated under an operating agreement with the state until a permit was issued in July 1976. The sanitary landfill was officially closed in 1977 when a permit was issued to BHS for operation of an industrial waste landfill on adjoining acreage (Reference 9, p. 1).

On November 16, 1971, Bob's Home Service, Inc. was approved by Warren County and the Division of Health to operate a refuse disposal area or sanitary landfill one-half mile south on Muenz Road #151 Highway M. Mr. James Zykan, owner and operator, estimated that 36 yards a day of residential and commercial refuse was to be dumped at the landfill (Reference 10; 11). In February 1972, Mr. Zykan indicated to the Division of Health that he had an interest in contracting disposal of industrial chemicals at his landfill. File information does not show whether this was ever officially approved. However, Mr. Zykan was given information on landfilling procedures for disposing of chemical barrels if the chemicals were approved (Reference 12).

Between March 1972 and May 1973, BHS Sanitary Landfill was cited by the Division of Health for deficiencies in landfill operation including: soil conditions not suited to type of equipment being used, failing to cover the active face of the landfill at close of daily operation with six inches of cover, final cover depth of less than 24 inches, unsatisfactory control of blowing paper, and failure to divert surface water runoff from the fill area (Reference 13).

Beginning June 30, 1973, Senate Bill No. 387 required that all solid waste disposal areas be licensed by the Missouri Division of Health. The bill required engineering plans to be submitted on all refuse disposal areas. The bill also later required that operating landfills be licensed by DNR (Reference 14). In May 1974, BHS submitted an Application for Operating Permit along with engineering plans for the design and operation of their landfill (References 15; 16). In November 1974, DNR approved the plans with certain modifications and allowed the landfill to continue operating while official permits were still being developed (Reference 17).

At the time of the Sanitary Landfill Design and Operation Report, BHS Sanitary Landfill was serving a population of 10,370 persons within a 20-mile radius in Lincoln, Montgomery, St. Charles and Warren Counties. The solid waste delivered to the landfill was estimated to be 92 tons per week, or 19,136 cubic yards for 1974. Approximately three acres had been used for landfilling by 1974. It was estimated that by 1975-76, the landfill would be serving 31,650 persons, due to population growth and expansion of the collection area. (Reference 16, pp. 1, 2).

The trenching method of landfilling was used at BHS Sanitary Landfill. For this method, a trench is cut in the ground and the solid wastes are placed in the trench. The wastes are then spread in thin layers, compacted, and covered with earth excavated from the trench. The trench method is best suited for flat or gently sloping land where the water table is not near the ground surface (Reference 16, p. 12). The depth of this landfill was relatively shallow (8 to 10 feet). As a result, gas vents were not deemed necessary for operation (Reference 18, p. 2).

In the Report of Approval of Plans and Specifications completed by DNR, Solid Waste Management, the wastes that were approved for acceptance at the landfill included: municipal solid waste, bulky waste, dead animals, brush and untreated wood waste. No hazardous waste, bulk liquids, semi-solids, sludges containing free moisture, highly flammable or volatile substances, unexpended pesticide containers, raw animal manure, septic tank pumpings, raw sewage sludge, industrial process sludge, radioactive materials and explosives were to be accepted (Reference 17). However, records indicate that BHS was accepting 30 55-gallon drums a month of waste from Petrolite Corporation, Tretolite Division from St. Louis. Whether the waste was solid or liquid was debated. Petrolite's description of the wastes was: paper waste, woodscraps, polymers of condensed alkanolamines, and other chemical wastes such as polyethylene oxide ethers (Reference 19).

Landfill inspections conducted by DNR during 1975 documented unsatisfactory features of BHS Sanitary Landfill. The violations were similar to those in the past including: not placing a minimum of six inches of cover material on the waste at the end of each working day, ponding of water on-site, no signs posted with the wastes excluded from acceptance, loads of trash stacked on-site, and no employees on-site when landfill was in use (Reference 20).

On July 30, 1976 Mr. Zykan was officially issued a Solid Waste Disposal Area Operating Permit from the DNR for the sanitary landfill (Reference 21). Official closure documents are not available, but it is reported that the BHS Sanitary Landfill was closed in 1977 when a permit was issued to BHS for operation of an industrial waste disposal facility (hazardous waste) (References 21; 22).

2.4 Site History and Previous Investigations

In July 1985, DNR placed the portion of the property that was the site of BHS Sanitary Landfill on the *Missouri Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites*. The site was placed on the Registry under the name "Zykan Site", presumably to avoid confusion with the Bob's Home Service Hazardous Waste Landfill (Reference 23). The Registry listing was prompted by the fact that, since the landfill's closing, many of the suspected industrial wastes deposited during operation have been classified as hazardous substances. It has been learned that some of the waste disposed

of at the Zykan Landfill site is similar to the type disposed of at the BHS Hazardous Waste Landfill (Reference 24, p. 64).

A Public Drinking Water Advisory was issued by DNR's Public Drinking Water Program in August 1985 in relation to the Zykan Landfill. The water supplies listed included four Wright City wells, one Midway Trailer Park well, two Warren County PWSD #2 wells, one Innsbrook Estates well, and one Cedars Mobile Home Park well (Reference 25). The annual report states that although the Zykan Landfill site may pose a potential threat to nearby wells, the natural geologic conditions tend to lessen the possibility of contamination (Reference 24, p. 65).

During an annual registry site inspection in June 1990, a leachate outbreak was observed on the south end of the landfill. An area approximately 25'x25' was void of vegetation, and an oily leachate was observed running into a nearby creek. Erosion ditches 1-2 feet deep were also observed on the south and east ends of the landfill (Reference 26). In November 1991, Bob's Home Service Sanitary Landfill was issued a Notice of Violation for failure to provide cover and establish vegetation in a manner to minimize erosion and control drainage (Reference 27).

The leachate outbreak and erosion gullies continue to be a problem from 1990 to the present time. An Enforcement Action Request was submitted by the Solid Waste Management Program in January 1992. However, the enforcement action was dropped due to lack of funds by the property owner. In August 1995, Registry staff personnel recommended that Zykan Landfill be evaluated under a Preliminary Assessment/Site Inspection to determine the extent of contamination, since the owners had made no attempt to address the problems (Reference 28).

2.5 Waste Characteristics

The most significant aspect of the contamination at the Zykan Landfill site is the 55-gallon drums of material which are classified as ignitable hazardous waste based on flash point of less than 60°C. The only hazardous substance detected at relatively high levels in the drums was total xylenes. The hazardous substances detected in the leachate were all present at relatively low levels. The chemicals from the leachate and/or hazardous waste drums significantly affecting the intermittent creek include xylenes and 2,4-D.

Volatile Organic Compounds

Xylene is a man-made chemical that industries produce from petroleum and to a smaller extent from coal. Xylene is a colorless liquid with a sweet odor. Mixed xylene is a mixture of the three forms of xylene (meta-, ortho-, and para-) and smaller amounts of other chemicals, primarily ethylbenzene. Total xylenes refers to the three forms of the mixed xylenes. Xylene is used as a solvent and is also found in airplane fuel and gasoline. Xylene is volatile and flammable. It is not miscible with water; however, it is soluble in

alcohol and many other organic solvents. Xylene is a liquid, and can leach into soil, surface water, or groundwater, where it may remain for 6 months or longer before it is broken down into other chemicals. Xylene is most likely to enter the body through breathing xylene vapors. Xylene is classified by EPA as a hazardous substance and hazardous waste when discarded (References 29, pp. 1-3; 30, p. 931).

3. WASTES/SOURCES

3.1 Sample Locations (References 34; 47)

Table 1 presents sample numbers, descriptions, collection locations, dates and times for samples collected by DNR on May 9 and May 22-23, 1996. Figure 3 shows the location of all samples collected on a site map. The following source areas were identified on the site:

Leachate

- One sample, #96-1991, was collected from flowing leachate on May 9, 1996 from the central portion of the south slope of the landfill. A soil sample, #96-1993, was collected at the leachate seep area.

55-Gallon Drums

- On May 9, 1996 a single sample, #96-1988, was collected from a viscous, caramel-colored semisolid material in the gully, which appeared to have leaked from a buried drum. A total of four samples, #96-6116 thru 6119, were collected from nine 55-gallon drums on May 22-23, 1996. All drums were located in the gully on the southern slope of the landfill. The drums had no markings or labels. In order for samples to be collected from the partially exposed drums, an environmental contractor was hired to excavate the drums from the gully.

  Sample #96-6116 was a black oily liquid with a solvent odor. Sample #96-6117 was a thick oily substance with a strong solvent odor. Sample #96-6118 was a light brown oily material with a strong solvent odor. Sample #96-6119 had two phases, one gray and the other black in color.

3.2 Analytical Results (Reference 34)

Tables 2 and 3 present the information and analytical results for the leachate sample, the soil sample from the leachate seep area, and the drum samples collected by DNR on May 9 and May 22-23, 1996. The leachate sample was analyzed for total metals (As, Ba, Cd, Cr, Hg, Pb, Se, Ag), volatile organics (VOAs), base neutrals/acid extractables (BNAs), and pesticides/herbicides. The drum samples were analyzed for total metals, VOAs, and flash point. Two drum content samples, #96-6118 and #96-1988, were analyzed for pesticides/herbicides as well. Sample #96-1988 was analyzed for BNAs in addition. If any

source sample results exhibited total analyte levels which were at least 80% of 20 times their regulatory limit, the sample was also analyzed via the Toxicity Characteristic Leaching Procedure (TCLP).

Leachate
The leachate sample, #96-1991, contained five heavy metals: arsenic (10.3 ppb), barium (913 ppb), cadmium (10.7 ppb), chromium (37.5 ppb), lead (38.3 ppb). Volatile organic compounds as well as semi-volatile compounds were also detected - most significantly: benzene (99 ppb), toluene (5.8 ppb), ethylbenzene (240 ppb), total xylenes (560 ppb), phenol (42 ppb). The herbicide 2,4-D was detected at 2.33 ppb. The soil sample, #96-1993, contained average levels of heavy metals, no VOAs, and only two BNAs at low levels: bis(2-ethylhexyl)phthalate (0.13 ppm) and di-n-butylphthalate (0.42 ppm).

Drums
All samples of drum material failed flash point analysis (less than 60°C), classifying the material as ignitable hazardous waste. Only one drum showed the presence of metals, #96-6118; the levels were relatively low. All drums except #96-6119 showed total xylenes. Ethylbenzene, 2-hexanone, and tetrachloroethene were also detected in some drum samples. No pesticides/herbicides were detected in the two drums analyzed for pesticides/herbicides.

3.4 Conclusions

Integrated PA/SI sampling data documents several 55-gallon drums of ignitable hazardous waste on-site. Nine leaking drums were sampled and overpacked. However, an unknown number of buried drums remain in and around the erosion gully. The remaining drums observed are in very poor condition and there is a strong probability that these drums will begin leaking as well.

The landfill leachate, which contains benzene, ethylbenzene, xylenes and 2,4-D, among other VOAs and some metals, is flowing directly into the intermittent creek.

TABLE 1
SAMPLING COLLECTION INFORMATION

SAMPLE NUMBER	SAMPLE MEDIA/TYPE	LOCATION COLLECTED/ DEPTH	DATE	TIME
96-1981	QA/QC	Trip Blank	5/9/96	–
96-1982	water/target	Confluence of leachate seep & intermittent stream	5/9/96	1110
96-1983	sediment/target	Confluence of leachate seep & intermittent stream (0-3" depth)	5/9/96	1125
96-1984	water/target	Immediately downgradient of leaking drum in erosion gully	5/9/96	1145
96-1985	sediment/target	Immediately downgradient of leaking drum in erosion gully (0-3" depth)	5/9/96	1150
96-1986	water/background	Intermittent stream 50 yards upstream of leachate outflow	5/9/96	1200
96-1987	sediment/ background	Intermittent stream 50 yards upstream of leachate outflow (0-3" depth)	5/9/96	1205
96-1988	source material	Midway between east & west drums in erosion gully	5/9/96	1218
96-1989	water/background	Southern gully 50 yards upstream of leaking drums	5/9/96	124
96-1990	sediment/ background	Southern gully 50 yards upstream of leaking drums (0-3" depth)	5/9/96	1248
96-1991	leachate/source	Leachate from south slope side of landfill	5/9/96	1305
96-1992	QA/QC	Duplicate of 96-1992	5/9/96	1305
96-1993	soil/source	Southern slope of landfill at the leachate seep (0-3" depth)	5/9/96	1315
96-1994	QA/QC	Duplicate of 96-1993	5/9/96	1345
96-1995	QA/QC	Field blank	5/9/96	–
96-6116	drum/source	55-gallon drum in southern slope erosion gully	5/22/96	1130
96-6117	drum/source	55-gallon drum collected from portion released to visqueen during overpacking	5/22/96	1210
96-6118	drum/source	55-gallon drum in souther slope erosion gully (7th drum encountered)	5/22/96	1540
96-6119	drum/source	55-gallon drum in southern slope erosion gully	5/22/96	1550

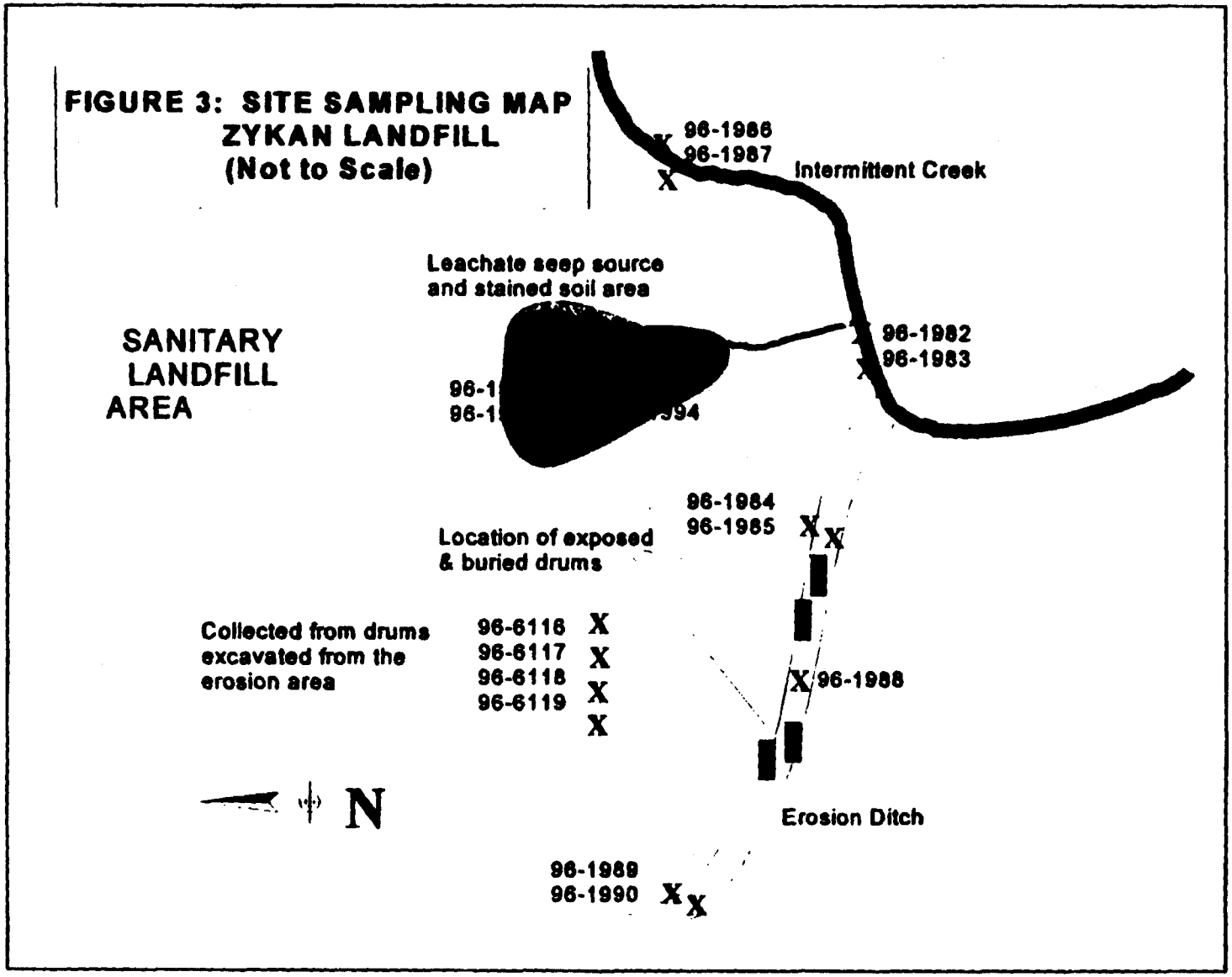


FIGURE 3: SITE SAMPLING MAP
ZYKAN LANDFILL
(Not to Scale)
96-1986
96-1987
Intermittent Creek
Leachate seep source
and stained soil area
SANITARY
LANDFILL
AREA
96-1982
96-1983
96-1984
96-1985
Location of exposed
& buried drums
Collected from drums
excavated from the
erosion area
96-6116
96-6117
96-6118
96-6119
96-1988
N
Erosion Ditch
96-1989
96-1990

TABLE 2: ANALYTICAL RESULTS FOR LEACHATE SAMPLES		
All results in parts per billion (ppb)	– Denotes Non-Detect	
SUBSTANCE	96-1991 Leachate Grab	96-1993 Soil at Leachate Seep
Arsenic, Total	10.3	11,100
Barium, Total	913	123,000
Cadmium, Total	10.7	–
Chromium, Total	37.5	10,500
Lead, Total	38.3	12,000
Mercury, Total	–	–
Selenium, Total	–	579
Silver, Total	–	–
VOAs		
Benzene	99	–
Chlorobenzene	13	–
Ethylbenzene	240	–
2-Hexanone	–	–
Tetrachloroethene	–	–
Toluene	5.8	–
Total Xylenes	560	–
BNAs		
Benzoic Acid	2.8	–
Bis(2-ethylhexyl)phthalate	2.8	130
Di-n-Butylphthalate	–	420
2,4-Dimethylphenol	2.9	–
Naphthalene	2.1	–
Phenol	42	–
PESTICIDES/HERBICIDES		
2,4-D	2.33	–

TABLE 3
ANALYTICAL RESULTS FOR DRUM SOURCE SAMPLES

All results in parts per million (ppm) – Denotes Non-Detect NA Denotes Not Analyzed

SUBSTANCE	96-1988 Source	96-6116 Source	96-6117 3rd Drum	96-6118 7th Drum	96-6119 9th Drum
Flash Point	59°C	54°C	54°C	57°C	52°C
Arsenic, Total	–	–	–	–	–
Barium, Total	–	–	–	17.5	–
Cadmium, Total	–	–	–	0.613	–
Chromium, Total	–	–	–	71	–
Lead, Total	–	–	–	158	–
Mercury, Total	–	–	–	1.43	–
Selenium, Total	–	–	–	–	–
Silver, Total	–	–	–	–	–
Lead, TCLP	NA	NA	NA	–	NA
VOAs					
Ethylbenzene	–	150	–	–	190
2-Hexanone	–	–	–	–	9200
Tetrachloroethene	–	–	–	690	–
Total Xylenes	3.9	6700	3000	1600	–
BNAs		NA	NA	NA	NA
2-Methylnaphthalene	33				
Naphthalene	55				
PESTICIDES	–	NA	NA	–	NA

4. GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting (Reference 35, pp. 1-5)

The Zykan Landfill site is in a boundary area between two physiographic provinces; the Dissected Till Plains and the Salem Plateau. Loess (wind deposited silt or silty clay) covers the uplands in this area. The loess is underlain by a glacially deposited mixture made up predominantly of clay but including particle sizes ranging from clay through boulders. This mixture of unstratified sediment is called till. Bedrock exposed in the area includes formations of Ordovican, Devonian, Mississippian, and Pennsylvanian age. The bedrock is an important source of water for both domestic and municipal supplies.

Though the glacial till is used as an aquifer in other parts of northern Missouri, there is no record of water production from the till in Warren County. This may be because the till is generally less permeable or thinner than in other areas, but is more likely because of the abundant and more reliable supply of water from the bedrock. The combined thickness of the loess and till may vary from 50 to 120 feet, depending on elevation. The most productive zones within the till would be from lenses of sand or gravel that may occur near its base. These high permeability lenses are discontinuous both vertically and horizontally.

Water level measurements in wells monitoring the Bob's Home Service hazardous waste landfill indicate that groundwater within the till flows toward the south. Pennsylvanian-aged clay, shale, coal, and sandstone may be present, but is discontinuous throughout the area. Its thickness will vary considerably due to deposition on an uneven surface, but generally the Pennsylvanian section is expected to be 0 to 20 feet thick. Some of the clays of the Pennsylvanian system in this area are of economic value and have been mined.

A thin Mississippian section is present. The Burlington Limestone, which is an aquifer in other parts of the state, is too thin here to be considered an aquifer. Logs for nearby wells indicate that there is probably no Burlington beneath the site. The Chouteau Formation may be the shallowest bedrock at the site. The Chouteau, along with underlying thin Devonian-aged formations, are usually considered to be a confining layer. The Ordovician-aged Kimmswick Limestone underlies the Devonian. The top of the Kimmswick, at a depth of approximately 100 feet beneath the site, marks the top of the Ozark Aquifer in this area. The Ozark Aquifer is made up of a thick sequence of limestone, dolomites, and sandstones. The sequence is over 1,000 feet thick in this area. The following stratigraphic table lists the lithologies and estimated thicknesses for the formations that are included in the Ozark Aquifer in this area. Most residential wells penetrate into the St. Peter Sandstone. The top of the St. Peter is estimated to be at 325 feet below the surface. Public water supplies generally obtain water from the lower part of the Ozark Aquifer, targeting the Roubidoux and Gasconade Formations. The top of the Roubidoux Formation is estimated to be at a depth of 850 feet below the site. The bedrock layers dip regionally

to the northeast at an angle of less than 1° from horizontal. The general direction of groundwater flow within the bedrock is also toward the northeast.

There is only one aquifer of concern at this site. The glacial till is not used as an aquifer in this area, and zones deeper than the Ozark Aquifer have not been used, and may be mineralized. No major geologic structures are known to exist in this area. Due to the great thickness of the Ozark Aquifer, no topographic features transect the aquifer. No aquifer discontinuities exist within a four mile radius of the site. Though shallow bedrock in the area is highly solutioned along bedding plains and joints, karst features, such as caves, springs, sinkholes, pinnacled bedrock, and losing streams have not generally developed. The Ozark Aquifer in this area is not considered karst.

The depth to the top of the Kimmswick Formation is estimated at 75 to 100 feet. However, water levels in domestic wells open to the aquifer generally range from 100 to 200 feet below ground surface, depending on the depth of the well casing. The glacial till, which is approximately 100 feet thick has a measured permeability (hydraulic conductivity) in the range of 10^{-8} to 10^{-9} cm/sec.

TABLE 4
GENERALIZED STRATIGRAPHY FOR THE ZYKAN SITE

System	Stratigraphic Unit	Composition	Thickness (feet)	Remarks
Quaternary	till	poorly sorted mixture made up primarily of clay	50 - 120	low permeability
Pennsylvanian	undifferentiated	shale, clay	0 - 20	these layers are thin or absent beneath the site
Mississippian	Chouteau Formation	dolomitic limestone	0 - 30	
Devonian	Sulphur Springs Group	sandstone, siltstone, shale	0 - 20	
Ordovician	Kimmswick Limestone	limestone	20 - 40	Ozark Aquifer
	Decorah Group	shale, limestone	20 - 30	
	Plattin Group	limestone, shaley limestone	75 - 95	
	Joachim Dolomite	dolomite	70 - 80	
	St. Peter Sandstone	sandstone	120 - 150	
	Powell/Cotter/ Jefferson City Dolomite	dolomite, cherty dolomite	400 - 450	

TABLE 4 GENERALIZED STRATIGRAPHY FOR THE ZYKAN SITE				
	Roubidoux Formation	cherty dolomite, sandstone	140 - 160	
	Gasconade Dolomite	cherty dolomite	100+	

4.2 Groundwater Targets

There are many residential wells in this area, generally ranging in depth from 300 to 600 feet in depth. Some public water supplies are also present. Both public and private water supply wells draw water from the same aquifer (Reference 35, p. 3)

Since 1986, drillers have been required to report the drilling of residential water wells to the Division of Geology and Land Survey. Ten water wells have been reported within 1 mile of the site. Twenty-one wells are reported to be between 1 and 2 miles from the site, 30 between 2 and 3 miles from the site, and 33 between 3 and 4 miles from the site. One public water supply well is located between 1 and 2 miles from the site. The nearest well is the well that serves the residence at the entrance to the property (Reference 35, p. 3). This well is just over 1/4 mile from the source areas (Reference 3).

There are numerous public drinking water wells within four miles of the site. Reference 31 is a DNR, Public Drinking Water Map of Warren County which shows all public wells in the county, including city and small subdivision wells in addition to mobile home park and vacation home developments. The largest system is the Wright City Public Wells. There are three wells that service Wright City and a portion of the surrounding area, a total of approximately 1700 people (Reference 36).

Table 5 on the following page is a breakdown of the population served by both private and public drinking water systems in the target area of the site. The population attributed to the private wells was based on the number of private wells on record with DNR's Division of Geology and Land Survey and the average population per household in Warren County, 2.73 persons (References 35, p. 3; 37). Information regarding population served by public wells was gathered from DNR's Inventory of Missouri Public Water Systems (References 38, pp. 93, 97, 103, 105, 108, 111; 39; 40). [The Shady Oaks Subdivision well is listed on the Public Drinking Water map, however, no information can be found documenting population served.]

TABLE 5
POPULATION SERVED BY GROUNDWATER WELLS
WITHIN FOUR MILES OF ZYKAN LANDFILL

DISTANCE FROM SITE (miles)	POPULATION SERVED BY PRIVATE WELLS	POPULATION SERVED BY PUBLIC WELLS		TOTAL
		NAME	# OF PERSONS	
0 - 1	27	–	–	27
1 - 2	57	ECM Water & Sewer Innsbrook Area Wells (2)	750	1147
		Innsbrook Estates Subd.	200	
		Maple Ridge MHP	140	
2 - 3	82	Glenbrook Estates	123	902
		Midway MHP	100	
		Oakview Estates	30	
		Wright City Well # 5	567	
3 - 4	90	Child Evangelism	100	1573
		ECM Water & Sewer North Oak Well	200	
		Pleasant Oak MHP	50	
		Shady Oaks Subd.	?	
		Wright City Well # 3	567	
		Wright City Well # 4	566	

4.3 Groundwater Sampling Locations and Analytical Results

The Missouri Department of Health (DOH) has been engaged in an ongoing surveillance of private drinking water wells in the area surrounding the Bob's Home Service Hazardous Waste Landfill and Zykan Landfill (BHS Sanitary Landfill) since 1986. The regular monitoring program is completed yearly by DOH and currently includes sampling private wells for 19 inorganic chemicals, 6 chlorinated pesticides, 57 volatile organic compounds, and 2 chlorophenoxy herbicides. Sampling thus far has not revealed any groundwater contamination. The latest round of sampling was completed in March 1996 (References 41, p 131; 42; 24, p. 65).

No groundwater samples were collected as part of the Integrated PA/SI for the following reasons:

+ The regular groundwater sampling by DOH satisfactorily addresses the potential threat to surrounding private drinking water wells and has shown no contamination since 1986.
+ Although there are several monitoring wells surrounding the BHS Hazardous Waste Landfill and the Zykan Landfill, it would be difficult to attribute any groundwater contamination solely to the Zykan Landfill without factoring in influence from BHS Hazardous Waste Landfill, which is located immediately upgradient of the Zykan Landfill.
+ Natural geologic conditions in the area (the upper 50 to 75 feet of glacial drift is composed of dense, low-permeability sandy and silty clay) are likely to inhibit the migration of contaminants and prevent or reduce groundwater contamination.

4.3 Groundwater Conclusions

DOH sampling of private wells in the vicinity of Zykan Landfill has not shown any presence of hazardous substances that would be related to the site or the Bob's Home Service Hazardous Waste Landfill. Although the wastes at the Zykan Landfill are buried, it is unlikely that they would affect groundwater due to the presence of 50 to 75 feet of dense, low-permeability clay underlying the site.

5. SURFACE WATER PATHWAY

5.1 Hydrologic Setting

The Zykan Landfill site is located in the Central Lowland physiographic province of the United States The Dissected Till Plains is a subdivision of the Central Lowland in Missouri that is chiefly developed on glacial material deposited on sedimentary rocks. This is a region of mixed hills and plains. The site is located about 15 miles north of the Missouri River in the Missouri River Basin, which is the largest of the major river basins in Missouri. A subdivision of the Missouri River Basin is the East Lower Missouri River Basin which includes tributaries to the Missouri River in the east-central part of Missouri such as Charette Creek (Reference 43, pp. 5, 10)

Leachate outbreaks and erosional gullies are in the southeast portion of the landfill. This drainage flows directly into an intermittent tributary to Charrette Creek which borders the southern and eastern sides of the site. This tributary flows for approximately 0.75 miles before entering Lake Lucern in the northeast corner of Section 6, T. 46 N., R. 1 W., where perennial water is encountered. This would be the probable point of entry. The distance to perennial surface water is approximately 4,000 feet. Lake Lucern is one of a series of lakes in Innsbrook Estates, a large vacation home development (Figure 4). The topographic map for the area indicates that this tributary is intermittent down gradient from the lakes, however, judging from the amount of water in the stream at the site during the

FIGURE 4: INNSBROOK ESTATES MAP

site visit, it seems reasonable to assume that water flows in this tributary most of the year (References 4; 3; 35, p. 4).

The target distance would terminate 15 miles below the point where the tributary flows into Lake Lucern. This would include the two large lakes, Lake Lucern and Lake Innsbrook, in the east half of Section 6, as well as the unnamed tributary of Charrette Creek downgradient from the lakes. It would also include Charrette Creek for approximately 12 miles downstream from the confluence with this tributary, to near the center of Section 12, T. 45 N., R. 2 W. (Reference 35, p. 4).

The site itself is approximately five acres. The upgradient area would include another 65 to 75 acres. Soils in the upgradient area are a silty clay loam. The landfill is covered by a compacted silty to sandy clay loam (References 3; 35, p. 4).

According to the Federal Emergency Management Flood Insurance Rate Map, the site is not located in a flood plain (Reference 44).

5.2 Surface Water Targets

There are no public water supply intakes in the target area (References 35, p. 5; 38 p. 193A).

Lake Lucern and Lake Innsbrook are currently used by Innsbrook Estate residents for boating, fishing and swimming (Reference 4). The first 5 miles of Charrette Creek encountered in the 15 mile surface water pathway is classified as a stream that may cease flow in dry penods but maintains permanent pools which support aquatic life. This portion is classified for livestock and wildlife watering, protection of warm water aquatic life and human health-fish consumption. The remainder of Charrette Creek, starting in Section 14 T46N R2W is a stream that maintains permanent flow even in drought periods, and is classified for whole body contact recreation in addition to the previous classifications (Reference 45, p. 52)

The only federally-listed sensitive environment along the surface water pathway is the habitat for the plant Sullivantia (*Sullivantia sullivantii*), which is a candidate for federal listing, located along Charrette Creek in Section 25, T.46N., R.2W. The only state-listed sensitive environment is the Spinulose shield fern (*Dryopteris carthusiana*), state-listed Endangered, located along Charrette Creek in Section 24, T.46N., R.2W. (Reference 46).

5.3 Surface Water Sampling Locations (References 34; 47)

Surface water and sediment samples were collected on May 9, 1996 from the intermittent stream immediately south of the landfill. One surface water and one sediment sample were collected where the leachate flow intersects the stream on the southern border of the

landfill. One background surface water and one background sediment sample were also collected approximately 50 yards upstream. It was important to note that the background samples would identify any influence from BHS Hazardous Waste Landfill, as they were taken downstream of any surface water runoff from the hazardous waste landfill (See Figure 3).

There were also two water grab and "sediment" samples taken on May 9, 1996 from the gully on the south side slope of the landfill where the leaking drums were located. During the time frame of the May 9th sampling event there had been a great deal of rain, and the gully, which is normally dry, actually had a very low flowing stream of water with standing pools in it. One water and one "sediment" sample were collected from a small pool of water in the gully directly downgradient from a leaking drum. Background water and "sediment" samples were collected from another small pool of water in the gully approximately 50 yards upgradient of the leaking drums.

5.4 Analytical Results (Reference 34)

Table 6 presents the analytical results for the gully and intermittent stream samples collected by DNR on May 9, 1996. The samples were analyzed for total metals, VOAs, BNAs, and pesticides/herbicides.

The background and target samples for the gully indicate that the leaking drums are releasing hazardous substances, including xylenes and several BNA compounds, into the gully.

The background and target samples for the intermittent creek indicate that the creek is being impacted by hazardous substances from both the leachate and the leaking drums in the gully. The target creek water sample, #96-1982, contains xylenes at 24 ppb and 2,4-D at 1.22 ppb. The leachate contains both xylenes (560 ppb) and 2,4-D (2.33 ppb) while the leaking drums contained xylenes (3,900 - 6,700,000 ppb). There are no SCDM benchmarks to compare results to since the surface water samples were collected from an intermittent creek.

5.5 Surface Water Conclusions

PA/SI sampling documents that the intermittent creek immediately south of the Zykan Landfill is being impacted by hazardous substances from the leachate and the leaking drums in the gully. The leachate has been observed flowing directly into the creek. This intermittent creek is not known to be used for any fishing or recreation purposes. The creek flows for 0.75 miles into Lake Lucern, which is used for fishing and recreation.

TABLE 6 - SEDIMENT AND SURFACE WATER SAMPLES FROM EROSION GULLY AND INTERMITTENT CREEK
All results in parts per billion (ppb) – Denotes Non-Detect
Results in red are values that are 3X background concentration or exceed the detection limit

	Background - Gully		Target - Gully		Background - Creek		Target - Creek	
Substance	96-1990 Sediment	96-1989 Water	96-1985 Sediment	96-1984 Water	96-1987 Sediment	96-1986 Water	96-1983 Sediment	96-1982 Water
METALS								
Arsenic, Total	7480	–	7660	–	4100	–	9220	
Barium, Total	89800	113	66700	117	23800	54.3	73400	164
Cadmium, Total	–	1.78	–	1.43	–	–	–	1.11
Chromium, Total	16600	–	22300	–	9790	–	17800	–
Lead, Total	16200	–	12500	–	6880	–	19300	–
Selenium, Total	–	–	–	–	–	–	585	–
Silver, Total	–	–	–	5.99	–	–	–	–
'OA's								
Total Xylenes	–	–	18000	1200	–	–	–	24
BNA's								
Acenaphthene	–	–	800	11	–	–	–	–
Anthrancene	–	–	850	–	–	–	–	–
Benzo(a)anthracene	–	–	260	–	–	–	–	–
Benzo(a)pyrene	–	–	350	–	–	–	–	–
Benzo(b)fluoranthene	–	–	160	–	–	–	–	–
Benzo(k)fluoranthene	–	–	107	–	–	–	–	–
Bis(2-chloroethyl)ether	–	–	–	180	–	–	–	–
Bis(2-ethylhexyl) phthalate	160	–	–	23	–	–	1100	3.6
4-Chloroaniline	–	–	–	–	–	–	180	–
Chrysene	–	–	106	–	–	–	–	–
Di-n-butylphthalate	660	–	360	–	650	–	1400	–
)ibenzofuran	–	–	110	–	–	–	–	–

TABLE 6 - SEDIMENT AND SURFACE WATER SAMPLES FROM EROSION GULLY AND INTERMITTENT CREEK
All results in parts per billion (ppb) -- Denotes Non-Detect
Results in red are values that are 3X background concentration or exceed the detection limit

	Background - Gully		Target - Gully		Background - Creek		Target - Creek	
Substance	96-1990 Sediment	96-1989 Water	96-1985 Sediment	96-1984 Water	96-1987 Sediment	96-1986 Water	96-1983 Sediment	96-1982 Water
Dimethylphthalate	--	--	--	--	--	7.6	--	--
2,4-Dinitrotoluene	--	--	1600	--	--	--	--	--
Fluoranthene	--	--	220	--	--	--	--	--
Fluorene	--	--	1400	--	--	--	--	--
2-Methylnaphthalene	--	--	59000	920	--	--	970	--
Naphthalene	--	--	7000	810	--	--	190	--
N-Nitrosodiphenylamine	--	--	3700	14	--	--	--	--
Phenanthrene	--	--	1900	7.1	--	--	130	--
Phenol	--	--	--	--	--	--	--	104
Pyrene	--	--	720	--	--	--	--	--
HERBICIDES								
2,4-D	--	--	--	--	--	--	--	1 22

6. SOIL EXPOSURE AND AIR PATHWAYS

6.1 Physical Conditions

According to the Montgomery and Warren County Soil Survey conducted in the early 1970s, the majority of the Zykan Landfill site is located in an area of Keswick silt loam with 9 to 14 percent slopes. The Keswick series consists of deep, moderately well drained, moderately sloping and strongly sloping soils on uplands. These soils formed in glacial deposits under hardwood forest. In a representative profile, the surface layer is very dark grayish brown silt loam about two inches thick. The subsurface layer is silt loam about 14 inches thick. It is brown in the upper part and yellowish brown in the lower part. The very firm clay subsoil is about 36 inches thick. It is yellowish red in the upper part and strong brown in the lower part. The underlying material is firm, yellowish brown clay loam. Permeability is low. Depending on the degree of erosion, the available water capacity is moderate or low. Content of organic matter and natural fertility are low. Runoff is rapid (Reference 6, pp. 27, 28, Sheet No. 47, 48).

The majority of the level portion of the landfill is flat with heavy vegetation. There is a small depression in the central southern part that is believed to be related to the leachate outbreak on the southern slope directly below it. The southern and eastern slopes are severly eroded with large erosion gulleys. Access to the road to the landfill is blocked by a gate (References 4; 47).

6.2 Soil and Air Targets

There are currently no workers on the Zykan Landfill site. No people live on or within 200 feet of the site. The nearest residence is 0.3 miles to the northwest, and the nearest schools are in Wright City 3.3 miles north-northeast of the site (References 3; 4). The site is located in a very rural, sparsely populated part of the state. The nearest and only city within four miles of the site is Wright City, located three miles north-northwest, with a population of 1,250 (References 3; 32). The nearby population within one travel mile of the site is 136 persons. Total population within four miles of the site is 3465 people. Table 7 shows a breakdown of the population within a four-mile radius of the site (References 3; 33).

TABLE 7
POPULATION DATA

DISTANCE FROM SITE (IN MILES)	METHOD OF OBTAINING POPULATION WITH CALCULATIONS	TOTAL
0 - 1/4	House Count showed no residents	0
1/4 - 1/2	45.2 persons/sq mile X 0.58875 sq mile	27
1/2 - 1	45.2 persons/sq mile X 2.355 sq miles	106
1 -2	45.2 persons/sq mile X 9.42 sq miles	426
2 - 3	45.2 persons/sq mile X 15.6 sq miles = 705 10% of Wright City population = 125	830
3 - 4	45.2 persons/sq mile X 20.98 sq miles = 948 90% of Wright City population = 1125	2073
TOTAL		3465

The state-listed Rare wood frog (*Rana slyvatica*) is located in the Reifsnider (Frank) State Forest, T.46N., R.2W., Section 3, which is between 3 and 4 miles from the site (Reference 46).

6.3 Soil Sample Locations

Since the only soil sample collected was considered a source sample from near the

leachate seep area, this sample is discussed in Section 3.1, 3.2 Waste/Source Sample Location and Analytical Results and Table 2.

6.4 Soil Exposure and Air Pathway Conclusions

The population surrounding the site is sparse with the nearest resident 0.3 miles away. There is little danger of residents coming into casual contact with site wastes. Access to the site, however, is minimally secure. The gate blocking the entrance to the dirt road leading to the landfill is in poor shape and there is evidence of unauthorized persons on-site.

7. SUMMARY AND CONCLUSIONS

The Zykan Landfill Integrated PA/SI attempted to gather data necessary to evaluate the site as a candidate for the NPL, and to assess the potential need for removal actions. Waste and environmental samples were collected and analyzed to characterize the types of substances deposited at the site and potential migration pathways. In addition, information was collected to confirm target populations and environments potentially at risk from the site.

The Zykan Landfill site, approximately five acres in size, is a closed landfill located in a rural area of Warren County three miles south-southwest of Wright City off of Highway M and Muenz Road. The landfill was operated by Mr. James Zykan from 1971 to 1977 as Bob's Home Service Sanitary Landfill. Most of the material accepted at the landfill was municipal and commercial refuse. However, records show that the landfill was at one time accepting 55-gallon drums of chemical wastes. During operation, the landfill was cited by the Division of Health and DNR several times for unsatisfactory landfill practices.

In July 1985, DNR placed the property that was the site of BHS Sanitary Landfill on the *Missouri Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites*. Annual Registry inspections have documented a growing leachate seep area on the south slope of the landfill as well as erosion gullys on the side slopes that have been increasing in size each year. During the Integrated PA/SI sampling event, several partially exposed and leaking 55-gallon drums were discovered in the gully on the south slope.

Integrated PA/SI sampling documents the presence of several 55-gallon drums of ignitable hazardous waste on-site. Nine leaking drums were sampled and overpacked. However, there remains an unknown number of buried drums in and around the erosion gully. The remaining drums observed are in very poor condition, and there is a strong probability that these drums will begin leaking as well.

Landfill leachate is discharging directly into an intermittent stream immediately south of the landfill. Sampling documented that the stream is being impacted by hazardous substances

including xylenes and 2,4-D from both the leachate and the leaking drums in the gully. This intermittent stream flows for 0.75 miles into a lake used for fishing and recreation. There are few residential targets near the site, and DOH sampling of private drinking water wells in the area has not shown any contamination.

A removal action is recommended for the Zykan Landfill site. Sampling confirmed ignitable hazardous waste in buried 55-gallon drums that were leaking into a nearby intermittent stream. The structural integrity of an unknown number of remaining buried drums indicates leaking is probable in the near future. These drums, as well as the leachate seep represent a significant threat to the environment and anyone that may come into contact with the wastes. Since the drums sampled and overpacked during the PA/SI sampling event were classified as ignitable hazardous waste, the Site Evaluation Unit recommends a removal action be initiated within one year.

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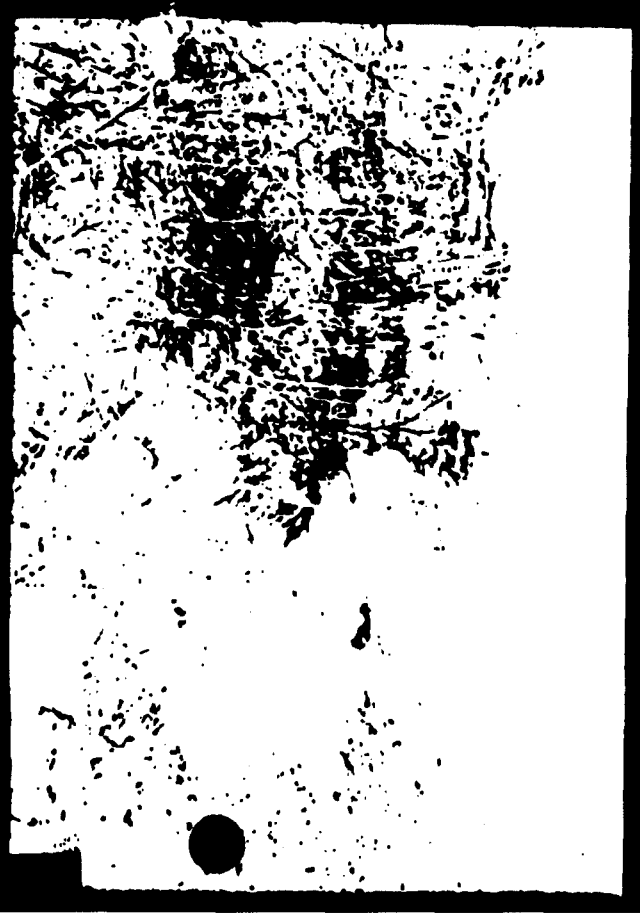
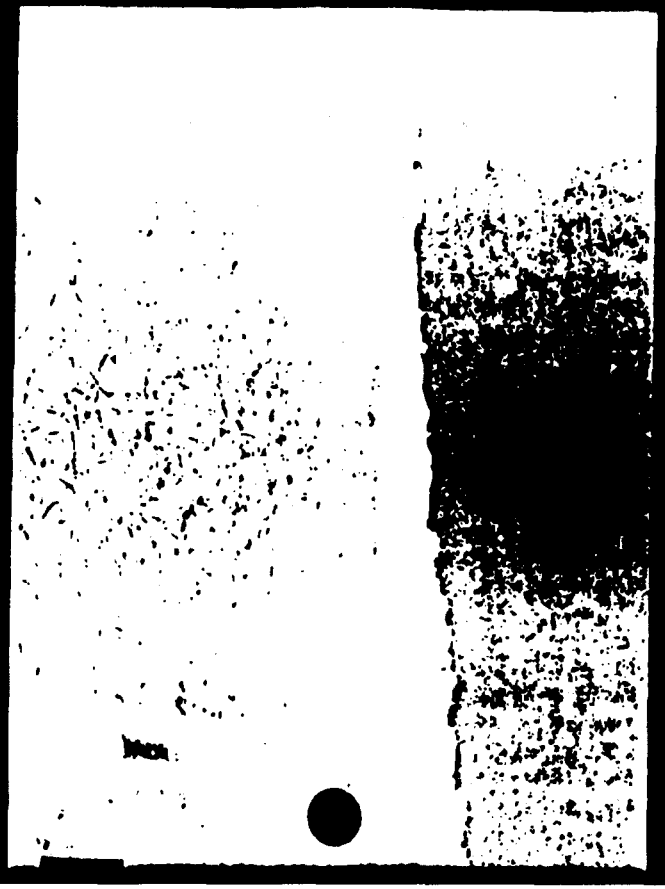
4





Zykan Landfill (aka Bob's Home Service Sanitary Landfill)
3 miles southwest of Wright City, MO.
Photo taken 3/14/96 by Valerie Harding, Superfund, MDNR.
Photo taken looking southeast at the landfill. Small gravel path runs southwest-northwest through the landfill. The fence shown is the end of the fence surrounding the Bob's Home Service Hazardous Waste landfill located immediately north of the BHS Sanitary Landfill. #57-11.

Zykan Landfill (Bob's Home Service Sanitary Landfill)
Wright City, MO. Warren County
Photo taken on 4/12/96 by Valerie Harding, Superfund, MDNR
Photo taken looking west at gulley on south side slope of landfill. #66-6

Zykan Landfill (aka Bob's Home Service Sanitary Landfill)
3 miles southwest of Wright City, MO.
Photo taken 3/14/96 by Valerie Harding, Superfund, MDNR.
Photo taken looking east-southeast at the BHS Sanitary Landfill. #57-8.

Zykan Landfill (Bob's Home Service Sanitary Landfill)
Wright City, MO. Warren County
Photo taken on 4/12/96 by Valerie Harding, Superfund, MDNR
Close-up of partially exposed drum in gulley on south side slope of landfill. #66-2

Zykan Landfill (Bob's Home Service Sanitary Landfill)
Wright City, MO. Warren County
Photo taken on 4/12/96 by Valerie Harding, Superfund, MDNR
Photo taken looking east at gulley on south side slope of landfill. #66-5

PETRO CORPORATION
Petrolite Corporation, Tretolite division, 1974.
TRETOLITE DIVISION
369 Marshall Avenue / Saint Louis, Missouri 63119
(314) 961-3500 / TWX 910-760-1660 / Telex 44-7417

SYKAN LANDFILL SITE
AKA BOB'S HOME SERVICE
SANITARY LANDFILL
WARREN COUNTY, MO
PA/SI REFERENCE 19

April 18, 1974

Missouri Division of Health
P.O. Box 570
Jefferson City, Missouri 65101

Attn: Mr. Barney Bergman

Dear Sir:

30 Drums of solid waste hauled by Bobs Home Service per month.

Description: Paper waste, woodscraps, polymers of condensed alkanolamines (these should be biodegradeable), other chemical wastes such as polyethylene oxide ethers not currently marketable.

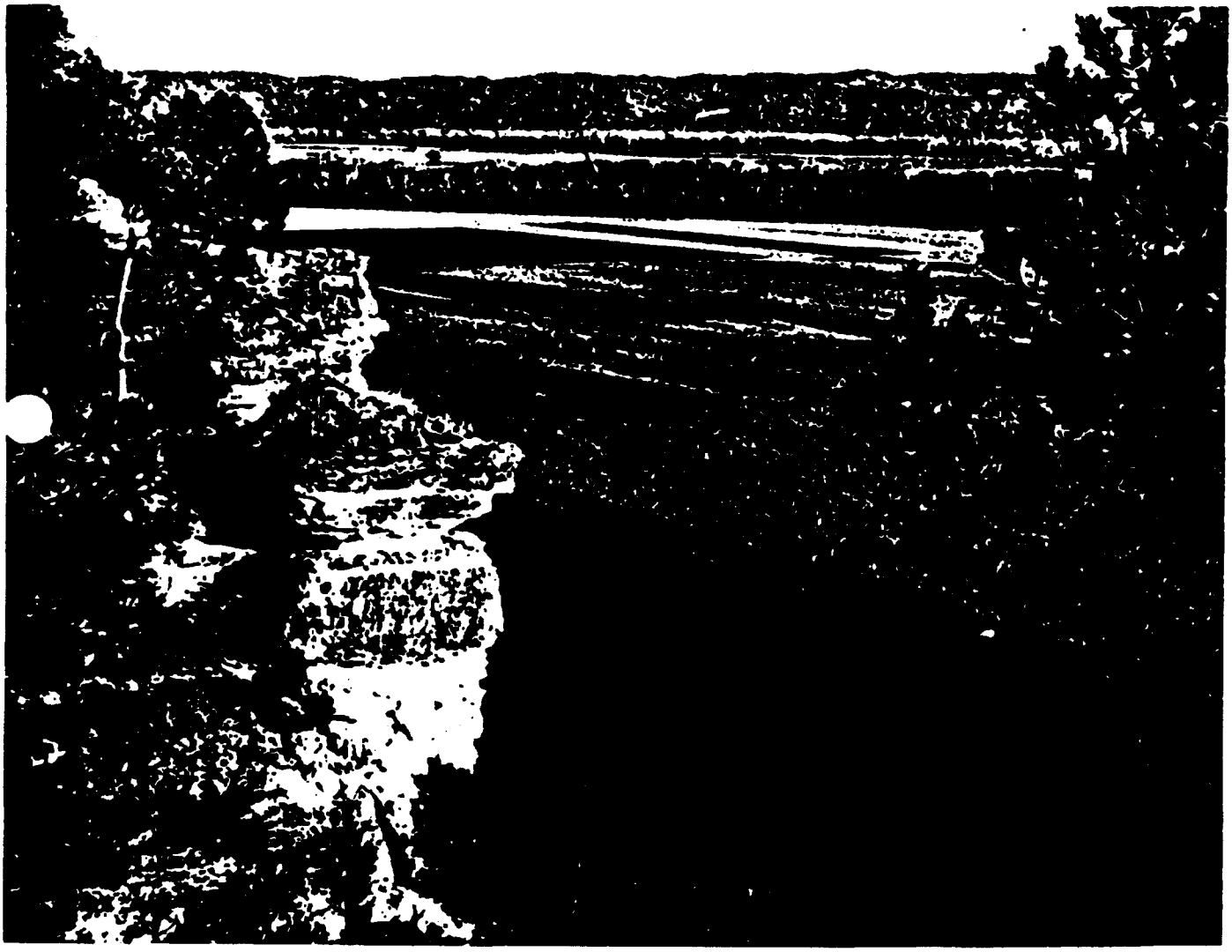
E.J. Schnieders
Plant Manager

EJS/ji
cc: Bobs Home Service

United S Department of Agriculture (USD '978.

SOIL SURVEY OF

Montgomery and Warren Counties, Missouri



United States Department of Agriculture
Soil Conservation Service
In cooperation with
Missouri Agricultural Experiment Station

blocky; firm; thick continuous clay films on surfaces of primary peds; common black stains; few sand grains; few fine chert fragments; medium acid; clear smooth boundary.

IIB24t—41 to 60 inches; yellowish red (5YR 5/6) silty clay; common medium distinct dark brown (7.5YR 4/4) mottles; weak medium prismatic structure parting to weak fine subangular blocky; firm; thin continuous clay films on faces of primary peds; few sand grains; few fine chert fragments; medium acid.

The solum ranges from 60 to about 70 inches in thickness. Depth to limestone bedrock ranges from about 70 to 80 inches. The Ap or A1 horizon is brown or dark grayish brown. The B horizon is brown or dark brown. The IIB horizon is at a depth of 20 to 40 inches. It has matrix colors of yellowish red or strong brown.

Crider soils contain more clay and are redder in the lower part of the B horizon than Winfield soils, which occupy similar positions. They contain less sand throughout than Holstein soils. Crider soils are redder and contain more clay in the lower part of the B horizon than the associated Hatton soils, and they do not have a fragipan.

CrC—Crider silt loam, 5 to 9 percent slopes. This moderately sloping soil is on crests of ridgetops at elevations somewhat lower than those of Hatton soils. Most areas are long and narrow and range from 10 to 60 acres in size. This soil has the profile described as representative of the series.

Included with this soil in mapping are areas of a similar soil that is 40 to 60 inches deep over bedrock and a few areas where bedrock is at a depth of less than 40 inches and gray mottles are in the lower part of the subsoil. Also included are areas of severely eroded soils. These are indicated on the soil map by a spot symbol.

This soil is used for pasture, meadow, corn, wheat, and small grain and is well suited to alfalfa. Many small areas are used for woodland. Larger areas are suited to cultivated crops if erosion is controlled. Losses of soil and water can be controlled by terraces and grassed waterways, contour farming, and conservation cropping systems. No-till farming and minimum tillage are effective alternative erosion control methods. Areas at higher elevations have a potential for orchards and vineyards.

Fertility can be improved and maintained by liming and fertilization according to soil tests and using crop residue and barnyard manure. Cover crops and green manure crops also help maintain organic matter, available water capacity, and good tilth.

Important pasture management includes fertility maintenance by liming and fertilization, control of brush and weeds by mowing, and protection from overgrazing by proper stocking. Capability unit IIIe–1.

CrD2—Crider silt loam, 9 to 14 percent slopes, eroded. This strongly sloping soil is on side slopes, generally below areas of less sloping Crider soils. Most areas are 10 to 30 acres in size. This soil has a profile similar to the one described as representative of the series, but the depth to the silty clay loam subsoil is generally less.

Included with this soil in mapping are many areas of a similar soil where bedrock is at a depth of 40 to 60 inches and areas where bedrock is at a depth of less than 40 inches. A few areas of limestone bedrock outcrops are indicated on the soil map by Rock outcrop symbols. Also included, on foot slopes, are some areas of a similar soil that has gray mottles in the lowe part of the subsoil.

This soil is suited to pasture, meadow, or woodland. In cultivated areas the hazard of further erosion is severe. Terraces that have grassed outlets, minimum tillage or no-till farming, and contour cultivation help control erosion and retard runoff. Important, in cropping sequences, are rotations that include several years of meadow or other cover crops. Using crop residue, cover crops, barnyard manure, and green manure crops helps maintain organic matter, good tilth, and available water capacity. Liming and fertilization according to soil tests improves and maintains fertility.

Woodland can benefit from selective harvest of mature timber, thinning of second growth stands, and control of fire and grazing. These practices also benefit most woodland wildlife.

Important pasture management includes maintenance of fertility by liming and fertilization, control of brush and weeds by mowing, and protection from overgrazing by proper stocking. Capability unit IVe–1.

Dockery Series

The Dockery series consists of deep, somewhat poorly drained, nearly level soils on bottom land. These soils formed in recent alluvium along the Loutre River and smaller streams in the survey area. Native vegetation is forest.

In a representative profile the surface layer is dar grayish brown silt loam about 6 inches thick. The nex layer is dark grayish brown silty clay loam about 8 inches thick. Below this is a layer of dark grayish brown silt loam about 34 inches thick. The next layer is dark grayish brown silty clay loam about 12 inches thick.

Permeability is moderately slow, and available water capacity is high. Content of organic matter is moderate, and natural fertility is high. Runoff is slow.

Dockery soils are used mostly for cultivated crops. Some areas are used for pasture or woodland.

Representative profile of Dockery silt loam in a cultivated field in Montgomery County, 1,290 feet south and 410 feet east of center of sec. 5, T. 46 N., R. 5 W.:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) heavy silt loam; moderate very fine granular structure; friable; few roots; neutral; abrupt smooth boundary.

C1—6 to 14 inches; dark grayish brown (10YR 4/2) light silty clay loam; few fine prominent dark reddish brown (5YR 3/4) and faint dark gray (10YR 4/1) mottles; massive; firm; few roots; neutral; clear smooth boundary.

C2—14 to 38 inches; dark grayish brown (10YR 4/2) silt loam; common fine faint dark brown (10YR 4/3) mottles; weak thin platy structure; thin strata of brown coarse silt; friable; neutral; clear smooth boundary.

C3—38 to 48 inches; dark grayish brown (10YR 4/2) heavy silt loam; common fine prominent dark reddish brown (5YR 3/4) mottles; weak thin platy structure; friable; common black stains; neutral; clear smooth boundary.

