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Environmental Protection Agency

Division of Emergency and Remedial Response

Emery Transportation Spill Site Interim Action Completion Report

July 2009

Governor Ted Strickland
Director Chris Korleski

OHIO ENVIRONMENTAL PROTECTION AGENCY (OHIO EPA)

DIVISION OF EMERGENCY & REMEDIAL RESPONSE (DERR)

INTERIM ACTION COMPELTION REPORT

EMERY TRANSPORTATION SPILL SITE

Fayette County
DERR Project No.: 124-001538-001

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EXECUTIVE SUMMARY

On September 17, 1995, an Emery Transportation (Emery) gasoline tanker truck was traveling southbound on Interstate 71 (I-71) when the driver lost control, hitting the Jenks Road overpass abutment and rolling over onto its top. The damaged tanker released an estimated (by Emery) 2,500 gallons of gasoline to the west side of the highway and the adjacent drainage ditch. Ohio EPA, Division of Emergency and Remedial Response (DERR), Emergency Response Program personnel oversaw the clean-up of the spilled gasoline from the damaged tanker truck. The gasoline spill was confined to the soils in the immediate area of the accident, and did not migrate into any local surface water body.

During the spill's immediate clean-up, the upper foot of soil in an approximately 60 by 70 foot area was excavated and removed by Emery. An L-shaped french-drain system with four recovery sumps and shallow extraction wells was built inside the spill-impacted area so free product and contaminated ground water could periodically be removed using a vacuum truck. In September 1996, a ground water treatment system using activated carbon filters was installed to treat the contaminated water and recover free product from the four extraction wells. The initial spill clean-up activities are detailed in Ohio EPA's District Office Investigation Report, Incident Number 9509-24-3914.

The Emergency Response Program transferred the spill site to the Remedial Response Program in December 1996 for continued oversight of the ground water treatment system and to further investigate the extent of environmental contamination resulting from the gasoline spill.

Emery's site investigations determined that the soil contamination was located 6 - 8 feet below the ground surface (bgs), which was also the depth of the shallow ground water aquifer impacted by the gasoline spill. The approximate lateral area of both the soil and ground water contamination was centered in the area of the four recovery sumps, and calculated to be 80 ft. (east to west) X 100 ft. (north to south). The maximum detections of benzene, toluene, ethylbenzene and xylenes (BTEX) in the soil and ground water decreased significantly from 1996 through 2001; from 18.4 milligram per kilogram (mg/kg) to 4.24 mg/kg in the soil, and from 17.4 milligram per liter (mg/L) to 3.65 mg/L in the ground water.

Based upon the decreasing levels of BTEX in the sampling results, the limited lateral extent of contamination in the soil and ground water, the location of the site next to an interstate highway with 1,000 foot easements, and the lack of human and ecological receptors in the immediate area, no additional action is recommended for the Emery Transportation spill site at this time by Ohio EPA.

1.0 INTRODUCTION

On September 17, 1995, an Emery gasoline tanker truck was traveling southbound on I-71 when the driver lost control, hitting the Jenks Road overpass abutment and rolling over onto its top. See **Figure 1**, Site Location. The tanker's front storage compartments ruptured, releasing an estimated (by Emery) 2,500 gallons of gasoline to the west side of the highway and the adjacent drainage ditch. Ohio EPA, DERR, Emergency Response Program personnel oversaw the clean-up of the spilled gasoline from the damaged tanker truck. The gasoline spill was confined to the soils in the immediate area of the accident, and did not migrate into any local surface water body.

During the spill's immediate clean-up, the upper foot of soil in an approximately 60 by 70 foot area was excavated to remove the gasoline-soaked soil. Numerous desiccation fractures and small animal burrows in the excavated area were observed to have visible spilled gasoline (free product), indicating that the spilled gasoline had infiltrated deeper into the soil. An L-shaped french-drain system with four recovery sumps was built inside the excavated area to recover the free product and contaminated ground water from the shallow ground water aquifer. A vacuum truck was used by Emery to remove contaminated ground water periodically from the four sumps until October 26, 1995.

Because free product continued to be collected in the four ground water recovery sumps, Ohio EPA, DERR personnel assumed that the gasoline spill area's soil and ground water had elevated levels of BTEX above clean-up levels. The clean-up levels for the spill and subsequent remedial activities came from the petroleum action levels in Ohio EPA DERR's *Petroleum Contaminated Sites Guidance Document for Emergency Response Actions (July 1997)*. Using the guidance document's "Site Feature Work Sheet," the evaluation determined the petroleum action levels to be classified as "Category 4." Therefore, the clean-up levels for the spill site were:

	Soil	**Ground water**
Benzene	0.5 mg/kg	0.005 mg/L
Toluene	12.0 mg/kg	1.0 mg/L
Ethylbenzene	18.0 mg/kg	0.7 mg/L
Total Xylenes	85.0 mg/kg	10.0 mg/L

Approximately one year after the accident, Emery installed a ground water treatment system using activated carbon filters. The treatment system began operating at the site on September 17, 1996. The untreated ground water from the combined discharge of the four recovery sumps was sampled periodically through December 17, 1996, approximately twice a month, before entering the treatment system. These nine sampling results had levels of benzene ranging from 0.55 mg/L to 5.10 mg/L, above the clean-up level of 0.005 mg/L, with the highest benzene result detected in December 1996. Six sample results were above the toluene clean-up level of 1.0 mg/L, with a maximum detected value of 5.10 mg/L. Three sample results were above the ethylbenzene clean-up level of 0.7 mg/L, with a maximum detected value of 2.50 mg/L. Only one of the nine sample results was above the xylenes clean-up level of 10.0 mg/L,

with the detected value of 10.6 mg/L. One hundred gallons of free product were removed from the treatment system in December 1996.

The Emergency Response Program transferred the spill site to the Remedial Response Program in December 1996 for continued oversight of the ground water treatment system and to further investigate the extent of environmental contamination resulting from the gasoline spill. Because the ground water's BTEX concentrations remained above the clean-up levels and the continued recovery of free product, Ohio EPA requested Emery to operate and monitor the treatment system until the untreated ground water met the clean-up levels. In addition, Ohio EPA requested Emery to investigate the gasoline spill area to determine the horizontal and vertical extent of BTEX contamination (above the clean-up levels) in the soil and ground water.

2.0 BACKGROUND

Site Name: Emery Transportation Spill **Alias:** Not Applicable (N/A)

DERR I.D. No.: 124-1538-001 **U.S. EPA I.D. No.:** N/A

District: Central District Office **County:** Fayette

Site Address: I-71 southbound lanes at the Jenks Road overpass in Jasper Township, Octa, Ohio 43128.

Directions to Site: Take I-71 south from downtown Columbus, OH. Proceed on I-71 past the Route 35 exit for Washington Courthouse, OH. Approximately 1.8 miles past the Route 35 exit, pull over onto the highway berm just past the Jenks Road overpass.

Latitude: 39°36'18" **Longitude:** 83°38'03"

2.1. Attachments

Figure 1: Site Location

Figure 2: October 1998 Site Investigation

Figure 3: July 2000 Site Investigation

Figure 4: Site Aerial Photo

Figure 5: Distribution of Benzene in Groundwater

Figure 6: Distribution of Benzene in Soil

Photo 1: ODOT Excavation Work

Table 1: Summary of Sampling Results Analytical Data

Table 2: Summary of Analytical Data from Combined Sump Water

Attachment 1: Ohio EPA Emergency Response Program District Office Investigation Report; Spill #9509-24-03914

Attachment 2: Petroleum Contaminated Sites Guidance Document for Emergency Response Actions; Ohio EPA March 2005

Attachment 3: Emery Transportation Spill Site Results of Ground Water Sampling October 28, 1997; Ohio EPA Memo Dated December 31, 1997

Attachment 4: Emery Transportation Spill Site Results of Ground Water Sampling November 7, 2001; Ohio EPA Memo Dated February 15, 2002

2.2. Site Description

The site is located in a rural area approximately 1.2 miles southwest of Octa, Ohio, and 1.8 miles south of the I-71 interchange for U.S. Route 35. The site is located on the northwest side of the I-71 southbound lanes, just south of the County Road #83 (a.k.a. Jenks Road) overpass, in Jasper Township of Fayette County. See **Figure 1**, Site Location. The site is located on a 15-acre parcel currently owned by Ralph Wilt, which is divided into two adjacent areas by the Ohio Department of Transportation's (ODOT) I-71 right-of-way easement.

2.3. Regulatory Information

The site is a result of a gasoline spill caused by Emery's September 1995 tanker truck accident. The Ohio EPA has adopted the Ohio Fire Marshal, Bureau of Underground Storage Tank Regulation's Site Feature Scoring System Action Levels to apply towards spills of hydrocarbon products (such as gasoline). Therefore, Ohio EPA, DERR's *Petroleum Contaminated Sites Guidance Document for Emergency Response Actions (July 1997)* was used to establish the site's clean-up levels during the initial spill clean-up and subsequent remedial activities. The sampling results were compared to the clean-up levels. Ohio EPA DERR's petroleum guidance document was revised in March 2005, but the updated guidance document's clean-up levels remain unchanged from the earlier July 1997 document.

Emery installed a ground water treatment system under a permit-to-install application that was approved in July 1996 by the Ohio EPA, Division of Surface Water (DSW). The treated ground water was discharged to an unnamed tributary of Rattlesnake Creek under the terms and conditions of National Pollution Discharge Elimination System (NPDES) general permit Number 4GU00027, which was issued to Emery by Ohio EPA, DSW on August 28, 1996. The permit required the treatment system's discharge to be sampled once per month, with the discharge limits established for benzene, toluene and

ethylbenzene at 0.005 mg/L, for xylenes at 0.010 mg/L, for lead at 0.015 mg/L, and for total oil and grease at 10 mg/L.

2.4. Site History

2.4.1. Emergency Response Phase

On September 17, 1995, an Emery gasoline tanker truck was traveling southbound on I-71 when the driver lost control, hitting the Jenks Road overpass abutment and rolling over onto its top. The tanker's front storage compartments ruptured, releasing an estimated (by Emery) 2,500 gallons of gasoline to the west side of the highway and the adjacent drainage ditch. The exact amount of gasoline spilled from this accident was never provided by Emery to Ohio EPA.

Ohio EPA, DERR, Emergency Response Program personnel oversaw the removal of the remaining gasoline from the damaged tanker truck. The spilled gasoline was vacuumed up into a waiting vacuum truck. Then a backhoe removed the upper foot of soil from the approximately 60 by 70 foot spill area. A sump was dug near the end of the culvert near the Jenks Road overpass. Gasoline quickly entered the sump from desiccation fractures in the soil and numerous small animal burrows visible throughout the drainage ditch area.

A second sump was excavated in-between the culvert and the overturned tanker truck. Gasoline still rapidly infiltrated into this sump. Two more trenches were excavated to combine the two original sumps into an L-shaped french-drain system at the north and west edges of the spill-impacted area for the recovery of the free product and contaminated ground water. Four 12-inch diameter PVC extraction wells were installed in each sump of the french-drain system. A vacuum truck was used periodically to remove free product and contaminated ground water from the 12-inch extraction wells in the four sumps. By October 2, 1995, a small amount of free product was still observed in each of the extraction wells.

More than fifty dump truck loads of contaminated soil were excavated from the spill-impacted area and hauled to Petro Environmental, located at 1600 Robinson Road in Washington Court House, Ohio, for treatment and disposal.

Because of the continued recovery of free product from the recovery sumps, a ground water treatment system was installed at the site on September 14, 1996 by Emery. The ground water treatment system consisted of a surge tank, oil/water separator, sediment filters and a multi-stage activated carbon filter as specified in the permit-to-install application approved by Ohio EPA, DSW. The treated ground water was discharged to an unnamed tributary of Rattlesnake Creek under the terms and conditions of NPDES general permit Number 4GU00027 issued to Emery by Ohio EPA, DSW. The general permit required monthly sampling of the treated effluent, which was subject to the discharge permit limits described in Section 2.3.

2.4.2. Remedial Response Phase

On December 9, 1996, the Emergency Response Program transferred the spill site to the Remedial Response Program for continued oversight of the ground water treatment system and to further investigate the extent of environmental contamination resulting from the gasoline spill.

In September 1997, Ohio EPA completed a preliminary assessment (PA) of the Emery spill site to determine if there had been a release of hazardous waste or if there was a potential for a release of hazardous waste and to evaluate whether the site posed a threat or potential threat to human health or the environment based on the review of all information available to Ohio EPA. The PA report did not find any visual evidence of apparent surface water, soil or air contamination at the site, and no sensitive environments or receptors were identified in the immediate area of the site.

On October 28, 1997, Ohio EPA collected four ground water samples, which detected benzene above the clean-up level of 0.005 mg/L in all of the ground water treatment system's sumps, with a maximum detection at 1.50 mg/L. In addition, the Sump #3 samplings result of 1.8 mg/L for toluene exceeded the clean-up level of 1.0 mg/L. One sample was also collected from the ground water treatment system's discharge into the unnamed tributary of Rattlesnake Creek, but the detected levels for BTEX were all below the laboratory reportable detection limits (ND).

Because the ground water sampling results remained above the site's clean-up levels and the continued recovery of free product by the treatment system (approximately 200 gallons collected in July 1997), Ohio EPA requested Emery to operate the treatment system until the incoming, untreated ground water met the clean-up levels. In addition, Ohio EPA requested Emery to further investigate the gasoline spill area to determine the horizontal and vertical extent of the BTEX contamination (above the clean-up levels) in the soil and ground water.

On October 8, 1998, an investigation was conducted by Emery to evaluate the gasoline spill's impact to the soil and ground water in the immediate area of the site. Eight soil borings were completed, with ground water being encountered in seven of the borings at a depth between 6 - 8 feet bgs. These seven soil borings were then converted into temporary monitoring wells (B-1, B-2B, B-3B, B-4, B-5, B-6B and B-7) around the four existing ground water recovery sumps. See **Figure 2**, October 1998 Site Investigation. The site characterization event's activities are summarized in the December 21, 1998 *Site Investigation Report* submittal by Emery to Ohio EPA.

The soil sampling results for Boring B-4 detected benzene at 2.8 mg/kg, above the clean-up level of 0.5 mg/kg for soil. The soil sampling results for Boring B-6B of 18.6 mg/kg for benzene, 91.7 mg/kg for toluene, 21.7 mg/kg for ethylbenzene and 148.0 mg/kg for xylenes exceeded their respective clean-up levels of 0.50 mg/kg, 12.0 mg/kg, 18.0 mg/kg and 85.0 mg/kg.

The ground water sampling results detected benzene at 0.082 mg/L in temporary Monitoring Well B-1, at 0.327 mg/L in Well B-4, at 0.396 mg/L in Sump #3 and at 0.185 mg/L in Sump #4, above the clean-up level of 0.005 mg/L. Well B-6B had elevated ground water BTEX concentrations, detecting benzene at 17.4 mg/L, above the clean-up level of 0.005 mg/L; toluene at 23.8 mg/L, above the clean-up level of 1.0 mg/L; ethylbenzene at 3.82 mg/L, above the clean-up level of 0.7 mg/L; and xylenes at 18.9 mg/L, above the clean-up level of 10.0 mg/L.

Emery's December 1998 report concluded that the soil contamination was located 6 – 8 feet bgs, which was also the depth of the shallow ground water aquifer impacted by the gasoline spill. At that time, small amounts of free product continued to be intermittently recovered by the ground water treatment system. The highest levels of BTEX concentrations were detected at the edge of the I-71 highway berm, which raised a concern about possible migration of contamination to the east beneath the southbound lanes of the highway.

In July 2000, Emery performed additional work at the site to investigate the extent of migration of the BTEX contamination away from the gasoline spill's impacted area by completing 19 new soil borings. See **Figure 3**, July 2000 Site Investigation. Seven soil borings were installed in the median between the I-71 southbound and northbound lanes east of the site, as well as one soil boring 400 feet southwest of the highway overpass. Of the 19 soil boring samples, only Boring B-12D detected benzene at 4.24 mg/kg, above the clean-up level of 0.5 mg/kg, and toluene at 17.6 mg/kg, above the clean-up level of 12.0 mg/kg. The July 2000 investigation activities are summarized in the *Revised Additional Site Investigation Report* submitted by Emery on March 6, 2001 to Ohio EPA.

Eighteen of the 19 soil boring locations were converted into temporary ground water monitoring wells. The ground water sampling results detected benzene at 0.072 mg/L in Well B-4, at 0.30 mg/L in Well B-9, at 8.31 mg/L in Well B-15, at 0.017 mg/L in Well B-27 and at 0.014 mg/L in Sump #3, above the clean-up level of 0.005 mg/L. In addition, the ground water sampling results from Well B-27 detected toluene at 1.36 mg/L, above the clean-up level of 1.0 mg/L. The sample results from Well B-6B had elevated ground water BTEX concentrations, detecting benzene at 9.01 mg/L, above the clean-up level of 0.005 mg/L; toluene at 10.9 mg/L, above the clean-up level of 1.0 mg/L; ethylbenzene at 1.83 mg/L, above the clean-up level of 0.7 mg/L; and xylenes at 11.7 mg/L, above the clean-up level of 10.0 mg/L. However, no reportable concentrations of BTEX were detected in the four surface water samples collected from the I-71drainage ditches.

Emery's July 2000 report confirmed that the ground water and soil contamination was located 6 – 8 feet bgs in the areas of the site impacted by the gasoline spill, and that the levels of BTEX had decreased by approximately 50 percent in the ground water and 75 percent in the soil. The report also concluded that the approximate lateral extent of both the soil and ground water contamination was centered in the area of the four recovery sumps, calculated to be approximately 80 feet (east to west) X 100 feet (north to south). However, all of the soil sample results collected from the I-71 median, B-18 through B25,

had BTEX levels at ND. The report concluded that the BTEX contamination had not migrated to the east beneath the southbound lanes of I-71.

The ground water treatment system had operated for approximately 4.7 years when it ceased operation in April 2001. During operation it pumped and treated 7,625,530 gallons of ground water with 300 gallons of free product also removed.

Samples from each of the four sumps were analyzed monthly to compare the levels of BTEX in the shallow ground water to the site's clean-up levels. The highest ground water analytical results were detected December 1996 in Sump #3 for 5.1 mg/L of benzene, 5.1 mg/L for toluene, 2.5 mg/L for ethylbenzene and 10.6 mg/L for xylenes exceeding their respective clean-up levels of 0.005 mg/L, 1.0 mg/L, 0.7 mg/L and 10.0 mg/L. However, the treatment system's last sampling event in November 2001 found BTEX levels at ND in Sumps #1, #2 and #4 (below the clean-up levels), with only benzene detected at 0.038 mg/L in Sump #3, above the clean-up level of 0.005 mg/L.

On November 7, 2001, Ohio EPA collected ground water samples from the four recovery sumps of the treatment system and temporary Monitoring Well B-6B. Benzene was detected in Sump #3 at 0.38 mg/L and in Well B-6B at 3.65 mg/L, above the clean-up level of 0.005 mg/L. Well B-6B also had detections of toluene at 1.3 mg/L and ethylbenzene at 0.93 mg/L, both above their respective clean-up levels of 1.0 mg/L and 0.70 mg/L. See **Table 1**, Summary of Sampling Results Analytical Data, for a listing of the soil, ground water and surface water sampling results collected by both Emery and Ohio EPA.

In 2002, several meetings were held among Ohio EPA, ODOT and Emery to discuss the concerns to the upcoming I-71 reconstruction project for Fayette County caused by the proximity of the spill site adjacent to the highway. No agreement could be reached between ODOT and Emery for payment of costs related to the excavation of contaminated soil from the highway's shoulder and the former ground water treatment system area during the I-71 reconstruction. ODOT agreed to excavate outside the required highway work area at the spill site.

In July 2002, Emery removed the french-drain system, the four recovery sumps, the ground water treatment system and all of the temporary ground water monitoring wells from the spill site.

Beginning in early 2003 and ending in late 2004, ODOT rebuilt I-71 from a four-lane to a six-lane divided highway in Fayette County. In prior meetings with ODOT, they agreed to excavate outside the highway's regular construction zone at the approximate location of the gasoline spill. After being notified by ODOT that the I-71 widening work area was approaching the approximate location of the site, Ohio EPA went on September 14, 2004 to observe the conditions at the over-excavated area at the site. However, the contractor had only excavated to the highway's shoulder down to a depth of approximately two feet, not further into the actual area of the former french-drain system as shown by **Photo 01**, ODOT Excavation Work. Ohio EPA did not observe any visual

evidence of impacted soil or ground water from the gasoline spill at the edge of the I-71 southbound lanes excavation. Because Emery's earlier investigations had determined that the BTEX contamination was located at 6 - 8 feet bgs, Ohio EPA did not collect any soil or ground water samples from the edge of the highway work area's shallower excavation.

2.5. Previous Field Work

2.5.1. Soil

In October 1998, Dames and Moore Group Co. installed eight soil borings to investigate the environmental impact in the immediate area of the gasoline spill. Six borings were installed around the spill area, one boring was installed northeast at the end of the drainage culvert, and one boring was installed southwest adjacent to the I-71 southbound highway berm (B-1 through B-8, see **Figure 2**). The soil borings were drilled to a depth of 8 - 12 feet bgs where silty clay graded with some fine sand glacial till was observed in the borings. Soil samples from the eight borings were analyzed only for BTEX compounds.

BTEX was found above ND in four of the eight soil borings, and above the clean-up levels in two borings, B-4 and B-6. In Boring B-4's sampling results, only benzene was detected at 2.80 mg/kg, above the clean-up level of 0.50 mg/kg. Boring B-6B's sampling results of 18.6 mg/kg for benzene, 91.7 mg/kg for toluene, 21.7 mg/kg for ethylbenzene and 148.0 mg/kg for xylenes exceeded their respective clean-up levels of 0.50 mg/kg, 12.0 mg/kg, 18.0 mg/kg and 85.0 mg/kg. From the borings' soil geology and sample results, the October 1998 report concluded that the soil contamination was located in a zone located 6 – 8 feet bgs.

In July 2000, URS Corporation installed 19 soil borings to investigate the extent of migration of the BTEX contamination away from the gasoline spill's impacted area; eight borings were installed around the spill area (B-9 through B-13, B-26 and B-27, see **Figure 3**), and three sets of borings along transects parallel to I-71. One transect (B-14 through B-17) was installed adjacent to the west side of the I-71 southbound lanes. The second transect (B-18 through B-21) was installed between the I-71 northbound and southbound lanes on the western border of the grassy median area. The third transect (B-23 through B-25) was installed on the eastern border of the highway's grassy median. Soil borings were drilled to a depth of 8 – 12 feet bgs where silty clay was again encountered. Shallow ground water was encountered in all the soil boring locations, and 18 of the 19 borings were converted into temporary monitoring wells.

The soil samples were analyzed for BTEX, with detections of BTEX above ND found in four of the 19 borings. Benzene concentrations ranged from ND to 4.24 mg/kg. Toluene ranged from ND to 17.6 mg/kg. Ethylbenzene ranged from ND to 9.0 mg/kg. Xylenes ranged from ND to 51.2 mg/kg. However, only Boring B-12D had elevated levels of BTEX with benzene at 4.24 mg/kg, above the clean-up level of 0.50 mg/kg, and toluene at 17.6 mg/kg above the clean-up level of 12.0 mg/kg. The July 2000 sampling results

confirmed the October 1998 report's conclusion that the soil contamination was located 6 – 8 feet bgs, and had not migrated beneath the I-71 southbound lanes into the median. The approximate lateral extent of the soil contamination was centered in the area of the four recovery sumps, approximately 80 feet (E to W) by 100 feet (N to S). The BTEX levels had also decreased by approximately 75 percent in the soil sampling results.

2.5.2. Ground Water

The extracted ground water from the four 12-inch extraction wells was combined before entering the ground water treatment system. This untreated, combined ground water was sampled approximately twice a month by Emery from September 1996 through December 1996, collecting a total of nine samples with the highest levels of BTEX detected in December 1996. These nine sampling results had levels of benzene ranging from 0.55 mg/L to 5.10 mg/L, above the clean-up level of 0.005 mg/L. Six sample results were above toluene's clean-up level of 1.0 mg/L, with a maximum detected value of 5.10 mg/L. Three sample results were above ethylbenzene's clean-up level of 0.7 mg/L, with a maximum detected value of 2.50 mg/L. Only one of the nine sample results was above xylenes' clean-up level of 10.0 mg/L, with the detected value of 10.6 mg/L. In addition, 100 gallons of free product were removed from the treatment system in December 1996. See **Table 2,** Summary of Analytical Data from Combined Sump Water.

The untreated, combined ground water was then sampled for BTEX approximately once per month from January 1997 through July 1997, for a total of nine samples. Benzene was detected above the clean-up level of 0.005 mg/L nine times, ranging from 0.006 mg/L to the maximum detected value of 3.25 mg/L in February 1997. Toluene was detected above the clean-up level of 1.0 mg/L two times, with a maximum detected value of 2.32 mg/L in January 1997. Ethylbenzene was not detected above the clean-up level of 0.7 mg/L, ranging from ND to 0.50 mg/L. Xylenes were not detected above the clean-up level of 10.0 mg/L, ranging from ND to 2.0 mg/L. In addition, 200 gallons of free product were removed from the treatment system in July 1997 as noted in **Table 2**. The benzene concentrations detected in the shallow ground water had decreased from 5.10 to 3.25 mg/L by the end of July 1997, but the sample results remained significantly above the clean-up level of 0.005 mg/L.

The four 12-inch extraction wells were individually sampled each month by Emery to check the levels of BTEX in the shallow ground water of each sump from August 1997 through March 2001. In August 1997, the detected levels of benzene in Sumps #1, #2, #3 and #4 were respectively 0.74, 0.48, 1.40 and 1.50 mg/L, above the clean-up level of 0.005 mg/L. In December 1997, the detected levels of benzene in Sumps #1, #2, #3 and #4 were at ND, 3.78, 0.67 and 0.85 mg/L. In October 1998, the detected levels of benzene in Sumps #1, #2, #3 and #4 were 0.03, ND, 0.40 and 0.18 mg/L. In August 1999, the detected levels of benzene in Sumps #1, #2, #3 and #4 were 0.02, 1.16, 0.03 and 0.07 mg/L. In February 2000, the detected levels of benzene in Sumps #1, #2, #3 and #4 were ND, ND, 0.19 and 0.03 mg/L.

