SEP 30 1992

Station #21

ENGINEERING DATA TRANSMITTAL

Page 1 of 2

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16. KEY

Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
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1	2	Cog. Mgr. W. L. Johnson		9/30/92	H4-55	R. P. Henckel			H4-55	2	
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7. Abstract

N/A

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9. Impact Level ~~3~~ 4 QL

10. RELEASE STAMP

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FIGURES

TABLES

1.0 INTRODUCTION

This report summarizes remediation efforts at the 3000-1, -2, -3, -4, -5, and -6 underground storage tanks (UST). Thirteen UST were exhumed and removed from the Hanford Site 3000 Area from 1989 to 1991. During removal of six UST, evidence was found of leakage and soil contamination. Contaminated soil was removed and sampling was performed to assess success of remediation efforts.

2.0 SITE BACKGROUND

DO NOT MICROFILM

The 3000 Area is part of the 560 mi^2 Hanford Site operated by the U.S. Department of Energy (DOE)-Richland Field Office in southeastern Washington State (Figure 1). The 3000 Area includes a 61-acre fenced-in parcel located within the city of Richland and located immediately west of one of the city of Richland's water supply recharge basins. The site of the UST remediation effort is approximately 900 ft west of the city of Richland's groundwater recharge basins, and approximately 1 mi from the Columbia River (Figure 2). The fenced area is within the 1100-EM-3 Operable Unit. The six UST and all remediation efforts that are the subject of this report are within this operable unit.

Most of the facilities in the fenced area were originally constructed in 1951 by the U.S. Army Corps of Engineers to support Hanford construction activities. In 1961, the site was assigned to a construction services company to support construction of the Fast Flux Test Facility. The area houses a fabrication shop, equipment maintenance shop, a warehouse, facilities projects design office, and a project management office. The fenced area has approximately 20 permanent structures and seven mobile trailers. Utility locations in the vicinity of the site are shown in Figure 3.

The 1207-A Building was constructed in 1950 as a fuel pumphouse, which was used to house fuel pumps and the system valve pit. The 1207-A Building was a single-story, wood structure with approximately 290 ft^2 of floor space. A concrete pad with fuel pumps to load diesel fuel tank trucks was located approximately 15 ft south and 50 ft west of the 1207-A Building.

Four fuel UST (3000-1, -2, -3, -4), each with a 15,000-gal capacity, were located immediately adjacent to the 1207-A Building. The facility was removed from service in 1975, and the UST were removed in early 1991. The 3000-5 and -6 UST, located south of the 3000-1, -2,- 3,- 4 UST, were removed in 1989. An as-built schematic for the 3000 Area UST facility, showing the former locations of fuel transfer lines, UST and buildings, is presented in Figure 3.

