

BNSF Railway Company

Investigation Report

Proposed Albuquerque Arena Site Albuquerque, New Mexico

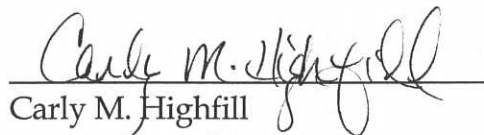
June 7, 2005



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EXECUTIVE SUMMARY

During November 2004, a limited Phase II Site Investigation (Geoprobe investigation) of the site was conducted. A total of 76 soil samples were collected from 13 soil boring locations and analyzed for TPH-DRO (total petroleum hydrocarbon – diesel range organics) and TPH-MRO (total petroleum hydrocarbon – motor oil range organics). Fifteen soil samples were collected and analyzed for BTEX and PAH. The soil samples collected from the 13 boring locations supplemented the sampling data from an earlier Phase II conducted by the developer of the property in July 2004. In addition to the soil samples, three groundwater samples were collected.

TPH-DRO/MRO concentrations ranged from non-detect in 27 samples from eight boring locations to 15,000 mg/Kg in a sample from boring location P-10, with an average TPH-DRO/MRO concentration of 2,000 mg/Kg.

BTEX compounds were detected above reporting limits in 12 of the 15 samples, with concentrations ranging from 16.5 µg/Kg in sample P-6-29.5-30 to 498.7 µg/Kg in sample P-9-22-22.5. No soil screening levels for BTEX compounds were exceeded in any of the samples submitted.

PAH compounds were detected above reporting limits in all 15 samples submitted, with concentrations ranging from 258.06 µg/Kg in sample P-5-29-30 to 580,994.79 µg/Kg in sample P-9-22-22.5. Five of the samples (P-3-28.5-29, P-9-22-22.5, P-10-26-27.5, P-11-29-30, and P-19-21-21.6) exceeded the Migration to Pathway Standard (DAF 20) for naphthalene (393 µg/Kg) with concentrations of 1,115 µg/Kg, 49,200 µg/Kg, 830.5 µg/Kg, 963.2 µg/Kg, and 3,164 µg/Kg, respectively. No other soil screening levels were exceeded.

During November 2004, three site monitoring wells were gauged for depth to groundwater and presence of LNAPL. Groundwater flow is to the east with a hydraulic gradient of approximately 0.01 feet/foot.

Groundwater samples were collected from three monitoring wells on-site and analyzed for BTEX and PAH. Dissolved-phase hydrocarbons were detected above reporting limits in just one of the three wells sampled (MW-3, with a total PAH concentration of 8.507 µg/L). BTEX was not detected above reporting limits in any of the wells sampled. No dissolved-phase hydrocarbon standards were exceeded during the November 2004 event.

1.0

INTRODUCTION

This report has been prepared by ERM-Rocky Mountain, Inc. (ERM) for the BNSF Railway Company (BNSF) to detail the activities and results associated with the limited Phase II Site Investigation for the proposed Albuquerque Arena site.

1.1

SITE LOCATION AND DESCRIPTION

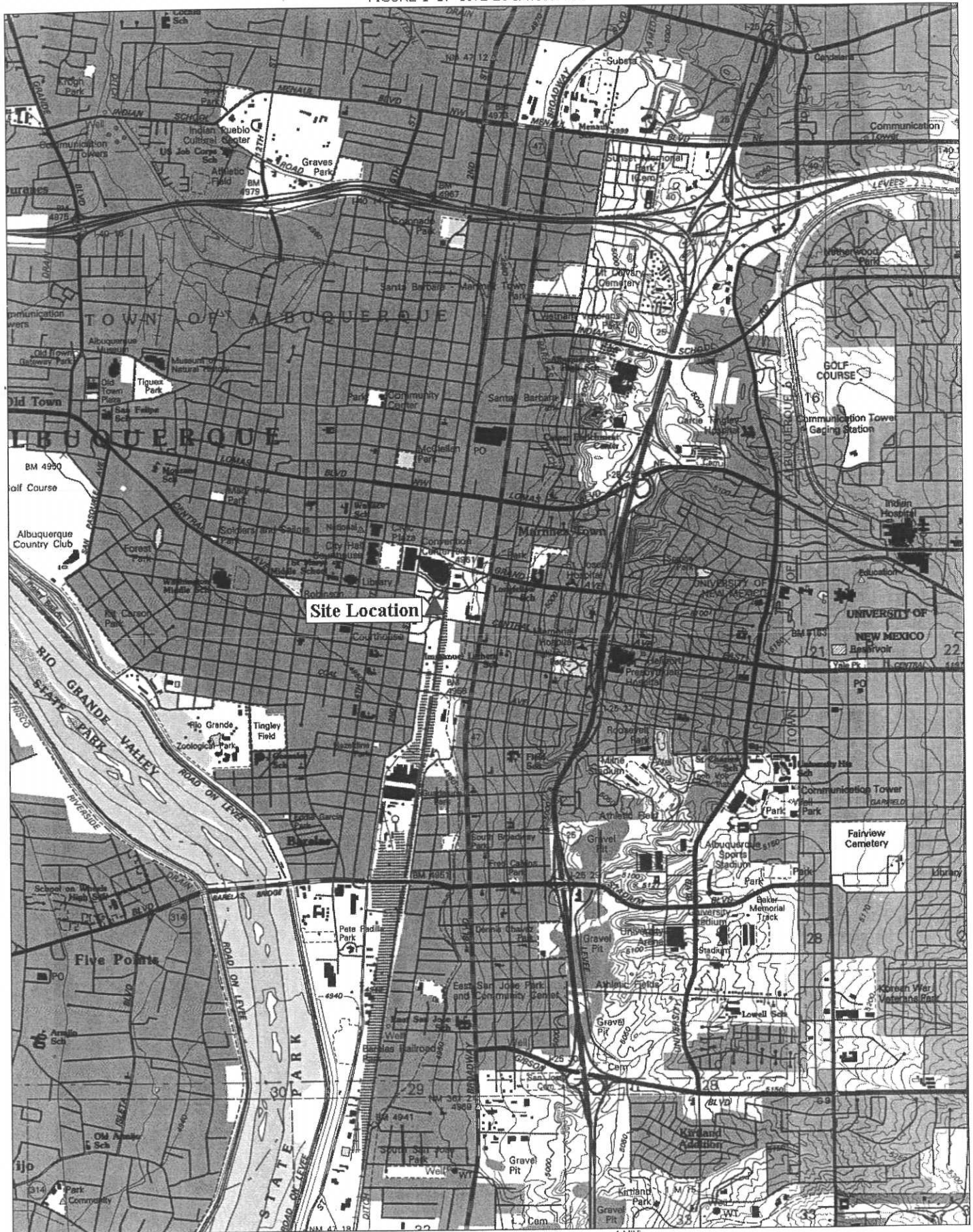
The proposed Albuquerque Arena site is located in downtown Albuquerque, New Mexico (Figure 1-1). The proposed site is located between Copper Avenue to the north and Central Avenue to the south, and is situated between First Street on the west and extends eastward to the BNSF Railway Albuquerque Yard property line (Figure 1-2). The Rio Grande is located about one mile west of the site. The proposed site is currently being used as a city parking lot.

1.2

SITE HISTORY

A Phase I Environmental Site Assessment of the proposed Albuquerque Arena property was conducted during May 2004 by AMEC Earth and Environmental of Albuquerque, NM (AMEC). During the geotechnical study, petroleum-based soil contamination was encountered in soil borings advanced in the eastern portion of the site. AMEC concluded that there was potential for impact to the proposed development of the property and possible groundwater contamination beneath the site surface; therefore, a Phase II Environmental Site Assessment (Phase II ESA) of the property was performed by AMEC during July and August, 2004. The site assessment

FIGURE 1-1. SITE LOCATION MAP



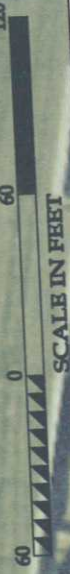
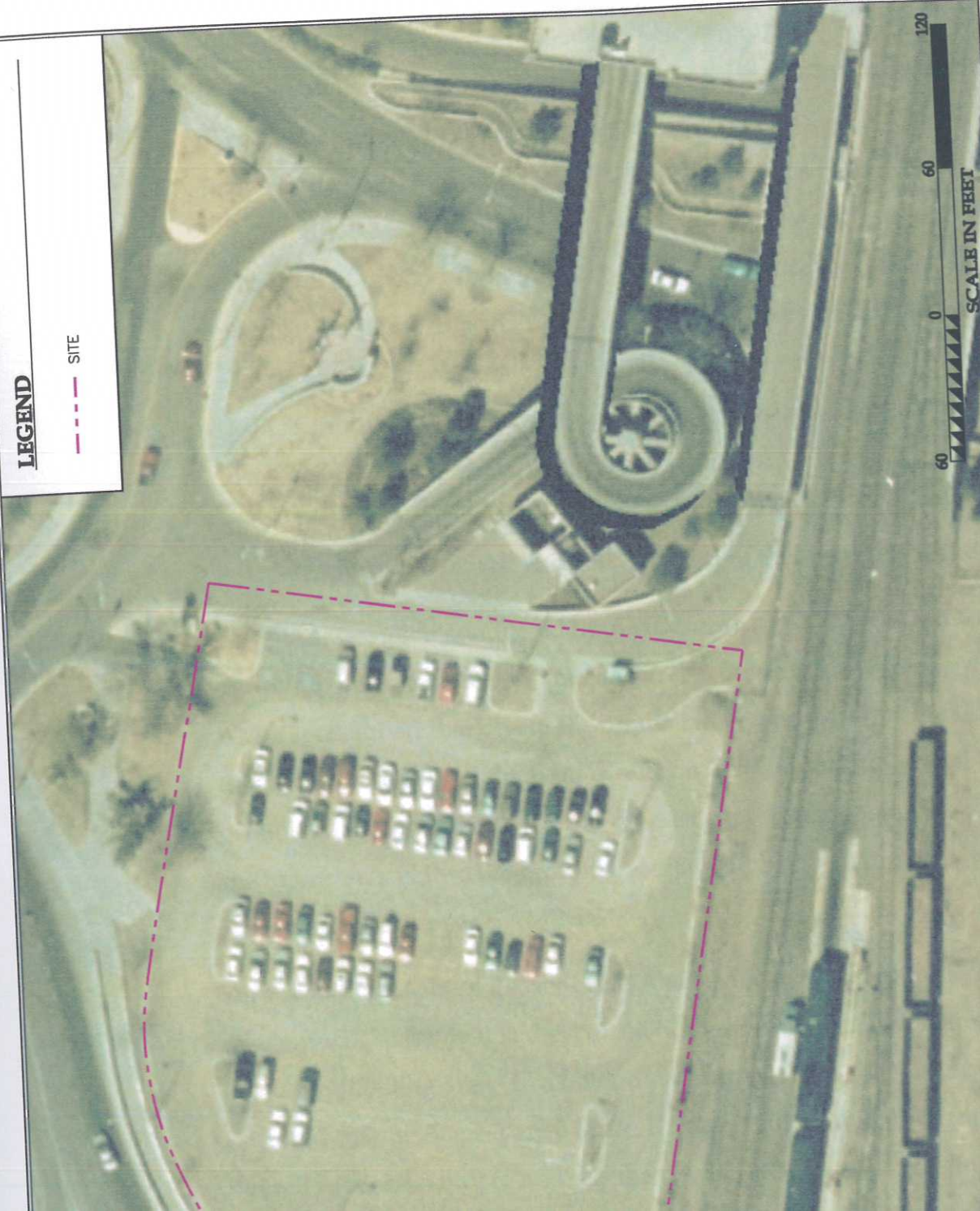
TN/MN
10°