Ohio EPA agreed with Emery's request in March 2000 to discontinue sampling the ground water from Sumps #1 and #2 due to the BTEX results of ND for an extended period of time in these sumps. However, Emery continued to collect ground water samples from Sumps #3 and #4 from March 2000 to March 2001. In March 2001, the detected levels of benzene in Sumps #3 and #4 were respectively 0.07 and 0.02 mg/L, continuing to decrease but above the clean-up level of 0.005 mg/L. The benzene concentrations detected by Emery in the sumps' shallow ground water had decreased 99 percent from September 1996 to March 2001. See **Table 2** for the listing of the entire ground water treatment system's sampling results from September 1996 through March 2001.

Three of the seven soil borings converted to temporary monitoring wells (B-1, B-4 and B-6B) had detected concentrations of BTEX in the shallow ground water above the clean-up levels during Emery's October 1998 investigation. Benzene was detected at 0.032 mg/L in Well B-1 and at 0.327 mg/L in Well B-4, above the clean-up level of 0.005 mg/L. In Well B-6B, benzene was detected at 17.4 mg/L, toluene at 23.8 mg/L, ethylbenzene at 3.82 mg/L and xylenes at 18.9 mg/L; above their respective clean-up levels of 0.005 mg/L, 1.0 mg/L, 0.70 mg/L and 10.0 mg/L. The highest levels of BTEX were detected in Well B-6B located close to I-71, south of the ground water treatment system. Modeling of the October 1998 sampling results calculated that the approximate lateral extent of the shallow ground water contamination was centered in the area of the four recovery sumps, approximately 80 feet (E to W) by 100 feet (N to S). See **Table 1** for these sampling results and **Figure 2** for the sampling locations.

Four of the eighteen soil borings converted to temporary monitoring wells (B-4, B-6B, B-9 and B-27) had detected concentrations of BTEX in the shallow ground water above the clean-up levels during Emery's July 2000 investigation. Benzene was detected at 0.030 mg/L in Well B-9, at 8.31 mg/L in Well B-15, and at 0.017 mg/L in B-26, above the clean-up level of 0.005 mg/L. In Well B-27, benzene was detected at 1.05 mg/L and toluene was detected at 1.36 mg/L, exceeding their respective clean-up levels of 0.005 mg/L and 1.0 mg/L. In addition, two of the borings converted to temporary monitoring wells from the October 1998 investigation were also sampled during the July 2000 investigation. Benzene was detected at 0.072 mg/L in Well B-4, above the clean-up level of 0.005 mg/L. In Well B-6B, benzene was detected at 9.01 mg/L, toluene at 10.9 mg/L, ethylbenzene at 1.83 mg/L and xylenes at 11.7 mg/L; exceeding their respective clean-up levels of 0.005 mg/L, 1.0 mg/L, 0.70 mg/L and 10.0 mg/L.

The highest levels of BTEX were again detected in the temporary monitoring wells located close to I-71 and south of the ground water treatment system, B-6B and B-9. However, the BTEX levels in Well B-6B had decreased approximately 48 percent since the previous sampling results. Modeling of the July 2000 sampling results showed that the shallow ground water contamination remains centered around the recovery sumps, approximately 80 feet by 100 feet. See **Table 1** for these sampling results and **Figure 2** for the sampling locations.

2.5.3. Surface Water

In the July 2000 investigation, Emery collected four surface water samples from the I-71 drainage ditches, one from the ditch adjacent to the southbound lanes and three from the ditch adjacent to the northbound lanes. See **Figure 3**. The four samples all had BTEX levels below ND.

2.6. Topography, Geology, Hydrogeology and Hydrology

The site is located in the Scioto Lobe glacial drift plain, approximately 1.2 miles to the southwest of the village of Octa in Fayette County, Ohio (ODNR 1981). The glacial recessional Wisconsin ground moraine consists of alternating layers of glacial till ranging from 20 to 140 feet thick. The glacial till contains mostly clay with occasional interbedded lenses of sand and gravel. Niagara Limestone of the Upper Silurian age (ODNR 1981) underlies these glacial deposits in the area.

The discontinuous sand and gravel lenses within the glacial till deposits supply the ground water for the residential private water supply wells within a two-mile radius of the site. However, the area's public water supply wells are cased through the upper glacial till to use the limestone bedrock below for their water source. The limestone bedrock aquifer system is reported to yield between 25 to 100 gallons per minute (Schmidt 1990).

The rural residents within a two-mile radius of the site use the ground water from private wells to supply their drinking water needs. A web-search of the Ohio Department of Natural Resources (ODNR) well record installation logs indicate the nearest residential water supply well to be approximately 1300 feet northwest of the site. These well logs indicate that the private water wells are placed in the glacial till's sand and gravel lenses at various depths, ranging from 30 to 95 feet bgs. Approximately 64 private water supply systems are found within a two-mile radius around the site as determined from ODNR's water well logs.

Four community and ten non-community public water supply systems are located within a three-mile radius of the site based on the file information from the Ohio EPA, Division of Drinking Water. These public water supply systems utilize the area's ground water by being cased through the glacial till until reaching the limestone bedrock below. The depth to this aquifer system ranges from 80 to 115 feet below the ground surface. The nearest public water supply system to the site is the village of Octa located approximately 1.2 miles to the northeast.

2.7. Land Use and Demographic Information

The population within a two-mile radius of the Emery spill site is approximately 245 people, based on the 2000 U.S. Census data for households in Fayette County. The land usage within a two-mile radius of the site is mainly rural devoted to agricultural, except for the village of Octa (Population 83). See **Figure 4**, Site Aerial Photo.

3.0 METHODOLOGY

3.1. Field Screening and Sampling Locations

On October 28, 1997, Ohio EPA collected four ground water and one surface water samples. The ground water samples were collected from the four recovery sumps of the ground water treatment system, and the surface water sample was from the NPDES-permitted discharge location into the unnamed tributary of Rattlesnake Creek. Ground water samples from the four recovery sumps and the temporary Monitoring Well B-6B were also collected by Ohio EPA in November 2001. See **Figure 2** for the sampling locations used in both events.

3.2. Field Screening and Sampling Methodologies

On October 28, 1997, Ohio EPA conducted a sampling event to evaluate the operation of the site's ground water treatment system. Prior to sample collection, static water levels and total well depths were measured in each of the extraction wells installed in the four recovery sumps. Since the wells were part of the active ground water treatment system that continually cycled on and off, they were not purged prior to sampling.

Ground water samples were collected from the extraction wells in the four recovery sumps using dedicated Teflon bailers while the treatment system's sample was collected directly from the discharge line into the unnamed tributary. All five samples were collected in 40-ml volatile organic compound glass vials containing hydrochloric acid preservative. To minimize agitation, water was slowly poured into the 40-ml vials until an inverted meniscus formed above the top edge of the vial. The samples were then examined to ensure the vial had zero-headspace and no air bubbles.

Following sample collection, all of the glass vials were immediately placed into a cooler filled with ice. A chain-of-custody form was completed for the five collected samples and placed into the cooler before sealing it shut with duct tape. The sealed cooler was shipped to Quanterra Environmental Services, Inc. (Quanterra) on October 29, 1997. The samples were analyzed for BTEX by Quanterra using U.S. EPA SW846, Method 8020A. See Ohio EPA's interoffice memorandum dated December 31, 1997 for a more detailed description of the October 28, 1997 ground and surface water sampling event.

On November 7, 2001, Ohio EPA conducted a sampling event to evaluate the operation of the ground water treatment system. Prior to sample collection, static water levels and total well depths were measured in each of the extraction wells installed in the four recovery sumps. Ground water samples were collected from the four extraction wells and temporary Monitoring Well B-6B using dedicated Teflon bailers for each well. The sampling procedures followed the methods described above for the October 1997 event. However, the five samples were shipped to DLZ Laboratories on November 7, 2001, and analyzed for BTEX by DLZ Labs using U.S.EPA Method 8260B. See Ohio EPA's interoffice memorandum dated February 15, 2002 for a more detailed description of the November 7, 2001 ground water sampling event.

4.0 RESULTS

4.1. Field Screening and Sampling Results

On October 28, 1997, Ohio EPA collected four ground water samples from the recovery sumps and one surface water sample from the ground water treatment system's discharge location into the unnamed tributary of Rattlesnake Creek. In the four recovery sumps, benzene was detected from 0.27 mg/L to 1.50 mg/L, toluene was detected from 0.043 mg/L to 1.80 mg/L, ethylbenzene was detected from ND to 0.042 mg/L and xylenes was detected from ND to 1.3 mg/L. The one surface water sample results for BTEX were all ND.

On November 7, 2001, Ohio EPA collected ground water samples from the four recovery sumps and temporary Monitoring Well B-6B. In the four recovery sumps, the detected levels of BTEX in three of the four sumps were ND. However, in Sump #3, benzene was detected at 0.038 mg/L, toluene was ND, ethylbenzene was detected at 0.001 mg/L and xylenes were detected at 0.006 mg/L. In Well B6-B, benzene was detected at 3.65 mg/L, toluene was detected at 1.3 mg/L, and ethylbenzene was detected at 0.93 mg/L and xylenes were detected at 6.41 mg/L.

4.2. Comparison of Field Screening and Sampling Results to Screening Levels Criteria

For the October 1997 ground and surface water sampling event, benzene was detected above the clean-up level of 0.005 mg/L in all four recovery sumps, ranging from 0.27 mg/L to 1.50 mg/L. Toluene was also detected at 1.80 mg/L in Sump #3, above the clean-up level of 1.0 mg/L. Comparing the October 1997 to December 1996 ground water sampling results, the BTEX concentrations decreased 70 percent from the maximum levels detected in December 1996. In addition, the surface water sample results for BTEX were all ND.

For the November 2001 ground water sampling event, benzene was ND in three of the four sumps, but in Sump #3 it was at 0.038 mg/L, above the clean-up level of 0.005 mg/L. In Monitoring Well B6-B, benzene was detected at 3.65 mg/L, toluene was detected at 1.3 mg/L, and ethylbenzene was detected at 0.93 mg/L; exceeding their respective clean-up levels of 0.005 mg/L, 1.0 mg/L and 0.70 mg/L

Using the November 2001 ground water sampling results for a comparison, the BTEX concentrations detected in the recovery sumps decreased 99 percent from the maximum levels detected in December 1996. Comparing the November 2001 to the October 1998 sampling results, the BTEX concentrations detected in Well B-6B also decreased 79 percent.

5.0 DISCUSSION

5.1. Migration and Exposure Pathways

5.1.1. Soil Pathway

The visibly contaminated surface and near surface soils, from the BTEX compounds derived from the gasoline spill, were removed under the direction of Ohio EPA, DERR, Emergency Response Program personnel and replaced with clean fill. The site investigation activities determined that the remaining BTEX contamination was located in a zone 6 – 8 feet bgs, and centered in the area of the four recovery sumps, approximately 80 feet (E to W) by 100 feet (N to S). BTEX levels remain above the benzene clean-up level of 0.50 mg/kg, but the concentrations decreased by 75 percent from 1995 to 2001. They are expected to continue to decrease due to natural degradation.

Residential development in the site's surrounding area is unrestricted. However, the adjacent land uses are limited by the 1,000 foot easements maintained by ODOT for the I-71 highway corridor. Therefore, further development of the site is unlikely due to the site's location adjacent to the western edge of the I-71 southbound lanes and the Jenks Road overpass. The spill site is bounded on two sides by fencing, with open access to the site from the highway berm.

The above factors have resulted in significantly reducing or eliminating the soil exposure pathway for the site. Therefore, the soil pathway is considered to be incomplete.

5.1.2. Ground Water Pathway

While BTEX levels remain above the clean-up levels in the shallow ground water, benzene concentrations have decreased 99 percent in the four recovery sumps and 79 percent in the monitoring wells closest to the I-71 highway berm. The ground water treatment system removed approximately 7,600,000 gallons of ground water and 300 gallons of free product during its operation from September 1996 through April 2001. The site investigation activities have determined that the BTEX concentration was located in a zone 6 – 8 feet bgs. Emery's modeling of the July 2000 sampling results showed that the shallow ground water contamination remains centered around the recovery sumps, approximately 80 feet by 100 feet.

Residential and public water supply wells are located within a two-mile radius of the site. The residential water wells utilize the glacial till's sand and gravel lenses found from 30 to 95 feet bgs for their water supply, and the nearest water well is located approximately 1,300 feet northwest of the site. The area's public water wells utilize the limestone bedrock found from 80 to 115 feet bgs for their water supply, and the nearest public water supply system (the village of Octa) is located approximately 1.2 miles to the northeast of the site.

The actual impact of the gasoline spill to the lower ground water aquifer and the actual direction of ground water flow in the lower aquifer remain unknown at this time, because the installation of deeper ground water monitoring well(s) was not performed by Emery during the investigation efforts at this site. However, the public water supply system to date (13 years later) has not reported any levels of elevated BTEX concentrations reaching their system's wells.

The above factors have resulted in significantly reducing or eliminating the shallow ground water exposure pathway for the site. Therefore, the shallow ground water pathway is considered to be incomplete

5.1.3. Surface Water Pathway

During Ohio EPA's April 8, 1997 site visit, a small area of standing water was observed at the south side of the culvert going underneath Jenks Road. Surface water runoff flows into the small drainage ditch from the adjacent farm fields and empties into this culvert. The ground water treatment system discharges into the same drainage ditch, which is an unnamed tributary of Rattlesnake Creek. The nearest potential target of surface water contamination is Rattlesnake Creek, which receives the runoff from the highway's drainage ditches. No surface water intakes for drinking water are known to exist within a three-mile radius around the site. None of the surface water sampling results collected during the site investigation have recorded levels of BTEX above ND. Therefore, the surface water pathway is considered to be incomplete.

5.1.4. Air Pathway

Upon removal of the gasoline and contaminated soil at the time of the spill in 1995, no significant source of contamination to the air pathway remained. The recovery of free product from the french-drain system and recovery wells provided a small source of gasoline's BTEX constituents until that system was shut down in April 2001. Currently, any remaining gasoline constituents are below the ground's surface, and since the spill area is in the easement for the I-71 highway corridor, there is no expectation of future residential or commercial development. Therefore, the air pathway is considered to be incomplete.

5.2. U.S. EPA Removal Actions

None.

6.0 CONCLUSIONS AND SITE RECOMMENDATIONS

While the most heavily contaminated soil was excavated and removed from the site during the emergency response activities, BTEX concentrations in the soil and ground water at the spill site remain above the clean-up levels in the area adjacent to the berm of the I-71 southbound lanes. The October 1998 and July 2000 investigations found that the BTEX contamination appeared to be concentrated in a 6 – 8 feet bgs zone as shown

in **Figure 5**, Distribution of Benzene in Groundwater, and **Figure 6**, Distribution of Benzene in Soil, approximately 80 feet (E to W) and 100 feet (N to S). However, the BTEX levels detected by the earlier sampling events show a decreasing trend over time in both the shallow ground water and soil, and the contamination does not appear to be migrating from the spill site.

Analytical results for BTEX concentrations in the ground water from the four recovery sumps showed decreasing trends where historically elevated concentrations were detected. The last sampling event in November 2001 detected benzene in Sump #3 at 0.038 mg/L, still above the desired clean-up level of 0.005 mg/L, but it had decreased 99 percent from the concentration in the December 1996 sampling results. The ground water sampling results had the highest levels of BTEX in the temporary monitoring wells close to western edge of the I-71 southbound lanes, with benzene detected at 3.65 mg/L in November 2001 by Ohio EPA at temporary Monitoring Well B-6B, but it had decreased 79 percent from the concentration in the October 1998 sampling results.

The shallow ground water showed contamination in the immediate area of the gasoline spill, but not to the southeast at the western edge of the I-71 northbound lanes. The actual impact of the gasoline spill to the lower ground water aquifer remains undetermined at this time. Ohio EPA had requested Emery to install a deeper monitoring well(s), 45 to 70 feet bgs, to determine the condition of the aquifer below the shallow ground water aquifer. However, this work was not performed by Emery. Ohio EPA assumes the direction of ground water flow from the spill site is northeast, towards Rattlesnake Creek.

Analytical results for BTEX concentrations in the soil show decreasing trends where historically elevated concentrations were detected. The last sampling event in July 2000 detected benzene in Boring B-12D at 4.24 mg/kg, still above the desired clean-up level of 0.50 mg/kg, but it had decreased 75 percent from the concentration in the October 1998 sampling results. The soil sampling results had the highest levels of BTEX in the borings close to western edge of the I-71 southbound lanes.

Residential development in this area is unrestricted. However, land uses are limited by the large easement maintained by ODOT for the I-71 highway corridor. Therefore, development of the site is unlikely due to the site's location adjacent to the western edge of the I-71 southbound lanes.

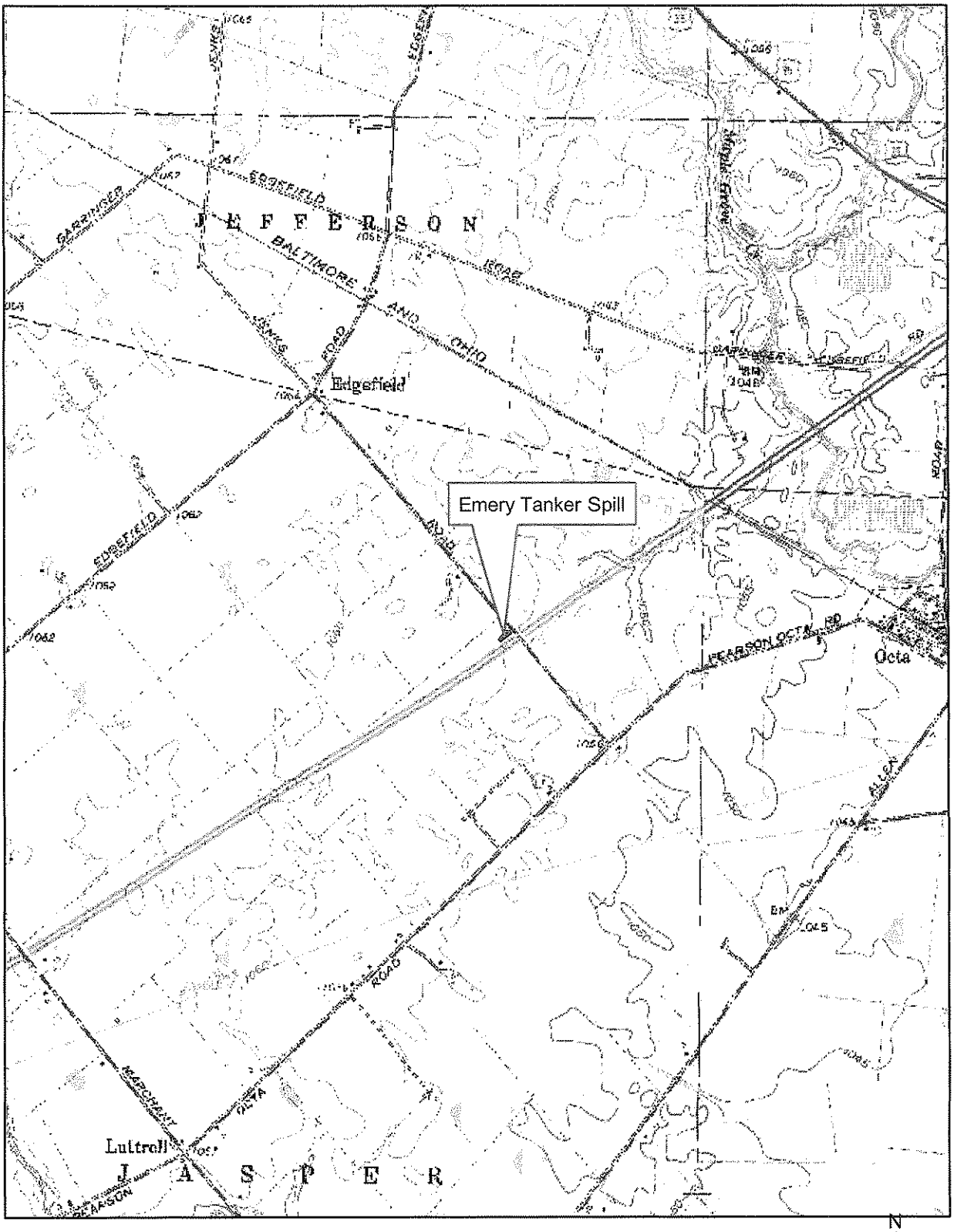
Based upon the results of the work performed at the site to clean-up the gasoline spill (*i.e.*, soil removal, french-drain system, sumps and ground water treatment system), the limited extent of BTEX contamination in the soil and shallow ground water that is centered in the gasoline spill area, and the lack of receptors in the immediate area due to the location of the site next to an interstate highway with 1,000 foot easements, the potential for human and ecological exposure is low. Therefore, no additional action is recommended for the Emery Transportation spill site at this time by Ohio EPA. It is unlikely that additional remedial activities would significantly reduce the potential exposure threat to human health and environment due to releases at the site.

7.0 REFERENCE PAGE/ATTACHMENTS

ODNR, 1981. Ohio Department of Natural Resources, Division of Geologic Surveys, Geologic map for the State of Ohio.

Schmidt, 1990. James J. Schmidt, Ground-Water Resources of Fayette County, issued by ODNR.

FIGURES



Site Location Map
Emery Transportation Tanker Spill
Ohio ID # 124-1538
Fayette County

USGS Bowersville, Ohio Quadrangle
1:24,000

N
W E
S

FIGURE 1

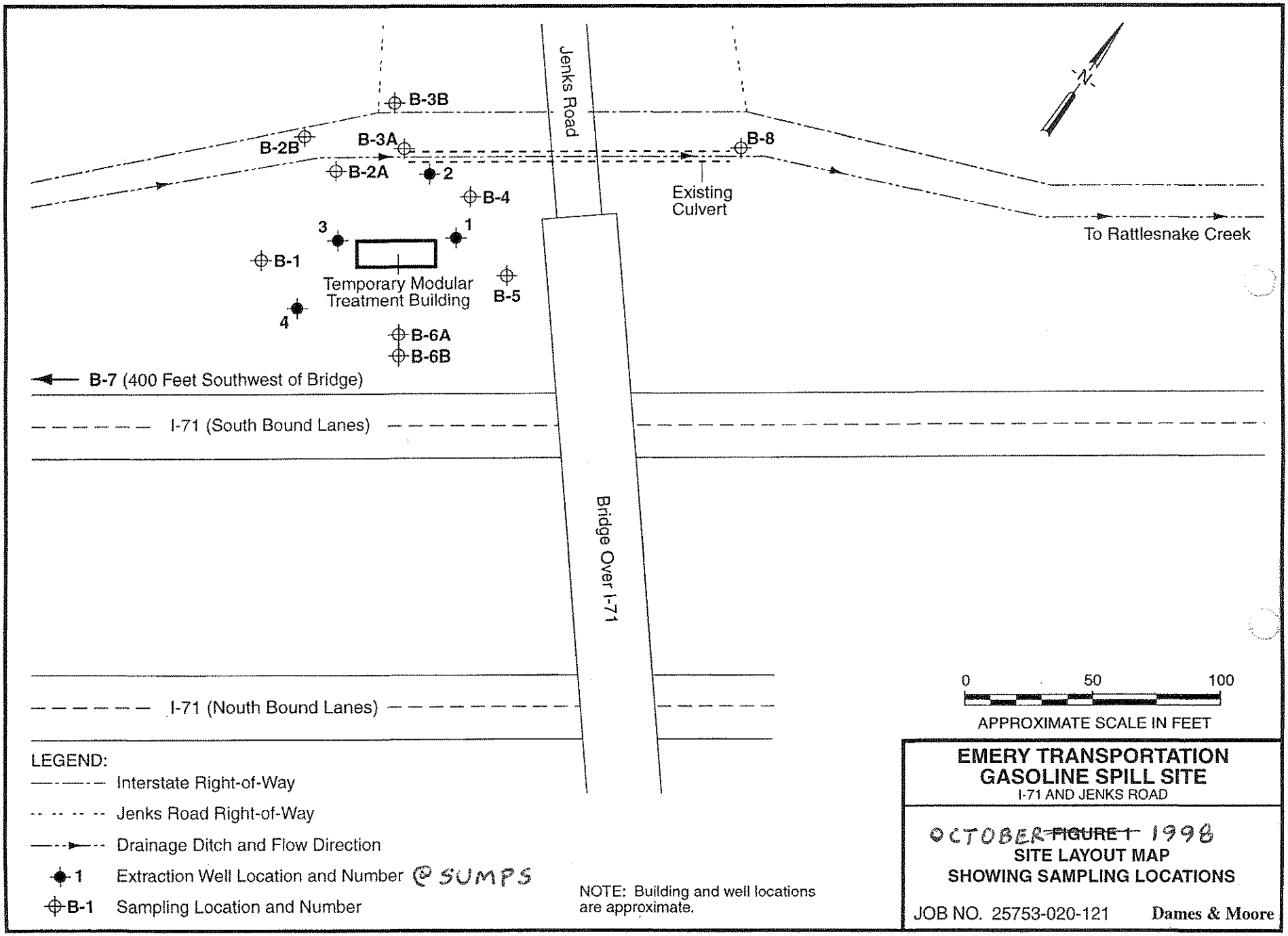
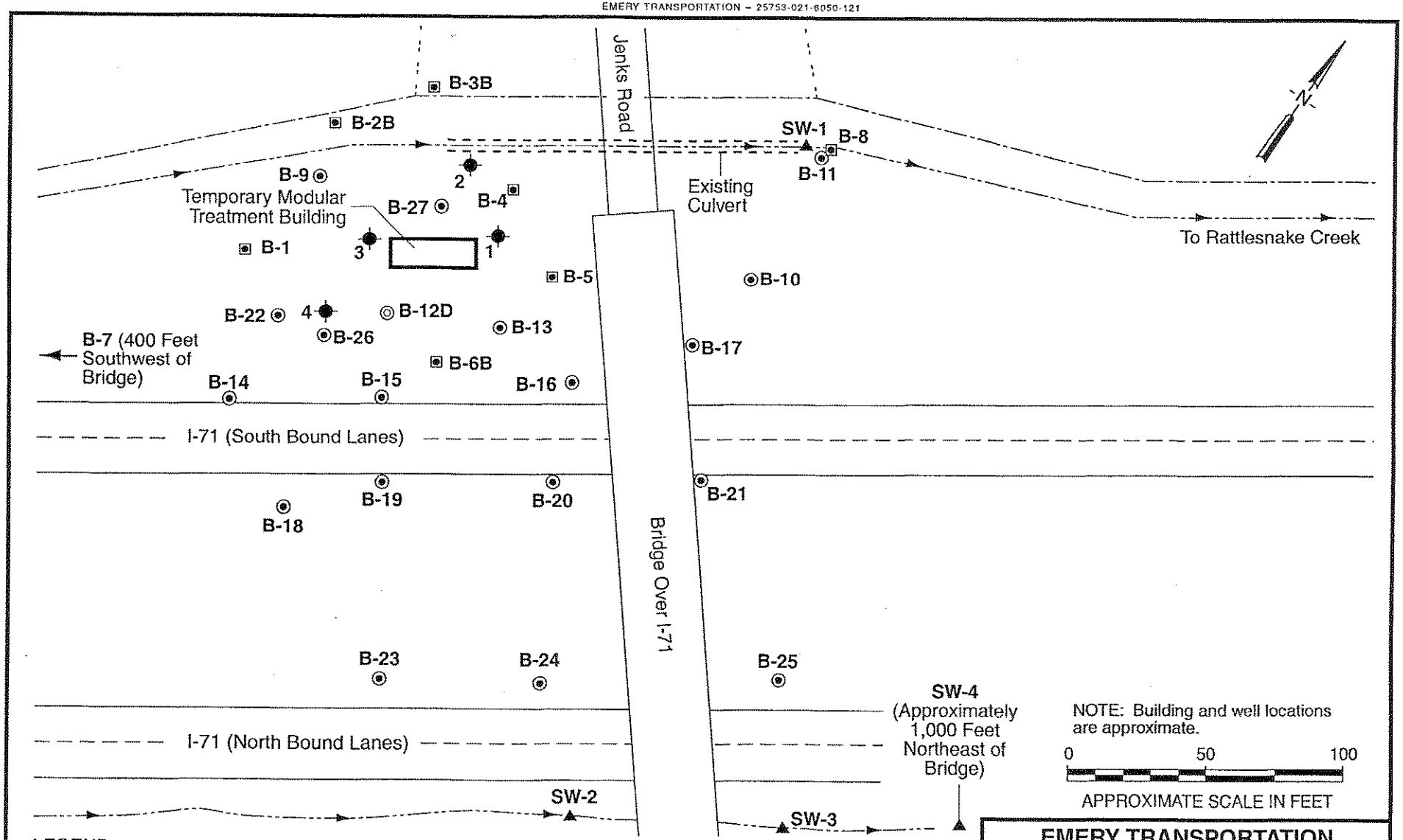