C4—48 to 60 inches; dark grayish brown (10YR 4/2) ligh silty clay loam; common fine distinct brown (10YI 5/3) and dark yellowish brown (10YR 3/4) mottles; massive; friable; neutral.

The solum is less than 10 inches thick. The A horizon is

dark grayish brown or very dark grayish brown. The C horizon commonly has coarser or finer textured lenses less than 6 inches thick.

Dockery soils are wetter than the associated Nodaway soils. They are higher in reaction than Sharon soils, which occupy similar positions.

Do—Dockery silt loam (0 to 2 percent slopes). This soil is on first bottoms. In larger flood plains it is between areas of Nodaway soils that border the stream and areas of Nodaway soils that are on higher stream terraces. In many places it is in old stream meanders that are filled with recent alluvium. It also is in narrow areas of bottom land along many small stream branches. Most areas are 20 to 60 acres in size and have an elongated shape. Included in mapping are areas of a similar soil that contains more sand throughout and has a lighter colored surface layer.

On the larger flood plains, this soil is used mostly for corn and soybeans. Small grain is less extensive in these areas because of the hazard of spring flooding. Narrow areas along small stream branches are used mostly for pasture and woodland.

This soil is well suited to row crops in areas large enough for practical use of large machinery. Flooding is the main hazard, and levee construction is generally impractical. Some ponded areas need surface drainage.

Fertilization according to soil tests is effective. The soil is neutral in most areas and does not need lime. Good tilth and organic matter can be maintained by ıg crop residues. Capability unit IIw–1.

Gasconade Series

The Gasconade series consists of shallow, somewhat excessively drained, moderately sloping to very steep soils on uplands. These soils formed in material weathered from limestone and thinly interbedded shale. Native vegetation is grasses, forbs, and hardwood trees. The hardwood trees are mostly chinquapin, black oak, and cedar.

In a representative profile the surface layer is very dark grayish brown stony silty clay loam about 6 inches thick. The subsoil is firm, dark brown channery silty clay about 7 inches thick. Limestone bedrock is at a depth of 13 inches.

Permeability is moderately slow, and available water capacity is very low. Content of organic matter is moderate, and natural fertility is medium. Runoff is rapid.

Gasconade soils are used mostly for recreation and wildlife habitat.

Representative profile of Gasconade stony silty clay loam, 5 to 9 percent slopes, in a wooded area in Montgomery County, 290 feet east and 210 feet north of the southwest corner of sec. 5, T. 47 N., R. 5 W.:

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) stony heavy silty clay loam; strong very fine subangular blocky structure; friable; many roots; 10 percent limestone fragments 1 inch to 4 inches long; 20 percent of surface covered by limestone fragments 20 to 50 inches long; neutral; clear smooth boundary.

B2—6 to 13 inches; dark brown (7.5YR 3/2) channery silty clay; moderate very fine subangular blocky structure; firm; common roots; 30 percent limestone fragments 3 to 6 inches long and 10 percent limestone fragments 6 to 20 inches long; neutral.

R—13 inches; limestone bedrock.

The solum ranges from 9 to 20 inches in thickness, and the depth to limestone bedrock is commonly the same as this thickness. The A horizon is very dark grayish brown or very dark brown. The B horizon is dark brown or very dark brown. The content of coarse fragments varies greatly within short horizontal distances.

Gasconade soils have limestone bedrock at a shallower depth than the associated Chilhowie and Goss soils.

GaC—Gasconade stony silty clay loam, 5 to 9 percent slopes. This moderately sloping soil is mostly on crests of ridgetops and points of ridges. Most areas are 10 to 30 acres in size. This soil has the profile described as representative of the series. Stones, mostly limestone, are dominantly 6 inches to 2 feet across and occupy 5 to 20 percent of the surface area.

Included with this soil in mapping are small areas of Rock outcrop that has practically no soil material above the bedrock. Also included are areas where slopes are 9 to 14 percent.

Most areas are covered with mixed grasses and cedars and other hardwoods. They are mainly used for recreation but also serve incidentally as wildlife habitat. Some areas are used for pasture, but production of grasses is limited by droughtiness, and mowing is hampered by large stones. High quality cedar is harvested for posts and other uses in places, but growth is slow. Other hardwoods, mostly black oak and chinquapin oak, seldom reach marketable size or quality. Development of wildlife habitat is severely limited by droughtiness, large stones, and shallow rooting depth.

Some areas afford access by road or trail to the steeper soils below. These areas provide vistas of great scenic beauty, and are favored as cabin sites. Capability unit VIs–8.

GdF—Gasconade-Rock outcrop complex, 14 to 50 percent slopes. This complex is on side slopes in areas that have an intricate pattern of shallow soils and exposed bedrock. Slopes are steep and very steep. The complex is about 50 percent Gasconade soils, 30 percent Rock outcrop, and 20 percent other soils.

The Rock outcrop has little or no soil material above the bedrock. It is mostly very steep and is on south and southwest facing side slopes. Gasconade soils are on the slightly more stable side slopes.

Included with this unit in mapping are areas of Goss soils and many small areas of Chilhowie soils. Also included are areas where slopes are more than 50 percent. In places these areas have vertical or overhanging cliffs.

Most areas support a stand of mixed, poor quality hardwoods or a sparse stand of cedars and grasses. Few trees reach marketable size or quality.

This complex is used mainly for recreation and wildlife habitat. It has severe limitations for both these uses. Steep slopes, large stones, and cliffs limit use to hunting and hiking by the physically fit. Development of wildlife habitat is severely limited by steep slopes, droughtiness, large stones, and the shallow rooting depth. Capability unit VIIs–8.

Goss Series

The Goss series consists of deep, well drained, moderately sloping to very steep soils on uplands. These

soils formed in material weathered from cherty limestone and thinly interbedded shale under forest vegetation.

In a representative profile the surface layer is dark grayish brown very cherty silt loam about 2 inches thick. The subsurface layer is brown very cherty silt loam about 21 inches thick. The subsoil is firm very cherty clay about 38 inches thick. The upper part is reddish brown and the lower part is brownish yellow. The underlying material is very pale brown weathered chert and shale.

Permeability is moderate, and available water capacity is low. Content of organic matter and natural fertility are low. Runoff is rapid.

Most areas remain in mixed hardwood forest. A much smaller acreage has been cleared and is used for pasture. Goss soils are suited to woodland, pasture, woodland wildlife habitat, and recreation.

Representative profile of Goss very cherty silt loam in a wooded area of Goss soils, 14 to 45 percent slopes, in Warren County, 680 feet south and 1,180 feet east of northwest corner of sec. 8, T. 46 N., R. 4 W.:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) very cherty silt loam; moderate very fine granular structure; friable; many roots; 75 percent coarse fragments, mostly angular chert 1 to 4 inches in diameter; medium acid; abrupt smooth boundary.

A2—2 to 23 inches; brown (10YR 5/3) very cherty silt loam; weak fine subangular blocky structure; friable; many roots; 75 percent coarse fragments, mostly angular chert 1 to 4 inches in diameter; strongly acid; abrupt smooth boundary.

B2—23 to 43 inches; reddish brown (5YR 4/4) very cherty clay; strong medium angular and subangular blocky structure; firm; common roots; thick continuous clay films on faces of peds; 75 percent coarse fragments, mostly angular chert 1 to 4 inches in diameter; strongly acid; abrupt wavy boundary.

B3—43 to 61 inches; brownish yellow (10YR 6/6) very cherty clay; weak very fine subangular blocky structure; firm; few roots; thick continuous reddish brown (5YR 4/4) clay films and flows on chert fragments and filling cracks and interstices between coarse fragments; strongly acid; clear wavy boundary.

C—61 to 65 inches; very pale brown (10YR 7/4) weathered chert and shale.

The solum ranges from 55 to about 75 inches in thickness. The A horizon is silt loam or very cherty silt loam. The A2 horizon is brown or pale brown. Chert content of the A2 horizon ranges from about 60 to 80 percent. The B horizon is reddish brown, yellowish red, or strong brown cherty silty clay or cherty clay. Chert content of the B horizon ranges from 65 to 80 percent. The B horizon is medium acid or strongly acid.

Goss soils are deeper over bedrock than the associated Gasconade and Chilhowie soils.

GoD—Goss very cherty silt loam, 5 to 14 percent slopes. This moderately sloping to strongly sloping soil is on the tops and points of ridges. Most areas are 5 to 20 acres in size. This soil has a profile similar to the one described as representative of the series, but the underlying material is a few inches deeper.

Most areas of this soil are used for woodland, wildlife habitat, and recreation. Some areas have been cleared and are used for pasture.

Most woodland is in need of stand improvement by selective harvest and thinning or removal of undesirable trees. Controlling fire and grazing is also a concern.

Most areas used for pasture can be mowed to control weeds and brush, but stand renovation is difficult because of the very cherty surface layer. Droughtiness limits pasture production.

Development for wildlife habitat is limited by droughtiness and the very cherty surface layer. Capability unit VIs–9.

GoF—Goss soils, 14 to 45 percent slopes. These steep to very steep soils are on side slopes. They are generally downslope from ridgetops occupied by Hatton and Keswick soils and upslope from areas of Gasconade-Rock outcrop complex or areas of Chilhowie, Crider, and Gasconade soils. Areas are long and banded and range from about 20 acres to hundreds of acres in size.

This undifferentiated group is about 40 percent Goss very cherty silt loam, which is on south facing side slopes and has the profile described as representative of the series; 40 percent Goss silt loam, which is generally on north facing side slopes and has a surface layer that is less than 10 percent chert; and 10 percent Goss cherty silt loam, which is on side slopes that have intermediate aspects and has a surface layer that is 20 to 50 percent chert.

Included with this unit in mapping are areas of a soil that has a silt loam surface layer and subsurface layer, a silty clay loam subsoil, and a cherty fragipan at a depth of about 24 inches. This included soil is on the less sloping parts of north facing slopes adjacent to Goss silt loam. Areas of it and small areas of other similar soils make up 10 percent of the areas of this mapping unit.

Most areas of Goss soils remain in woodland of mixed hardwoods. A much smaller acreage has been cleared and is used for pasture. These soils are better suited to woodland, woodland wildlife habitat, and recreation than to other uses. Pasture is mostly limited to areas of less sloping Goss silt loam and to areas of the included similar soils on north facing slopes. Growth of timber is also much better on north facing slopes.

The main woodland concerns are selective cutting, stand improvement, and control of fire and grazing. These practices also improve areas as habitat for woodland wildlife. Capability unit VIIs–9.

Hatton Series

The Hatton series consists of deep, moderately well drained, gently sloping and moderately sloping soils on uplands. These soils formed in loess and the underlying glacial sediment under forest vegetation.

In a representative profile the surface layer is very dark grayish brown and dark brown silt loam about 2 inches thick. The subsurface layer is yellowish brown silt loam about 6 inches thick. The subsoil is about 24 inches thick. It is strong brown silt loam and silty clay loam in the upper part, dark yellowish brown silty clay in the middle part, and mottled silty clay loam in the lower part. Below this, to a depth of 60 inches, is mottled silt loam.

Permeability is slow, and the available water capacity is moderate. Content of organic matter and natural fertility are low. Runoff is medium.

Hatton soils are used mainly for pasture and wood-

land, but many areas are used for field crops and meadow.

Representative profile of Hatton silt loam, 2 to 9 percent slopes, in woodland in Warren County, 1,120 feet north and 160 feet west of southeast corner of sec. 2, T. 46 N., R. 2 W.:

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) and dark brown (10YR 4/3) silt loam; moderate very fine granular structure; very friable; many roots; strongly acid; abrupt smooth boundary.

A2—2 to 8 inches; yellowish brown (10YR 5/4) silt loam; weak thin platy structure parting to moderate very fine granular; very friable; many roots; few fine black concretions; very strongly acid; clear smooth boundary.

B1—8 to 13 inches; strong brown (7.5YR 5/6) heavy silt loam; moderate very fine subangular blocky structure; friable; few roots; few fine black concretions; very strongly acid; clear smooth boundary.

B21t—13 to 18 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine subangular blocky structure; firm; few roots; thin discontinuous clay films; few fine black concretions; very strongly acid; clear smooth boundary.

B22t—18 to 23 inches; dark yellowish brown (10YR 4/4) silty clay; strong fine subangular blocky structure; firm; few roots; thick continuous clay films; thick light gray silt coatings on peds; very strongly acid; clear smooth boundary.

B3t—23 to 32 inches; mottled dark brown (7.5YR 4/4), brown (10YR 4/3), and grayish brown (10YR 5/2) heavy silty clay loam; moderate very fine subangular blocky structure; firm; few roots; thin continuous clay films; few fine black concretions; very strongly acid; gradual smooth boundary.

IIA'2—32 to 37 inches; coarsely mottled grayish brown (10YR 5/2) and brown (7.5YR 4/4) heavy silt loam; moderate medium prismatic structure parting to weak fine subangular blocky; firm; few roots; few fine black concretions; very strongly acid; clear smooth boundary.

IIB'2x—37 to 45 inches; dark yellowish brown (10YR 4/4) silt loam; common coarse prominent light brownish gray (10YR 6/2) mottles; weak fine platy structure; very firm; compact and brittle; shatters under pressure; common fine sand grains; strongly acid; gradual smooth boundary.

IIC2—45 to 60 inches; yellowish brown (10YR 5/4) silt loam; few fine faint dark brown (10YR 4/3) mottles; massive; firm; common fine sand grains; common coarse black iron and manganese stains; medium acid.

The solum ranges from 40 to about 55 inches in thickness. The A1 horizon is very dark grayish brown or dark grayish brown. In plowed areas the Ap horizon is brown or dark grayish brown and generally no A2 horizon is present. The B1 horizon is heavy silt loam or light silty clay loam. Reaction is strongly acid or very strongly acid throughout the solum if the Ap horizon is not limed.

Hatton soils are better drained than the associated Keswick and Marion soils.

HcB—Hatton silt loam, 2 to 9 percent slopes. This soil is on long, narrow ridgetops, generally upslope from Keswick or Goss soils. Areas are large and have a narrow and winding shape.

Included with this soil in mapping are many areas of severely eroded soil that are indicated on the soil map by a spot symbol. In most cultivated areas, some of the subsoil material has been mixed into the plow layer.

Also included in mapping are many long, narrow areas of Keswick soils that have slopes of 5 to 9 percent.

This soil is used for woodland, pasture, meadow, wheat, grain sorghum, and corn. It is suited to cultivated crops if erosion is controlled, but terracing is difficult because areas are irregularly shaped and slopes are complex. In cultivated areas erosion can be controlled by no-till farming or minimum tillage and cropping sequences that include meadow and small grain. In most places Hatton soils are surrounded by forests. In years of poor mast production, damage to row crops by wildlife, notably deer and squirrels, can be serious.

An important part of management is the improvement and maintenance of fertility by liming and fertilizing according to soil tests. Using crop residue, green manure crops, and barnyard manure helps to maintain content of organic matter and tilth and also helps to control erosion.

This soil has good potential for orchards and vineyards. Many areas are used for woodland, and stands are mostly white oak, black oak, and hickory. Selective harvest of mature trees, thinning of second growth stands, removal or deadening of cull trees, and control of fire and grazing are good management practices that also enhance the areas as habitat for wildlife, especially deer, grouse, and turkeys.

Important pasture management practices are maintenance of fertility by liming and fertilizing, control of brush and weeds by mowing, and protection from overgrazing by proper stocking. Capability unit IIIe–4.

Haynie Series

The Haynie series consists of deep, well drained, nearly level soils on bottom land. These soils formed in Missouri River alluvium under mixed forest vegetation.

In a representative profile the surface layer is dark grayish brown very fine sandy loam about 7 inches thick. Below this, to a depth of 60 inches, is grayish brown and dark grayish brown very fine sandy loam that has thin lenses of finer and coarser textured material.

Permeability is moderate, and available water capacity is high. Content of organic matter is low, and natural fertility is high. Runoff is slow.

Haynie soils are used for field crops and alfalfa.

Representative profile of Haynie very fine sandy loam in a cultivated field in Montgomery County, 1,420 feet north and 5 feet east of southwest corner of sec. 1, T. 45 N., R. 6 W.:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) very fine sandy loam; moderate very fine granular structure; very friable; common roots; mildly alkaline; abrupt smooth boundary.

C1—7 to 17 inches; dark grayish brown (10YR 4/2) very fine sandy loam; moderate very fine granular structure; very friable; common roots; common very dark grayish brown (10YR 3/2) wormcasts; slight effervescence; mildly alkaline; abrupt smooth boundary.

C2—17 to 60 inches; grayish brown (10YR 5/2) very fine sandy loam; few fine prominent yellowish red (5YR 5/8) mottles, massive; very friable; few thin lenses of silty clay loam and loamy fine sand; strong effervescence; mildly alkaline.

The solum is less than 10 inches thick, and is equivalent to the Ap or A1 horizon. Texture is mainly very fine sandy loam throughout, but in many places there are thin lenses of coarser or finer textured material.

The A horizon is dark grayish brown, which is outside

the range defined for the Haynie series, but this difference does not alter use or behavior.

Haynie soils contain less clay between depths of 10 and 40 inches than the associated Blake soils. They contain less and finer textured sand than the associated Hodge soils.

He—Haynie very fine sandy loam (0 to 2 percent slopes). This soil generally is on natural levees, which are the highest positions in the Missouri River flood plain. Most areas are elongated in shape and 40 to 100 acres in size.

Included with this soil in mapping were many long, narrow areas of a soil which is similar, but has coarser textured sand at a depth of about 20 to 40 inches, and small areas of another similar soil that has a clay loam surface layer. Also included are small areas of Blake soils.

This soil is used for corn, soybeans, wheat, and alfalfa, and it is well suited to these crops. Because drainage and tilth are good, the soil is generally the first to be planted in the Missouri River flood plain, especially in wet spring planting seasons.

Nitrogen and starter fertilizers are effective. Organic matter and tilth can be maintained by using crop residue. Capability unit I–1.

Hodge Series

The Hodge series consists of deep, somewhat excessively drained, nearly level soils on bottom land. These soils formed in recent sandy Missouri River alluvium. Native vegetation consists mainly of willow, cottonwood, and a sparse growth of grasses.

In a representative profile the surface layer is dark brown loamy fine sand about 10 inches thick. The next layer is dark grayish brown loamy fine sand about 35 inches thick. It has a few thin lenses of very fine sandy loam. Below this is a layer of dark grayish brown very fine sandy loam about 10 inches thick. It is underlain by brown fine sand.

Permeability is rapid, and available water capacity is low. Content of organic matter is low, and natural fertility is medium. Runoff is slow.

Some areas of Hodge soils are used for crops, mainly small grain. Other areas are wooded or are idle.

Representative profile of Hodge loamy fine sand in woodland of Montgomery County, 340 feet west and 990 feet north of southeast corner of sec. 31, T. 46 N., R. 6 W.:

A1—0 to 10 inches; dark brown (10YR 4/3) loamy fine sand; single grained; loose; slight effervescence; mildly alkaline; clear smooth boundary.

C1—10 to 45 inches; dark grayish brown (10YR 4/2) loamy fine sand; single grained; loose; few thin lenses of grayish brown very fine sandy loam; slight effervescence; mildly alkaline; clear wavy boundary.

C2—45 to 55 inches; dark grayish brown (10YR 4/2) very fine sandy loam; massive; friable; few thin lenses of very dark brown silty clay loam; slight effervescence; mildly alkaline; clear wavy boundary.

C3—55 to 60 inches; brown (10YR 5/3) fine sand; single grained; loose; slight effervescence; mildly alkaline.

The thickness of the solum is 10 inches or less and is equivalent to that of the Ap or A1 horizon. The sandy horizons range from 40 inches to several feet in thickness. The A horizon and C horizon are mainly loamy fine sand throughout and have thin lenses of finer textured material.

Hodge soils contain more and coarser textured sand throughout than the associated Haynie soils.

Hg—Hodge loamy fine sand (0 to 2 percent slopes). This soil is in areas next to the Missouri River channel and in other areas of recent deposition. Most areas are 20 to 60 acres in size, but a few are much larger.

Included with this soil in mapping are large areas of a sandy soil that was recently deposited by fast flowing floodwater pouring through levee breaks. This soil differs from other Hodge soils in that the sand is coarser textured and is not so thick. It is generally unsuited to crops, and many areas are being renovated by sand spreading followed by deep plowing.

The low available water capacity limits the suitability of this Hodge soil for crops. Row crops are poorly suited because of the hazard of summer drought. In areas protected by levees, small grain and alfalfa can be grown successfully if fall moisture is adequate to establish a stand. Many areas are too small or are too irregular in shape to be handled separately, and they are farmed with areas of other soils. Capability unit IIIs–1.

Holstein Series

The Holstein series consists of deep, well drained, moderately sloping to steep soils on uplands. These soils formed under hardwood forest in colluvium weathered from sandstone and the overlying limestone and shale.

In a representative profile the upper 5 inches of t surface layer is dark brown loam and the lower 4 inches is strong brown clay loam. The upper 37 inches of the subsoil is firm, yellowish red clay loam, and the lower 19 inches is yellowish red sandy clay loam.

Permeability is moderate, and available water capacity is high. Content of organic matter and natural fertility are low. Runoff is medium to rapid.

Holstein soils are used mostly for pasture and woodland. Some areas are used for field crops and meadow.

Representative profile of Holstein loam, 9 to 14 percent slopes, eroded, in a pasture in Montgomery County, 1,290 feet south and 2,250 feet west of northeast corner of sec. 2, T. 46 N., R. 5 W.:

Ap—0 to 5 inches; dark brown (10YR 4/3) loam; moderate very fine granular structure; very friable; many fine roots; common chert fragments; medium acid; clear smooth boundary.

Ap2—5 to 9 inches; strong brown (7.5YR 5/6) light clay loam; moderate very fine subangular blocky structure; friable; peds surrounded by dark brown (10YR 4/3) loam; moderate very fine granular structure; very friable; many fine roots; common fine chert fragments; medium acid; clear smooth boundary.

B1—9 to 13 inches; yellowish red (5YR 5/6) light clay loam; moderate very fine subangular blocky structure; firm; common fine roots; common dark brown wormcasts; common fine chert fragments; strongly acid; clear smooth boundary.

B21t—13 to 30 inches; yellowish red (5YR 5/6) clay loam; strong fine and medium subangular blocky structure; firm; few fine roots; thick discontinuous clay films on faces of peds; few fine chert fragmer very strongly acid; gradual smooth boundary.

B22t—30 to 46 inches; yellowish red (5YR 5/8) clay loam; moderate medium prismatic structure parting to moderate fine and very fine subangular blocky firm; few fine roots; thin continuous clay films on faces

of prisms; common fine chert fragments; very strongly acid; clear smooth boundary.

B23t—46 to 65 inches; yellowish red (5YR 5/8) sandy clay loam; common coarse distinct brown (7.5YR 5/4) mottles; moderate medium prismatic structure; firm; few fine iron oxide and manganese oxide concretions and coarse black stains; common fine chert fragments; very strongly acid.

The solum is 60 or more inches thick. The A horizon is as much as 15 percent coarse fragments in places. It is typically brown or dark brown. The B2 horizon is clay loam or sandy clay loam. The B horizon is yellowish red, reddish brown, dark brown, or strong brown. Reaction is medium acid or slightly acid in the A horizon, and it ranges from very strongly acid to medium acid in the B horizon.

Holstein soils are thicker than the associated Chilhowie and Gasconade soils. They contain more sand than Winfield and Crider soils, which occupy similar positions.

HoC2—Holstein loam, 5 to 9 percent slopes, eroded. This moderately sloping soil is on convex foot slopes adjoining small stream bottom land. Most areas are 5 to 20 acres in size. This soil has a profile similar to the one described as representative of the series, but the subsoil is mottled with gray.

Included with this soil in mapping are small areas of severely eroded soil that are indicated on the soil map by a spot symbol. Also included were a few areas of a soil that contains more sand in the subsoil than Holstein soils.

This soil is used for pasture and meadow and, to a lesser extent, for corn, soybeans, and small grain. Larger areas are suited to cultivated crops in sequence with small grain and meadow if runoff from adjoining uplands is diverted. Most areas have short slopes and do not require terracing. Further erosion can be controlled by cropping systems that include small grain and meadow as well as row crops, and by no-till farming or minimum tillage.

Improvement and maintenance of fertility is an important concern, and liming and fertilizing according to soil tests is effective. Using crop residue, green manure crops, and barnyard manure helps maintain organic matter content and tilth and also helps control erosion.

Important pasture management practices are maintenance of fertility by liming and fertilization, mowing to control brush and weeds, and proper stocking to avoid overgrazing. Capability unit IIIe–1.

HoD2—Holstein loam, 9 to 14 percent slopes, eroded. This moderately sloping soil is on foot slopes. In most places it is downslope from sandstone bedrock exposures. Most areas are 10 to 60 acres in size. This soil has the profile described as representative of the series.

Included with this soil in mapping are areas of severely eroded soil and many outcrops of sandstone bedrock, both of which are indicated on the soil map by symbols. Also included are small areas of a similar soil that is gray in the subsoil and is less than 60 inches deep to bedrock.

This soil is used mostly for pasture and woodland, but some areas are used for cultivated crops. Larger areas where slopes are smooth are suited to cultivated crops in sequence with small grain and meadow, if erosion is controlled. Terraces and grass waterways need extreme care in design and maintenance because of the hazard of gully erosion. Minimum tillage and cultivation on the contour help control soil and water losses.

Fertility needs can be met by liming and fertilizing according to soil tests. Using crop residue, green manure crops, and barnyard manure maintains organic matter content and tilth and also helps control erosion.

Gullies are common. They can be filled or shaped and seeded to grass, which permits crossing by machinery needed to improve and mow pasture. Other important pasture management practices are maintenance of fertility by liming and fertilization and proper stocking to avoid overgrazing. Capability unit IVe–1.

HrE—Holstein-Rock outcrop complex, 14 to 35 percent slopes. This moderately steep to steep complex is on foot slopes downslope from standstone bedrock exposures. It is about 30 percent Holstein soils, 30 percent soils that differ from Holstein because they contain more sand in the subsoil and are less deep over bedrock, 10 percent very stony soils that have common sandstone bedrock exposures, and 30 percent other soils. Included in mapping are areas where slopes are more than 35 percent. Many of these areas have vertical or overhanging cliffs.

The complex is used mainly for woodland and pasture. Many areas where slopes are less than 20 percent have been cleared and are used for pasture. Areas of steeper soil are nearly all in hardwood forest.

Because of the erosion hazard, renovation of pasture is better accomplished by seeding and treating the soil following minimum tillage. Mowing to control weeds and brush is difficult in those areas that are dissected by steep sided drainageways.

Timber production can be increased by selective cutting, thinning of second growth stands, and removal of undesirable trees. By creating openings in the forest canopy, these practices also improve areas as habitat for wildlife, especially deer, grouse, and turkey.

Recreation use is increasing because of the striking scenic beauty of the landscape. There are many vertical cliffs, water carved sandstone formations, and clear streams. Capability unit VIIs–8.

Keswick Series

The Keswick series consists of deep, moderately well drained, moderately sloping and strongly sloping soils on uplands. These soils formed in glacial deposits under hardwood forest.

In a representative profile the surface layer is very dark grayish brown silt loam about 2 inches thick. The subsurface layer is silt loam about 14 inches thick. It is brown in the upper part and yellowish brown in the lower part. The very firm clay subsoil is about 36 inches thick. It is yellowish red in the upper part and strong brown in the lower part. The underlying material is firm, yellowish brown clay loam.

Permeability is slow. Depending on the degree of erosion, the available water capacity is moderate or low. Content of organic matter and natural fertility are low. Runoff is rapid.

Keswick soils are used for field crops, meadow, pasture, and woodland.

Representative profile of Keswick silt loam, 9 to 14 percent slopes, in a forest in Warren County, 1,320

feet south and 430 feet east of northeast corner of sec. 2, T. 46 N., R. 2 W.:

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam; moderate very fine granular structure; very friable; many roots; medium acid; clear smooth boundary.

A21—2 to 8 inches; brown (10YR 5/3) silt loam; weak thin platy structure parting to moderate very fine granular; friable; common roots; very strongly acid; clear smooth boundary.

A22—8 to 16 inches; yellowish brown (10YR 5/6) heavy silt loam; moderate very fine subangular blocky structure; friable; common roots; very strongly acid; gradual smooth boundary.

IIB21t—16 to 30 inches; yellowish red (5YR 4/6) clay; common fine distinct brown (7.5YR 4/4), red (2.5YR 4/6), and grayish brown (10YR 5/2) mottles; moderate fine angular blocky structure parting to moderate very fine subangular blocky; very firm; few roots; thick continuous clay films; common rounded glacial pebbles and angular chert fragments; prominent stone line at top of horizon; very strongly acid; clear smooth boundary.

IIB22t—30 to 52 inches; strong brown (7.5YR 5/6) clay; few fine distinct yellowish red (5YR 4/8) mottles; moderate very fine angular and subangular blocky structure; very firm; few roots; thick continuous clay films; common rounded glacial pebbles and angular chert fragments; strongly acid; clear smooth boundary.

IIC—52 to 60 inches; yellowish brown (10YR 5/6) clay loam; common fine distinct grayish brown (10YR 5/2) and prominent yellowish red (5YR 4/8) mottles; moderate fine subangular blocky structure; firm; few roots; common rounded glacial pebbles and angular chert fragments; medium acid.

The solum ranges from about 45 to 72 inches in thickness. In most places a stone line of dominantly chert fragments is at the top of the IIB horizon. The A horizon ranges from about 8 to 20 inches in thickness. It is silt loam or clay loam. The IIB horizon has matrix colors of yellowish red, brown, or strong brown and has grayish brown mottles.

Keswick soils are better drained than the associated Marion soils. They are wetter than the associated Hatton soils. They are wetter than Lindley soils, which formed in similar material, and have a redder subsoil.

KeC2—Keswick silt loam, 5 to 9 percent slopes, eroded. This moderately sloping soil is on crests of ridges and on side slopes. Most areas are 10 to 40 acres in size. This soil is similar to the one described as representative of the series, but it is less sloping and depth to the clay subsoil is greater. Included in mapping are many areas of severely eroded soil that are indicated on the soil map by spot symbols.

This soil is well suited to pasture, meadow, and woodland. It is suited to cultivated crops if erosion is controlled, but terracing is difficult on many areas because slopes are complex. If these areas are cultivated, erosion can be controlled by no-till farming or minimum tillage practices. Cropping systems that include small grain and meadow are needed in all cultivated areas.

Other important management practices are liming and fertilizing according to soil tests for improvement and maintenance of fertility. Using crop residue, green manure crops, and barnyard manure helps maintain organic matter content and tilth and also helps control erosion. Important pasture management practices, in addition to liming and fertilizing, are control of brush and weeds by mowing and proper stocking to prevent overgrazing.

Many areas are used for woodland, and good quality white oak is predominant in the stands. The main concerns are selective harvest of mature trees, thinning of second growth stands, and removal of undesirable trees. These practices also improve areas as habitat for wildlife, especially deer, grouse, and turkeys. Capability unit IIIe–5.

KeD—Keswick silt loam, 9 to 14 percent slopes. This strongly sloping soil is on side slopes. Most areas are large, long, and narrow. This soil has the profile described as representative of the series.

Included with this soil in mapping are many small areas of Lindley loam, 14 to 35 percent slopes, on short slopes at drainageways. Areas of severely eroded soil are included and are indicated on the soil map by spot symbols. Also included are areas of a soil similar to Keswick soils, except for a surface layer that is 10 to 35 percent chert.

This soil is used mostly for woodland and pasture, and it is well suited to these uses. It is poorly suited to cultivated crops.

Most areas are in woodland, and good quality white oak is dominant. The main concerns are selective harvest of mature trees, thinning of second growth stands, and removal or deadening of undesirable trees. These practices also improve the areas as habitat for wildlife, especially deer, grouse, and turkeys. Important pasture management practices are renovation of stands, control of grazing, and mowing to control weeds and brush. Capability unit IVe–4.

KeC3—Keswick clay loam, 5 to 9 percent slopes, severely eroded. This soil has a profile similar to the one described as representative of the series, but erosi has removed nearly all of the surface layer. The su soil material has mixed into the plow layer, and the former silt loam surface layer is now clay loam. Most areas are 3 to 15 acres in size.

This soil is poorly suited to cultivated crops. It is better suited to pasture, wildlife habitat, or reforestation. Many small areas are impractical to use separately and are farmed with adjacent Keswick or Hatton soils, but production of cultivated crops is generally poor.

Important pasture management practices are establishment and renovation of stands, controlled grazing, and mowing to control brush and weeds.

Many abandoned areas serve incidentally as wildlife habitat. These areas can be improved by plantings that provide food for wildlife. Capability unit IVe–8.

Lindley Series

The Lindley series consists of deep, well drained, moderately steep and steep soils on uplands. These soils formed in glacial till under hardwood forest.

In a representative profile the surface layer is dark grayish brown loam about 2 inches thick. The subsurface layer is pale brown loam about 2 inches thick. The subsoil is firm clay loam about 41 inches thick. It is strong brown in the upper part and yellowish brown mottled with gray in the lower part. The underlying material is yellowish brown clay loam that has gr mottles.

Permeability is moderately slow, and available water capacity is high. Content of organic matter and natural fertility are low. Runoff is rapid.

Hazardous Waste Ground-Water Task Force

Evaluation of B. H. S., Inc. Wright City, Missouri

EPA UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

December 11, 1986

UPDATE OF THE HAZARDOUS WASTE GROUND-WATER TASK FORCE EVALUATION OF THE B.H.S., INC., WRIGHT CITY, MISSOURI, FACILITY

The United States Environmental Protection Agency's Hazardous Waste Ground-Water Task Force (Task Force) conducted an evaluation of the ground-water monitoring program at the B.H.S., Inc. (B.H.S.), hazardous waste disposal facility. The onsite field inspection was conducted during the period February 19 through February 26, 1986. The Task Force was accompanied by Missouri Department of Natural Resources (MDNR) and EPA Region VII personnel. B.H.S. is one of 58 facilities that are being evaluated by the Task Force. The B.H.S. facility is located approximately 50 miles west of St. Louis, Missouri, near the town of Wright City.

The purpose of the Task Force evaluation was to determine the adequacy of the B.H.S. ground-water monitoring system in regard to State and Federal ground-water monitoring requirements. Specifically, the objectives of the evaluation at B.H.S. were to:

- Determine compliance with the State equivalent of 40 CFR Part 265 interim status ground-water monitoring requirements.
- Evaluate the ground-water monitoring program described in the facility's RCRA Part B permit application for compliance with the State equivalent of 40 CFR Part 270.14(c) requirements.
- Determine if hazardous waste constituents have entered the ground-water at the facility.
- Provide information to assist the Regional Administrator in determining if the facility meets EPA requirements for waste management facilities receiving waste from Federal Superfund response actions.

The facility was closed at the time of the inspection and, therefore, little activity has taken place since the field work was completed. The faciltiy has met with MDNR once on July 3, 1986 to discuss closure, ground-water monitoring and Part B issues. EPA Region VII met with the facility on December 8, 1986 to preliminarily identify the deficiencies at the facility, and the alternatives for correcting those deficiencies. EPA and MDNR comments on the Part B application for Area 2 have been formulated and will be sent to the facility in December 1986.

Analytical data from the Task Force sampling effort have qualitatively indentified the presence of methylene chloride and 1,2-dichloroethane in the ground water at the facility. A majority of the wells sampled were installed just prior to the investigation and were sampled for the first time with this effort. The presence of these compounds will be confirmed with additional sampling by both the facility, during routine quarterly events, and EPA.

The Task Force investigation identified several deficiencies in the geologic and hydrologic site characterization, and in the ground-water monitoring system. These include lack of identification of the uppermost aquifer, lack of a true upgradient well to characterize the background ground-water quality, failure to define the hydraulic characteristics of Units A and B, failure to determine the nature and extent of the sand lenses present in Unit A, and failure to assess the vertical head distribution within and between Hydrologic Units A and B. EPA, in consultation with MDNR, will initiate an appropriate action that will correct these deficiencies and will ensure full implementation of the Task Force recommendations.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
HAZARDOUS WASTE GROUND-WATER TASK FORCE

EPA-330/2-86-012

GROUND-WATER MONITORING EVALUATION

B.H.S., INC.
Wright City, Missouri

December 1986

Alan E. Peckham
Project Coordinator
National Enforcement Investigations Center

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United Sta' Environmental protection Agency ('), 1997.

MEMORANDUM

SUBJECT: Request for a Removal Action at the Zykan Landfill Site (a/k/a Bob's Home Service) in Wright City, Missouri
ACTION MEMORANDUM

FROM: Jeffrey G. Weatherford, P.E.
Enforcement/Fund-Lead Removal Branch
Superfund Division

THRU: Michael J. Sanderson
Director
Superfund Division

TO: Dennis Grams, P.E.
Regional Administrator

Site ID: XG
Category of Removal: Time-critical
Nationally Significant/Precedent Setting: No

I. PURPOSE

The purpose of this Action Memorandum is to request and document approval of the proposed removal action described herein for the Zykan Landfill Site in Wright City, Missouri (the Site). This removal action will temporarily stabilize conditions at the site until more investigation or remedial action can be conducted.

II. SITE CONDITIONS AND BACKGROUND

A. Removal Site Evaluation

The site is a former landfill that accepted industrial waste during its operation from about 1971 to 1977. There are no known records available that detail waste amounts. Several drums were unearthed by erosion in a deep ditch at the base of the landfill. The waste in these drums and in the surrounding soil exhibited the hazardous waste characteristic of

WEATHERFORD	MOTLEY	BUCHHOLZ	MILLER	KATHER
EFLR	EFLR 9/23	EFLR	CNSL	SDDD
JGW	9/23			
SANDERSON	GRAMS	STAFFORD		
SUPR	RGAD	SDDD		

SUPR:EFLR:Weatherford:cdt:7127:9/22/97:g:\user\share\eflr\action\zykanam1

of ignitability and consisted of several solvents such as xylene, ethylbenzene, 2-hexanone, and tetrachloroethene. A subsequent geophysical investigation revealed buried metal to the south of this erosion ditch, which is outside the landfill boundaries.

Another key problem area at the site is a leachate seep at the southeast edge of the landfill. The leachate itself contains numerous hazardous substances, including benzene, chlorobenzene, ethylbenzene, phenol and various heavy metals such as arsenic, lead, cadmium, and chromium. The material from the leaking drums and the leachate from the landfill is currently entering a nearby intermittent stream at significant concentrations. This intermittent stream then flows into Lake Lucern approximately 3/4 miles from the landfill. Lake Lucern is a multi-use residential development lake.

2. Physical Location

The site is located approximately three miles southwest of Wright City, Missouri. It is located in the center of the south ½ of section 32, Township 47 North (T47N), Range 1 West (R1W) in Warren County. The geographic coordinates for the site are 38°47'14" N latitude and 91°19'48"W longitude.

The area immediately surrounding the site is sparsely populated and is mostly wooded or pastureland with the exception of Innsbrook Estates, a residential lake development to the south of the site. Innsbrook Estates contains many large and small interconnected lakes including Lake Lucern which is immediately downstream of the site. Approximately 3,465 persons live within a four mile radius of the site. The nearest residence is located on the landfill property less than 1,000 feet from the landfill. This residence is currently being rented. The nearest off-site residence is slightly greater than 1/4 mile south of the site, in the Innsbrook Estates residential development.

3. Site Characteristics

The site officially began operations as a sanitary landfill in 1971. Various documents from the Missouri Department of Natural Resources' (MDNR) files indicate that industrial wastes were disposed of in this sanitary landfill. There are no known facility records available for this portion of the site that would allow for a detailed inventory of wastes or calculation of waste quantities.

On November 16, 1971, Bob's Home Service Inc. was approved by Warren County and the Missouri Division of Health to operate a refuse disposal area. It was estimated, at that time, that 36 cubic yards per day of residential and commercial refuse was to be dumped at the landfill. In February 1972, the landfill owner indicated an interest in contracting for disposal of industrial chemicals. The Missouri Division of Health sent him information on the proper methods for chemical disposal, but did not officially approve it.

On May 25, 1977, the facility (Bob's Home Service Inc.) was issued a special industrial waste disposal permit from the Missouri Department of Natural Resources. At this time, it is believed that disposal into the sanitary portion of the landfill was discontinued. This new permitted area was located north of and adjacent to the sanitary landfill. The new disposal cell subsequently operated as Bob's Home Service Hazardous Waste Landfill, under the Resource Conservation Recovery Act (RCRA) interim status. After an unsuccessful attempt to obtain a RCRA part B permit, the landfill officially closed in 1986. Post-closure activities have included capping and installation of a leachate collection trench. This trench covers only the portion of the landfill that was permitted for hazardous waste disposal and does not encompass the Zykan Landfill.

On April 16, 1997, the MDNR conducted a closed site inspection at the sanitary landfill to assess the facility's compliance with regulations pursuant to the Missouri Solid Waste Management Law. The following violations were noted:

a. Runoff not properly diverted off the landfill;
b. Leachate not controlled on-site;
c. Failure to recover and regrade the landfill;
d. Failure to establish vegetation within 180 days of regrading cover; and
e. Storage of waste tires for over six months.

A notice of violation was sent to the current property owner, Ms. Laverne Zykan, to conduct the following repairs at the landfill:

a. Cover, recompact soil, and establish vegetation in the areas of leachate outbreaks and erosion gullies on the south slope;
b. Recover, regrade, and establish vegetation on the subsided area so as to promote proper storm water runoff from this area;
c. Remove and dispose of all waste tires being stored on-site;
d. Dispose of all used oil stored on-site, and excavate and dispose of all oil contaminated soil; and
e. Stabilize the drainage ditch in order to prevent additional erosion from occurring and the subsequent exposure of buried drums.

Based on preliminary Potentially Responsible Party (PRP) search information, it is unlikely that Ms. Zykan has the resources to conduct the required repairs.

4. Release or Threatened Release Into the Environment of a Hazardous Substance, or Pollutant or Contaminant

In 1996, MDNR conducted an integrated Preliminary Assessment/Site Inspection (PA/SI). During the PA/SI, the MDNR observed severe erosion at the southern edge of the sanitary landfill. This erosion ditch, which was greater than six feet deep in places, had uncovered numerous 55-gallon drums that were damaged and leaking. Several samples were collected from the waste in and around these drums (Table 1), which revealed that these drums contained significant concentrations of ethylbenzene, 2-hexanone, tetrachloroethene, and total xylenes. In addition, all waste samples exhibited the RCRA hazardous waste characteristic of ignitability with flashpoints measured at below 60 degrees centigrade. During this sampling effort, MDNR excavated and overpacked several drums that were damaged and leaking. The MDNR indicated that the drums remaining in the ground are in poor condition and are either leaking or are likely to leak. The total rate of flow of material from the drums is unknown. The total number of drums buried in the ground is unknown, but it is suspected that many more drums are buried in and possibly around the landfill.

Table 1 - Analytical Results for Samples Collected from Drums in the Erosion Ditch by the Missouri Department of Natural Resources

All results in parts per million (ppm) —Denotes Non-Detect

SUBSTANCE	Sample No. 96-1988	Drum No. 96-6116	Drum No. 96-6117	Drum No. 96-6118	Drum No. 96-6119
Flashpoint	59° C	54° C	54° C	57° C	52° C
Ethylbenzene	—	150	—	—	190
2-Hexanone	—	—	—	—	9200
Tetrachloroethene	—	—	—	690	—
Total Xylenes	3.9	6700	3000	1600	—

Another source of hazardous substance release is a leachate outbreak at the southeast corner of the landfill. A sample of this leachate (Table 2) detected concentrations of various heavy metals, various volatile organic chemicals and a herbicide. An MDNR inspector estimated the flow to be 2 to 3 gallons per minute during a visit to the site in June 1997.

Table 2 - Analytical Results for Samples Collected from the Leachate Area by the Missouri Department of Natural Resources

All results in parts per billion (ppb) — Denotes Non-Detect or Not Available
Bold denotes exceeded SCDMs[1] benchmark

SUBSTANCE	Sample No. 96-1991 Leachate Sample	SCDMs Environmental Screening Levels	Sample No. 96-1993 Soil at Leachate Seep	SCDMs Food Chain Screening Level
Arsenic, Total	10.3	190	**11,100**	390
Barium, Total	913	—	**123,000**	91,000
Cadmium, Total	10.7	1.1	—	1300
Chromium, Total	37.5	210	10,500	6500
Lead, Total	**38.3**	3.2	12,000	—
Selenium, Total	—	36	579	6500
Benzene	99	—	—	45
Chlorobenzene	13	—	—	26,000
Ethylbenzene	240	—	—	130,000
Toluene	5.8	—	—	260,000
Total Xylenes	560	—	—	2,600,000
Benzoic Acid	2.8	—	—	5200
Bis(2-ethylhexyl)phthalate	2.8	—	130	26,000
Di-n-Butylphthalate	—	—	420	130,000
2,4-Dimethylphenol	2.9	—	—	26,000
Napthalene	2.1	—	—	—
Phenol	42	—	—	780,000
2,4-D	2.33	—	—	13,000

[1] The Superfund Chemical Data Matrix (SCDM) benchmarks are values that are generally used in evaluating potential NPL sites by the Hazard Ranking System (HRS). These values are for the surface water pathway only and are presented here for comparison purposes only.

Table 3 - Analytical Results for Samples Collected from the Erosion Ditch and Creek by the Missouri Department of Natural Resources

All results in parts per billion (ppb) — Denotes Non-Detect or Not Available
Bold denotes exceeded SCDMs benchmark. Underline denotes exceeded 3 X background

SUBSTANCE	Erosion Ditch Samples		Creek Samples		SCDMs Food Chain Screening Levels (sediment)	SCDMs Environmental Screening Levels (water)
	Sediment	Water	Sediment	Water		
Arsenic, Total	**7660**	—	**9220**	—	390	190
Barium, Total	**66,700**	117	**73,400**	164	91,000	—
Cadmium, Total	—	1.43	—	1.11	1300	1.1
Chromium, Total	**22,300**	—	**17,800**	—	6500	210
Lead, Total	12,500	—	19,300	—	—	3.2
Selenium, Total	—	—	585	—	6500	36
Silver, Total	—	5.99	—	—	6500	0.12
Total Xylenes	18,000	1200	—	24	2,600,000	—
Acenapthene	800	11	—	—	78,000	—
Anthracene	850	—	—	—	390,000	—
Benzo(a)anthracene	260	—	—	—	—	—
Benzo(a)Pyrene	350	—	—	—	0.18	—
Benzo(b)fluoranthene	160	—	—	—	—	—
Benzo(k)fluoranthene	107	—	—	—	—	—
Bis(2-chloroethyl) ether	—	180	—	—	1.2	—
Bis(2-ethylhexyl) phthalate	—	23	1100	3.6	26,000	—
4-chloroanaline	—	—	180	—	5200	—
Chrysene	106	—	—	—	—	—
Di-n-butylphthalate	360	—	1400	—	130,000	—
Dibenzofuran	110	—	—	—	—	—
Dimethylphthalate	—	—	—	—	1,300,000	—
2,4-Dinitrotoluene	1600	—	—	—	2600	—
Fluoranthene	220	—	—	—	—	—

Table 3 - Analytical Results for Samples Collected from the Erosion Ditch and Creek by the Missouri Department of Natural Resources

All results in parts per billion (ppb) — Denotes Non-Detect or Not Available
Bold denotes exceeded SCDMs benchmark. Underline denotes exceeded 3 X background

SUBSTANCE	Erosion Ditch Samples		Creek Samples		SCDMs Food Chain Screening Levels (sediment)	SCDMs Environmental Screening Levels (water)
	Sediment	Water	Sediment	Water		
Fluorene	1400	—	—	—	52,000	—
2-Methylnapthalene	59,000	920	970	—	—	—
Napthalene	7000	810	190	—	—	—
N-Nitrosodiphenyl-amine	3700	14	—	—	270	—
Phenanthrene	1900	7.1	130	—	—	—
Phenol	—	—	—	104	780,000	—
Pyrene	720	—	—	—	39,000	—
2,4-D	—	—	—	1.22	13,000	—

Samples of sediment and water were collected from the erosion ditch where the drums were found and from the creek that runs adjacent to the landfill (Table 3). The ditch sediment and water samples detected numerous compounds at greater than three times the concentrations that were detected in the upgradient (background) sample. These chemicals included total xylenes, various polycyclic aromatic hydrocarbons (PAHs), dibenzofuran, and 2,4-dinitrotoluene. Similar compounds were detected in sediment and water samples from the creek at concentrations greater than three times the upgradient concentration.

All of the compounds listed in tables 1, 2, and 3 are "hazardous substances" as defined by Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601(14), and are designated as hazardous substances in 40 C.F.R. § 302.4. In addition, the materials in the drums include solid wastes which exhibit the characteristic of ignitability as defined in 40 C.F.R. § 261.21 and as such are designated hazardous substances in accordance with 40 C.F.R. § 302.4 (b).

5. NPL Status

The Site is not on nor is it proposed for listing on the National Priorities List (NPL). A PA/SI has been conducted at the site by MDNR. EPA expects to conduct an Extended Site Inspection (ESI) to further evaluate the threat to groundwater. This removal action may not permanently address the long-term threat associated with leachate migration, if any.

B. Other Actions to Date

1. Previous Actions

No known previous removal actions have been conducted at this Site. The hazardous waste landfill underwent a RCRA closure soon after EPA denied the part B permit. Post closure activities include routine maintenance and leachate collection.

2. Current Actions

There is no current activity at the sanitary/industrial portion of the landfill. The hazardous waste landfill is currently collecting leachate from a leachate collection system. It was reported that the hazardous waste landfill is generating hazardous waste leachate at a rate of approximately 5,000 gallons per month. This leachate is being sent directly to a RCRA Treatment, Storage, and Disposal facility. The Superfund Technical Assistance and Response Team (START) contractor has been tasked to conduct an ESI at this site to determine the threat of release to the groundwater. This investigation will include an in-depth review of data gathered during the RCRA permitting process.

C. State and Local Authorities' Roles

1. State and local actions to date

There have been no known state or local removal actions on the sanitary landfill portion of the site. The hazardous waste portion is undergoing leachate collection and routine operation and maintenance as part of its closure under RCRA. The MDNR is overseeing post closure activities which are being funded by the RCRA Post Closure Assurance Trust, set aside by Bob's Home Service, Inc. MDNR has reported that this fund is nearly depleted. They are currently attempting to replenish the fund by contacting the various waste generators that shipped waste to the Bob's Home Service Site.

2. Potential for continued state and local response

The State referred this site to EPA for removal actions and has been informed of EPA's actions and observations. The State has also received a copy of this action memo. The MDNR has agreed to conduct Post Removal Site Control at the sanitary landfill until such time as a long-term solution can be developed or it is determined that no long-term threat is present from the site. Post removal site control is expected to be limited to routine site inspections to assess the integrity of this removal action.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

Section 104(a) of CERCLA, 42 U.S.C. § 9604(a), authorizes a removal response whenever any hazardous substance is released or there is a substantial threat of such a release into the environment. Section 106 (a) of CERCLA, 42 U.S.C. § 9604, authorizes the issuance of orders as may be necessary to protect public health and welfare and the environment. In addition, 40 C.F.R. § 300.415(b)(1) provides that, whenever the lead agency makes a determination based on factors listed in 40 C.F.R. § 300.415(b)(2) that there is a threat to public health or welfare, or the environment, the lead agency may take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or the threat of release. The following is a discussion of the factors listed in 40 C.F.R. § 300.415(b)(2) that apply to the Site:

- **40 C.F.R. § 300.415(b)(2)(i) - Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants**

  The material is leaking from the drums directly into an erosion ditch, which leads to an intermittent tributary of Charrette Creek. The PA/SI report indicated that this tributary, although listed as intermittent, likely flowed water most of the year. The stream then empties into Lake Lucern, which is used by Innsbrook Estate residents for fishing, boating, and swimming. The first five miles of Charrette Creek downstream from Innsbrook Estates is classified by the State of Missouri as a stream that may cease flow in dry periods, but maintains permanent pools which support aquatic life. This portion of Charrette Creek is classified for livestock and wildlife watering, protection of warm water aquatic life, and human health fish consumption. The potential for human exposure to contaminants would be to persons coming into direct contact with the chemicals on-site, persons exposed to contaminated water while swimming, or from persons ingesting contaminated aquatic life. None of these exposure conditions are known to exist, but there is a potential based on known releases of contaminants and expected uses of local natural resources.

  As is shown in Tables 1, 2, and 3, there are many known hazardous substances being released from the Site. Each individual substance presents a different risk based on its environmental fate and the degree and route of exposure to humans or animals. Some adverse affects that can result from exposure to a few of these chemicals are described as follows:

Cadmium - Cadmium has a number of industrial applications, but is used mostly in metal plating, pigments, batteries, and plastics. Cadmium is not known to have any beneficial effects, but can cause a number of adverse health effects. The U. S. Department of Health and Human Services has determined that cadmium and certain cadmium compounds may reasonably be anticipated to be carcinogens. Examples of effects resulting from various levels and durations of exposure are as follows:

- Kidney damage has been observed in people who are exposed to excess cadmium either through air or through the diet. This kidney disease is usually not life-threatening, but it can lead to the formation of kidney stones and effects on the skeleton that are equally painful and debilitating.

- Lung damage, such as emphysema, has been observed in workers in factories where levels of cadmium concentration in air are high.

- Lung cancer has been shown to occur in animals exposed for long periods to cadmium in air. Studies in humans also suggest that long-term inhalation of cadmium can result in increased risk of lung cancer. Oral exposure to cadmium is not believed to cause cancer.

- High blood pressure has been observed in animals exposed to cadmium. Whether or not cadmium exposure plays an important role in human hypertension is not yet known and requires further research.

Other tissues reported to be injured by cadmium exposure in animals or humans include the liver, the testes, the immune system, the nervous system, and the blood. Reproductive and developmental effects have been observed in animals treated with cadmium, but these have not been reported in humans.

Polycyclic Aromatic Hydrocarbons (PAHs) - PAHs are a group of chemicals found in substances such as crude oil, coal tar, road and roofing tar, or creosote. Although the health effects of the individual PAHs are not exactly alike, the following chemicals detected at the Zykan Landfill Site are grouped as PAHs:

acenapthene
anthracene
benzo(a)anthracene
benzo(a)pyrene
benzo(b)fluoranthene
benzo(k)fluoranthene
chrysene
fluoranthene
fluorene
phenanthrene
pyrene

The U.S. Department of Health and Human Services has determined that PAHs may reasonably be anticipated to be carcinogens. EPA considers several PAHs to be probable human carcinogens. Several of the PAHs have caused tumors in laboratory animals through ingestion, skin contact or chronic inhalation. Reports in humans show that individuals exposed through breathing or skin contact for long periods of time to chemicals mixed with PAHs can also develop cancer. Mice fed high levels of benzo(a)pyrene during pregnancy had difficulty reproducing and so did their offspring. The offspring from pregnant mice fed benzo(a)pyrene also showed other harmful effects, such as birth defects and decreased body weight. Similar effects could occur in humans, but there is no information to show that these effects do occur.

Xylene - Xylene is commonly found in solvents used in the printing, rubber and leather industries and as a cleaning agent and in paint thinner. Surface water generally contains 1 part per billion of xylene, but may be higher in industrial areas.

Exposure to xylene may take place from eating or drinking contaminated food or water, breathing xylene vapors, or absorption through the skin.

Short-term exposure of humans to high levels of xylene or chemical mixtures containing xylene causes: irritation of the skin, eyes, nose, and throat; difficulty in breathing; impaired function of the lungs; delayed response to a visual stimulus; impaired memory; stomach discomfort; and possible changes in the liver and kidneys. Death can occur in individuals who are exposed to very high levels of xylene for a short period of time. Both short and long-term exposure to high concentrations of xylene can also cause a number of effects on the nervous system, such as headaches, lack of muscle coordination, dizziness, confusion, and changes in sense of balance.

Results of studies with animals indicate that large amounts of xylene can cause changes in the liver and adverse effects on the kidney, lung, heart, and nervous system. Short-term exposure to high concentrations of xylene causes death in some animals, as well as muscular spasms, incoordination, hearing loss, changes in behavior, changes in organ weights, and changes in enzyme activity. Long-term exposure to low concentrations of xylene has not been well studied in animals.

Information from animal studies is not adequate to determine whether or not xylene causes cancer in humans. The International Agency for Research on Cancer has determined that xylene is not classifiable as to its carcinogenicity to humans. Exposure of pregnant women to high levels of xylene may cause adverse effects in the fetus. Studies with unborn animals indicate that high levels of xylene may cause increased numbers of deaths, decreased weight, skeletal changes, and delayed skeletal development. In many instances, the levels of xylenes causing these effects also caused the mothers to be ill. The higher the level of exposure and the longer the exposure to xylene, the greater the chance for adverse health effects.

- **40 C.F.R. § 300.415(b)(2)(ii) - Actual or potential contamination of drinking water supplies or sensitive ecosystems**

Approximately fourteen public drinking water wells exist within a four mile radius of the site providing water to more than 3,393 people (reference 8/30/96 PA/SI). There are more than 30 private residential drinking water wells within four miles of the site serving an estimated population of 256 persons. The closest private drinking water well is located within 1/4 mile of the site.

The only drinking water aquifer of concern near this site is the Ozark aquifer. Both public and private water supply wells near the site draw water from this aquifer at depths generally ranging from 300 to 600 feet.