0 1000 FEET 0 500 1000 METERS

Printed from TOPO! ©2001 National Geographic Holdings (www.topo.com)

LEGEND

--- SITE



REVISION	DESCRIPTION	DATE

Environmental Resources
Management
2201 Buena Vista, S.E.
Suite 305
Albuquerque, New Mexico 87106
(505) 243-3330



4.377SM1 Site Map.dwg
THE BNSF RAILWAY COMPANY
ALBUQUERQUE ARENA - ALBUQUERQUE, NEW MEXICO

SITE MAP

diameter core barrel by a removable rod. The core barrel is advanced in five-foot intervals by truck-mounted hydraulics and a percussion hammer. AMEC collected samples from each direct push core (DPC) for analysis of Diesel Range Organics (DRO) and Gasoline Range Organics (GRO). In the Phase II ESA Report, AMEC identified thirteen of the 20 Geoprobe borings as having some level of hydrocarbon impact based on analytical samples, PID readings, and visual and olfactory data. The report therefore concluded that past releases of diesel fuel from BNSF had impacted the property. Specifically, AMEC's report, *Phase II Environmental Site Assessment, Proposed Albuquerque Arena Site, Downtown Albuquerque, New Mexico* (AMEC, 2004) indicated diesel contamination was confined to the eastern portion of the site, extending between approximately 80 and 150 feet west of the eastern site boundary.

The site assessment conducted by AMEC also consisted of groundwater sampling of three on-site monitoring wells. As a result of this sampling, AMEC concluded that one of the monitoring wells (MW-3) contained dissolved diesel contamination. However, AMEC concluded that since groundwater appeared to flow to the east, any contaminants that leach from the impacted soil into the groundwater would likely be directed away from the site toward the east (AMEC, 2004).

As a result of AMEC's Phase II ESA, the NMED concluded that a regulated discharge of diesel fuel had occurred at the site, originating from BNSF's eastbound fueling area. In a letter dated September 1, 2004, the NMED required that BNSF prepare a Stage 1 Abatement Plan modification for the overall fueling facility to address the newly discovered contaminated area. On September 23, 2004, representatives from BNSF and ERM met with Mr. Bart Faris of the NMED to discuss the modification proposal. ERM then submitted the Stage 1 Abatement Plan modification proposal to the NMED on October 28, 2004. ERM was then asked by BNSF to conduct its own limited Phase II investigation of the proposed Albuquerque Arena site. Upon reviewing the Phase II ESA report by AMEC, ERM discovered that during

the Geoprobe investigation, only one analytical sample was collected in several of the borings. ERM therefore proposed to fill in the missing analytical data gaps from the 13 Geoprobe locations.

1.3

REPORT ORGANIZATION

This report summarizes the activities and results of activities conducted at the site during the investigation. Section 2.0 presents the site activities that were conducted; Section 3.0 summarizes the results of the Geoprobe investigation, as well as groundwater monitoring results; Section 4.0 discusses the significance of the results; Section 5.0 presents conclusions, and Section 6.0 contains references.

2.0

INVESTIGATION ACTIVITIES

Activities at the site by ERM included Geoprobe investigation work, fluid level measurement, and collection of confirmation groundwater samples.

2.1

GEOPROBE INVESTIGATION

On November 8-12, 2004, ERM conducted a Geoprobe investigation of the site which involved re-drilling the 13 locations identified by AMEC as having hydrocarbon contamination and collecting additional soil samples at each location to obtain a more complete picture of the vertical and lateral extent of hydrocarbon impact. The 13 soil borings were advanced to depths from 20 to 40 feet below ground surface by ESN Southwest, using a truck-mounted direct push sampler. The boring locations are illustrated on Figure 2-1. The borings were continuously sampled, and the cores examined onsite by an ERM staff geologist. For most of the soil borings, analytical samples were collected approximately every five feet to the water table (approximately 40 feet below ground surface). However, for one of the borings (P-9), samples were collected every two feet to the water table. This boring appears to be located near the old oil separating basin and it also generally showed the greatest level of hydrocarbon impact during AMEC's Phase II. Appendix A contains the borehole lithologic logs for the 13 soil borings.

A total of 76 soil samples were collected and analyzed for TPH-DRO (total petroleum hydrocarbon - diesel range organics) and TPH-MRO (total petroleum hydrocarbon - motor oil range organics) by Method 8015B. In addition, 15 soil samples were collected and analyzed for BTEX (benzene, toluene, ethylbenzene, and xylenes) by Method 8021B and PAH (18 polynuclear aromatic hydrocarbons typically found in diesel fuel) by Method 8270C.

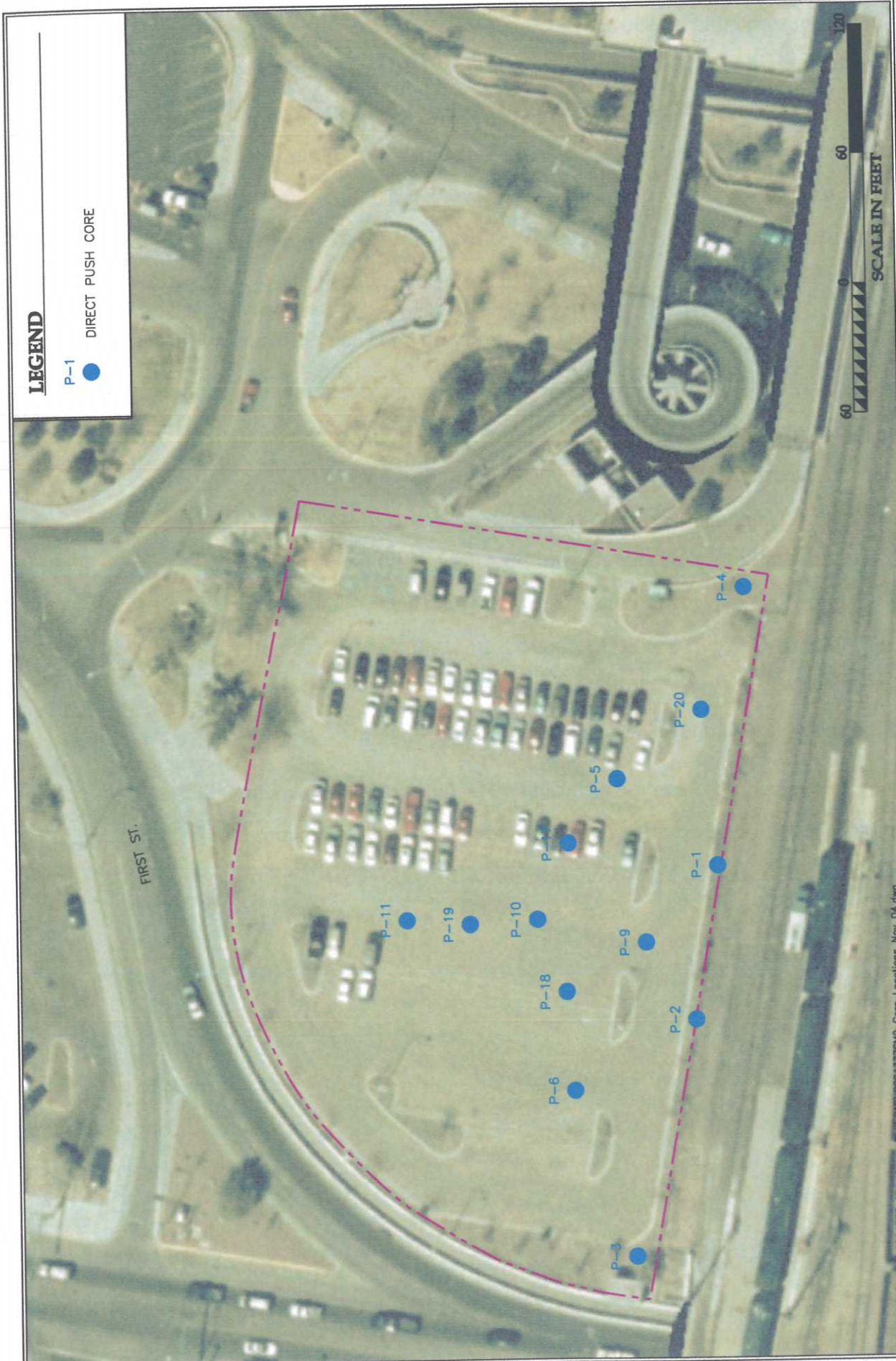
2.2

GROUNDWATER MONITORING

2.2.1

Fluid Level Measurement

Fluid levels were measured in three monitoring wells with an ORS® model oil/water interface probe on November 9, 2004. The monitoring well locations