Jenks Road
B-3B
B-2B
B-3A
B-8
B-2A
2
B-4
Existing
Culvert
To Rattlesnake Creek
3
1
B-1
Temporary Modular
Treatment Building
B-5
4
B-6A
B-6B
B-7 (400 Feet Southwest of Bridge)
I-71 (South Bound Lanes)
Bridge Over I-71
I-71 (Nouth Bound Lanes)
0
50
100
APPROXIMATE SCALE IN FEET
LEGEND:
Interstate Right-of-Way
Jenks Road Right-of-Way
Drainage Ditch and Flow Direction
1 Extraction Well Location and Number @ SUMPS
B-1 Sampling Location and Number
NOTE: Building and well locations are approximate.
EMERY TRANSPORTATION
GASOLINE SPILL SITE
I-71 AND JENKS ROAD
OCTOBER ~~FIGURE 1~~ 1998
SITE LAYOUT MAP
SHOWING SAMPLING LOCATIONS
JOB NO. 25753-020-121
Dames & Moore

FIGURE 2



LEGEND:

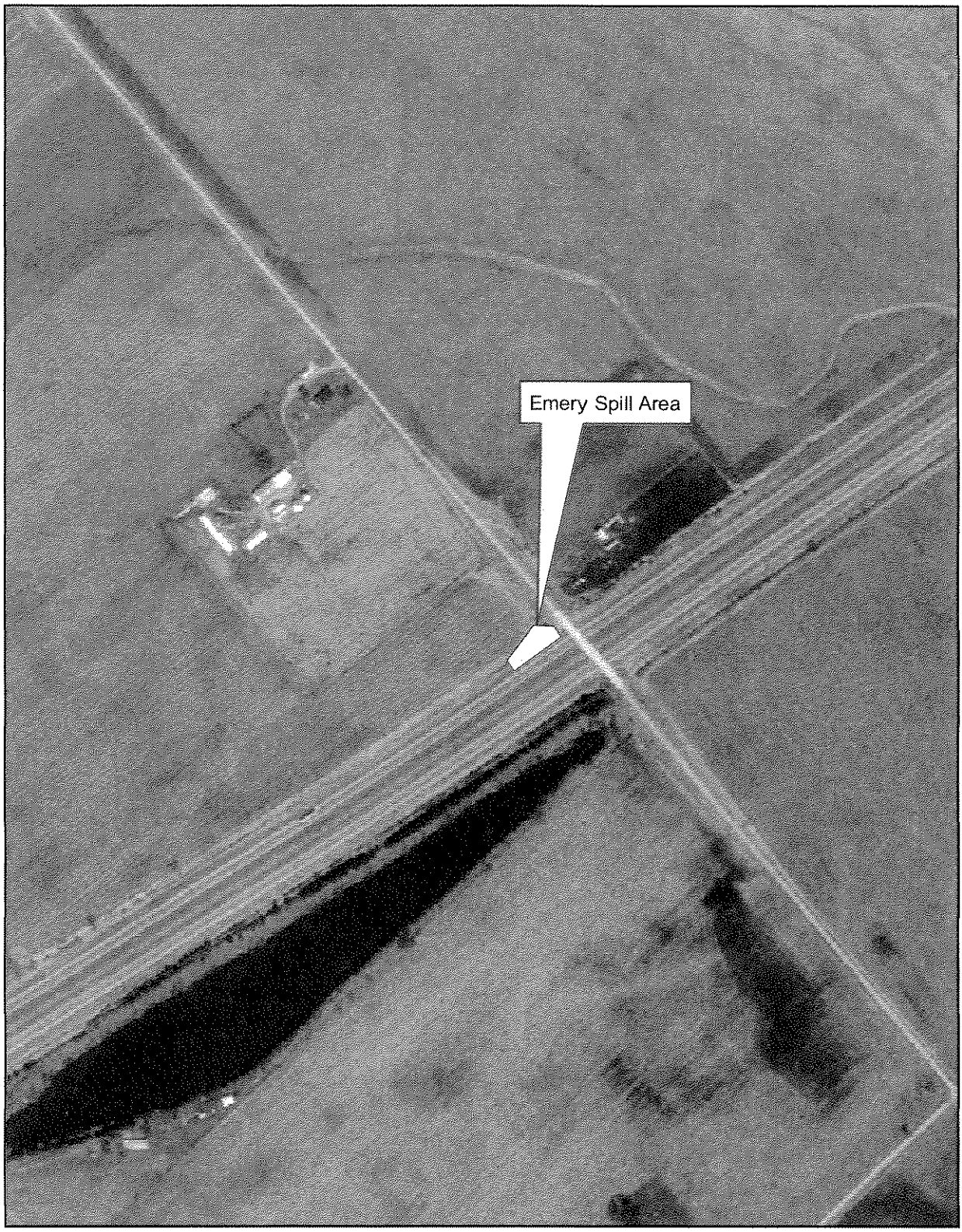
- Interstate Right-of-Way
- Jenks Road Right-of-Way
- Drainage Ditch and Flow Direction
- 3 Extraction Well Location
- B-4 Sampling Location (October 1998)
- B-26 Shallow Soil Boring/Piezometer Location (July 2000)
- B-12D Deep Soil Boring/Piezometer Location (July 2000)
- SW-2 Surface Water Sample Location

EMERY TRANSPORTATION GASOLINE SPILL SITE
I-71 AND JENKS ROAD

JULY ~~FIGURE 2~~ 2000
SITE LAYOUT MAP SHOWING PIEZOMETER LOCATIONS

Job No. 25753-021-121 URS

FIGURE 3



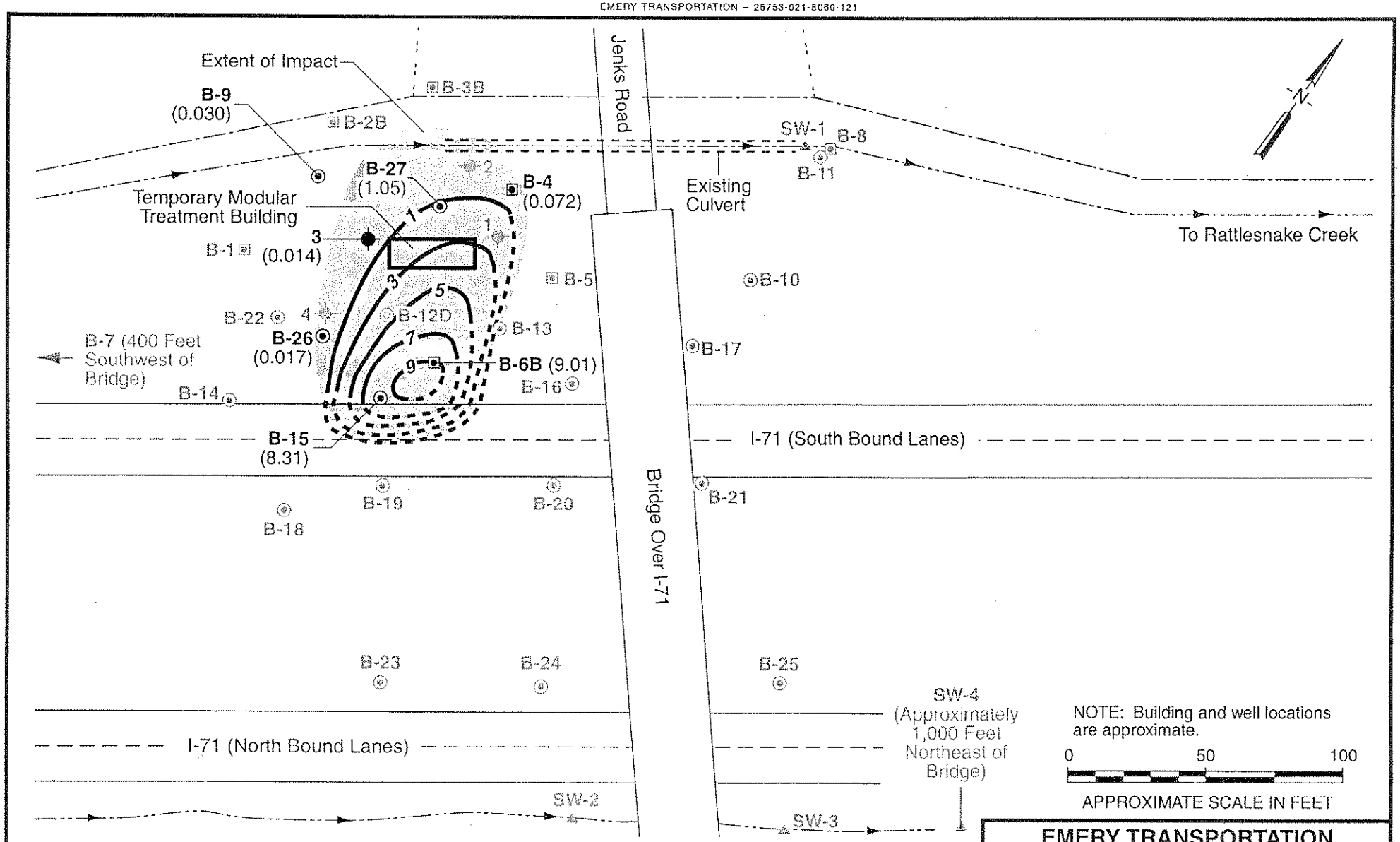
Geolocation Boundary Source for Emery

Method: Interpolated from Paper Map
Source: Aerial Photo - bowersville_ne.sid

1:5,840

N
W E
S

FIGURE 4



LEGEND:

- Interstate Right-of-Way
- Jenks Road Right-of-Way
- Drainage Ditch and Flow Direction
- 3 Extraction Well Location
- B-4 Sampling Location (October 1998)
- B-26 Shallow Soil Boring/Piezometer Location (July 2000)
- B-12D Deep Soil Boring/Piezometer Location (July 2000)
- SW-2 Surface Water Sample Location
- (0.072) Benzene Concentration (July 2000), (mg/L)
- 1 Benzene Concentration Isopleth (mg/L), (Dashed Where Inferred)

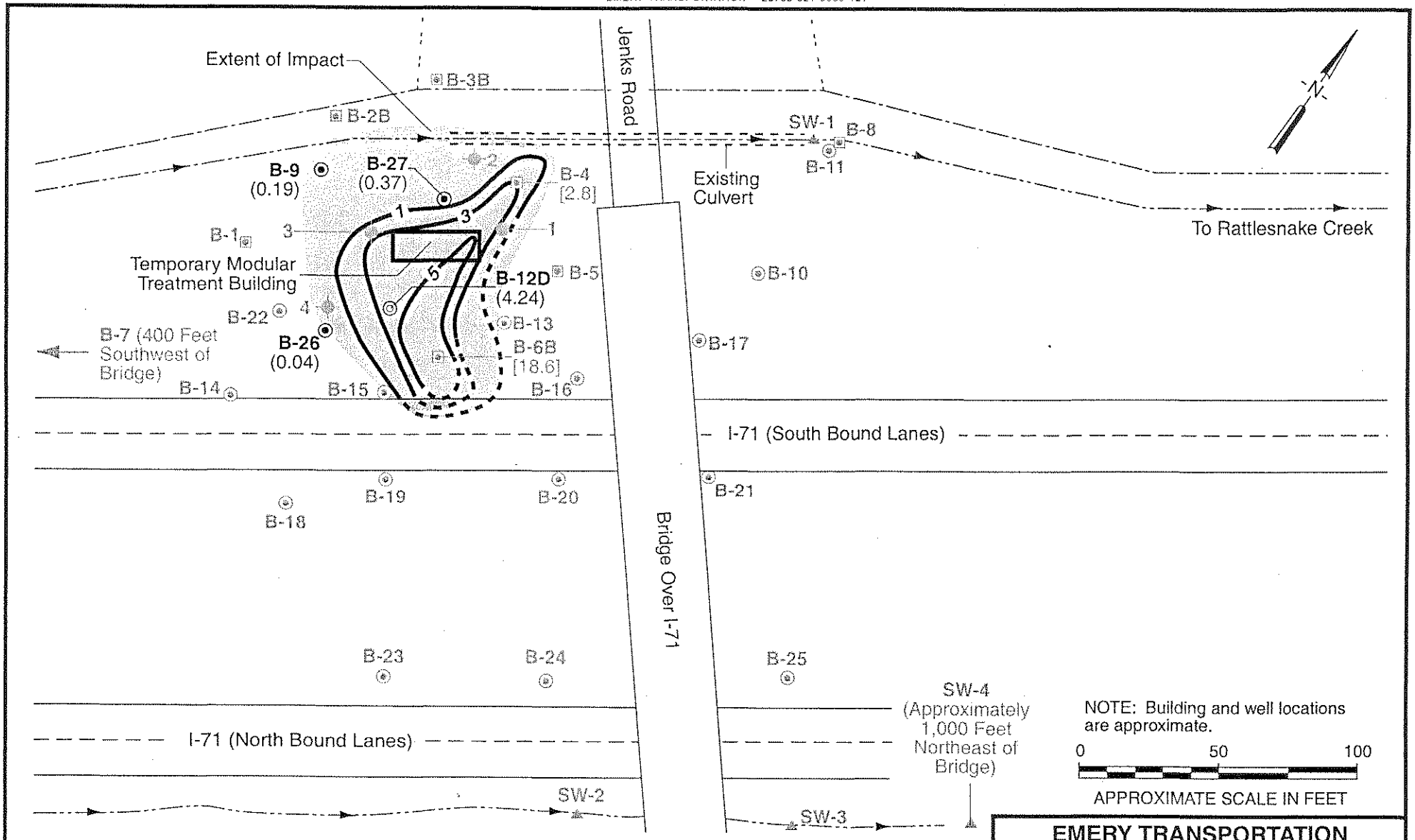
EMERY TRANSPORTATION GASOLINE SPILL SITE

I-71 AND JENKS ROAD

FIGURE 5
DISTRIBUTION OF BENZENE IN GROUNDWATER

Job No. 25753-021-121

URS



LEGEND:

- Interstate Right-of-Way
- Jenks Road Right-of-Way
- Drainage Ditch and Flow Direction
- 4 Extraction Well Location
- B-6 Sampling Location (October 1998)
- [18.6] Benzene Concentration (October 1998) (mg/kg)
- B-26 Shallow Soil Boring/Piezometer Location (July 2000)
- B-12D Deep Soil Boring/Piezometer Location (July 2000)
- SW-2 Surface Water Sample Location
- (4.24) Benzene Concentration (July 2000), (mg/kg)
- 1 Benzene Concentration Isopleth (mg/kg), (Dashed Where Inferred)

EMERY TRANSPORTATION GASOLINE SPILL SITE

I-71 AND JENKS ROAD

FIGURE 6
DISTRIBUTION OF BENZENE IN SOIL

Job No. 25753-021-121 URS

PHOTO 1- ODOT EXCAVATION @ SPILL SITE

TABLES

TABLE 1: SUMMARY OF SAMPLING RESULTS ANALYTICAL DATA

Sample Number:		Sump #1	Sump #2	Sump #3	Sump #4	Effluent	Cleaup Level
Matrix:		Water	Water	Water	Water	Water	Water
Units:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Collected By:		Ohio EPA	Ohio EPA	Ohio EPA	Ohio EPA	Ohio EPA	
Date Sampled:		10/28/1997	10/28/1997	10/28/1997	10/28/1997	10/28/1997	
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**	**Result**	**Category 4**
Benzene	71-43-2	**0.740**	**0.480**	**1.500**	**0.270**	ND	0.005
Toluene	108-88-3	0.140	0.500	**1.800**	0.043	ND	1.000
Ethylbenzene	100-41-4	ND	0.042	ND	ND	ND	0.700
Xylenes (total)	1330-20-7	0.220	0.360	1.200	0.032	ND	10.000

Sample Number:		B-1	B-2B	B-3B	B-4		Cleaup Level
Matrix:		Soil	Soil	Soil	Soil		Soil
Units:		mg/kg	mg/kg	mg/kg	mg/kg		mg/kg
Collected By:		Emery	Emery	Emery	Emery		
Date Sampled:		10/8/1998	10/8/1998	10/8/1998	10/8/1998		
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**		**Category 4**
Benzene	71-43-2	ND	0.010	0.010	**2.800**		0.500
Toluene	108-88-3	ND	0.010	0.010	2.980		12.000
Ethylbenzene	100-41-4	ND	0.020	ND	2.130		18.000
Xylenes (total)	1330-20-7	ND	0.030	ND	9.340		85.000

Human Health Screening Levels Sources:
Petroleum Contaminated Sites Guidance Document for Ohio EPA Emergency Response Actions (July 1997) from Category 4 levels
BOLDED VALUES IN TABLE ARE GREATER THAN CLEANUP LEVELS Sampling results below the laboratory detection limits = ND

TABLE 1: SUMMARY OF SAMPLING RESULTS continued:

Sample Number:		B-5	B-6B	B-7	B-8	Cleaup Level
Matrix:		Soil	Soil	Soil	Soil	Soil
Units:		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Collected By:		Emery	Emery	Emery	Emery	
Date Sampled:		10/8/1998	10/8/1998	10/8/1998	10/8/1998	
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**	**Category 4**
Benzene	71-43-2	ND	**18.600**	ND	ND	0.500
Toluene	108-88-3	ND	**91.700**	ND	ND	12.000
Ethylbenzene	100-41-4	ND	**21.700**	ND	ND	18.000
Xylenes (total)	1330-20-7	ND	**148.000**	ND	ND	85.000

Sample Number:		B-1	B-2B	B-3B	B-4	Cleaup Level
Matrix:		Water	Water	Water	Water	Water
Units:		mg/L	mg/L	mg/L	mg/L	mg/L
Collected By:		Emery	Emery	Emery	Emery	
Date Sampled:		10/8/1998	10/8/1998	10/8/1998	10/8/1998	
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**	**Category 4**
Benzene	71-43-2	**0.032**	ND	ND	**0.327**	0.005
Toluene	108-88-3	0.063	ND	ND	0.159	1.000
Ethylbenzene	100-41-4	0.020	ND	ND	ND	0.700
Xylenes (total)	1330-20-7	0.124	ND	ND	0.110	10.000

Human Health Screening Levels Sources:
Petroleum Contaminated Sites Guidance Document for Ohio EPA Emergency Response Actions (July 1997) from Category 4 levels
BOLDED VALUES IN TABLE ARE GREATER THAN CLEANUP LEVELS Sampling results below the laboratory detection limits = ND

TABLE 1: SUMMARY OF SAMPLING RESULTS continued:

Sample Number:		B-5	B-6B	B-7		Cleaup Level
Matrix:		Water	Water	Water		Water
Units:		mg/L	mg/L	mg/L		mg/L
Collected By:		Emery	Emery	Emery		
Date Sampled:		10/8/1998	10/8/1998	10/8/1998		
Compound	**Cas No.**	Result	Result	Result		**Category 4**
Benzene	71-43-2	ND	**17.400**	ND		0.005
Toluene	108-88-3	ND	**23.800**	ND		1.000
Ethylbenzene	100-41-4	ND	**3.820**	ND		0.700
Xylenes (total)	1330-20-7	ND	**18.900**	ND		10.000

Sample Number:		Sump #1	Sump #2	Sump #3	Sump #4	Cleaup Level
Matrix:		Water	Water	Water	Water	Water
Units:		mg/L	mg/L	mg/L	mg/L	mg/L
Collected By:		Emery	Emery	Emery	Emery	
Date Sampled:		10/8/1998	10/8/1998	10/8/1998	10/8/1998	
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**	**Category 4**
Benzene	71-43-2	0.003	ND	**0.396**	**0.185**	0.005
Toluene	108-88-3	0.005	ND	0.278	0.052	1.000
Ethylbenzene	100-41-4	ND	ND	ND	0.016	0.700
Xylenes (total)	1330-20-7	0.010	ND	0.663	0.091	10.000

Human Health Screening Levels Sources:
Petroleum Contaminated Sites Guidance Document for Ohio EPA Emergency Response Actions (July 1997) from Category 4 levels
BOLDED VALUES IN TABLE ARE GREATER THAN CLEANUP LEVELS Sampling results below the laboratory detection limits = ND

TABLE 1: SUMMARY OF SAMPLING RESULTS continued:

Sample Number:		B-9	B-10	B-11	B-12D	B-13	Cleaup Level
Matrix:		Soil	Soil	Soil	Soil	Soil	Soil
Units:		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Collected By:		Emery	Emery	Emery	Emery	Emery	
Date Sampled:		7/10/2000	7/10/2000	7/10/2000	7/10/2000	7/10/2000	
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**	**Result**	**Category 4**
Benzene	71-43-2	0.190	ND	ND	**4.240**	ND	0.500
Toluene	108-88-3	0.170	ND	ND	**17.600**	ND	12.000
Ethylbenzene	100-41-4	0.190	ND	ND	9.000	ND	18.000
Xylenes (total)	1330-20-7	1.010	ND	ND	51.200	ND	85.000

Sample Number:		B-14	B-15	B-16	B-17	B-18	Cleaup Level
Matrix:		Soil	Soil	Soil	Soil	Soil	Soil
Units:		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Collected By:		Emery	Emery	Emery	Emery	Emery	
Date Sampled:		7/10/2000	7/10/2000	7/10/2000	7/10/2000	7/10/2000	
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**	**Result**	**Category 4**
Benzene	71-43-2	ND	ND	ND	ND	ND	0.500
Toluene	108-88-3	ND	ND	ND	ND	ND	12.000
Ethylbenzene	100-41-4	ND	ND	ND	ND	ND	18.000
Xylenes (total)	1330-20-7	ND	ND	ND	ND	ND	85.000

Human Health Screening Levels Sources:
Petroleum Contaminated Sites Guidance Document for Ohio EPA Emergency Response Actions (July 1997) from Category 4 levels
BOLDED VALUES IN TABLE ARE GREATER THAN CLEANUP LEVELS Sampling results below the laboratory detection limits = ND

TABLE 1: SUMMARY OF SAMPLING RESULTS continued:

Sample Number:		B-19	B-20	B-21	B-22	B-23	Cleaup Level
Matrix:		Soil	Soil	Soil	Soil	Soil	Soil
Units:		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Collected By:		Emery	Emery	Emery	Emery	Emery	
Date Sampled:		7/10/2000	7/10/2000	7/10/2000	7/10/2000	7/10/2000	
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**	**Result**	**Category 4**
Benzene	71-43-2	ND	ND	ND	ND	ND	0.500
Toluene	108-88-3	ND	ND	ND	ND	ND	12.000
Ethylbenzene	100-41-4	ND	ND	ND	ND	ND	18.000
Xylenes (total)	1330-20-7	ND	ND	ND	ND	ND	85.000

Sample Number:		B-24	B-25	B-26	B-27		Cleaup Level
Matrix:		Soil	Soil	Soil	Soil		Soil
Units:		mg/kg	mg/kg	mg/kg	mg/kg		mg/kg
Collected By:		Emery	Emery	Emery	Emery		
Date Sampled:		7/10/2000	7/10/2000	7/10/2000	7/10/2000		
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**		**Category 4**
Benzene	71-43-2	ND	ND	0.040	0.370		0.500
Toluene	108-88-3	ND	ND	0.020	2.040		12.000
Ethylbenzene	100-41-4	ND	ND	0.230	1.190		18.000
Xylenes (total)	1330-20-7	ND	ND	0.280	9.880		85.000

Human Health Screening Levels Sources:
Petroleum Contaminated Sites Guidance Document for Ohio EPA Emergency Response Actions (July 1997) from Category 4 levels
BOLDED VALUES IN TABLE ARE GREATER THAN CLEANUP LEVELS Sampling results below the laboratory detection limits = ND

TABLE 1: SUMMARY OF SAMPLING RESULTS continued:

Sample Number:		B-9	B-10	B-11	B-12D	B-13	Cleaup Level
Matrix:		Water	Water	Water	Water	Water	Water
Units:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Collected By:		Emery	Emery	Emery	Emery	Emery	
Date Sampled:		7/10/2000	7/10/2000	7/10/2000	7/10/2000	7/10/2000	
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**	**Result**	**Category 4**
Benzene	71-43-2	**0.030**	ND	ND	ND	ND	0.005
Toluene	108-88-3	0.005	ND	ND	ND	ND	1.000
Ethylbenzene	100-41-4	0.017	ND	ND	ND	ND	0.700
Xylenes (total)	1330-20-7	0.132	ND	ND	ND	ND	10.000

Sample Number:		B-14	B-15	B-16	B-17	B-18	Cleaup Level
Matrix:		Water	Water	Water	Water	Water	Water
Units:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Collected By:		Emery	Emery	Emery	Emery	Emery	
Date Sampled:		7/10/2000	7/10/2000	7/10/2000	7/10/2000	7/10/2000	
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**	**Result**	**Category 4**
Benzene	71-43-2	ND	**8.310**	ND	ND	ND	0.005
Toluene	108-88-3	ND	0.540	ND	0.001	ND	1.000
Ethylbenzene	100-41-4	ND	ND	ND	ND	ND	0.700
Xylenes (total)	1330-20-7	ND	0.555	ND	0.002	ND	10.000

Human Health Screening Levels Sources:
Petroleum Contaminated Sites Guidance Document for Ohio EPA Emergency Response Actions (July 1997) from Category 4 levels
BOLDED VALUES IN TABLE ARE GREATER THAN CLEANUP LEVELS Sampling results below the laboratory detection limits = ND

TABLE 1: SUMMARY OF SAMPLING RESULTS continued:

Sample Number:		B-19	B-20	B-21	B-22	B-23	Cleaup Level
Matrix:		Water	Water	Water	Water	Water	Water
Units:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Collected By:		Emery	Emery	Emery	Emery	Emery	
Date Sampled:		7/10/2000	7/10/2000	7/10/2000	7/10/2000	7/10/2000	
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**	**Result**	**Category 4**
Benzene	71-43-2	ND	ND	ND	ND	ND	0.005
Toluene	108-88-3	ND	ND	ND	ND	ND	1.000
Ethylbenzene	100-41-4	ND	ND	ND	ND	ND	0.700
Xylenes (total)	1330-20-7	ND	ND	ND	ND	ND	10.000

Sample Number:		B-24	B-25	B-26	B-27		Cleaup Level
Matrix:		Water	Water	Water	Water		Water
Units:		mg/L	mg/L	mg/L	mg/L		mg/L
Collected By:		Emery	Emery	Emery	Emery		
Date Sampled:		7/10/2000	7/10/2000	7/10/2000	7/10/2000		
Compound	**Cas No.**	**Result**	**Result**	**Result**	**Result**		**Category 4**
Benzene	71-43-2	ND	ND	**0.017**	**1.050**		0.005
Toluene	108-88-3	ND	ND	0.006	**1.360**		1.000
Ethylbenzene	100-41-4	ND	ND	0.024	0.307		0.700
Xylenes (total)	1330-20-7	ND	ND	0.077	3.180		10.000

Human Health Screening Levels Sources:
Petroleum Contaminated Sites Guidance Document for Ohio EPA Emergency Response Actions (July 1997) from Category 4 levels
BOLDED VALUES IN TABLE ARE GREATER THAN CLEANUP LEVELS Sampling results below the laboratory detection limits = ND

TABLE 1: SUMMARY OF SAMPLING RESULTS continued:

Sample Number:		B-4	B-6B	Sump #3	Sump #4		Cleaup Level
Matrix:		Water	Water	Water	Water		Water
Units:		mg/L	mg/L	mg/L	mg/L		mg/L
Collected By:		Emery	Emery	Emery	Emery		
Date Sampled:		7/10/2000	7/10/2000	7/10/2000	7/10/2000		
Compound	**Cas No.**	Result	Result	Result	Result		Category 4
Benzene	71-43-2	**0.072**	**9.010**	**0.014**	ND		0.005
Toluene	108-88-3	0.014	**10.900**	0.004	ND		1.000
Ethylbenzene	100-41-4	ND	**1.830**	ND	ND		0.700
Xylenes (total)	1330-20-7	0.046	**11.700**	0.025	ND		10.000

Sample Number:		Sump #1	Sump #2	Sump #3	Sump #4	B-6B	Cleaup Level
Matrix:		Water	Water	Water	Water	Water	Water
Units:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Collected By:		Ohio EPA	Ohio EPA	Ohio EPA	Ohio EPA	Ohio EPA	
Date Sampled:		11/7/2001	11/7/2001	11/7/2001	11/7/2001	11/7/2001	
Compound	**Cas No.**	Result	Result	Result	Result	Result	Category 4
Benzene	71-43-2	ND	ND	**0.038**	ND	**3.650**	0.005
Toluene	108-88-3	ND	ND	ND	ND	**1.300**	1.000
Ethylbenzene	100-41-4	ND	ND	0.001	ND	**0.926**	0.700
Xylenes (total)	1330-20-7	ND	ND	0.006	ND	6.410	10.000

Human Health Screening Levels Sources:
Petroleum Contaminated Sites Guidance Document for Ohio EPA Emergency Response Actions (July 1997) from Category 4 levels
BOLDED VALUES IN TABLE ARE GREATER THAN CLEANUP LEVELS Sampling results below the laboratory detection limits = ND

TABLE 2

SUMMARY OF ANALYTICAL DATA FROM EACH SUMP
EXTRACTED GROUNDWATER

CINCINNATI INSURANCE / EMERY TRANSPORTATION
I-71 & JENKES ROAD SPILL SITE

Sample Date	Sump #3					Sump #4				
	Benzene	Ethylbenzene	Toluene	Xylene	Total BETX	Benzene	Ethylbenzene	Toluene	Xylene	Total BETX
	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]
6/9/00	0.023	0.002	0.017	0.034	0.076	<0.001	<0.001	<0.001	<0.001	<0.001
7/20/00	0.014	<0.001	0.004	0.025	0.043	<0.001	<0.001	<0.001	<0.001	<0.001
9/11/00 *	0.391	0.060	<0.020	<0.020	0.491	<0.001	<0.001	<0.001	<0.001	<0.001
10/10/00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
11/2/00	0.240	0.040	0.030	0.083	0.393	<0.001	<0.001	<0.001	<0.001	<0.001
12/4/00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1/17/01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2/8/01	<0.001	<0.001	<0.001	<0.001	<0.001	0.03	0.005	0.002	0.003	0.04
3/14/01	0.07	0.01	<0.005	0.01	0.092	0.02	<0.005	<0.005	<0.005	0.035

* As agreed upon with Ohio EPA, August 2000 samples were not collected due to close proximity of collection of July 2000 samples. These samples were collected on July 20, 2000.

TABLE 2

SUMMARY OF ANALYTICAL DATA FROM EACH SUMP
EXTRACTED GROUNDWATER

CINCINNATI INSURANCE / EMERY TRANSPORTATION
I-71 & JENKS ROAD SPILL SITE

Sample Date	Sump #1					Sump #2				
	Benzene	Ethylbenzene	Toluene	Xylene	Total BETX	Benzene	Ethylbenzene	Toluene	Xylene	Total BETX
	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]
6/9/00	-	-	-	-	-	-	-	-	-	-
7/20/00	-	-	-	-	-	-	-	-	-	-
9/11/00 *	-	-	-	-	-	-	-	-	-	-
10/10/00	-	-	-	-	-	-	-	-	-	-
11/2/00	-	-	-	-	-	-	-	-	-	-
12/4/00	-	-	-	-	-	-	-	-	-	-
1/17/01	-	-	-	-	-	-	-	-	-	-
2/8/01	-	-	-	-	-	-	-	-	-	-
3/14/01	-	-	-	-	-	-	-	-	-	-

- denotes not sampled per March 21, 2000 letter from URS Dames & Moore to OEPA and response letter from OEPA, dated April 6, 2000 with modifications.
* As agreed upon with Ohio EPA, August 2000 samples were not collected due to close proximity of collection of July 2000 samples.
These samples were collected on July 20, 2000.

TABLE 2

SUMMARY OF ANALYTICAL DATA FROM EACH SUMP
EXTRACTED GROUNDWATER

CINCINNATI INSURANCE / EMERY TRANSPORTATION
I-71 & JENKES ROAD SPILL SITE

Sample Date	Sump #3					Sump #4				
	Benzene	Ethylbenzene	Toluene	Xylene	Total BETX	Benzene	Ethylbenzene	Toluene	Xylene	Total BETX
	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]
8/26/97	0.066	<0.01	0.120	0.124	0.310	0.050	<0.010	0.058	0.006	0.114
10/28/97	1.400	<0.050	1.300	1.200	3.900	1.500	<0.050	1.800	1.300	4.600
11/5/97	0.420	<0.001	0.043	0.041	0.504	<0.001	<0.001	<0.001	<0.001	<0.001
12/9/97	0.666	0.027	0.865	0.736	2.294	0.851	0.022	0.099	0.115	1.087
1/13/98	0.148	0.011	0.103	0.188	0.450	<0.001	<0.001	<0.001	<0.001	<0.001
2/10/98	0.158	0.005	0.034	0.096	0.293	<0.001	<0.001	<0.001	<0.001	<0.001
3/9/98	0.159	<0.01	<0.01	0.054	0.213	<0.001	<0.001	<0.001	<0.001	<0.001
4/9/98	0.009	<0.005	0.010	<0.005	0.019	<0.005	<0.005	<0.005	<0.005	<0.005
5/13/98	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6/4/98	0.170	0.254	0.044	0.311	0.779	0.046	0.028	0.007	0.039	0.120
7/7/98	0.001	0.001	0.001	0.001	0.004	0.023	0.015	0.004	0.026	0.068
8/4/98	0.083	0.024	0.020	0.087	0.214	0.182	0.039	0.014	0.056	0.291
9/8/98	0.064	<0.010	<0.010	<0.010	0.064	0.216	<0.010	0.049	0.013	0.278
10/16/98	0.396	<0.050	0.278	0.663	1.337	0.185	0.016	0.052	0.091	0.344
11/6/98	0.081	0.013	0.007	0.025	0.126	0.215	<0.001	0.003	0.002	0.220
12/2/98	0.183	0.045	0.008	0.125	0.361	0.003	<0.001	<0.001	<0.001	0.003
1/13/99	0.087	0.036	0.192	0.285	0.600	0.175	0.044	0.148	0.430	0.797
2/4/99	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.022	0.024
3/8/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4/6/99	<0.001	<0.001	<0.001	<0.001	<0.001	0.014	0.004	0.002	0.022	0.042
5/12/99	<0.001	<0.001	<0.001	<0.001	<0.001	0.011	0.007	0.002	0.013	0.033
6/10/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
7/8/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8/6/99	0.003	0.004	0.002	0.003	0.012	0.007	0.002	<0.001	<0.001	0.009
9/8/99	0.020	<0.001	<0.001	<0.001	0.020	0.003	<0.001	<0.001	<0.001	0.003
10/18/99	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
11/8/99	<0.001	<0.001	<0.001	<0.001	<0.001	0.023	<0.001	<0.001	<0.001	0.023
12/3/99	0.001	0.001	<0.001	0.003	0.005	0.002	<0.001	<0.001	<0.001	0.002
1/10/00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2/4/00	0.006	<0.001	0.005	0.012	0.023	0.005	<0.001	0.004	0.006	0.015
2/29/00	0.019	0.002	0.025	0.023	0.069	0.003	<0.001	0.004	0.005	0.012
4/10/00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
5/8/00	0.04	0.005	0.035	0.038	0.118	<0.001	<0.001	<0.001	<0.001	<0.001

TABLE 2

SUMMARY OF ANALYTICAL DATA FROM EACH SUMP
EXTRACTED GROUNDWATER

CINCINNATI INSURANCE / EMERY TRANSPORTATION
I-71 & JENKS ROAD SPILL SITE

Sample Date	Sump #1					Sump #2				
	Benzene	Ethylbenzene	Toluene	Xylene	Total BETX	Benzene	Ethylbenzene	Toluene	Xylene	Total BETX
	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]
8/26/97	0.005	<0.001	0.003	0.002	0.010	0.022	0.001	0.017	0.014	0.054
10/28/97	0.740	<0.020	0.140	0.220	1.100	0.480	0.042	0.500	0.360	1.382
11/5/97	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12/9/97	<0.001	<0.001	<0.001	<0.001	<0.001	3.780	<0.001	<0.001	<0.001	3.780
1/13/98	0.018	0.002	0.001	0.009	0.030	0.060	0.004	0.029	0.056	0.149
2/10/98	<0.001	<0.001	<0.001	<0.001	<0.001	0.006	<0.001	0.002	0.004	0.012
3/9/98	0.020	<0.001	0.001	0.003	0.024	<0.001	<0.001	<0.001	<0.001	<0.001
4/9/98	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
5/13/98	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6/4/98	0.013	0.009	0.001	0.015	0.038	<0.001	<0.001	<0.001	<0.001	<0.001
7/7/98	0.009	0.004	0.003	0.005	0.021	<0.001	<0.001	<0.001	<0.001	<0.001
8/4/98	0.009	<0.001	0.003	0.005	0.017	0.008	<0.001	<0.001	<0.001	<0.001
9/8/98	0.111	<0.01	0.012	<0.01	0.123	0.009	<0.001	0.004	<0.001	0.013
10/16/98	0.003	<0.001	0.005	0.010	0.018	<0.001	<0.001	<0.001	<0.001	<0.001
11/6/98	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	0.003	0.001	0.004	0.011
12/2/98	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1/13/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2/4/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
3/8/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4/6/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
5/12/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6/10/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
7/8/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8/6/99	0.002	0.005	0.003	0.003	0.013	1.160	0.064	0.101	0.152	1.477
9/8/99	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.002	0.001	0.001	0.006
10/18/99	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
11/8/99	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
12/3/99	<0.001	<0.001	<0.001	<0.001	<0.001	0.008	0.01	0.005	0.022	0.045
1/10/00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2/4/00	0.002	<0.001	<0.001	0.006	0.008	<0.001	<0.001	<0.001	0.003	0.003
2/29/00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4/10/00	-	-	-	-	-	-	-	-	-	-
5/8/00	-	-	-	-	-	-	-	-	-	-

- denotes not sampled per March 21, 2000 letter from URS Dames & Moore to OEPA and response letter from OEPA, dated April 6, 2000 with modifications.

ATTACHMENTS

OHIO E..., EMERGENCY RESPONSE SECTION
DISTRICT OFFICE INVESTIGATION REPORT

SPILL # : 9509-24-03914

SPILL STATUS	F17		**OSC**	DALTON
	DATE	**TIME**	**REPORTED BY**	TIM SNYDER
REPORTED	09/17/95	6:24	**TITLE**	
DISCOVERED	09/17/95	5:15	**AFFILIATION**	COMPANY
OCCURRED	09/17/95	435	**TELEPHONE**	513-561-0304

---ENTITY INFORMATION---

NAME/COMPANY	EMERY TRANSPORTATION
ADDRESS	7208 SR 32
	CINCINNATI-OH- 45224
TELEPHONE	513-561-0304
SPCC PLAN REQD	N
SPCC PLAN IN EFFECT	N

---CONTACTS---

NAME	**TITLE**	**PHONE #**
RON FWEGHEIMER	PUCO INSPECTOR	614-466-0409
PETE MC CARTY	CINCINNATI INSURANCE	513-870-2833
DAVID A. BIVENS	FAYETTE CO SHERIFF DEPUTY	614-335-6170
DAVID H. EDWARDS	FAYETTE CO SUPERINTENDENT ODOT	614-335-1800
ROBERT A. RUSSELL	FAYETTE CO SHERIFF SGT	614-335-6170
JEFF WARNER	JEFFERSON TWP FIRE CHIEF	614-426-6330

---REPRESENTATIVES---

NAME	**TITLE**	**PHONE #**
RICH EMERY	OWNER	513-561-0304

---SPILL LOCATION INFORMATION---

COUNTY	FAYETTE	**LATITUDE**	393618.5
CITY/TWP	JEFFERSON TWP	**LONGITUDE**	833801.9
LOCATION	I-71 SB MM 64 UNDER JENKS RD BRIDGE		
WATERWAY	GROUND WATER		
LENGTH	0.000		
LAND AREA	70 X 50 FT		
PRE RESPONSE ACTION			

---PRODUCTS SPILLED---

PRODUCT	**AMOUNT**	**UOM**	**TYPE**
GASOLINE	2500.0	GAL	H

SOURCE	TRANSPORTATION TRUCK TANKER
CAUSE	TANK RUPTURE
REASON	ACCIDENT
MEDIA AFFECTED	GROUNDWATER/SUBSURFACE AFFECT LAND OR LAND SURFACE IMPACT

---SAMPLE INFORMATION---

---SUPPLIES USED---

---SUPPORTING DOCUMENTS---

DOCUMENT NAME	**DOCUMENT DATE**	**# OF PAGES**
CAMEO MAP	09/20/95	1
OTHER MAPS	09/20/95	1
TOPOGRAPHIC MAP	09/20/95	1

ATTACHMENT 1

OHIO E.., EMERGENCY RESPONSE SECTION
DISTRICT OFFICE INVESTIGATION REPORT

SPILL # : 9509-24-03914 **PAGE: 2**

DOCUMENT NAME	DOCUMENT DATE	# OF PAGES
AGENCY LETTER	03/11/96	3
WORK PLAN	03/25/96	4
WORK PLAN	06/28/96	2
AGENCY LETTER	07/08/96	1
WORK PLAN	09/19/96	1
SAMPLING RESULTS	10/30/96	2
SAMPLING RESULTS	11/01/96	2
AGENCY LETTER	12/09/96	1
SAMPLING RESULTS	12/11/96	2

---REFERRALS---

NAME	AGENCY	DATE SEEN
DAVID O'TOOLE	OEPA CDO DERR RRS	12/12/96

---NOTIFICATIONS---

AGENCY NAME	DATE SENT	PERSON
RTK	/ /	SHELDON
PUCO	/ /	CALLED FISHER
RTK	/ /	SHELDON

---REMARKS---

09/17/95

OSC DALTON WAS CONTACTED AT HOME BY THE NIGHT DUTY OFFICER AND RESPONDED TO THE SCENE. UPON ARRIVAL HE MET WITH CHIEF JEFF WARNER OF JEFFERSON TOWNSHIP FIRE DEPARTMENT. CHIEF WARNER REPORTED THE FIRST COMPARTMENT OF THE TANKER HAD BEEN DAMAGED AND ALL OF THE GASOLINE WAS SUSPECTED TO HAVE LEAKED OUT. THE OSC EXAMINED THE WRECK TO DETERMINE WHAT ACTIONS WERE NECESSARY. THE TRACTOR HAD CRUSHED 150 FEET OF GUARDRAIL, STRUCK A PIER UNDER A BRIDGE, AND DIVERTED BACK ONTO THE ROADWAY. THE TANK TRAILER HAD SNAPPED OFF THE FIFTH WHEEL PIN AND THEN FLIPPED TO THE RIGHT ONTO ITS TOP. THE TANKER WAS LYING AT THE BASE OF THE APPROACH RAMP, ON THE OTHER SIDE OF THE PIER FROM THE TRACTOR.

THE FRONT COMPARTMENT WAS ACCORDIONED AND HAD A BREAK IN THE METAL ON BOTH SIDES. IT APPEARED TO BE EMPTY. THE REST OF THE COMPARTMENTS APPEARED TO BE SOUND. THE GASOLINE FROM THE FRONT COMPARTMENT HAD FLOWED SOUTH FOR SIXTY TO SEVENTY FEET AND ALSO WEST ABOUT 60 FEET. THE GASOLINE HAD NOT QUITE REACHED A DRY DRAINAGE DITCH JUST BEYOND THE ODOT RIGHT-OF-WAY FENCE. GASOLINE WAS STANDING IN PUDDLES UP TO EIGHT INCHES DEEP IN OLD TIRE RUTS IN THE GRASS.

OSC DALTON MET WITH MR. RICH EMERY AND WAS TOLD A & B SANITATION HAD BEEN CALLED TO RESPOND TO THE SCENE WITH EQUIPMENT TO CLEAN-UP THE SPILL. A TRANSPORT WAS ALSO ON ITS WAY TO OFF-LOAD THE REMAINING GASOLINE. THE OSC CONTACTED A & B TO DETERMINE WHAT EQUIPMENT WAS BEING BROUGHT AND AN ETA. HE WAS TOLD THE CREW HAD JUST LEFT AND WERE BRINGING TWO VACUUM TRUCKS, A BACKHOE, A DUMP TRUCK, AND A SPILL VAN. THE OSC THEN MET WITH MR. DAVID EDWARDS OF OHIO DEPARTMENT OF TRANSPORTATION TO DISCUSS TRAFFIC CONTROL. THE INTERSTATE WAS CURRENTLY CLOSED IN BOTH DIRECTIONS. AS NORMAL IN SUCH SITUATIONS, THE HIGHWAY PATROL WANTED TO KNOW WHEN IT WOULD BE POSSIBLE TO OPEN THE INTERSTATE. THE OSC ADVISED HE WOULD NOT RECOMMEND OPENING ANY LANES UNTIL THE TANKER HAD BEEN REMOVED AND THE LEVEL OF GASOLINE FUMES COULD BE MONITORED. THIS WAS AGREED WITH BY MR. EDWARDS.

THE OSC, MR. EMERY, AND CHIEF WARNER DISCUSSED THE METHODS AVAILABLE TO OFF-LOAD THE

TANKER. IT WAS DECIDED TO REMOVE THE BELLY VALVES AND MANIFOLD SO A HOSE COULD BE INTRODUCED INTO EACH COMPARTMENT. WHITLOCK TOWING FROM COLUMBUS WAS ON-SCENE TO REMOVE THE TRACTOR AND TANKER. AS A FIRST STEP, THEY WERE TOLD TO REMOVE THE TRACTOR AS IT WOULD BLOCK ACCESS TO THE TANKER BY THE TRANSPORT. WHILE THEY WERE DOING THIS, A & B ARRIVED AND WERE BRIEFED ON THE SITUATION. THEY WERE TOLD TO BEGIN VACUUMING THE SPILLED GASOLINE FROM THE PUDDLES TO THE SOUTH OF THE BRIDGE AND TO REMOVE THE RIGHT-OF-WAY FENCE FOR ACCESS TO THE DITCH.

THE OSC ALSO ADVISED A & B AND MR. EMERY TO CONTACT PETROCELL OF WASHINGTON COURT HOUSE REGARDING SOIL DISPOSAL. PETROCELL WAS CLOSED BUT MR. EDWARDS AND DEPUTY RUSSELL OF THE FAYETTE COUNTY SHERIFF'S OFFICE BEGAN MAKING CALLS TO LOCATE A REPRESENTATIVE. EVENTUALLY THEY WERE ABLE TO GET IN CONTACT WITH THE COUNTY ENGINEER WHO MADE ARRANGEMENTS FOR THE SOIL TREATMENT FACILITY TO BE OPENED.

AS SOON AS THE TRACTOR WAS REMOVED, THE TRANSPORT WAS MOVED INTO POSITION AND THE OSC AND TWO OTHERS REMOVED THE BELLY VALVES FROM THE TANKER. THE FIRST COMPARTMENT WAS INDEED EMPTY. A VACUUM WAS DETECTED IN COMPARTMENT FOUR (REAR), INDICATING SOME PRODUCT HAD BEEN LOST. WHEN THE BELLY VALVE WAS REMOVED FROM THIS COMPARTMENT, A HEAVY FLOW OF GASOLINE BEGAN FROM BENEATH THE TANKER. THIS INDICATED THE MANWAY ON THE TOP OF THE TANKER (NOW THE BOTTOM) WAS LEAKING. THIS GASOLINE WAS VACUUMED UP BY A & B WHILE THE TRANSPORT TRANSFERRED THE GASOLINE FROM THE COMPARTMENTS.

ONCE THE COMPARTMENTS WERE EMPTY, THE TANKER WAS SLID FROM UNDER THE BRIDGE AND THEN UPRIGHTED. A & B COULD THEN ACCESS THE AREA WITH A BACKHOE TO BEGIN REMOVING THE GASOLINE SOAKED SOIL. THE FREE GASOLINE PUDDLES HAD ALREADY BEEN RECOVERED. THE PLAN WAS TO REMOVE THE UPPER FOOT OF SOIL OVER THE AREA AFFECTED AND THEN DIG A SERIES OF PITS TO CHECK FOR GASOLINE PENETRATION. THE SOIL WOULD BE STOCKPILED ON PLASTIC SHEETS UNTIL IT COULD BE HAULED AWAY FOR DISPOSAL. THE OSC ADVISED A & B TO BRING TWO MORE DUMP TRUCKS TO THE SCENE AS THE AMOUNT OF SOIL TO BE HAULED WOULD BE MUCH LARGER THAN ANTICIPATED.

MR. EDWARDS ADVISED THE OSC THAT TRAFFIC WAS BACKED UP FOR FIVE MILES NORTH OF US 35 AND SOUTH OF SR 72 DUE TO THE DETOUR AND ASKED IF THE NORTH BOUND LANES COULD BE OPENED. THE OSC CHECKED THE AREA SURROUNDING THE SPILL SCENE WITH THE GASTECH GX-91 AND THE PHOTOVAC PID. THE LEVELS FLUCTUATED WITH WIND CHANGES BUT NO EXPLOSIVE LEVELS WERE DETECTED AWAY FROM THE IMMEDIATE SPILL AREA. THE OSC AGREED TO OPENING THE NORTHBOUND LANES AND ADVISED MR. EDWARDS THE LEFT-HAND SOUTH BOUND LANE COULD ALSO BE OPENED ONCE THE SURFACE HAD BEEN SCRAPED TO REMOVE THE FREE GASOLINE.

OSC DALTON WAS CALLED AWAY TO RESPOND TO A LOCOMOTIVE DERAILMENT IN WASHINGTON COURT HOUSE AND THEN RETURNED.