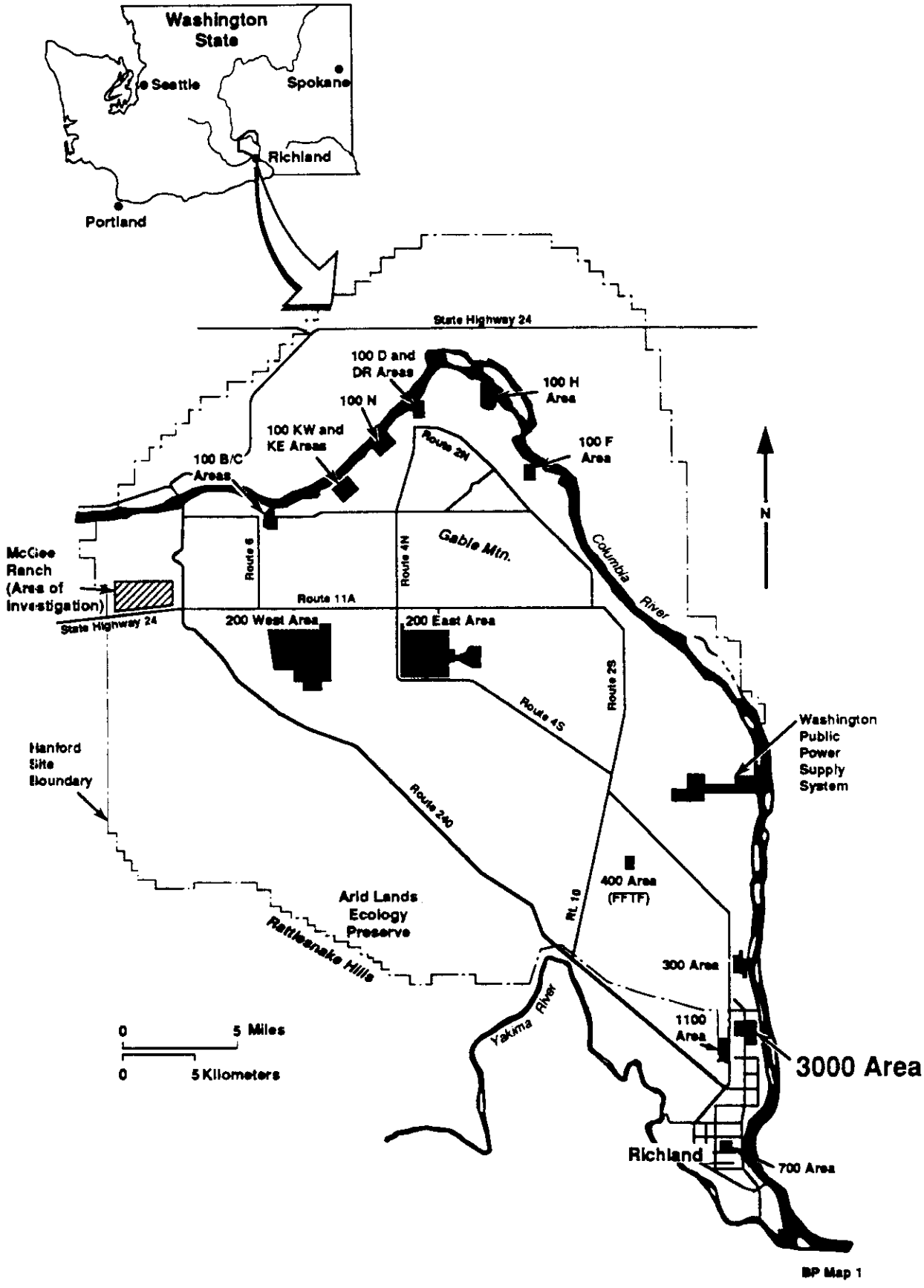

Figure 1. Hanford Site Map.