LEGEND

- P-1
- DIRECT PUSH CORE

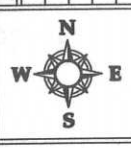
F:\B\106\B\BNSF\0024377 Albuq Arena_Phil\040\0024379M2 Core Locations Nov 04.dwg

THE BNSF RAILWAY COMPANY
 ALBUQUERQUE ARENA - ALBUQUERQUE, NEW MEXICO
DIRECT PUSH CORE LOCATIONS
NOVEMBER 2004

FIGURE	DESIGNED	CMH
2-1	DRAWN	RJB
	CHECKED	
DATE	DATE	TIME
Apr 12, 2005	Apr 12, 2005	4:49 pm

Environmental Resources
 Management
 2201 Buena Vista, S.E.
 Suite 305
 Albuquerque, New Mexico 87106
 (505) 243-3330

ERM



REVISION	DESCRIPTION	DATE

are illustrated on Figure 2-2. The ORS® probe permits measurement of depth to both water and product in monitoring wells, allowing determination of product thicknesses down to 0.01 feet. On July 26, 2004, AMEC Earth and Environmental measured the relative elevation of the top-of-casing at each monitoring well using a level-gun and support equipment. The top-of-casing for MW-2 was arbitrarily set to 100.00 feet (AMEC, 2004). This same top-of-casing elevation was used for ERM's investigation.

2.2.2 *Dissolved-Phase Hydrocarbon Monitoring*

Groundwater samples were collected from all three wells on-site on November 9, 2004. Prior to sampling the wells, the depth to water in each well was measured with a water-level indicator. A minimum of three-wetted well casing volumes was purged from each well using a submersible Grundfos® pump with dedicated low-density polyethylene tubing. The pump was set in the middle of the screened portion of the well. During purging, the field water quality parameters of pH, temperature, conductivity, oxidation/reduction potential, and dissolved oxygen were measured periodically. The field sampling forms are presented in Appendix B.

Groundwater samples were delivered to Severn Trent Laboratories in Houston, TX where they were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8021B and polyaromatic hydrocarbon (PAH) by EPA Method 8270C.

LEGEND

MW-1

MONITORING WELL

FIRST ST.

MW-2

MW-3

SCALE IN FEET
0 60 120

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Suite 305
Albuquerque, New Mexico 87106
(505) 245-3330



THE BNSF RAILWAY COMPANY
ALBUQUERQUE ARENA - ALBUQUERQUE, NEW MEXICO

MONITORING WELL LOCATIONS

FIGURE	DESIGNED	CNH	DATE
2-2	DRAWN	RJE	Apr 12, 2005
	CHECKED		4:48 pm

\\BMR1001\BNSF\0024377 Albuquerque, Phil\CAD\00243725M3_MW_Loc.dwg

3.0

INVESTIGATION RESULTS

3.1

GEOPROBE INVESTIGATION RESULTS

Geoprobe Borings

During the Geoprobe investigation conducted by ERM in November 2004 attempts were made to advance each boring to the water table (approximately 40 feet below ground surface); however, due to rod refusal, several of the borings (P-1, P-2, P-4, P-10, P-11, and P-20) were not advanced to the water table, but to depths ranging from 21.5 feet to 38.5 feet below ground surface.

Total Petroleum Hydrocarbon Results

Table 3-1 presents the soil analytical results from the November 2004 Geoprobe investigation, as well as results from the investigation conducted in July 2004 by AMEC. The table shows that during the November 2004 investigation TPH-DRO/MRO concentrations ranged from non-detect in 27 samples from eight boring locations to 15,000 mg/Kg in a sample from boring location P-10, with an average TPH-DRO/MRO concentration of 2,000 mg/Kg. Boring P-9, which was sampled approximately every two feet and therefore provides the most data on the vertical extent of hydrocarbon impact, showed TPH-DRO/MRO concentrations ranging from 9.8 mg/Kg at 20 - 20.5 feet below ground surface to 4,000 mg/Kg at 6 - 6.5 feet below ground surface. TPH-DRO/MRO concentrations decreased from 8 - 20 feet below ground surface in this boring, then increased to 3,900 mg/Kg at 24 feet below ground surface, then decreased again from 26 - 36 feet below ground surface.

Results show that most of the hydrocarbon impact occurs at depths greater than 20 feet below ground surface; in fact, in several of the borings the greatest TPH-DRO/MRO concentrations occur at depths from 20.5 - 38 feet below ground surface. Only borings P-9 and P-10 show increased TPH-DRO/MRO concentrations above 20 feet below ground surface (from approximately 6 - 16 feet below ground surface). Soil analytical laboratory reports from the November 2004 investigation are included in Appendix C.

**Table 3-1. Soil Analytical Results
Proposed Albuquerque Arena Site
July and November 2004**

DPC I.D.	Sample Depth (ft bgs)	TPH-DRO/MRO (mg/Kg)	Total BTEX (μg/Kg)	Total PAH (μg/Kg)
P-1	4.0 - 4.5	510/37	NA	NA
	8.0 - 8.5	74/ND	NA	NA
	14.0 - 14.5	2,500/ND	NA	NA
	16.5 - 18.5	NA	422.5	5,328.96
	20.0 - 21.0	290/ND	NA	NA
	25.0 - 25.5	2,800/ND	NA	NA
	28.0 - 32.0	4,200/ND	NA	NA
	33.5 - 34.0	3,100/ND	NA	NA
	37.0 - 38.0	3,600/ND	NA	NA
P-2	4.0 - 30.0 (Composite)	NA	ND ⁽¹⁾	10.7 ⁽²⁾
	4.0 - 4.5	480/37	NA	NA
	8.0 - 9.0	250/ND	NA	NA
	14.0 - 15.0	190/ND	NA	NA
	20.5 - 21.0	3,000/ND	NA	NA
	22.0 - 22.5	NA	113.6	18,392.34
	23.0 - 24.0	8,400/ND	NA	NA
	26.0 - 26.5	1,500/ND	NA	NA
	29.0 - 29.5	510/ND	NA	NA
	30.0 - 31.0	1,000/ND	NA	NA
P-3	4.0 - 30.0 (Composite)	NA	ND ⁽¹⁾	7,720 ⁽²⁾
	4.0 - 4.5*	54/41	NA	NA
	8.0 - 9.0	110/ND	NA	NA
	15.0 - 16.0*	1,600/ND	198.3	1,383.91
	20.0 - 20.5*	ND/ND	NA	NA
	27.0 - 28.0	280/ND	NA	NA
	28.5 - 29.0*	NA	ND	27,850.16
	30.0 - 31.0	480/ND	NA	NA
	36.0 - 36.5*	1,900/ND	NA	NA
	40.0 - 40.5*	ND/ND	170.1	471.96
P-4	Composite	NA	ND ⁽¹⁾	1.53 ⁽²⁾
	4.0 - 4.5	38/39	NA	NA
	9.0 - 9.5	31/16	NA	NA
	14.0 - 14.5	390/68	NA	NA
	18.0 - 18.5	NA	82.5	1,095.95
	19.0 - 20.0	1,300/ND	NA	NA
P-5	21.5 - 22.5	67/ND	NA	NA
	4.5 - 5.0	ND/ND	NA	NA
	10.0 - 10.5	ND/ND	NA	NA
	16.0 - 16.5	ND/ND	NA	NA
	21.0 - 21.5	ND/ND	NA	NA
	27.0 - 27.5	2,000/ND	NA	NA
	29.0 - 30.0	3,900/ND	25.1	258.06
	33.5 - 34.0	1,400/ND	NA	NA
P-6	39.0 - 40.0	ND/ND	NA	NA
	5.5 - 6.0	ND/ND	NA	NA
	10.0 - 10.5	ND/ND	NA	NA
	16.5 - 17.0	ND/ND	NA	NA
	21 - 21.5	ND/ND	NA	NA
	25.5 - 26.0	30/ND	NA	NA
	28.0 - 29.0	850/ND	NA	NA
	29.5 - 30.0	NA	16.5	3,115.14
P-6	32.0 - 33.0	ND/ND	NA	NA