THE GRASS AND SOME SOIL HAD BEEN REMOVED OVER A MAJORITY OF THE AFFECTED AREA. GASOLINE HAD BEEN FOUND IN ANIMAL BURROWS THAT WERE EXPOSED. THE OSC HAD A & B DIG A SUMP AT THE END OF THE CULVERT UNDER THE APPROACH RAMP FOR THE JENKS ROAD BRIDGE. GASOLINE ENTERED THE SUMP FROM DESICCATION FRACTURES IN THE SOIL AND FROM ANIMAL BURROWS. THE DISTANCE THE GASOLINE HAD TRAVELLED AND THE QUANTITY ENTERING THE EXCAVATION INDICATED A SEVERE INFILTRATION PROBLEM EXISTED. THE OSC DETERMINED IT WOULD BE NECESSARY TO EXCAVATE A SERIES OF TRENCHES THROUGH THE AREA AND INSTALL FRENCH DRAIN COLLECTORS.

IT WAS DECIDED IT WAS NOT SAFE TO CONTINUE EXCAVATING AFTER DARK SO A & B WAS ADVISED TO DISCONTINUE FOR THE DAY AND RETURN IN THE MORNING. ODOT AGREED TO SET UP TRAFFIC CONTROL FOR THE RIGHT LANE AT 07:00.

09/18/95

OSC DALTON MET MR. JUDGE BURKE OF A & B SANITATION ON SCENE. MORE SURFICIAL SOIL NEEDED TO BE REMOVED. THE OSC USED A SOIL AUGER TO CHECK THE AREA AND MARKED THOSE AREAS THAT NEEDED FURTHER SCRAPING. THE OVERALL PLAN FOR TRENCHES WAS DISCUSSED AND IT WAS DETERMINED SIX STANDPIPES WOULD BE NEEDED. MR. BURKE WOULD MAKE ARRANGEMENTS TO OBTAIN THESE FROM A SUPPLIER. THEY WOULD HAVE TO BE TEN OR TWELVE INCHES IN DIAMETER AND FINE SLOTTED. A & B WOULD ALSO LOCATE A SOURCE OF WASHED GRAVEL OR CRUSHED STONE TO BACKFILL THE TRENCHES.

THE OSC LEFT TO CHECK ON PROGRESS AT THE LOCOMOTIVE DERAILMENT SITE AND THEN RETURNED TO THE SCENE AFTER LUNCH.

A SECOND SUMP HAD BEEN DUG BETWEEN THE CULVERT AND WHERE THE TANKER HAD BEEN. GASOLINE WAS ALSO ENTERING THIS PIT RAPIDLY. BY THE END OF THE DAY, THE MAJORITY OF THE SURFACE WORK WAS COMPLETED. THE STANDPIPES COULD NOT BE OBTAINED UNTIL THE TWENTIETH SO A & B WOULD HAUL STOCKPILED SOIL ON THE NINETEENTH.

09/20/95

OSC DALTON MET MR. BURKE AND THE A & B CREW ON SCENE. THE TRENCHES WERE STARTED BEGINNING AT THE PIT DUG AT THE END OF THE CULVERT. IT WAS QUICKLY APPARENT THERE WOULD BE CONSIDERABLE DIFFICULTY DUE TO CAVING OF THE SIDES. THE SOIL WAS FINELY FRACTURED WITH DESICCATION CRACKS AND NUMEROUS ANIMAL BURROWS. MR. BURKE ATTEMPTED TO DIG WITH A ONE FOOT BUCKET ON THE BACKHOE AN THEN SWITCHED TO A TWO FOOT BUCKET. THE SIDES OF THE TRENCH WOULD USUALLY NOT REMAIN INTACT BELOW A DEPTH OF FIVE FEET. SINCE THE TRENCH NEEDED TO BE ABOUT EIGHT FEET DEEP, THIS LED TO A MUCH WIDER TRENCH THAN ANTICIPATED.

THE ORIGINAL PLAN HAD BEEN FOR A TRENCH TO BE DUG AROUND THE BASE OF THE JENKS ROAD APPROACH RAMP IN A SHALLOW "U" SHAPE. THREE LATERALS WOULD THEN BE DUG OFF THIS TO THE SOUTH. WITH THE CAVING THAT WAS ENCOUNTERED, THIS WOULD BE IMPRACTICAL. IT WAS DECIDED TO DIG ONE TRENCH FROM THE CULVERT SOUTH THROUGH THE AREA OF GASOLINE CONTAMINATION AND THEN DIG THE TRENCH AROUND THE BASE OF THE RAMP.

RAIN ALSO HAMPERED THE WORK BY MAKING THE SURFACE SLIPPERY AND MUDDY.

09/21/95

THE EXCAVATION WORK CONTINUED. THE FIRST TRENCH HAD BEEN BACKFILLED WITH CRUSHED, WASHED STONE WITH ONE STANDPIPE ABOUT FIFTY FEET FROM THE CULVERT. THE END AT THE CULVERT HAD NOT YET BEEN BACKFILLED AND THREE TO FOUR INCHES OF GASOLINE WAS STANDING ON TOP OF THE WATER. MR. BURKE REPORTED THE EXCAVATING ON THE FIRST TRENCH HAD STILL NOT EXTENDED BEYOND THE GASOLINE CONTAMINATION AREA WHEN THEY WERE FORCED TO QUIT BY DARKNESS. THE OSC ADVISED THIS TRENCH WOULD HAVE TO BE EXTENDED IN ORDER FOR IT TO BE FULLY EFFECTIVE.

THE EXCAVATING ON THE SECOND TRENCH BEGAN AND THE SAME CAVING PROBLEMS WERE ENCOUNTERED. THIS TRENCH BEGAN AT THE CULVERT END OF THE FIRST AND EXTENDED TO THE SECOND PIT THAT HAD BEEN DUG. AT THIS POINT IT WAS DECIDED FURTHER EXCAVATING WOULD NOT BE BENEFICIAL AND A STANDPIPE WAS INSTALLED. ANOTHER STANDPIPE WAS INSTALLED AT THE JUNCTURE OF THE TWO TRENCHES. THE SOIL REMOVED DURING THIS EXCAVATING WAS ALL HEAVILY CONTAMINATED. MORE THAN FORTY TRUCK LOADS OF SOIL HAVE ALREADY BEEN DISPOSED OF AT PETROCELL AND AT LEAST AN EQUAL AMOUNT IS STOCKPILED.

THERE WAS NOW AN "L" SHAPED FRENCH DRAIN EXTENDING FROM NEAR THE WRECK SITE AROUND TO THE CULVERT AND THEN SETTING OFF AT NINETY DEGREES TO THE SOUTH. THE LEG TO THE

SOUTH WILL BE EXTENDED AT LEAST ANOTHER TWENTY FEET TO GET BEYOND THE GASOLINE CONTAMINATION ZONE AND PREVENT MIGRATION FURTHER TO THE SOUTH.

09/26/95

OSC DALTON CHECKED THE PROGRESS OF A & B SANITATION IN DISPOSING OF THE EXCAVATED SOIL. HE FOUND THEM IN THE PROCESS OF LOADING THE SOIL INTO TRUCKS FOR REMOVAL TO PETROCELL IN WASHINGTON COURT HOUSE. A LARGE AMOUNT OF SOIL HAD ALREADY BEEN REMOVED, BUT THE WORK WAS SLOW DUE TO THE USE OF SINGLE AXLE DUMP TRUCKS.

THE OSC CHECKED THE STANDPIPES THAT HAD BEEN INSTALLED. SINCE THE TRENCHES TENDED TO CAVE IN BEFORE THEY COULD BE EXCAVATED TO THE PLANNED DEPTH, THE PIPES WERE LEFT HIGHER OUT OF THE GROUND. SOME OF THE SLOTS ON THE PIPES WERE EXPOSED ABOVE THE SURFACE AND WOULD ALLOW RAIN WATER TO ENTER. THE OSC INSTRUCTED A & B TO WRAP THE PIPES WITH PLASTIC BEFORE CAPPING THE TRENCH WITH SOIL. A LAYER OF PLASTIC HAD BEEN USED TO COVER THE GRAVEL BACKFILL, AND SOIL WAS TO BE PLACED ON TOP OF THIS. BY WRAPPING THE PIPE WITH PLASTIC, MOST RAIN INFILTRATION SHOULD BE BLOCKED.

A VACUUM TRUCK WAS ON-SCENE, VACUUMING FROM THE STAND PIPE CLOSE TO THE CULVERT. THE DRIVER TOLD THE OSC HE WAS ABLE TO FILL THE TRUCK EACH DAY. HE COULD NOT ESTIMATE HOW MUCH OF THE LIQUID WAS GASOLINE, HOWEVER. THE OSC LOOKED INTO THE STAND PIPE AND COULD SEE GASOLINE RUNNING IN WITH THE WATER.

10/02/95

THE OSC CHECKED THE RECOVERY WELLS INSTALLED IN THE TRENCHES. THERE WAS 1/4 INCH OF GASOLINE IN EACH OF THEM. A & B SANITATION REPORTED THEY HAD RECOVERED VERY LITTLE PRODUCT OVER THE PAST WEEK. THEY HAD SENT A TRUCK TO THE SITE EACH DAY AND PUMPED FOR ABOUT FOUR HOURS. HOWEVER THE INFLOW OF GASOLINE HAS DECREASED SO THAT THEY ARE ONLY RECOVERY A FEW GALLONS EACH TIME.

OSC DALTON CONTACTED MR. RICH EMERY AND EXPLAINED THE NEED FOR A FULL TIME RECOVERY SYSTEM. HE DESCRIBED USING AN AUTOMATIC WATER PUMP TO MAINTAIN A STEADY STATE DRAWDOWN ON THE WATER TABLE. THIS WOULD ENCOURAGE CONTINUOUS INFLOW OF GASOLINE FROM THE SURROUNDING SOIL. THE TYPE OF PUMPS AVAILABLE AND THEIR USE WAS DISCUSSED. MR. EMERY STATED HE WOULD HAVE HIS MAINTENANCE MAN OBTAIN A BATTERY OPERATED PUMP AND INSTALL IT. THE OSC OFFERED TO INSTALL A PASSIVE SKIMMER SYSTEM OWNED BY OHIO EPA IF MR. EMERY WOULD HAVE IT EMPTIED DAILY. MR. EMERY AGREED.

10/26/95

OSC DALTON HAD SEVERAL TELEPHONE CONSERVATIONS WITH MR. EMERY REGARDING THE CONSTRUCTION OF A RECOVERY SYSTEM AT THE SITE. TO DATE, NO SYSTEM HAD BEEN SET UP. EMERY HAD TERMINATED A & B SANITATION ON THE RECOMMENDATION OF THE OSC THAT A VACUUM TRUCK WAS NOT COST EFFECTIVE. THE OSC HAD RECOMMENDED THAT EITHER A BATTERY POWERED PUMP BE INSTALLED OR A TEMPORARY POWER DROP INSTALLED TO PROVIDE ELECTRICITY FOR A RECOVERY SYSTEM. MR. EMERY HAD WAVERED BACK AND FORTH BETWEEN DOING THE WORK HIMSELF OR TURNING IT OVER TO HIS INSURANCE CARRIER.

ON THIS DATE THE OSC CHECKED THE STANDPIPES AND FOUND FREE GASOLINE STILL FLOATING ON TOP OF THE WATER. HE INSTALLED THE PASSIVE SKIMMER IN THE ONLY STANDPIPE WITH A LARGE ENOUGH DIAMETER. THE SKIMMER ONLY HOLDS ONE GALLON, SO IT WILL HAVE TO BE EMPTIED REGULARLY.

12/01/95

CHECK STANDPIPES; NO RECOVERY SYSTEM IN PLACE AND STILL FREE GASOLINE IN ALL WELLS. THE OSC CALLED EMERY TRANSPORTATION AND REMINDED MR. EMERY THE WORK HAD TO BE DONE. MR. EMERY STATED HE WAS GOING TO TURN IT OVER TO HIS INSURANCE CARRIER.

03/26/96

THE OSC RECEIVED A LETTER FROM MR. SUHRE WHICH INCLUDED A REQUEST FOR A QUOTE FROM SUBCONTRACTORS TO BUILD THE PUMP AND TREAT SYSTEM. THE QUOTE BID ALSO INCLUDED A SCHEMATIC DIAGRAM OF THE SYSTEM.

06/28/96

THE OSC WAS NOT CONTACTED BY MR. SUHRE, NOR WAS ANY SYSTEM INSTALLED AT THE SITE. THE OSC CALLED MR. SUHRE AND ASKED FOR AN EXPLANATION FOR THE DELAY. MR. SUHRE STATED THE COST OF THE SYSTEM WAS MUCH HIGHER THAN EXPECTED AND DAMES AND MOORE HAD DECIDED TO BUILD THEIR OWN SYSTEM. THE OSC ASKED WHAT PROGRESS HAD BEEN MADE AND WHEN THE SYSTEM COULD BE EXPECTED TO BE ON SITE AND OPERATING. MR. SUHRE STATED THEY HAD SUBMITTED AN APPLICATION TO OHIO DEPARTMENT OF TRANSPORTATION TO WORK IN THE RIGHT-OF-WAY, BUT HAD NOT RECEIVED A RESPONSE. HE ALSO STATED THEY HAD SUBMITTED A PERMIT TO INSTALL APPLICATION TO OHIO EPA AND WERE WAITING FOR A RESPONSE.

THE OSC CONTACTED THE ODOT SUPERINTENDENT FOR FAYETTE COUNTY AND ASKED IF HE WOULD EXPEDITE THE APPROVAL FOR THE RIGHT-OF-WAY WORK PERMIT. HE AGREED TO DO SO.

THE OSC THEN MET WITH MR. JOHN OWEN OF THE OHIO EPA DIVISION OF SURFACE WATER. MR. OWEN WAS REVIEWING THE PERMIT TO INSTALL SUBMITTED BY DAMES AND MOORE. MR. OWEN TOLD THE OSC THE APPLICATION WAS DEFICIENT IN SEVERAL REGARDS; THE APPLICATION DID NOT HAVE THE NECESSARY SETS OF DETAILED ENGINEERING DRAWINGS, THERE WAS NO SPECIFICATION LIST, AND THERE WAS NO EXPLANATION OF THE BASIS FOR THE DESIGN CHOSEN OR HOW IT WAS INTENDED TO FUNCTION. THE OSC ASKED WHEN A RESPONSE TO DAMES AND MOORE WOULD BE SENT AND MR. OWEN STATED HE WAS INVOLVED IN A MAJOR CASE REQUIRING MOST OF HIS TIME AND HE HAD NOT PLANNED TO RESPOND TO THE APPLICATION SOON. THE OSC EXPLAINED WHAT THE SYSTEM WAS FOR AND ASKED MR. OWEN IF HE COULD MOVE UP THE RESPONSE. MR. OWEN AGREED TO DO SO AND SENT A LETTER TO DAMES AND MOORE ON JULY 8.

07/18/96

OSC DALTON STOPPED AT THE SITE WHILE ENROUTE TO CINCINNATI FOR A MEETING. THE WAS NO SIGN ANYONE HAD VISITED THE SITE AND THE PASSIVE SKIMMER INSTALLED IN OCTOBER, 1995 WAS FULL OF WATER AND HAD NOT BEEN MAINTAINED. THE OSC REMOVED THE SKIMMER. THE OSC CHECKED EACH STANDPIPE AND FOUND A GASOLINE SHEEN AND STRONG ODOR IN ALL OF THEM.

09/16/96

THE OSC CHECKED THE SITE WHILE ENROUTE TO CINCINNATI FOR A MEETING. VOICE MAIL LEFT ON THE OSC'S TELEPHONE BY MR. SUHRE HAD INDICATED THE PUMP AND TREAT SYSTEM WOULD BE INSTALLED IN AUGUST. NO SYSTEM WAS IN-PLACE ON THIS DATE, HOWEVER THERE WERE SIGNS SOMEONE HAD BEEN AT THE SITE.

09/18/96

WHILE ENROUTE FROM CINCINNATI BACK TO COLUMBUS THE OSC SAW A VAN BODY TRUCK PARKED AT THE SITE AND PEOPLE WORKING AROUND IT. THE TRUCK HAD A FEE CORP LOGO ON IT.

SINCE THE OSC WAS RESPONDING TO THE SCENE OF ANOTHER SPILL, HE DID NOT STOP.

09/24/96

OSC DALTON MET WITH MR. JEFF WEHNER OF DAMES AND MOORE AND MR. JAMES KOVATCH OF FEE CORP AT THE SITE. THE OSC EXAMINED THE PUMP AND TREAT SYSTEM AND DISCUSSED ITS OPERATION WITH MR. KOVATCH. THE SYSTEM WAS INSTALLED IN THE VAN BODY OF A TRUCK THAT WAS PARKED ON A CRUSHED STONE PAD. IT CONSISTED OF SUMP PUMPS INSTALLED IN EACH STANDPIPE AND CONNECTED TO A MANIFOLD PIPE. THAT PIPE LEAD TO A SURGE TANK THAT MODERATED THE FLOW RATE. FROM THE SURGE TANK THE FLOW ENTERED AN OIL/WATER SEPARATOR WHERE FREE GASOLINE WAS SKIMMED INTO A HOLDING CELL. THE WATER THEN WAS BATCH PUMPED THROUGH A MULTI-STAGE CARBON FILTER AND DISCHARGED TO THE CULVERT UNDER JENKS ROAD. THE SYSTEM HAD A FLOW TOTALIZER SO THE AMOUNT OF WATER PUMPED AND DISCHARGED COULD BE DETERMINED.

THE OSC AND MR. WEHNER DISCUSSED SAMPLING PROTOCOL. IT WAS DECIDED TO SAMPLE THE INFLUENT SURGE TANK RATHER THAN INDIVIDUAL WELLS. THE DISCHARGE WOULD ALSO BE SAMPLED. SAMPLING WOULD BE WEEKLY UNTIL A BASELINE COULD BE ESTABLISHED, THEN IT WOULD BE REDUCED TO MONTHLY. THE OSC ALSO REQUESTED MR. KOVATCH KEEP TRACK OF THE AMOUNT OF GASOLINE ACCUMULATED EACH WEEK. THE SAMPLE RESULTS AS WELL AS THE FLOW TOTALIZER READINGS WERE TO BE REPORTED TO THE OSC IN WRITING.

10/08/96

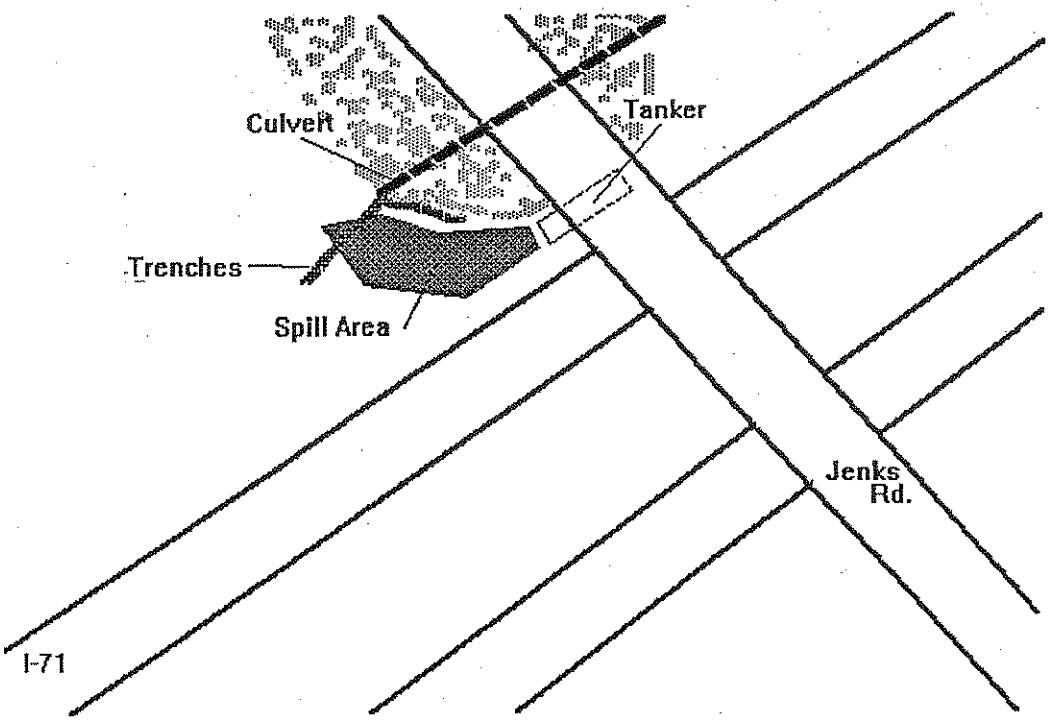
THE OSC MET MR. KOVATCH AT THE SCENE TO CHECK THE OPERATION OF THE SYSTEM. THE ORIGINAL SUMP PUMPS HAD TO BE REPLACED DUE TO INCOMPATIBILITY WITH GASOLINE. THE AMOUNT OF FREE GASOLINE BEING RECOVERED HAD DECREASED TO ALMOST NONE. NO SIGNIFICANT PROBLEMS HAD BEEN ENCOUNTERED IN OPERATING THE SYSTEM.

NO CHARGE WAS MADE FOR MILEAGE ON THIS INSPECTION AS THE OSC DROVE HIS PERSONAL VEHICLE

12/12/96

RESULTS OF THE FIRST TWO MONTHS OF SAMPLING INDICATED THE CONCENTRATION OF BTEX HAD DECREASED OVER THE PERIOD, ALTHOUGH THE BENZENE CONCENTRATION HAD STILL EXCEEDED THE MCL.

THE OSC DISCUSSED THE ON-GOING OVERSIGHT OF THE SITE WITH MS. DEBORAH STRAYTON AND MR. MANNY AYENI, THE UNIT SUPERVISOR OF THE CENTRAL DISTRICT OFFICE DIVISION OF EMERGENCY AND REMEDIAL RESPONSE AND THE REMEDIAL RESPONSE SECTION GROUP LEADER. IT WAS DECIDED THE SITE SHOULD BE TURNED OVER TO REMEDIAL RESPONSE FOR OVERSIGHT SINCE THE EMERGENCY PHASE WAS OVER AND A REMEDIAL ACTION WAS IN PLACE. MR. DAVID O'TOOLE WAS SELECTED TO BE THE SITE COORDINATOR. A LETTER WAS SENT TO EMERY TRANSPORTATION, CINCINNATI INSURANCE, AND DAMES AND MOORE TO INFORM THEM OF THE CHANGE IN OVERSIGHT.


Culvert
Tanker
Trenches
Spill Area
Jenks
Rd.
I-71

PETROLEUM CONTAMINATED SITES GUIDANCE DOCUMENT FOR EMERGENCY RESPONSE ACTIONS

(March, 2005)

OHIO EPA
DIVISION OF EMERGENCY AND REMEDIAL RESPONSE
EMERGENCY RESPONSE AND SPECIAL INVESTIGATIONS SECTION
1800 WATERMARK DRIVE, COLUMBUS, OHIO 43215-1099

ATTACHMENT 2

SECTION 1: INTRODUCTION

Releases of petroleum to the environment in Ohio are regulated by the Bureau of Underground Storage Tank Regulation (BUSTR), Division of State Fire Marshall, Ohio Department of Commerce, the Divisions of Wildlife and Oil and Gas, Ohio Department of Natural Resources (ODNR); the Public Utilities Commission of Ohio; the Ohio Environmental Agency (OEPA); the United States Coast Guard; the United States Environmental Protection Agency, (US EPA); and various local municipalities which have adopted pollution prohibition regulations and ordinances. This document has been adapted from the Bureau of Underground Storage Tank Regulations Corrective Actions Guidance Document, which in turn, evolved from a Petroleum Contaminated Soils Policy originally created by OEPA.

The purpose of this document is to offer guidance in situations where a release of petroleum has occurred from a non-BUSTR regulated source. This document has been developed specifically for emergency response actions and may not be appropriate for use at sites where a long term clean up is necessary, such as where there is extensive ground water contamination or more than just petroleum contamination. In these long term situations, the appropriate Ohio EPA District Office DERR Unit Supervisor should be contacted for guidance.

The following topics are outlined in this document: free product recovery recommendations, permit application responsibilities, petroleum action level calculations, and field sampling procedures. In no way does this document supersede any other applicable law, regulation, or cleanup criteria previously established by any government entity. OEPA reserves the right, pursuant to Chapters 3704, 3714, 3734, 3745, 3750, 6109, and 6111 of the Ohio Revised Code (ORC) and any other applicable state or federal laws or regulations to require further site investigation and abatement of release(s) of hazardous wastes, hazardous substances, industrial wastes or other wastes, pollutants or contaminants into the environment from any site and to seek civil penalties, reimbursement of oversight costs, response costs, and any other appropriate legal or equitable relief for any violation of law.

Another program has developed petroleum standards, which under certain circumstances are different from the BUSTR action levels applied in this document. OEPA's Voluntary Action Program (VAP) has developed cleanup standards based on land use and ground water use for various hazardous substances and petroleum under final rules adopted in December 1996. However, Paragraph (B)(1) of ƒ3746.04 of the Ohio Revised Code (ORC) requires that the petroleum standards for *residential* and *commercial* properties be the standards adopted under Division (B) of ƒ3737.882 of the ORC, the standards developed by BUSTR and described in Chapter 1301:7-9-13 of the Ohio Administrative Codes (OAC). The VAP developed direct contact soil standards for petroleum releases at *industrial* properties; these standards are described in Paragraph (B)(3)(a)(ii) of Rule 3745-300-08 of the OAC. These standards, like all VAP generic numerical standards, are applicable to a property undergoing a Voluntary Action under the supervision of a Certified Professional in accordance with all the requirements in ƒ3745-300 of the OAC. Participating in the VAP and performing a cleanup in accordance with the VAP rules is an alternative to following this Petroleum Contaminated Sites Guidance Document for Emergency Response Actions.

Another Ohio EPA Guidance Document (DERR-00-DI-033, September 22, 2004) may be used to

address petroleum contaminated sites. Ohio EPA-DERR has developed a tiered approach to address petroleum contamination in soils. This approach includes the evaluation of indicator chemicals and residual petroleum constituents. Necessary inputs to calculate human health risk-based numerical standards, such as physicochemical and toxicity data, are documented. Analytical sampling requirements are provided for site assessment to ensure that sample results are compatible with the proposed risk assessment process. The petroleum-specific process to derive soil saturation limits is also provided.