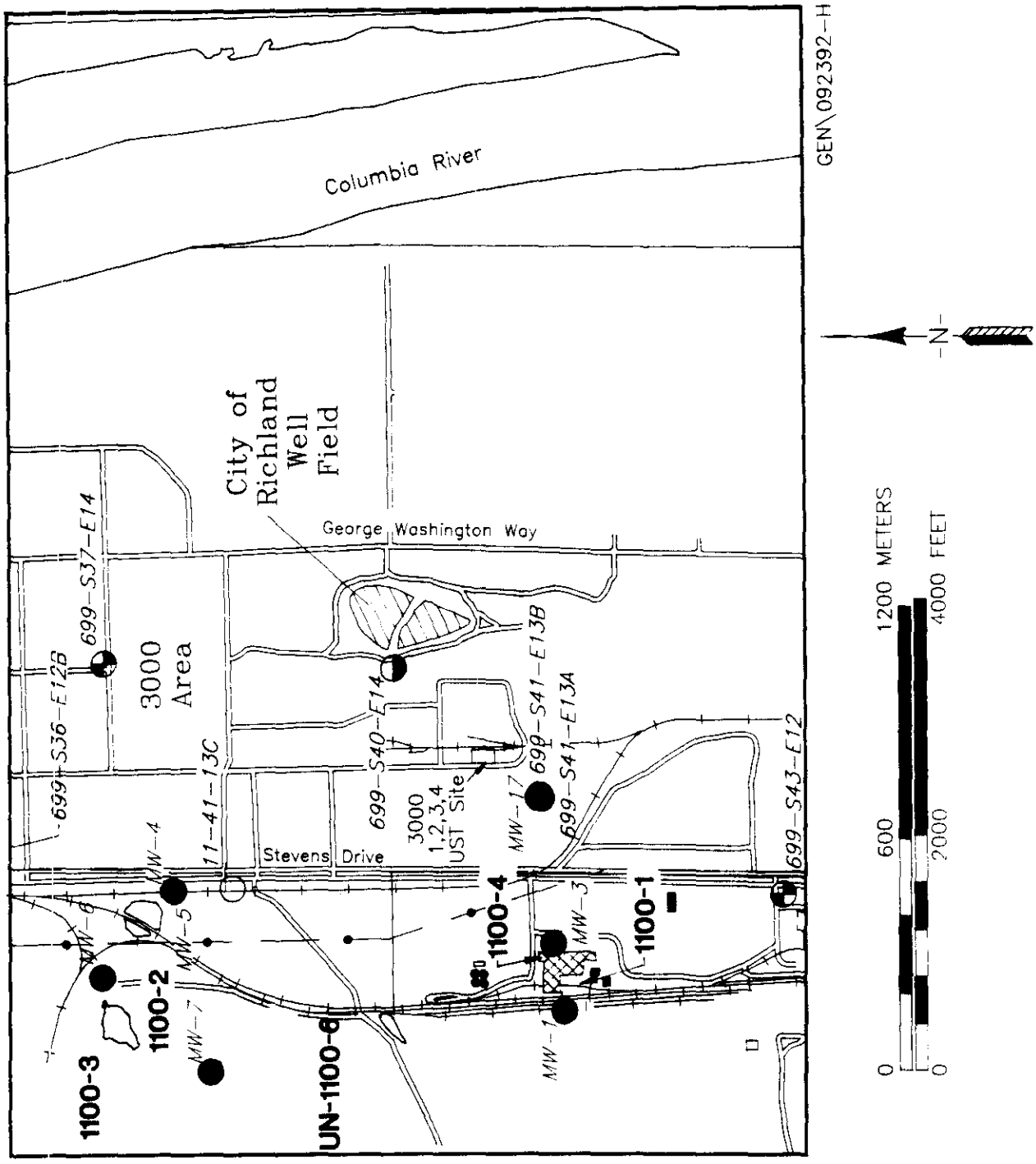

Figure 2. 3000 Area Underground Storage Tank Location.