DPC I.D.	Sample Depth (ft bgs)	TPH-DRO/MRO (mg/Kg)	Total BTEX (μg/Kg)	Total PAH (μg/Kg)
P-9	2.0 - 2.5	ND/ND	NA	NA
	4.0 - 4.5	1,200/ND	NA	NA
	6.0 - 6.5	4,000/ND	NA	NA
	8.0 - 8.5	2,700/ND	NA	NA
	10.0 - 10.5	3,000/ND	NA	NA
	12.0 - 12.5	1,100/ND	NA	NA
	14.0 - 14.5	92/ND	NA	NA
	16.0 - 16.5	15/ND	NA	NA
	18.0 - 18.5	ND/ND	NA	NA
	20.0 - 20.5	9.8/ND	NA	NA
	22.0 - 23.0	6,300/ND	498.7 ⁽³⁾	580,994.79 ⁽³⁾
	24.0 - 24.5	3,900/ND	NA	NA
	26.0 - 26.5	120/ND	NA	NA
	28.0 - 29.0	3,000/ND	NA	NA
P-10	30.0 - 30.5	3,300/ND	NA	NA
	32.5 - 33.0	1,100/ND	NA	NA
	36.0 - 36.3	810/ND	NA	NA
	6.0 - 6.5	15,000/ND	NA	NA
	10.0 - 10.5	1,700/ND	NA	NA
	16.0 - 16.4	4,100/ND	NA	NA
	20.0 - 20.5	5,900/ND	NA	NA
	23.0 - 24.0	2,700/ND	NA	NA
P-11	26.5 - 27.5	NA	45.9	12,843.42
	29.0 - 30.0	67/ND	NA	NA
	32.5 - 33.0	4,300/ND	NA	NA
	6.0 - 6.5	ND/ND	NA	NA
	9.5 - 10.0	ND/ND	NA	NA
P-17	16.5 - 17.0	ND/ND	NA	NA
	22.0 - 23.0	ND/ND	NA	NA
	25.0 - 25.5	160/ND	NA	NA
	29.0 - 30.0	74/ND	ND	19,815.25
	33.5 - 34.0	ND/ND	NA	NA
	5.0 - 5.5	ND/ND	NA	NA
	10.0 - 10.5	ND/ND	NA	NA
	17.0 - 17.5	ND/ND	NA	NA
P-18	23.0 - 24.0	44/ND	NA	NA
	25.5 - 26.5	200/ND	NA	NA
	28.5 - 29.0	NA	29.8	3,842.59
	30.5 - 31.0	1,900/ND	NA	NA
	34.5 - 35.0	2,500/ND	NA	NA
	39.0 - 39.5	ND/ND	NA	NA
	5.0 - 5.5	ND/ND	NA	NA
	10.0 - 10.5	ND/ND	NA	NA
P-18	16.5 - 17.0	ND/ND	NA	NA
	21.0 - 22.0	17/ND	NA	NA
	26.0 - 27.0	NA	158	13,058.27
	30.5 - 31.0	820/ND	NA	NA
	34.0 - 34.5	ND/ND	NA	NA
	37.5 - 38.0	ND/ND	NA	NA

Table 3-1. Soil Analytical Results (Continued)
Proposed Albuquerque Arena Site
July and November 2004

DPC I.D.	Sample Depth (ft bgs)	TPH-DRO/MRO (mg/Kg)	Total BTEX (µg/Kg)	Total PAH (µg/Kg)
P-19	6.0 - 6.5	ND/ND	NA	NA
	12.0 - 12.5	15/ND	NA	NA
	17.5 - 18.0	8.6/ND	NA	NA
	21.0 - 21.6	NA	116.2	35,972.83
	21.5	22/ND	NA	NA
	25.0 - 25.5	5,200/ND	NA	NA
	29.5 - 30.0	1,900/ND	NA	NA
	33.5 - 34.0	6,900/ND	NA	NA
	37.0 - 37.4	920/ND	NA	NA
P-20	4.0 - 4.5	12/21	NA	NA
	9.5 - 10.0	56/30	NA	NA
	14.0	500/ND	NA	NA
	18.0 - 18.5	NA	ND	1,291.34
	21.0 - 21.5	44/26	NA	NA

DPC = Direct Push Core.

NA = Not analyzed.

ND = Not detected at the reporting limit.

(1) Sample analyzed by EPA Method 8260 Full List; only reported total BTEX in table.

(2) Sample analyzed by EPA Method 8270 Full List; only reported total PAH in table.

(3) Sample is from 22 feet bgs to 22.5 feet bgs.

* In analytical laboratory report, samples are named MW25-4-4.5; MW-25-15-16; MW25-20-20.5; MW25-36-36.5; and MW25-40-40.5.

Shaded cells indicate samples that were collected during July 2004 by AMEC Earth and Environmental, Inc. and analyzed by Hall Environmental Analysis Laboratory in Albuquerque, NM. All other samples were collected during November 2004 by ERM and analyzed by Severn Trent Laboratories in Houston, TX.

The Phase II ESA conducted in July by AMEC showed TPH-DRO concentrations ranging from non-detect in a sample from boring P-11 to 8,400 mg/Kg in a sample from boring P-2, with an average TPH-DRO concentration of 1,470 mg/Kg. TPH-MRO was not detected above reporting limits during the July 2004 investigation. AMEC's investigation also showed the majority of the hydrocarbon impact to occur greater than 20 feet below ground surface, with just one boring location showing a significant TPH-DRO concentration above (P-1, which showed 2,500 mg/Kg of TPH-DRO from 14 - 14.5 feet below ground surface) (AMEC, 2004).

BTEX and PAH Results

Table 3-1 also shows total BTEX and PAH results from both the July and November 2004 events; Table 3-2 shows the individual BTEX and PAH analytes that were detected during both events. Fifteen soil samples were analyzed for BTEX and PAH during November 2004 and three soil samples were analyzed for BTEX and PAH during the event conducted by AMEC in July 2004. The November 2004 results show BTEX concentrations above reporting limits in 12 of the 15 samples, with concentrations ranging from 16.5 µg/Kg in sample P-6-29.5-30 to 498.7 µg/Kg in sample P-9-22-22.5. The only soil borings that did not contain detections of any BTEX compounds were P-11 and P-20. No soil screening levels for BTEX compounds were exceeded in any of the samples submitted.

During the November 2004 event, PAH compounds were detected above reporting limits in all 15 samples submitted, with concentrations ranging from 258.06 µg/Kg in sample P-5-29-30 to 580,994.79 µg/Kg in sample P-9-22-22.5. Five of the samples (P-3-28.5-29, P-9-22-22.5, P-10-26-27.5, P-11-29-30, and P-19-21-21.6) exceeded the Migration to Pathway Standard (DAF 20) for naphthalene (393 µg/Kg) with concentrations of 1,115 µg/Kg, 49,200 µg/Kg, 830.5 µg/Kg, 963.2 µg/Kg, and 3,164 µg/Kg, respectively. No other soil screening levels were exceeded. Figure 3-1 outlines the portion of the site in which the Migration to Groundwater Pathway Naphthalene DAF 20 Standard was exceeded during the November 2004 investigation.

Table 3-2. Soil BTEX and PAH Analytical Results
Proposed Albuquerque Arena Site
July and November 2004