SECTION II: IMMEDIATE RESPONSES TO RELEASES

FREE PRODUCT RECOVERY

During an emergency response, immediately begin recovery efforts. Absorbents, bailers, pumps, skimmers, vacuum trucks, and/or other techniques that facilitate free product recovery may be utilized. These efforts are to continue until a non-recoverable level is reached.

APPLICABLE OEPA PROGRAMS AND PERMITS

During emergency response activities, it may be necessary to install and/or utilize certain treatment technologies. The use of treatment technology may require the facility to obtain a permit. Please contact the appropriate district office for questions regarding the need for such permits (see Appendix C for the appropriate district office telephone number.)

SECTION III: PETROLEUM ACTION LEVELS

INTRODUCTION

The following "SITE FEATURE DEFINITIONS" and attached "SITE FEATURE WORK SHEET" (see Appendix A) can be used to determine petroleum cleanup standards at petroleum contaminated sites, **which are not regulated by BUSTR**. The definitions are for further clarification while using the work sheet. Once the points have been assigned and totaled, match the total score with the corresponding category in the "PETROLEUM ACTION LEVELS TABLE". The applicable category lists the cleanup standards that are to be used at the scored site.

In order to complete the site feature worksheet, it is necessary to gather site information. For those circumstances where site specific information has not been obtained, there are default 'unknown' values that may be used.

SITE FEATURE DEFINITIONS

Proximity to Water Supplies (Site Feature #1)
The proximity to a public or private water well or a water intake will be measured from the perimeter of the spill. The determination of sole source aquifer, sensitive area or well head protected area will be made based on whether or not the spill site is within one of the designated areas. For the purpose of this site feature, sensitive area will be interpreted as defined in BUSTR OAC 1301:7-9-09.

Depth to Ground Water (Site Feature #2)
Depth to ground water shall be measured in linear feet from the ground surface to the first zone of saturation that acts as a preferential pathway for migration. OAC 3745-27-01-B(49) defines zone of saturation as that part of the earth's curst, excluding the capillary zone, in which all voids are filled with water.

Site specific information should be used in the determination of the depth to ground water. However, if this is not feasible, then the information can be obtained through an evaluation of ODNR well logs. Another possible source are the county soil surveys published by the United States Department of Agriculture, Soil Conservation Service. These provide information on subsurface conditions to approximately six feet, including information on the depth to the water table and whether the water is perched. Additional information concerning the depth of the ground water may be obtained from ODNR Ground water Resource Maps and Pollution Potential Maps. Emphasis must be placed on the fact that these sources did not provide site-specific information. These may help provide a first-cut approximation and help identify areas that are vulnerable to contamination.

Predominant Type of Substratum (Site Feature #3)
A substratum type that best represents native soil and/or bedrock to the depth to ground water must be selected. If the boundary of a particular substratum type is unclear, the highest permeability soil or bedrock type most typical of the area should be chosen. Predominant type of substratum should be determined either by existing site or area substratum data, on-site borings and soil analysis, or consultation of the soil surveys published by the United States Department of Agriculture, Soil Conservation Service. (**Note:** If the predominant type of substratum is classified as fill material and the fill consists of a homogeneous mixture of clay-based soils, then the score for Column A may

be used. However, if the fill material consists of a heterogeneous mixture of cement, bricks, asphalt and/or similar unconsolidated material, then the score from Column C must be used.)

Proximity to Structures or Preferential Migration Pathways (Site Feature #4)
The Site Feature 4 Worksheet must be completed and totaled in order to score this feature. The following are the structures and pathways considered:

1. Structures with basements or subsurface foundations refers to any structures, occupied or unoccupied, which have subsurface features such as crawl spaces, footer drains, or basements.
2. Water line includes water mains, laterals, tie-ins and any piping connected to a publicly or privately owned and/or operated drinking water distribution system.
3. Curtain drains, french drains or field tiles refers to manmade drainage systems used to conduct storm water away from a location, which may be affected by the release or can reasonably be assumed to be affected.
4. Shallow injection wells refers to injection of fluids into the subsurface. This could include storm water drainage, industrial/automotive waste and remediation wells.
5. Septic systems (tank & associated leaching systems) includes influent and effluent piping associated with the systems. However, this does not include piping to a system that enters a publicly or privately owned and/or operated sewage treatment works.
6. Structures without subsurface conditions refers to structures, occupied or unoccupied, that do not have subsurface features (i.e. structures built on slabs, or directly on the ground.)
7. Sanitary sewer lines includes sewer lines, tap-ins, laterals or any other conduit connected to a publicly or privately owned and/or operated sewage treatment works.
8. Natural gas lines
9. Pipelines or other conduits includes piping trenches, lined or unlined, concrete or otherwise.
10. Buried telephone/television cable lines includes the piping trenches, lined or unlined, concrete or otherwise.

Proximity to Surface Water and/or Sensitive Areas (Site Feature #5)
The proximity shall be measured from perimeter of spill to the surface water or sensitive area. Surface waters include all streams, lakes, reservoirs, ponds, marshes, wetlands, springs, irrigation systems, storm sewers, and other waterways and/or direct pathways to surface waters. Sensitive areas include any local, state or federal nature reserve, wildlife refuge, preserve, park or forest, or habitat of threatened an/or endangered species. **Note:** Consult ODNR Division of Natural Areas and Preserves for information regarding threatened and/or endangered species.

Land Use (Site Feature#6)
1. Commercial/Industrial
   Commercial land use refers to facilities that supply goods and/or services and are open to the public. Examples of such uses include, but are not limited to, warehouses, building supply facilities, retail gasoline stations, automobile service stations, automobile dealerships, retail warehouses, repair and service establishments for appliances and other goods, professional offices, banks, credit unions, office buildings, retail businesses selling food and or merchandise, hospitals, clinics, religious institutions, hotels, motels, personal service establishments and parking facilities. Industrial land use refers to property where the current or intended use is for manufacturing or assembling goods including parts, machines and chemicals, and transportation uses. Examples of such uses include, but are not limited to, lumber yards, power plants, metal-working and plating shops, blast furnaces,

coke plants, oil refineries, brick factories, chemical plants, plastic plants, assembly plants, non-public airport areas, limited access highways, railroad switching yards and marine port facilities.

2. Residential/Agricultural/Recreational
Residential land use refers to areas where the current or intended uses of the property would be for housing, education, and health care for adults, children, the elderly and the infirm. Examples of such uses included, but are not limited to, family residences; day care facilities with open-air playgrounds with exposed soils; schools, colleges and other educational institutions with open-air facilities; nursing homes, elder care and other long-term health care facilities where exposure routes to soil, sediment, ground water or surface water from the property could exist. Agricultural land use is included in this category because this land use generally includes the residence of the farm family and farming operations where food crops are grown and farm animals are raised. Recreational land use has been included in this category because of the wide range of potential exposure frequencies and durations and to ensure protection os sensitive sub-populations such as young children who could frequent these areas on a regular basis.

TEST METHODS

Soil and water samples collected at the site should be analyzed using the following applicable U.S. EPA test methods:

Contaminant	Analytical Method for Soil	Analytical Method for Water
Benzene	SW-846, Method 8260B or 8021B	US EPA Test Method 524.2**
Toluene	SW-846, Method 8260B or 8021B	US EPA Test Method 524.2**
Ethyl benzene	SW-846, Method 8260B or 8021B	US EPA Test Method 524.2**
Total Xylenes (o,m,p - xylenes)	SW-846, Method 8260B or 8021B	US EPA Test Method 524.2**
TPH for Gasoline Range	SW-846, Method 8015B	Not Applicable
TPH for Diesel Range	SW-846, Method 8015B	Not Applicable

** U.S. EPA Test Method 524.2 or 502.2 should be utilized in those situations where the Ohio Department of Health and/or a local health department, and/or the OEPA Division of Drinking and Ground Waters require that this analysis be used. Otherwise, a U.S. EPA SW-846 method may be utilized as long as the practical quantitation limit is lower than the action level stipulated by the Site Feature Work Sheet. **Source**: US EPA's Environmental Monitoring Systems Laboratory, "Methods for the Determination of Organic CPLs in Drinking Water", December 1988 (Revised July 1991).

APPENDIX A

SITE FEATURE WORK SHEET

SITE FEATURE WORK SHEET

SITE FEATURES	COLUMN A		COLUMN B		COLUMN C	
	Score 15 Points	Enter Score	Score 10 Points	Enter Score	Score 5 Points	Enter Score
1. Proximity of perimeter of spill to a public or private well or water intake	>1000 ft		300-1000 ft		<300 ft or inside of a designated sole source aquifer, sensitive area, well head protection area, or unknown	
2. Depth to ground water	>75 ft		25 -75 ft		<25 ft or unknown	
3. Predominant type of substratum	Unfractured clay, shale, claystone, mudstone, clay, silty clay, low permeable tills		Clayey silt, moderate permeable till, silty shale, unfractured siltstone-sandstone-limestone, sandy clay, clay loam. Silty clay loam, sandy silt, silty sand, clayey sand, coal, peat		Sand, gravel, loamy sand, sandy loam, poorly lithified sandstone, karst limestone, highly fractured rock, fill material, or unknown	
4. Proximity to structures or preferential migration pathways (see below)	<8 points		8-12 points		>12 points	
5. Proximity to surface water and/or proximity to sensitive areas	>120 ft		50-120 ft		<50 ft or unknown	
6. Land use	Commercial/ Industrial				Residential/Recreational/ Agricultural	
Add Subtotals	+		+		+	
					TOTAL SCORE	

SITE FEATURE 4 WORK SHEET

Structures with basements or subsurface foundations (i.e. crawl space, footer drains, basements) within 50 ft.	4 pts. _____
Water line within 50 ft.	4 pts. _____
Curtain drains, french drains or field tiles within 100 ft.	4 pts. _____
Shallow injection wells, if within 50 ft. score 3 pts.; if within 100 ft., score 1 pt.	3 pts. or 1 pt. _____
Septic Systems (tank & associated leachate systems) within 50 ft.	2 pts. _____
Building type structure without subsurface conditions tested above within 50 ft.	1 pt. _____
Sanitary sewer line within 50 ft.	1 pt. _____
Natural gas lines within 50 ft.	1 pt. _____
Pipelines or other conduits within 50 ft.	1 pt. _____
Buried telephone/television cable lines within 50 ft.	1 pt. _____
Buried electrical cable & lines within 50 ft.	1 pt. _____
	TOTAL POINTS _____

If Total Points from Site Feature 4 Work Sheet are:
<8, enter score of 15 in Column A for Site Feature 4 in the above chart
8-12, enter score of 10 in Column B for Site Feature 4 in the above chart
>12, enter score of 5 in Column C for Site Feature 4 in the above chart.

PETROLEUM ACTION LEVELS (PPM)

CONSTITUENTS	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4
Total Score	< 46 Points	46 - 60 Points	61 - 75 Points	> 75 Points
Soil BTEX	0.006 ppm Benzene 4 ppm Toluene 6 ppm Ethylbenzene 28 ppm Total Xylenes	0.17 ppm Benzene 7 ppm Toluene 10 ppm Ethylbenzene 47 ppm Total Xylenes	0.335 ppm Benzene 9 ppm Toluene 14 ppm Ethylbenzene 67 ppm Total Xylenes	0.5 ppm Benzene 12 ppm Toluene 18 ppm Ethylbenzene 85 ppm Total Xylenes
Ground Water BTEX	0.005 ppm Benzene 1 ppm Toluene 0.7 ppm Ethylbenzene 10 ppm Total Xylenes	0.005 ppm Benzene 1 ppm Toluene 0.7 ppm Ethylbenzene 10 ppm Total Xylenes	0.005 ppm Benzene 1 ppm Toluene 0.7 ppm Ethylbenzene 10 ppm Total Xylenes	0.005 ppm Benzene 1 ppm Toluene 0.7 ppm Ethylbenzene 10 ppm Total Xylenes
Soil TPH (Gasoline)	105 ppm TPH	300 ppm TPH	450 ppm TPH	600 ppm TPH
Soil TPH (Others)	380 ppm TPH	642 ppm TPH	904 ppm TPH	1156 ppm TPH

APPENDIX B

FIELD SAMPLING GUIDANCE

FOR PETROLEUM CONTAMINATE SITE CLEANUP

DURING EMERGENCY RESPONSE ACTIONS

FIELD SAMPLING GUIDANCE FOR PETROLEUM CONTAMINATED SITE CLEANUP DURING EMERGENCY RESPONSE ACTIONS

INTRODUCTION

Sampling is needed to determine if a petroleum contaminated site cleanup has achieved the specific concentrations presented in the Petroleum Action Levels Table in the Petroleum Contaminated Sites Guidance Document For Emergency Response Actions. Sampling will consist of collecting representative media from the area impacted by the petroleum release or discharge. For the purposes of this guidance document the following protocols recommended to be followed. This protocol has been established to address only sites that are involved in an emergency response action. The sampling protocol utilizes a biased sampling method that may not adequately characterize a site for other purposes such as risk evaluation and/or assessment. However, the sampling protocol will provide a framework for sampling scheme that can be modified to address the needs of the facility and/or vessel clean up process. The sampling protocol will assist in determining whether or not there are areas of contamination that may exceed the Petroleum Action Levels stipulated in the Petroleum Contaminated Site Guidance Document for Emergency Response Actions (April, 1997).

SAMPLING PROTOCOL FOR EMERGENCY RESPONSE ACTIONS

Soil Sampling

The first step to be undertaken is to determine the size of the area impacted by the release. This determination may be based on direct physical observation (such as oil stained vegetation, soils, etc.) and/or filed screening techniques (photoionization meter, flame ionization meter, immunoassay test kits, etc.) Once the affected area has been determined, it may be sampled prior to initiating cleanup or the affected area may be remediated and then sampled. (Note: It has been the experience of the Ohio EPA, Emergency Response Unit, On Scene Coordinators, that the sampling and subsequent analysis of grossly contaminated media will result in analytical concentrations that exceed the Petroleum Action Levels stipulated in the Petroleum Contaminated Sites Guidance Document. For the purposes of cost savings, the removal and proper disposal of grossly contaminated media may prove more cost effective.)

The size of the area impacted should be determined in approximate square feet. If the area impacted includes non-horizontal surfaces (such as the sidewalls of an excavation), these areas should also be included in the estimation. Upon arriving at a total square feet impacted by the spill, a determination of the number of samples to be collected can be made.

The area impacted will be divided in approximate 10' x 10' squares. These squares will be laid out so that they included as much of the impacted area as is possible although it is recognized that many spills can not be neatly broken into this shape. In each of these squares a grab sample will be collected from a point that would bias the sample towards the worst concentration (i.e. that point where it would be suspected that the contamination would be at its highest concentration). This bias may be based on physical observation (i.e. media that is discolored or has a detectable odor of petroleum), geologic factors (i.e. sample collected from the most permeable layer on the sidewall of an excavation, perhaps the root zone or a sand lens where petroleum is most likely to migrate), and/or other site specific features noted by the facility/vessel.

The grab sample will be collected utilizing recommended USEPA and OEPA guidance and will incorporate media from the impacted area. For each sample point two samples will be collected. One of these will be used for field screening with either a photoionization meter, flame ionization detector, or any other field screening method that will allow the facility to determine relative concentrations of petroleum in grab samples collected. The other will be retained for possible laboratory submittal.

The following table indicates the recommended number of grab samples that will be submitted for laboratory analysis. In the case where only one field screened samples is recommended to be submitted for laboratory analysis and more than one sample has been collected (i.e. area affected is > 100 square feet and < 500 square feet), the samples will

be rank ordered by the concentration of petroleum detected by the field screening method. The sample containing the highest concentration of petroleum will be submitted for analysis.

When more that one sample is to be submitted for laboratory analysis (i.e. area affected is greater than 500 square feet), the following procedure is recommended. The sample grid sections will be grouped in groups of five. The grouping will consist of sample grids that are adjacent to each other either horizontally or diagonally. If the number of grid sections is not a multiple of five then the grouping will consist of five adjacent grid sections and then the remainder would be grouped together. For each of these groupings, grab samples would be collected and field screened from each grid. A separate rank ordering of field screening results for each group would be collected and field screened from each grid. A separate rank ordering of field screening results for each group would then be done and the highest concentration sample from each grouping would be submitted for laboratory analysis.

SIZE OF AREA IMPACTED IN SQUARE FEET (S.F.)	FIELD GRAB SAMPLES COLLECTED	FIELD SCREENED GRAB SAMPLES SUBMITTED FOR LABORATORY ANALYSIS
0-100 S.F.	1	1
101-200 S.F.	2	1
201-300 S.F.	3	1
301-400 S.F.	4	1
401-500 S.F.	5	1
501-600 S.F.	6	2
601-700 S.F.	7	2
701-800 S.F.	8	2
801-900 S.F.	9	2
901-1000 S.F.	10	2
CONTINUE WITH THIS PATTERN	**ONE FOR EVERY 100 SQUARE FEET**	**ONE FOR EVERY 500 SQUARE FEET**

Water Sampling

For those sites where ground water and/or surface water may be or have been impacted by a spill or release, it it is recommended that a site specific sampling protocol be developed and utilized. Fore ground water this protocol could incorporate sampling existing wells if installed at appropriate depths, installing and sampling monitoring wells, or sampling any nearby surface discharge point. If monitoring wells are determined to be necessary, geoprobe samples may be useful in selecting appropriate locations for the wells. All water samples should be submitted for laboratory analysis.

INTERPRETATION OF ANALYTICAL RESULTS

Upon receiving the analytical results for a particular 10' x 10' grid section, a comparison should be made to the previously calculated Petroleum Action Level. If any of the concentrations of the applicable criteria exceed the Petroleum Action grid section, it is recommended that the facility take the following steps:

1) Perform additional remediation measures on the affected media in that grid section. Field screening results should be consulted to determine if other grid sections in the grouping should also be remediated prior to resampling. **EXAMPLE:** The field screening results for five grid sections were 700, 680, 10, 5, and 6 ppm. The 700 ppm sample was submitted for laboratory analysis and found to exceed the Petroleum Action Level calculated for the site. Therefore, the facility may assume that the 680 ppm field screened sample may also exceed the Petroleum Action Level. The facility would then remediate two grid sections prior to resampling.

   Upon completion of remediation in that grid section (and/or other grid sections that field screened with a concentration similar to the highest concentration), samples would be collected again from all grid sections in that grouping, the samples would be field screened, and then ranked from highest to lowest concentration. The sample that contained the highest concentration based on field screening would then be submitted for laboratory analysis. This process would continue until analytical results are received that meet the calculated Petroleum Action Level for that site.

2) If either a ground water and/or surface water sample analysis indicates a concentration greater than the calculated Petroleum Action Level for the site, the facility/vessel will consult with the Ohio EPA On Scene Coordinator as to what actions well be taken.

APPENDIX C

OHIO EPA DISTRICT OFFICES

Ohio EPA
DISTRICT OFFICES

Central District Office
3232 Alum Creek Drive
Columbus, Ohio 43207-3461

Southeast District Office
2195 Front Street
Logan, Ohio 43138

Southwest District Office
401 East 5th Street
Dayton, Ohio 45402

Northeast District Office
2110 E. Aurora Road
Twinsburg, Ohio 44087

Northwest District Office
347 N. Dunbridge Road
Bowling Green, Ohio 43402

DISTRICT OFFICES:

CENTRAL DISTRICT OFFICE
3232 Alum Drive
Columbus, Ohio 43207

P.O. Box 1049
Columbus, Ohio 43216-1049

General Information	614-728-3778
Fax Number	614-728-3898
800 Number (Environmental Complaints Only)	1-800-728-3797
Acting Chief, Craig Butler	614-728-3778
District Administrator, Millicent Sims	614-728-3784
Air Pollution Control, Isaac Robinson	614-728-3802
Emergency & Remedial Response, Debbie Strayton	614-728-3819
Drinking & Ground Waters (Ground Water), Linnea Saukko	614-728-3860
Drinking & Ground Waters (Drinking Water),Scot Foltz	614-728-3860
Solid & Hazardous Waste Management, Steven Rath	614-728-3876
Surface Water (Water Pollution), William McCarthy	614-728-3837
Surface Water (Water Quality), Jeff Bohne	614-728-3837

NORTHEAST DISTRICT OFFICE
2110 East Aurora Road
Twinsburg, Ohio 44087

(calls placed to this district can be made on the
Centrex system by dialing 7-3005 plus 1 then
the last 3 digits of the telephone number only)

General Information	330-425-9171 or 330-963-1200
Fax Number	330-487-0769
800 Number (Environmental Complaints Only)	1-800-686-6330
Chief, William Skowronski	330-963-1130
Assistant Chief, Keith Riley	330-963-1111
District Administrator, Pat Billet	330-963-1262
Air Pollution Control, Dennis Bush	330-963-1233
Emergency & Remedial Response, Rod Beals	330-963-1218
Drinking & Ground Waters (Ground Water), Chris Khourey	330-963-1213
Drinking & Ground Waters (Drinking Water), Nancy Rice	330-963-1195
Solid & Hazardous Waste Management, Kurt Princic	330-963-1204
Surface Water (Water Pollution), John Januska	330-963-1100
Surface Water (Water Quality), Dave Stroud	330-963-1177

NORTHWEST DISTRICT OFFICE
347 North Dunbridge Road
Bowling Green, Ohio 43402

General Information	419-352-8461
Fax Number	419-352-8468
800 Number (Environmental Complaints Only)	1-800-686-6930
Chief, Edwin Hammett	419-373-3078
Assistant Chief, Jeff Steers	419-373-3079
District Administrator, Jim Ottarson	419-373-3077
Air Pollution Control, Gerald Rich	419-373-3124
Emergency & Remedial Response, Bruce Dunlavy	419-373-3036
Drinking & Ground Waters (Ground Water), Tim Fishbaugh	419-373-3094
Drinking & Ground Waters (Drinking Water), Douglas Scharp	419-373-3109
Solid & Hazardous Waste Management, Charles Hull	419-373-3076
Surface Water (Water Pollution), Allen Rupp	419-373-3000
Surface Water (Water Quality), Tom Balduf	419-373-3023

SOUTHEAST DISTRICT OFFICE
2195 Front Street
Logan, Ohio 43138

General Information	740-385-8501
Fax Number	740-385-6490
800 Number (Environmental Complaints Only)	1-800-686-7330
Chief, Steve Skinner	740-380-5295
Assistant Chief, Craig Butler	740-380-5202
District Administrator, Joe Anderson	740-380-5211
Air Pollution Control, Kay Gilmer	740-380-5257
Emergency & Remedial Response, Ken Dewey	740-380-5259
Drinking & Ground Waters (Ground Water), Mike Preston	740-380-5244
Drinking & Ground Waters (Drinking Water), Janet Barth	740-380-5250
Solid & Hazardous Waste Management, Dave Chenault	740-380-5292
Surface Water (Water Pollution), Dave Schuetz	740-380-5212
Surface Water (Water Quality), Joann Montgomery	740-380-5433

SOUTHWEST DISTRICT OFFICE
401 East Fifth Street
Dayton, Ohio 45402-2911

General Information	937-285-6357
Fax Number	937-285-6249
Fax Number	937-285-6404
800 Number (Environmental Complaints Only)	1-800-686-8930
Chief, Tom Winston	937-285-6016
Assistant Chief, Jeff Hines	937-285-6020
District Administrator, Joyce Hanauer	937-285-6026
Air Pollution Control, Jeff Hines	937-285-6020
Emergency & Remedial Response, Mike Starkey	937-285-6439
Drinking & Ground Waters (Ground Water), Rich Bendula	937-285-6452
Drinking & Ground Waters (Drinking Water), Jeff Davidson	937-285-6111
Solid & Hazardous Waste Management, Don Marshall	937-285-6076
Surface Water (Water Pollution), Jim Simpson	937-285-6033
Surface Water (Water Quality), Diana Zimmerman	937-285-6440

APPENDIX D

PETROLEUM ACTION LEVEL RISK CALCULATIONS

SFM/BUSTR
SOIL BTEX ACTION LEVEL JUSTIFICATION

Action levels for benzene, toluene, ethylbenzene, and xylene (BTEX) were derived through risk and soil-water partitioning calculations. Several assumptions were made based on professional judgment and experience. Often, conservative values and assumptions were selected to add factors of safety to the calculated end value. The documents used to calculate these action levels are listed here under references.

All toluene, ethylbenzene, and xylene (TEX) action levels are calculated on the assumption that groundwater ingestion by a child is the primary route of exposure. Action levels for soils were back calculated from documented toxicities, documented ground water consumption rates, and partitioning coefficients for groundwater to soil. BTEX action levels in category 1 match those values calculated by the RCRA technical section of the Ohio Environmental Protection Agency (OEPA) for petroleum contaminated soils (PCS) interim final policy. These PCS values in category 1 were derived assuming a hazard quotient of .33 or one/third. The hazard quotient (HQ) is the ration of a single substance exposure level over a specified time period to reference dose for that substance derived from a similar exposure period. When we assume higher values of the HQ, up to 1, we increase our intake of a particular compound and approach a known adverse health effect. The value of HQ was changed to 1 for TEX calculations in category 4. After this calculation was completed, the remaining categories were averaged in, down to the PCS values in category 1. TEX values vary from higher values on the left of the chart to lower values on the right. This reflects the decreased risk of exposure in areas which score higher, or to the left side of the chart. Being that the primary exposure pathway is assumed to be ingestion of groundwater, very large factors of safety exist for areas which are not truly sensitive (i.e. areas without direct groundwater pathway). Thus, the TEX action levels are highly conservative category 4.

One of the underlying assumptions in the Site Feature Scoring System is that the primary route of exposure to contaminants from a petroleum underground storage tank (UST) release would vary according to the site's location and proximity to sensitive areas; or areas where water is obtained from a local source (i.e. groundwater or surface water body). If a site is located away from areas that would be considered sensitive, where the permeability of the substratum is low, where the water table is low and where few man made or natural pathways of contaminant migration exist, the primary route of exposure would most likely be ingestion of soils. This assumes that an individual would excavate to the contamination and be in contact with it for some length of time. Other routes of exposure in this scenario that should be taken into account are dermal contact and inhalation of the contaminants. By removing the groundwater pathway, we can calculate a reasonable action level for benzene. This action level will in no way have the same factors of safety built in as do the TEX action levels in category 4, yet we can still take a conservative approach to the assumptions. For instance, we will assume that soil ingestion is the primary route of exposure to a child 365 days a year, for five years, who ingests soils from the contaminated site alone during those five years. In an industrialized or commercial area, the exposed population would take a more opposite profile. The action calculated value for an action level for benzene is .793 mg/kg or ppm. To be conservative, this value was rounded down to .600 mg/kg or ppm and entered into category 4. Thus, the benzene values range from .600 ppm on the left in category 4 to .006 ppm in category 1, where ingestion of groundwater was assumed to be the primary route. The benzene action levels between categories 1 and 4 were simply interpolated.