The Missouri Department of Health has been sampling and analyzing the water from private drinking water wells surrounding the site since the site closed in 1986. The regular monitoring program is completed yearly and currently includes analyzing private well water for 19 inorganic chemicals, 6 chlorinated pesticides, 57 volatile organic compounds, and 2 chlorophenoxy herbicides. As of March 1996, none of these constituents were found to be present in the well water (reference 8/30/96 PA/SI).

The Bob's Home Service Hazardous Waste Landfill (BHS) Site is north of and immediately adjacent to this landfill. The BHS site is currently undergoing post-closure activities designed to reduce or prevent leachate from entering the surface water or groundwater near the site. Leachate collection trenches have been installed around the BHS landfill and are reportedly collecting leachate at a rate of 5,000 gallons per month. These trenches do not encompass the Zykan landfill portion of the site.

There is no direct evidence of groundwater contamination at this time. The potential exists for groundwater contamination due to the suspected large quantities of liquid hazardous substances in the landfill. The EPA is currently conducting an ESI to assess possible groundwater pathways.

The habitat for the plant Sullivantia (Sullivantia sullivantii), which is a candidate for federal listing, and the Spinulose Shield Fern (Dryopteris carthusiana), which is State-listed endangered, are located along Charrette Creek within fifteen miles downstream of the site. These habitats are considered sensitive ecosystems.

- **40 C.F.R. § 300.415(b)(2)(iii) - Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release**

  During the PA/SI, MDNR excavated and sampled nine leaking drums from in and around the erosion ditch. The report indicates that many drums remain in and around the ditch that are in poor condition and are leaking or are likely to leak. The nine drums that were excavated by MDNR were overpacked and left on-site. These drums were sampled and they do contain hazardous substances. In addition, there are other drums and tanks scattered about the site that have not been characterized.

- **40 C.F.R. § 300.415(b)(2)(v) - Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released**

  Precipitation in the form of rain or snow can cause contaminants to be released. Run-off from precipitation has caused severe erosion that is currently exposing the drums on the south flank of the landfill. In addition, precipitation that is not diverted from the landfill cap is penetrating the cap and mixing with hazardous substances to form leachate.

- **40 C.F.R. § 300.415(b)(2)(vi) - Threat of fire or explosion**

  The material in the five drums excavated from the erosion ditch showed a flashpoint of below 60° Celsius. Thus, the material will form explosive vapors when heated to above its flashpoint. If these vapors were ignited by a spark or flame, an explosion or fire could result. Possible ignition sources would be lightning, trespassers, or fire. Potential adverse effects would include: injury to persons near the drums during explosion or fire; the drums may become a source for a larger brush or forest fire, or persons downwind may breathe toxic fumes from the fire.

- **40 C.F.R. § 300.415(b)(2)(vii) - The availability of other appropriate federal or state response mechanisms to respond to the release**

  There are no known federal response mechanisms, other than Superfund, that are available to respond to this release of hazardous substances. The state of Missouri has referred this site to EPA for a removal action to stabilize the site.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed Action Description

This response action will address the obvious short-term problem of contaminant migration from the site. The two key areas that will be addressed with this removal action are the erosion ditch where the drums were unearthed and the leachate seep.

The proposed action for the erosion ditch is to backfill and control future erosion. Basically, the erosion ditch will be filled in with soil and future erosion will then be controlled with an engineered drainage structure. It is expected that this action will control or reduce releases from the drums via the surface water route, until such time that a more permanent solution can be developed or more information is obtained. All drums currently at the surface that contain hazardous substances will be disposed of accordingly.

The leachate seep will be addressed through soil cover and run-on control to reduce the amount of precipitation that infiltrates the existing landfill cover. The proposed soil cover is not intended to be a permanent solution to the leachate seep problem. It is expected that this cover will only be utilized to fill in sunken areas on the existing landfill cover and to maintain proper drainage. In addition, drainage control will be provided to prevent precipitation from running on to the landfill from outside areas.

2. Contribution to Remedial Performance

The Site is currently undergoing a CERCLA ESI to determine its remedial status. The removal actions taken at the Site should not impede future actions based on available information. It is expected that this removal action will reduce migration of hazardous substances from the Site until a permanent remedy is chosen or it is decided that a permanent remedy is not needed.

3. Description of Alternative Technologies

The proposed response action described for the Site will provide for protection of human health and the environment by stabilizing the Site and do so in a timely manner. This action may or may not be a permanent solution to the migration problem.

4. Applicable or Relevant and Appropriate Requirements

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 C.F.R. § 300.415(j) provides that removal actions shall, to the extent practicable considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (ARARs) under federal environmental, or state environmental, or facility siting laws. The following Federal ARARs have been identified for this action:

- RCRA, 42 U.S.C. 6901, et. seq., substantive requirements pertaining to waste packing, container storage and disposal requirements found in 40 C.F.R. Parts 262 and 264.

- RCRA, 42 U.S.C. 6901, et. seq., substantive requirements pertaining to Land Disposal Restrictions in 40 C.F.R. Parts 268.

On September 17, 1997 a letter was sent to the MDNR requesting that state ARARs be identified.

5. Project Schedule

Removal activities are expected to begin at the Site within 6 months of the signing of this action memorandum. It is not expected that on-site activities will exceed six months from the start date.

B. Estimated Costs

Extramural Costs:

Regional Allowance Costs:

Total Cleanup Contractor Costs	$ 309,286
Contingency	53,789
Total Extramural Costs	$ 363,075

Intramural Costs:

Intramural Direct Costs	$ 66,000
Intramural Indirect Costs	70,950
Total Intramural Costs	$ 136,950

TOTAL REMOVAL PROJECT CEILING **$ 500,025**

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will allow contaminants to continue to migrate and possibly accumulate in the environment, thus posing a larger threat to human health or the environment through increased risk of exposure.

VII. OUTSTANDING POLICY ISSUES

None.

VIII. ENFORCEMENT

At this time, the search for viable PRPs for this site is ongoing. An enforcement strategy for this site is in the attached enforcement addendum.

IX. RECOMMENDATION

This decision document represents the selected removal action for the Zykan Landfill Site in Wright City, Missouri, developed in accordance with CERCLA, as amended, and not inconsistent with the NCP. This decision is based on the administrative record for this Site.

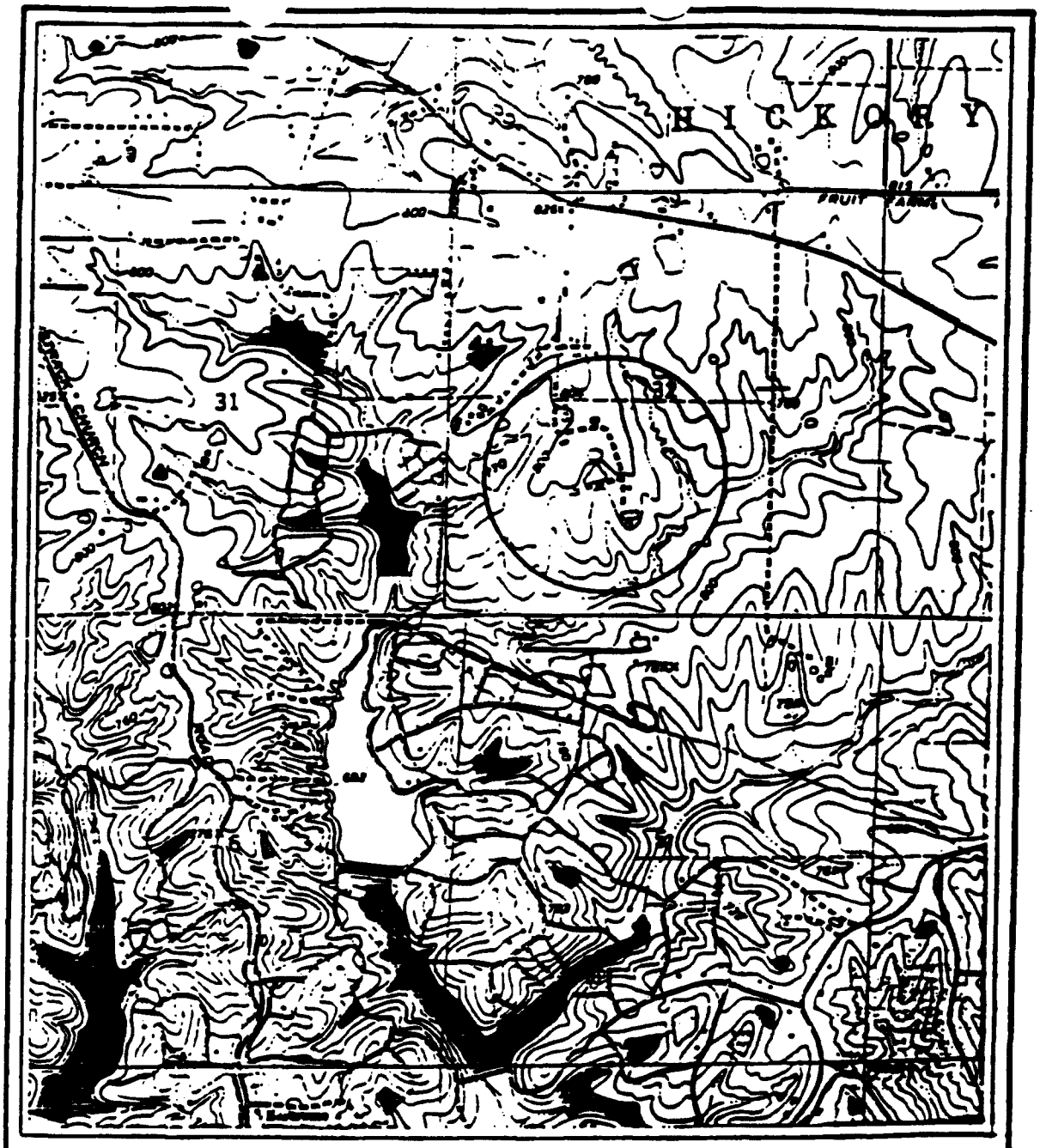
Conditions at the Site meet the NCP section 300.415(b)(2) criteria for a removal and I recommend that you approve the proposed fund-lead removal action. The total project ceiling, if approved, will be $500,025. Of this, an estimated $363,075 comes from the regional removal allowance.

SEP 29 1997

Date

for Dennis Grams, P.E.
Regional Administrator

Attachments



ZYKAN LANDFILL SITE

WARREN COUNTY, MISSOURI

0315ZLSFXX/S07-9810-014

United Sta' ıvironmental protection Agency (' ', 1998.

KB

U.S. ENVIRONMENTAL PROTECTION AGENCY
POLLUTION REPORT

I. HEADING

Date: February 24, 1998

From: Jereme M. Altendorf
EFLR/SUPR

To: Kenneth S. Buchholz, Chief
EFLR/SUPR

Subject: Zykan Landfill Site, Wright City, Missouri

Report: POLREP No: 5

II. BACKGROUND

Site No: XG
Delivery Order No: 0005
Response Authority: CERCLA §104(a)
NPL Status: Non-NPL Site
State Notification: MDNR Notified
Action Memo Status: Signed, September 29, 1997
Start Date: October 27, 1997

III. SITE INFORMATION

A. Incident Category

Time-Critical Removal

B. Site Description

1. Site Location

The site is located approximately three miles southwest of Wright City, Missouri. It is located in the center of the south ½ of section 32, Township 47 North (T47N), Range 1 West (R1W) in Warren County. The geographic coordinates for the site are 38°47'14" N latitude and 91°19'48"W longitude.

The area immediately surrounding the site is sparsely populated and is mostly wooded or pastureland with the exception of Innsbrook Estates contains many large and small-interconnected lakes including Lake Lucern which is immediately downstream of the site. Approximately 3,465 persons live within a four-mile radius of the site. The nearest residence is located on the landfill property less than 1,000 feet from the landfill. This residence is currently being rented. The nearest off-site residence is slightly greater than ¼ mile south of the site, in the Innsbrook Estates residential development.

2. Description of Threat

The site is a former landfill that accepted industrial waste during its operation from about 1971 to 1977. There are no known records available that detail waste amounts. Several drums were unearthed by erosion in a deep ditch at the base of the landfill. The waste in these drums and in the surrounding soil exhibited the hazardous waste characteristic of ignitability and consisted of several solvents such as xylene, ethylbenzene, 2-hexanone, and tetrachloroethene. A subsequent geophysical investigation revealed buried metal to the south of this erosion ditch, which is outside the landfill boundaries.

Another key problem area at the site is a leachate seep at the southeast edge of the landfill. The leachate itself contains numerous hazardous substances, including benzene, chlorobenzene, phenol, and various heavy metals such as arsenic, lead, cadmium, and chromium. The material from the leading drums and the leachate from the landfill is currently entering a nearby intermittent stream at significant concentrations. This intermittent stream then flows into Lake Lucern approximately ¾ miles from the landfill. Lake Lucern is a multi-use residential development lake.

III. RESPONSE INFORMATION

A. Actions Taken (November 25, 1997 thru February 19, 1998)

The sub-contract has been awarded to Keevan Bros. of Wright City, Mo., for the hydro-seeding to take place in the spring of 1998.

On February 19, 1998, an ERRS crew was tasked to install silt fencing around an area of the landfill that was eroding. The erosion had grown worse in the last few weeks due to the large amount of rain that has occurred in the area. Two one-hundred foot sections were placed around the southeastern section of the newly capped landfill. The ERRS response manager will make periodic checks of the landfill to ensure that the erosion problems are not worsening before the area is hydro-seeded this spring.

B. Next Steps

The ERRS contractor will wait until spring to seed the graded areas, since it is too late in the year to assure adequate vegetative growth. Some touch-up grading may be needed at that time. No further POLREPs will be generated until seeding is complete, unless something significant happens.

III. COST INFORMATION (Through 2/27/98)*

ERRS contractor (including awaits)	$ 102,875
Project Contractor Ceiling	$ 363,075
Percent of Extramural Funds Remaining	72%
EPA Intramural Direct Costs	$ 300
EPA Intramural Indirect Costs	$ 700
TOTAL	$ 1000
TOTAL PROJECT COSTS	$ 103,875
Project Ceiling	$ 500,025
Percent of Project Funds Remaining	79%

*The above accounting of expenditures is an estimate based on figures known to the OSC at the time this report was written. The cost accounting provided in this report does not necessarily represent an exact monetary figure that the government may include in any claim for cost recovery.

IV. DISPOSITION OF WASTES

All wastes at the surface has been removed from the site.

cc: Dennis Grams, P.E., RGAD
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W' 'ard-Clyde Consultants (WCC), I'

B.H.S., INC.

TREATMENT, STORAGE, AND DISPOSAL FACILITY

RCRA
PART B PERMIT APPLICATION

FEBRUARY 14, 1986

B.H.S., Inc.
Route 1, Box 116F
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VOLUME 11 OF 12

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BHS INCORPORATED

TREATMENT, STORAGE, AND DISPOSAL FACILITY
RCRA PART B PERMIT APPLICATION

February 14, 1986

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APPENDIX 1
GEOLOGIC INVESTIGATION

A. PROCEDURES AND METHODS IN SUBSURFACE AND GEOLOGIC INVESTIGATIONS

1. Introduction

This report presents the findings of the investigation of the B.H.S., Incorporated landfill site and proposed expansion area in Warren County, Missouri.

The purpose of this report is to summarize the geologic and hydrologic properties of the site.

The objectives were accomplished through an intensive drilling, sampling and laboratory testing program, geologic research, and analysis of the results obtained from this investigation.

2. Subsurface Investigations

A field investigation was conducted at the B.H.S., Inc. (BHS) site during the period from October to December, 1985, for the purpose of obtaining detailed stratigraphic, geotechnical and hydrogeological information. This investigation was conducted in response to queries noted in an EPA Notice of Deficiency pertaining to the BHS RCRA Part B permit application. The field program was divided into two tasks.

Task 1 included drilling of eight shallow borings and two deep soil borings to generally identify subsurface conditions. These borings were sampled continuously and field logs were prepared from visual descriptions of the samples.

Task 2 included the drilling and continuous sampling of twenty-seven borings for the installation of 2-inch-diameter stainless steel piezometers. Two deep soil borings were drilled and stainless steel screens and risers were installed as

demonstration wells. Borings previously sampled under Task 1 were drilled without sampling and piezometers were installed. New locations were drilled and continuously sampled and, upon completion, stainless steel piezometers were installed.

In order to further determine details and features of the BHS site, one additional deep soil boring and several additional shallow exploratory borings were drilled.

The locations of the borings are shown on Figure A1. Boring logs are presented in Attachment 1 to this report.

a. Test Borings - Methods and Equipment

Four truck-mounted drilling rigs were engaged in soil test boring operations in the fall of 1985:

- CME-75 (Woodward-Clyde Consultants);
- CME-55 (D. E. Klockow - outside contractor);
- Mobil B-40 and Mobil B-61 (Canonie - outside contractor).

Four-inch-diameter continuous-flight augers (CFA) or 6- to 7-inch-diameter hollow-stem augers (HSA), or a combination, were used to advance the borings.

Prior to beginning of drilling operations, all equipment (drill rigs, drill rods, augers, bits, casing, etc.) were cleaned at the decontamination area with a hot-water washer and/or portable steam cleaner. Clean augers, rods and tools were then wrapped in plastic for storage before use. Decontamination procedures were also conducted after each boring was completed.

Three deep soil borings were advanced with augers for the first 10 feet below the surface. From this depth, wash boring techniques with tri-cone roller bit and wash water were used to advance the borings to their finished depths. These borings were plugged to the

ground surface with a cement-bentonite grout. The typical grout mix was 45 percent (weight) water, 10 percent (weight) bentonite, and 45 percent (weight) cement.

All auger cuttings, drilling fluids and wastes generated during boring operations were collected and placed in numbered drums.

b. Soil Sampling - Methods and Equipment

Each boring location was sampled continuously using 2- or 3-inch split-barrel (split-spoon) samplers, or thin-wall (Shelby) tubes. If more than one boring was to be advanced at a boring location, only one of these borings was continuously sampled. As a rule, the samples were retrieved ahead of the augers or drill bits. The split-barrel samplers were hydraulically pushed or advanced by Standard Penetration Test techniques (falling weight hammer). The split-barrel samplers were equipped with spring catchers to aid the retention of materials. The undisturbed samples (Shelby tubes) were obtained with hydraulic pressure only. After being pushed into the soil, the tubes were left for 10 to 15 minutes to allow the material to rebound. The Shelby tubes were removed from the holes without rotation.

The Shelby tubes were decontaminated and wrapped in plastic before sampling. The split-spoon samplers and sampling equipment (cutters, pans, etc.) were cleaned using a hot-water wash prior to the beginning of each boring. After each sampling interval, the split-spoon and equipment were scrubbed and washed with detergent and potable water, and rinsed with potable water. Clean latex disposable gloves were used by personnel when handling each sample to minimize the potential for cross contamination of the samples.

As a check of field decontamination procedures, a field blank was obtained by each sampling crew during each day. Deionized water was poured over the decontaminated soil sampler and caught in a laboratory-clean glass container.

c. Rock Coring - Methods and Equipment

Two drilling rigs, Mobil B-40L and Mobil B-61, were used for rock coring operations. The three deep soil borings (B-12, B-17, B-23) were advanced into bedrock using rotary core drilling techniques and equipment: diamond bit, NX-size double-tube core barrel (10-feet long), flush-jointed drilling rods, and drilling water.

For each boring to bedrock, casing was advanced to the bedrock surface prior to the rock coring operation. During the course of the coring operations, all of the holes had drill fluid loss.
The decontamination procedures mentioned above were used for the casing, and the core barrel was washed and rinsed after each run.

3. Geologic Investigation

a. Available Data

1) Previous Site Investigations

Site-specific investigations directed at interpreting the geology of the BHS, Inc. site commenced in the early 1970's. There have been three geotechnical consultants investigating the specifics of the site from 1976 to the present. These are: Reitz & Jens, Inc., St. Louis, Missouri; D. E. Klockow and Associates, Columbia, Missouri; and Woodward-Clyde Consultants, Overland Park, Kansas. Throughout the duration of the investigations, geologists and engineers of the Missouri Department of Natural Resources have actively participated in much of the interpretation.

In March, 1976, Reitz & Jens, Inc. installed sixteen piezometers around the general perimeter of the Area 1 disposal trenches. These piezometers were designated P-1 through P-16 and ranged from 35 to 40 feet in depth. Later in the year (July-August,

1976), an additional deep boring, designated TH-1, was drilled to a depth of 130 feet without encountering bedrock. According to the dating in the earliest available Reitz & Jens, Inc. documents, monitoring well MW-2 was drilled during March, 1977. The boring was advanced to a depth of 168 feet where bedrock was encountered; the boring was continued with a tri-cone roller bit and water to 174 feet.

During the month of December, 1978, there were six additional piezometers (P-17 through P-22) installed. All but two of these piezometers were 4-inch-diameter PVC installation, 50 feet in depth, with a PVC screen and sand to 10 feet below the surface. Borings P-19 and P-21 were drilled to 111 feet and 126 feet, respectively (to elevation 656±). During the month of December, 1979, there were ten 24-inch-diameter holes drilled in the vicinity of boring/piezometer B-20. These holes were left open and 24-hour and 72-hour water levels were obtained before closure.

Beginning in January and later again in March of 1980, additional test borings, designated TH-40 through TH-48, were drilled. Borings TH-40, TH-41 and TH-42 were drilled to depths of 140 feet, 140 feet and 134 feet, respectively. The remainder of the borings were extended to 67± feet. Boring TH-42 encountered bedrock at 128 feet and was advanced to 134 feet. Time delay water levels were obtained on the TH borings.

During the period of May through October, 1981, the firm of D. E. Klockow and Associates commenced a second phase of site investigations. The boring/piezometer clusters placed by this firm were designated K-1 through K-12. A cluster consisted of a sampled boring and one or more separate piezometers. Typically, one boring in the cluster was advanced to auger refusal, assumed to be bedrock. Upon completion of the initial borings, an

additional piezometer (P-12R) was installed to resolve the anomaly between P-12 and P-13.

From October through November, 1982, there were four monitoring wells installed (designated GM-1 through GM-4). Depths ranged from 105 feet for GM-4, 125 feet for GM-2 and GM-3, and 175 feet for GM-1. These wells were 4 inches in diameter, flush-jointed, PVC installed in 8-inch-diameter bore holes.

During August, 1983, a shallow boring was advanced to obtain undisturbed samples of the unoxidized glacial till. This boring was at the excavation level of a completed disposal trench. Laboratory and field permeability testing was conducted at this time.

The final field investigation prior to the current investigation was during the month of May, 1984. Two monitoring wells, GM-1R and GM-5, were drilled and installed to 60 feet and 145 feet, respectively. As with the 1982 series, these wells were 4 inches in diameter, flush-jointed PVC installed in 8-inch-diameter borings.

2) Near-Site Investigations

The initial investigation of typical subsurface conditions of the region and pertaining to the BHS site appears to be the work done by Reitz & Jens, Inc. in their interpretation of the regional setting for the site. This work was enhanced and reissued by D. E. Klockow and Associates. Both reporters evaluate subsurface conditions based on available, local well logs; these interpretations tended to present limited information on the near-surface geology in the area surrounding the site. D. E. Klockow's regional geological cross sections are included as Figures A2 through A5.

Regionally, the earliest detailed study of the area including the BHS site was published in the 1800's. The first local geological mapping which included the site is contained in an unpublished Master's Thesis by L. H. Heflin (1961). To the east of the site, St. Charles County has been surficially mapped and has extensive available subsurface information. To the west of the site, mapping has been conducted for various purposes including thesis work, time-stratigraphic studies, natural resources, and other geologic investigations.

b. Site Investigation

1) Test Borings

The 1985 subsurface investigations consisted of drilling two deep exploratory borings (B-12, B-17) and eight shallow exploratory borings (B-1, B-3, B-6, B-10, B-11, B-14, B-21, B-22). The eight shallow exploratory borings were designed to be continuously sampled and advanced to 5 feet below the oxidized/unoxidized glacial till interface. Accordingly, these borings were advanced to the depths of 35 to 62 feet below ground surface (elevations 715 to 753 MSL). Water was detected in three borings (B-11, B-21, and B-22) at the time of drilling. All shallow borings were advanced with augering techniques and, after completion, were grouted to the ground surface with cement-bentonite grout.

Two soil borings (B-12, B-17) were drilled to bedrock to obtain stratigraphic information to depths of 213 and 108.5 feet, respectively (elevations 595 and 650 MSL). Both borings were drilled to the soil/bedrock contact with a tri-cone roller bit and water, and advanced into the bedrock by coring techniques. The drilling water was lost in both deep borings at the time of contact with the bedrock surface.

After coring B-12 and B-17, these borings were grouted to the ground surface with a cement-bentonite slurry which was tremied into the bore hole.

Twenty-two shallow borings and two deep borings and piezometer installations were planned in addition to the initial ten borings. Two deep borings for installation of demonstration monitoring wells (GMW-1 and GMW-4) were drilled and installed to depths of 125 and 105 feet, respectively.

Additional information on the configuration of the bedrock surface required drilling of one additional deep soil boring (B-23). This boring encountered the bedrock surface at the depth of 139 feet (elevation 579 MSL) and was advanced into bedrock to the depth of 149 feet (elevation 787 MSL) with coring techniques. Upon completion, this boring was sealed with cement-bentonite grout.

The ten exploratory borings and boring B-23 were redrilled, without sampling, for piezometer installation. These borings were located within a 15-foot radius of the previously sampled and grouted borings. Clusters of piezometers were placed at B-12 and B-17, B-18 and B-19. These positions consisted of one shallow and one deep boring (66 and 115 feet at B-12; 47 and 79 feet at B-17; 29 and 44 feet at B-18; 23 and 35 feet at B-19). The remaining twelve borings were sampled continuously and advanced to 5 feet below the oxidized/unoxidized glacial till interface for piezometer installation.

Boring B-8 was abandoned due to high organic vapors when the bore hole encountered an abandoned interceptor trench at a depth of 12 feet. The boring was redrilled within a 15-foot radius of B-8 and was designated B-8a.

Localized sand layers in the oxidized till in borings B-18 and B-19 required the installation of pairs of piezometers (29 and 44 feet at B-18; 23 and 35 feet at B-19).

During the final stage of the subsurface investigations, six additional shallow soil borings were drilled near the center of the proposed landfill to delineate the oxidized/unoxidized till interface surface configuration (see Figure A10). The additional borings were designated B-24 through B-29. Only boring B-24 was sampled through the oxidized/unoxidized interface; the remainder of these exploratory borings were logged on the basis of cuttings or a limited number of split-spoon samples.

2) Soil Sampling - Collection and Handling

A total of twenty-four soil borings were sampled continuously using 2- and/or 3-inch-OD split-barrel samplers and thin-wall (Shelby) tube samplers.

Each sample was split after logging to provide material for chemical analyses, geotechnical (physical) analyses, micrologging and archiving.

Each sample was split longitudinally with a decontaminated stainless steel knife and one-half of the sample was wrapped in aluminum foil (or placed in plastic bags) and was held for micrologging procedures. The remaining half of the sample was split longitudinally again in a decontaminated stainless steel pan. The two quarter samples were placed in separate glass containers for chemical and geotechnical analyses. Sample labels were affixed to the glass containers at the time of sample recovery.

The standard label contained the following information:

- Project name and number (B.H.S., Inc., W4C7729-6);
- Boring number (B-1 to B-24);
- Sample number (with indexes P or C, accordingly for Physical or Chemical samples);
- Sample depth (interval);
- Date and time of sampling;
- Sampling personnel.

The Shelby tube samples were sealed with melted wax on both ends, covered with plastic end caps, and taped. The top of each Shelby tube sample was marked with a permanent marker and a standard label was affixed.

The glass containers with samples for chemical analyses were immediately placed into coolers with ice at the boring locations and were transferred to the sample custodian. The samples were subsequently stored in a temperature controlled facility.

The samples for geotechnical analyses and Shelby tube samples were transported daily to the sample custodian under chain-of-custody procedures to be stored in an on-site archive. Geotechnical and chemical samples as well as Shelby tube samples were maintained under chain-of-custody protocol throughout shipment to the laboratories. Chain-of-custody records were filled out at the time of sampling and were kept with the samples at all times.

3) Rock Coring

Rock coring techniques were employed during the drilling of three deep soil borings (B-12, B-17, B-23). Coring was accomplished with NX-size, double-tube core barrel, diamond bit, flush-coupled drilling rods and potable water.

The summary of rock coring operations is presented in Table A2.

Stratigraphically, the bedrock encountered in boring B-17 appears to represent younger horizons relative to the bedrock in borings B-12 and B-23. Details of the stratigraphy are presented in following sections.

Drilling water was lost at the bedrock/soil interface, specifically 100 percent on borings B-12 and B-17; 50 percent on boring B-23. The soils immediately above the bedrock surface are a residual material represented by a layer of reddish-brown clay with gravel and boulders of underlying rock types.

The cores obtained from three deep borings were maintained under chain-of-custody protocol, each core box being considered a single entry.

4) Micrologging

To define the stratigraphy and lithology of the glacial till, the continuous soil samples from twenty-four borings were micrologged. The micrologging process included an estimation of grain size, identification of clasts and minerals, gravel roundness estimation, detailed descriptions, etc. Sandy or silty variations were estimated in the clay sequences. Some general observations include:

- Root stems and hairs were found in the joints reaching as deep as 30 feet from the ground surface.
- In near-surface conditions, desiccation shrinkage resulted in the formation of blocky structures, and shrinkage cracks or joints were characterized by different color and composition material.

- o Rock fragments embedded in the clay matrix range in size from silt to boulders, in shape from angular (often striated) to well rounded, and in composition from sedimentary rocks (shales, limestones) to igneous and metamorphic erratics.

- o A wide variety of early diagenetic processes can be observed throughout both oxidized and unoxidized sequences including nodules and concretions formation, leaching, precipitation and authigenesis and crystallization.

5) Soil Gas Survey

In response to a query on the effectiveness of a leachate collection gas venting system, a soil gas survey was conducted. The aim of the survey was to evaluate the potential for gas generation and provide an estimate of internal gas pressures in the previous disposal area. The survey was conducted by evacuating a gas sample from the subsurface and analyzing the sample on a flame ionization detector gas chromatograph relative to a reference standard (in this case Methane); pressure measurements were obtained by manometrically measuring the subsurface gas pressures.

6) Documentation

The geologists assigned to the drill rigs prepared boring logs for each of the exploratory soil borings. These logs were prepared during the field observations and were based on identification of soil samples, drilling cuttings, and drilling characteristics of each boring. Soils were classified according to the Unified Soil Classification System. The field boring logs were modified to conform with the results of geotechnical laboratory analyses and micrologging.

The field geologists maintained separate field notebooks for the exploratory soil borings describing in diary form the drilling and other activities at the boring location, drilling equipment, sampling procedures (including sample number, sample depth, date

and time of sampling, sample recovery and identification), all environmental monitoring readings, field blank checks, etc. The field notebooks included information concerning each boring throughout the monitoring well and piezometer installations and development period.

The chain-of-custody forms were completed for all samples including chemical and geotechnical samples, for thin-wall samples, and rock cores. A master sample logbook was maintained containing: sample number, location, depth, date and time of recovery, required analysis parameters, destination (archive storage or analytical laboratory), date of shipping, and shipping or mailing information.

The archive storage logbook contained the information relating to the unanalyzed samples: sample number, sample location, sampling date and time, date and time sample was archived.

For temporarily stored samples, the following information was added: date and time of sample shipping for analysis, laboratory identification data, and shipping-mailing information.

A master logbook was prepared for tracking all the drums on site which were filled with auger cuttings, drilling fluids and other wastes. This logbook was updated daily and contained the following information: drum number, type of material in the drum, location of drum, and date drum was filled. Typically, drilling fluids were disposed in an on-site fluid waste impoundment.

4. Laboratory Testing Procedures

The laboratory investigation was performed to evaluate selected engineering and index properties of on-site soils.

The tests included visual classification, Unified Soil Soil Classification, natural water content, dry unit weight, unconfined compression strength, liquid and plastic (Atterberg) limits, grain-size analysis (seive and hydrometer analysis), compaction tests, consolidation tests, permeability tests, cation exchange capacity and pH.

All laboratory testing was conducted by WCC's personnel, except pH and analysis for cation exchange capacity which were performed by Wilson Laboratories, Salina, Kansas.

The tests were performed in general accordance with ASTM specifications. The ASTM standard test methods followed are presented in Table A3. The procedures used to perform permeability tests were consistent with the methodology specified by the U. S. Army Corps of Engineers in their document entitled, "Engineering and Design, Laboratory Soils Testing," Engineers Manual EM 1110-2-1906, U. S. Army Corps of Engineers, 1970, revised 1980. The permeability tests were performed in triaxial compression devices with back-pressure saturation. De-aired tap water was used as the permeant in the permeability tests. An effective confining stress of 5, 20 and 40 psi was applied sequentially on 2-inch-diameter samples. The analyses for cation exchange capacity were performed utilizing approved procedures published in the Federal Register, Volume 44, No. 233, December 3, 1979 (p. 69568-69575) and as amended in the Federal Register, Volume 44, No. 244, December 18, 1979.

The laboratory test results obtained for this study including data received from Wilson Laboratories are summarized in Table A5. The test results are described in detail in Table A4.

B. REGIONAL GEOLOGY

1. Physiography

The BHS site is located near the southern edge of the Dissected Till Plains section of the central lowland physiographic province. The Dissected Till Plains are gently undulating to rolling plains that may show greater topographic

relief in the vicinity of the center of drainage basins. The till plains comprise a heterogeneous mixture of clay, silt, sand and gravel which completely masks the pre-Pleistocene bedrock surface. This till plain thins toward and ultimately ends at the Missouri River to the south of BHS.

Drainage in the region is toward one of two major rivers, the Mississippi River and the Missouri River, which have their confluence east-southeast of the site at St. Louis, Missouri. A drainage divide between the two systems trends northwest/southeast, approximately a mile south of Wright City, Missouri. North of this divide, drainage is into the Mississippi River drainage basin; south of this divide drainage is into the Missouri River drainage basin.

2. Regional Stratigraphy

The stratigraphy described in the following section represents typical materials encountered in the area under discussion. The actual stratigraphy is dependent upon many environmental factors including erosional and depositional processes.

a. Alluvial/Colluvial Deposits

The alluvial deposits are generally associated with drainage channels. These deposits are generally thin and narrow in the upland areas and become broader, deeper, and more significant in the lowlands. In valleys the alluvial deposits have a broad concave surface extending from valley wall to valley wall. The materials which compose the alluvial sediment range from clay to sand with gravel. They are primarily derived from erodable material in the basin uplands.

Colluvial sediments are present in the form of heterogeneous mixtures of clay-silt sheetwash derived from soils and bedrock mass wasting by-products. These deposits are typically quite thin (less than several feet) when present.

b. Loess

This material is believed to be derived from the silty fraction at the surface of a newly exposed till plain. Wind erodes the silt fraction from the exposed till and redeposits this material over the surrounding landscape as blanket deposits which tend to thicken in depressions.

In the BHS region loess occurs on most uplands and especially along the ridges along rivers and divides. Loess is a buff to tan, low plastic, homogeneous, generally non-stratified silt with subordinate amounts of very fine sand and clay; less than 15 percent fine sand, 60 to 80 percent silt, and less than 15 percent clay. In exposure, loess may form very distinctive vertical faces which are protected by a low level of case hardening. With variations in time and conditions, the loess may be modified to a moderate to highly plastic material; less than 10 percent fine sand, 50 to 70 percent silt, and 15 to 45 percent clay.

c. Ferrelview Formation

The Ferrelview Formation is an accretion gley (gumbotil) which develops on poorly drained till surfaces. It is typically gray, sticky, highly plastic, very impermeable clay which occurs in the uplands of the dissected till plain. Where observed, it is generally 7 to 10 feet in thickness. Compositionally, this formation is stone-free but is 20 percent very fine sand, 40 to 50 percent silt and 30 to 40 percent clay.

d. Glacial Till

Glacial till is ice transported and deposited material. This material is typically a gray, unstratified, heterogeneous mixture of clay, silt and sand with occasional gravel, cobbles and boulders and may contain some stratified granular zones formed on or within the glacier.

A broad assortment of sizes and material types are evident as part of the heterogeneous till. Much of the gravel, cobble and boulder size material can be identified as originating at locations far away from this region.

Tills are generally saturated at the time of deposition. In the saturated state, the materials remain in a chemically reducing environment. As the till begins to drain and the pore space becomes partially filled with air, the till changes its potential to an oxidizing environment. The oxidized till is generally characterized by the same heterogeneous mixture, but diagenetic alteration results in a conspicuous yellow to reddish brown color often with new resultant mineral assemblages.

Pockets of a predominant material type (e.g., clay layers, sand pockets, gravel zones) are often found throughout the till. These pockets are generally very localized in areal extent and are the result of surficial and intra-ice accumulations. Variations in these pockets can result in small, very localized reservoirs in which ground water can become trapped.

e. Bedrock

A hiatus occurs between the above described sediments and the underlying bedrock deposits. Sedimentary deposits are known to exist as infill bedrock depressions in the region. These infilled depressions penetrate the bedrock surface ranging from Mississippian to Ordovician age.

A stratigraphic column of rock units is presented as Figure A6. The following discussion represents the bedrock units which are present within the area of interest.

1) Pennsylvanian System

The Cheltenham Formation is the youngest bedrock identified in the subject area. It is represented as a light gray to white, highly plastic, indurated clays and associated sands which unconformably infill solutioned depressions in older Mississippian, Devonian or Ordovician Series deposits. The areal extent of this material is masked by the overlying glacial deposits. This formation has been identified in the southern portion of the subject region and nearby is being exploited for the fire-grade clays. These deposits can be found to a considerable depth and are believed to be related to bedrock solutioning.

Frequently associated with the Cheltenham Formation is another early Pennsylvanian unit, the Graydon Formation. This unit is characteristically a sandstone with chert conglomerate at its base.

Due to the sporadic occurrence of the Pennsylvanian age deposits in the study area, they are considered to be of only minor importance in this report.

2) Mississippian System

The surface of the Mississippian age rock is not well defined except from well log data. Limited exposure of the undifferentiated Chouteau Group in the southern portions of the region represent the only outcrops of this unit in the subject area.

The undifferentiated Chouteau Group is composed of three formations of limestone, dolomite limestone and shale/siltstone. In the study region this group has been eroded but possibly caps

the highest elevations of the buried bedrock surface. This unit rests unconformably on the underlying Devonian Sulphur Springs Group.

3) Devonian System

The Devonian System of deposits is represented by the unassigned Sulphur Springs Group of the Mississippian/Devonian System which overlies the Snyder Creek Formation upper series Devonian and Callaway Formation lower series Devonian which in turn unconformably overlie middle Ordovician limestones and dolomites. This system of deposits is generally represented by limestone, dolomitic limestone, and associated sandstones and shales of discontinuous distribution over the study region. The Pleistocene erosion has presumably removed widespread portions of this system during various periods of erosion. Remnants may remain at higher elevations in the buried bedrock surface.

4) Ordovician System

This system of deposits is regionally observed in the subsurface profile as limestone and dolomites with associated shale and sandstones. The regional sequence of Mid-Ordovician series deposits below the Mississippian or Devonian unconformity begins with the Kimmswick Formation overlying the Decorah Formation siltstones and shales and Plattin Formation. Beneath the Plattin Formation, the dolomite and limestones of the Joachim Formation caps the uppermost regional aquifer, the St. Peters Formation.

The Kimmswick Formation is thin in this region and ranges in thickness from 10 feet to 60 feet. Erosion may have removed all or portions of this formation in the subsurface, particularly in the deeper buried valleys.

The St. Peters Sandstone Formation is typically a white, permeable, quartzose, fine to medium-grained frosted sandstone and can typically deliver as an aquifer 10 to 30 gallons per minute as a normal yield in this region. Due to local inconsistencies in yield, this unit is frequently bypassed in favor of deeper, more reliable aquifers such as the Jefferson City Formation or the Roubidoux Formation.

3. Regional Geological Features

The majority of regional geologic features are assumed from available rock exposures, test drilling and other assumptions. The following section describes some of the known or suspected features.

a. Buried Bedrock Valleys

The existence of bedrock valleys buried beneath the loess and till mantle of northern Missouri has been well documented in the geologic literature. According to recent studies by the MDNR, there is a buried bedrock valley which trends west-northwest/east-southeast and filled with glacial till to depths exceeding 150 to 200 feet. The City of Warrenton, Missouri is on the axis of this buried topographic valley. The pre-Pleistocene and Pleistocene erosion of this valley may have removed bedrock material as deep as the Kimmswick or Plattin Limestone (Ordovician age), and subsequent glaciation resulted in a regional glacial till filled trough.

b. Geological Structure

Northeastern Missouri is characterized by broad, gentle, up and down warps of the bedrock of which there is the tendency for a similar harmonic expression in the pre-Cambrian basement complex. The regional locale is on the eastern flank of a very broad, gentle, pre-Mississippian up warp. Prior to and subsequent to this up warp,

geologically induced stresses have acted on the bedrock resulting in local folding and faulting.

Recent studies have indicated jointing in the Burlington Formation trends about N40°W, and in the St. Peter Formation jointing was observed in two directions, N30°W and N45°E. The jointing of the bedrock in the study region, based on limited information, can be characterized as ranging from multi-directional, multi-order, closely spaced to uni-directional, single-order, widely spaced, and nearly vertical.

Folds are the dominant geologic structure in Missouri and tend to be open and very gentle. These folds may be the result of block-faulting in the crystalline basement. The regional dip is only a few degrees in most areas; steeply dipping beds are restricted to the immediate vicinity of folds and faults.

A list of the known folds within thirty miles of the facility are described below.

1) Cuivre Anticline. This structure is located 18 miles north-northeast of the site. It strikes about N80W and plunges to the southeast. The structure was formed in Post-Mississippian time.

2) Eureka-House Springs Anticline. The Eureka-House Springs anticline is located 8 miles southeast of the site. The structure trends to the northwest and plunges to both the northwest and southeast. The last movement of the structure is thought to be during the Late or Post-Paleozoic.

3) Troy-Brussels Syncline. The Troy-Brussels syncline is located 20 miles northeast of the site. The structure trends to the west and the axis plunges eastward. The structure was formed during Late to Post-Pennsylvanian time.

4) Lincoln Fold. The Lincoln fold is a regional structure located 30 miles north of the site. It is an asymetrical anticline which strikes N45W. It is approximately 165 miles long and up to 15 miles wide. Structural relief reaches a maximum of 1000 feet. The southwest flank has steep dips and sometimes faulting; however, the northeast limb has gentle dips.

5) Mineola Structure. The structure is located 28 miles west-northwest of the site. It is a small, north-south trending anticline. The structure formed in Post-Mississippian times.

6) Big Spring Anticline. This structure is located 20 miles west of the site. It is a small anticline trending west northwest.

7) Warren County Anticline. This structure is a north-south trending anticline located about 8 miles west-northwest of the site. This is the closest known structure relative to the site.

Faults of Missouri are generally not of great throw but average about 100 feet of displacement. Reactivation of older faults is common. The regional trend of the faults in this area is predominantly northwest-southeast.

Known faults that are within thirty miles of the site are described below.

8) Cap au Gres Fault. The Cap au Gres Fault is located 20 miles to the north-northeast of the site. Vertical displacements on the fault range from several to a few hundred feet with the southern block being downthrown. The Cap au Gres Fault may also have had approximately thirty miles of left-lateral displacement. Major movement along the fault occurred during Post-Middle Mississippian.

9) Jeffries Mine Fault. The Jeffries Mine Fault is located 30 miles south-southeast of the site. The structure has a near vertical dip and trends nearly north-south. The west side has been downthrown with a displacement of approximately 50 feet.

10) Jeffriesburg Fault. The Jeffriesburg fault is located 34 miles south of the site. The structure has a strike of N60W, and the northeast side is downthrown to the northeast. The age of the fault is Post-Pennsylvanian.

11) Moselle Fault. The Mosselle Fault is located 25 miles south of the site. The structure is a normal fault which trends to the north. The strata are downthrown on the west side. The fault is described as being the epicenter of an earthquake which occurred in 1945. The hypocenter of the quake was 44 kilometers deep.

12) St. Clair Fault. The St. Clair Fault is located 30 miles south of the site. The structure trends approximately north or northwest with several changes in direction. It is generally considered to be a large collapse structure.

c. Karst Area

Subtle evidence suggests bedrock solutioning exists to the west of the site. The karst area occurs in a band about one mile wide ranging from about two to three miles west-southwest to northwest of the BHS facility. Evidence for bedrock solution consists of localized depressions and surface water impoundments apparently not associated with the headwaters of surface drainage features. Typical karst features such as sinkholes and collapsed features are not evident in the study region due to masking by overlying glacial till.

C. SITE GEOLOGY

1. Site Physiography

The 1158±-acre BHS site is located approximately three miles southwest of Wright City, Missouri. The site is located within the overlapping boundaries of the Dissected Till Plains physiographic subprovince of the Central Lowland province to the north and the Ozark Salem Plateau province to the south. (The topography of the site area is characterized by gently rolling to hilly till plains with moderate relief. The ground surface elevations range from 810 MSL at the northwest corner of the site to 725 MSL at the southwest corner.)

The site is transected by two major and one minor surface drainage features which are characterized as intermittent streams and are illustrated on Figures I.U-2 in the topographic map section of the submitted Part B application. The primary surface drainage feature enters the site on the northern portion of the eastern boundary, trends across the site to the southwest, and exits the site at the southwest corner. The other major surface drainage feature enters the site at the center of the northern boundary and trends southerly across the site. Confluence with the other major surface drainage system occurs in the east-central portion of the site. The minor surface drainage feature enters the site near the western edge of the northern boundary, trends south southeast across the site, and enters with the primary drainage feature occurring in the lower western third of the site. This minor drainage feature has two relict man-made ponds (circa 1948-1950) that were drained in November of 1985 by breeching the dams. These drainage features exhibit subtle signs of minor meandering along a 50- to 100-foot belt along the features. A minor swale that originates off site enters the property near the southwest corner. No wetlands or sinkholes are present on the subject site.

2. Site Stratigraphy

a. Unconsolidated Deposits

The unconsolidated materials at the BHS site are composed of a series of Pleistocene and Holocene (Recent) sediments overlying a thin veneer of residual bedrock soils. In ascending order the unconsolidated materials consist of: residual soils, older Kansan Till, Younger Kansan Till and intermixed Outwash, Yarmouth soils (Ferrelview Formation), and post-Ferrelview loessial deposits. The Recent or Holocene materials include alluvial sediments, colluvial deposits and the development of secondary soils on the exposed older Pleistocene and Holocene sediments.

1) Residual Soils

Several deep borings extended to bedrock indicate the presence of residual soils developed from the weathering and alteration of the underlying rock. The residual soils are remnants of the post-Paleozoic alteration of the bedrock exposed at the surface prior to advance of the glaciers. Subsequent Pleistocene glacial activity has apparently removed most of the residual soils leaving scattered pockets or a thin veneer of residuum between the Pleistocene deposits and the unaltered bedrock. Two varieties of residual soils have been recognized in the borings at BHS. A highly plastic, dark gray to black, clay or silty and sandy clay has apparently formed from the weathering of bedrock shale and shaley sandstone formations. This unit contains remnants of shale and shaley sandstone in the form of fragments and appears to grade downward into relatively unweathered bedrock. A reddish-brown to varigated, sandy to gravelly, highly plastic clay soil has apparently formed from the weathering of limestone bedrock formations. Limestone fragments increase while the clay matrix fraction decreases with depth but poor sample recovery has not allowed observation of the transition from soil

to unweathered bedrock. In all likelihood much of the original residual soils have been removed by the scouring action of the glaciers prior to deposition of basal till. In at least one boring basal glacial till lies directly on the bedrock with no intervening residual soils. The residual soils at BHS may be correlative with the Whippoorwill Formation and the New Florence soil horizon of Guccione (1982).

2) Older Kansan Till

An older till deposit has been recognized in several borings at the BHS site. This till overlies either the bedrock formations or the residual bedrock soils. These till deposits are generally homogeneous, highly plastic clays with some zones of sandy and silty clay and with only occasional gravel to boulder size rock fragments imbedded in the clay matrix. This older till differs from the highly sandy and silty nature and higher gravel content of the overlying younger tills. Additionally, the older tills have a brown to yellow-brown color either at the upper surface of the deposit or where the deposit is thin, completely pervading the materials (i.e., development of a paleosol). The paleosol represents soil formation during the subaerial erosion and weathering of the deposits in a glacial melt-back period. The interface between the younger and older till deposits appears to be quite sharp with no transition zone. This till is designated as an older Kansan till, possibly the stratigraphic equivalent of the lower Kansan portion of the McCredie Formation mapped by Guccione (1982) and Allen and Ward (Assoc. Mo. Geol., 1974) to the west of Warren County. A Nebraskan age for this older till cannot be ruled out completely.

In those borings in which continuous samples to bedrock were obtained the older Kansan till ranged from 11 to 14 feet in thickness. The very fine-grained homogeneous nature of this basal till is consistent with till lithology elsewhere in the

region, Gucionne (1982) and Kemmis et al (1979). According to Allen & Ward (Assoc. Mo. Geol., 1974), the older till is separated from the overlying till by outwash deposits with incompletely developed paleosols. This outwash is not recognized at the BHS site.

3) Younger Kansan Till

The bulk of the unconsolidated sediment thickness at the BHS site appears to consist of a younger Kansan till intermixed with occasional stratified material representing limited glacial outwash or deposits of supraglacial and englacial till. Stratigraphically the younger till appears to consist of a relatively thin basal till unit overlain by a thick ablation till incorporating the above mentioned stratified till deposits. Clearly definable and correlatable outwash deposits were not observed within the Pleistocene sequence. However, if stratified material, intermixed with the tills, were formed beyond the ice margin, these would technically qualify as outwash deposits. The fact that the stratified materials are completely enclosed within till would seem to preclude an outwash origin on an extensive outwash plain.

a) Basal Till

Tills formed by depositional processes at the base of an ice mass are termed basal tills. In a fluctuating ice front condition the basal till connotation only refers to origin, not to stratigraphic position. It is quite possible for basal tills from multiple glacial advances to overlie ablation tills formed during earlier melt-back periods.

The basal till of younger Kansan age at the BHS site consists of a 10- to 25-foot-thick deposit of clays with varying amounts of admixtures of other particle sizes. This matrix material varies from a low to a highly plastic clay with the highly plastic clays predominant in the sequences observed. Consistencies are generally in the very stiff to hard range with some firm to stiff zones. Visually, the overall texture of the matrix is homogeneous, although the deposits have sandy clay and silty clay zones. The matrix admixtures, especially the sand fraction, appear to be substantially less prevelant than in the overlying Kansan ablation till, but in greater abundance than in the underlying older till.

Detailed logging of the continuously sampled bore holes indicates the younger Kansan basal till contains greater amounts of clasts imbedded in the matrix than are present in the older, underlying basal till. The majority of the clasts are subrounded to highly angular and pebble to gravel size; some cobble to boulder size materials were reported in the boring logs. The bulk of the clasts are rocks similar in lithology to the bedrock in and north of the site area. The presence of these erratics, while modifying the visual uniformity of the clays, is compatible with a basal-lodgement till origin for this material (Kemmis et al, 1979).

b) Younger Kansan Supraglacial Tills

Supraglacial tills are those landforms and sediments, deposited by glaciers, formed above the pre-existing subglacial (basal) tills or bedrock (Eyles, 1983). Supraglacial tills include material transported upon (supraglacial) or within (englacial) the ice mass, ice-contact stratified materials (Flint, 1975) from supraglacial streams and lakes, as well as melt-out

unstratified debris (Huddart, 1982). Outwash (glacio-fluvial) deposits and glacial lacustrine materials that formed beyond the terminal moraine of the glacier by the action of meltwaters are excluded from the till group of glacial sediments. Almost all stratified materials were once classified as glacio-fluvial. Recent work in the past ten years (Boulton, 1975; Clayton and Moran, 1974; Drozdowski, 1979; Eyles, 1983; Huddart, 1983; and Kemmis et al, 1979) among others (bibliography) have redefined supraglacial deposition processes to now include many stratified deposits.

The younger Kansan supraglacial/ablation tills consist of a thick sequence of predominantly sandy and silty clays. The deposits at BHS have many gravel-size clasts or erratics embedded within the clay matrix. Additionally, granular sediments occur as discrete pockets surrounded by clay-rich material. The presence of these discrete granular zones, as well as the large number of clasts, gives the ablation tills a heterogeneous appearance compared to the underlying Kansan basal tills. Based on ASTM procedures for visual classification (D2488-69) approximately 35 percent of the ablation till clays were low plastic and approximately 45 percent were highly plastic in those borings continuously sampled to the underlying basal till. Similarly, approximately 70 percent of the samples were estimated to have a stiff through a very stiff consistency or strength.

The granular rich zones within the till vary from very sandy or silty clays through clayey-silts or sands to impure but dominantly silt, sand and gravel beds with varying amounts of other grain sizes. The granular materials range from rounded to angular; the sand size fraction generally is rounded to subrounded and the clasts are subrounded to angular with the subangular form visually predominant.

The granular zones are not traceable for any distance laterally, based on elevation or depth within borings, nor do they appear to be contiguous in terms of stratigraphic position using the basal till and paleosols as marker horizons. Similar observations have been reported by MDNR personnel during inspection of trenches and excavations at BHS. The granular deposits are not always stratified or laminated. Graded bedding (i.e., the upward fining of particle sizes within a stratum) was noted in only one zone in the micrologged samples.

It is concluded that the material overlying the basal tills at the BHS site is a thick ablation till deposit. The granular materials occur as pockets or discrete, laterally discontinuous, zones within the till. These were formed by supraglacial, englacial or ice-contact processes. A possible alternative to this origin has been suggested (Klockow, 1983), assigning a glacio-fluvial or outwash origin to the granular sediments. In this case glacial melt waters winnowed and transported the sediments from the glacier and deposited these sediments over till previously deposited during glacial meltback. Glacial re-advance buried the outwash sediments under new till deposits. This meltback-readvance oscillation could occur repeatedly to form a repetitive till-outwash generally similar to the gross stratigraphy observed at BHS.

With the exception of areas where the deep stream or slope erosion has occurred, the upper portion of the Kansas ablation till has undergone weakening and oxidation. The separation of the oxidized from the lower lying unoxidized till may be sharp, occurring within a few inches vertically, or may occur over a transition zone of several feet. The

maximum depth to the top of the unoxidized till is approximately 65 feet. The base of the oxidized zone generally tends to parallel the present land surface and appears to be independent of till lithology or stratigraphic position.

The oxidized and unoxidized glacial tills at the BHS site follow the classic weathering zone profiles described by Hallbert et al (1978). The oxidized till is typically gray to light gray in color with slight mottling to intermixing with tints of red and yellow near the surface, becoming gray to light gray intermixed with yellowish brown to brownish yellow near the center, and becoming yellowish brown to brownish-yellow with lesser amounts of gray to light gray in the lower portion. The oxidized till is generally jointed or fractured.

X-ray diffraction analyses of the clay minerals (Klockow, 1983) indicated that the primary clay member is a mixed layer of illite and montmorrillinite. The clay mineralogy is further confirmed by previous cation-exchange-capacities (CEC) analyses performed by others which ranged from 10 to 20 milliequivalents per 100 grams and indicated a clay chemistry of illite or kaolinite with possibly some montmorillinite. The natural moisture content in the upper oxidized till ranges from 20 to 30 percent with the lower oxidized till having a natural moisture content of generally less than 20 percent. The liquid limit ranges from in excess of 30 percent to 30 to 35 percent for the upper and lower oxidized tills, respectively.

The unoxidized glacial till is generally a sandy silty clay with a distinctive gray to dark gray color. X-ray diffraction analyses indicated a clay mineralogy of predominantly kaolinite with only minor amounts of the

interlayered illite-montmorillinite. The measured cation exchange capacity is generally less than 12 milliequivalents per 100 grams which would infer the aforementioned clay mineralogy. The natural moisture content ranges from 15 to 19 percent and remains relatively constant with depth. The liquid limit ranges from greater than 30 percent in the more plastic upper zone to 23 to 27 percent in the basal zone.

The oxidized/unoxidized weathering profile is apparently due to oxidation-weathering and desiccation. Characteristically, infiltrating water and carbon dioxide create carbonic acid which, in turn, leaches out the carbonate minerals for subsequent redeposition in the lower portions of the oxidized zone. Oxidation of iron and manganese occur simultaneously with the carbonate leaching processes due to the abundance of oxygen in the unsaturated zones. This yields the characteristic reddish-brown, yellowish-brown, and olive-brown coloring of the oxidized sediments.

The results of laboratory consolidation and unconfined compressive strength tests suggest that both the unoxidized and oxidized ablation tills are lightly to moderately overconsolidated. Preconsolidation pressures of the unoxidized ablation till estimated from consolidation tests ranged from 6 to 11 kips per square foot and are consistent with a preconsolidation pressure of 15± kips per square foot predicted from c/p ratios. Preconsolidation pressures generally increased with depth while overconsolidation ratios decreased, indicating that the unoxidized ablation till deposit has been subjected to a nearly uniform net preconsolidation pressure. From plots comparing pre-

consolidation pressure to the existing vertical geostatic pressure, the following relationship was determined:

$$Pc = Po + 5.6$$

where: Pc = Maximum past vertical pressure in ksf
Po = Existing vertical geostatic pressure in ksf.