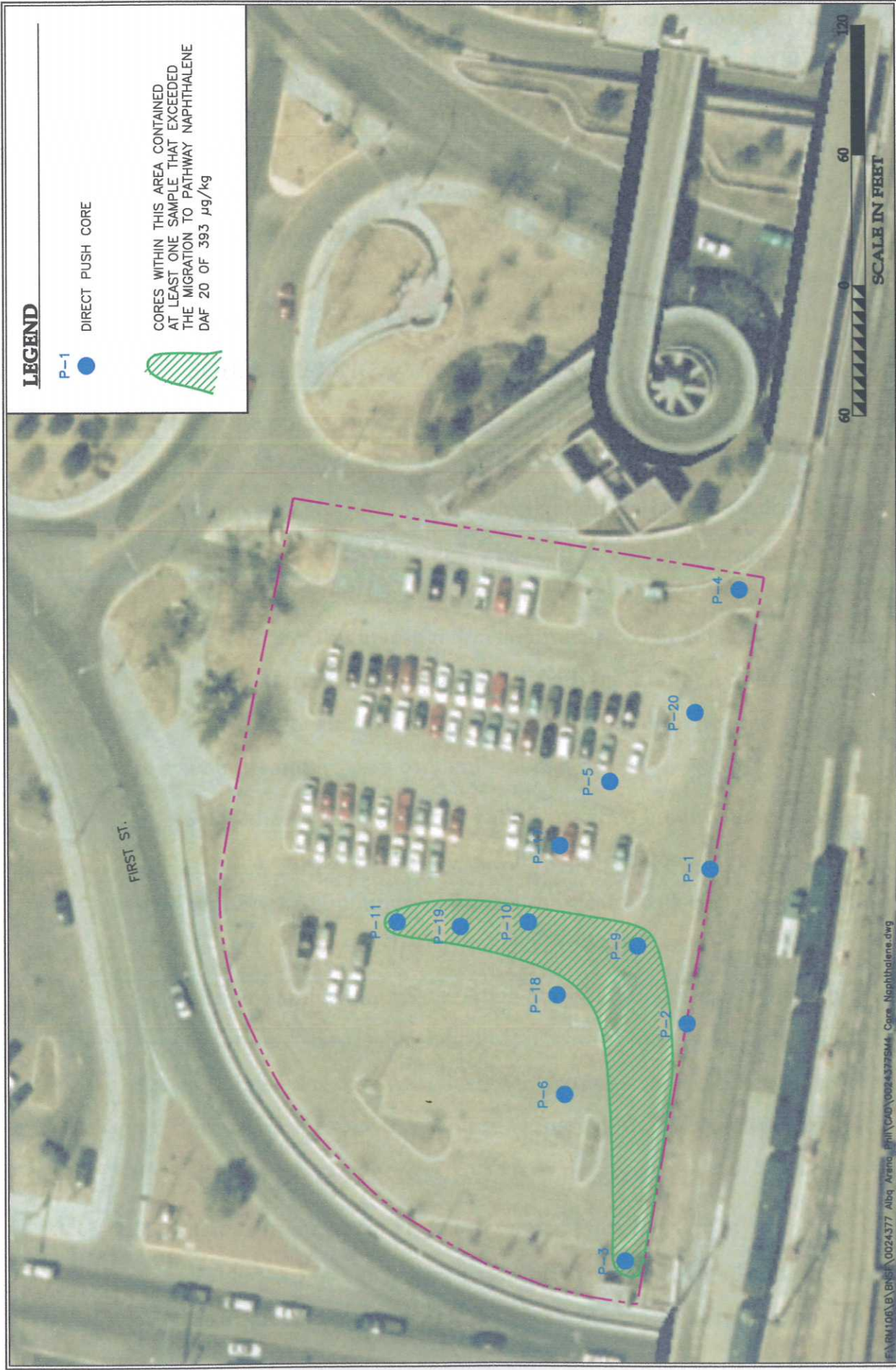
Sample Depth (ft bgs)	Direct Push Core I.D.																		NMED Soil Screening Level DAF 20 (μg/Kg)
	P-1		P-2		P-3				P-4	P-5	P-6	P-9	P-10	P-11	P-17	P-18	P-19	P-20	
	16.5 – 18.5	4.0 – 30.0* (composite)	22 – 22.5	4.0 – 30.0* (composite)	15 – 16.0	28.5 – 29	40 – 40.5	16.0 – 30.0* (composite)	18 – 18.5	29 – 30	29.5 – 30	22 – 22.5	26.5 – 27.5	29 – 30	28.5 – 29	26 – 27	21 – 21.6	18 – 18.5	
BTEX (μg/Kg) Method 8021																			
Benzene	ND (10.0)	ND (250)	ND (12.6)	ND (250)	ND (10.0)	ND (10.0)	ND (10.0)	ND (250)	ND (10.0)	ND (10.0)	ND (10.3)	ND (10.0)	ND (10.0)	ND (11.6)	ND (10.0)	ND (10.0)	ND (10.0)	ND (10.0)	28.3
Toluene	ND (10.0)	ND (250)	19.5 (12.6)	ND (250)	63.1 (10.0)	ND (10.0)	51.0 (10.0)	ND (250)	ND (10.0)	ND (10.0)	ND (10.3)	49.7 (10.0)	ND (10.0)	ND (11.6)	ND (10.0)	47.3 (10.0)	24.1 (10.0)	ND (10.0)	6,800
Ethylbenzene	89.5 (10.0)	ND (250)	31.6 (12.6)	ND (250)	38.9 (10.0)	ND (10.0)	26.6 (10.0)	ND (250)	22.2 (10.0)	25.1 (10.0)	16.5 (10.3)	132 (10.0)	45.9 (10.0)	ND (11.6)	29.8 (10.0)	67.0 (10.0)	51.8 (10.0)	ND (10.0)	10,500
Xylenes (total)	333 (30.0)	ND (250)	62.5 (37.8)	ND (250)	96.3 (30.0)	ND (30.0)	92.5 (30.0)	ND (250)	60.3 (30.0)	ND (30.0)	ND (30.8)	317 (30.0)	ND (30.0)	ND (34.8)	ND (30.0)	43.7 (30.0)	40.3 (30.0)	ND (30.0)	10,100
Total BTEX	422.5	–	113.6	–	198.3	–	170.1	–	82.5	25.1	16.5	498.7	45.9	–	29.8	158	116.2	–	
PAH (μg/Kg) Method 8270																			
Acenaphthene	321.1 (15.0)	ND (200)	ND (18.9)	ND (200)	120.4 (15.0)	570.9 (15.0)	41.11 (15.0)	ND (200)	ND (15.0)	ND (15.0)	88.13 (15.4)	ND (45.0)	89.69 (15.0)	134.4 (17.4)	ND (15.0)	ND (15.0)	155.9 (15.0)	ND (15.0)	79,800
Acenaphthylene	ND (15.0)	ND (200)	ND (18.9)	ND (200)	ND (15.0)	ND (15.0)	ND (15.0)	ND (200)	ND (15.0)	ND (15.0)	ND (15.4)	ND (45.0)	ND (15.0)	ND (17.4)	ND (15.0)	ND (15.0)	ND (15.0)	ND (15.0)	NE
Anthracene	125.9 (10.0)	ND (200)	224.7 (12.6)	ND (200)	90.26 (10.0)	215.6 (10.0)	28.65 (10.0)	ND (200)	55.87 (10.0)	ND (10.0)	59.64 (10.3)	1,443 (30.0)	39.43 (10.0)	83.92 (11.6)	21.89 (10.0)	58.17 (10.0)	93.53 (10.0)	37.31 (10.0)	1,600,000
Benzo(a)anthracene	16.07 (10.0)	ND (250)	18.65 (12.6)	ND (250)	22.88 (10.0)	ND (10.0)	ND (10.0)	ND (250)	17.87 (10.0)	ND (10.0)	ND (10.3)	90.39 (30.0)	ND (10.0)	ND (11.6)	ND (10.0)	ND (10.0)	ND (10.0)	10.39 (10.0)	1,100
Benzo(b)fluoranthene	ND (30.0)	ND (200)	ND (37.8)	ND (200)	30.04 (30.0)	ND (30.0)	ND (30.0)	ND (200)	ND (30.0)	ND (30.0)	ND (30.8)	ND (90.0)	ND (30.0)	ND (34.8)	ND (30.0)	ND (30.0)	ND (30.0)	ND (30.0)	3,400
Benzo(k)fluoranthene	ND (30.0)	ND (200)	ND (37.8)	ND (200)	ND (30.0)	ND (30.0)	ND (30.0)	ND (200)	ND (30.0)	ND (30.0)	ND (30.8)	ND (90.0)	ND (30.0)	ND (34.8)	ND (30.0)	ND (30.0)	ND (30.0)	ND (30.0)	34,000
Benzo(g,h,i)perylene	ND (20.0)	ND (300)	ND (25.2)	ND (300)	ND (20.0)	ND (20.0)	ND (20.0)	ND (300)	ND (20.0)	ND (20.0)	ND (20.5)	ND (60.0)	ND (20.0)	ND (23.2)	ND (20.0)	ND (20.0)	ND (20.0)	ND (20.0)	NE
Benzo(a)pyrene	ND (10.0)	ND (200)	35.20 (12.6)	ND (200)	18.75 (10.0)	ND (10.0)	ND (10.0)	ND (200)	11.41 (10.0)	ND (10.0)	ND (10.3)	349.7 (300)	ND (10.0)	ND (11.6)	ND (10.0)	ND (10.0)	ND (10.0)	ND (10.0)	6,120
Chrysene	19.49 (10.0)	ND (200)	18.53 (12.6)	ND (200)	35.87 (10.0)	23.88 (10.0)	ND (10.0)	ND (200)	34.10 (10.0)	ND (10.0)	ND (10.3)	194.9 (30.0)	ND (10.0)	ND (11.6)	ND (10.0)	ND (10.0)	ND (10.0)	17.82 (10.0)	110,000
Dibenz(a,h)anthracene	ND (20.0)	ND (250)	ND (25.2)	ND (250)	ND (20.0)	ND (20.0)	ND (20.0)	ND (250)	ND (20.0)	ND (20.0)	ND (20.5)	ND (60.0)	ND (20.0)	ND (23.2)	ND (20.0)	ND (20.0)	ND (20.0)	ND (20.0)	1,050
Fluoranthene	74.52 (15.0)	ND (200)	208.0 (18.9)	ND (200)	73.16 (15.0)	76.08 (15.0)	26.52 (15.0)	ND (200)	59.10 (15.0)	ND (15.0)	16.81 (15.4)	582.8 (45.0)	ND (15.0)	17.73 (17.4)	ND (15.0)	ND (15.0)	ND (15.0)	25.69 (15.0)	4,820,000
Fluorene	563.9 (10.0)	700 (200)	1,732 (62.9)	ND (200)	122.0 (10.0)	1,464 (100)	82.51 (10.0)	ND (200)	94.86 (10.0)	74.40 (10.0)	349.1 (10.3)	19,730 (300)	385.1 (10.0)	534.8 (11.6)	225.9 (10.0)	487.6 (10.0)	319.4 (10.0)	209.7 (10.0)	100,000
Indeno(1,2,3-c,d)pyrene	ND (25.0)	ND (200)	ND (31.5)	ND (200)	ND (25.0)	ND (25.0)	ND (25.0)	ND (200)	ND (25.0)	ND (25.0)	ND (25.6)	ND (75.0)	ND (25.0)	ND (29.0)	ND (25.0)	ND (25.0)	ND (25.0)	ND (25.0)	9,580
1-Methylnaphthalene	2,714 (60.0)	6,900 (1,000)	15,130 (472)	4,300 (1,000)	326.5 (15.0)	8,981 (600)	61.36 (15.0)	1,100 (1,000)	232.5 (15.0)	112.1 (15.0)	1,715 (61.5)	200,000 (4,500)	6,336 (150)	9,343 (174)	2,009 (60.0)	6,992 (150)	17,400 (750)	418.3 (15.0)	NE
2-Methylnaphthalene	306.6 (20.0)	1,900 (1,000)	ND (25.2)	3,200 (1,000)	226.3 (20.0)	11,450 (800)	ND (20.0)	430 (1,000)	337.1 (20.0)	ND (20.0)	603.8 (20.5)	258,900 (12,000)	4,788 (200)	8,172 (232)	1,230 (80.0)	4,792 (200)	13,790 (1,000)	267.1 (20.0)	NE
Naphthalene	ND (15.0)	ND (200)	ND (18.9)	ND (200)	41.70 (15.0)	1,115 (150)	ND (15.0)	ND (200)	104.7 (15.0)	ND (15.0)	74.66 (15.4)	49,200 (4,500)	830.5 (15.0)	963.2 (174)	132.1 (15.0)	262.8 (15.0)	3,164 (75.0)	65.82 (15.0)	393
Phenanthrene	1,122 (40.0)	1,200 (200)	966.5 (12.6)	220 (200)	184.5 (10.0)	3,783 (100)	199.5 (10.0)	ND (200)	98.06 (10.0)	71.56 (10.0)	208.0 (10.3)	49,380 (3,000)	374.7 (10.0)	566.2 (11.6)	223.7 (10.0)	465.7 (10.0)	1,050 (50.0)	211.3 (10.0)	76,200
Pyrene	65.38 (15.0)	ND (200)	58.76 (18.9)	ND (200)	91.55 (15.0)	170.7 (15.0)	32.31 (15.0)	ND (200)	50.38 (15.0)	ND (15.0)	ND (15.4)	1,124 (45.0)	ND (15.0)	ND (17.4)	ND (15.0)	ND (15.0)	ND (15.0)	27.91 (15.0)	568,000
Total PAH	5,328.96	10,700	18,392.34	7,720	1,383.91	27,850.16	471.96	1,530	1,095.95	258.06	3,115.14	580,994.79	12,843.42	19,815.25	3,842.59	13,058.27	35,972.83	1,291.34	

Shaded cells indicate samples that were collected during July 2004 by AMEC Earth and Environmental, Inc. and analyzed by Hall Environmental Analysis Laboratory in Albuquerque, NM. All other samples were collected during November 2004 by ERM and analyzed by Severn Trent Laboratories in Houston, TX.