TPH SOIL AND GROUNDWATER ACTION LEVEL JUSTIFICATION

Total petroleum hydrocarbons (TPH) are a varied mixture of many compounds. To assess the toxicity of a particular petroleum product alone would be nearly impossible. If we can identify the most toxic components of a particular product, we can produce some conservative values or action levels. The amount of BTEX in a given petroleum product is of concern due to the toxicity associated with it. The amount of BTEX in a gasoline or diesel can significantly vary. At most, gasoline can be referenced to contain 36% BTEX. Diesel contains only a small portion of BTEX, only 2 % at most. The average BTEX component of gasoline of all the references listed below is 20.26%. Using the percentage of BTEX in gasoline and diesel and assuming that the product in question consists solely of petroleum hydrocarbon, a conservative action level for TPH may be back calculated using the following equation:

$$\% \text{ BTEX in product} = \frac{\text{BTEX in the soil (ppm)}}{\text{TPH in the soil (ppm)}}$$

Since we are attempting to create an action level that applies for gasoline, diesel, and other similar petroleum products in a non-sensitive area, we can average the highest concentration of these two products together and derive a value for the % of BTEX in product. This average value would allow more reasonable end action levels for our non-sensitive area. The highest value of each product is selected to add factors of safety to our calculated number.

2% ÷ 36% / 2 = 19%
diesel ÷ gasoline / 2 = average

Note that this value of 19% is only 1% less than the average BTEX component in gasoline noted to be 20.26% above. Thus, at sites which are diesel specific, the action level would still be very conservative. This assumes that, in general, the toxicity of hydrocarbons decrease as the molecules become non-aromatic and more straight-chained. Even when considering the presence of polynuclear aromatic hydrocarbons (PAH), the end action level should be conservatively based on the known toxicity of BTEX. This is due primarily to the assumption that the TPH portion of the contaminated soil is as toxic as the BTEX portion. Another factor entering the calculations which make the end action level conservative is the fact that the % BTEX in the soil has already been calculated on a conservative basis.

The soil TPH action level for category 1 assumes a total BTEX in product of 36% in order to add very high factors of safety. TPH in category 4, being considered non-sensitive, was calculated using a total BTEX in product of 19%. The calculated value for TPH in category 4 is 607 mg/kg or ppm. This value was rounded down to 600 ppm to add even more factors of safety. The same calculation method used for category 4 was used for categories 2 and 3. Ground water values for TPH were calculated using a total BTEX in the product of 36%, thus being highly conservative.

BUSTR
Petroleum Underground Storage Tank Site Feature Scoring System

SITE FEATURES	COLUMN A		COLUMN B		COLUMN C		COLUMN D	
	SCORE 20 IF TRUE	SCORE	SCORE 15 IF TRUE	SCORE	SCORE 10 IF TRUE	SCORE	SCORE 5 IF TRUE	SCORE
1.Distance of UST System from closest drinking water supply well or intake currently in use.	> 1000 ft. away		301-1000 ft. away		< 301 ft. away		Inside of designated sensitive area	
2. Average depth to ground water.	> 50 ft.		31-50 ft.		15-30 ft. or unknown		< 15 ft.	
3. Predominant soil type of substratum	Clay or shale		Silt or clayey sands or fine sandstone					
4. Natural and/or manmade conduits or receptors	< 8		8-10		11-13		> 13	
SUBTOTAL:								

TOTAL SCORE _____

SFSS Action Levels (ppm)

	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4
TOTAL SCORE	<31	31-50	51-70	>71
Soil BTEX	.005/4/6/28	.170/7/10/47	.335/9/14/67	.005/12/18/85
Ground water BTEX	.005/1/.700/10	.005/1/.700/10	.005/1/.700/10	.005/1/.700/10
Soil TPH (gasoline)	105	300	450	600
Soil TPH (others)	380	642	904	1156

TOTAL PETROLEUM HYDROCARBON (SOIL)

Category 1:

.36 = 38.006 ppm BTEX / TPH IN SOIL (PPM)
105.57 ppm = TPH IN SOIL

Category 2:

.19 = 64.2 ppm BTEX / TPH IN SOIL (PPM)
337.8 ppm = TPH IN SOIL

Category 3:

.19 = 90.4 ppm BTEX / TPH IN SOIL (PPM)
475.8 ppm = TPH IN SOIL

Category 4:

.19 = 115.6 ppm BTEX / TPH IN SOIL (PPM)
608.4 ppm = TPH IN SOIL

TOTAL PETROLEUM HYDROCARBONS (SOIL)

ANALYTICAL GROUP 1

Category 1:

.36 = 38.006 ppm BTEX / TPH IN SOIL (PPM)
105.57 ppm = TPH IN SOIL

Category 2:

.19 = 64.2 ppm BTEX / TPH IN SOIL (PPM)
337.8 ppm = TPH IN SOIL

Category 3:

.19 = 90.4 ppm BTEX / TPH IN SOIL (PPM)
475.8 ppm = TPH IN SOIL

Category 4:

.19 = 115.6 ppm BTEX / TPH IN SOIL (PPM)
608.4 ppm = TPH IN SOIL

ANALYTICAL GROUPS 2, 3, &4

Based on an average BTEX component in Analytical groups 2, 3, & 4 of 2 to 3% plus taking into account poly nuclear aromatic component of 6%.

Category 1:

.10 = 38.006 ppm BTEX / TPH IN SOIL (PPM)
380.0 ppm = TPH IN SOIL

Category 2:

.10 = 64.2 ppm BTEX / TPH IN SOIL (PPM)
642.0 ppm = TPH IN SOIL

Category 3:

.10 = 90.4 ppm BTEX / TPH IN SOIL (PPM)
904.0 = TPH IN SOIL

Category 4:

.10 = 115.6 ppm BTEX / TPH IN SOIL (PPM)
1156.0 ppm = TPH IN SOIL

SFM/BUSTR Calculation for Soil Action Levels

I	=	Intake			
AT	=	Average Time	CF	=	Conversion Factor
BW	=	Body Weight	FX	=	Fraction Ingested from Contaminated Source
ED	=	Exposure Duration			
EF	=	Exposure Frequency	SA	=	Skin Surface Area Available for Contact
IR	=	Intake/Contract Rate			
SFo	=	Slope Factor	AF	=	Soil to Skin Adherence Factor
CS	=	Concentration in the soil			
CW	=	Concentration in the water	ABS	=	Absorption Factor
HQ	=	Hazard Quotient			
RFDo	=	Referenced Oral Dose			
Kd	=	Partitioning Coefficient (soil to groundwater)			
K(oc)	=	organic carbon Partitioning Coefficient			
(oc)	=	organic carbon (assume .01, Ohio farm soils range from 1-4%)			

Developed for Category 4 (right side of table)

BENZENE

Supporting Risk Calculation for Carcinogenic Effects (Cancer-Benzene 6 ppm Child)

1. INGESTION OF SOIL:

$$\text{Intake (mg/kg-d)} = \frac{CS \times IR \times CF \times FX \times EF \times ED}{BW \times AT}$$

I = CS x 8.9E-7

Benzene = .006 X 8.9E-7 = 5.3E-9

Risk = 5.3E-9 x 2.9E-2 = 2E-10

2. DERMAL CONTACT WITH SOIL

$$\text{Absorbed dose (mg/kg-d)} = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

$$\text{Absorbed dose - } \frac{CS \times IE\text{-}6 \times 3160 \times 2.11 \times 25 \times 365\ d/yr \times 5yr}{16 \times 25550}$$

Benzene = .006 x 7.44E-6 = 4.46E-8

Risk = 4.46E-8 x 3.2E-2 = 1.42E-9

Adjustment of an administered dose (e.g. intake) to an absorbed dose:

SFd = 2.9E-2/.9 = 3.2E-2

3. INHALATION OF AIRBORNE CHEMICALS:

$$\text{Intake (mg/kg-d)} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

$$= \frac{CA \times .83 \times 24 \times 365\ d/yr \times 5 \times yr}{16 \times 25550}$$

Benzene = CA x 8.9E-2

= 7.23E-6 x 8.9E-2 = 6.4E-7

Risk = 6.4E-7 x 2.9E-2 = 1.9E-8

TOTAL RISK = 2.06E-8

Carcinogen (child)

Back-calculate for health based action level for soil ingestion (no pathway in groundwater)

Intake = CS x 8.9E-7

Risk = Intake x SFo

where, HQ or Risk = 2.062E-8 and SFo = 2.9E-2

Intake = 2.062E-8 / 2.9E-2 = 7.1103E-7

So, CS = 7.1103E-7 / 8.97E-7 = 7.92E-1 mg/l

CS = .793 ppm

TOLUENE, ETHYLBENZENE, XYLENE

Non-carcinogen (child)

Back-calculate for health based action level for ingestion of groundwater as primary pathway. Assume a hazard quotient, HQ, of one.

TOLUENE

Exposure = CW x .0625

HQ = Exposure / RFDo

where HQ = 1 and RFDo = 3E-1 or .3

so, Exposure = 1 x.3 = .3

so, CW = .3 / .0625 = 4.8 mg/l

CS = CW x KD, where KD = K(oc) x (oc)

so, CS = CW x (K(oc) x (oc))

CS = (4.8) x (250 x .01) = 12 ppm

REFERENCES

"California Leaking Underground Fuel Tank (LUFT) Manual" State of California Leaking Underground Fuel Tank Task Force, May, 1988

"Determining Soil Response Action Levels Based on Potential Contaminant Migration to Groundwater: A compendium of examples" (EPA/540/2-89/057)

"Development of Standard, Pure-Compound Base Gasoline Mixture for use as a Reference in Field and Laboratory Experiments" by David K. Kreamer and Klaus J. Stetenbach GWMR, 1990

"Risk Assessment Guidance for Superfund" (EPA/540/1-89/002)

"Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors", Interim Final, 3-25-91, OSWER: 9285.6-03

Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part B, Development of Risk-based Preliminary Remediation Goals", Interim, 9-91, OSWER: 9285.7-01B

"The Ohio Environmental Protection Agency Petroleum Contaminated Soil (PCS) Policy", pp. 01-03-2000, Interim Final, issued 3-25-91

APPENDIX E

FIELD SAMPLING GUIDANCE FOR PETROLEUM CONTAMINATED SITE CLEANUP DURING EMERGENCY RESPONSE OPERATIONS

A QUICK OVERVIEW

INTRODUCTION

1.) The Field Sampling Guidance is to be used in conjunction with the **Petroleum Contaminated Sites Guidance Document for Emergency Response Actions**.

2.) The Field Sampling Guidance was developed for use in emergency response actions. The majority of these actions historically have involved releases of petroleum from vehicular accidents and/or home heating oil tanks not regulated by BUSTR and have been limited in volume to less than 300 gallons.

3.) The sampling protocol utilizes a biased sampling method derived from practical field experience. The sampling protocol is not derived from a statistically valid sampling scheme and it may not adequately characterize a site for a detailed risk evaluation and/or assessment. However, if properly applied, the sampling protocol should insure that the majority of site soils contain concentrations of petroleum less than or equal to the recommended cleanup goals of the petroleum contaminated sites guidance document for emergency response operations.

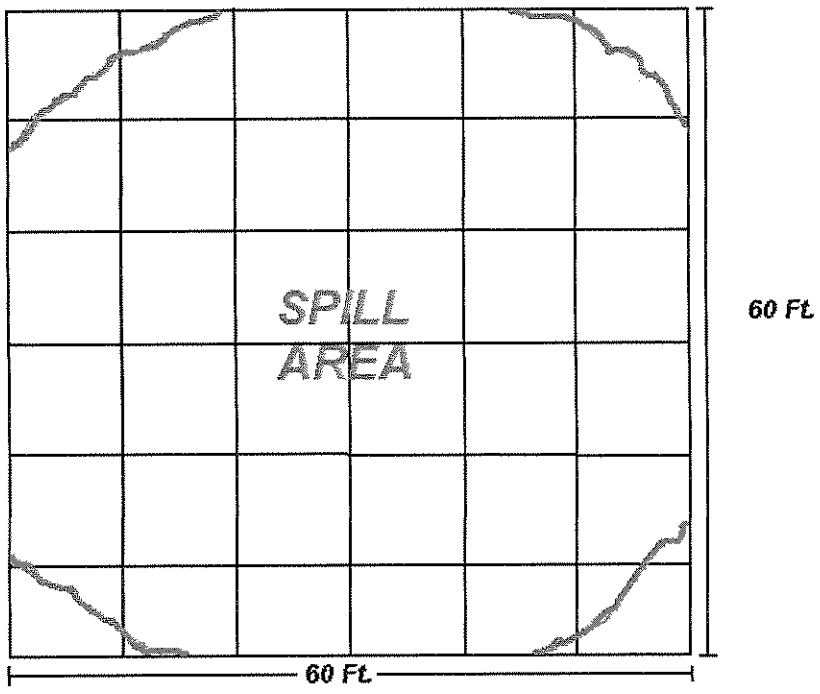
4.) The field sampling guidance does not include guidance on the sampling of groundwaters or surface waters. In cases where these media are impacted a site specific sampling plan is needed.

SAMPLING PROTOCOL

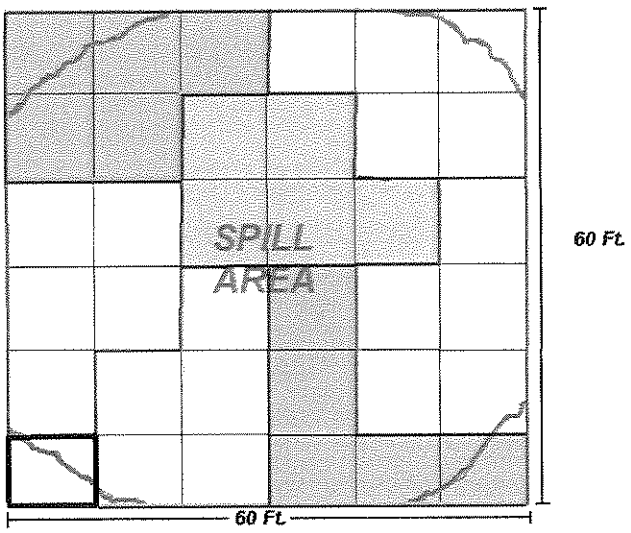
1.) Determine the size of the area impacted by the release. This determination may be based on direct physical observation and/or field screening.

2.) Measure and divide the area so that the entire area is overlain by grid sections which are ten foot by ten foot square.

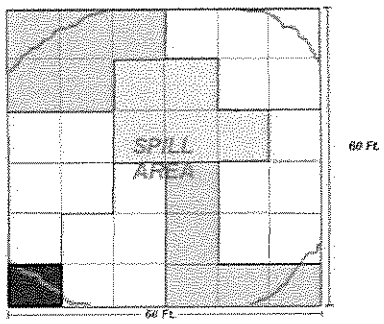
For example this spill area has been overlain by 36 ten foot by ten foot grids. The total surface area impacted by the spill would be estimated at 3600 feet.



3.) Group adjacent grid sections into groupings of five. Only grid sections which are adjacent either horizontally or diagonally may be grouped together.



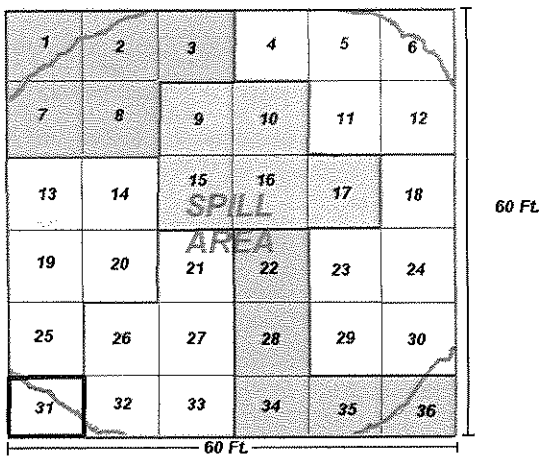
4.) If the total number of grid sections is not a multiple of five then there will be grid sections left over after the initial grouping. This/these remaining grid section or sections would then be grouped together and considered a sample grouping. If the total number of grid sections is less than five (spill area is less than 500 square feet) then these sections would be grouped together and considered a sample group.



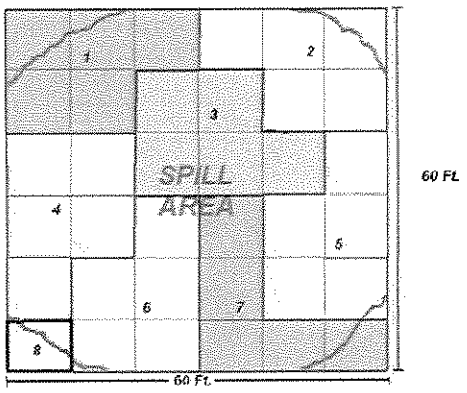
5.) Within each grid section (the ten foot by ten foot area) of a sample grouping (five grid sections grouped together), a sample biased towards the highest potential petroleum concentration present would be collected. These samples would be field screened and then rank ordered from highest to lowest concentration.

FOR EXAMPLE, THE FOLLOWING FIELD SCREENING CONCENTRATIONS WERE OBTAINED FOR GRID SECTIONS 1,2,3,7, AND 8.

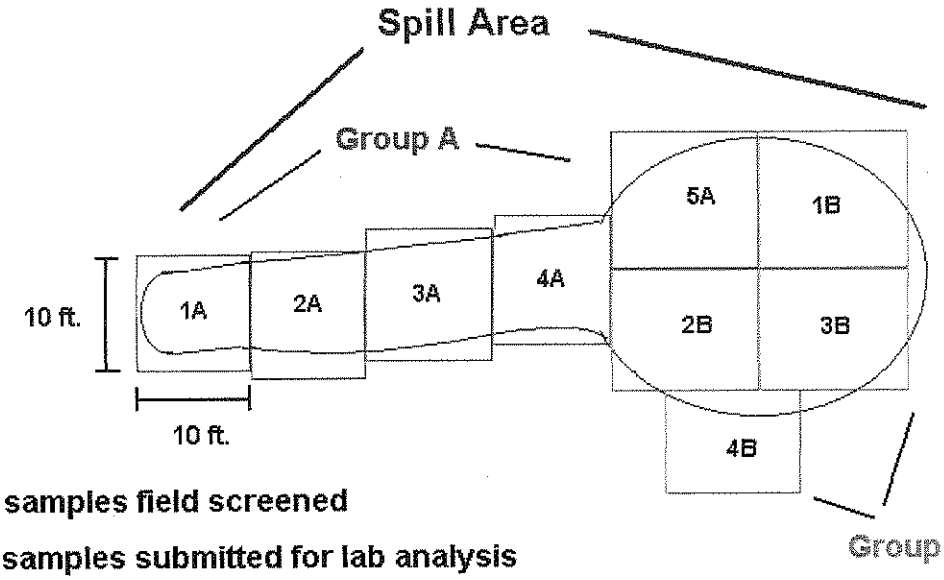
GRID SECTION	CONCENTRATION
1	10 PPM
2	12 PPM
3	9 PPM
7	14 PPM
8	200 PPM



6.) The sample that contained the highest concentrations based on the field screening for each sample grouping would be submitted for laboratory analysis. In the example above the grid sample collected in grid #8 would be submitted for laboratory analysis for sample grouping #1. For the entire spill area there would be 36 field samples screened and there would be eight samples submitted to the laboratory.

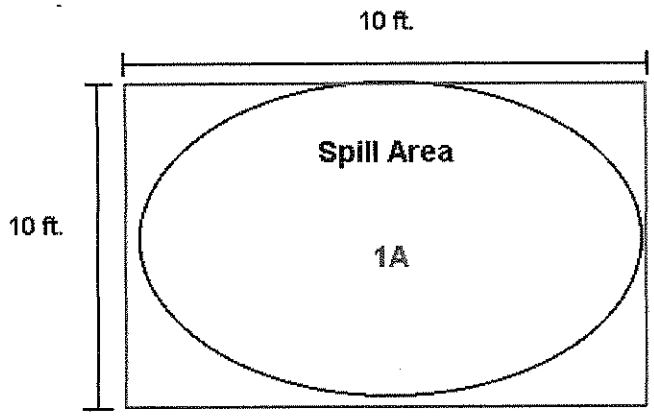


EXAMPLES OF VARIOUS SHAPED SPILL AREAS AND GRIDDING TECHNIQUE



** 9 samples field screened

** 2 samples submitted for lab analysis

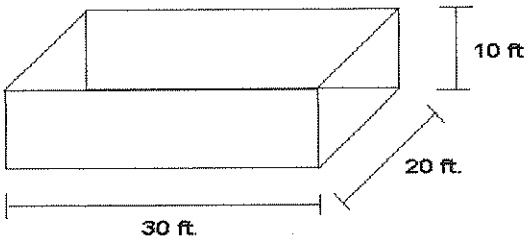


** 1 sample field screened

** 1 sample submitted for lab analysis

EXAMPLES OF VARIOUS SHAPED SPILL AREAS AND GRIDDING TECHNIQUE

Underground Storage Tank Excavation

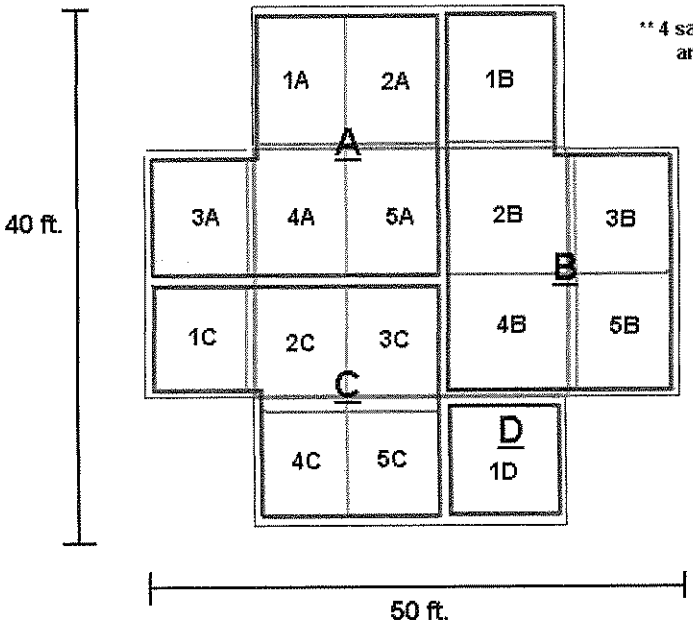


-Tank Excavation

- Grid Section Groups

** 16 samples field screened

** 4 samples submitted for lab analysis



INTERPRETATION OF ANALYTICAL RESULTS

Upon receiving the analytical results for a particular 10' x 10' grid section a comparison should be made to the previously calculated petroleum action level. If any of the concentrations of the applicable criteria exceed the petroleum action level for that grid section it is recommended that the facility take the following steps:

1.) Perform additional remediation measures on the affected media in that grid section. Field screening results should be consulted to determine if other grid sections in the sample grouping should also be remediated prior to sampling.

Example: the field screening results for five grid sections were 700, 680, 10, 5, and 6 ppm. The 700 ppm sample was submitted for laboratory analysis and found to exceed the petroleum action level calculated for the site. Therefore, the facility may assume that the 680 ppm field screened sample may also exceed the petroleum action level. The facility would then remediate two grid sections prior to resampling.

Upon completion of remediation in that grid section (and/or other grid sections which field screened with a concentration similar to the highest concentration grid), samples would be collected again from all grid sections in that sample grouping, the samples would be field screened and ranked again. The highest concentration sample would be submitted for laboratory analysis. This process would continue until analytical results are received which meet the petroleum action level for the site.

2.) If either a ground water and/or surface water sample analysis indicates a concentration greater than the calculated petroleum action level for the site, the facility/vessel shall consult with the appropriate Ohio EPA On Scene Coordinator as to what actions shall be taken.

TEST METHODS

Soil and water samples collected at the site should be analyzed using the following applicable U.S. EPA test methods:

Contaminant	Analytical Method for Soil	Analytical Method for Water
Benzene	SW-846, Method 8260B or 8021B	US EPA Test Method 524.2**
Toluene	SW-846, Method 8260B or 8021B	US EPA Test Method 524.2**
Ethyl benzene	SW-846, Method 8260B or 8021B	US EPA Test Method 524.2**
Total Xylenes	SW-846, Method 8260B or 8021B	US EPA Test Method 524.2**
TPH for Gasoline Range	SW-846, Method 8015B	Not applicable
TPH for Diesel Range	SW-846, Method 8015B	Not applicable

** U.S. EPA Test Method 524.2 or 502.2 should be utilized in those situations where the Ohio

Ohio EPA

Central District Office
3232 Alum Creek Drive * Columbus, Ohio 43207-3417 * 614-728-3778

INTEROFFICE MEMORANDUM

TO: David O'Toole through Manny Ayeni, DERR-CDO

FROM: Michael Bondoc through Linnea Saukko, DDAGW-CDO

DATE: December 31, 1997

SUBJECT: Emery Transportation, I-71 and Jenks Road Spill Site: Results of Ohio EPA Ground Water Sampling, October 28, 1997 (Fayette County) MSL #124-1538

Introduction

The Ohio EPA Division of Emergency and Remedial Response, Central District Office (DERR, CDO) requested that the Division of Drinking and Ground Waters (DDAGW, CDO) conduct ground water sampling at the site of an Emery Transportation (Emery) fuel tanker truck spill. On October 28, 1997 ground water samples were collected by Ohio EPA from the four extraction wells and the surface water discharge line (post-treatment) at the site. This memo presents the results of the October sampling event.

Site Geology/Hydrogeology

The Emery spill site is located in the northwest corner of Jasper Township in west-central Fayette County. The site is located on Wisconsin ground moraine which is characterized by glacial till consisting of clay, silt, sand and some coarser materials. According to the *Ground Water Resources of Fayette County* map (Schmidt, 1990), glacial deposits in the vicinity of the site range in thickness from 30 to 95 feet. The principal aquifer for the area is the Silurian, Niagara Limestone which underlies the glacial till and may yield as much as 100 gallons per minute. However, sand and gravel deposits within the till yield sufficient quantities for domestic use and many shallow domestic wells are developed in the glacial materials.