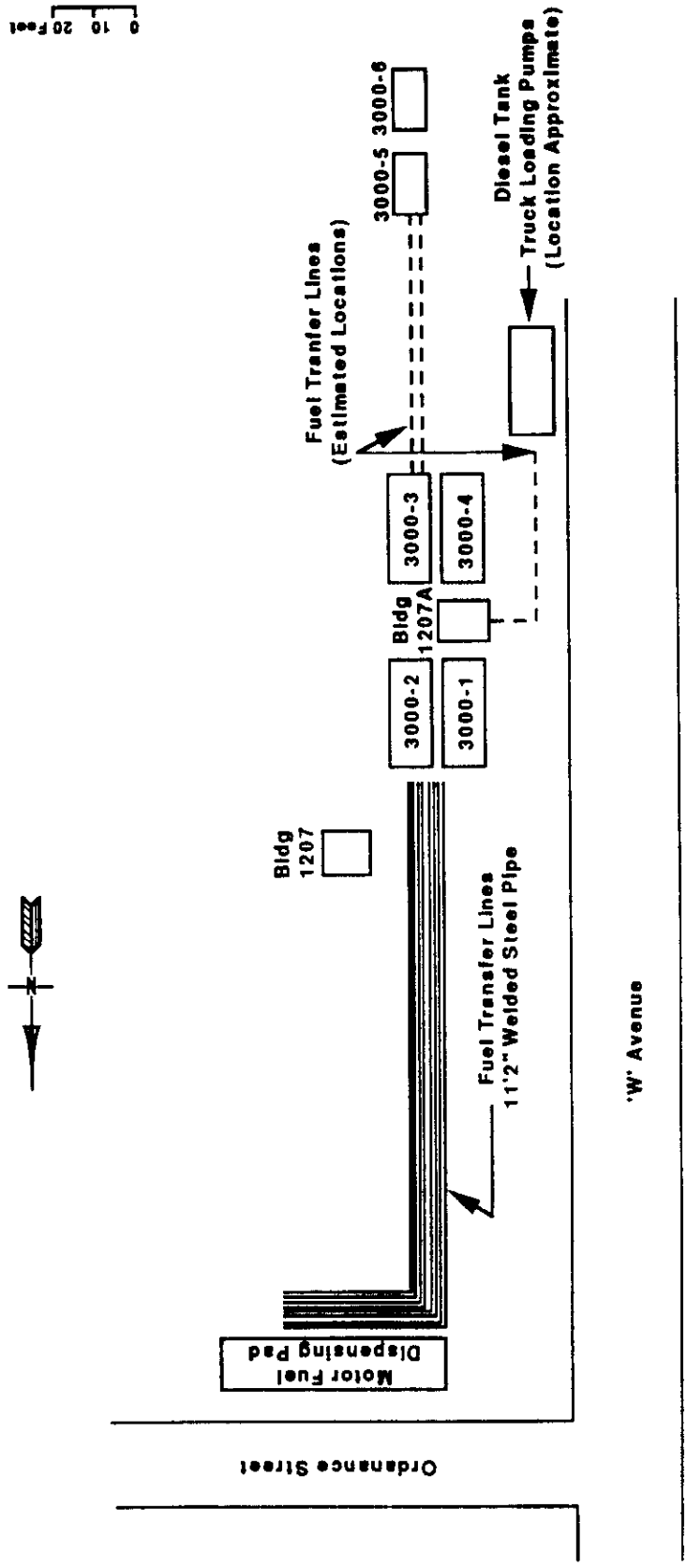

Figure 3. Utility Locations in the 3000 Area.

3.0 SITE-SPECIFIC HYDROGEOLOGY

The 3000 Area UST were installed in the coarse-grained Pasco Gravels of the upper Hanford formation, a Quaternary age, glacio-fluvial flood deposit. The Hanford formation in the vicinity of the 3000 Area is estimated to be approximately 50 ft thick and is in disconformable contact with sands and gravels of the upper Ringold Formation (DOE-RL 1989).

Groundwater in the vicinity of the release site occurs in an unconfined aquifer approximately 50 to 60 ft below ground surface (BGS). The unconfined aquifer exhibits high permeability, particularly in the Pasco Gravels. Aquifer tests and groundwater modeling indicate transmissivities in the Hanford formation of greater than 100,000 ft^2/day (DOE-RL 1989). Storativity and transmissivity measurements collected during aquifer testing at the Richland recharge basins, located approximately 900 ft east of the site, were 0.11 and 86,000 ft^2/day, respectively. Transmissivity and storativity for the Ringold Formation range from the 10,000 ft^2/day to 100,000 ft^2/day and 0.0002 to 0.05, respectively (DOE-RL 1989).

Studies conducted at the 3000 Area have estimated maximum groundwater flow velocity beneath the site at 170 ft/year (DOE-RL 1989). Regional groundwater flow beneath the site is generally from west to east, controlled by the elevation difference between the Yakima and Columbia rivers.

Several factors complicate the groundwater flow system in the 3000 Area. The dominant factor is the groundwater mound generated from the city of Richland recharge basins. The city of Richland is currently pumping water into the basins at a 2:1 to 5:1 ratio in excess of water usage during approximately 11 months of the year. The recharge basins are normally drained for 1 month during the spring for maintenance.

The groundwater mound resulting from recharge introduces a westward component to groundwater flow in the vicinity of the 3000 Area UST site. Additional factors affecting the groundwater flow system include spatial differences in the hydraulic conductivity of the unconfined aquifer, variations in river stage, and yearly pumping patterns.

Groundwater monitoring wells within the 3000 Area are sampled quarterly as part of the 1100-EM-1 Operable Unit investigation. Analytical results of samples collected from monitoring wells MW-17, SB41-13A, and SB41-13B, located approximately 800 ft southwest of the former tank location, and well SB40-E14, located approximately 1,000 ft northeast of the site, do not indicate the presence of gasoline or diesel fuel constituents. Groundwater sample analyses obtained from the Richland well field also do not indicate gasoline or diesel fuel contamination.