Bolded values indicate an exceedance of the Migration to Pathway Naphthalene DAF 20 Standard.

ND = Not detected at reporting limit. NE = Standard not established. (10.0) = Reporting limit (µg/Kg).

* Samples were analyzed by EPA Methods 8260 and 8270 full lists; only reported total BTEX and total PAH in table.



LEGEND

P-1

DIRECT PUSH CORE



CORES WITHIN THIS AREA CONTAINED AT LEAST ONE SAMPLE THAT EXCEEDED THE MIGRATION TO PATHWAY NAPHTHALENE DAF 20 OF 393 µg/kg

FA\RM106\B\BNSF\0024377 Albu Arena_Phil\CAD\0024377SMA_Core Naphthalene.dwg

FIGURE	DESIGNED DRAWN	CHECKED	DATE TIME	CMH RJB	THE BNSF RAILWAY COMPANY ALBUQUERQUE ARENA - ALBUQUERQUE, NEW MEXICO DIRECT PUSH CORES EXCEEDING MIGRATION TO GROUNDWATER PATHWAY NAPHTHALENE DAF 20 OF 393 µg/kg	 Environmental Resources Management 2201 Buena Vista, S.E. Suite 305 Albuquerque, New Mexico 87106 (505) 243-3330	 N S E W	REVISION	DESCRIPTION	DATE

3-1

May 10, 2005
12:52 pm

Samples collected for BTEX and PAH analysis by AMEC in July 2004 were collected from direct push cores P-1, P-2, and P-3, and the samples were collected by compositing the entire core (all from 4.0 – 30.0 feet below ground surface). The July 2004 results did not show any detections of BTEX compounds above reporting limits. P-1, P-2, and P-3 all showed detections of PAH compounds during July 2004, with concentrations of 10,700 µg/Kg, 7,720 µg/Kg, and 1,530 µg/Kg, respectively. No soil screening levels were exceeded during the investigation conducted by AMEC in July 2004 (AMEC, 2004).

3.2 *SOIL SAMPLING QA/QC*

For the purpose of assessing sampling procedures and the laboratory's performance, QA/QC samples were submitted along with the soil samples during the November 2004 investigation, and the laboratory ran appropriate blanks and spiked samples. The field QA samples associated with the soil sampling included six duplicate samples. QA/QC data associated with the November 2004 investigation is summarized in Table 3-3. The results reported for these samples, along with the laboratory quality control results, allow the evaluation of the laboratory's performance and the determination of any sample cross-contamination.

All samples were analyzed within specified holding times. The duplicate sample collected from P-1-16.5-18.5 showed good reproducibility for BTEX and PAH compounds. All other duplicates collected showed good reproducibility for TPH-DRO and TPH-MRO.

Eleven samples showed relative percent differences between the two columns to be greater than 40%, in nine of these cases the lower of the two results was reported; in the other two cases the higher of the two results was reported. Despite these minor QC issues, the data are considered valid.

3.3 *GROUNDWATER MONITORING RESULTS*

3.3.1 *Groundwater Depth and Interpreted Flow Direction*

Table 3-4 presents the groundwater depth and elevation data from the November 2004 event. Fluid levels were measured on November 9, 2004.

**Table 3-3. Soil QA/QC Results
Proposed Albuquerque Arena Site
November 2004**

Chemical Analyte	Results											
	P-1-4-4.5	DUP 1	P-1-16.5-18.5	DUP 2	P-1-37-38	DUP 3	P-9-14-14.5	DUP 4	P-10-10-10.5	DUP 5	P-6-32-33	DUP 6
TPH-DRO (mg/Kg)	510	390	NA	NA	3,600	4,200	92	78	1,700	2,400	720	560
TPH-MRO (mg/Kg)	37	25	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
EPA Method 8021B (mg/Kg)												
Benzene	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	0.0895	0.0434	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes	NA	NA	0.333	0.174	NA	NA	NA	NA	NA	NA	NA	NA
Total BTEX	--	--	0.4225	0.2174	--	--	--	--	--	--	--	--
EPA Method 8270C (mg/Kg)												
Acenaphthene	NA	NA	0.3211	0.3406	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	0.1259	0.1221	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	0.01607	0.01023	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	0.01949	0.01588	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	0.07452	0.07982	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	0.5639	0.6198	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	0.3066	0.3261	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	1.122	0.7961	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	0.06538	0.07154	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	2.714	2.629	NA	NA	NA	NA	NA	NA	NA	NA
Total PAH	--	--	5.32896	5.01117	--	--	--	--	--	--	--	--

NA = Not analyzed.

ND = Chemical analyte was not detected in sample.

**Table 3-4. Fluid Level Survey Results
Proposed Albuquerque Arena Site
November 9, 2004**

Well I.D.	Top of Casing* (ft)	Depth to LNAPL (ft)	Depth to Water (ft)	LNAPL Thickness (ft)	Groundwater Elevation* (ft)
MW-1	94.58	--	39.74	--	54.84
MW-2	100.00	--	46.78	--	53.22
MW-3	96.58	--	43.36	--	53.22

* Top of Casing at monitoring well MW-2 was arbitrarily set to 100.00 feet by AMEC.

The interpreted groundwater flow direction appears to be toward the east, with a hydraulic gradient of approximately 0.01 feet per foot. Groundwater contours and the interpreted direction of flow are shown on Figure 3-2.

3.3.2 *Dissolved-Phase Hydrocarbon Results*

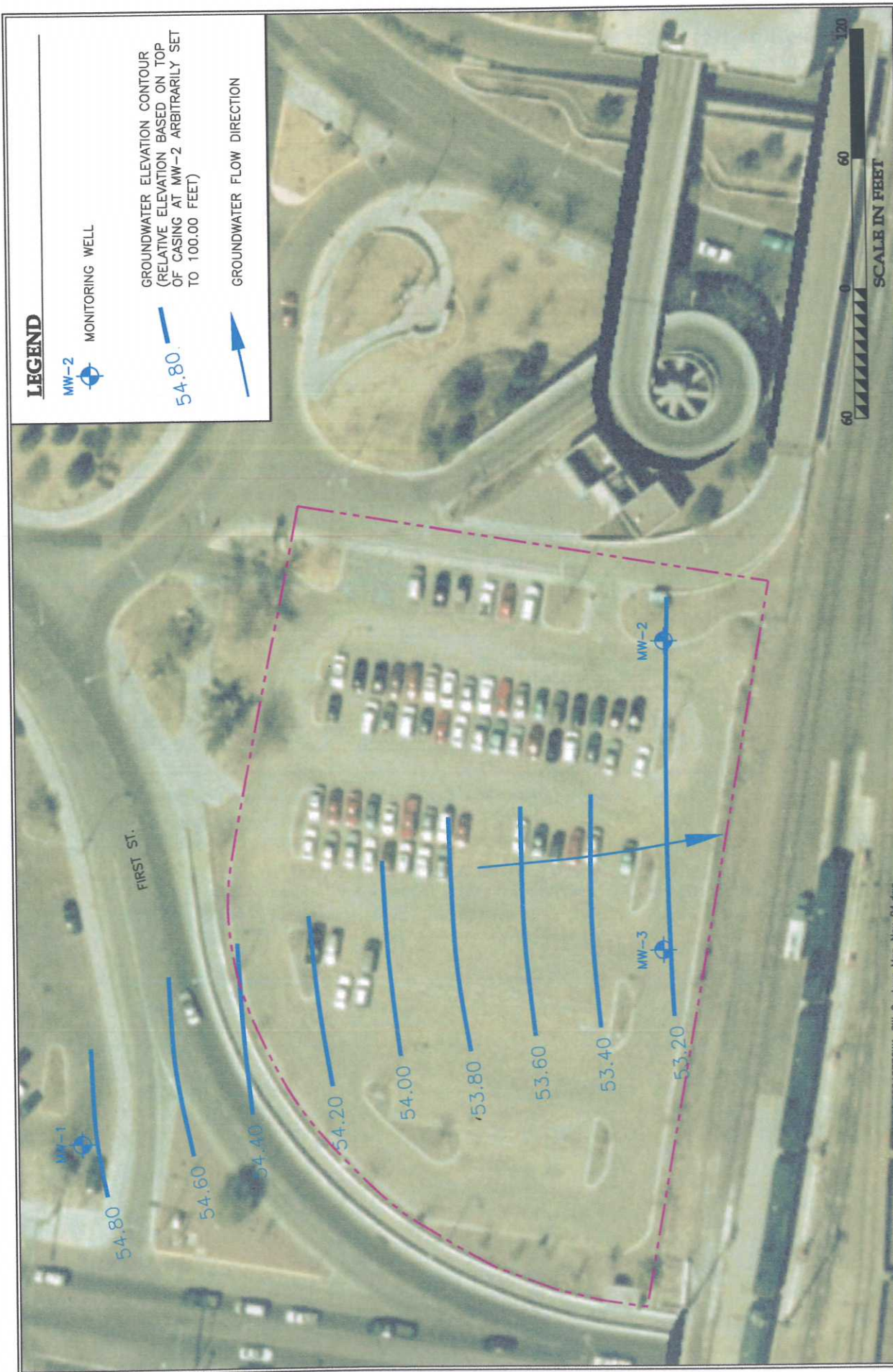
The results of the laboratory analysis of dissolved-phase hydrocarbons from the three groundwater samples submitted are presented in Table 3-5 and shown on Figure 3-3. Table 3-5 also shows groundwater monitoring results from the investigation conducted in July 2004 by AMEC. Groundwater analytical laboratory reports from the November 2004 investigation are included in Appendix C.