The oxidized ablation till was also determined to be overconsolidated, although to a lesser degree than the unoxidized till. The following relationship between preconsolidation pressure and vertical effective stress was determined:

$$Pc = Po + 2.6$$

The oxidized glacial till at the BHS site is characterized by numerous vertical fractures within this unit. The joints are predominantly vertical to nearly vertical and range in width from less than 1 millimeter up to 25 millimeters across with an average width of 4 to 5 millimeters. A few thin (less than 2 millimeters wide) horizontal joints were noted during the detailed logging proceedings. In many cases, the joints (or fractures) were infilled with either dark gray clay or a mineral deposit identified as selenite, a calcium sulfate. No pattern to the vertical joint network was determined during the field investigation. The joints were apparently concentrated in the oxidized glacial till.

The vertical joints may be accounted for by regional extension of the earth's crust due to crustal rebound following glacial loading, or by tension fracturing as a result of a primarily vertical stress release following removal of the load imposed by the glacial ice (Grisak et al, 1976).

It has been suggested by Hendry (1986) that all the sulfate in unoxidized till zones and up to 20 percent of the sulfate in oxidized till zones was incorporated into the till from the bedrock during deposition. The remaining 80 percent of the sulfate in the oxidized glacial till was derived by the oxidation of reduced sulfur which had the local bedrock as its source.

4) Yarmouthian Stage

Post-Kansan Yarmouthian sediment and possible soil development has been tentatively identified at the BHS site by geologists of the MDNR. Following the final retreat of the Kansan stage glacial advances, the exposed surface of the till was subjected to soil formation processes. The soil formed on top of the till, mixed with aeolian silt and clay resulting in a tenaceous light-gray, silty clay being formed on a poorly drained, often saturated, poorly dissected plain. Traditionally this material is referred to as Kansan Gumbotil. More recent work has elevated the Kansan Gumbotil to formational status, the Ferrelview Formation. The age of the Ferrelview is obviously late Kansan or early Yarmouthian but may extend into mid-Illinoian time.

At the BHS site, the Ferrelview Formation may be present in the upper 15 to 20 feet of till beneath the overlying loess deposits. The presence of the Ferrelview Formation has probably acted as a barrier to infiltration in those regions of the site that have not been eroded.

5) Loess

Mantling the till and where present, the Ferrelview Formation is an evenly distributed blanket of

loess. Loess is typically a buff, low plastic, silt with clay and occasional sand thought to be deposited by aeolian processes. In the vicinity of the site, the loess is approximately 2 feet in thickness and may range up to 5 feet in surface depressions. At some site locals the loess has been eroded away.

6) Alluvial/Colluvial

In the low lying areas of the site sands, silts and clays have accumulated. Fluvial processes erode, transport and deposit these sands, silts and clays from areas higher in the basin. These materials are deposited or eroded relative to the variation in the entropy of the process and tend to accumulate as stratified stream deposits which typically delineate the channel floodplain during periods of flood. In the vicinity of the channel in the southern portion of the site, the average accumulation is 5± feet. Thicknesses up to 17 feet have been noted at isolated locations in the stream channel on the southern edge of the proposed landfill.

Colluvial sediments are identified at isolated locations around the site. These materials are typically derived from sheetwash or mass wasting processes. They may form as a veneer (usually very thin) on gentle slopes and in areas adjacent to alluvial deposits.

b. Bedrock Stratigraphy

Site specific bedrock data are sketchy. There are no outcroppings of rock on the site; stratigraphic correlation is based on previous work, both locally and regionally, and core samples obtained during the 1985 investigation.

Where cored, the bedrock interval below the soil/rock interface was observed to be fractured and deeply weathered. Typically, coring did not commence until a zone of resistance was encountered (see Table A2). Core was reviewed by geologists of MDNR.

Boring B-12 was cored through the elevation interval 609 feet to 595 feet MSL which appeared to be a single limestone unit, very weathered in the upper part. There was no recovery in the interval 609 feet elevation to elevation 605 feet, MSL, probably as a result of weathering and fracturing of the rock unit. The rock was a light gray micrite with sparry patches matrix with dark gray replacement micrite. Within the cored interval, the formation was weathered, irregular, wavy bedded, jointed, fossiliferous and styolitic. This unit was tentatively identified as the Plattin Limestone.

Coring in boring B-17 did not begin until 10 feet of the weathered, fractured bedrock had been penetrated. The elevation of the cored interval was from 670 feet to 653 feet MSL. A shale/limestone contact was observed at elevation 655 feet. Geologists from the MDNR identified this limestone as being the Calloway Formation based on megascopic observations. Additionally, they interpreted the overlying shale sequence to be the Snyder Creek Formation, in turn overlain by shales of the Sulfur Springs Group.

This sequence represents the Devonian age material which unconformably overlies early Ordovician age deposits.

Boring 23 was advanced to bedrock and cored to resolve variations in bedrock elevation and lithologies noted at borings B-12 and B-17. There were 10 feet of core obtained in the elevation interval of 597 feet to 587 feet, MSL. This core was tentatively identified as a section of the Plattin Limestone. As with borings B-12 and B-17, the core samples were observed and identified by geologists with the MDNR.

Prior to developing the site as a landfill, the Zykan water well was drilled into the St. Peter Formation for domestic purposes. The following formations were penetrated below the glacial till:

- Bottom of casing, elevation 596
  - Plattin Formation
  - Joachim Formation
  - St. Peter Formation
- Bottom of boring, elevation 394.

The St. Peter Sandstone is a well sorted, fine to medium grained, friable, white quartzose sandstone. The Zykan well probably encountered the Plattin Limestone at the bedrock surface.

A buried deep bedrock valley trough trends roughly parallel to the axis of a line segment extending from boring B-12 to boring B-23. The bedrock encountered along this axis is the Plattin Limestone. Projecting boring B-17 on the B-12/B-23 axis, normal to the axis, suggests a steep-walled, broad, U-shaped glacial valley with topographic highs and lows buried by the glacial till. The valley so described roughly parallels the description of a regional buried bedrock valley described earlier and may represent some part of that valley system.

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TABLE A1

CONTINUOUSLY SAMPLED TEST BORINGS
FALL 1985

Boring Number	Boring Location (Grid Coordinator)	Elevation of the Ground (ft, MSL)	Depth (ft) Elevation Hole Bottom	Approximate Depth to unoxidized Till Surface	Water Level ATD
1	2693N, 1009E	808.6	61.5 /747.1	57 /751.6	None
2	2623N, 1260E	791.2	49 /742.2	44 /747.2	49 /742.2
3	2593N, 1518E	773.4	39 /734.4	32 /741.4	None
4	2351N, 1650E	767	39 /728	30 /737	22 /745
5	2163N, 1812E	760.8	28.5 /732.3	22 /738.8	None
6	1909N, 1888E	763.2	30 /733.2	30 /733.2	None
7	1889N, 1609E	778.9	56 /722.9	52.5/726.4	25 /753.9
8A	1861N, 1428E	790.7	59 /731.7	59 /736.7	None
9	2171N, 1053E	799.3	56 /743.3	51 /748.3	None
10	2407N, 959E	805.4	57 /748.4	51 /754.4	None
11	1875N, 1148E	793.0	54 /739	51 /742	49.5/743.5
12	2395N, 670E	808	213 /595	57 /751	None
13	2160N, 625E	800.7	61.5 /739.2	57 /743.7	None
14	1895N, 618E	792.3	55.5 /736.8	50.5/741.8	None
15	1604N, 623E	787.8	55 /732.8	49 /738.8	None
16	1320N, 625E	775.6	54.5 /721.1	48 /727.6	None
17	1023N, 632E	759.2	108.4 /650.8	41 /718.2	None
18	875N, 750E	748.2	43.5 /704.7	38 /710.2	25.5/722.7
19A	876N, 1025E	745.4	34.83/710.57	22.5/719.9	20 /725.4
20	1300N, 1425E	769.6	54 /715.6	49 /721	45 /724.6
21	1590N, 1423E	778.2	54 /724.2	48 /730.2	40.5/737.7
22	1067N, 1417E	751.6	42 /709.6	36 /715.6	33 /718.6
23	887N, 1299E	736.2	149 /587.2	12 /724.2	None
24*	1503N, 670E	781.7	68 /713.7	55 /726.7	None

* Continuously sampled only through the oxidized/unoxidized interface.

TABLE A2

ROCK CORING OPERATIONS
ON B.H.S., INCORPORATED SITE (Fall, 1985)

Boring Number	Boring Location	Ground Surface Elevation (MSL,ft)	Interval of Rock Coring (ft)	Interval of Rock Coring Interval (MSL,ft)	Number of NX Runs	Percent Recovery %	RQD %	Generalized Stratigraphy
B-12	2395N, 670E	808	199 - 213	609 - 595	3	4 75 100	0 25 92	From weathered cherty limestone to unweathered gray limestone.
B-17	1035N, 625E	759	90 - 108.4	670 - 652.6	2	67 95	27 83	From weathered yellow shale to dark gray shale. From blue-gray shale to gray limestone.
B-23	875N, 1300E	736	139 - 149	597 - 587	1	97	75	Slightly weathered gray limestone.

TABLE A3

LABORATORY TESTING PROCEDURE
ASTM STANDARDS

Analysis	ASTM Standard Test Method for:	ASTM Designation
Visual Classification	Description of Soils	D2488-69
Unified Soil Classification	Classification of Soils for Engineering Purposes	D2487-83
Natural Water Content	Determination of Water Content of Soil	D2216-80
Unconfined Compression Strength	Unconfined Compression Strength of Cohesive Soil	D2166-66
Liquid and Plastic Limits	Liquid Limit, Plastic Limit and Plasticity Index of Soils	D4318-83
Grain-Size Analysis	Particle-Size Analysis of Soils	D422-63
Compaction Tests Standard Modified	Moisture Density Relation of Soils	D698-78 and D1557-78
Consolidation Tests	One-Dimensional Consolidation Properties of Soil	D2435-80

SUMMARY OF LABORATORY TEST DATA

B.H.S., INC.
Wright City, Missouri
W4C7729-6

TABLE A4

BORING OR TEST PIT NUMBER	SAMPLE DEPTH, ft	UNIFIED SOIL CLASSIFICATION *	CLASSIFICATION PROPERTIES					STRENGTH PROPERTIES						VOLUME CHANGE					
								UNCONFINED		TRIAXIAL									
			AVERAGE NATURAL WATER CONTENT, %	DRY UNIT WEIGHT, pcf	LIQUID LIMIT	PLASTIC LIMIT	% PASSING NO 200 OR (FIGURE NO)	COMPRESSIVE STRENGTH (Q_u) tsf	STRAIN AT 50% OF FAILURE, %	TRIAXIAL DATA - FIGURE	TYPE OF TEST	ANGLE OF INTERNAL FRICTION	COHESION, tsf	VOLUME CHANGE DATA - FIGURES	COMPRESSION INDEX, C_c	EXISTING OVERBURDEN STRESS, tsf	ESTIMATED PRECONSOLIDATION STRESS, tsf	VOLUME CHANGE, INUNDATED @ 1 psi	MAXIMUM SWELL PRESSURE, tsf
B-16	20.0	CL	15	119	40	14													
**	50.0	CL	17	117	29	13		7.3	1.8						0.10		10.0		
B-19	13.0	CL	18	112	32	16									0.11		3.2		
	31.0	CL	16	117	30	13									0.15		8.0		
B-23	18.0	CL	17	116	32	13		4.9	1.7						0.17		10.0		
**	28.0	CL	16	118	29	14		5.3	2.4						0.13		6.0		

NOTES:
**For cation exchange capacity and pH data, see attached lab report from Wilson

* CLASSIFICATION BASED ON VISUAL EXAMINATION AND/OR LABORATORY TEST

SUMMARY OF LABORATORY TEST DATA

B.H.S., INC.
Wright City, Missouri
W4C7729-6

TABLE A4

BORING OR TEST PIT NUMBER	SAMPLE DEPTH, ft	UNIFIED SOIL CLASSIFICATION *	CLASSIFICATION PROPERTIES			STRENGTH PROPERTIES						VOLUME CHANGE					
						UNCONFINED		TRIAXIAL									
			AVERAGE NATURAL WATER CONTENT, %	DRY UNIT WEIGHT, pcf	GRAIN SIZE DISTRIBUTION (mm)	COMPRESSIVE STRENGTH (Q_u), tsf	STRAIN AT 50% OF FAILURE, %	TRIAXIAL DATA - FIGURE	TYPE OF TEST	ANGLE OF INTERNAL FRICTION	COHESION, tsf	VOLUME CHANGE DATA - FIGURES	COMPRESSION INDEX, C_c	EXISTING OVERBURDEN STRESS, tsf	ESTIMATED PRECONSOLIDATION STRESS, tsf	VOLUME CHANGE, INUNDATED @ 1 psi	MAXIMUM SWELL PRESSURE, tsf
Composite B-1	51 to 55.5	CH	16		$D_{10} < .001$ $D_{15} < .001$ $D_{30} = .0018$ $D_{50} = .010$ $D_{60} = .022$ $D_{85} = .017$												

NOTES

* CLASSIFICATION BASED ON VISUAL EXAMINATION AND/OR LABORATORY TEST

SUMMARY OF LABORATORY TEST DATA

B.H.S., INC.
Wright City, Missouri
W4C7729-6

TABLE A4

BORING OR TEST PIT NUMBER	SAMPLE DEPTH, ft	UNIFIED SOIL CLASSIFICATION *	CLASSIFICATION PROPERTIES			STRENGTH PROPERTIES						VOLUME CHANGE					
						UNCONFINED		TRIAXIAL									
			AVERAGE NATURAL WATER CONTENT, %	DRY UNIT WEIGHT, pcf	GRAIN SIZE DISTRIBUTION (mm)	COMPRESSIVE STRENGTH (Q_u) tsf	STRAIN AT 50% OF FAILURE, %	TRIAXIAL DATA - FIGURE	TYPE OF TEST	ANGLE OF INTERNAL FRICTION	COHESION, tsf	VOLUME CHANGE DATA - FIGURES	COMPRESSION INDEX, C_c	EXISTING OVERBURDEN STRESS, tsf	ESTIMATED PRECONSOLIDATION STRESS, tsf	VOLUME CHANGE, INUNDATED @ 1 psi	MAXIMUM SWELL PRESSURE, tsf
Composite B-1	57 to 61.5	CH	18		$D_{10} < .001$ $D_{15} < .001$ $D_{30} = .0028$ $D_{50} = .014$ $D_{60} = .026$ $D_{85} = 0.2$												

NOTES

* CLASSIFICATION BASED ON VISUAL EXAMINATION AND/OR LABORATORY TEST

SUMMARY OF LABORATORY TEST DATA

TABLE A4

B.H.S., INC.
Wright City, Missouri
W4C7729-6

BORING OR TEST PIT NUMBER	SAMPLE DEPTH, ft	UNIFIED SOIL CLASSIFICATION *	CLASSIFICATION PROPERTIES			STRENGTH PROPERTIES						VOLUME CHANGE					
						UNCONFINED		TRIAXIAL									
			AVERAGE NATURAL WATER CONTENT, %	DRY UNIT WEIGHT, pcf	GRAIN SIZE DISTRIBUTION (mm)	(Q_u) COMPRESSIVE STRENGTH ksf	STRAIN AT 50% OF FAILURE, %	TRIAXIAL DATA - FIGURE	TYPE OF TEST	ANGLE OF INTERNAL FRICTION	COHESION, ksf	VOLUME CHANGE DATA - FIGURES	COMPRESSION INDEX, C_c	EXISTING OVERBURDEN STRESS, ksf	ESTIMATED PRECONSOLIDATION STRESS, ksf	VOLUME CHANGE, INUNDATED @ 1 psi	MAXIMUM SWELL PRESSURE, ksf
Composite B-10	46.5 to 51	CH	16		D_{10} < .001 D_{15} < .001 D_{30} = .0018 D_{50} = .010 D_{60} = .021 D_{85} = 0.18												

NOTES

* CLASSIFICATION BASED ON VISUAL EXAMINATION AND/OR LABORATORY TEST

SUMMARY OF LABORATORY TEST DATA

TABLE A4

B.H.S., INC.
Wright City, Missouri
W4C7729-6

BORING OR TEST PIT NUMBER	SAMPLE DEPTH, ft	UNIFIED SOIL CLASSIFICATION *	CLASSIFICATION PROPERTIES			STRENGTH PROPERTIES						VOLUME CHANGE					
						UNCONFINED		TRIAXIAL									
			AVERAGE NATURAL WATER CONTENT, %	DRY UNIT WEIGHT, pcf	GRAIN SIZE DISTRIBUTION (mm)	COMPRESSIVE STRENGTH (Q_u) tsf	STRAIN AT 50% OF FAILURE, %	TRIAXIAL DATA - FIGURE	TYPE OF TEST	ANGLE OF INTERNAL FRICTION	COHESION, tsf	VOLUME CHANGE DATA - FIGURES	COMPRESSION INDEX, C_c	EXISTING OVERBURDEN STRESS, tsf	ESTIMATED PRECONSOLIDATION STRESS, tsf	VOLUME CHANGE, INUNDATED @ 1 psi	MAXIMUM SWELL PRESSURE, tsf
Composite B-10	51 to 55.5	CH	16		D_{10} < .001 D_{15} < .001 D_{30} = .0028 D_{50} = .016 D_{60} = .032 D_{85} = 0.21												

NOTES:

* CLASSIFICATION BASED ON VISUAL EXAMINATION AND/OR LABORATORY TEST

SUMMARY OF LABORATORY TEST DATA

B.H.S., INC.
Wright City, Missouri
W4C7729-6

TABLE A4

BORING OR TEST PIT NUMBER	SAMPLE DEPTH, ft	UNIFIED SOIL CLASSIFICATION *	CLASSIFICATION PROPERTIES			STRENGTH PROPERTIES						VOLUME CHANGE					
						UNCONFINED		TRIAXIAL									
			AVERAGE NATURAL WATER CONTENT, %	DRY UNIT WEIGHT, pcf	GRAIN SIZE DISTRIBUTION (mm)	COMPRESSIVE STRENGTH (Q_u) tsf	STRAIN AT 50% OF FAILURE, %	TRIAXIAL DATA - FIGURE	TYPE OF TEST	ANGLE OF INTERNAL FRICTION	COHESION, tsf	VOLUME CHANGE DATA - FIGURES	COMPRESSION INDEX, C_c	EXISTING OVERBURDEN STRESS, tsf	ESTIMATED PRECONSOLIDATION STRESS, tsf	VOLUME CHANGE, INUNDATED @ 1 psi	MAXIMUM SWELL PRESSURE, tsf
Composite B-14	45 to 49.5	CH			D_{10} < .001 D_{15} < .001 D_{30} = .0024 D_{50} = .013 D_{60} = .028 D_{85} = 0.20												

NOTES

* CLASSIFICATION BASED ON VISUAL EXAMINATION AND/OR LABORATORY TEST

SUMMARY OF LABORATORY TEST DATA

B.H.S., INC.
Wright City, Missouri
W4C7729-6

TABLE A4

BORING OR TEST PIT NUMBER	SAMPLE DEPTH, ft	UNIFIED SOIL CLASSIFICATION *	CLASSIFICATION PROPERTIES			STRENGTH PROPERTIES						VOLUME CHANGE					
						UNCONFINED		TRIAXIAL									
			AVERAGE NATURAL WATER CONTENT, %	DRY UNIT WEIGHT, pcf	GRAIN SIZE DISTRIBUTION	COMPRESSIVE STRENGTH (Q_u) tsf	STRAIN AT 50% OF FAILURE, %	TRIAXIAL DATA - FIGURE	TYPE OF TEST	ANGLE OF INTERNAL FRICTION	COHESION, tsf	VOLUME CHANGE DATA - FIGURES	COMPRESSION INDEX, C_c	EXISTING OVERBURDEN STRESS, tsf	ESTIMATED PRECONSOLIDATION STRESS, tsf	VOLUME CHANGE, INUNDATED @ 1 psi	MAXIMUM SWELL PRESSURE, tsf
Composite B-14	51 to 55.5	CH			D_{10} < .001 D_{15} < .001 D_{30} = .003 D_{50} = .016 D_{60} = .032 D_{85} = 0.21												

NOTES

* CLASSIFICATION BASED ON VISUAL EXAMINATION AND/OR LABORATORY TEST

SUMMARY OF LABORATORY TEST DATA

B.H.S., INC.
Wright City, Missouri
W4C7729-6

TABLE A4

BORING OR TEST PIT NUMBER	SAMPLE DEPTH, ft	UNIFIED SOIL CLASSIFICATION *	CLASSIFICATION PROPERTIES: AVERAGE NATURAL WATER CONTENT, %	DRY UNIT WEIGHT, pcf	LIQUID LIMIT	PLASTIC LIMIT	% PASSING NO 200 OR (FIGURE NO)	STRENGTH PROPERTIES: UNCONFINED: COMPRESSIVE STRENGTH (Q_u) tsf	UNCONFINED: STRAIN AT 50% OF FAILURE, %	TRIAXIAL: TRIAXIAL DATA - FIGURE	TRIAXIAL: TYPE OF TEST	TRIAXIAL: ANGLE OF INTERNAL FRICTION	TRIAXIAL: COHESION, tsf	VOLUME CHANGE: VOLUME CHANGE DATA - FIGURES	COMPRESSION INDEX, C_c	EXISTING OVERBURDEN STRESS, tsf	ESTIMATED PRECONSOLIDATION STRESS, tsf	VOLUME CHANGE, INUNDATED @ 1 psi	MAXIMUM SWELL PRESSURE, tsf
Composite 1 (B-25 @ 10-35')		CH	19		55	12		Max. Dry Density = 110 pcf @ 17% opt. water content (ASTM D-698)											
								Max. Dry Density = 125 pcf @ 12% opt. water content (ASTM D-1557)											
Compl Remold		CH	16	114				6.8	0.8										
Compl Remold		CH	18	111				4.3	0.9										
Compl Remold		CH	20	108				3.0	0.7										
Compl Remold		CH	$k = 3 \times 10^{-9}$ @ $\sigma' = 5$ psi					$k = 9 \times 10^{-10}$ @ $\sigma' = 20$ psi						$k = 6 \times 10^{-10}$ @ $\sigma' = 40$ psi					
			19(i) 20(f)	110															

NOTES:

Note: For cation exchange capacity and pH data, see attached Wilson lab tests

* CLASSIFICATION BASED ON VISUAL EXAMINATION AND/OR LABORATORY TEST

SUMMARY OF LABORATORY TEST DATA

B.H.S., INC.
Wright City, Missouri
W4C7729-6

TABLE A4

BORING OR TEST PIT NUMBER	SAMPLE DEPTH, ft	UNIFIED SOIL CLASSIFICATION *	CLASSIFICATION PROPERTIES: AVERAGE NATURAL WATER CONTENT, %	DRY UNIT WEIGHT, pcf	LIQUID LIMIT	PLASTIC LIMIT	% PASSING NO 200 OR (FIGURE NO)	STRENGTH PROPERTIES: UNCONFINED: COMPRESSIVE STRENGTH (Q_u) tsf	UNCONFINED: STRAIN AT 50% OF FAILURE, %	TRIAXIAL: TRIAXIAL DATA - FIGURE	TRIAXIAL: TYPE OF TEST	TRIAXIAL: ANGLE OF INTERNAL FRICTION	TRIAXIAL: COHESION, tsf	VOLUME CHANGE: VOLUME CHANGE DATA - FIGURES	COMPRESSION INDEX, C_c	EXISTING OVERBURDEN STRESS, tsf	ESTIMATED PRECONSOLIDATION STRESS, tsf	VOLUME CHANGE, INUNDATED @ 1 psi	MAXIMUM SWELL PRESSURE, tsf
Composite II (TP-27 or (TP-1)		CH	31	89	32			Max. Dry Density = 93 pcf @ 27% opt. water content (ASTM D-698)											
								Max. Dry Density = 110 pcf @ 18% opt water content (ASTM D-1557)											
Compll Remold		CH	27					5.0	0.5										
ompll Remold		CH	29					3.8	0.5										
Compll Remold		CH	30					3.2	0.6										

NOTES:

Note: For cation exchange and pH data, see attached Wilson lab report

* C' 'SIFICATION BASED ON VISUAL EXAMINATION AND/OR LABORAT~~Y~~Y TEST

TABLE A5 - W I L S O N L A B O R A T O R I E S

525 NORTH EIGHTH STREET - P.O. BOX 1884 - SALINA, KANSAS 67402-1884 - (913)825-7186

LABORATORY REPORT PAGE 1

CLIENT: WCC (W4C7729-6)
ATTN: FRANK WEAVER
5055 ANTIOCH ROAD
OVERLAND PARK, KS 66203

DATE RPTD: 01/22/86
DATE RCVD: 12/27/85
PURCHASE AUTH:
FILE NO.: 86-9559
ORDER NO.: 1489

LAB NUMBER: 86010028 DATE SAMPLED: 12/23/85
SAMPLE DESCRIPTION: COMPOSITE #1

ANALYSIS	CONCENTRATION	UNITS	BOOK-PAGE
PH, EXTRACTABLE	7.8	STANDARD UNITS	404-65
CATION EXCHANGE CAPACITY	28.	MEQ/100 G	160-80
CALCIUM, CEC EXTRACT	447.	MG/L	670-22
MAGNESIUM, CEC EXTRACT	63.	MG/L	670-22
POTASSIUM, CEC EXTRACT	15.	MG/L	511-144
SODIUM, CEC EXTRACT	9.	MG/L	670-22

—CONCLUSION—LAB NUMBER: 86010028 COMPOSITE #1

LAB NUMBER: 86010029 DATE SAMPLED: 12/23/85
SAMPLE DESCRIPTION: COMPOSISTE #2

ANALYSIS	CONCENTRATION	UNITS	BOOK-PAGE
PH, EXTRACTABLE	4.6	STANDARD UNITS	404-65
CATION EXCHANGE CAPACITY	17.	MEQ/100 G	160-80
CALCIUM, CEC EXTRACT	178.	MG/L	670-22
MAGNESIUM, CEC EXTRACT	87.	MG/L	670-22
POTASSIUM, CEC EXTRACT	9.	MG/L	511-144
SODIUM, CEC EXTRACT	19.	MG/L	670-22

—CONCLUSION—LAB NUMBER: 86010029 COMPOSISTE #2

LAB NUMBER: 86010030
SAMPLE DESCRIPTION: B-16 @ 49.5-51.0

ANALYSIS	CONCENTRATION	UNITS	BOOK-PAGE
PH, EXTRACTABLE	7.8	STANDARD UNITS	404-65
CATION EXCHANGE CAPACITY	20.	MEQ/100 G	160-80
CALCIUM, CEC EXTRACT	339.	MG/L	670-23
MAGNESIUM, CEC EXTRACT	32.	MG/L	670-23
POTASSIUM, CEC EXTRACT	8.	MG/L	511-144

CLIENT: WCC (W4C7729-6)

FILE NO.: 86-9559
ORDER NO.: 1489

LAB NUMBER: 86010030 (CONT.)

ANALYSIS	CONCENTRATION	UNITS	BOOK/PAGE
SODIUM, CEC EXTRACT	2.	MG/L	670-23
—CONCLUSION—LAB NUMBER: 86010030	B-16 @ 49.5-51.0		

LAB NUMBER: 86010031
SAMPLE DESCRIPTION: B-23 @ 27-28.5

ANALYSIS	CONCENTRATION	UNITS	BOOK-PAGE
PH, EXTRACTABLE	8.0	STANDARD UNITS	404-65
CATION EXCHANGE CAPACITY	19.	MEQ/100 G	160-80
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MAGNESIUM, CEC EXTRACT	20.	MG/L	670-23
POTASSIUM, CEC EXTRACT	6.	MG/L	511-144
SODIUM, CEC EXTRACT	ND(1)	MG/L	670-23
—CONCLUSION—LAB NUMBER: 86010031	B-23 @ 27-28.5		

ND(), WHERE NOTED, INDICATES NONE DETECTED WITH THE DETECTION LIMIT IN PARENTHESES.

ANALYSES WERE PERFORMED ON SAMPLED AS RECEIVED IN ACCORDANCE WITH PROCEDURES PUBLISHED IN THE FEDERAL REGISTER, VOL. 49, NO. 209, OCT. 26, 1984 OR IN EPA PUBLICATION, SW 846, 2ND EDITION, JULY 1982 AND IN THE PROPOSED ADDITION TO SW 846, 1984.

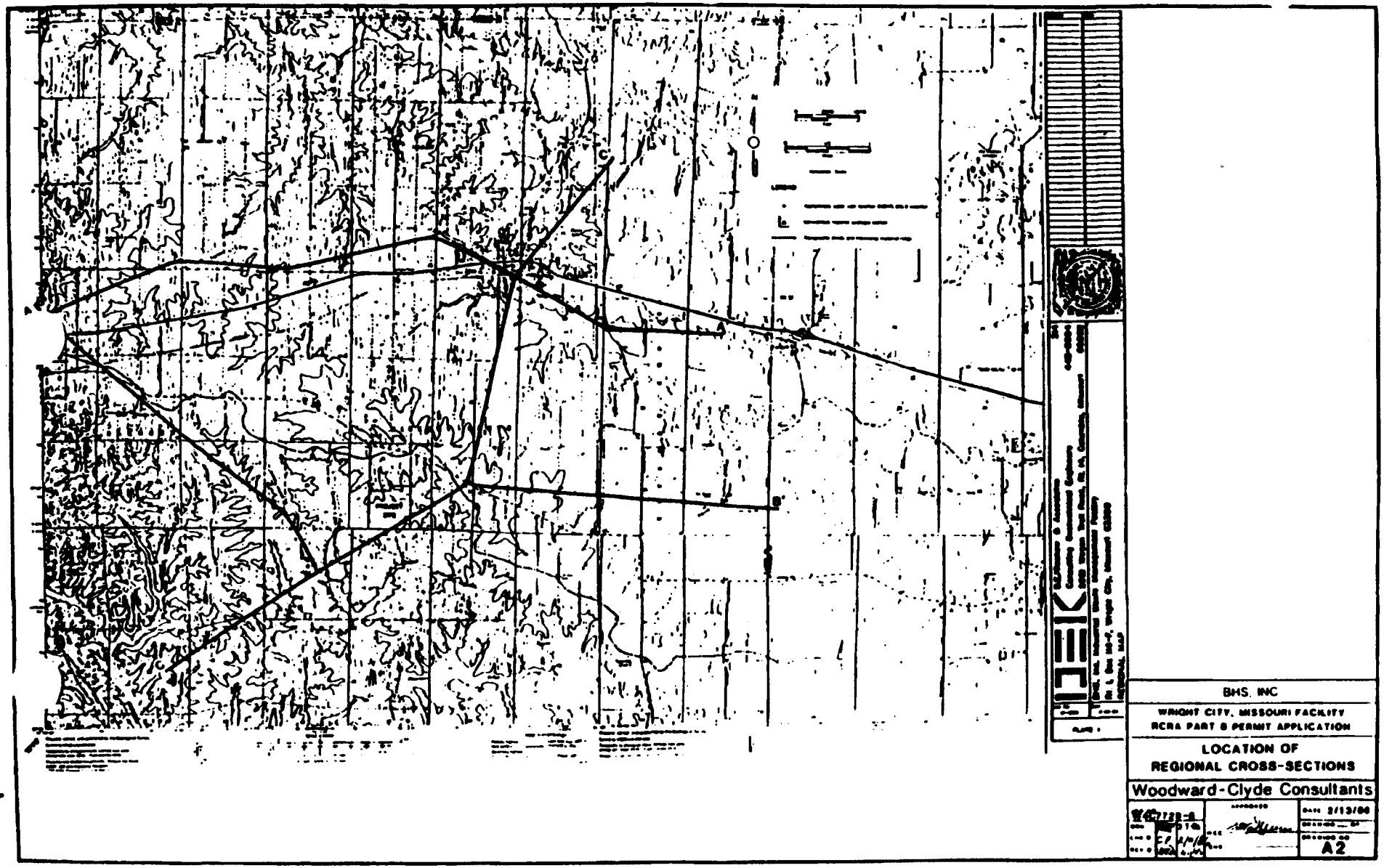
SAMPLES WILL BE RETAINED FOR 30 DAYS UNLESS OTHERWISE NOTIFIED.

IF YOU HAVE ANY QUESTIONS CONCERNING THIS REPORT, PLEASE CONTACT PROJECT MANAGER CLIFFORD J. BAKER , OR THE UNDERSIGNED.

WILSON LABORATORIES

Lynn R. Newcomer

LYNN R. NEWCOMER
CHIEF CHEMIST



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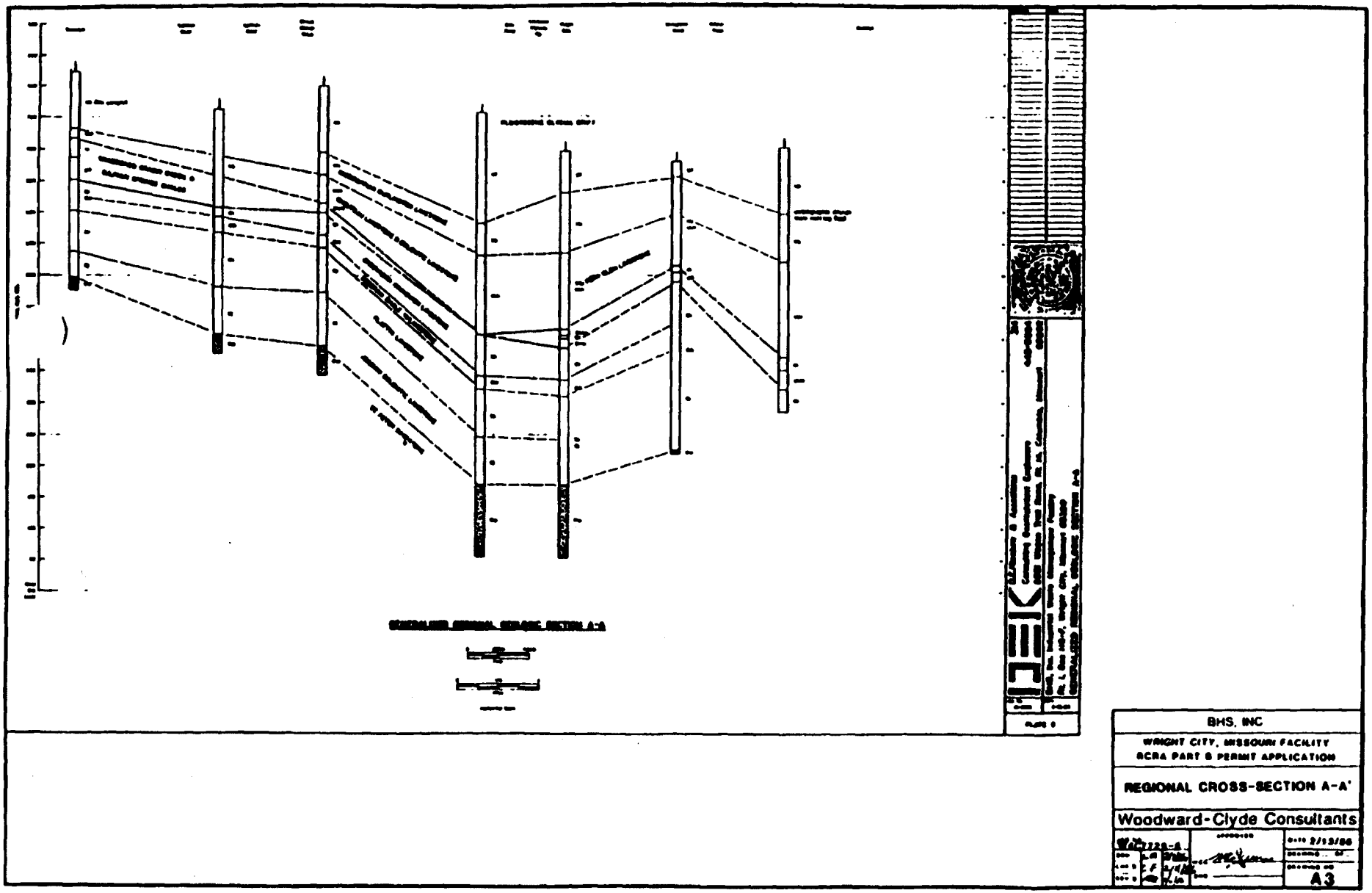
LOCATION OF
REGIONAL CROSS-SECTIONS

Woodward-Clyde Consultants

A2



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REGIONAL CROSS-SECTION A-A'

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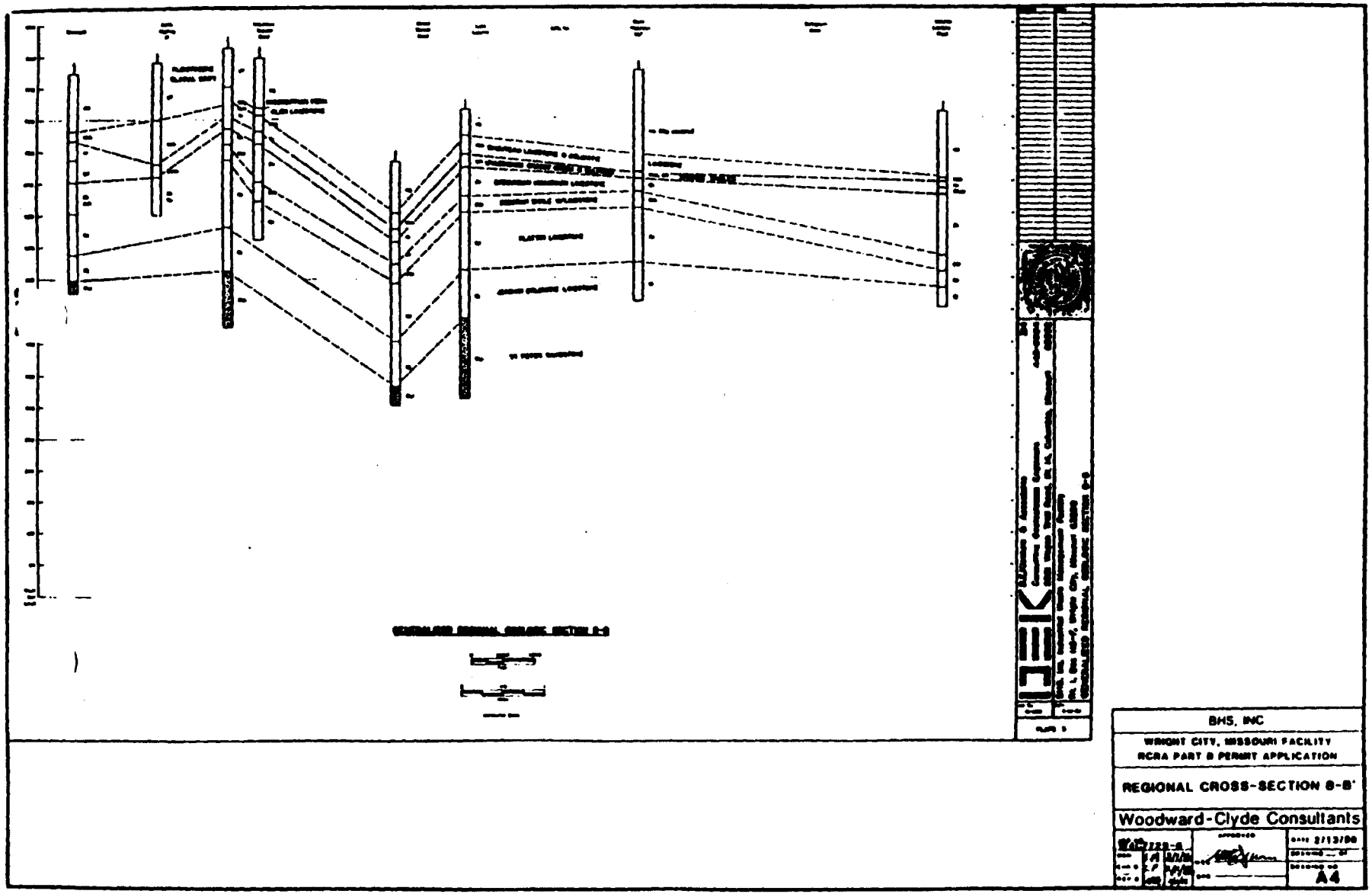

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REGIONAL CROSS-SECTION B-B'

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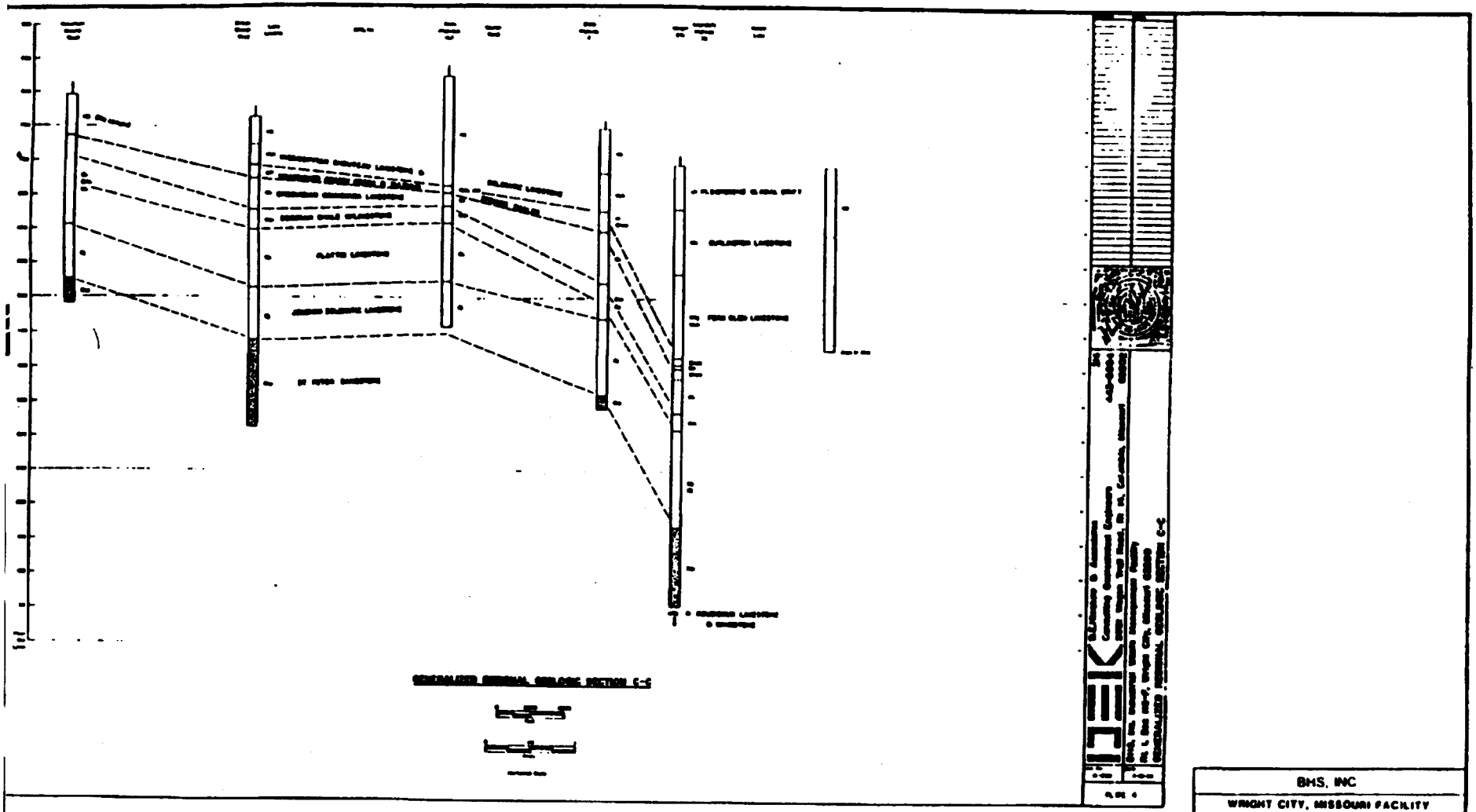

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REGIONAL CROSS-SECTION C-C'

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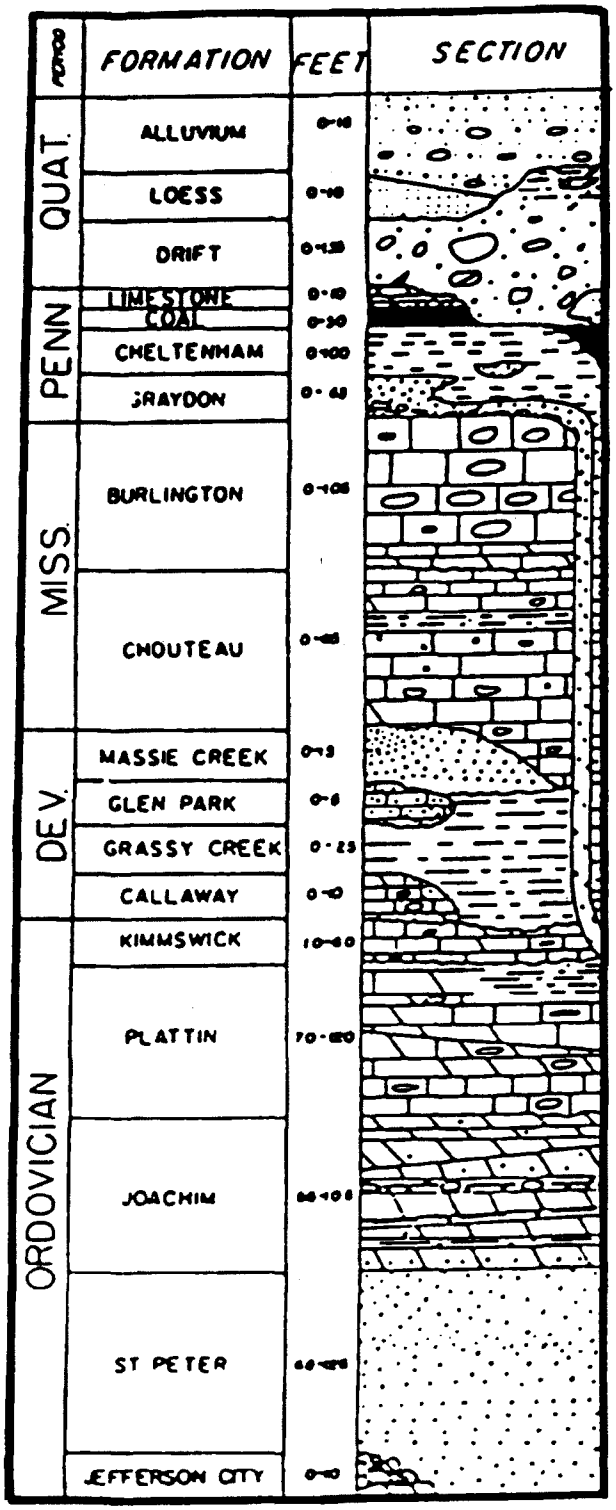

NOTE:

Information obtained from: GEOLOGY OF THE SOUTHERN HALF OF THE WARRENTON QUADRANGLE M.S. THESIS: University of Missouri, Columbia, Missouri L.H. Heflin, 1961.

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GENERAL STRATIGRAPHIC PROFILE

Woodward-Clyde Consultants

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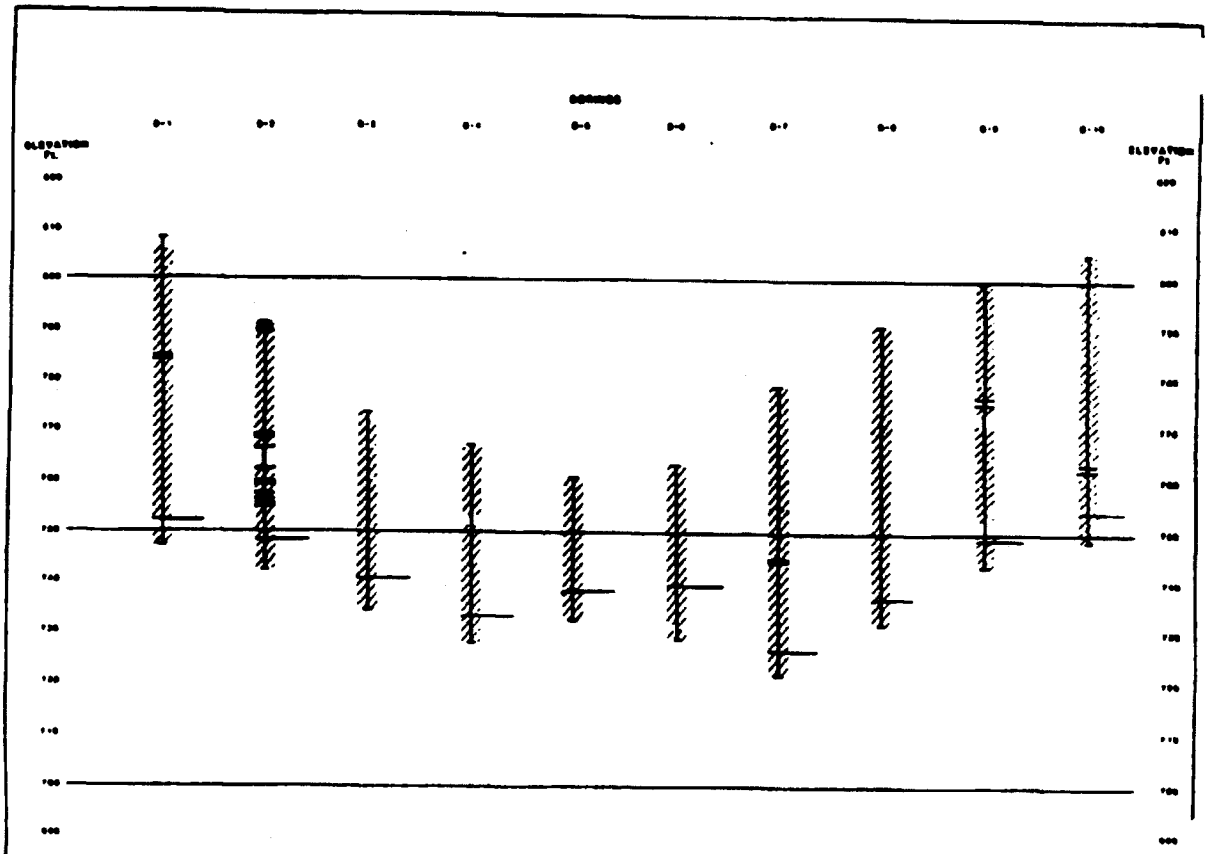

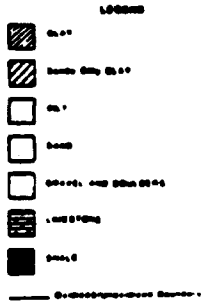

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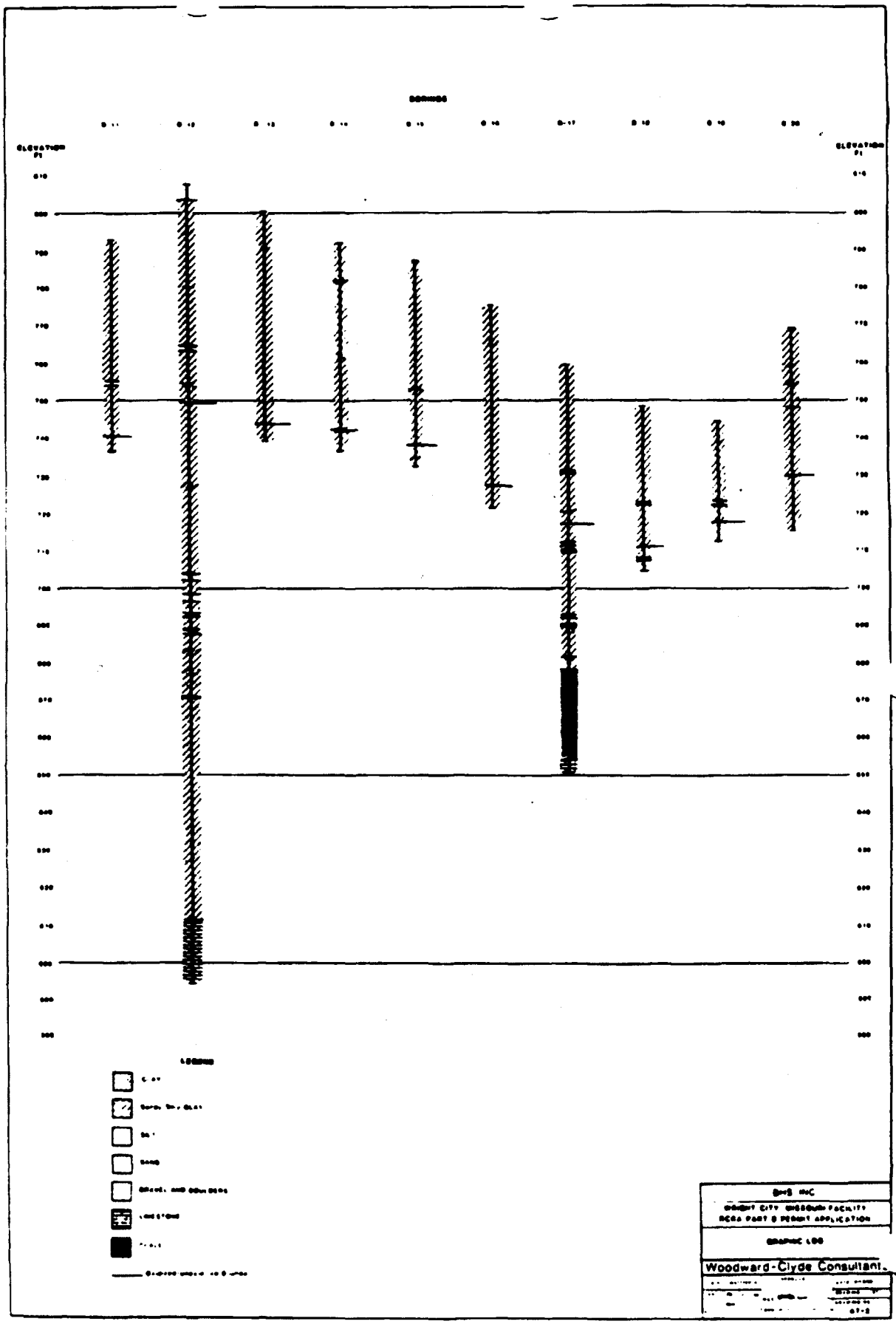
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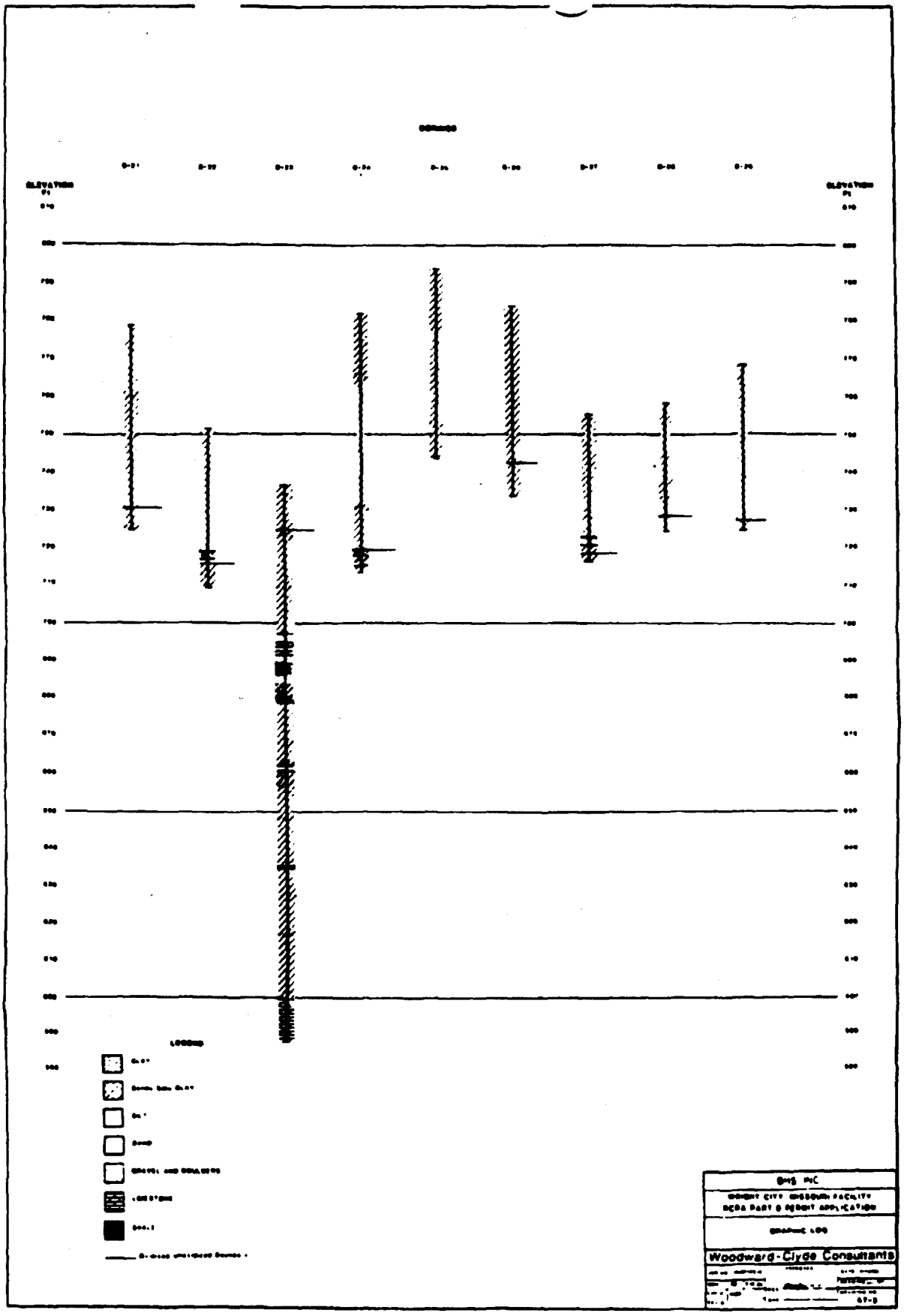
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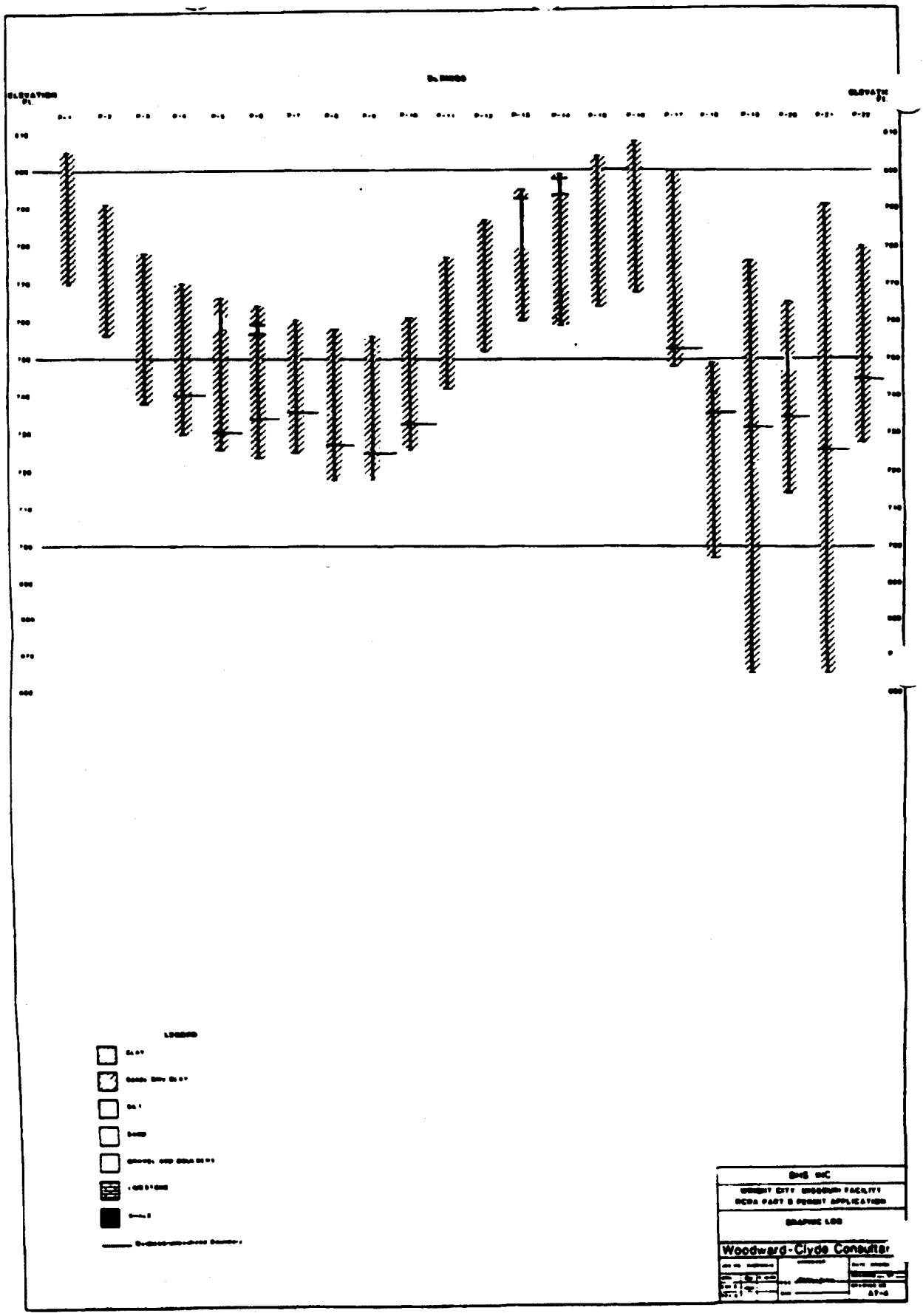