Following the fuel spill, trenching was completed at the site to a depth of approximately eight feet below ground surface. During trenching, the DERR Emergency Response on-scene coordinator reported fine dessication cracks and numerous animal burrows present in the surficial soils. The burrows and dessication cracks appeared to be the primary pathway for migration of the spilled fuel. Based on measurements made by Ohio EPA on October 28, 1997, the depth to ground water at the site is approximately five feet below ground surface.

Background

The gasoline spill occurred on September 17, 1995 along southbound Interstate 71, at the southwest corner of the intersection of I-71 and the Jenks Road (County Hwy 38) overpass in Fayette County. The location of the site is shown on Figure 1. Emergency response actions following the spill included free-product recovery, pumping of contaminated ground water using a vacuum truck, and excavation and disposal of contaminated soil. A french drain system was constructed to contain and recover spilled fuel and allow recovery of contaminated ground water. On September 14, 1996, approximately one year after

ATTACHMENT 3

the spill, a ground water recovery and treatment system was placed into service at the site. Sump pumps extract water from the french drain through four 12-inch diameter extraction wells (Sump #1, #2, #3, and #4). The ground water is pumped through a truck-mounted treatment system consisting of an oil/water separator, oil adsorbing media and granular activated carbon (GAC). A permit to install (PTI) for the system and NPDES permit were obtained by Emery from Ohio EPA. Treated ground water is discharged into a culvert under Jenks Road which leads to a drainage swale parallel to I-71. A site map is shown on Figure 2.

According to a December 16, 1997 report (Dames & Moore, 1997), approximately 781,100 gallons of ground water had been treated from startup in September 1996 through December 9, 1997. Recovery of approximately 200 gallons of free product (as of July 1997) through the oil/water separator was also reported. Monthly NPDES sampling of the treated discharge water is conducted by FeeCorp on behalf of Emery. Samples are analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX), polynuclear aromatic hydrocarbons (PAHs), oil and grease, and lead. In addition, periodic sampling of treatment system influent for BTEX analysis has previously been conducted. Influent samples were collected from the holding tank, following the oil/water separator and prior to treatment. Monthly sampling of the extraction wells has been conducted by Dames & Moore on behalf of Emery since August 26, 1997. Samples are collected from each extraction well and analyzed for BTEX. Results of the most recent ground water laboratory analyses submitted by Emery are shown in Table 1.

Table 1. Ground Water Sampling Data Summary
Emery Transportation I-71 Spill Site

Sample Location	Date Sampled	Benzene µg/l	Toluene µg/l	Ethylbenzene µg/l	Xylenes (total) µg/l
Influent *	7/30/97	552	160	< 100	330
Sump #1	12/9/97	< 1	< 1	< 1	< 1
Sump #2	12/9/97	3,780	< 1	< 1	< 1
Sump #3	12/9/97	666	865	27	736
Sump #4	12/9/97	851	99	22	115
Effluent**	11/11/97	< 2	< 2	< 2	< 2

*Composite sample from pre-treatment holding tank. **NPDES sample collected at surface water discharge.

Cleanup levels for the site were established in correspondence from Mike Dalton (DERR, CDO) to Emery, dated December 9, 1996. The cleanup goal is the drinking water maximum contaminant level (MCL) of 5 µg/l for benzene. Based on the most recent sampling event, benzene concentrations in ground water continue to exceed the MCL.

Ohio EPA Ground Water Sampling Results

Ground water sampling at the Emery site was conducted by David O'Toole (DERR, CDO) and Michael Bondoc (DDAGW, CDO) on October 28. 1997. Prior to sample collection, static water levels and total well depths were measured in each of the extraction wells (see Table 2). Since the wells are part of an active pump and treat system and are continually cycling on and off they were not purged prior to sampling. Sump #3 and Sump #4 went through several pumping cycles during this sampling event, but were shut off and allowed to recover for one hour prior to sampling. Pumps in Sump #1 and Sump #2 were not running during the sampling event. A strong fuel odor was noted in Sump #3 and a light sheen was observed on the water surface in Sump #1.

Table 2. Extraction Well Data
Emery Transportation I-71 Spill Site

Well	Date	Water Level*	Total Depth*
Sump #1	10/28/97	6.05 ft.	10.0 ft.
Sump #2	10/28/97	5.67 ft.	8.45 ft.
Sump #3**	10/28/97	9.70 ft.	10.45 ft.
Sump #4**	10/28/97	9.65 ft.	10.20 ft.

*Measurements made from Top of Casing
**Sump pumps were shut off and wells allowed to recover for 1 hour before taking measurements.

Samples were collected from the extraction wells using dedicated, Teflon® bailers. A section of new nylon cord was used for each bailer. A new pair of disposable latex sampling gloves was worn during collection of each sample. Samples were collected in 40-ml VOC sample vials containing hydrochloric acid (HCl) preservative. To minimize agitation and allow collection of zero-headspace samples, water was slowly poured from the bailer into the vials until an inverted meniscus was formed, then Teflon®-lined caps were placed tightly on the containers. Following sample collection, sample vials were immediately placed in a cooler with ice packs for preservation at 4°C. A chain-of-custody form was completed to track sample handling and shipment. Samples were sealed in a cooler and shipped to Quanterra Environmental Services, Inc. (Quanterra) for laboratory analysis on October 29, 1997. All water samples collected were analyzed for BTEX by Quanterra using EPA SW846, Method 8020A. Results of laboratory analysis are presented in Table 3.

Table 3. Ground Water Sampling Data Summary
Emery Transportation I-71 Spill Site, October 28, 1997

Sample Location	Benzene µg/l	Toluene µg/l	Ethylbenzene µg/l	Xylenes (total) µg/l
Sump #1	740	140	< 20	220
Sump #2	480	500	42	360
Sump #3	1400	1300	< 50	1200
Sump #3 (dup)*	1500	1800	< 50	1300
Sump #4	270	43	< 20	32
SW-01**	< 1.0	< 1.0	< 1.0	< 1.0
Trip blank	< 1.0	< 1.0	< 1.0	< 1.0

*dup = Field Duplicate sample. **Surface Water discharge sample(post-treatment).

One or more of the BTEX constituents was detected in each sample collected from the four extraction wells. Benzene was detected above the cleanup goal (5 µg/l) in the samples from all wells. Concentrations ranged from 270 µg/l (Sump #4) to 1400 µg/l (Sump #3). Toluene and xylenes were also detected in all the wells. Toluene concentrations ranged from 43 µg/l (Sump #4) to 1300 µg/l (Sump #3) and xylenes ranged from 32 µg/l (Sump #4) to 1200 µg/l (Sump #3). Ethylbenzene was detected at a concentration of 42 µg/l in Sump #2, but was below detection limits (< 20 µg/l or < 50 µg/l) in the remaining wells. BTEX constituents were not detected (< 1.0 µg/l) in the post-treatment sample or trip blank.

Conclusions and Recommendations

Sampling results indicate significant levels of BTEX contamination in ground water within the spill site. Benzene was detected above the cleanup goal (MCL) in all wells during Ohio EPA's October sampling event. Since there is no ground water monitoring system in place at the site to monitor potential migration of contamination, the ground water flow direction and the current extent of contamination are not known. Sampling of the treated effluent showed BTEX concentrations below the detection limit indicating that the current treatment system appears to be effectively treating the contaminated ground water.

Based on a review of DERR, CDO files, there was apparently no active ground water remediation at the Emery site from the time that pumping with a vacuum truck ceased to the time the current recovery system started operating (nearly one year). Although the french drain may have effectively contained free-product, DDAGW is concerned that contaminated ground water may have migrated beyond the original spill area. Additional investigation is recommended to delineate the extent of ground water contamination and determine if the current recovery wells adequately capture the contaminant plume.

As of August 1997, Emery modified the site sampling protocol for the ground water recovery system and began sampling each extraction well. DDAGW recommends that Emery continue sampling each of the four sumps individually instead of collecting a composite sample from the holding tank. This will provide data more representative of the actual conditions in the aquifer.

Since Emery has modified the sampling protocol, DDAGW recommends that the new sampling procedures followed by sampling personnel be documented in a field sampling plan. In the plan Emery should provide detailed information on sampling protocols including, but not limited to, well purging procedures, sampling methods, field measurements, equipment used, types of sample containers, decontamination procedures, sample preservation, and chain-of-custody procedures. DDAGW's *Technical Guidance Manual for Hydrogeologic Investigations and Ground Water Monitoring* (Ohio EPA, 1995) may be consulted for guidance on preparation of the plan. A copy of the plan should be submitted to Ohio EPA.

cc: Jeff Patzke, DDAGW-CO
DDAGW-CDO File

DDAGW Work ID #091097015010

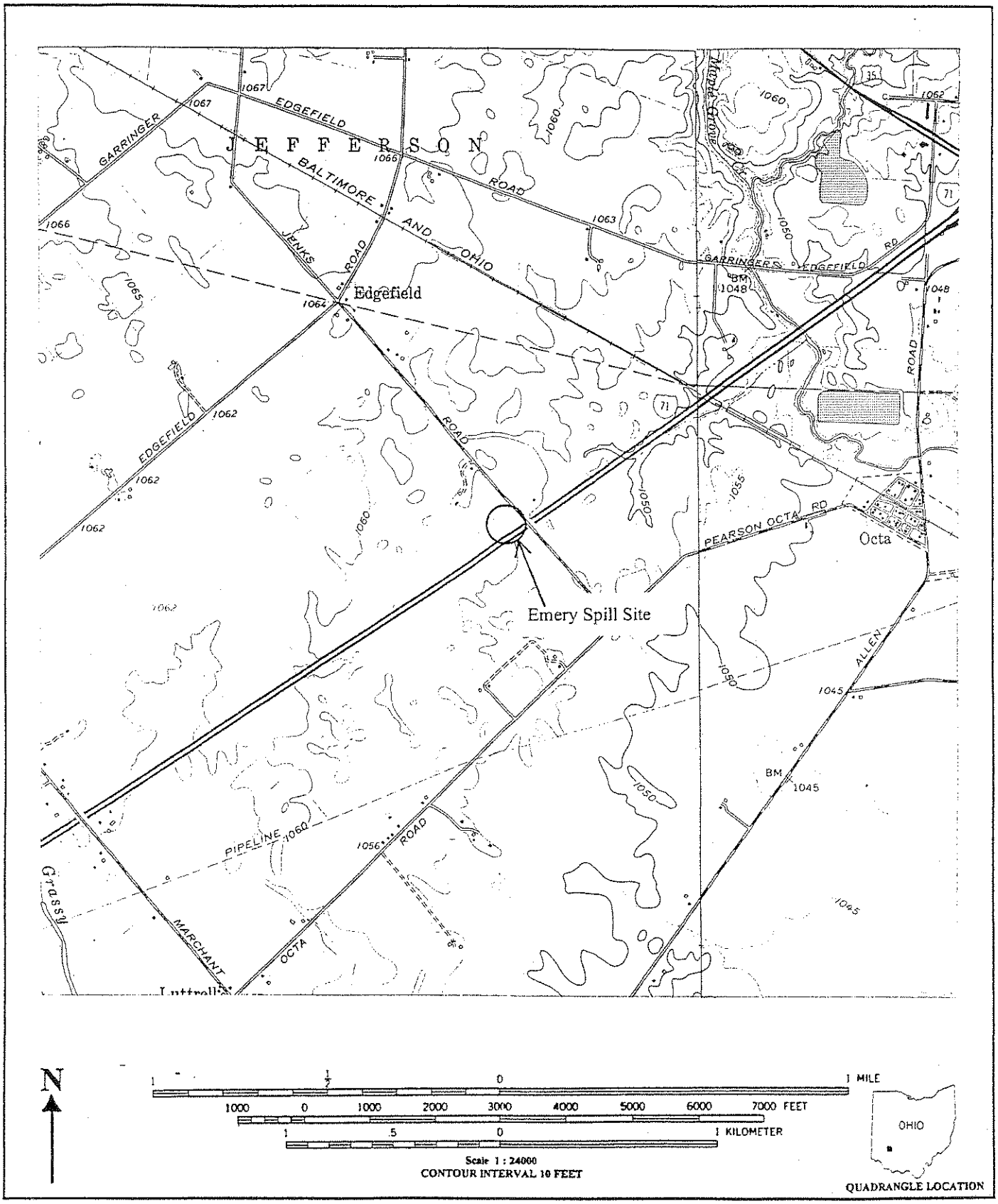


Figure 1. Site Location Map, Emery Tanker Truck Spill Site

(From Bowersville and Milledgeville Quadrangles, USGS 7.5 Minute Series, Topographic)

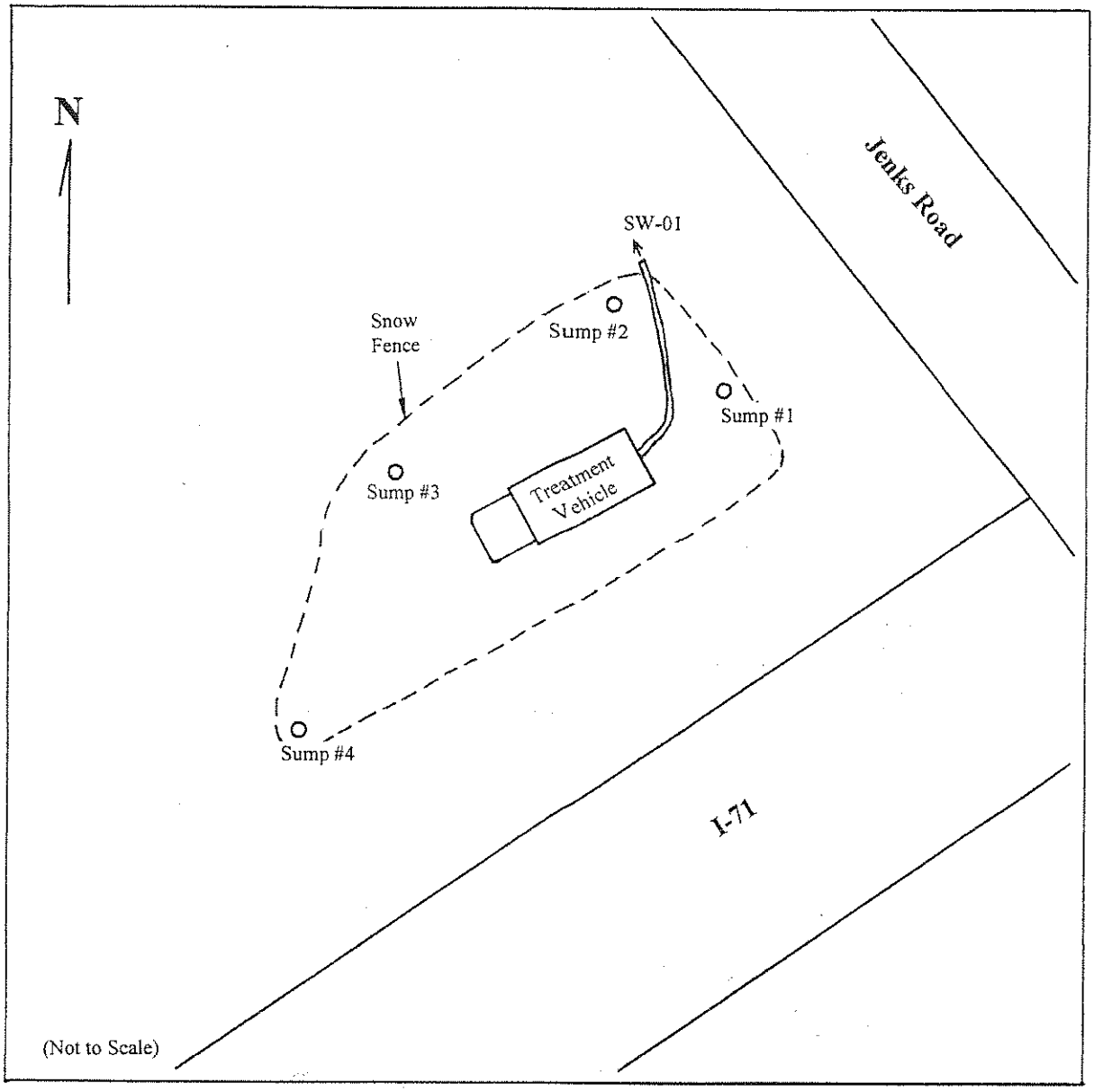


Figure 2. Emery Tanker Truck Spill Site

OhioEPA

Central District Office

3232 Alum Creek Drive
Columbus, Ohio 43207-3417

Tel: 614-728-3778
Fax: 614-728-3898

INTEROFFICE MEMORANDUM

TO: David O'Toole through Ken Schultz, DERR-CDO

FROM: Michael Bondoc through Linnea Saukko, DDAGW-CDO

DATE: February 15, 2002

SUBJECT: *November 7, 2001 Ground Water Sampling Results, Emery Transportation, Inc. I-71 / Jenks Road Spill Site.* ID #124-1538 (Fayette County)

Introduction

The Ohio EPA Division of Emergency and Remedial Response, Central District Office (DERR, CDO) requested that the Division of Drinking and Ground Waters (DDAGW, CDO) assist in the collection of ground water grab samples at an Emery Transportation (Emery) fuel tanker truck spill site. The site is located on southbound Interstate 71 at the Jenks Road overpass near mile marker 64.5. Sampling was conducted on November 7, 2001. Results of Laboratory analyses completed by DLZ Laboratories, Inc. were received on November 20, 2001. The purpose of this review is to evaluate the laboratory data and provide recommendations on any additional investigation and/or remedial action that may be appropriate for the site.

Ground Water Sampling

Sampling of ground water from four ground water recovery sumps and one ground water monitoring well at the Emery Transportation spill site was conducted by Ohio EPA personnel on November 7, 2001. Grab samples were collected from Sump #1, #2, #3, and #4 and from monitoring well B6B using dedicated bailers. A 1-inch monitoring well (B6B) was sampled using a small diameter teflon bailer and the sumps were sampled using standard polyethylene bailers. A site diagram showing the well locations is shown on Figure 1. Prior to sampling, water levels in the sumps and well were measured using an electronic water level meter which was decontaminated before each measurement. Water level measurements were also made in 6 piezometers (B1, B2B, B3B, B13B, and B12D) at the site.

Samples collected from each location were carefully poured into 40 milliliter vials to ensure that no air headspace was present in the vials. A duplicate sample was collected from Sump #3. Samples were preserved using a hydrochloric acid solution and, upon collection, all samples were immediately placed in a cooler with ice packs. Samples were delivered under strict chain-of-custody protocols to DLZ Laboratories, Inc. in Columbus, Ohio for analysis. Ohio EPA requested analyses for benzene, toluene, ethylbenzene, p,m-xylene, and o-xylene (or BTEX) using USEPA Method 8260B. Results of the ground water laboratory analyses are presented in Table 1.

ATTACHMENT 4

Table 1. November 7, 2001 Ground Water Sampling Data Summary
Emery Transportation I-71 Spill Site

Parameter:	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)
Sump #1	ND	ND	ND	ND
Sump #2	ND	ND	ND	ND
Sump #3	**37.7**	ND	**1.2**	**6.2**
Sump #3 (dup)	**35.8**	ND	**1.2**	**7.6**
Sump #4	ND	ND	ND	ND
B6B (1" Well)	**3650**	**1300**	**926**	**6410**

ND: not detected
All results are in micrograms per liter (µg/L)

Cleanup levels for the Emery Transportation site were previously established in correspondence from Mike Dalton (DERR, CDO) to Emery, dated December 9, 1996. The ground water cleanup goal is the drinking water maximum contaminant level (MCL) of 5 µg/l for benzene. Analytical results from the most recent sampling event show the benzene concentration in ground water from Sump #3 continues to exceed the MCL. Results for the 1" well also indicate elevated benzene well above the MCL. Toluene was detected in B6B only. Ethylbenzene and xylenes were detected in both Sump #3 and B6B. BTEX constituents were not detected in Sumps #1, #2, and #4.

Comments

Following are DDAGW comments on the Emery Transportation, Inc. Spill site.

1. During the November sampling event, Well B6B was observed to have a separation between the sections of casing which are connected approximately at ground surface. This damage should be addressed in order to prevent the potential infiltration of surface water into the subsurface.

2. The well logs for the site wells were evaluated in conjunction with the sampling event. Monitoring well B12-D is constructed about 8 to 10 feet deeper than all other site wells. It monitors ground water at a depth between 14 and 18 feet below the ground surface. Emery has maintained that the zone monitored by this well is under confined conditions and is not part of the upper units monitored by shallow wells. Based on this review, it appears that the limited water level measurements are inconclusive in determining if the zone is confined. The lithology, however, indicates that the sands monitored in B12-D are part of the same interbedded till and sand typical of the area. Additional water level measurements would be required to determine if this is a separate, confined aquifer.

Conclusions and Recommendations

Ground water grab samples collected from five locations around the Emery Transportation spill site on November 7, 2001 confirm that the shallow ground water at the site contains contamination above the

site-specific cleanup level of 5 µg/l for benzene. It appears that gasoline contaminated soil at the site continues to act as a source of BTEX which is still being released into the ground water. Pump and treat operations are no longer in operation at the site to contain any contaminated ground water, therefore, contamination may migrate laterally away from the spill area or may infiltrate into deeper ground water zones.

DDAGW-CDO recommends that soils acting as a source of ground water contamination be excavated or treated in order to prevent further contamination. Wells at the site should continue to be monitored to evaluate the rate and extend of contaminant migration. The condition of Well B6B should be investigated and the well replaced or repaired.

cc: Jeff Patzke, DDAGW-CO
DDAGW-CDO File

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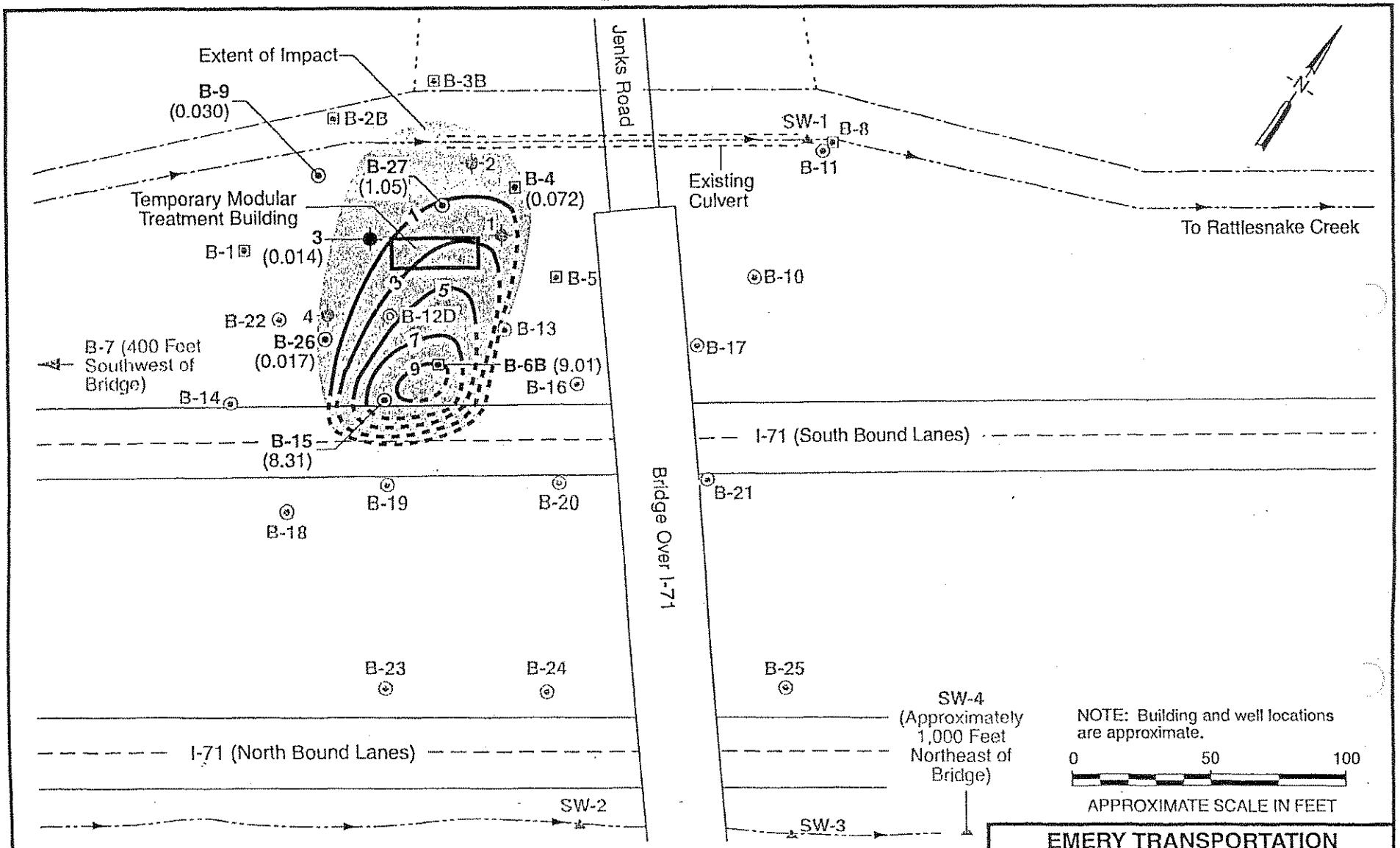

LEGEND:

- Interstate Right-of-Way
- Jenks Road Right-of-Way
- Drainage Ditch and Flow Direction
- 3 Extraction Well Location
- B-4 Sampling Location (October 1998)
- B-26 Shallow Soil Boring/Piezometer Location (July 2000)
- B-12D Deep Soil Boring/Piezometer Location (July 2000)
- SW-2 Surface Water Sample Location
- (0.072) Benzene Concentration (July 2000), (mg/L)
- 1 Benzene Concentration Isopleth (mg/L), (Dashed Where Inferred)

EMERY TRANSPORTATION GASOLINE SPILL SITE

I-71 AND JENKS ROAD

FIGURE 1
DISTRIBUTION OF BENZENE IN GROUNDWATER

Job No. 25753-021-121

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