The November 2004 results shown in Table 3-5 show detections of dissolved-phase hydrocarbons in just one of the three wells sampled (MW-3, with a total PAH concentration of 8.507 µg/L). BTEX was not detected above reporting limits in any of the wells sampled. No dissolved-phase hydrocarbon standards were exceeded during the November 2004 event.

The July 2004 results from AMEC's Phase II ESA show detections of PAH compounds in wells MW-2 and MW-3, with concentrations of 0.12 µg/L and 156.1 µg/L, respectively. During this event, MW-3 contained concentrations of total naphthalenes above the New Mexico Water Quality Control Commission (NMWQCC) standard of 30 µg/L, with a total naphthalene concentration of 139 µg/L. No other dissolved-phase hydrocarbon standards were exceeded. There were no detections of BTEX compounds during the July 2004 event (AMEC, 2004).

3.4 *GROUNDWATER SAMPLING QA/QC*

For the purpose of assessing sampling procedures and the laboratory's performance, QA/QC samples were collected and submitted along with the groundwater samples, and the laboratory ran appropriate blanks and spiked samples. The field QA samples associated with the groundwater sampling included one laboratory-prepared trip blank. The results reported for this



LEGEND

MW-2



MONITORING WELL

GROUNDWATER ELEVATION CONTOUR
(RELATIVE ELEVATION BASED ON TOP
OF CASING AT MW-2 ARBITRARILY SET
TO 100.00 FEET)

54.80

GROUNDWATER FLOW DIRECTION

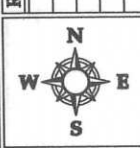


F:\RM106\B\BEN\0024377 Albq Arena - RM106\0024377DW1 GW Contour Map Nov 04.dwg

THE BNSF RAILWAY COMPANY
ALBUQUERQUE ARENA - ALBUQUERQUE, NEW MEXICO
**GROUNDWATER ELEVATION
CONTOUR MAP**
NOVEMBER 9, 2004

FIGURE	DESIGNED	CMH
3-2	DRAWN	RJE
	CHECKED	
DATE	DATE	TIME
	Apr 12, 2005	4:47 pm

Environmental Resources
Management
2201 Buena Vista, S.E.
Suite 305
Albuquerque, New Mexico 87106
(505) 243-3330
ERM



REVISION	DESCRIPTION	DATE

Table 3-5. Dissolved-Phase Hydrocarbon Results
Groundwater Monitoring
Proposed Albuquerque Arena Site
July 26 and November 9, 2004

Chemical Analyte	Results						New Mexico Standard ($\mu\text{g/L}$)
	MW-1		MW-2		MW-3		
	7/26/04 ⁽¹⁾	11/9/04	7/26/04 ⁽¹⁾	11/9/04	7/26/04 ⁽¹⁾	11/9/04	
Benzene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	10*
Ethylbenzene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	750*
Toluene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	750*
Xylenes (total)	ND (1.0)	ND (3.0)	ND (1.0)	ND (3.0)	ND (1.0)	ND (3.0)	620*
Total BTEX	--	--	--	--	--	--	
Acenaphthene	ND (2.5)	ND (0.50)	ND (2.5)	ND (0.48)	ND (2.5)	0.842 (0.50)	NE
Acenaphthylene	ND (2.5)	ND (0.50)	ND (2.5)	ND (0.48)	ND (2.5)	ND (0.50)	NE
Anthracene	ND (0.60)	ND (0.50)	ND (0.60)	ND (0.48)	ND (0.60)	ND (0.50)	11,000**
Benzo(a)anthracene	ND (0.02)	ND (0.50)	ND (0.02)	ND (0.48)	ND (0.08)	ND (0.50)	1.2**
Benzo(a)pyrene	ND (0.02)	ND (0.50)	ND (0.02)	ND (0.48)	ND (0.02)	ND (0.50)	0.7*
Benzo(b)fluoranthene	ND (0.05)	ND (0.50)	ND (0.05)	ND (0.48)	ND (0.05)	ND (0.50)	NE
Benzo(k)fluoranthene	ND (0.02)	ND (0.50)	0.03 (0.02)	ND (0.48)	ND (0.02)	ND (0.50)	NE
Benzo(g,h,i)perylene	ND (0.03)	ND (0.50)	ND (0.03)	ND (0.48)	ND (0.03)	ND (0.50)	NE
Chrysene	ND (0.20)	ND (0.50)	ND (0.20)	ND (0.48)	ND (0.20)	ND (0.50)	117**
Dibenz(a,h)anthracene	ND (0.08)	ND (0.50)	0.09 (0.08)	ND (0.48)	ND (0.08)	ND (0.50)	0.12**
Fluoranthene	ND (0.30)	ND (0.50)	ND (0.30)	ND (0.48)	ND (0.30)	ND (0.50)	1,460**
Fluorene	ND (0.80)	ND (0.50)	ND (0.80)	ND (0.48)	7.1 (0.80)	1.444 (0.50)	1,460**
Indeno(1,2,3-cd)pyrene	ND (0.08)	ND (0.50)	ND (0.08)	ND (0.48)	ND (0.08)	ND (0.50)	NE
1-Methylnaphthalene	ND (2.5)	ND (0.50)	ND (2.5)	ND (0.48)	89 (2.5)	4.995 (0.50)	30*
2-Methylnaphthalene	ND (2.5)	ND (0.50)	ND (2.5)	ND (0.48)	35 (2.5)	ND (0.50)	
Naphthalene	ND (2.5)	ND (0.50)	ND (2.5)	ND (0.48)	15 (2.5)	ND (0.50)	
Phenanthrene	ND (0.60)	ND (0.50)	ND (0.60)	ND (0.48)	10 (6.0)	1.226 (0.50)	1,100**
Pyrene	ND (0.30)	ND (0.50)	ND (0.30)	ND (0.48)	ND (0.30)	ND (0.50)	1,100**
Total PAH	--	--	0.12	--	156.1	8.507	

Bolded values indicate detections; bolded and shaded cells indicate exceedance of NMED standard.

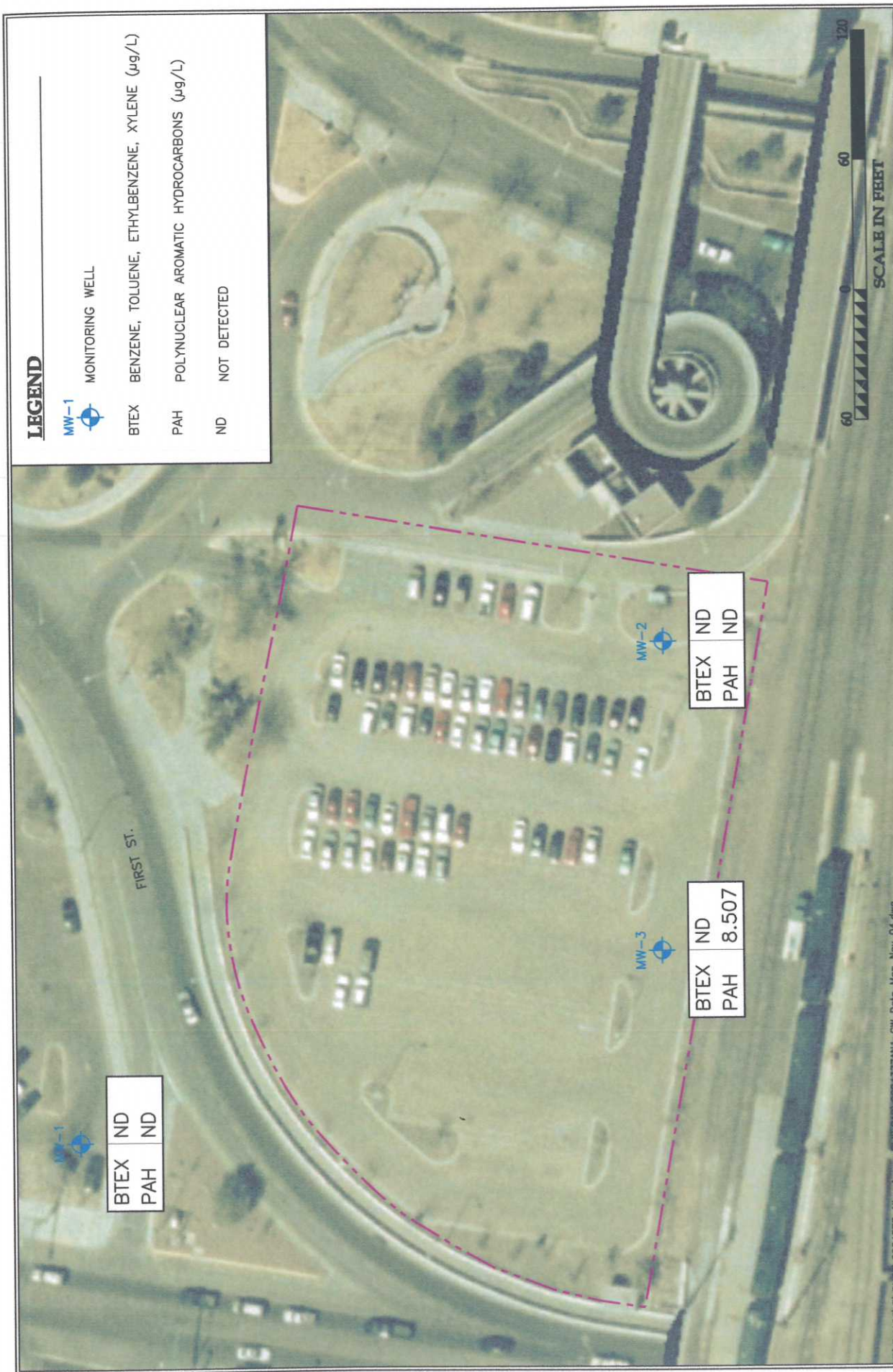
ND = Chemical analyte was not detected in sample. NE = Standard not established. (1.0) = Detection limit.