DHS INC

GRAPHIC LOG

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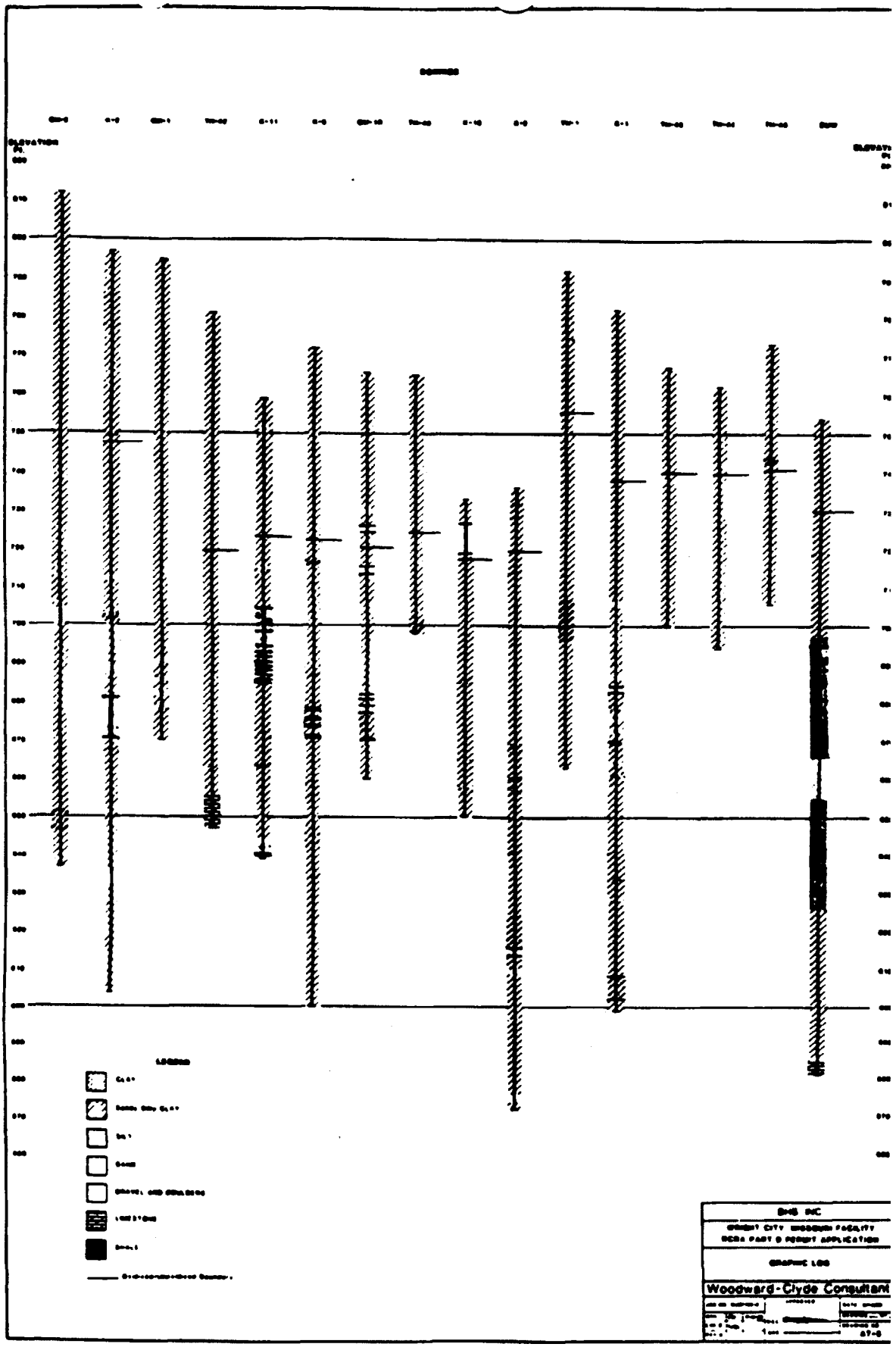
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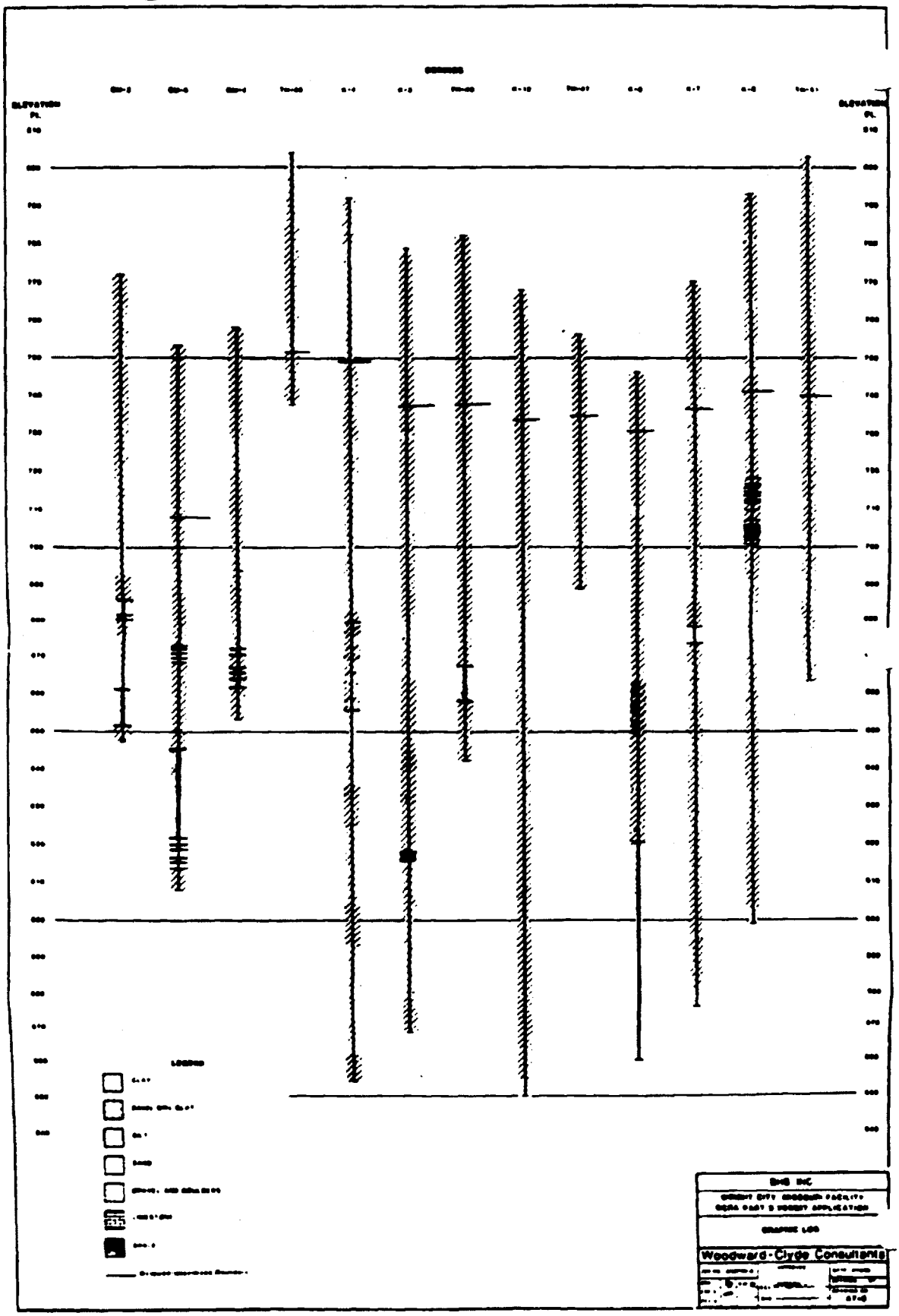
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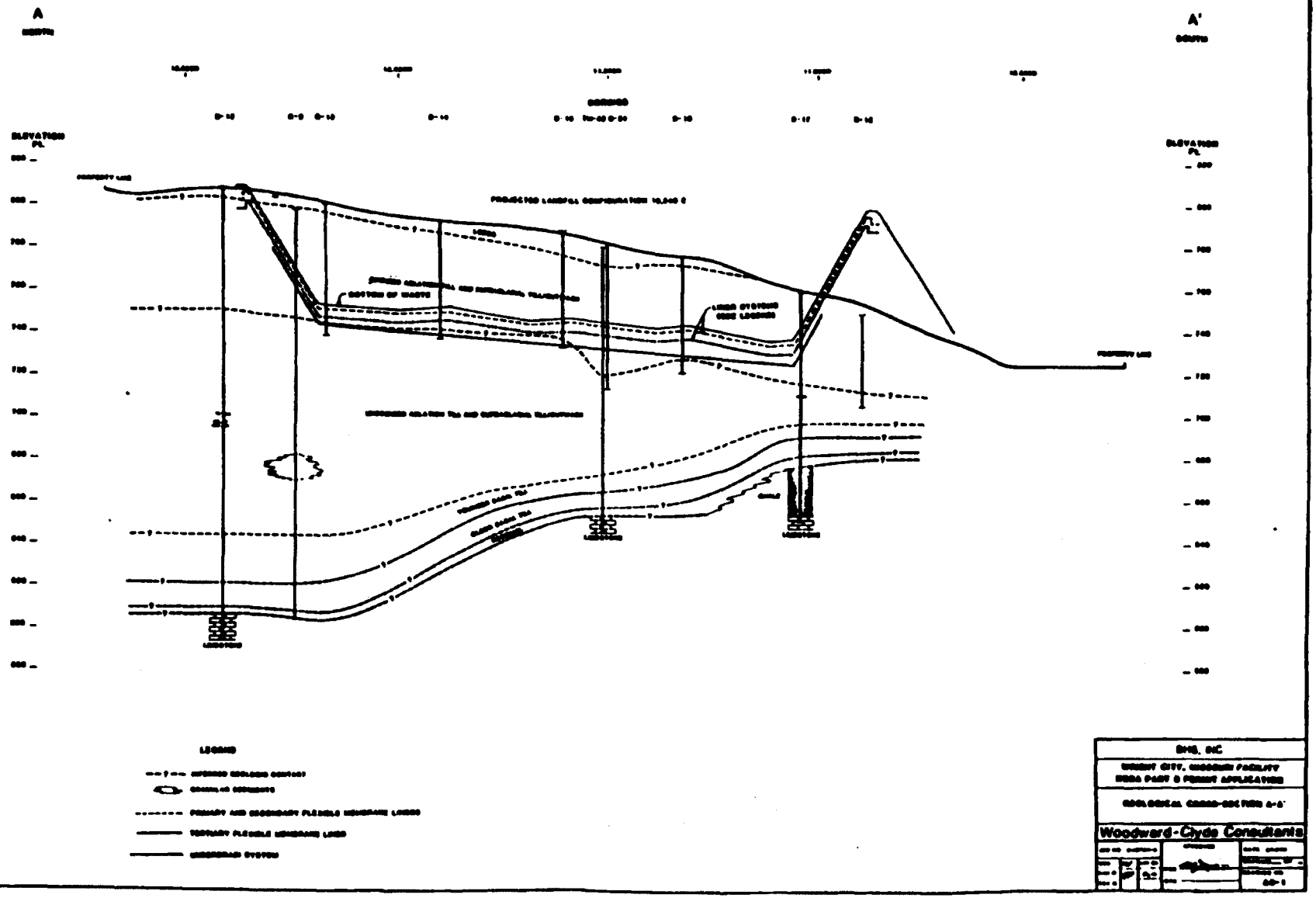
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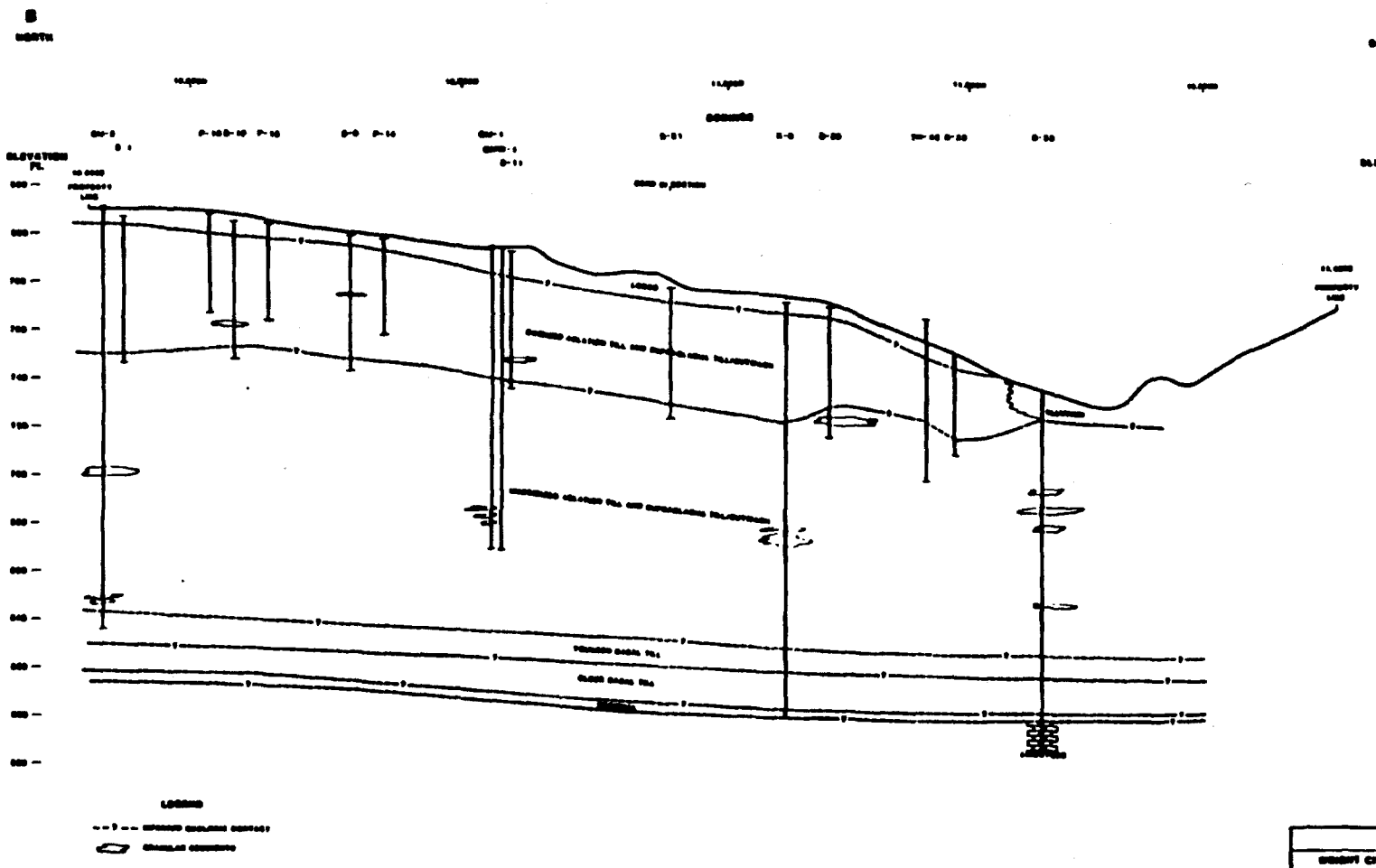
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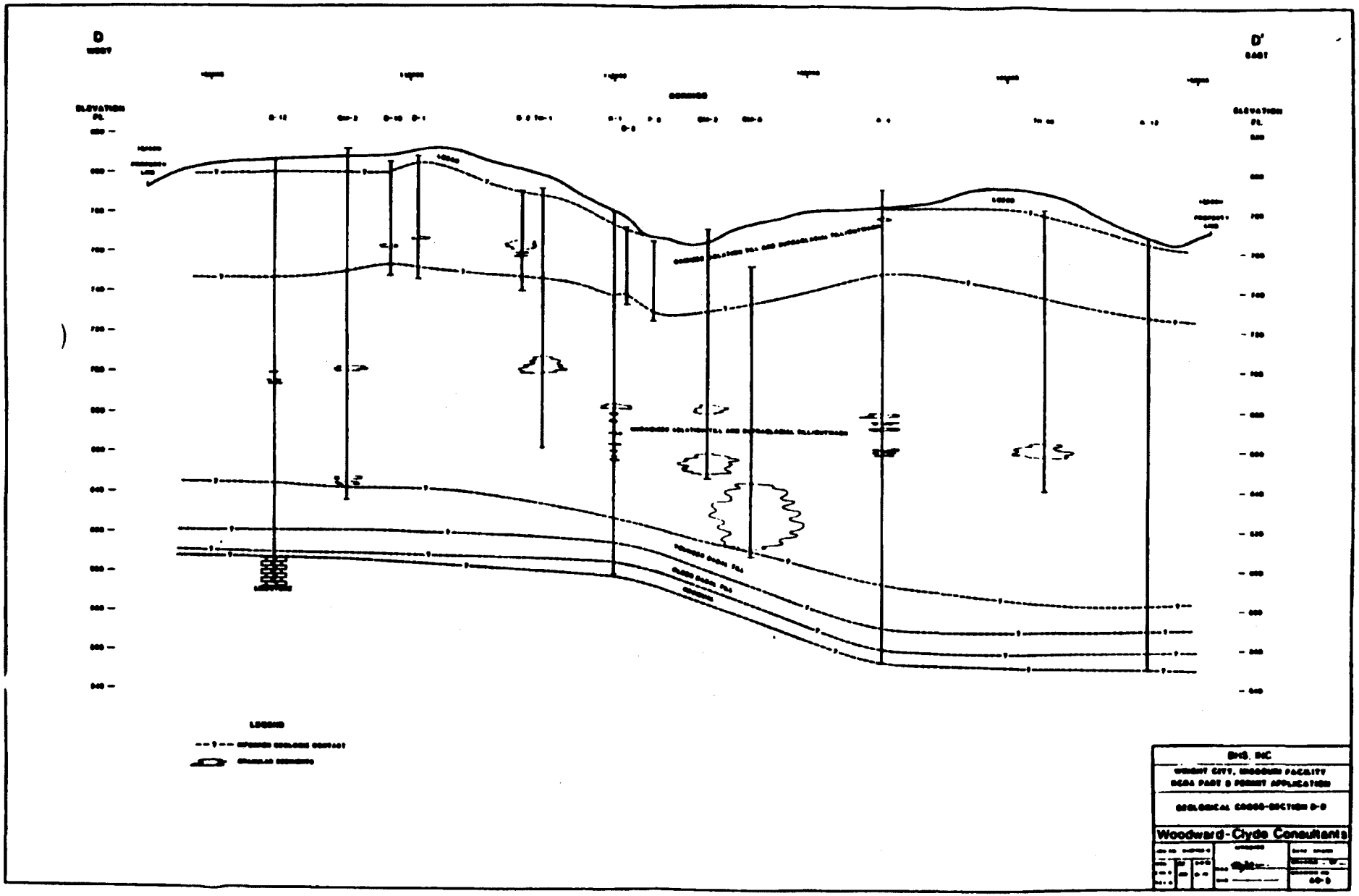
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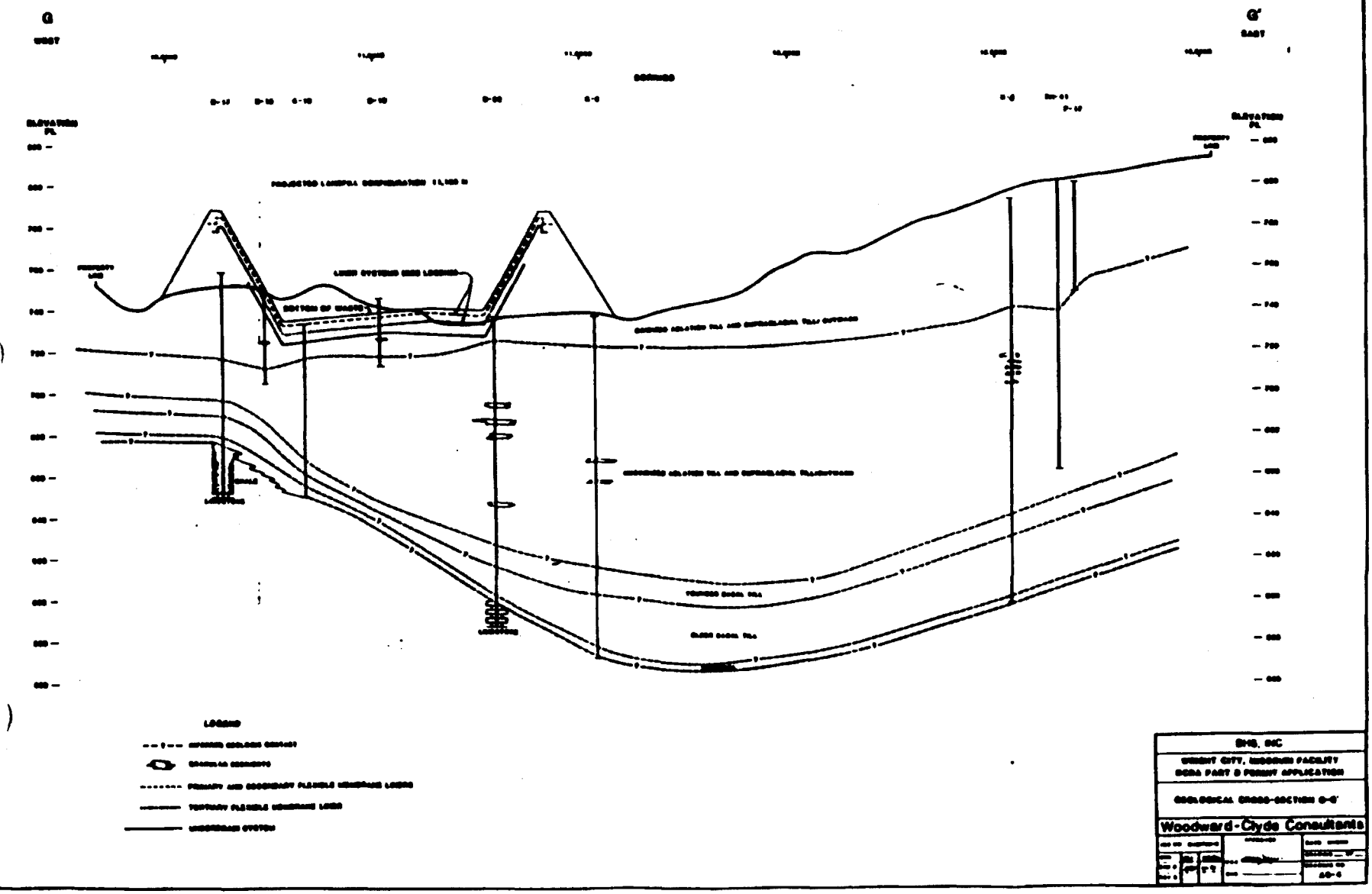
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B.H.S., INC.

TREATMENT, STORAGE, AND DISPOSAL FACILITY

RCRA
PART B PERMIT APPLICATION

FEBRUARY 14, 1986

B.H.S., Inc.
Route 1, Box 116F
Wright City, Mo. 63390

(314) 745-3371

VOLUME 12 OF 12

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BHS INCORPORATED

TREATMENT, STORAGE, AND DISPOSAL FACILITY
RCRA PART B PERMIT APPLICATION

February 14, 1986

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APPENDIX 2
GROUND WATER HYDROLOGY INVESTIGATION

I. INTRODUCTION

This report presents the findings of the ground water hydrology investigation of the BHS landfill site in Warren County, Missouri by Woodward-Clyde Consultants (WCC). This section provides a brief geologic summary, the investigations completed to date, and the descriptions of the regional and site hydrology.

A separate geologic report has been prepared and is presented as Appendix 1 of this Part B Permit application.

The purpose of this report is to summarize and update previous investigations of the hydrologic conditions at the site and vicinity by incorporating newly acquired information pertaining to site hydrology. This report has been prepared in conjunction with Section III of the main body of the Part B Permit application which presents specific information concerning site conditions.

This appendix is organized to generally follow the progress of activities at the site. Section II provides a brief summary of the geologic setting. Section III provides a summary of previous work, Section IV is a summary of information which describes field and laboratory activities of this investigation, Section V describes the hydrologic units beneath the site, and Section VII presents the analysis of ground water levels and ground water quality.

II. GEOLOGIC SUMMARY

The topography of the BHS site is gently rolling with moderate relief on the order of 85 feet. The site is transected by two intermittent streams (i.e., one flowing southwesterly across the property and a second stream

flowing southerly through the center of the site). A small south-southeast trending swale occupies the central portion of the proposed expansion area of the site.

The unconsolidated soils at BHS consist of a lowermost, discontinuous residual clay covered by varying thicknesses of Pleistocene glacial and Holocene alluvial-colluvial deposits or loessial soils. A dense, plastic clay till forms the base of the glacial deposits. The basal tills are overlain by unoxidized silty-clay ablation tills mixed with granular deposits of supraglacial or outwash origin. These deposits are overlain by oxidized and weathered silty-clay till, in turn veneered by loessial silt deposits on the uplands and alluvial-colluvial granular sediments in the stream valleys.

The maximum thickness of the unconsolidated sediments is on the order of 250 feet. The loess and oxidized till deposits have been designated the 'A' hydrologic unit and the unoxidized till and residual soils have been designated the 'B' hydrologic unit, as indicated in Table 2-1.

The site bedrock topography forms a buried bedrock valley that apparently drained to the northeast prior to glacial soil deposition. Relief in this bedrock valley is on the order of 125 feet and various stratigraphic units form the bedrock surface.

The youngest rock units identified at BHS are shales of the Sulfur Springs Group at approximate depths of 80 feet. This unit is underlain by shales of the Snyder Creek Formation. The maximum thickness of these two units at BHS is approximately 30 feet. A thick rock sequence consisting of the Callaway, Kimmswick, Plattin and Joachim Limestones and the Decorah Shale underlies the Snyder Creek. The Joachim through Sulfur Springs has an aggregate thickness on the order of 250 feet, although this full thickness is not present everywhere due to pre-glacial erosion. The units from the Sulfur Springs to the Joachim are designated the 'C' hydrologic unit (Table 2-1).

The St. Peter Formation underlies the Joachim and is a fine to medium grained, moderately to poorly cemented sandstone. This unit is on the order of 110 to 125 feet thick and is designated the 'D' hydrologic unit. The St. Peter is present at depth ranging from 350 to 500 feet below ground surface.

The St. Peter is underlain by the Powell and Cotter Limestones and the Jefferson City Limestone/Dolomite units. Collectively, these units are on the order of 450 to 600 feet thick and are designated as the 'E' hydrologic unit on Table 2-1.

The Jefferson City is underlain by the Roubidoux Formation, a mixed sandstone, dolomitic sandstone and cherty limestone. The Roubidoux is at least 150 feet thick in the BHS area and is designated as the 'F' hydrologic unit (Table 2-1).

III. PREVIOUS INVESTIGATIONS AND BACKGROUND

Ground Water Investigations

Ground water investigations at the BHS site commenced in March, 1976. Previous site investigations have included installation of piezometers and wells to measure ground water levels and to sample for ground water quality tests. Slug tests have been conducted on selected wells and piezometers at the site. No specific off-site investigation of ground water from the near-surface materials has been conducted.

Locally there are a number of wells that penetrate the St. Peter Sandstone and deeper aquifers. Logs of these wells have been utilized to interpret the local stratigraphic sequence.

The existing wells on the site prior to the most current investigation are documented in Table 2-2 which summarizes some of the pertinent details associated with these monitoring locations. Well locations are shown on Drawing 2-1.

The methods of well installation have varied. Initially, construction materials used in wells were solvent-welded PVC. These materials were replaced with flush-coupled, threaded PVC with screw-in end plugs. Generally, the annular space between the screen and the borehole was filled with sand to act as a filter. The filter pack, which typically extended 1 foot above the screen, was sealed from overlying strata with bentonite and cement.

A plan for ground water monitoring was initiated by Reitz & Jens, Inc. in 1976 which included construction of shallow piezometers and a moderately deep monitoring well (designated P and DMW, see Table 2-3). Creek locations were also monitored. An extensive plan was implemented by D. E. Klockow and Associates in 1981 which included well installation at staged monitoring locations (designated K). Typically, each location had one or more piezometers screened in different hydrologic zones.

During the month of November, 1982, four ground water monitoring wells were installed under the direction of D. E. Klockow and Associates around the Area 1 waste disposal trenches; these wells are designated GM-1, GM-2, GM-3 and GM-4. Well depths are: 105± feet (GM-4), 125± feet (GM-1 and GM-3), and 175± feet (GM-2). Typically, these wells are screened in the lower 20 feet.

In May, 1984, two additional wells, GM-1R and GM-5, were installed to a depth of 60 feet and 145 feet, respectively. These wells were 4 inches in diameter, flush-jointed PVC with well screens 15 feet and 25 feet in length, respectively.

IV. FIELD ACTIVITIES

Field activities were performed by WCC in 1985 to characterize the hydrologic and geological units and to evaluate the extent of hydraulic connection within the hydrologic units. Over 30 borings were drilled with three borings extending into bedrock. Field activities included placement of borings around both the existing landfill area and proposed

landfill area. Procedures to complete the borings as monitoring wells are described below. The frequency and techniques to measure water levels in the wells, as well as the methods to determine the hydraulic conductivity of the materials surrounding screened zones of the wells, are also presented. Sampling and measurement of selected water quality parameters is planned to commence following completion of well development. Procedures related to sampling and analyses are described in Section III.A.5.b of the Part B Permit application.

a. Well Design and Materials

The screen slot size was selected based on grain-size distribution data from geotechnical laboratory tests conducted in 1985. The B-series and the GMW-series wells were constructed of 2-inch-ID, flush-coupled and threaded, No. 316 stainless steel riser and screen; whereas, piezometers were constructed of 2-inch-I.D. flush-coupled PVC riser pipe and screen. The B-series wells were completed with nominal 10-foot-long screens; whereas, the GMW-series wells were constructed with 20-foot-long screen lengths. A 10-inch dense-phase sampling cup was installed below the screened interval. The B-series well screens were constructed with the mid-point of the screened interval typically located at the oxidized/unoxidized glacial till interface. Exceptions are noted. The screened intervals for the two GMW-series wells were constructed with the base of the well screen set at 124 and 104 feet for GMW-1 and GMW-4, respectively. Clean, rounded, quartz sand (locally available) was used as the filter material. A schematic drawing of a typical well is shown in Figure 2-1.

b. Well Installation

Altogether, twenty-nine wells were installed in 1985 on the BHS site at locations shown on Drawing 2-2. As-built well completion reports are presented in Attachment 2-1 and summarized in Table 2-2. The GMW-series wells were installed with 20-foot-long screens based at 124 feet (GMW-1) and 104 feet (GMW-4) from the ground surface.

Piezometers 18A and 19B of the B-series were installed to monitor sand lenses within the oxidized zone. These piezometers were constructed of 2-inch-ID, Schedule 40 PVC riser and screen (5 feet in length) with a slot size of 0.01 inch.

The rounded quartz sand used as a filter material was thoroughly washed in tap water to reduce the quantity of organic admixtures. The clean sand was typically placed into the annular space through the hollow-stem auger (HSA) to a level approximately 2 feet above the screened interval. The filter pack was then sealed with bentonite pellets to a minimum thickness of approximately 2 feet. The annular space within the saturated zone was filled with granular bentonite. Typically, the augers were pulled out at this time maintaining a 2-foot-thick head of bentonite within the augers. The intermediate zone, if any, between the top of the saturated zone and a level 10 feet below the ground surface was filled using a cement grout with 10 percent bentonite. A tremie pipe was used to install the sealant if water was present.

On wells B-18 and B-19 a bailer was used to evacuate water from the top of the granular bentonite seal. In piezometer B-19B the pump of the drilling rig was used for the same purpose. The upper 10 feet of annular space were sealed using a cement grout with 30 percent added sand. The same grout was used for construction of the surface pad.

Locking, protective steel casings were installed to protect the wells and piezometers.

All materials used in well construction were decontaminated using a steam cleaner prior to use and subsequently wrapped in plastic. All drilling crew personnel wore clean disposable gloves while handling all well and piezometer materials.

c. Well Development

During December of 1985 and January of 1986, all newly installed wells on the BHS site were developed by WCC field personnel. The objectives of development were to remove suspended matter from the water, to remove materials introduced into the formation during drilling operations, to stabilize filter material, and to provide gradation of the material in the formation immediately around the screen and filter.

A Teflon bailer was dedicated to each B-series well (a PVC bailer was dedicated to piezometers 18A and 19B). Each bailer was steam cleaned, washed with a non-phosphate detergent, and then rinsed with tap water, distilled water, acetone and hexane before use.

All water level readings, volume computations, quantity of evacuated water, and water condition description were recorded in field notebooks dedicated to the development program. These notebooks were updated daily. Water resulting from well development was collected in numbered drums dedicated to each well. The amount of water removed from each well was calculated based on the volume of the bailer and the volume of "wet inches" in 55-gallon drums.

Mechanical surging with a surge block was performed on all wells of the B-series as a second stage of development except B-1, B-12A and B-17A which were normally dry.

d. Ground Water Elevation Monitoring

Regular measurements of water levels were taken on all the newly installed wells. The ground water levels were measured from the mark on the top of the riser using an electric water level meter. The measured depths were used to calculate the elevation of the water surface in the wells and to calculate the potentiometric heads. Subsequent to each measurement, the probe and cable of the electric

water meter were sprayed with distilled water and acetone and dried to minimize the potential of cross contamination between wells.

e. Aquifer Evaluation

Slug tests were conducted in piezometers/wells B-11A, B-18, B-18A, B-20, B-21A, and B-22A between January 22 and January 31, 1986 to estimate the hydraulic conductivity of the permeable zones within the screened interval of each well. The tests consisted of measuring the rate at which the water level in the monitoring well declined after a known volume (slug) was instantaneously introduced, and the rate at which the water level rose after the slug was removed. Two slugs were used to alter the water levels: a 6-foot-long "tube" slug of reinforced hose and PVC pipe and a 7.9-foot-long PVC "pipe" slug. An In-Situ Model SE-1000B Hermit Data Logger with a submersible pressure transducer (10 psi) was used to record water-level changes.

Initially, the slug was quickly, but smoothly, lowered into the well until immersed. The resulting falling water level was recorded by the Hermit Data Logger until the water level returned to 90+ percent of the pre-immersion static level. Then the slug was quickly and smoothly removed from the well. Changes in pressure head as sensed by the transducer were recorded by the Data Logger.

Upon completion of each test, a hard copy of the data was obtained using an In-Situ SE1004 Data Printer. Preliminary data reduction was performed to compute the value of head in feet for selected times.

Table 2-4 provides the pertinent water-level and well construction data used in evaluating the saturated thickness at each well location. The last column of the table indicates the saturated thickness selected for the analysis in each case. The data were prepared for analysis by entry on an input data form specifically prepared for the computer program SLUGT. This program computes aquifer transmissivity (T) and hydraulic conductivity (K) using two independent methods. The

first method is Cooper, Bredehoeft and Papadopulos (1967) and applies to confined aquifer conditions for fully penetrating wells. The second method is the method of Bouwer and Rice (1976) and applies to unconfined aquifers for fully or partially pentrating wells. Program SLUGT computes T and K values two ways under the second method. In the first case, the diameter of the drilled hole is taken as the diameter of the well. Also in this case, whenever water-level recovery occurs within the well screen, the cross-sectional area of the drill hole corrected for the presence of the gravel pack is taken as the cross-sectional area of water-level recovery. In the second case, the well casing or screen is used in the computation for both the well diameter and cross-sectional area of the water-level recovery.

The computer output displaying the results of the computations of Program SLUGT is provided in Section III.A, Attachment 6, of the Part B application. A summary of the results indicating the computed hydraulic conductivities in each case is presented in Table 2-5.

V. HYDROLOGIC MODEL

A hydrologic model is a representation of physical, chemical, and biological processes that occur in the hydrologic cycle. A model may be based on concepts that provide a qualitative understanding of hydrology or based on mathematical formulations that provide a quantitive description of hydrology.

a. Conceptual Hydrologic Model

The general hydrology of the site, including precipitation, evapotranspiration, and surface runoff, was described by Reitz & Jens, Inc. in an April, 1980 document. The following general hydrologic information was taken from that report.

Average annual precipitation for three nearby locations are:

o	Troy	(11.5 miles north of Wright City)	37.51 inches.
o	Warrenton	(7.0 miles west of Wright City)	37.15 inches.
o	Washington	(19.0 miles south of Wright City)	38.01 inches.

Precipitation is not recorded by the National Weather Service at Wright City.

Studies conducted by the Illinois State Water Survey and Minnesota Resources Commission indicate average annual lake evaporation values that are slight higher than average annual precipitation (e.g. at St. Louis the mean annual precipitation is 36.57 inches and the mean annual evaporation is 40.99 inches).

Reitz & Jens, Inc. reported that the area of the upper watershed that drains surface runoff onto BHS is 333 acres. The BHS property is 150 acres, making 483 acres the total area of surface runoff leaving the property. Two small reservoirs are located near the BHS property (i.e., one north of the site and one southwest of the site). The reservoir to the north of the site supplies water to the intermittent stream that flows along the east side ofthe existing facility. The reservoir acts as a source of recharge to alluvial sediments in the stream bed.

In the Charrette Creek (the surface drainage stream receiving runoff from the site), surface runoff is not monitored by a USGS gaging station. An investigation performed by the United States Geological Survey (USGS) and Missouri Geological Survey (MGS) (Skelton, 1973), indicates that average annual runoff at the BHS site is 9.6 inches. The average soil infiltration is given as 2.6 inches increasing to 3.5 inches south of the BHS property.

The hydraulic property of primary importance is hydraulic conductivity (often referred to as the coefficient of permeability). Field and laboratory tests have been conducted to determine hydraulic conductivity, both in a vertical and horizontal orientation. Hydraulic conductivity measurements are presented in Attachment III.A-6 to the Part B Permit application.

Many shallow borings have been constructed (by WCC and others) for the purpose of monitoring the hydraulic properties of the relatively shallow geologic units and determining water quality. While some of the borings have penetrated bedrock, no monitoring wells have been completed into the rock formations.

Two deep bedrock wells have been constructed on the BHS site for water supply purposes. These wells are designated the "Truck Wash Well" which is used to wash equipment related to landfill purposes and the "Zykan Well" which is now used for the potable water supply for the entire facility. The Zykan Well is located near the northwest property corner; whereas, the Truck Wash Well is located in the central portion of the site. Both wells penetrate the St. Peter Sandstone. This unit is a portion of the Kimmswick-Potosi aquifer as defined by the USGS (1984). This aquifer is the primary drinking water source for municipalities in seven neighboring counties including Warren County.

Water levels have been reported by Reitz & Jens, Klockow and WCC. Figure 2-2 illustrates a hydrograph of the K5 well nest. The hydrograph shows the approximate potentiometric head in sediments beneath the site. The screened zones are shown in Table 2-2. These figures indicate that the hydraulic gradient is downward. A detailed discussion of ground water flow is presented in the following sections.

Subsurface geological information has been used to establish hydrologic units at the site under study. Hydrologic units are distinguished by their ability to transmit water; whereas, geologic units are distinguished by geologic characteristics.

A series of hydrologic units has been defined for the area under consideration. These units are described as 'A' through 'F'. Table 2-1 illustrates the relationship of geologic units to hydrologic unit designations. Individual hydrologic units are discussed in detail in the following sections.

1) Hydrologic Unit 'A'

This hydrologic unit is the uppermost saturated zone and is the first potential pathway of contaminant migration. Hydrologic unit 'A' is a silty clay with sand that is yellow-brown in color. This unit is an oxidized glacial till (see Appendix 1). The basal surface of hydrologic unit 'A' is irregular and generally follows the land surface topography. The unit displays fractures and joints which is secondary porosity, and hydraulic conductivity increases over matrix porosity and conductivity. A summary of the hydraulic conductivity tests performed on wells or samples from hydrologic unit 'A' is presented in Table 2-6. The depositional environment of glacial till results in deposits that have a large percentage of very fine grains; however, large (pebble size or greater) grains are also present. This variability of the size and distribution of grain size can yield a relatively large variation in hydraulic conductivity.

a) Water Levels

Water level hydrographs of recently constructed wells which were screened in hydrologic unit 'A' or screened at the interface of hydrolgic units 'A' and 'B' are presented in Figures 2-3 through 2-26 and presented in tabular form for 1985 and 1986 in Attachment 2-2. The figures indicate the approximate top and bottom of the filter, the land surface elevation, and the approximate time of well development. The hydrograph of well B-3A (Figure 2-4) indicates the slow recovery of the water level in this well in response to water withdrawals during development. At the north end of the facility property water levels in wells B-1A and B-9 (Figure 2-10), B-10A (Figure 2-11), B-12B (Figure 2-13), and B-13 (Figure 2-14) are below the top of the well screen and are approximately at the interface of the 'A' and 'B' hydrologic units. Due to the development process, B-1A has not had measurable levels of water.

Near the southern boundary of the proposed facility expansion, water levels in wells B-18 (Figure 2-19), B-19A (Figure 2-21), and B-23A (Figure 2-26) are noticeably shallower than the wells located farther north.

A continuous record of the water level in well B-23A was made from January 28 to February 3, 1986 (Figure 2-27). During that period, approximately 4 inches of rain were observed near the site at Lambert Airport in St. Louis, Missouri. On February 1, 1.30 inches were recorded, 1.02 inches on February 2, and 1.57 inches on February 3. The continuous hydrograph of well B-23A shows a marked increase in the water level starting shortly before midnight on February 1, as shown on Figure 2-27. This increase peaked around noon on February 3, with an overall increase of about 3 feet. Water levels taken for wells B-18 and B-19A on

January 31 and February 3 indicate an increase of about 1 to 2 feet.

This sudden rise in these hydrographs can be attributed to several factors: runoff from the northern portion of the site ponded near the area of B-23A and created an available supply of water which contributed to the amount of infiltration; and small sand lenses, fractures and joints in the soil above the screened interval of the wells were noted on the boring logs during the installation of all three wells, allowing water to infiltrate at a rapid rate as indicated on the hydrograph (Figure 2-27).

Piezometers P-A, P-B, P-C and P-D were installed under the supervision of Ben Moore, Site Engineer, prior to the breeching of two old farm ponds and their subsequent drainage in early October, 1985. Limited construction details are presented in Table 2-2. No water level information was recorded prior to the onset of the WCC field investigation in late October, 1985. Lack of these data makes an accurate assessment of the impact of the ponds on the aquifer prior to drainage difficult. Water level information obtained from these piezometers during the field program is included in Attachment 2-2.

A potentiometric map of hydrologic unit 'A' is presented in Drawing 2-3. The data were obtained on January 3, 1986 (during a period in which the wells were not being developed). The potentiometric surface shows a ground water mound that is attributed to the old farm pond that was drained in October.

To estimate vertical and horizontal travel times in the ground water environment, vertical and horizontal fluid velocities were estimated. The horizontal fluid velocities

were estimated from lateral gradients which were estimated from hydraulic unit 'A' piezometric surface maps, hydraulic conductivity, and estimated effective porosity. Velocities were estimated first as Darcy velocities (specific discharge, v), and then, to obtain a more conservative value, as seepage velocities ($v_s = v/n_e$, where n_e is the estimated effective porosity of the unit).

Vertical fluid velocities were estimated in the same manner as the horizontal velocities except that vertical gradients and vertical thicknesses were used. In these calculations, which are shown below, hydraulic conductivities in the horizontal and vertical direction were assumed equal. This is a conservative case in that faster vertical flow velocities are calculated than would realistically be expected. Travel times were then estimated horizontally and vertically in the unit to evaluate the monitoring requirements.

The data and estimated values used in these calculations were:

- Effective Porosity = .10 (10.0%)
- Hydraulic Conductivity = .028 fpd (10^{-5} cm/sec)
- Ground Surface - 792 feet above MSL
- Unit 'A'/'B' Interface = 730 feet above MSL
- Fluid Head at the Unit 'A'/'B' Interface = 756 feet above MSL
- Lateral Gradient = .05 (average)

Darcy Velocity was estimated using:

$v = Q/A = K * i$ where:

v = Darcy Velocity

v_s = Seepage Velocity

Q = Flow Rate
A = Area of Discharge
K = Hydraulic Conductivity
i = Gradient (change in head/unit distance)

Vertical Velocity:

Darcy: v = (.028 fpd) (44 ft/62 ft) = .02 fpd
Seepage: v_s = (.028/.10 fpd) (44 ft/62 ft) = 0.20 fpd

Horizontal Velocity:

Darcy: v = (.028 fpd) (.05 ft/ft) = .0014 fpd
Seepage: v_s = (.028/.10 fpd) (.05 ft/ft) = .014 fpd

From these velocities, average travel times of fluid particles were estimated. Using a hydraulic unit 'A' thickness of 50 feet, the vertical travel time for a particle moving at the velocity of the fluid, from the ground surface to the 'A'/'B' interface, ranged from .68 years to 13.6 years. The horizontal travel time, assuming a distance from particle release to a monitoring well of 250 feet, ranged from 49 years to 980 years.

b) Water Quality

Natural ground water quality for wells in hydrologic unit 'A' is based on one sample (taken on September 1, 1983) from two of the K-series wells: K2 (ox) and K5 (ox). The screened portion of the wells intersects the interface zone at a depth of approximately 35 feet below the land surface. Previous reports indicate the samples were collected in accordance with the procedures outlined in the National Handbook of Recommended Methods for Water-Data Aquistion, (1977). Prior to obtaining samples for analysis, the wells

were flushed by bailing them dry. The wells were then allowed to recharge for 24 hours prior to sampling. Samples were then collected using bailers which had previously been decontaminated by alternate rinses with acetone and distilled water. One bailer was dedicated to each well.

Sample pH, temperature and specific conductance were measured and recorded in the field. Table 2-7 provides a summary of the analysis and the physical description of the samples collected.

Each sample was analyzed for the cations, Calcium (Ca), Magnesium (Mg), Potassium (K) and Sodium (Na); and for the anions, bicarbonate (HCO_3), Carbonate (CO_3), Sulfate (SO_4) and Chloride (Cl). The laboratory analyses for these parameters are given in Table 2-8. The charge balance and calculated total dissolved solids (TDS) concentrations are provided in Table 2-9, and a Stiff diagram of the water sample from well K2 (ox) is provided in Figure 2-28.

The charge imbalances for the water samples preclude a quantative analysis of water quality, however, the data presented indicates that the water quality in the two wells is comparable. Alkalinity in K2 (ox) was approximately 19.5% greater than in K5 (ox). Alkalinity found in both wells was in the form of bicarbonate alkalinity. K2 (ox) exhibited more than twice the concentration of chloride ions than K5 (ox). Other water quality parameters analyzed were generally comparable and the overall water quality is typical of water taken from shallow clay soils.

2) Hydrologic Unit 'B'

This unit consists predominantly of dark gray silty clay with some minor sand lenses. This unit is associated with the

unoxidized glacial till. On-site wells installed in this unit are shown on Table 2-2. Sand lenses have been identified in this unit from logs and samples; however, their occurrence is at irregular elevations and thickness and is not considered continuous throughout the site. The likelihood of multiple connections between lenses that occur at different elevations is extremely unlikely. Wells GM-3 and GM-5 substantiate this in that both are completed in sandy zones; however, there is no correlation between water levels measured in 1984 (Table 2-10). The basal surface of hydrologic unit 'B' is the contact with bedrock. The unit displays no fractures and has a low hydraulic conductivity such that it yields water to a monitoring well very slowly, even when constructed with screen lengths greater than 20 feet. A summary of hydraulic conductivity tests performed on wells or sample from unit 'B' is presented in Table 2-11.

a) Water Levels

Water level hydrographs at two locations of hydrologic unit 'B' are presented in Figures 2-2 and 2-29. The hydrographs show the water level at a depth of approximately 100 feet from land surface and within the screened zone.

A potentiometric map constructed for hydrologic unit 'B' is presented in Drawing 2-3. The data were obtained on November 3, 1985 prior to construction of the B-series monitoring wells. Water levels were measured in the P, K, and GM series wells. Only one K-series well was used at each nest location. The K-series well used was determined by the screened zone elevation. These levels were used to establish that the direction of ground water movement in hydrologic unit 'B' is generally from southwest to northeast across the site.

Estimates of horizontal and vertical velocities and travel times were performed for hydrologic unit 'B' using the same procedure as for those in hydrologic unit 'A'. Following are the values used in the estimates:

- Effective Porosity = .05 (5.0%)
- Hydraulic Conductivity = .00028 fpd (10^{-7} cm/sec)
- Unit 'A'/'B' Interface = 730.0 feet above MSL
- Fluid Head at 'A'/'B' Interface = 756.0 feet above MSL
- Base of Unit 'B' = 700 feet above MSL
- Fluid Head at the base of Unit 'B' = 750 feet above MSL

Vertical Velocity:

Darcy: v = (.00028 fpd) (6 ft/30 ft) = .000056 fpd

Seepage: v_s = (.00028/.05 fpd) (6 ft/30 ft) = .001 fpd

Horizontal Velocity:

Darcy: v = (.00028 fpd) (.075 ft/ft) = .00021 fpd

Seepage: v_s = (.00028/.05 fpd) (.075 ft/ft) = .00042 fpd

From these velocities, average travel times of fluid particles were estimated. Using a hydrologic unit 'B' thickness of 30 feet, the vertical travel time for a particle moving at the velocity of the fluid, from the 'A'/'B' interface to the base of hydrologic unit 'B', ranged from 82 years to 1500 years. Horizontal travel times in hydrologic unit 'B' were estimated using the same assumptions as used in hydrologic unit 'A'. Approximate travel times of a particle traveling 300 feet horizontally to a monitoring well ranged from 145 to 2900 years.

b) Water Quality

Water quality data for wells screened in the hydrologic unit 'B' was based on samples collected from the GM series. These wells were designed to monitor the ground water quality in hydrologic unit 'B' at the site with regard to potential contamination migration. Water samples were obtained and analyzed by MMTL Analytical Services of Columbia, Missouri. A list of the constituents measured, and their concentrations, on a monthly basis for 1984 and 1985 can be found in Table 2-12. Additional samples were analyzed quarterly for 112 other priority pollutants, total coliform, gross alpha, gross beta, and total radium.

Water quality results indicated that the concentrations of heavy metals and pesticides are all less then the National Interim Primary Drinking Water Regulations (NIPDWR) standards. The reported levels of coliform bacteria and radiochemical activity were sporadically greater than the NIPDWR maximum allowable levels. Hydrologic unit 'B' is not, however, a drinking water supply.

Priority pollutants analysis during 1984 detected concentrations of a few compounds above the levels of detection on a few occasions. In the third quarter, well GM-1R exhibited concentrations of 78 ug/l and 44 ug/l of hexachlorobutadience and Bis (2-ethylene) phyhalate, respectively. Only methylene chloride at 160 ug/l was detected in well GM-1R for fourth quarter samples. Subsequent retesting of the water from well GM-1R indicated less than the detection limit of 10 ug/l of methylene chloride. Therefore, the high value may be attributable to container contamination because methylene chloride is a glass cleaning solvent.

In summary, the water quality of this unit is good. Some variations were noted in the indicator parameters, pH, specific conductance, and TOC during the year (1984). Priority pollutant scans did not consistently detect compounds, however, indicating the variation in indicator parameters is not due to contamination from the landfill.

Waters from hydrologic unit 'B' were compared to waters from hydrologic unit 'A'. The alkalinity in hydrologic unit 'A' wells was twice as great as that found in the hydrologic unit 'B' wells. Figure 2-28 illustrates a Stiff diagram for a water sample from well GM-1 of hydrologic unit 'B'. TDS and, subsequently, conductivity were also much greater in hydrologic unit 'A' wells. The physical appearance of all water was similar as all wells were described as clear to slightly cloudy.

3) Hydrologic Units 'C' and 'D'

Hydrologic unit 'C' consists of the sequence of rock units between top of rock to the top of the St. Peter Sandstone. Table 2-1 indicates the various units which are believed to be present at the subject site. Based on the geologic literature, these units are expected to exhibit relatively low hydraulic conductivity. Water from these units is not substantially used for commercial or residential purposes.

Hydrologic unit 'D' consists of the St. Peter Sandstone, located about 400 feet below ground surface at the subject site. This unit is typically 110 to 125 feet thick. Numerous wells are installed into this aquifer in the regional area, as well as the on-site Zykan Well.

Estimates of vertical velocities and travel times were performed for hydrologic unit 'D' using the same procedure as for those in hydrologic unit 'A' above. The vertical hydraulic conductivity of hydrologic unit 'D' was estimated to be 4.5×10^{-7} cm/sec.