Assuming a release history of 20 years and a maximum annual flow velocity of 170 ft/year, the maximum distance for contamination migration could be estimated at 3,400 ft. However, because of the influence of groundwater mounding at the recharge basins and based on the results of groundwater quality monitoring, migration of hydrocarbon constituents beneath the site is anticipated to be limited. Therefore, the focus of the subsurface investigation has been in the immediate vicinity of the former 3000-1, -2, -3, and -4 UST and the former fuel transfer lines.

4.0 TANK CHARACTERIZATION

4.1 3000-1, -2, -3, -4 UST

4.1.1 Tank Removal

3000-1 and -2 UST were 9 ft x 32 ft and approximately 2.5 ft BGS. Fittings for transfer lines were located approximately at the middle of the tanks near the bottom. Tank 3000-1 had two fittings, one on each side. Tank 3000-2 had one fitting on the west side.

After excavation and tank removal, field readings showed the north end of the excavation to be clean. All fittings showed some contamination between moderate and high levels. Soil near the south end of the 3000-1 tank was contaminated. The south end of 3000-2 tank had levels of contamination that were barely detectable on field instruments.

Examination of 3000-3 and 3000-4 tank excavations showed no significant levels of contamination in tank bottoms. Exceptions were the north end, which had high contamination in tank 3000-3 and moderate contamination in tank 3000-4. Also, low levels of contamination were detected at the transfer line fitting in 3000-4 tank.

4.1.2 Cleanup Excavation

Isolated areas of petroleum contamination were located by field instruments after removal of the UST. These "hot spots" were cleaned up in the areas beneath the tanks.

The area between tanks 3000-1 and -2, and 3000-3 and -4, (under the area occupied by the 1207-A pumphouse) was found to be the major area of contamination. Contaminated soil was removed to a depth of approximately 45 ft BGS. Contaminated soil removed from the site was placed on plastic sheeting, in spoil piles near the site. At a depth of approximately 45 ft BGS, remediation efforts were stopped due to safety concerns about the excavation depth. Continued soil removal would require reconfiguration of the existing excavation to maintain safe slope conditions. Field instruments identified petroleum contamination in the soil at 45 ft BGS. Soil removal was not continued pending examination of data.

4.1.3 Contamination Identification and Site Monitoring

Petroleum contamination was identified approximately in the center of the excavation resulting from the removal of 3000-1, -2, -3, and -4 UST. Contamination was excavated to approximately 45 ft BGS. This depth is approximately 5 to 15 ft above groundwater.

The excavation remained open for 9 months while data was evaluated and further actions planned. A remediation plan was prepared (WHC 1991) that specified soil and groundwater sampling and monitoring. This plan has been implemented and is complete except for ongoing groundwater monitoring.

In November 1991, the excavation was filled with "clean" soil in preparation for drilling three groundwater monitoring wells. Wells were drilled in November and December 1991 (Figure 4). Soil samples collected during drilling showed no petroleum contamination in the soil. Groundwater from the wells was sampled in February, July, and September 1992. No petroleum contamination has been identified in groundwater samples.

Lead in soils beneath the 3000-1, -2, -3, and -4 UST was generally in the range of 10 to 70 ppb (low <1, high 417 ppb). Soil samples collected during well drilling at the site had lead levels <1 through 37 ppb. Lead in groundwater has generally been below detection limits (seven samples below detection limits, two samples $\leq$10 ppb) (Table 1). However, specific lead samples were not collected due to confusion in direction to the samplers. Lead analysis was taken from volatile organic analysis sample bottles that were not properly preserved for lead analysis. Lead in groundwater from the 1100-EM-1 Operable Unit is generally in the range of 1 to 3 ppb (DOE-RL 1992).

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4.2 3000-5 AND 3000-6 UST

Tanks 3000-5 and 3000-6 were located approximately 70 ft south of the 3000-1, -2, -3, -4 UST. They were arranged in a line with the long axis running north-south. Tank 3000-5 was to the north. Tank dimensions for the 3000-5 tank were 7 ft 6-in. by 30 ft 3 in. and the 3000-6 tank were 7 ft 6 in. by 30 ft 5 in. The excavation for tank removal was approximately 40 ft by 110 ft. The top of the tanks were approximately 3 ft below grade prior to excavation.