⁽¹⁾ Samples were analyzed by EPA Method 8260 full list; only reported total BTEX in table. PAH samples were analyzed by EPA Method 8310.

* New Mexico Water Quality Control Commission Standard Section 3103.A.

** New Mexico Environment Department UST Bureau Risk-Based Screening Levels (March 2000).

July 2004 samples were collected by AMEC Earth and Environmental, Inc. and analyzed by Hall Environmental Analysis Laboratory in Albuquerque, NM. November 2004 samples were collected by ERM and analyzed by Severn Trent Laboratories in Houston, TX.



LEGEND



MONITORING WELL

BTEX BENZENE, TOLUENE, ETHYLBENZENE, XYLENE (µg/L)

PAH POLYNUCLEAR AROMATIC HYDROCARBONS (µg/L)

ND NOT DETECTED

BTEX	ND
PAH	ND

BTEX	ND
PAH	8.507

BTEX	ND
PAH	ND

F:\RM106\B\BNSF\0024377 Albuq. Arena - Phil\CAO\0024377\A11 GW Data Map Nov 04.dwg

THE BNSF RAILWAY COMPANY
ALBUQUERQUE ARENA - ALBUQUERQUE, NEW MEXICO

GROUNDWATER ANALYTICAL RESULTS MAP NOVEMBER 2004

FIGURE	DESIGNED	CMH
3-3	DRAWN	RJE
	CHECKED	
DATE	Apr 12, 2005	
TIME	4:55 pm	



Environmental Resources
Management
2201 Buena Vista, S.E.
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REVISION DESCRIPTION DATE



sample, along with the laboratory quality control results, allow the evaluation of the laboratory's performance and the determination of any sample cross-contamination.

All samples were analyzed within specified holding times. The laboratory control samples, method blanks, matrix spikes and matrix spike duplicates all showed recoveries within acceptable QC limits. The trip blank did not show any evidence of transport or laboratory contamination. The data are considered valid.

4.0

SIGNIFICANCE OF RESULTS

4.1

DIRECT EXPOSURE PATHWAY

There is limited analytical data for an evaluation of the direct exposure pathway at this site (zero to two feet). In the first subsurface investigation conducted by the construction company's consultant (AMEC) there were four Geoprobe boring locations that had TPH samples collected between zero and two feet and for the follow-up investigation by BNSF there was one TPH sample collected from a depth of between two and two and one-half feet with all five of the samples showing non-detect. It is logical to conclude that if there was not TPH in these five samples there would be no or very little amounts of hydrocarbon specific constituents, such as naphthalene, in the soils either.

A previous surface soil removal action in this area by BNSF in 2001 insures that the upper two feet of soil at the site will not pose a direct exposure threat at either the residential or industrial/occupational exposure pathways.

4.2

CONSTRUCTION WORKER EXPOSURE PATHWAY

This exposure pathway is considered to extend to a depth of approximately 10 feet. There are no constituent-specific analytical data for the zero to 10 feet depth interval to compare to soil screening levels for this pathway. However, if the maximum concentration of naphthalene encountered in any sample (49,200 $\mu\text{g}/\text{Kg}$) at any depth is used as comparison it can be seen that this concentration is less than the NMED SSL for the Construction Worker Pathway (98,300 $\mu\text{g}/\text{Kg}$). The use of 49,200 $\mu\text{g}/\text{Kg}$ is a good approximation of a maximum concentration that might have been found in the zero to 10 foot depth interval as evidenced by a concentration of 28,000 $\mu\text{g}/\text{Kg}$ from a sample at a depth of five feet at a soil boring at the adjacent railroad fueling platform. This soil boring sample from the fueling platform represents a location in the center of the fueling activity at the fueling platform and thus represents a worst-case scenario.

MIGRATION TO GROUNDWATER EXPOSURE PATHWAY

There are concentrations of naphthalene in the soils in four of the Geoprobe borings that exceed the NMED Tier 1 DAF 20 Migration to Groundwater Pathway Soil Screening Level (SSL) of 393 $\mu\text{g}/\text{Kg}$. The highest concentration of naphthalene that was encountered was 49,200 $\mu\text{g}/\text{Kg}$. The average naphthalene concentration from the 18 samples collected is 3,127 $\mu\text{g}/\text{Kg}$ (a non-detect sample, for statistical purposes, is assumed to have a concentration of one-half the detection limit). Seven of the 18 samples were non-detect for naphthalene. The 95th Upper Confidence Limit (UCL) for naphthalene for the 18 samples is 7,595 $\mu\text{g}/\text{Kg}$.

In a strict comparison of the maximum concentration of naphthalene encountered in the 18 samples to the NMED DAF 20 SSL it is obvious that the maximum concentration exceeds the DAF 20 SSL (393 $\mu\text{g}/\text{Kg}$). Even using the 95th UCL or the average concentration exceeds the DAF 20 SSL.

The DAF 20 SSLs make use of an equation with specified default parameters. By using site specific data a site-specific DAF 20 can be calculated. The site specific information used in place of default parameters include the length of the source parallel to groundwater flow (30 meters), aquifer thickness (24 m), infiltration rate (0.025 meters per year), aquifer hydraulic conductivity (3,544 meters per year), hydraulic gradient (0.006 meters per meter), and width of groundwater source perpendicular to groundwater flow. By substituting these site-specific parameters into the DAF 20 SSL calculation equation a SSL of 8,380 $\mu\text{g}/\text{Kg}$ is derived. Therefore, a concentration of naphthalene at 8,380 $\mu\text{g}/\text{Kg}$, extending from the surface to the groundwater table, would be protective of the NMWQCC standard of 30 $\mu\text{g}/\text{Kg}$ at the downgradient edge of the source mass of soil impact.

Based on the distribution of the sampling data it is pretty obvious that the actual concentration of naphthalene in the soil, from the surface to the groundwater table at the site is not the maximum concentration encountered.

In fact, the maximum concentration encountered (49,200 $\mu\text{g}/\text{Kg}$) is more than 15 times greater than the next highest concentration and the average concentration of the samples. The representative site concentration of naphthalene is in actuality much lower than the maximum concentration. To be conservative, the 95th UCL was calculated for all of the sampling data, and used as a comparison to the site-specific DAF 20 SSL.

The calculated 95th UCL of 7,595 $\mu\text{g}/\text{Kg}$ is less than the site-specific DAF 20 SSL and thus this concentration of naphthalene in the soils from the surface to the groundwater table would be considered protective of the groundwater standard for naphthalene at a receptor point immediately downgradient of the source soil mass.

Appendix D contains the back-up calculations for the site-specific DAF 20 for naphthalene.

CONCLUSIONS

The impact of petroleum hydrocarbon in the soils beneath the proposed Arena Site does not exceed NMED Tier 1 screening levels for residential or construction worker direct exposure pathways. In addition, using a statistical site representative concentration (95th UCL) and incorporating site-specific data into the DAF 20 Migration to Groundwater Pathway SSL equation indicates that the existing impact of naphthalene, the only compound exceeding Tier 1 DAF 20 SSLs, is not great enough to impact groundwater above the NMWQCC standard for naphthalene. The data does not support further action for the hydrocarbon impact to the soils beneath the site.

The initial groundwater sampling data by the construction company's consultant indicated an exceedance of the total naphthalenes standard of 30 µg/L. However, follow-up sampling by ERM did not show an exceedance of NMWQCC standards. Because of the conflicting groundwater monitoring data collected it is probably appropriate that continued groundwater monitoring be done and incorporated into the existing groundwater monitoring program at the adjacent Albuquerque rail yard.

Groundwater flow is from the proposed Arena Site property toward the adjacent rail yard. There is existing dissolved-hydrocarbon in the groundwater beneath the adjacent fueling platform. Groundwater monitoring data for the past four years at the adjacent Albuquerque rail yard indicate that biodegradation of dissolved-petroleum hydrocarbon is occurring. Therefore, if there is a small amount of hydrocarbon dissolved in the groundwater beneath the proposed Arena Site it will, in all likelihood, degrade over time as it is doing in the rail yard.

BNSF has implemented some surface equipment cleanup activities at the adjacent north fueling platform that will eliminate any potential continuing sources of hydrocarbon. In March 2005, the five fuel cranes that were at the

platform were removed and the pipe to the fueling cranes was capped. Prior to the removal of the fueling cranes the pipes to the fueling cranes were evacuated with a pumper truck to remove any diesel fuel remaining in the lines. There was not a lot of diesel fuel in the pipe to the north fuel cranes but there was some.

Currently fueling is done using direct truck loading which means that a tanker truck with fuel is pulled up adjacent to the locomotive and the fuel from the tanker truck is pumped into the locomotive. The risk of a spill of any significance is almost nil since the fueling operation is manned at all times so that immediate shutoff can occur. Other safeguards include placing a plastic tub beneath the fueling nozzle to catch any drips.