Following are the values used in the estimates of velocity and particle travel time:

- Effective Porosity = .12 (12.0%)
- Hydraulic Conductivity= .00023 fpd to .0023 fpd (average - 4.5×10^{-7} cm/sec)
- Base of Hydrologic Unit 'B' = 700 feet above MSL
- Fluid Head at the Base of Hydrologic Unit 'B' = 750 feet above MSL
- Top of St. Peter Sandstone = 480 feet above MSL
- Fluid Head at Top of the St. Peter Sandstone = 660 feet above MSL

Vertical Velocity:

Darcy: $v = (.00023 \text{ fpd})(90 \text{ ft}/120 \text{ ft}) = .00017 \text{ fpd}$

Seepage: $v_s = (.00023/.12 \text{ fpd})(90 \text{ ft}/120 \text{ ft}) = .0014 \text{ fpd}$

From these velocities, average travel times of fluid particles were estimated. Using a thickness of 120 feet, the vertical travel time for a particle moving at the velocity of the fluid through the bedrock aquitard to the top of the St. Peter Sandstone ranged from 243 years to 1900 years. The lack of information about hydraulic properties of hydrologic unit 'C' results in a wide range of travel times.

a) Water Levels

Table 2-13 presents the locations and approximate water levels measured in the uncased portion of the water supply

wells in the vicinity of the site. The potentiometric surface declines to the northeast which is consistent with the regional dip of the rock units. At the BHS site, the ground water surface elevation was measured to be 660 feet above mean sea level on January 15, 1986.

b) Water Quality

Water quality data from wells completed in the 'C' and 'D' hydrologic units were obtained from an exposure assessment study conducted by the Missouri Department of Health (MDH) in 1985. Seventeen private wells, with depths ranging from 200 to 400 feet and an average age of 14 years, were sampled by MDH personnel in January, 1985. Samples were analyzed for 40 chemical constituents, including the major anions and cations generally associated with water quality studies. Other individual constituents were chosen for analysis based on their concentrations detected in BHS's leachate collection system and their individual toxicities. A list of the constituents analyzed is included in Table 2-14. A partial list of constituents and their corresponding concentrations can be found in Table 2-15.

In general, water quality analysis indicated the regional wells are a reliable source of potable water. Alkalinities in the 17 wells ranged from a high of 477 mg/l as $CaCO_3$ to a low 267 mg/l as $CaCO_3$. Calcium hardness ranged from 288.5 mg/l as $CaCO_3$ to 124.5 mg/l as $CaCO_3$. Total hardness could not be calculated because the concentration of magnesium, a key element for determining total hardness, was not reported. These data are representative of average values reported for wells of this depth.

Analyses of these data by comparison with data from the BHS leachate collection system, indicates that off-site migration of contaminants from the BHS site has not occurred. Therefore, these data are considered representative of the natural water quality (background) for wells penetrating the 'C' and 'D' hydrologic units in the vicinity of the BHS facility.

Figure 2-28 presents Stiff diagrams for waters taken from the three different hydrologic units. K2 (ox) represents water sampled from the 'A' level wells. GM-1 represents water sampled from the 'B' level wells. The Zykan Well represents water sampled from the 'C'/'D' level wells or the St. Peter aquifer. A rapid comparison of the chemical make-up of these waters, made by comparing the distinctive graphical shapes, indicates varying water quality in the three levels.

In general, metals and pesticide values in all units sampled remained below NIPDWR standards.

4) Hydrologic Units 'E' and 'F'

Hydrologic unit 'E' consists of the limestone and dolomite rocks of the Powell-Cotter and Jefferson City Formations (Table 2-1). These rocks have a relatively low permeability and act as an aquitard between the more permeable rocks above and below. Hydrologic unit 'E' is at a depth of approximately 550 feet and is approximately 300 feet thick.

Hydrologic unit 'F' consists of the sandstone and limestone rocks of the Roubidoux Formation (Table 2-1). This aquifer is the source of drinking water for Wright City to the north

of the site. The great depth to the aquifer and overlying low permeability rocks makes this hydrologic unit safe from contamination.

b. Preliminary Numerical Ground Water Flow Model

The primary goals of the numerical ground water flow model were to obtain an understanding of: 1) the general significance of the two farm ponds that existed on the proposed expansion site prior to October, 1985; and 2) the shape of the potentiometric surface during facility operation. The modeled potentiometric surface provides indications of fluid velocities and directions for use in contaminant migration analysis.

The model used in this study was a modified version of the Prickett and Lonnquist Aquifer Simulation Model, known as PLASM (Prickett and Lonnquist, 1971). The ground water flow equations are formulated through a finite difference approach. These finite difference equations are solved by a modified 'alternating direction implicit' method.

The site model consists of a planar finite difference grid having a constant cell dimension in the X (north-south) and Y (east-west) directions of 53.3 feet. The grid is made up of 36 columns (north-south) and 46 rows (east-west).

Modeling the site features required definition of hydraulic properties (hydraulic conductivity and storativity) and physical features (top and bottom surface elevations of the transmissive zone) at each node location. The oxidized silty clay till was assigned an average hydraulic conductivity of 5×10^{-5} cm/sec (1.0 gpd/ft^2). This value is representative of the horizontal conductivity of clayey soils that display fractures and joints. Unconfined conditions exist in the oxidized till. Volume changes in the aquifer material and fluid are considered insignificant

and, therefore, the specific yield (S_y) will approximately equal the drainable pore space. Although the total porosity of hydrologic unit 'A' is approximately 40 percent, retention forces associated with the small grain size cause a specific yield of approximately 5 percent.

The interface between the oxidized (hydrologic unit 'A') and unoxidized (hydrologic unit 'B') soil is the lower confining surface to hydrologic unit 'A'. This boundary is relatively impermeable, which is a conservative approach in that drainage must occur entirely through hydrologic unit 'A'. This interface was modeled having a slope of .0258 ft/ft to the south.

The initial potentiometric surface was modeled so that the saturated thickness of hydrologic unit 'A' was 25 feet.

The farm pond was simulated by establishing an initial head at nodes representing the pond to be equal to the pond level.

Simulation of the removal of the two farm ponds required approximately 4 years to approximate a pre-pond steady state flow pattern. About 80 percent of the drainage occurred during the first two years.

The base of the proposed hazardous waste landfill will be lined with a primary, secondary and tertiary flexible membrane and an underdrain system. These liners are shown on Figure 2-30. The underdrain system was modeled to investigate the effects of the drain on the ground water surface. The drain was modeled as fixed heads at nodes representing the underdrain system.

Simulation of the landfill underdrain created a steady-state flow pattern having flow directions from the north, west, and east toward the drain. The monitoring wells in these areas, therefore, became up-gradient locations. A modeled potentiometric map

of hydrologic unit 'A' with the proposed landfill underdrain is presented in Drawing 2-5. This map shows that water levels decline to the drain.

VI. SUMMARY AND CONCLUSIONS

The objective of the BHS ground water investigation was to define the ground water piezometric surface prior to, during, and after construction.

a. Ground Water Level

The numerical ground water model indicates that for the proposed facility alteration of the land topography will cause changes in ground water levels at the site but will have minor impact on off-site ground water levels. The model also indicates that inclusion of an underdrain system in the landfill liner should divert any ground water that may occur in the lower sections of the liner.

A potentiometric ground water surface is easily defined in the lower part of hydrologic unit 'A'; however, uncertainly exists in the accuracy of the potentiometric ground water surface in hydrologic unit 'B' because water levels may take weeks or months to establish equilibrium following well development.

The monitoring system must be flexible to allow consideration of new hydrogeological information when it becomes available.

In October, 1985, the farm ponds on site were drained. The model indicates that ground water flow patterns may require 2 to 4 years to equilibrate to the pattern which would exist without the presence of ponds. The change in flow rate and direction in the vicinity of the ponds will have some minimal effect on water level and water quality monitoring. The numerical model indicates that the present high (mound) in the ground water piezometric surface is due to the prior

existence of the ponds but that, without the ponds' recharge, the natural gradient is to the south-southwest.

Modeling of the permeable underdrain indicates that where the drain is below the ground water table, it will create an artificial potentiometric surface wherein the drain is down gradient. It is possible that construction of the cells will cause a natural dewatering by evaporation that will also create a depression in the potentiometric surface beneath the site.

b. Ground Water Quality

One objective of the ground water investigation was to gain an understanding of the possible contaminant migration routes.

The ground water models show that the potential for migration of contaminants is greatest in hydrologic unit 'A'. Vertical migration of contaminants to the regional aquifers (hydrologic units 'D' and 'F') is unlikely.

Although transport and the fate of hazardous constituents in ground water is not well understood, the uncertainty in contaminant behavior is overcome by assuming the most conservative case (i.e., that the contaminant will not degrade during transport through the soil and move with the velocity of the ground water).

In this case, simple advective flow is the transport mechanism. Since adsorbtion, degradation, and reactivity of the contaminant constituents are not considered, a maximum travel velocity is obtained giving minimum travel times.

Travel velocities and times for vertical and horizontal migration indicate that: 1) the probability of lateral flow is higher than vertical flow, and 2) assuming both horizontal and vertical flow, contaminants would be observed in monitoring wells long before reaching the regional aquifer system.

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TABLE 2-1
CLASSIFICATION OF HYDROLOGIC UNITS

GEOLOGIC UNIT			HYDROLOGIC UNIT	
Name	Lithology	Thickness	Approximate Depth	Designation
Loess	Silt	0 - 20		A
Oxidized Till	Clay	0 - 60		A
			0 - 60	
Unoxidized Till	Clay	40 - 190		B
Residual Soil	Clay	0 - 20		B
			80 - 250	
Sulfur Springs	Shale	0 - 20		C
Snyder Creek	Shale	0 - 10		C
Callaway	Limestone			C
Kimmswick	Limestone	55 - 60		C
Decorah	Shale	20		C
Plattin	Limestone	75 - 95		C
Joachim	Limestone	75		C
			350 - 500	
St. Peters	Sandstone	110 - 125		D
			450 - 600	
Powell-Cotter	Limestone	325 - 345		E
Jefferson City	Dolomite	130 - 165		E
			900 - 1200	
Roubidoux	Sandstone/Limestone	150+		F

TABLE 2-2

SUMMARY OF EXISTING WELLS
WATER QUALITY MONITORING WELLS

Nominal 4" diameter schedule 40 PVC threaded flush joint pipe

Well Number	Surface Elevation (ft, MSL)	Screened Zone (ft, MSL)	Screened Hydrologic Unit
GM1	796.3	700.8 - 670.3	B
GM2	812.3	665.0 - 636.5	B
GM3	772.8	675.8 - 647.0	B
GM4	758.0	682.3 - 653.0	B
GM5	777.6	686.4 - 631.4	B
GM1R	765.3	728.0 - 705.0	B

TABLE 2-2 (continued)

SUMMARY OF EXISTING WELLS
OBSERVATION WELL INFORMATION

PIEZOMETERS

Nominal 3" diameter PVC pipe with glued joints

Well No.	Surface Elevation (ft, MSL)	Screened Zone (ft, MSL)	Screened Hydrologic Unit
P1	804.9	795 - 770	A
P2	790.5	780 - 755	A
P3	778.3	768 - 743	A
P4	770.0	760 - 735	A/B
P5	765.9	756 - 731	A/B
P6	764.3	754 - 729	A/B
P7	759.9	750 - 725	A/B
P8	758.4	748 - 723	A/B
P9	755.7	746 - 721	A/B
P10	761.2	751 - 726	A/B
P11	777.1	767 - 742	A
P12	586.7	777 - 752	A
P13	794.9	785 - 760	A
P14	798.5	786 - 761	A/B
P15	804.4	794 - 769	A
P16	808.4	798 - 773	A
P17	800.2	790 - 750	A/B
P18	748.5	738 - 698	B
P19	775.5	765 - 725	A/B
P20	764.6	755 - 715	A/B
P21	791.2	781 - 741	A
P22	779.8	770 - 730	A/B
DMW	753.5		A/B
PA	±793.5	742 - 754	A/B
PB	±793.5	714 - 726	B
PC	±796.0	716 - 728	B
PD	±796.0	745 - 757	A/B

TABLE 2-2 (continued)

PIEZOMETER WELLS AND WELL NESTS

Nominal 1/2 and 1-1/2" diameter PVC pipe with glued joints

Well Number	Surface Elevation (ft, MSL)	Screened Zone (ft, MSL)	Screened Hydrologic Unit
K1-ox	780.6	721.6 - 731.6	A/B
K1-80'	780.3	725 - 705	B
K1-sa	781.8	672 - 662	B
K1-br	781.8	606 - 604	B
K2-ox	796.6	739.6 - 741.6	A/B
K2-80'	797.9	741 - 721	B
K2-sa	797.0	677 - 667	B
K2-br	797.0	606.4 - 604.4	B
K3-ox	777.4	713 - 703	A
K3-80'	776.5	718 - 698	B
K3-110'	778.8	688 - 658	B
K3-br	778.8	580 - 578	B
K4-ox	791.7	748 - 738	A/B
K4-80'	791.5	734 - 714	B
K4-120'	792.2	672 - 662	B
K4-br	792.2	672 - 662	B
K4-bbr	791.9	582 - 557	B
K5-ox	773.1	734.6 - 724.6	A/B
K5-80'	771.4	715 - 695	B
K5-sa	772.1	677 - 667	B
K5-br	772.1	605 - 603	B
K6-ox	746.3	735.3 - 725.3	A/B
K6-si	745.5	644 - 624	B
K6-br	745.9	573 - 568	B
K7-ox	770.6	737.3 - 727.3	A/B
K7-si	769.7	772 - 762	B
K7-br	770.1	581.4 - 576.4	B
K8-ox	793.9	745.7 - 735.7	A/B
K8-si	791.9	713 - 693	B
K8-br	792.8	605 - 600	B
K9-80'	736.5	678 - 658	B
K9-sa	736.5	625 - 615	B
K9-br	736.5	580 - 575	B
K10-80'	732.9	657 - 652	B
K10-br	732.5	674 - 654	B
K11-ox	759.2	724 - 714	A/B
K11-sa	759.6	701 - 691	B
K11-br	759.2	663 - 643	B
K12-br	768.1	557 - 555	B

Table 2-2 (continued)
PIEZOMETERS AND MONITORING WELLS
FALL 1985

Nominal 2" diameter No. 316 stainless steel, threaded, flush-jointed pipe

Piezometer or Monitoring Well Number	Piezometer or Monitoring Well Location	Elevation of the ground surface (ft, MSL)	Top of Riser Elevation	Depth (ft) Elevation of Hole Bottom (MSL)	Water Level (ft, MSL) January 7, 1986
1A	2638N, 995E	808.9	811.48	60.75 /748.15	Dry
2	2623N, 1260E	791.2	793.22	49 /744.22	754.1
3A	2602N, 1520E	772.8	774.88	38.16/734.64	760.1
4	2351N, 1650E	767.0	768.94	38.84/728.16	763.5
5	2143N, 1812E	760.8	763.57	28.17/732.63	736.9
6A	1900N, 1897E	761.9	763.23	35 /726.9	747.3
7	1889N, 1609E	778.9	782.09	56 /722.9	762.5
8A	1861N, 1428E	790.7	792.27	59 /731.7	761.0
9	2171N, 1053E	799.3	801.64	55.84/743.46	748.0
10A	2395N, 959E	804.7	806.24	57 /747.7	754.6
11A	1878N, 1155E	793.1	793.95	57 /736.1	764.9
12A	2380N, 662E	807.4	809.34	116.5 /692.9	Dry
12B	2392N, 676E	807.8	810.55	65.41/742.39	748.7
13	2160N, 625E	800.7	802.75	61 /739.7	743.9
14A	1890N, 625E	792.2	793.2	56.75/735.45	758.3
15	1606N, 623E	787.8	791.69	55 /732.8	756.7
16	1320N, 625E	775.6	776.81	54.5 /721.1	752.1
17A	1046N, 630E	760.4	762.39	79 /681.4	683.1
17C	1031N, 625E	759.4	762.84	47 /712.4	741.1
18*	875N, 750E	748.2	750.23	43.83/704.37	732.9
18A*	877N, 762E	748.6	749.66	29.83/718.77	733.5
19A*	876N, 1025E	745.6	746.79	36.83/710.57	733.0
19B*	882N, 1030E	746.4	748.62	22.5 /723.9	733.2
20	1300N, 1425E	769.6	771.46	54 /715.6	751.2
21A	1574N, 1425E	778.0	779.57	49.33/728.67	762.7
22A	1035N, 1425E	750.5	752.66	41 /709.5	735.3
23A	889N, 1298E	736.0	738.85	20.58/715.42	734.0
GMW-1	1907N, 1150E	794.3	795.96	124 /670.3	784.4
GMW-4	1957N, 2095E	761.0	762.61	104 /657	687.5

Note: * Piezometers constructed from schedule 40 PVC

TABLE 2-3

DESIGNATION AND PURPOSE OF OBSERVATION WELLS

Current Designation	Well Numbers	Dates Installed
Water Supply	Zykan, Truck Wash	NA
Piezometer	P1-22	6-79 ? to 2-81
Monitoring	DMW	5-81 ?
Piezometer	K1-12[1]	5-81 to 10-81
Monitoring	GM1-5	11-82, 5-84
Monitoring	GMR1	7-84
Verification Monitoring of GM	GMW1,4	12-85
Monitoring	B1-23	11-85 to 12-85

[1] Wells were assigned a suffix describing the approximate depth of the hole or material encountered.

OX - oxidized/unoxidized zone interface
80 - 80 feet in depth
SA - completed in sand layer
SI - completed in silty layer
110 - 110 feet in depth
BR - bit refusal
BRR - bit refusal replacement

TABLE 2-4

SUMMARY OF WATER LEVEL
AND PIEZOMETER CONSTRUCTION DATA
FOR SLUG TESTS

Piezometer Number	Elevation of Static Water Level (ft,MSL)	Elevation of Top of Screen (ft,MSL)	Elevation of Bottom of Screen (ft,MSL)	Estimated Saturated Thickness Opposite Piezometer Screen
B-11A	765.35	747.03	737.03	24.0
B-18	733.42	715.23	705.23	22.4
B-18A	733.48	725.83	720.83	14.8
B-20	757.46	726.0	716.00	14.5
B-21A	762.65	739.74	729.74	31.9
B-22A	732.95	720.17	710.17	14.0

TABLE 2-5

RESULTS OF SLUG TEST ANALYSIS

Piezometer Number	Screened Hydrologic Unit	Falling Head or Rising Head	Method of Cooper Bredehoeft and Papadopulos	Method of Bouwer and Rice *
B-11A	A	FH	1.1×10^{-5}	-
		RH	3.1×10^{-5}	8.9×10^{-5}
B-18	A	FH	4.6×10^{-5}	-
		RH	4.4×10^{-5}	9.9×10^{-5}
B-18A	A	FH	1.74×10^{-4}	-
		RH	1.17×10^{-4}	5.4×10^{-5}
B-20	A	FH	1.4×10^{-5}	-
		RH	2.0×10^{-5}	1.5×10^{-5}
B-21A	A	FH	5.6×10^{-6}	-
		RH	2.9×10^{-5}	3.9×10^{-5}
B-22A	B	FH	7.6×10^{-5}	-
		RH	1.60×10^{-4}	4.33×10^{-4}

TABLE 2-6

HYDRAULIC CONDUCTIVITY OF PREVIOUS STUDIES OF HYDROLOGIC UNIT 'A'

Test Performed By	Sample Number	Test Type	Sample Location	Hydraulic Conductivity (cm/sec)
MDNR	BHS I	Lab, F. H.[1]	Test Pit	1.6×10^{-8}
MDNR	BHS II	Lab, F. H.	Test Pit	1.1×10^{-8}
MDNR	BHS III	Lab, F.H.	Test Pit	8.4×10^{-6}
DEK	1	Consol[2]	Well K1	4×10^{-9} to 2×10^{-8}
DEK	K3	Consol	Well K3	4×10^{-9} to 2×10^{-8}
DEK	-	Pressure Test[3]	K1(OX)	2×10^{-6} to 1×10^{-5}
WCC	BHS I	Triaxial[4]	Test Pit	5.3×10^{-7} to 2.3×10^{-7}
WCC	BHS II	Triaxial	Test Pit	9.5×10^{-8} to 7.9×10^{-8}
WCC	BHS III	Triaxial	Test Pit	1.0×10^{-8} to 7.2 to 10^{-8}
WCC		Slug[5]	K2(OX)	5×10^{-8} to 2×10^{-7}
WCC		Slug	K2(OX)	2×10^{-8} to 1×10^{-8}

1 Laboratory Falling Head Permeability Test
2 Laboratory Consolidation Test
3 Field Pressure Test
4 Laboratory Triaxial Compression Test
5 Field Slug Test

TABLE 2-7

SUMMARY OF FIELD ANALYSES AND LABORATORY ANALYTICAL REPORT

Sample Location	Time	Method of Recovery	Temperature (°C)	pH	Conductance (µmhos/cm)	Color	Appearance
2(0X)	8:40 am	Bailer	16	6.6	2,890	Light Brown	Slightly Cloudy
5(0X)	9:15 am	Bailer	14.2	6.5	2,430	None	Clear

LABORATORY REPORT

CLIENT: UCC (13C051)
ATTN: NEIL WILLIAMS
5055 ANTIOCH ROAD
OVERLAND PARK, KS 66203

DATE RPTD: 09/13/83
DATE RCVD: 09/02/83
PURCHASE AUTH:
FILE NO.: 83-9516
ORDER NO.: 5042

LAB NUMBER: 83090052
SAMPLE DESCRIPTION: K20X

DATE SAMPLED: 09/01/83
TIME SAMPLED: 840

ANALYSIS	CONCENTRATION	UNITS	BOOK-PAGE
ALKALINITY, PARTIAL	0.	MG/L AS CACO3	142-71
ALKALINITY, TOTAL	441.	MG/L AS CACO3	142-72
BICARBONATE	441.	MG/L AS CACO3	142-72
CARBONATE	0.	MG/L AS CACO3	142-72
CHLORIDE	74.	MG/L	197-45
PH	6.7	STANDARD UNITS	166-65
SULFATE	1740.	MG/L	196-23
CALCIUM BY AA	650.	MG/L	252-78
MAGNESIUM	220.	MG/L	252-78
POTASSIUM	8.3	MG/L	252-71
SODIUM	115.	MG/L	252-71

--CONCLUSION--LAB NUMBER: 83090052 K20X

LAB NUMBER: 83090053
SAMPLE DESCRIPTION: K50X

DATE SAMPLED: 09/01/83
TIME SAMPLED: 920

ANALYSIS	CONCENTRATION	UNITS	BOOK-PAGE
ALKALINITY, PARTIAL	0.	MG/L AS CACO3	142-71
ALKALINITY, TOTAL	369.	MG/L AS CACO3	142-72
BICARBONATE	369.	MG/L AS CACO3	142-72
CARBONATE	0.	MG/L AS CACO3	142-72
CHLORIDE	22.	MG/L	197-45
PH	6.8	STANDARD UNITS	166-65
SULFATE	1580.	MG/L	196-23
CALCIUM BY AA	500.	MG/L	252-78
MAGNESIUM	152.	MG/L	252-78
POTASSIUM	6.6	MG/L	252-71
SODIUM	93.	MG/L	252-71

--CONCLUSION--LAB NUMBER: 83090053 K50X

TABLE 2-8

SUMMARY OF IONIC CONSTITUENTS

Sample Number K2OX

Location Well K2(OX)

Date Taken 9/1/83

CATIONS	mg/l	meq/l	%
Ca	650	32.44	58
Mg	220	18.10	32
Na	115	5.00	9
K	8.3	0.21	1
Total		55.75	100

ANIONS	mg/l	meq/l	%
HCO_3	441	7.23	16
CO_3	0	0.0	0
SO_4	1740	36.23	80
Cl	74	2.09	4
Total		45.55	100

Sample Number K5OX

Location Well K5(OX)

Date Taken 9/1/83

CATIONS	mg/l	meq/l	%
Ca	500	24.95	60
Mg	152	12.50	29
Na	93	4.05	10
K	6.6	0.17	1
Total		41.67	100

ANIONS	mg/l	meq/l	%
HCO_3	369	6.05	15
CO_3	0	0.0	0
SO_4	1580	32.90	83
Cl	22	0.62	2
Total		39.57	100

TABLE 2-9
CHARGE BALANCE SUMMARY

Sample Number	Charge Balance* (%)	pH		Calculated TDS (mg/l)	Water Type
		Lab	Field		
K5(OX)	+8.2	6.8	6.5	2,723	$CaSO_4$ (some Mg)
K2(OX)	+10.1	6.7	6.6	3,248	$CaSO_4$ (some Mg)

* Charge Balance (percent): $\frac{\Sigma cations - \Sigma anions}{\Sigma cations + \Sigma anions} \times 100$ (after Hem, 1970)

TABLE 2-10 WATER LEVEL ELEVATIONS FOR 1984.

GROUND WATER ELEVATION DATA
BMS, INC.

Well No.	Surface Elevation (ft, MSL)	Screened Zone (ft, MSL)	1983 Dec	1984 Jan	1984 Feb	1984 Mar	1984 Apr	1984 May	1984 Jun	1984 Jul	1984 Aug	1984 Sep	1984 Oct	1984 Nov	1984 Dec
GM-1	796.3	780.8 - 670.3	702.5	702.8	-	702.3	703.3	699.8	698.3	-	749.3	748.3	737.8	740.3	740.3
GM-1R	765.3	720.8 - 705.8	-	-	-	-	-	-	-	667.3	666.7	718.3*	666.7	663.3	
GM-2	812.3	665.8 - 636.5	668.4	667.3	-	-	667.3	664.3	662.3	660.8	683.8	674.3	692.8	657.8	
GM-3	772.8	675.8 - 647.8	691.8	688.1	-	685.8	687.8	682.8	680.8	680.8	700.8	686.8	698.8	703.5	
GM-4	758.8	682.3 - 653.8	727.9	709.2	-	-	731.8	693.8	688.8	680.8	682.8	682.6	678.6	676.6	
GM-5	777.6	686.4 - 631.4	-	-	-	-	-	-	-	666.6					

Appendix 2 - Table 2-10
Page 1 of 1

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TABLE 2-11

HYDRAULIC CONDUCTIVITY OF PREVIOUS STUDIES OF HYDROLOGIC UNIT 'B'

Test Performed By	Sample Number	Test Type	Sample Location	Hydraulic Conductivity (cm/sec)
MDNR	K6	Lab, F. H.[1]	Well K6	4.9×10^{-8}
DEK	K1	Consol[2]	Well K1	1.1 to 1.4×10^{-8}
DEK	K2	Consol	Well K2	4×10^{-9} to 6×10^{-8}
DEK	K3	Consol	Well K3	9×10^{-9} x 2×10^{-8}
DEK	K4	Consol	Well K4	3×10^{-9} to 5×10^{-9}
DEK	K5	Consol	Well K5	5×10^{-9} x 1×10^{-8}
DEK		Pressure Test[3]	K1(80)	3×10^{-7} to 9×10^{-7}
DEK		Pressure Test	K2(80)	9×10^{-7} to 3×10^{-6}
DEK		Pressure Test	K3(80)	1×10^{-6}
WCC		Slug[4]	K3(80)	2×10^{-8} to 1×10^{-8}
WCC		Slug	K4(80)	8×10^{-9} to 5×10^{-8}
WCC		Slug	K5(80)	5×10^{-8} to 1×10^{-8}

[1] Laboratory Falling Head Permeability Test
[2] Laboratory Consolidation Test
[3] Field Pressure Test
[4] Field Slug Test

TABLE 2 - 12

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT 'B'

BH - 1 1984

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	9.3	8.8	9.3	10.8	10.8	9.1	-	-	-	-	-	-	umhos/cm
SPEC COND	790	820	700	650	710	900	-	-	-	-	-	-	mg/l
TOC	84	4	4	5	4	3	-	-	-	-	-	-	ug/l
TOX	12	18	13	13	14	13	-	-	-	-	-	-	mg/l
Cl	4	5	5	4	9	5	-	-	-	-	-	-	mg/l
NO	0.2	0.2	(0.1	0.2	0.1	0.2	-	-	-	-	-	-	mg/l
F	0.3	0.3	0.4	0.3	0.4	0.5	-	-	-	-	-	-	mg/l
Phenol	(0.02	0.01	(0.02	0.03	(0.005	(0.005	-	-	-	-	-	-	mg/l
Fe	0.12	0.02	(0.02	(0.02	(0.02	(0.02	-	-	-	-	-	-	mg/l
Na	110	70	60	60	93	160	-	-	-	-	-	-	mg/l
Mg	4.0	0.1	6.9	3.9	3.0	8.0	-	-	-	-	-	-	mg/l
SO	430	400	420	300	200	320	-	-	-	-	-	-	mg/l
As	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	-	-	-	-	-	-	mg/l
Cr	(0.02	(0.02	(0.02	(0.02	(0.02	(0.02	-	-	-	-	-	-	mg/l
Hg	1.0	(0.5	(0.5	N/R	(0.5	(0.5	-	-	-	-	-	-	ug/l
Ag	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	-	-	-	-	-	-	mg/l
Be	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	-	-	-	-	-	-	mg/l
Cd	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	-	-	-	-	-	-	mg/l
Pb	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	-	-	-	-	-	-	mg/l
Se	(0.002	(0.002	0.006	(0.002	(0.002	(0.002	-	-	-	-	-	-	mg/l
Methoxy-chlor	(5	(5	(5	(5	(5	(5	-	-	-	-	-	-	ug/l

A priority pollutant scan was conducted on one sample each quarter in 1984.
All 112 parameters were below detection limits unless indicated below.

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT '8'

GM - 1R 1984

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	-	-	-	-	-	-	10.4	11.2	9.3	7.3	7.7	7.3	umhos/cm
SPEC COND	-	-	-	-	-	-	1900	2200	2200	2000	1600	1610	ug/l
TOC	-	-	-	-	-	-	8.9	6.6	8.5	7	7	6	mg/l
TOX	-	-	-	-	-	-	7	10	9	15	13	10	mg/l
Cl	-	-	-	-	-	-	8	4.2	7	6	7	7	mg/l
NO	-	-	-	-	-	-	(0.1	0.3	(0.1	(0.1	0.3	0.2	mg/l
F	-	-	-	-	-	-	0.6	0.23	0.2	0.3	0.3	0.3	mg/l
Phenol	-	-	-	-	-	-	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	mg/l
Fe	-	-	-	-	-	-	(0.02	0.15	(0.02	0.61	0.76	2.1	mg/l
Na	-	-	-	-	-	-	190	140	82	96	90	69	mg/l
Mg	-	-	-	-	-	-	13	6	80	86	74	130	mg/l
SO	-	-	-	-	-	-	2300	2200	1300	1300	1200	1300	mg/l
As	-	-	-	-	-	-	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	mg/l
Cr	-	-	-	-	-	-	(0.02	(0.02	(0.02	(0.02	(0.02	(0.02	mg/l
Hg	-	-	-	-	-	-	(0.5	(0.5	(0.5	(0.5	(0.5	(0.5	ug/l
Ag	-	-	-	-	-	-	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	mg/l
Ba	-	-	-	-	-	-	(0.1	0.2	(0.1	(0.1	(0.1	(0.1	mg/l
Cd	-	-	-	-	-	-	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	mg/l
Pb	-	-	-	-	-	-	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	mg/l
Se	-	-	-	-	-	-	(0.002	(0.002	(0.002	(0.002	(0.002	(0.002	mg/l
Methoxy-chlor	-	-	-	-	-	-	(5	(5	(5	(5	(5	(5	ug/l

A priority pollutant scan was conducted on one sample each quarter in 1984.
All 112 parameters were below detection limits unless indicated below.

Third Quarter - 78 ug/l Hexachlorobutadiene, 44 ug/l Bis (2-Ethylhexyl) Phthalate
Fourth Quarter - 160 ug/l Methylene Chloride, less than 10 ug/l upon retesting

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FRO THE HYDROLOGIC UNIT 'B'

GW - 2 1984

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	7.9	8.1	8.3	8.3	8.0	7.8	8.2	8.2	8.2	8.0	8.1	8.2	umhos/cm
SPEC COND	790	740	600	600	600	730	670	800	600	660	500	600	mg/l
TOC	5.1	15	6	10	7	7	3.3	2.4	4.4	5	7	5	ug/l
TOX	17	14	13	9	29	22	8	23	(5	25	22	8	mg/l
Cl	10	8	8	6	5	3	5	4.2	4	2	4	4	mg/l
ND	1.5	0.4	(0.1	2.2	1.7	(0.1	(0.1	0.8	1.4	1.3	1.4	1.2	mg/l
F	0.5	0.5	0.5	0.5	0.4	0.6	0.7	0.5	0.4	0.4	0.4	0.5	mg/l
Phenol	(0.02	(0.01	(0.01	(0.01	(0.005	(0.005	(0.005	(0.005	(0.005	0.012	0.012	(0.005	mg/l
Fe	0.06	0.11	(0.02	(0.02	0.02	(0.02	0.07	0.02	(0.02	0.05	(0.02	(0.02	mg/l
Na	70	80	80	83	86	150	160	96	79	90	100	100	mg/l
Mg	3.0	31	11	13	18	22	24	19	18	19	20	23	mg/l
SO	350	60	100	190	310	800	1700	900	900	140	120	150	mg/l
As	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	mg/l
Cr	(0.02	(0.02	(0.02	(0.02	(0.02	(0.02	(0.02	(0.02	(0.02	(0.02	(0.02	(0.02	mg/l
Hg	(0.5	(0.5	(0.5	N/R	(0.5	(0.5	(0.5	(0.5	(0.5	(0.5	(0.5	(0.5	ug/l
Ag	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	mg/l
Ba	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	mg/l
Cd	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	mg/l
Pb	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	mg/l
Se	(0.002	(0.002	(0.002	(0.002	(0.002	(0.002	(0.002	(0.002	(0.002	(0.002	(0.002	(0.002	mg/l
Methoxy-chlor	(5	(5	(5	(5	(5	(5	(5	(5	(5	(5	(5	(5	ug/l

A priority pollutant scan was conducted on one sample each quarter in 1984.
All 112 parameters were below detection limits unless indicated below.

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT 'B'

GR - 3 1984

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	7.5	7.3	7.1	7.2	7.2	7.3	7.1	7.1	7.2	7.2	7.3	7.2	umhos/cm
SPEC COND	2030	2000	1900	2100	2400	2500	2500	2100	2700	2300	2000	2150	ug/l
TOC	8.2	7.0	7.0	7	5	3	3.7	2.7	7.7	6	5	5	ug/l
TOX	26	22	9	<5	20	11	7	20	26	18	11	30	ug/l
Cl	5	14	13	9	12	12	12	10	3	10	11	10	ug/l
NO	2.0	0.12	<0.1	0.7	0.5	1.0	<0.1	<0.1	0.3	<0.1	0.1	<0.1	ug/l
F	0.6	0.5	0.5	0.5	0.4	0.6	0.6	0.44	0.2	0.4	0.3	0.4	ug/l
Phenol	<0.02	0.02	0.05	<0.01	0.008	N/R	0.006	<0.005	0.007	<0.005	0.024	<0.005	ug/l
Fe	0.04	3.2	0.49	0	0.76	2.3	4.3	7.5	<0.2	0.23	13	6.2	ug/l
Na	75	60	50	55	65	130	130	70	41	70	77	82	ug/l
Mg	120	76	90	90	120	220	230	130	2	130	120	160	ug/l
SO	1700	1500	1400	1000	1200	2000	1900	1300	1700	1100	1700	2000	ug/l
As	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ug/l
Cr	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	ug/l
Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l
Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l
Ba	<0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	ug/l
Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ug/l
Pb	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ug/l
Se	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	ug/l
Methoxy-chlor	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l

A priority pollutant scan was conducted on one sample each quarter in 1984.
All 112 parameters were below detection limits indicated below.

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT '8'

GW - 4 1984

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	10.5	11.0	6.9	10.7	11.3	10.9	10.8	11.6	11.4	10.7	11.7	12.0	umhos/cm
SPEC COND	480	890	1320	340	1100	1400	1400	2100	1750	1100	1100	1400	mg/l
TOC	17	10	5	5	8	5	4.1	14	4.2	9	10	8	ug/l
TOX	54	12	11	11	14	14	15	31	16	31	19	67	mg/l
Cl	3	3	2	4	3	4	5	<1	14	1	2	6	mg/l
NO	0.7	0.92	0.3	1	0.6	0.5	<0.1	0.3	0.2	0.3	0.7	0.5	mg/l
F	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.35	0.4	0.3	0.3	0.4	mg/l
Phenol	0.02	0.02	<0.01	<0.01	0.010	<0.005	0.012	0.066	<0.005	0.012	0.042	0.024	mg/l
Fe	<0.02	<0.02	<0.02	0.1	<0.02	<0.02	<0.02	<0.02	0.4	<0.02	<0.02	<0.02	mg/l
Na	11	9	14	7.1	45	51	37	73	70	42	50	48	mg/l
Mg	1.2	0.49	0.03	1.4	80	<0.1	0.6	3	140	1.0	1.2	1.1	mg/l
SO	180	220	200	120	360	560	600	500	1300	320	360	400	mg/l
As	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l
Cr	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/l
Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	ug/l
Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l
Ba	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.01	<0.01	<0.01	mg/l
Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l
Pb	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/l
Se	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l
Methoxy-chlor	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/l

A priority pollutant scan was conducted on one sample each quarter in 1984.
All 112 parameters were below detection limits unless indicated below.

Fourth Quarter - 33 ug/l Methylene Chloride, less than 10 ug/l upon retesting

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT '8'

GP - 5 1984

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	-	-	-	-	-	-	7.1	7.2	7.2	7.1	7.2	7.4	umhos/cm
SPEC COND	-	-	-	-	-	-	2200	2000	2500	2300	2100	1900	ug/l
TOC	-	-	-	-	-	-	1.1	2.7	4.5	6	4	5	ug/l
TOX	-	-	-	-	-	-	4	32	22	8	14	15	ug/l
Cl	-	-	-	-	-	-	17	16	21	15	16	16	ug/l
NO	-	-	-	-	-	-	(0.1	0.3	0.1	0.2	0.1	(0.1	ug/l
F	-	-	-	-	-	-	0.3	0.32	0.2	0.2	0.2	0.3	ug/l
Phenol	-	-	-	-	-	-	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	ug/l
Fe	-	-	-	-	-	-	(0.02	0.95	0.36	1.4	3	4.7	ug/l
Na	-	-	-	-	-	-	110	82	85	82	87	81	ug/l
Mg	-	-	-	-	-	-	200	120	120	56	110	130	ug/l
SO	-	-	-	-	-	-	1800	1600	1100	1200	1300	1200	ug/l
As	-	-	-	-	-	-	(0.005	(0.005	(0.005	(0.005	(0.005	(0.005	ug/l
Cr	-	-	-	-	-	-	(0.02	(0.02	(0.02	(0.02	(0.02	(0.02	ug/l
Hg	-	-	-	-	-	-	(0.5	(0.5	(0.5	(0.5	(0.5	(0.5	ug/l
Ag	-	-	-	-	-	-	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	ug/l
Ba	-	-	-	-	-	-	(0.1	0.2	(0.1	(0.1	(0.1	(0.1	ug/l
Cd	-	-	-	-	-	-	(0.01	(0.01	(0.01	(0.01	(0.01	(0.01	ug/l
Pb	-	-	-	-	-	-	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	ug/l
Se	-	-	-	-	-	-	(0.002	(0.002	(0.002	(0.002	(0.002	(0.002	ug/l
Methoxy-chlor	-	-	-	-	-	-	(5	(5	(5	(5	(5	(5	ug/l

A priority pollutant scan was conducted on one sample each quarter in 1984.
All 112 parameters were below detection limits unless indicated below.

Third Quarter - 12 ug/l Methylene Chloride

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT '8'

GN - 1 1985

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	NR	10.0	10.6	10.0	9.5	7.3	NR	NR	7.7	NR	8.4	NR	umhos/cm
SPEC COND	-	700	800	890	990	890	-	-	793	-	700	-	mg/l
TOC	-	7.4	15.0	10.0	21.0	11.7	-	-	7.3	-	3.0	-	mg/l
TOX	-	22.0	49.0	69.0	14.0	14.0	-	-	8.3	-	-	15.0	mg/l
Cl	-	6.0	5.0	8.0	6.0	6.0	-	-	NR	-	NR	-	mg/l
NO	-	0.1	0.2	0.3	<0.1	<0.1	-	-	-	-	-	-	mg/l
F	-	0.3	0.3	0.3	0.3	0.2	-	-	-	-	-	-	mg/l
Phenol	-	0.032	0.011	0.079	0.064	0.056	-	<0.010	-	-	-	-	mg/l
Fe	-	<0.02	<0.02	<0.02	<0.02	<0.02	-	NR	-	-	-	-	mg/l
Na	-	95	30	93	68	81	-	-	-	-	-	-	mg/l
Mg	-	12	7.3	11.0	13.0	16	-	-	-	-	-	-	mg/l
SO	-	750	650	480	450	500	-	-	-	-	-	-	mg/l
As	-	<0.005	<0.005	<0.005	<0.005	0.015	NR	<0.005	NR	NR	NR	NR	mg/l
Cr	-	<0.02	<0.02	<0.02	<0.02	<0.02	NR	-	-	-	-	-	mg/l
Hg	-	<0.5	<0.5	<0.5	<0.5	<0.5	NR	-	-	-	-	-	ug/l
Ag	-	<0.01	<0.01	<0.01	<0.01	<0.01	NR	-	-	-	-	-	mg/l
Ba	-	<0.1	<0.1	<0.1	<0.1	<0.1	NR	-	-	-	-	-	mg/l
Cd	-	<0.01	<0.01	<0.01	<0.01	<0.01	NR	-	-	-	-	-	mg/l
Pb	-	<0.1	<0.1	<0.05	<0.1	<0.05	NR	-	-	-	-	-	mg/l
Se	-	<0.002	<0.005	<0.002	<0.002	<0.002	NR	-	-	-	-	-	mg/l
Methoxy-chlor	<5	<5	<5	<5	<5	<5	NR	-	-	-	-	-	ug/l

A priority pollutant scan was conducted on one sample in the first and third quarter of 1985. All 112 parameters were below detectable limits unless indicated below.

First Quarter - 1 ug/l Di-N-Butylphthalate

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT '8'

BR - 1R 1985

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	7.3	7.1	8.0	7.7	7.4	7.4	NA	NA	7.2	NA	7.1	NA	umhos/cm
SPEC COND	1600	1000	1600	1900	2100	2000	-	-	1320	-	1600	-	mg/l
TOC	3.9	6.6	4.0	6.1	5.0	6.1	-	-	5.2	-	4.0	-	ug/l
TOX	10.0	6.0	13.0	11.0	12.0	12.0	-	-	8.0	-	20.5	-	mg/l
Cl	7.0	9.0	7.0	6.0	6.0	9.0	-	-	NA	-	NA	-	mg/l
NO	0.2	0.4	0.2	0.3	<0.1	0.3	-	-	-	-	-	-	mg/l
F	0.5	0.3	0.3	0.3	0.3	0.2	-	-	-	-	-	-	mg/l
Phenol	<0.005	<0.005	<0.005	<0.010	<0.010	<0.010	-	-	-	-	-	-	mg/l
Fe	0.75	2.1	<0.02	<0.02	0.2	1.2	-	-	-	-	-	-	mg/l
Na	70	71	60	71	64	57	-	-	-	-	-	-	mg/l
Mg	88	120	54	130	120	130	-	-	-	-	-	-	mg/l
SO	1500	1400	1200	850	2700	1200	-	-	-	-	-	-	mg/l
As	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	NA	NA	NA	NA	NA	NA	mg/l
Cr	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	NA	NA	NA	NA	mg/l
Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA	ug/l
Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	NA	NA	mg/l
Ba	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	mg/l
Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA	NA	NA	mg/l
Pb	<0.1	<0.1	<0.1	<0.05	<0.1	<0.05	NA	NA	NA	NA	NA	NA	mg/l
Se	<0.002	<0.002	<0.005	<0.002	<0.002	<0.002	NA	NA	NA	NA	NA	NA	mg/l
Methoxy-chlor	<5	<5	<5	<5	<5	<5	NA	NA	NA	NA	NA	NA	ug/l

A priority pollutant scan was conducted on one sample in the first an third quarter of 1985. All 112 parameters were below detectable limits unless indicated below.

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT 'B'

BW - 2 1985

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	NA	NA	7.6	NA	7.9	NA	NA	NA	8.2	NA	7.5	NA	umhos/cm
SPEC COND	-	-	600	-	690	-	-	-	500	-	470	-	ug/l
TOC	-	-	5.3	-	5.0	-	-	-	7.0	-	8.0	-	ug/l
TOX	-	-	9.5	-	18.0	-	-	-	13.0	-	20.0	-	ug/l
Cl	-	-	NA	-	4.0	-	-	-	NA	-	NA	-	ug/l
NO	-	-	-	-	0.6	-	-	-	-	-	-	-	ug/l
F	-	-	-	-	0.5	-	-	-	-	-	-	-	ug/l
Phenol	-	-	-	-	0.030	-	-	-	-	-	-	-	ug/l
Fe	-	-	-	-	0.04	-	-	-	-	-	-	-	ug/l
Na	-	-	-	-	97	-	-	-	-	-	-	-	ug/l
Mg	-	-	-	-	16	-	-	-	-	-	-	-	ug/l
SO	-	-	-	-	700	-	-	-	-	-	-	-	ug/l
As	-	-	-	-	0.008	-	-	(0.005	-	-	-	-	ug/l
Cr	-	-	-	-	(0.02	-	-	NA	-	-	-	-	ug/l
Hg	-	-	-	-	(0.5	-	-	-	-	-	-	-	ug/l
Ag	-	-	-	-	(0.01	-	-	-	-	-	-	-	ug/l
Ba	-	-	-	-	(0.1	-	-	-	-	-	-	-	ug/l
Cd	-	-	-	-	(0.01	-	-	-	-	-	-	-	ug/l
Pb	-	-	-	-	(0.1	-	-	-	-	-	-	-	ug/l
Se	-	-	-	-	(0.002	-	-	-	-	-	-	-	ug/l
Methoxy-chlor	-	-	-	-	(5	-	-	-	-	-	-	-	ug/l

A priority pollutant scan was conducted on one sample in the first and third quarter of 1985. All 112 parameters were below detectable limits unless indicated below.

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT '8'

GM - 3 1985

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	NA	NA	7.0	NA	7.0	NA	NA	NA	7.1	NA	7.0	NA	umhos/cm
SPEC COND	-	-	1900	-	2100	-	-	-	2210	-	1900	-	mg/l
TOC	-	-	6.0	-	3.0	-	-	-	0.25	-	2.0	-	ug/l
TOX	-	-	9.0	-	7.0	-	-	-	5.0	-	5.0	-	mg/l
Cl	-	-	NA	-	13.0	-	-	-	NA	-	NA	-	mg/l
NO	-	-	-	-	(0.1	-	-	-	-	-	-	-	mg/l
F	-	-	-	-	0.3	-	-	-	-	-	-	-	mg/l
Phenol	-	-	-	-	0.020	-	-	-	-	-	-	-	mg/l
Fe	-	-	-	-	17.0	-	-	-	-	-	-	-	mg/l
Na	-	-	-	-	70	-	-	-	-	-	-	-	mg/l
Mg	-	-	-	-	120	-	-	-	-	-	-	-	mg/l
SO	-	-	-	-	1000	-	-	-	-	-	-	-	mg/l
As	-	-	-	-	(0.005	-	-	-	-	-	-	-	mg/l
Cr	-	-	-	-	(0.02	-	-	-	-	-	-	-	mg/l
Hg	-	-	-	-	(0.5	-	-	-	-	-	-	-	ug/l
Ag	-	-	-	-	(0.01	-	-	-	-	-	-	-	mg/l
Ba	-	-	-	-	(0.1	-	-	-	-	-	-	-	mg/l
Cd	-	-	-	-	(0.01	-	-	-	-	-	-	-	mg/l
Pb	-	-	-	-	(0.1	-	-	-	-	-	-	-	mg/l
Se	-	-	-	-	(0.002	-	-	-	-	-	-	-	mg/l
Methoxy-chlor	-	-	-	-	(5	-	-	-	-	-	-	-	ug/l

A priority pollutant scan was conducted on one sample in the first and third quarter of 1985.
All 112 parameters were below detectable limits unless indicated below.

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT '8'

BN - 4 1985

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	NA	NA	11.9	NA	11.3	NA	NA	NA	10.0	NA	9.0	NA	umhos/cm
SPEC COND		-	1700	-	1600	-	-	-	625	-	600	-	mg/l
TOC		-	8.2	-	24.0	-	-	-	11	-	5	-	ug/l
TOX	-	-	16.8	-	9.0	-	-	-	20	-	38	-	mg/l
Cl	-	-	NA	-	3.0	-	-	-	NA	-	-	-	mg/l
NO	-	-	-	-	<0.1	-	-	-	-	-	-	-	mg/l
F	-	-	-	-	0.3	-	-	-	-	-	-	-	mg/l
Phenol	-	-	-	-	0.158	-	-	-	-	-	-	-	mg/l
Fe	-	-	-	-	0.04	-	-	-	-	-	-	-	mg/l
Na	-	-	-	-	64	-	-	-	-	-	-	-	mg/l
Mg	-	-	-	-	0.4	-	-	-	-	-	-	-	mg/l
SO	-	-	-	-	500	-	-	-	-	-	-	-	mg/l
As	-	-	-	-	<0.005	-	-	-	-	-	-	-	mg/l
Cr	-	-	-	-	<0.02	-	-	-	-	-	-	-	mg/l
Hg	-	-	-	-	<0.5	-	-	-	-	-	-	-	ug/l
Ag	-	-	-	-	<0.01	-	-	-	-	-	-	-	mg/l
Ba	-	-	-	-	<0.1	-	-	-	-	-	-	-	mg/l
Cd	-	-	-	-	<0.01	-	-	-	-	-	-	-	mg/l
Pb	-	-	-	-	0.22	-	-	-	-	-	-	-	mg/l
Se	-	-	-	-	<0.002	-	-	-	-	-	-	-	mg/l
Methoxy-chlor	-	-	-	-	<5	-	-	-	-	-	-	-	ug/l

A priority pollutant scan was conducted on one sample in the first and third quarter of 1985.
All 112 parameters were below detectable limits unless indicated below.

TABLE 2 - 12 (continued)

SUMMARY OF 1984 AND 1985 WATER QUALITY DATA FOR THE HYDROLOGIC UNIT 'B'

GW - 5 1985

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	UNITS
pH	7.2	7.2	7.1	7.2	7.0	7.5	NR	NR	7.2	NR	7.2	NR	umhos/cm
SPEC COND	1800	1800	1900	2300	2200	2400	-	-	2050	-	1700	-	ug/l
TOC	2.7	7.3	4.8	9.4	4.0	4.8	-	-	4.8	-	6.5	-	ug/l
TOX	15.0	11.0	9.0	12	18	28	-	-	<5	-	2.0	-	ug/l
Cl	15.0	17.0	15.0	16	18	19	-	-	-	-	-	-	ug/l
NO	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	ug/l
F	0.4	0.2	0.3	0.2	0.3	0.2	-	-	-	-	-	-	ug/l
Phenol	<0.005	<0.005	<0.005	<0.010	<0.010	<0.010	NR	NR	NR	NR	NR	NR	ug/l
Fe	3.9	4.5	5.9	1.9	4.9	9.3	-	-	-	-	-	-	ug/l
Na	80	78	70	92	90	87	-	-	-	-	-	-	ug/l
Mg	120	140	130	150	130	130	-	-	-	-	-	-	ug/l
SO	1500	1500	1500	930	2600	1200	-	-	-	-	-	-	ug/l
As	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	NR	NR	NR	NR	NR	NR	ug/l
Cr	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	-	ug/l
Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	ug/l
Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	ug/l
Ba	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	ug/l
Cd	<0.0:	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	ug/l
Pb	<0.1	<0.1	<0.1	<0.05	<0.1	<0.05	-	-	-	-	-	-	ug/l
Se	<0.002	<0.002	<0.005	<0.002	<0.002	<0.002	-	-	-	-	-	-	ug/l
Methoxy-chlor	<5	<5	<2	<5	<5	<5	-	-	-	-	-	-	ug/l

A priority pollutant scan was conducted on one sample in the first and third quarter of 1985. All 112 parameters were below detectable limits unless indicated belw.