The 3000-5 and 3000-6 tanks appeared to be in very good condition based on observation prior to removal. Investigation found the tank impression to be clean except the area between the tanks.

During excavation of the 3000-5 tank, some contaminated soil was found near the surface, around the riser pipe. Soil near the tank was checked with an HNU (a trademark of HNU Systems, Inc.) and organic vapors were discovered. Soil was field screened using head space in a plastic bag and an HNU. The reading was 150 ppm. Contaminated soil was removed to the contaminated spoil pile.

During excavation of 3000-6 tank an inspection revealed no obvious holes or leaks. A dark stained area near the north end of 3000-6 tank was field screened using head space in a plastic bag. The reading was 65 ppm. Field screening was performed near the middle of the tank and readings were 0. Some contamination was found on the west side of the tank impression. Contaminated soil was later removed to the contaminated spoil pile. Confirmation sampling demonstrated that no contamination remained.

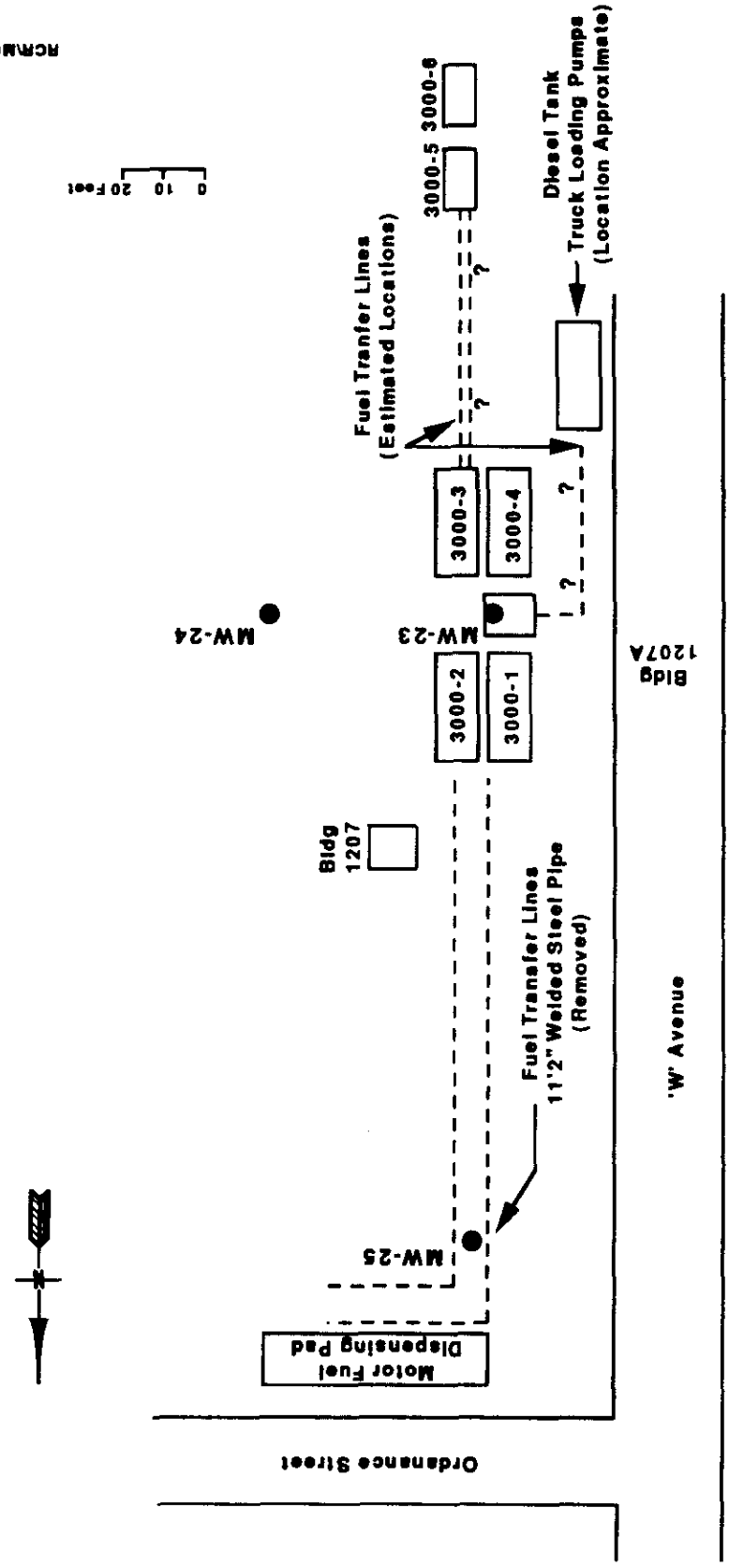

Figure 4. Groundwater Monitoring Wells Drilled in November/December 1991.

Table 1. Soil Sampling - Tank Removal. (sheet 1 of 2)

Sample No.	Tank	Note	EA*	SO*	Depth	TPH%	BNA	VOA	Pb (ppb)
KA-101		eq blk				-	-	-	ND
KA-102		trip blk				-	-	-	ND
KA-103	3		5	0	TB	-	ND	ND	16
KA-104	3		7	18	TB	-	ND	ND	40
KA-105	3		5	24	TB	-	ND	ND	26