TABLE 2-13
WATER SUPPLY WELLS

Well/Log Number	Surface Elevation (ft,MSL)	Uncased Zone (ft,MSL)	Uncased Hydrologic Unit	Water Surface Elevation (ft,MSL)
20893	696	578 - 66	C/D	-
25230	845	703 - 440	C/D	585
25784	798	694 - 353	C/D	-
26237	756	6 - (594)	E/F	586
26687	804	739 - 519	C/D	599
26748	824	664 - 459	C/D	654
26843	812	669 - 427	C/D	682
26872	746	681 - 341	C/D	561
26889	750	570 - 185	C/D	580
26913	796	732 - 491	C/D	581
26966	826	680 - 481	C	686
27016	764	389 - (-186)	D/E	-
28104	780	310 - 260	E	-
27570	825	700 - 440	C/D	562
26511	672	627 - 307	C/D	572
27605	738	658 - 453	C	595
25238	962	762 - 577	C/D	562

TABLE 2-14

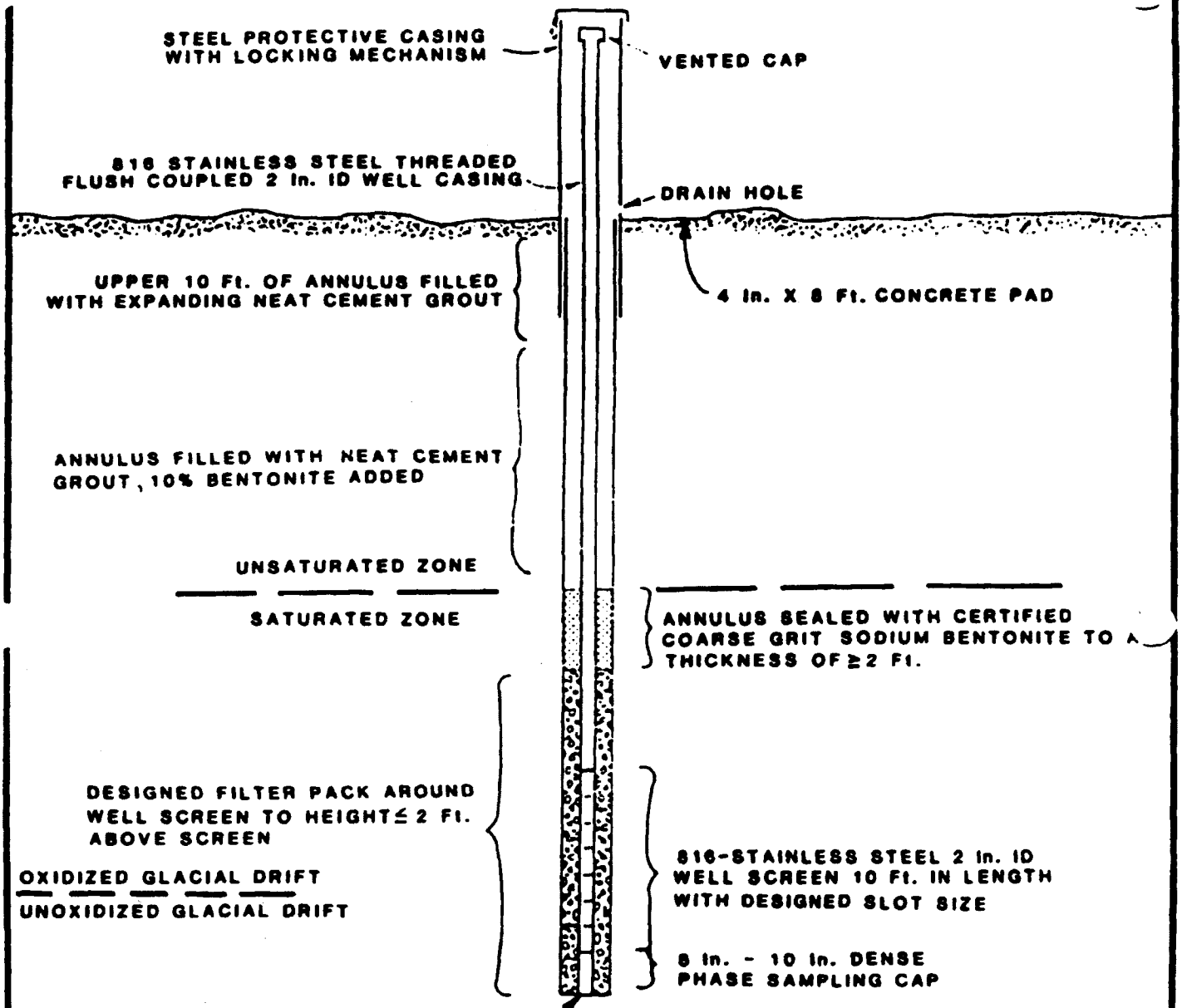
CHEMICALS ANALYZED FOR FROM PRIVATE WATER WELL SAMPLES

Arsenic	HCB
Barium	PCBs
Cadmium	p,p-DDE
Calcium	2,4-D
Chromium	2,4,5-TP
Copper	Lindane
Iron	Heptachlor Epoxide
Lead	Chlorobenzene
Manganese	1,1-Dichloroethane
Mercury	1,2-Dichloroethane
Nickel	Methylene Chloride
Selenium	Trichloroethylene
Silver	1,21,2-Transdichloroethylene
Sodium	1,1,1-Trichloroethane
Zinc	Trichloroethylene
Fluoride	Vinylidene Chloride
Chloride	Bromodichloromethane
Nitrates	Dibromochloromethane
Alkalinity	Bromoform
alpha BHC	

TABLE 2 - 15

CHEMICAL CONCENTRATIONS IN PRIVATE WATER WELL SAMPLES

Range	47W	47W	46W	47W	47W	47W	47W	47W	47W	47W	MD	47W	47W	47W	47W	47W	47W	R	R	U
Township	1N	1N	1N	1N	1N	1N	1N	1N	1N	1N	BESC.	1N	1N	1N	1N	1N	1N	A	A	N
Section	28	29	5	34	24	32	29	29	20	21		27	32	32	20	32	22	E	M	I
	SW2/3 SW1/4	SW3/4 SE1/4	NE1/4 NE1/4	- -	SW1/4 NE1/4	E1/2 SW1/4	N1/2 NW1/4 NW1/4	E1/2 SW1/4	E1/2 SW1/4	N1/2 SW1/4 NW1/4		N1/2 SW1/4	SE1/4 NW1/4	SE1/4 SE1/4 NW1/4	S2/3 NE1/4	0.DNG	NW1/4 NE1/4 SW1/4			T S
Field pH	7.02	7.3	7.3	7.1	7.0	7.3	7.2	7.3	7.3	7.2	7.2	7.2	7.6	7.1	7.4	7.5	7.2	7.6	7.0	-
Spec. Cond.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity	477	380	253	404	367	357	370	395	374	372	382	312	382	386	385	381	276	477	253	mg/l
Cl	6.0	3.0	12.0	28.0	5.0	12.0	4.0	5.0	3.0	3.0	4.0	19.0	5.0	6.0	3.0	2.0	15.0	28.0	3.0	mg/l
NO	0.09	0.08	<0.05	1.32	<0.05	0.05	0.07	0.06	0.10	0.06	<0.05	4.10	2.24	0.60	0.30	<0.05	5.10	5.10	<0.05	mg/l
F	0.30	0.52	0.43	0.72	0.56	0.70	0.50	0.60	0.43	0.30	1.10	0.66	0.45	0.70	0.53	0.64	0.13	1.10	0.13	mg/l
Phenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	-	-	-
Fe	0.11	0.54	1.23	<0.1	4.30	2.00	2.30	2.90	4.40	1.70	0.19	<0.1	0.23	0.27	0.14	1.40	<0.1	4.40	<0.1	mg/l
Na	60.5	50.3	12.3	38.5	55.0	14.6	41.0	52.0	39.6	46.2	34.5	32.3	34.5	53.9	55.4	28.2	38.4	60.5	12.3	mg/l
Mn	0.16	<0.02	0.07	<0.02	<0.02	<0.02	<0.02	0.05	0.03	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.16	<0.02	mg/l
SO	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	-	-	-
As	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	mg/l
Cr	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	mg/l
Hg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l
Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l
Ba	0.10	0.14	<0.2	<0.2	0.17	<0.2	<0.2	<0.2	0.12	<0.2	0.14	0.20	<0.2	<0.2	0.20	<0.2	0.11	0.20	0.11	mg/l
Cd	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l
Pb	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	mg/l
Se	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l
Ca	88.9	58.6	81.3	76.0	81.4	65.3	80.9	110.2	71.9	115.4	49.8	80.7	114.0	70.1	66.0	70.4	64.3	115.4	49.8	mg/l



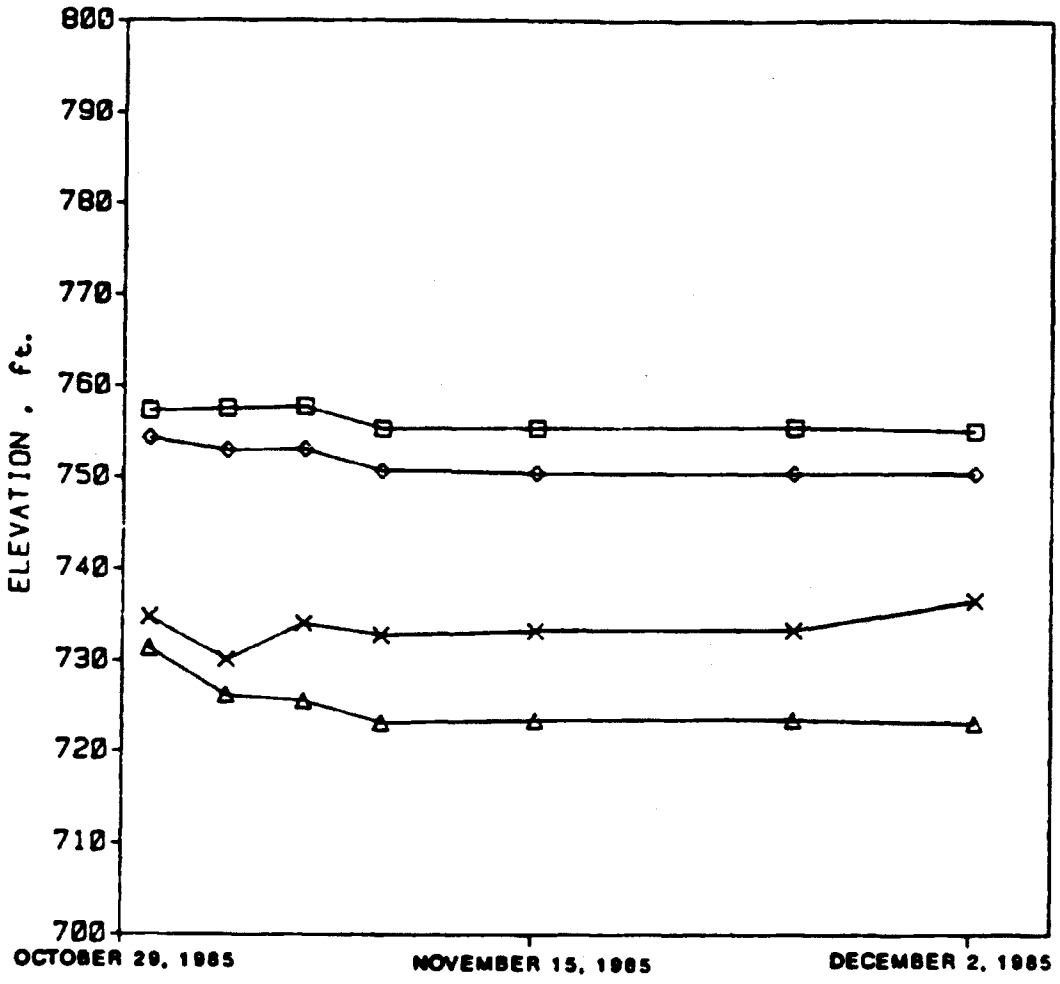
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

TYPICAL WELL CONSTRUCTION

Woodward-Clyde Consultan

JOB NO W4C7729-B			APPROVED	DATE 2-13-86
DRN		2-14-86	WCC	DRAWING — OF —
CHK'D	2	2/14/86	BHS M. D. Gill	DRAWING NO A2-1
REV'D				



LEGEND

□ K5-0X

◇ K5-80

X K5-8A

△ K5-8R

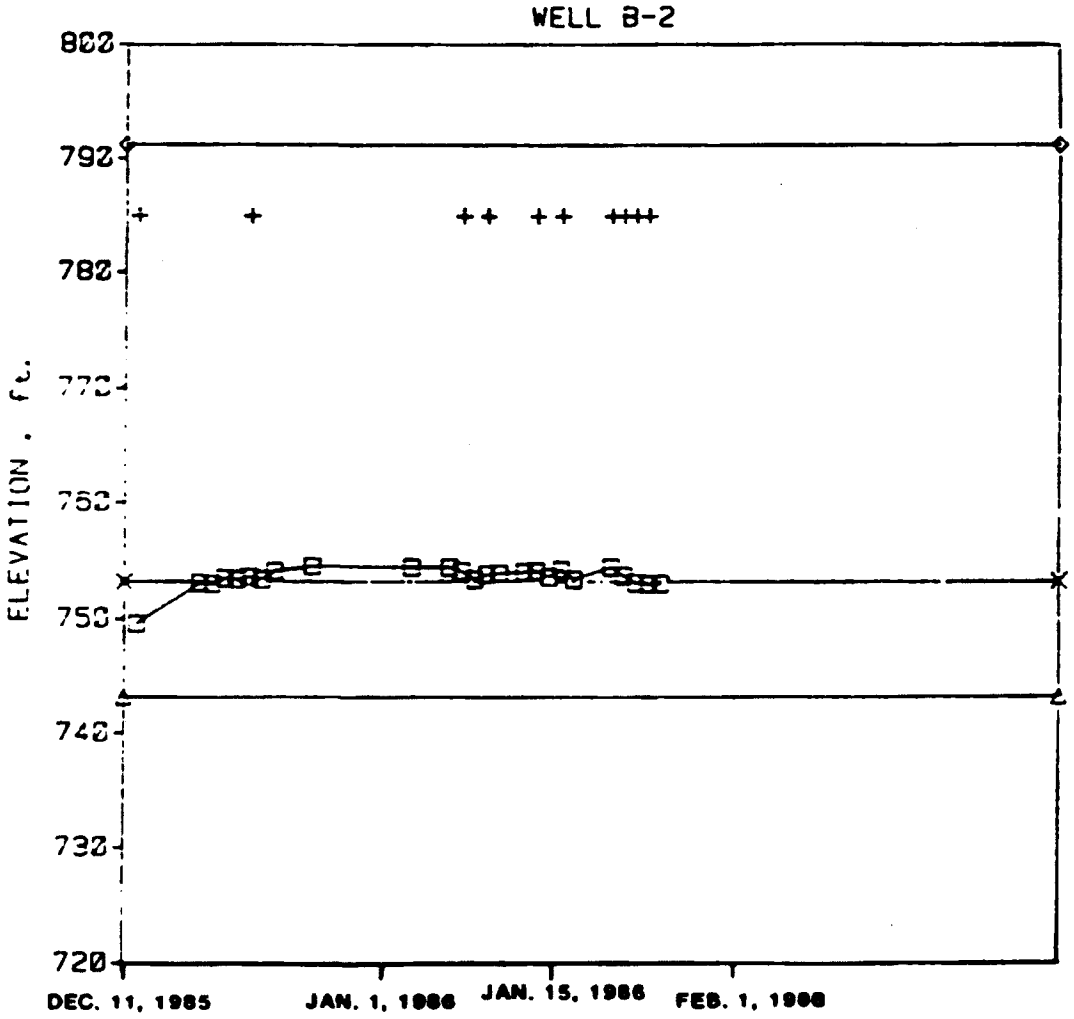
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

K-5 WELL NEST

Woodward-Clyde Consultants

JOB NO W4C7729-6	APPROVED		DATE 2-13-86
DRN			DRAWING OF
CHK'D	WCC		DRAWING NO
REV'D	BHS		A2-2



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

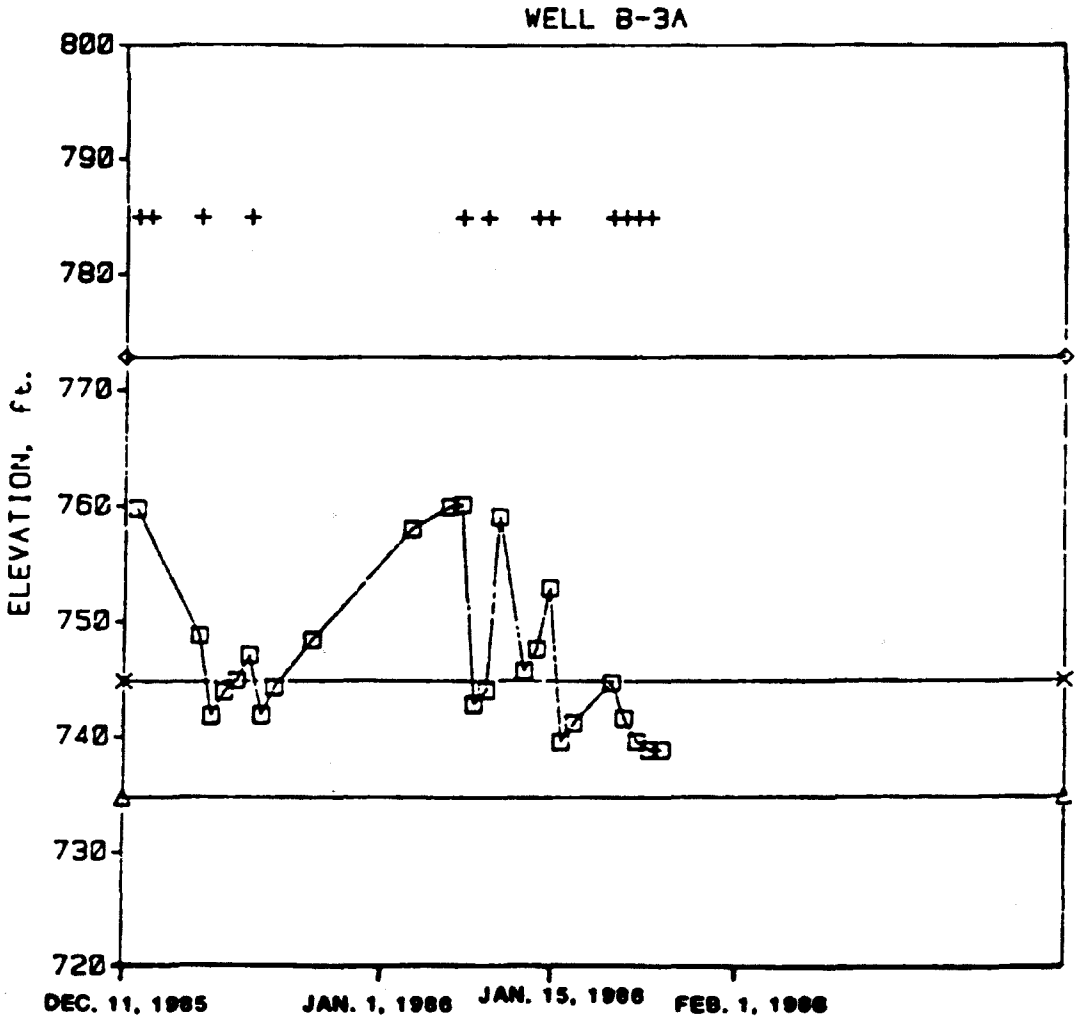
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-2 GROUND WATER ELEVATIONS

Woodward-Clyde Consultant

JOB NO W4C7729-6			APPROVED	DATE 2/13/86
DRN				DRAWING 01
CHK'D	R	2/14/86	MGR	DRAWING NO A2-3
REV'D		2/14	MGR W.D. Gill	



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

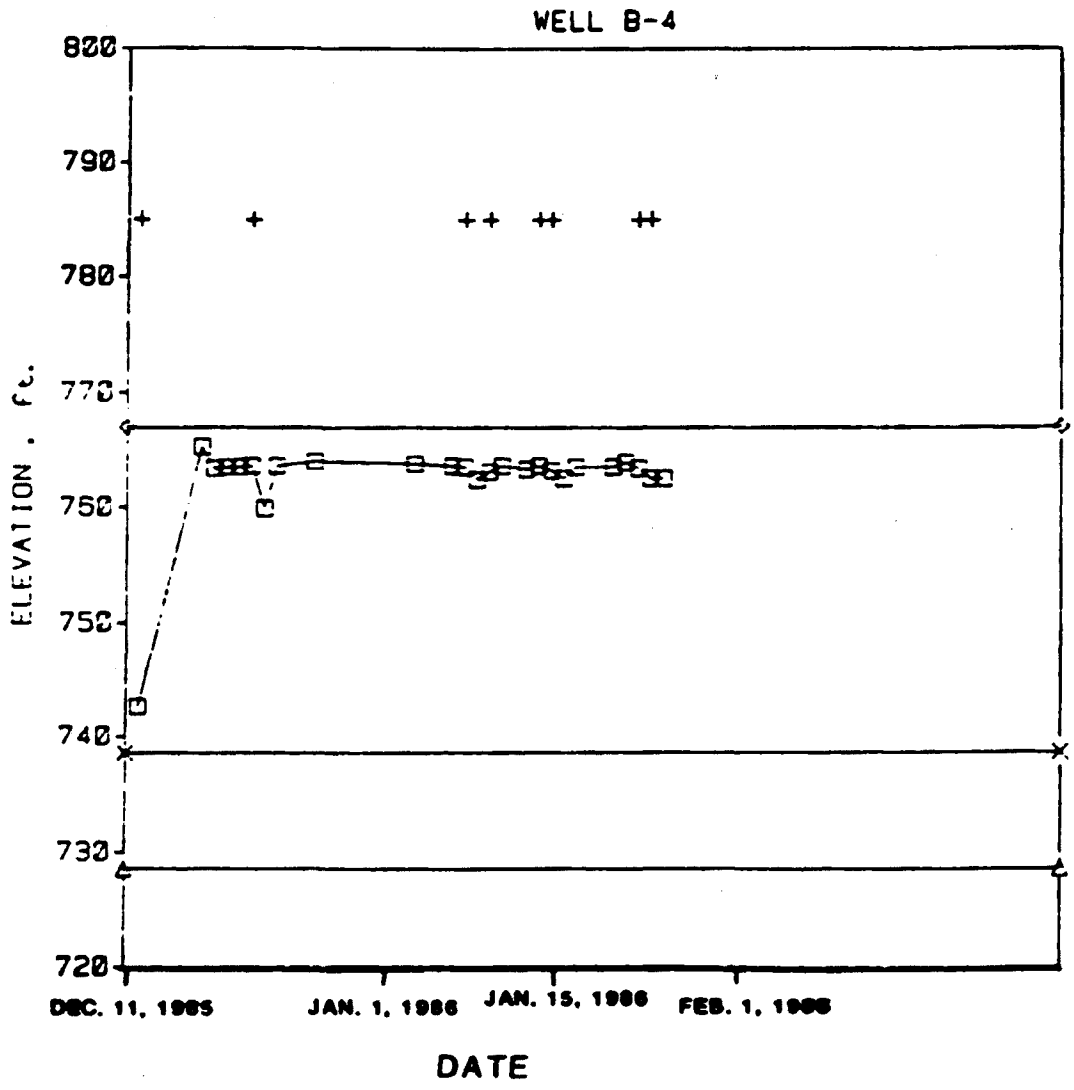
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-3A GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO W4C7729-6			APPROVED	DATE 2/13/86
DRN				DRAWING 01
CHK'D	JR	2/13/86	MCC	
REV'D		2/14	BHS M.D. Gill	DRAWING NO A2-4



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- + INDICATES WELL DEVELOPMENT

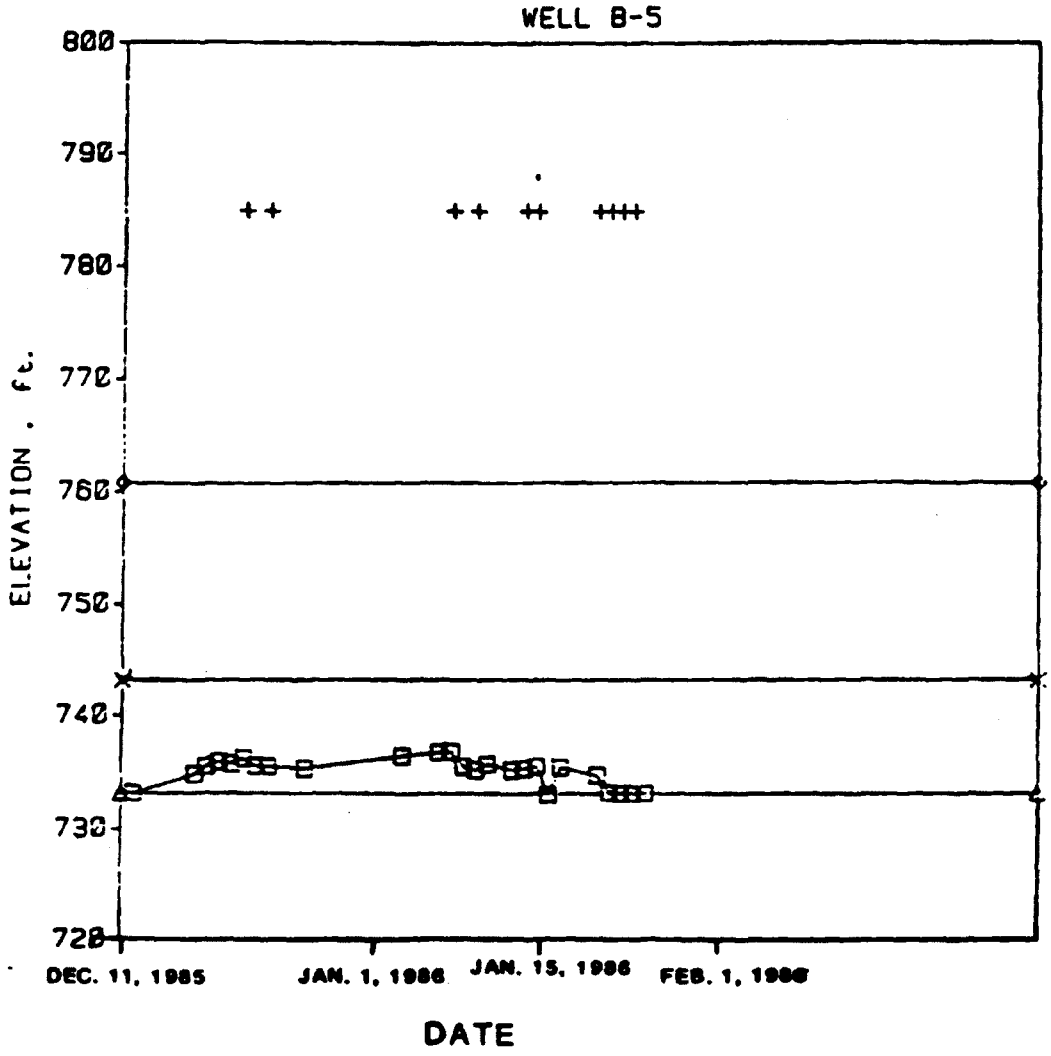
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-4 GROUND WATER ELEVATIONS

Woodward-Clyde Consultan

JOB NO W4C7729-6	APPROVED	DATE 2/13/86	
DRN		DRAWING OF	
CHK'D	WCC	DRAWING NO	
REV'D	BHS M.O. Gill	A2-5	



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

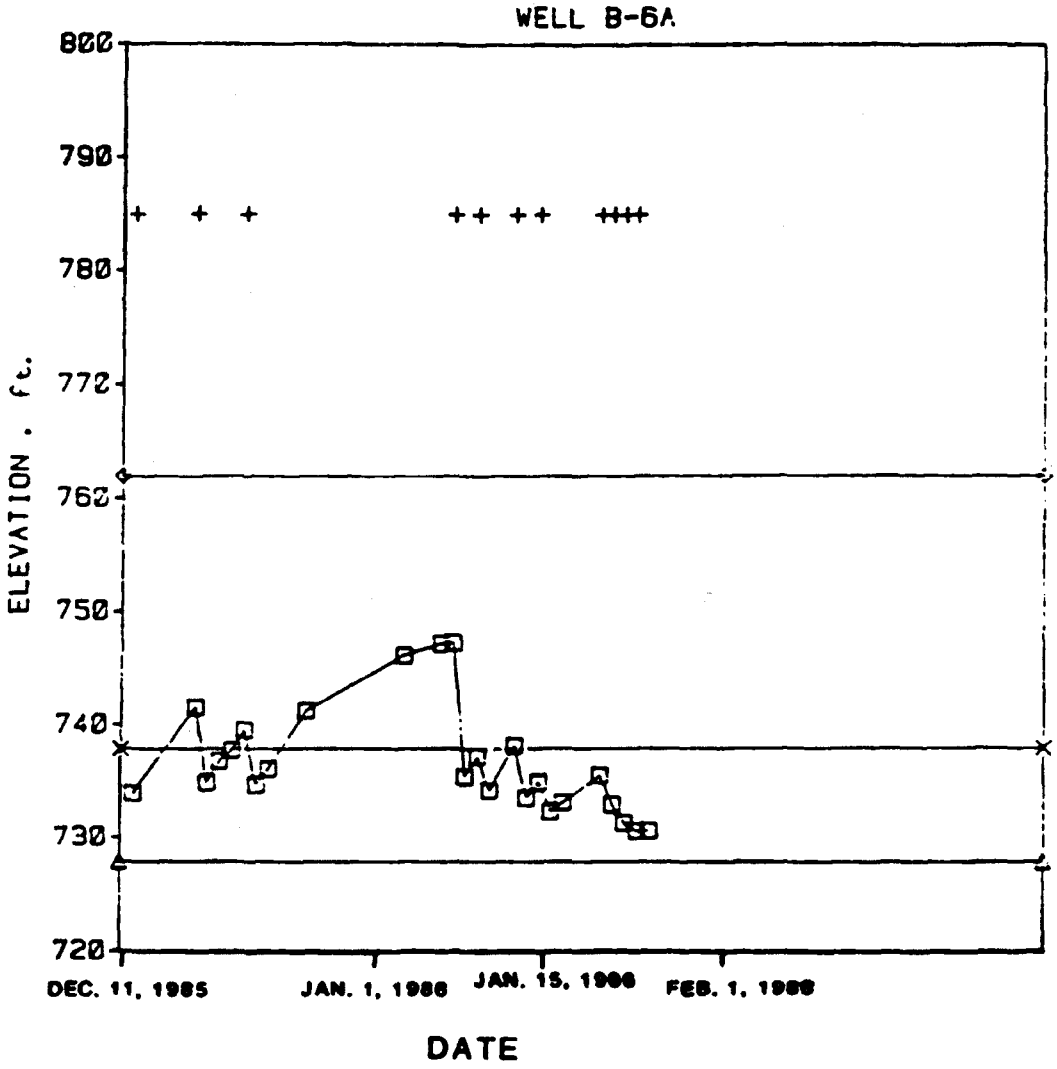
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-5 GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO W4C7729-6			APPROVED	DATE 2/13/86
DSN			MCC	DRAWING OF
CHK'D	R	1/16/86	DMS	DRAWING NO A2-6
REV'D				



LEGEND

◇ GROUND SURFACE ELEVATION
□ WATER SURFACE ELEVATION
× TOP OF SCREEN ELEVATION
△ BOTTOM OF SCREEN ELEVATION
+ INDICATES WELL DEVELOPMENT

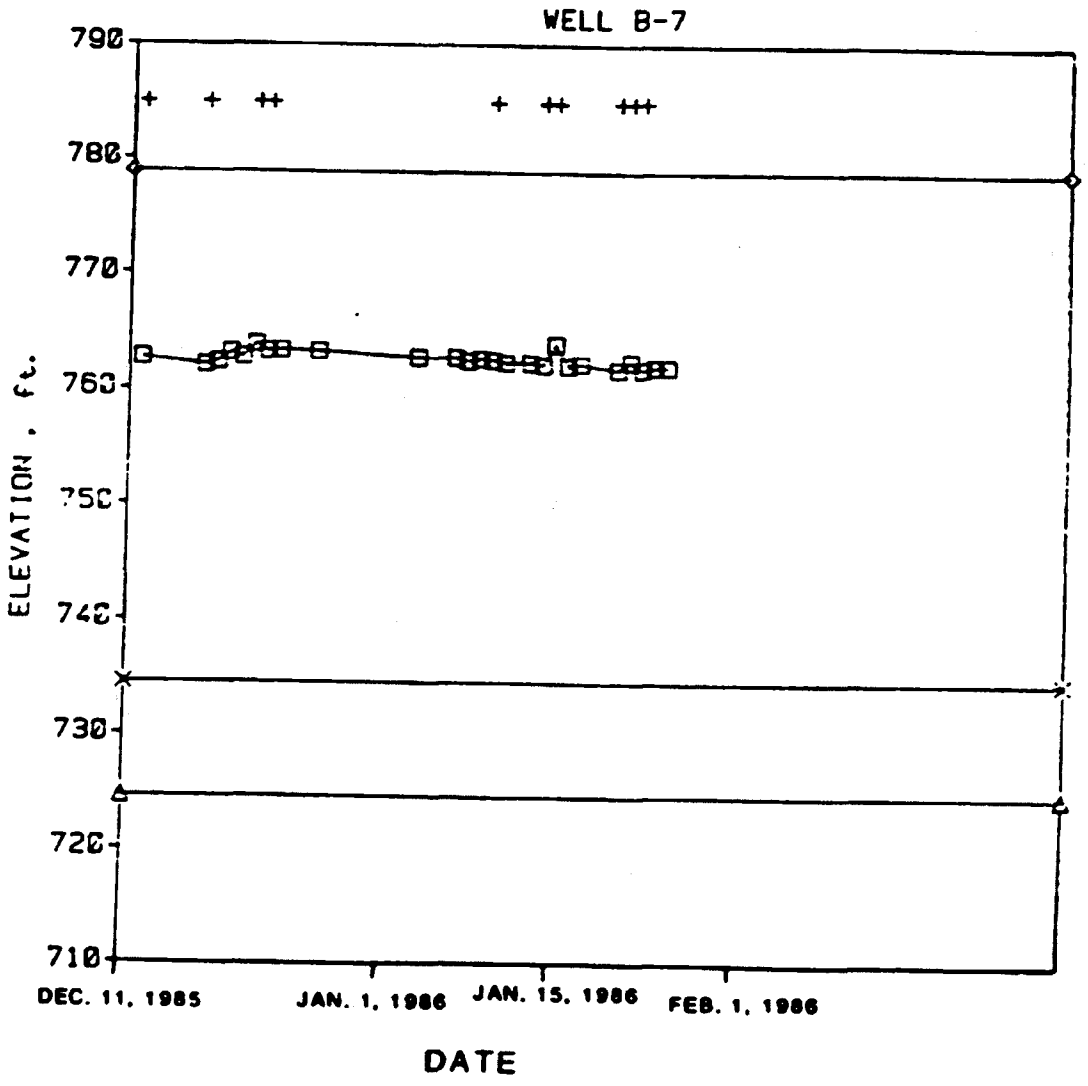
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-6A GROUND WATER ELEVATIONS

Woodward-Clyde Consultan

JOB NO W4C7729-6	APPROVED	DATE 2/13/86	
DRN		DRAWING OF	
CHK'D TR 2/10/86	WCC	DRAWING NO	
REV'D 2/14	BHS M. D. Gill	A2-7	



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- + INDICATES WELL DEVELOPMENT

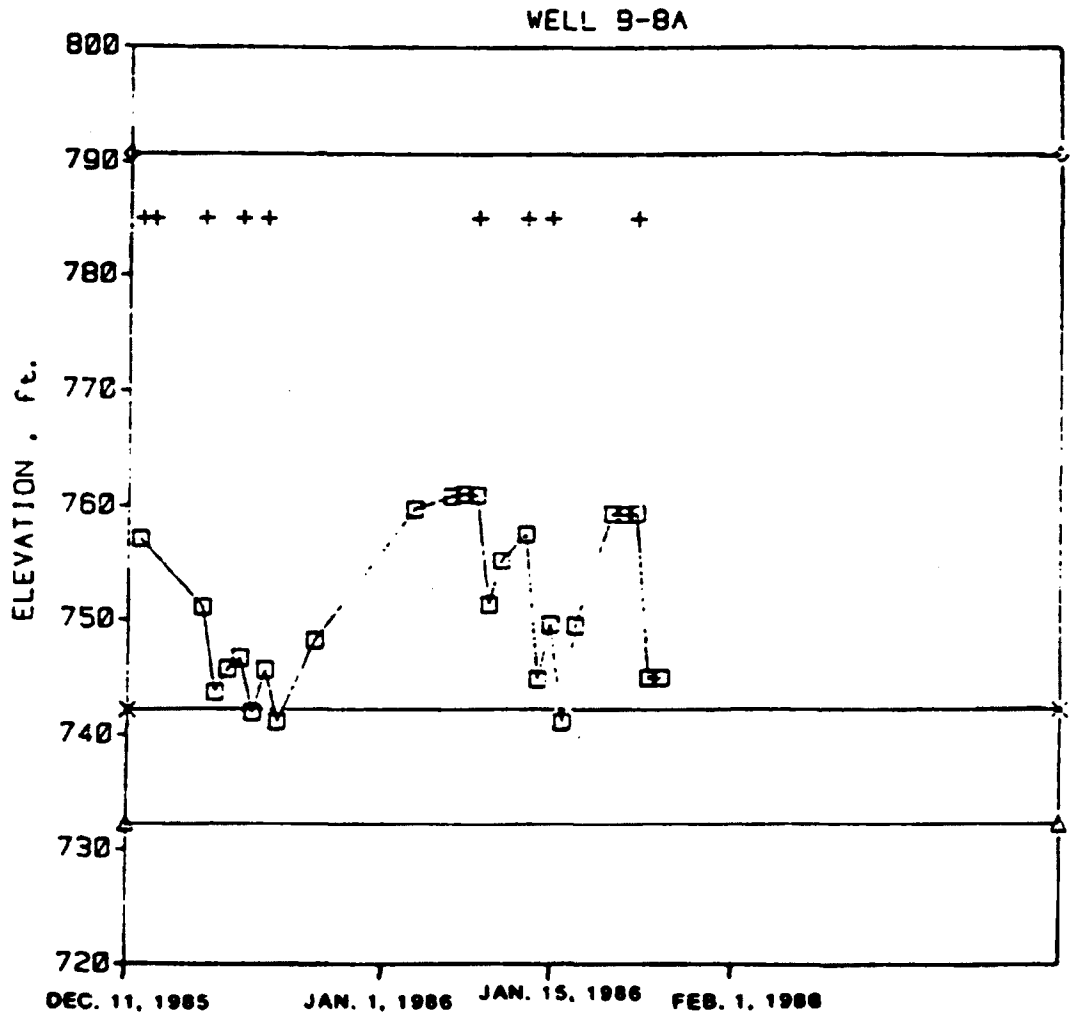
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-7 GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO W4C7729-6	APPROVED	DATE 2/13/86	
DRN	WCC	DRAWING OF	
CHK'D	BHS M.D. Gill	DRAWING NO A2-8	
REV'D			



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- + INDICATES WELL DEVELOPMENT

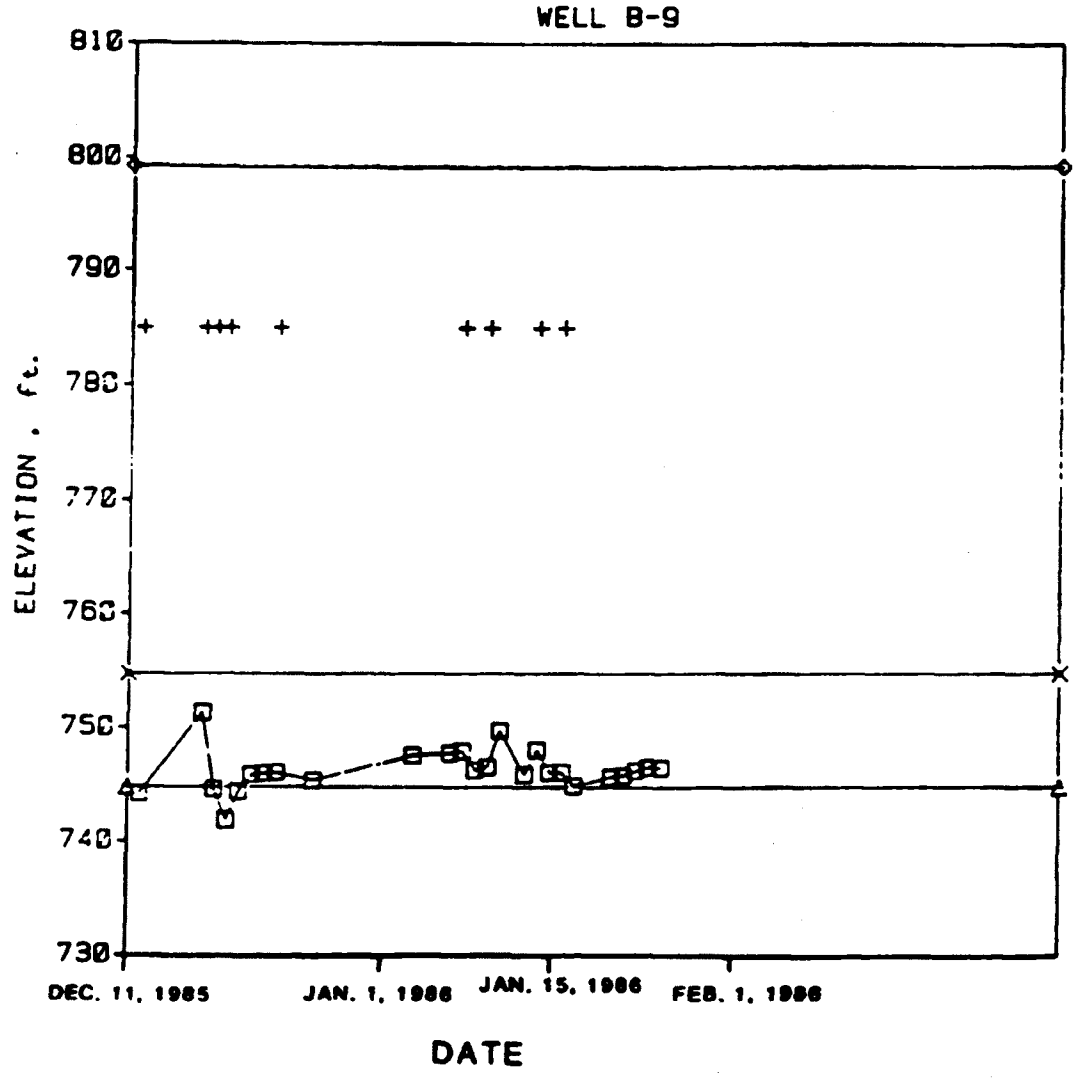
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-8A GROUND WATER ELEVATIONS

Woodward-Clyde Consultar

JOB NO. W4C7729-6			APPROVED	DATE 2/13/86
DRN			WCC	DRAWING OF
CHK'D	R	3/10/86	BHS	DRAWING NO. A2-9
REV'D		2/14		



LEGEND

◇ GROUND SURFACE ELEVATION
□ WATER SURFACE ELEVATION
× TOP OF SCREEN ELEVATION
△ BOTTOM OF SCREEN ELEVATION
+ INDICATES WELL DEVELOPMENT

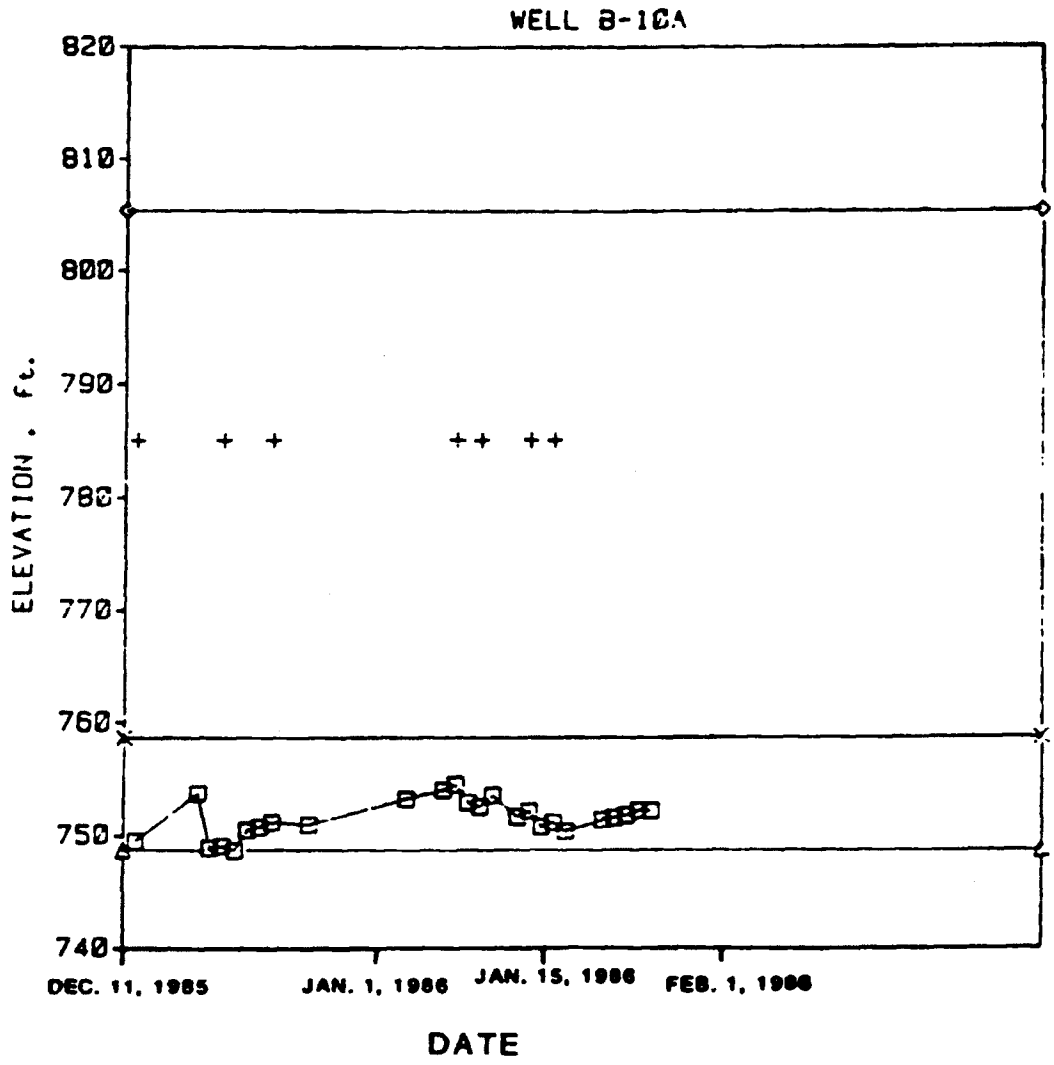
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-9 GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO W4C7729-6	APPROVED	DATE 2/13/86	
DRN		DRAWING OF	
CHK'D		DRAWING NO A2-10	
REV'D			



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- + INDICATES WELL DEVELOPMENT

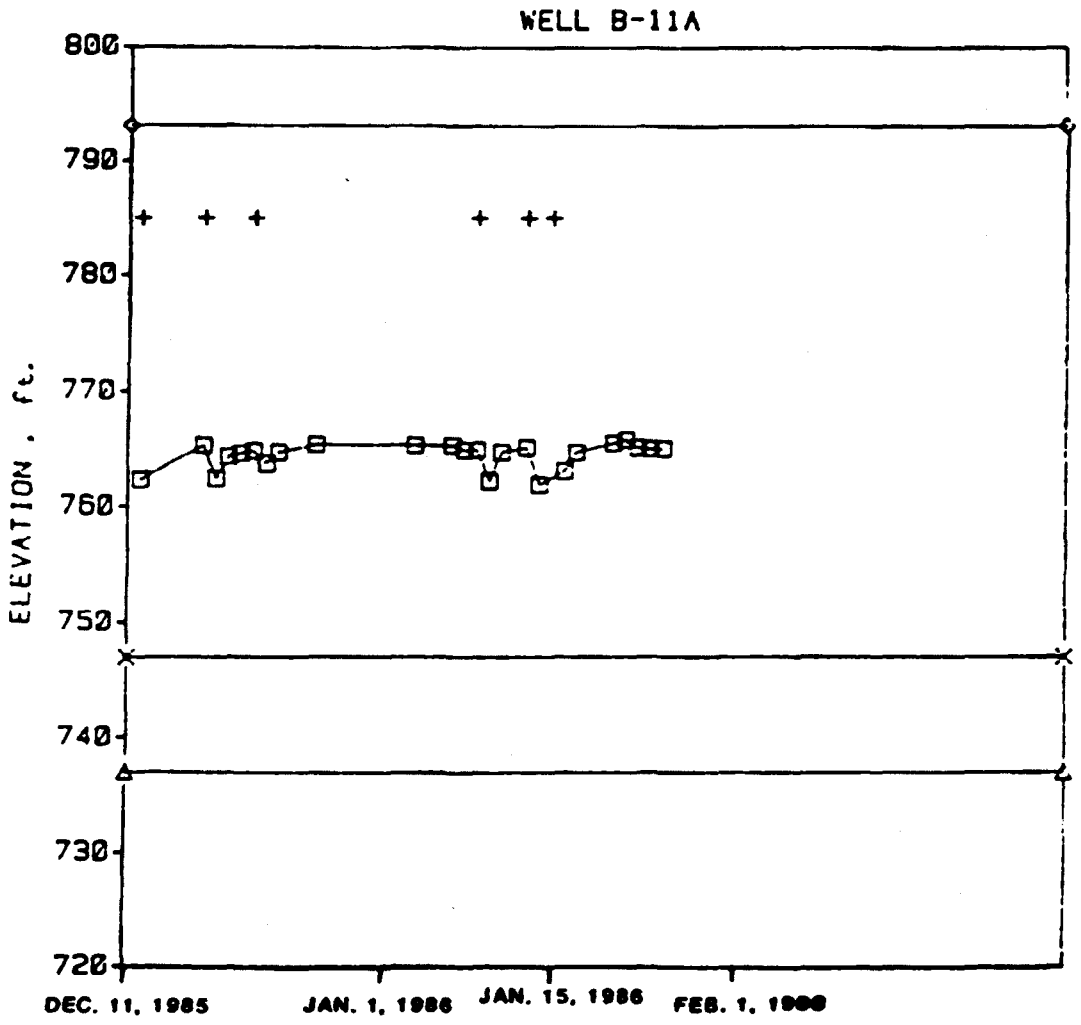
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-10A GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO W4C7729-6	APPROVED	DATE 2/13/86	
DRN		DRAWING OF	
CHK'D		DRAWING NO A2-11	
REV'D			



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- X TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

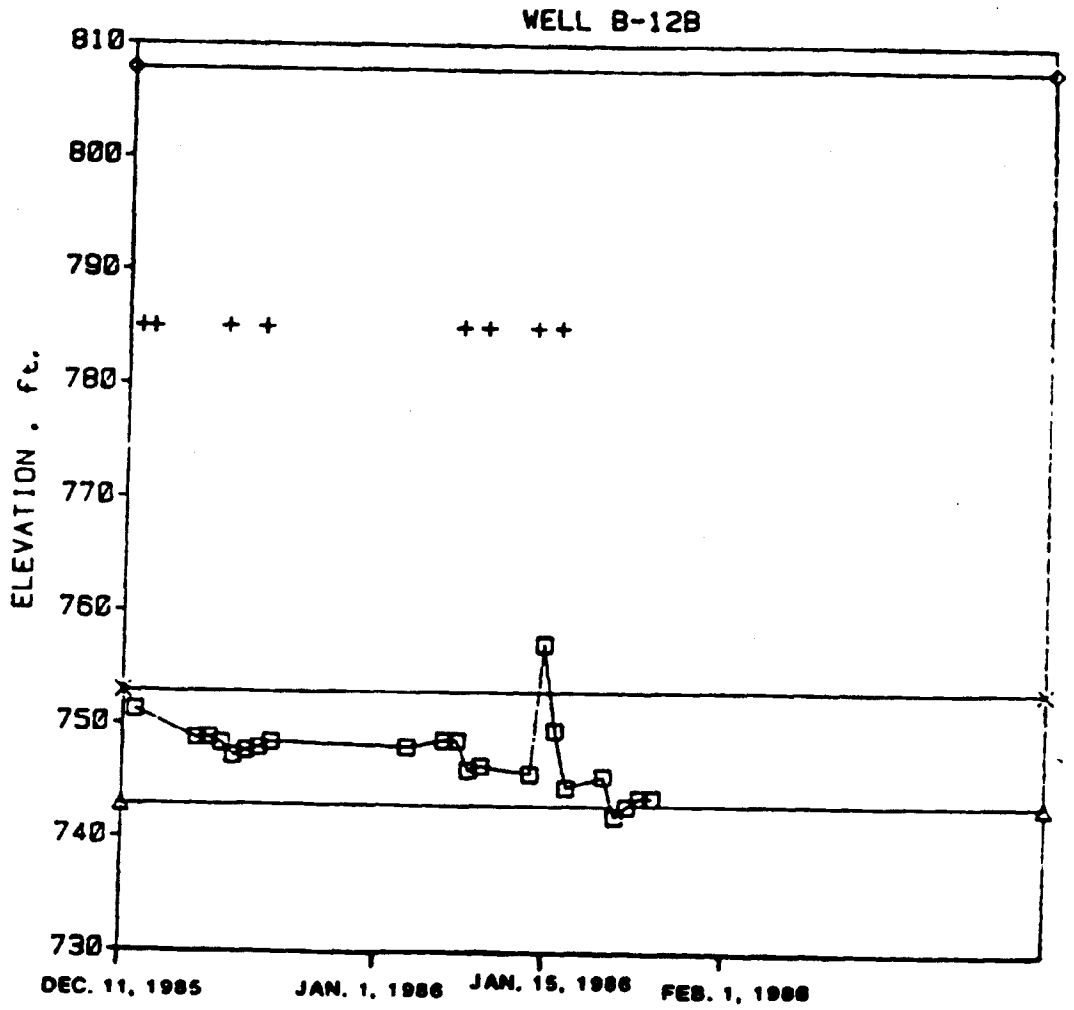
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-11A GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO W9C7729-6			APPROVED	DATE 2/13/86
DRN			WCC	DRAWING 01
CHK'D		2/14/86	BHS	DRAWING NO A2-12
REV'D		2/14		



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

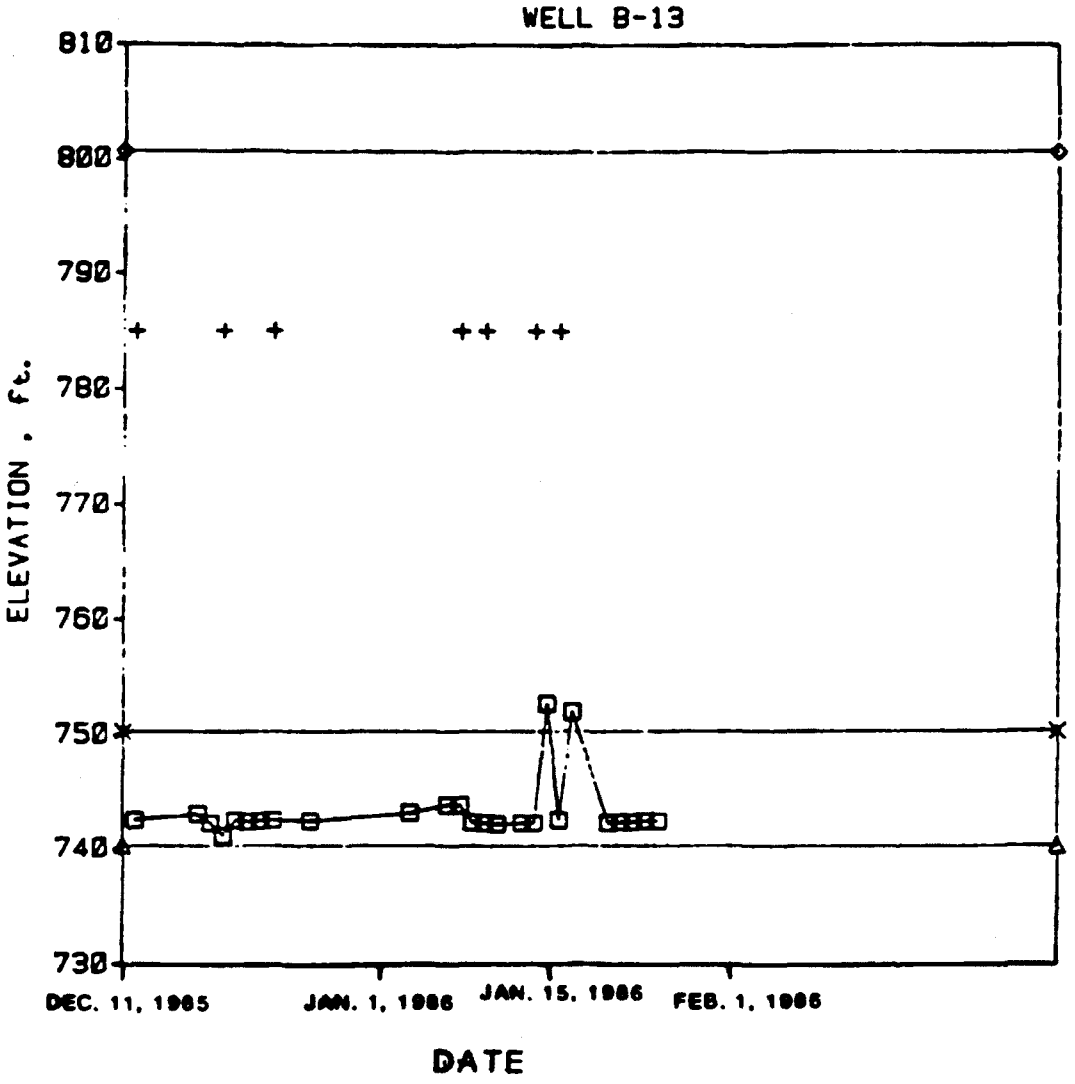
BHS. INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-12B GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

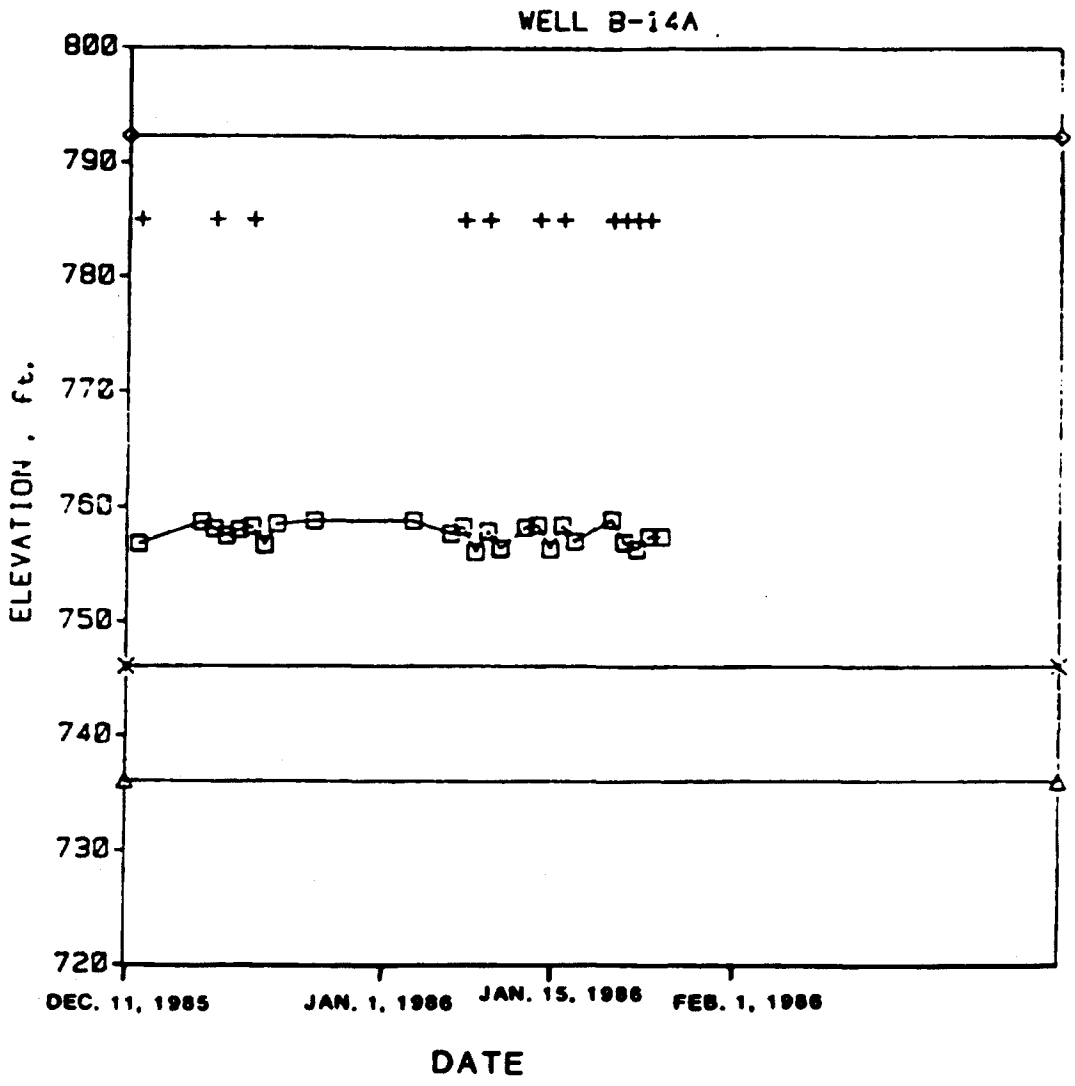
JOB NO W4C7729-6			APPROVED	DATE 2/13/86
DRN				DRAWING OF
CHK'D	RZ	2/13/86	WCC	
REV'D			BHS	DRAWING NO A2-13



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- + INDICATES WELL DEVELOPMENT

BHS, INC.			
WRIGHT CITY, MISSOURI FACILITY RCRA PART B PERMIT APPLICATION			
B-13 GROUND WATER ELEVATIONS			
Woodward-Clyde Consultants			
JOB NO W4C7729-6	APPROVED		DATE 2/13/86
DRN			DRAWING OF
CHK'D			DRAWING NO A2-14
REV'D			



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

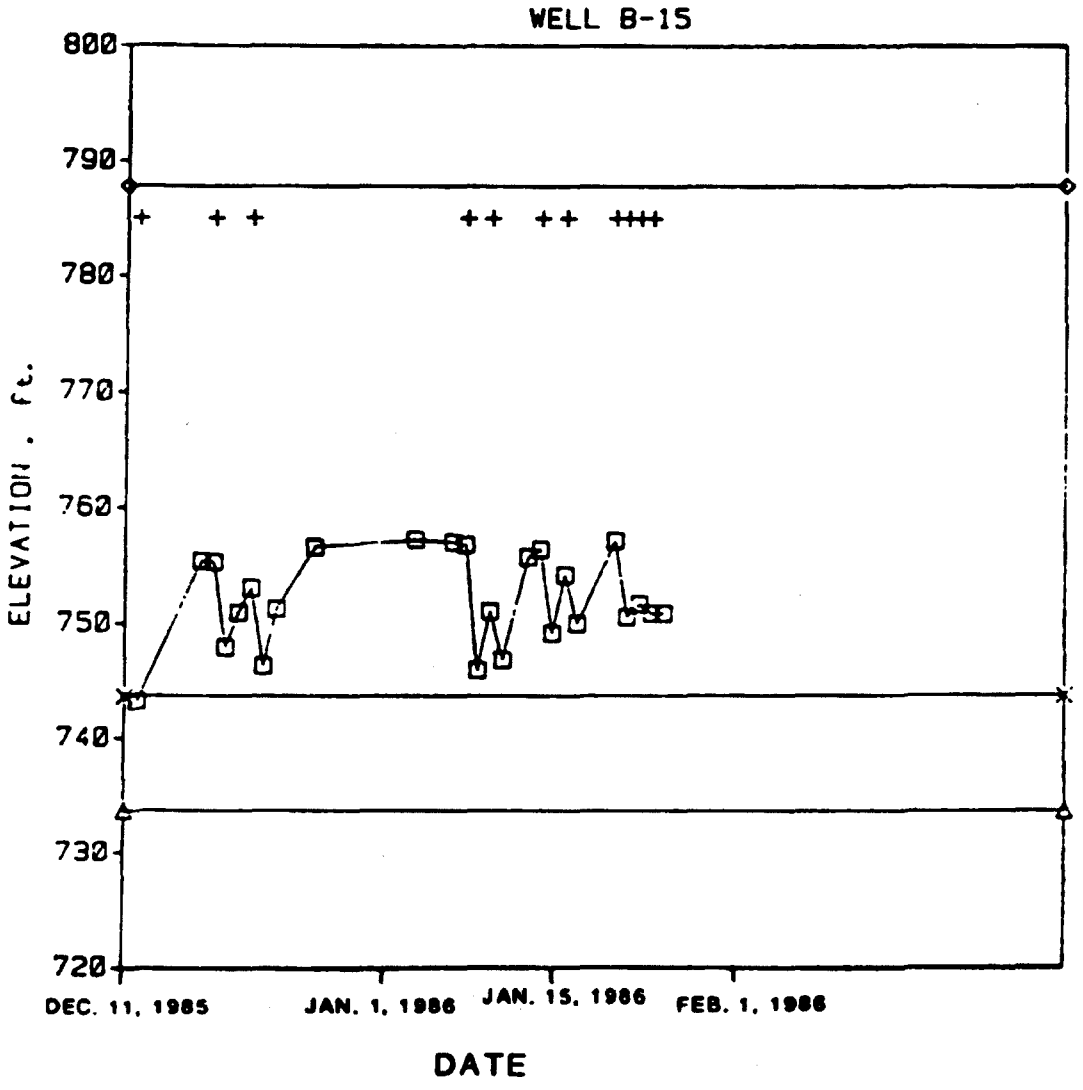
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-14A GROUND WATER ELEVATIONS

Woodward-Clyde Consultant

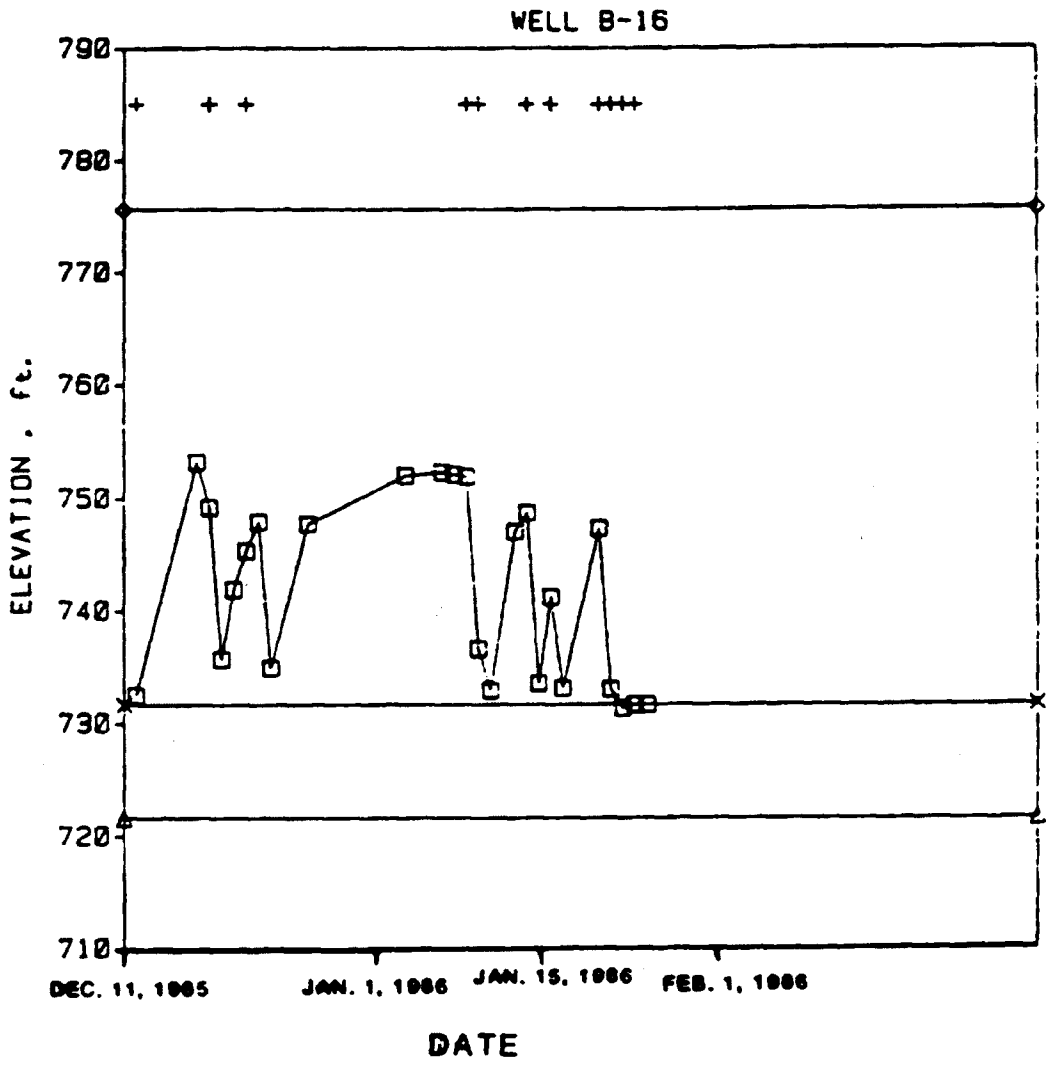
JOB NO W4C7729-B			APPROVED	DATE 2/13/86
DRN				DRAWING 01
CHK'D	R	2/13/86	WCC	
DES'D			BHS M. D. Gill	DRAWING NO A2-15



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- + INDICATES WELL DEVELOPMENT

BHS, INC.			
WRIGHT CITY, MISSOURI FACILITY RCRA PART B PERMIT APPLICATION			
B-15 GROUND WATER ELEVATIONS			
Woodward-Clyde Consultants			
JOB NO W4C7729-6	APPROVED		DATE 2/13/86
DRN			DRAWING OF
CHK'D	WCC		DRAWING NO
REV'D	BHS		A2-16



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

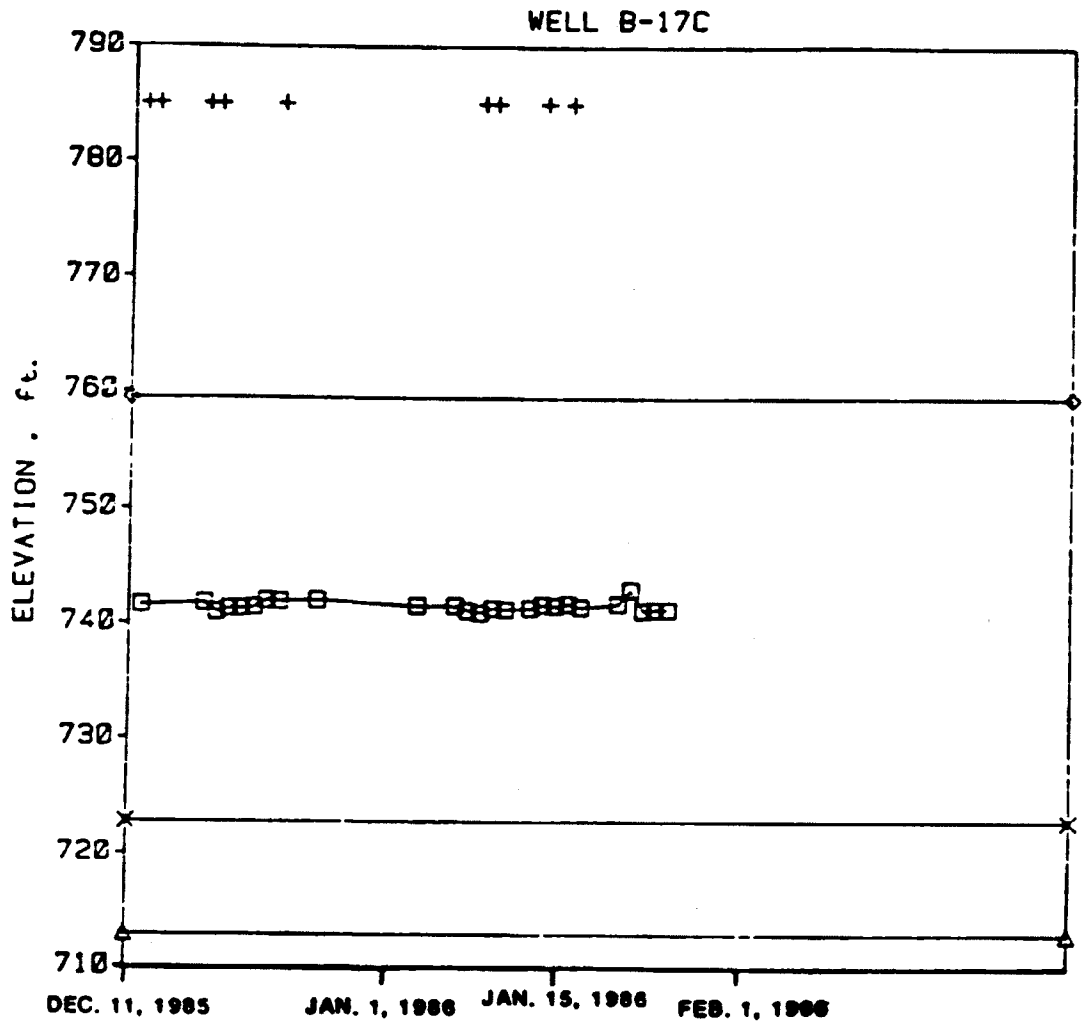
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-16 GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO W4C7729-B	APPROVED		DATE 2/13/86
DRN			DRAWING OF
CHK'D			DRAWING NO A2-17
REV'D			



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

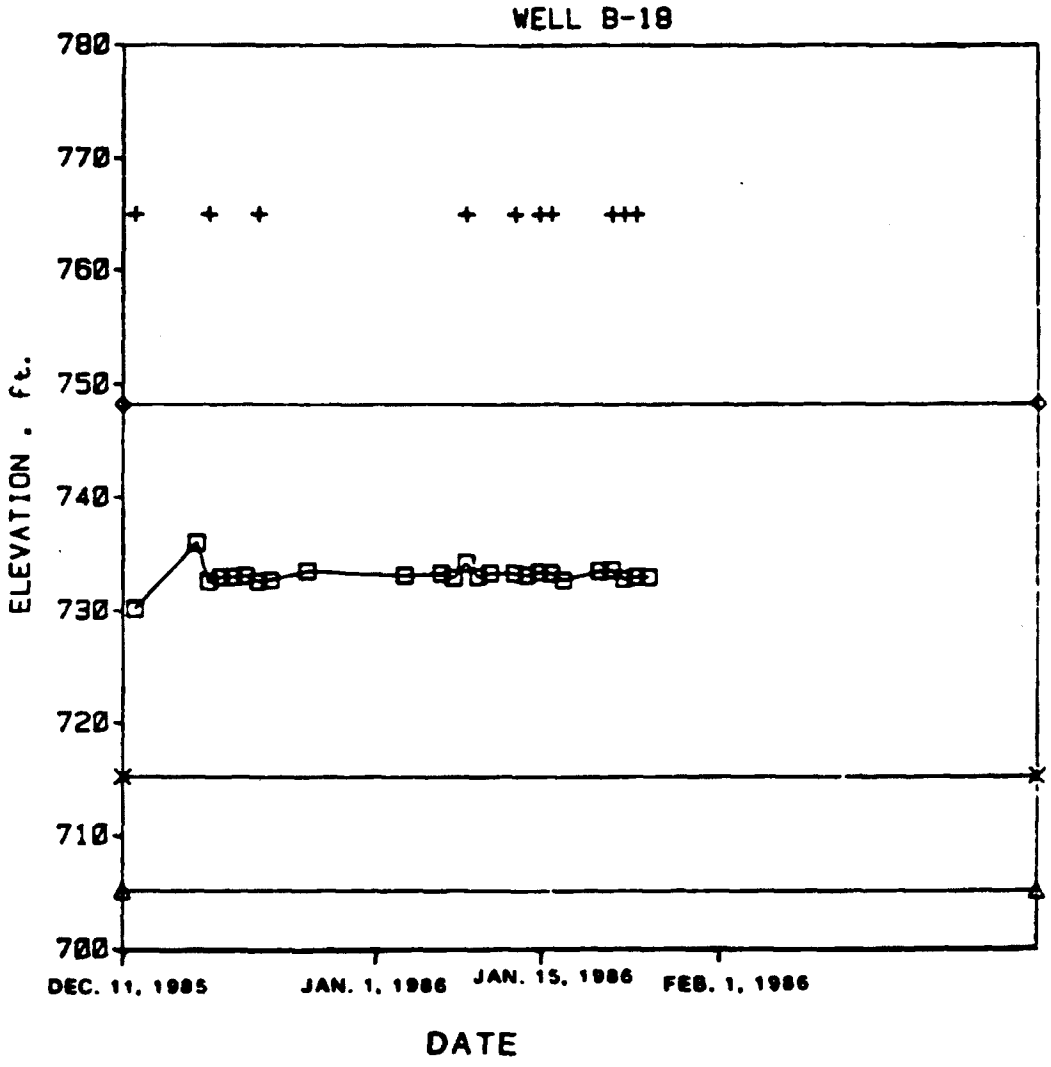
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-17C GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO W4C7729-B			APPROVED	DATE 2/13/86
DRN				DRAWING OF
CHK'D	TR	2/14/86	WCC	
REV'D		2/14	BHS W. D. Gill	DRAWING NO A2-18



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

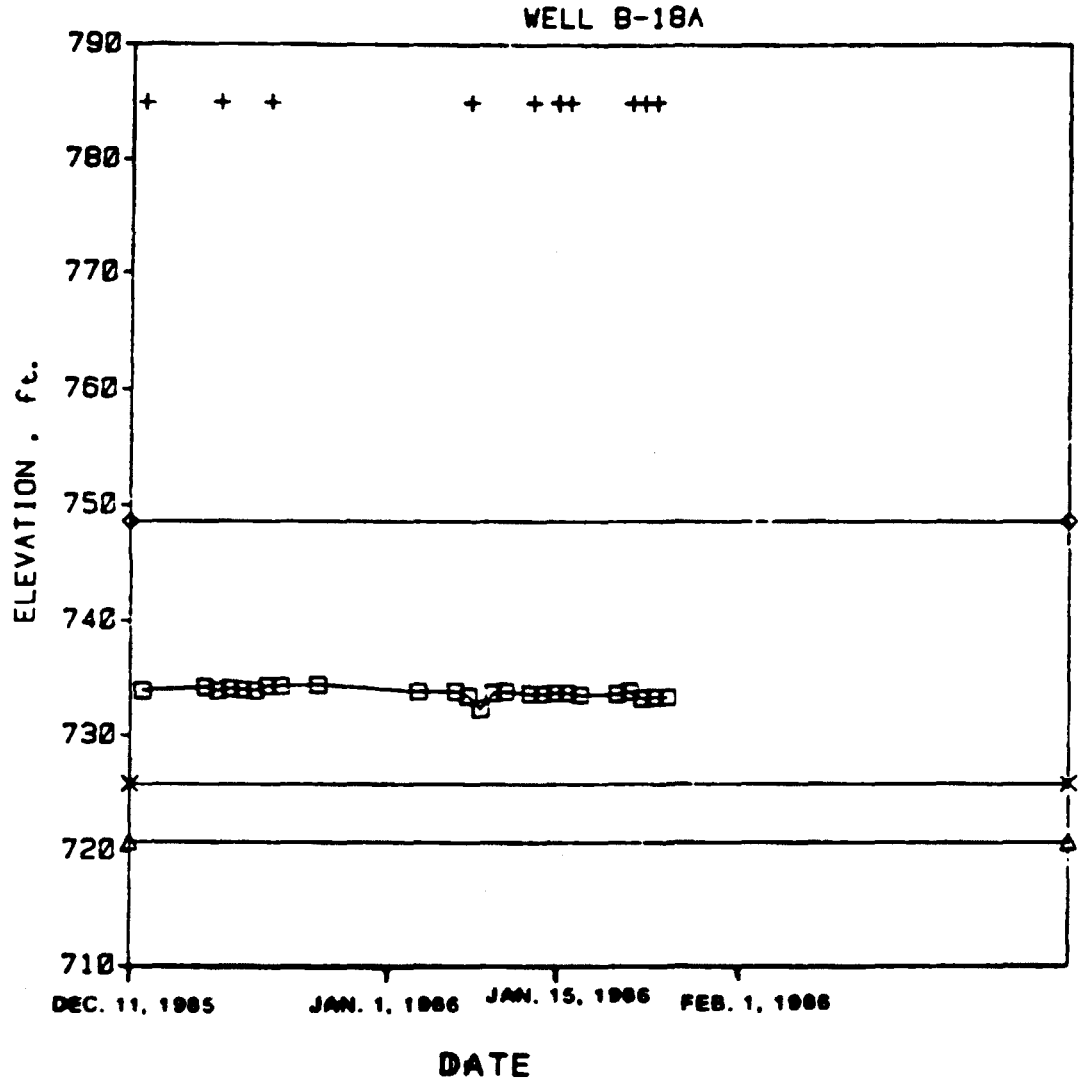
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-18 GROUND WATER ELEVATIONS

Woodward-Clyde Consultant

JOB NO W4C7729-6			APPROVED	DATE 2/13/86
DRN				DRAWING 01
CHK'D	TE	2/13/86	WCC	DRAWING NO A2-19
REV'D		2/ -	BHS	



LEGEND

◇ GROUND SURFACE ELEVATION
□ WATER SURFACE ELEVATION
× TOP OF SCREEN ELEVATION
△ BOTTOM OF SCREEN ELEVATION
\+ INDICATES WELL DEVELOPMENT

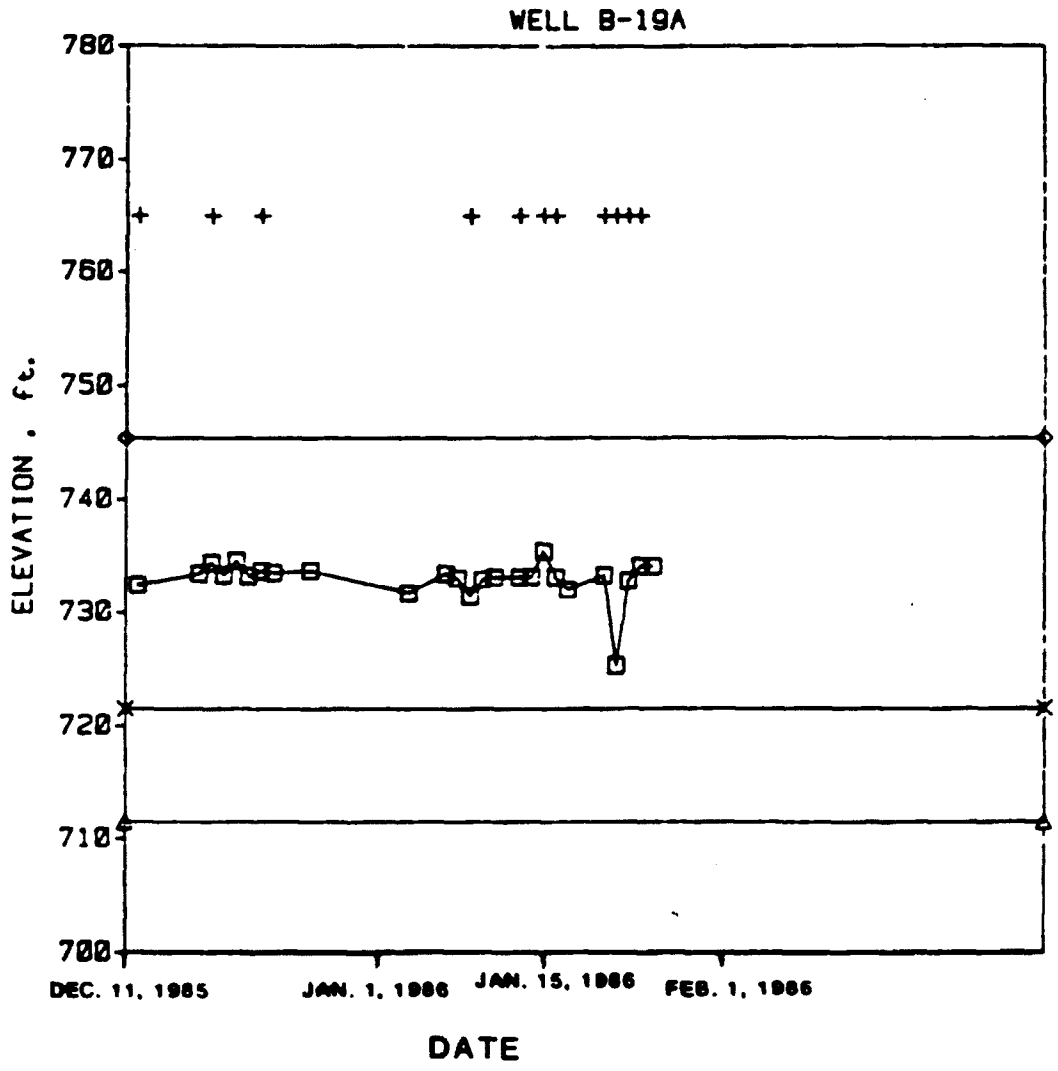
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-18A GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO W4C7729-B			APPROVED	DATE 2/13/86
DRN				DRAWING OF
CHK'D		2/13/86	WCC	DRAWING NO A2-20
REV'D			BHS	



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

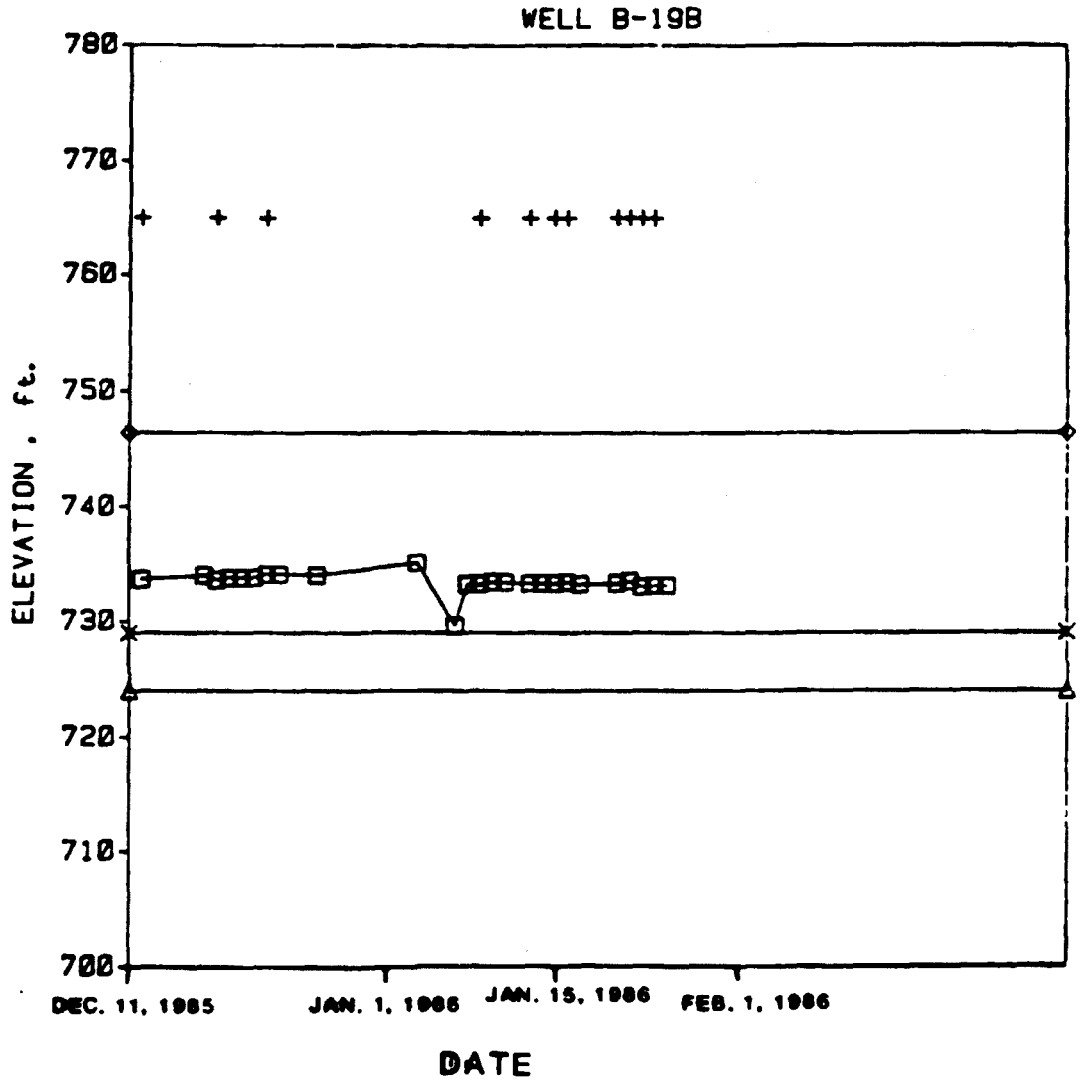
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-19A GROUND WATER ELEVATIONS

Woodward-Clyde Consultant

JOB NO W4C7729-B	APPROVED		DATE 2/13/86
DRN			DRAWING
CHK'D		WCC	
REV'D		BHS	DRAWING NO A2-21



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

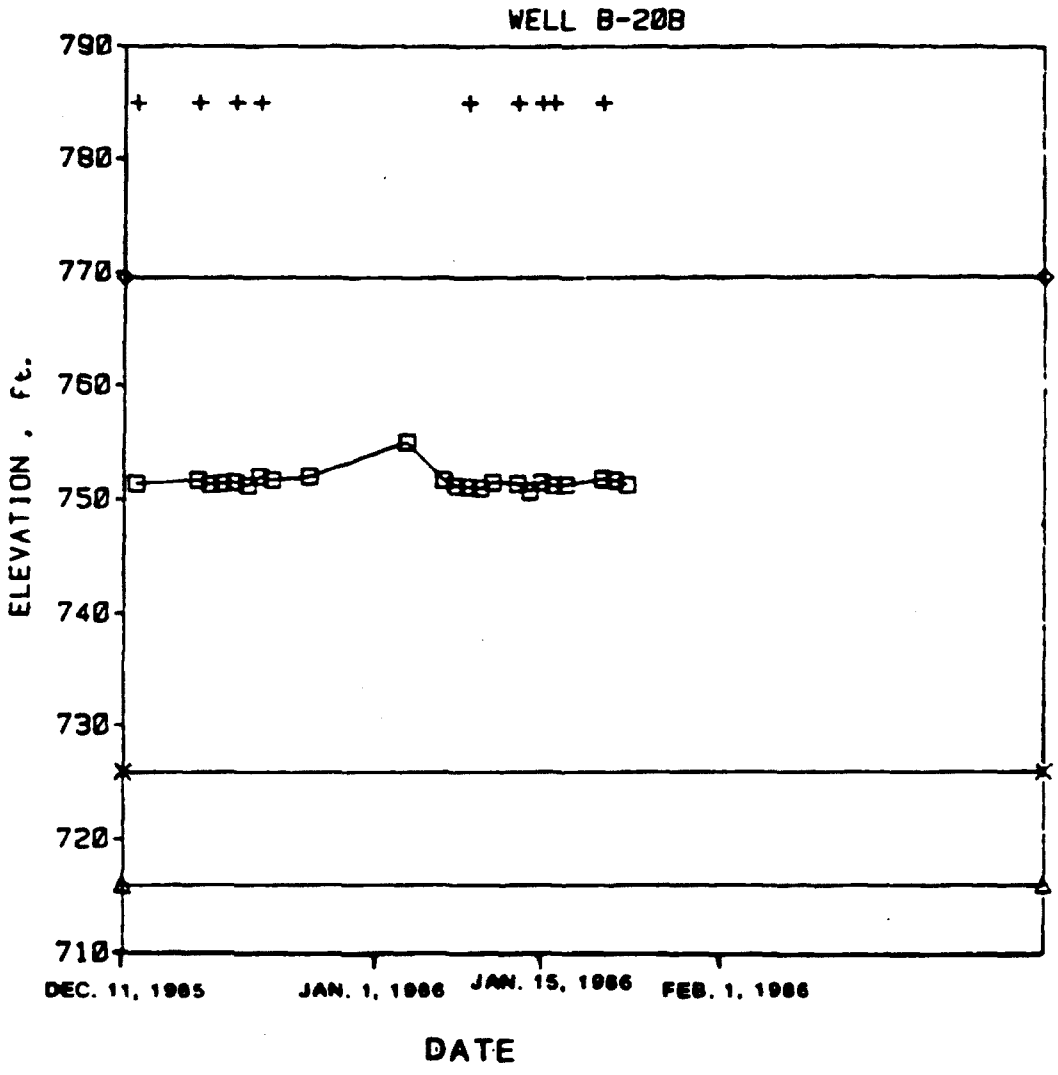
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-19B GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO W4C7729-6			APPROVED	DATE 2/13/86
DRN				DRAWING OF
CHK'D		2/14/86	MCC	
REV'D		2/14	BHS	DRAWING NO A2-22



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

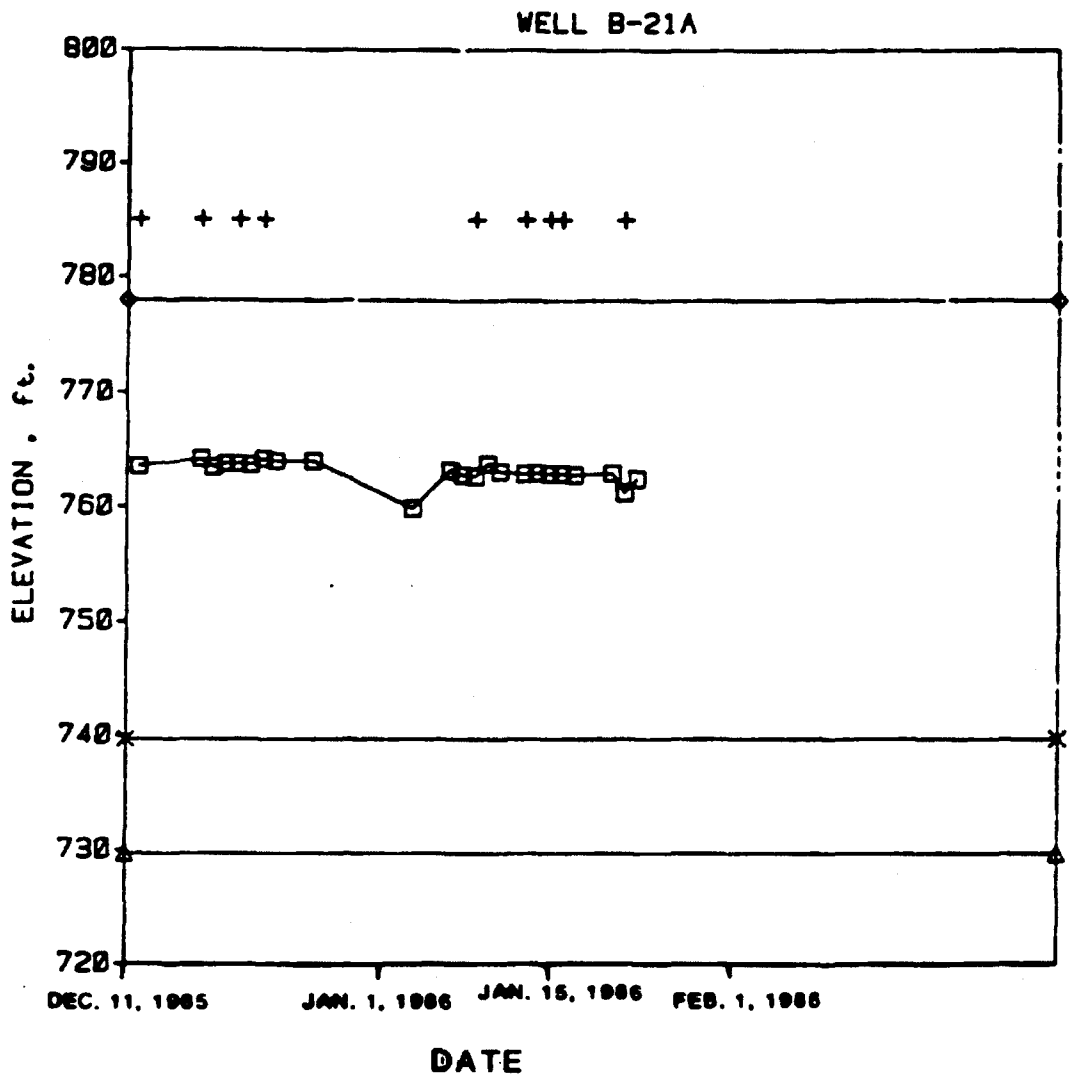
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-20B GROUND WATER ELEVATIONS

Woodward-Clyde Consultant

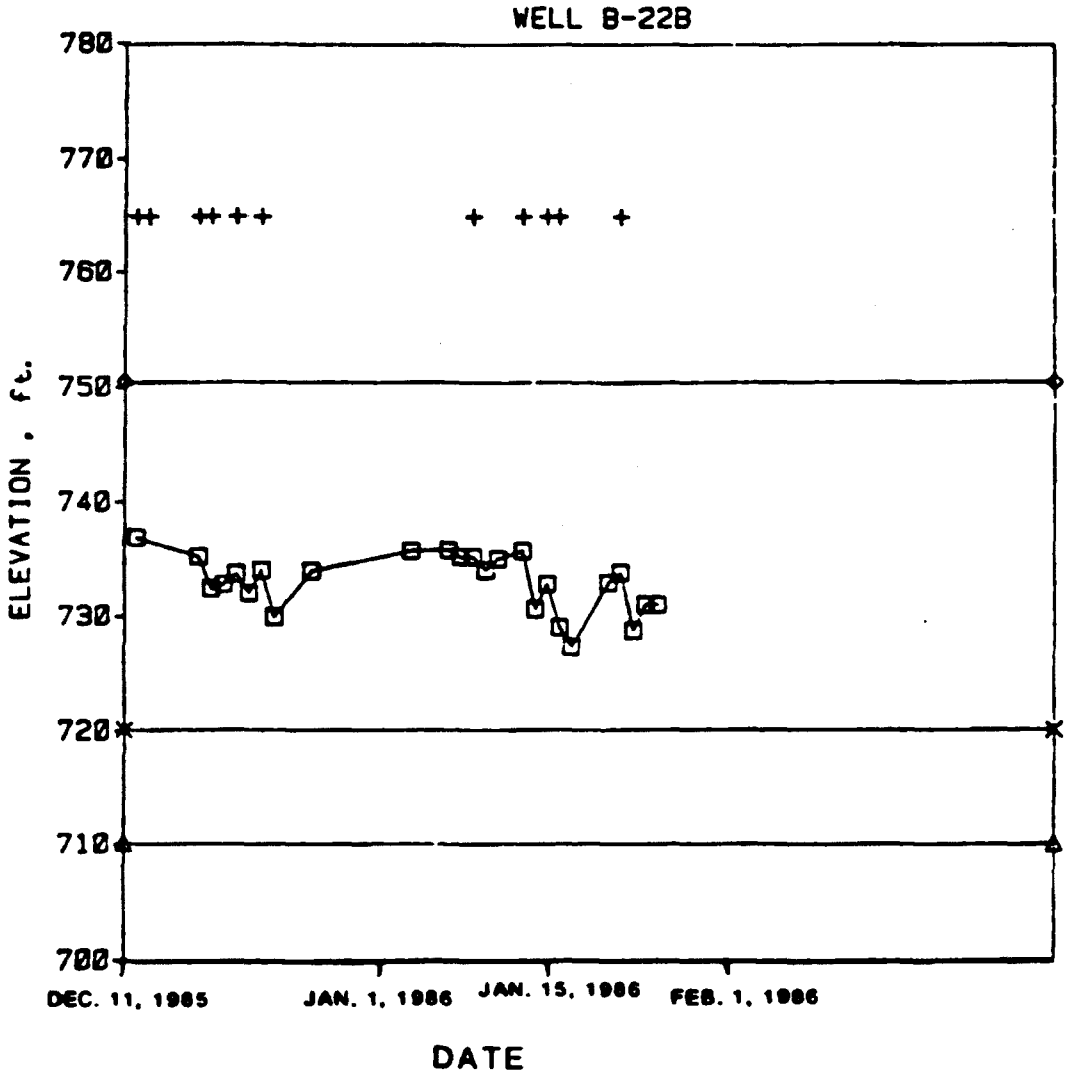
JOB NO W4C7729-6			APPROVED	DATE 2/13/86
DRN				DRAWING OF
CHK'D			WCC	DRAWING NO A2-23
REV'D			BHS	



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- + INDICATES WELL DEVELOPMENT

BHS, INC.			
WRIGHT CITY, MISSOURI FACILITY RCRA PART B PERMIT APPLICATION			
B-21A GROUND WATER ELEVATIONS			
Woodward-Clyde Consultants			
JOB NO W4C7729-8	APPROVED		DATE 2/13/86
DRN			DRAWING OF
CHK'D	WCC		DRAWING NO A2-24
REV'D	BHS		



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

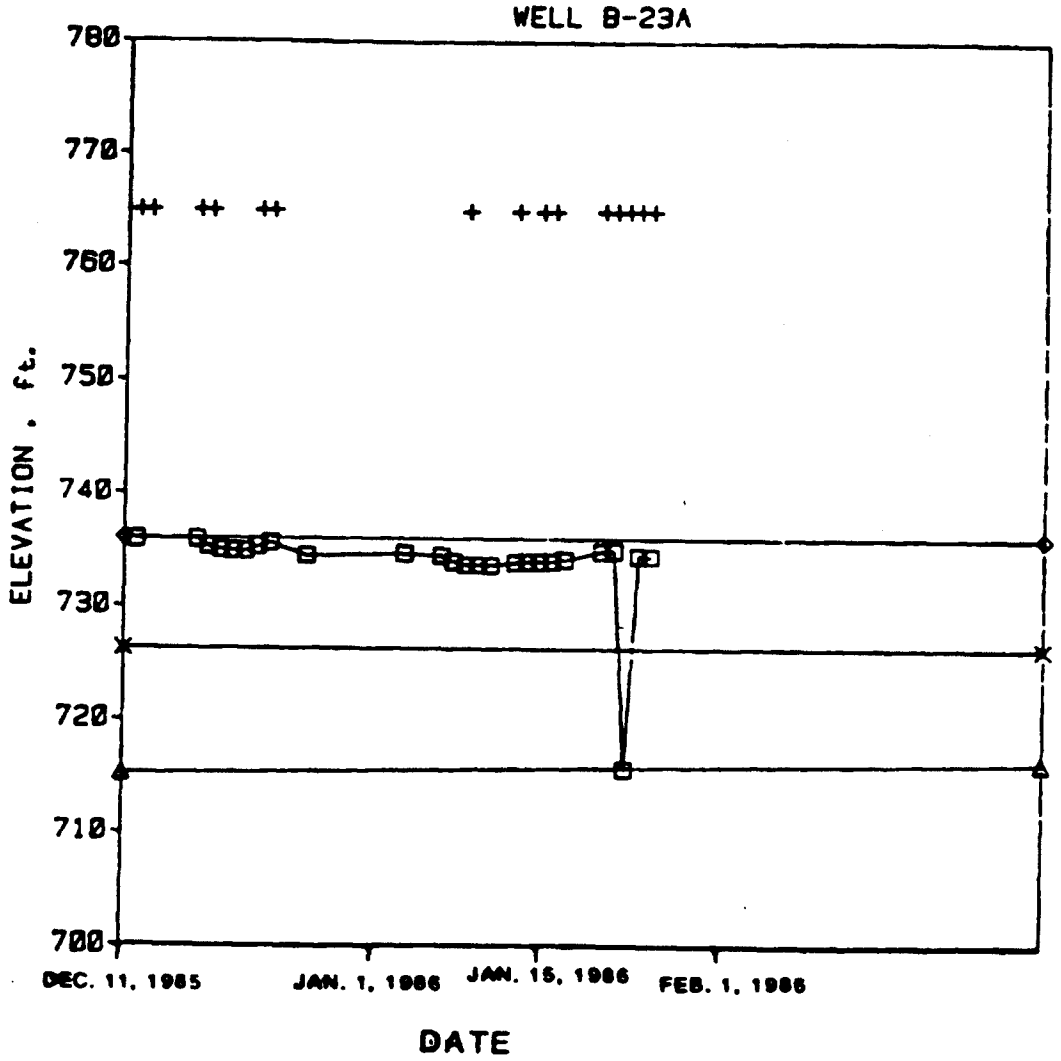
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-22B GROUND WATER ELEVATIONS

Woodward-Clyde Consultar

JOB NO. W4C7729-B			APPROVED	DATE 2/13/86
DSN			WCC	DRAWING OF
CHK'D		2/10/86	BHS	DRAWING NO. A2-25
REV'D		2/13		



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- X TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- \+ INDICATES WELL DEVELOPMENT

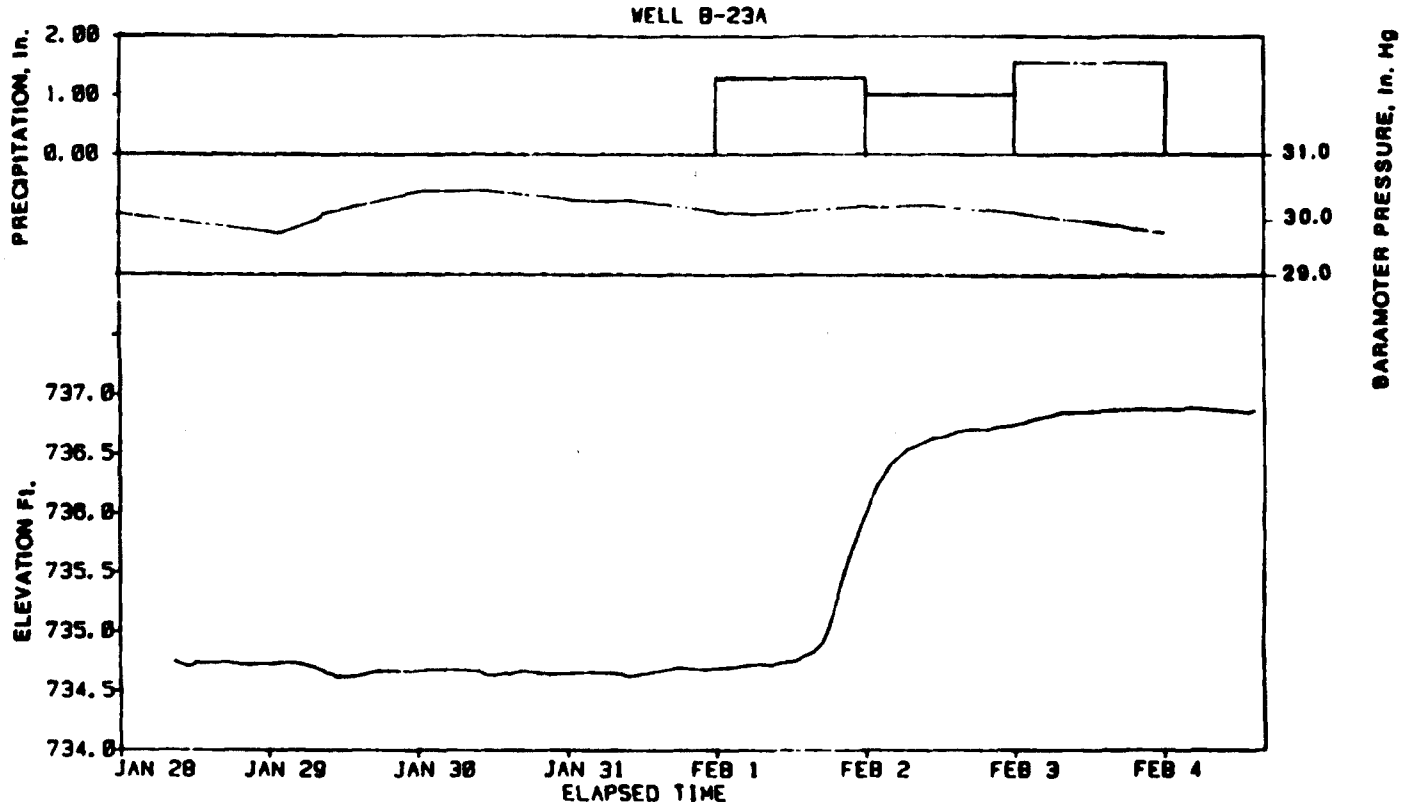
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-23A GROUND WATER ELEVATIONS

Woodward-Clyde Consultants

JOB NO. W4C7729-8			APPROVED	DATE 2/13/86
DRN			WCC	DRAWING OF
CHK'D	TL	2/13/86	BHS	DRAWING NO. A2-26
REV'D		2/14		



BHS, INC.

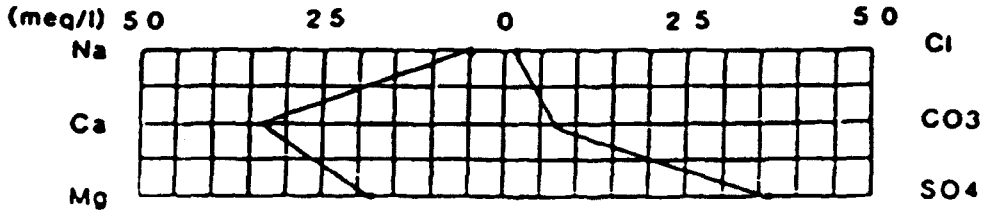
WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

CONTINUOUS HYDROGRAPH
FOR B-23A

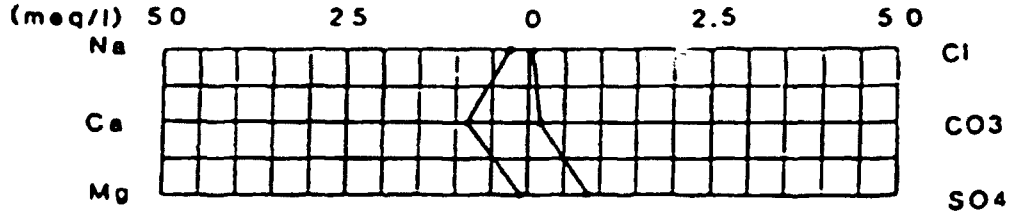
Woodward-Clyde Consultants

JOB NO W4C7729-6	APPROVED	DATE 2-13-86	
DRN	WCC	DRAWING OF	
CHK'D	BHS M.D. Gill	ING NO 2-27	
REV'D			

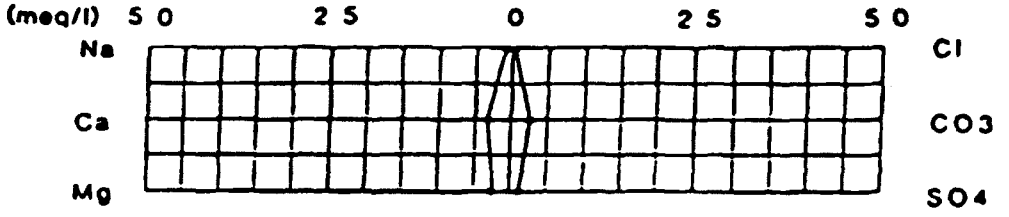
Hydrologic Unit 'A'
Well No.
K-2 (OX)



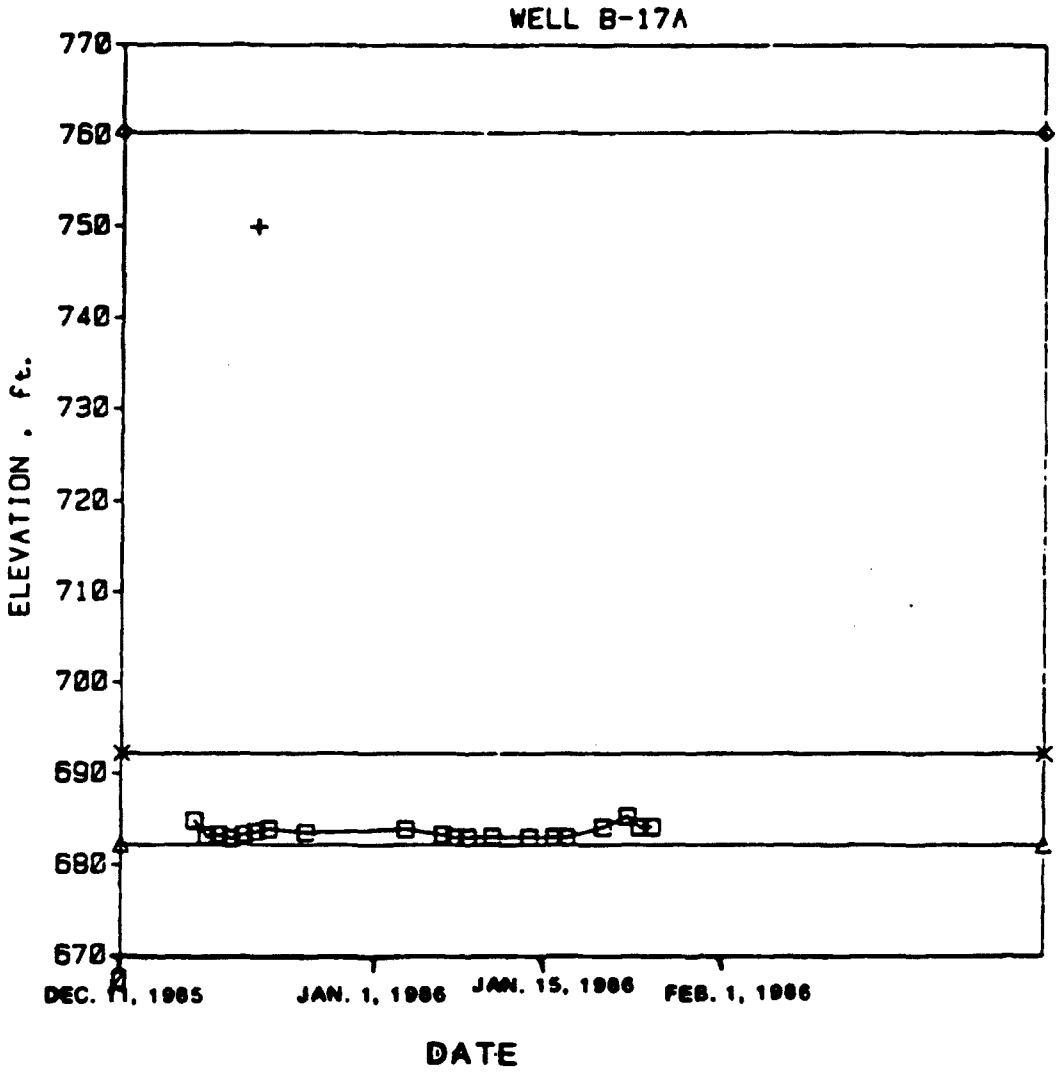
Hydrologic Unit 'B'
Well No.
GM-1



Hydrologic Unit 'D'
Well No.
Zykan Well



BHS, INC.			
WRIGHT CITY, MISSOURI FACILITY RCRA PART B PERMIT APPLICATION			
STIFF DIAGRAMS OF WATER SAMPLES			
Woodward-Clyde Consultants			
W4C7729-6			2-13-86
	12	1/92	A2-28



LEGEND

- ◇ GROUND SURFACE ELEVATION
- □ WATER SURFACE ELEVATION
- × TOP OF SCREEN ELEVATION
- △ BOTTOM OF SCREEN ELEVATION
- + INDICATES WELL DEVELOPMENT

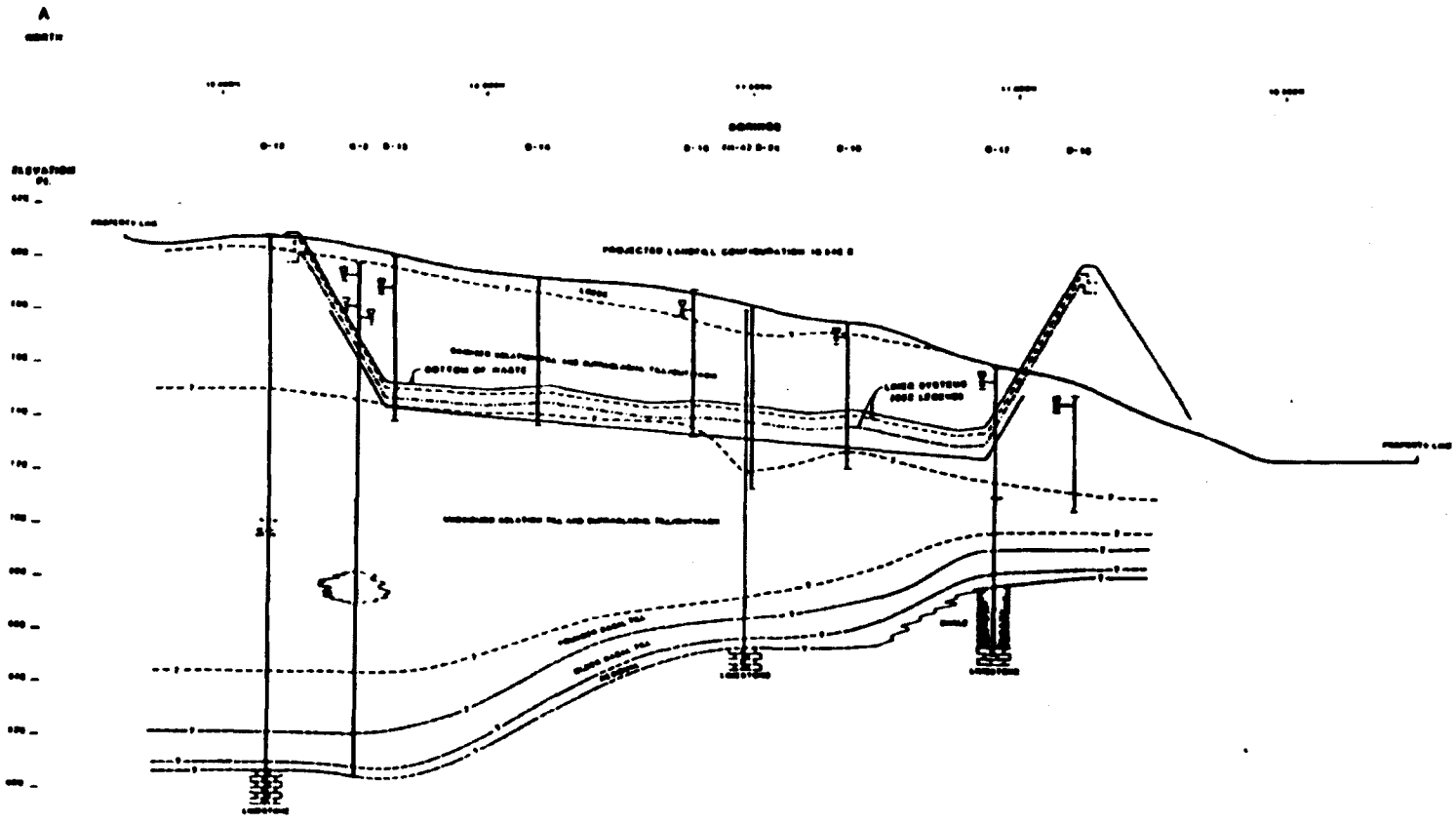
BHS, INC.

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

B-17A GROUND WATER ELEVATIONS

Woodward-Clyde Consultan'

JOB NO W4C7729-6	APPROVED	DATE 2/13/86	
DRN	WCC	DRAWING OF	
CHK'D	BHS	DRAWING NO A2-29	
REV'D			



BHS, INC

WRIGHT CITY, MISSOURI FACILITY
RCRA PART B PERMIT APPLICATION

GEOLOGICAL CROSS-SECTION A-A'

Woodward-Clyde Consultants

A2-30