KA-106	3		6	13	TB	-	ND	ND	5.8
KA-107	3	fitting	2	21	TB	-	ND	ND	25
KA-108	3		0	5	TB	-	ND	ND	128
KA-109	3		7	10	TB	-	ND	ND	20
KA-110	3		5	7	TB	-	ND	ND	4.0
KA-111	3		3	10	TB	-	ND	ND	10
KA-112	4		3	19	TB	-	ND	ND	29
KA-113	4	dup	5	0	TB	-	ND	ND	72
KA-114	4	dup	5	0	TB	-	ND	ND	63
KA-115	4	fitting	2	17	TB	-	ND		46
KA-116	4		2	5	TB	-	ND	ND	34
KA-117	4		1	10	TB	-	ND	ND	16
KA-118	4		8	14	TB	-	ND	ND	6.8
KA-119	4		8	5	TB	-	ND	ND	14
KA-120	4	fitting	7	21	TB	-	ND		75
KA-121	4		7	6	TB	-	ND	ND	28
KA-122	4		9	10	TB	-	ND	ND	21
KA-123	1		6	0	TB	0.077			75
KA-124	1		6	25	TB	0.010			6.3
KA-125	1		2	22	TB	0.027			13
KA-126	1		6	2	TB	0.008			15
KA-127	1		7	17	TB	0.011			60
KA-128	1	fitting	2	15.5	TB	0.407			22
KA-129	1		9	4	TB	0.028			63
KA-130	1	fit/dup	6	15.5	TB	0.078			72/63
KA-131	1	fit/dup	6	15.5	TB	0.139			43
KA-132	1		9	8	TB	0.022			417
KA-133	2		4	1	TB	0.012			46
KA-134	2		6	9	TB	0.068			122
KA-135	2		5	31	TB	0.002			8.6
KA-136	2		9	8	TB	0.111			23
KA-137	2		1	24	TB	0.004			50

Table 1. Soil Sampling - Tank Removal. (sheet 2 of 2)

Sample No.	Tank	Note	EA*	SO*	Depth	TPH%	BNA	VOA	Pb (ppb)
KA-138	2		2	18	TB	0.004			17
KA-139	2		4	13	TB	0.005			4.3
KA-140	2	fitting	2	15.5	TB	0.015			61E/75E
KA-141(?)	4	clay	2	17.5	TB-	ND			0.69
KA-142(?)	4	clay	2	17.5	TB-	0.001			7.8E
KA-143	A		10	14	TB-2	0.006			11/4.4
KA-144		blank				ND			ND
KA-145	A		11	18	TB-7				
KA-146		blank				ND			ND
KA-147	A		24	16	wall	ND			0.71
KA-148	1		2	15	TB-5	ND			1.5
KA-149	A		6	22	TB-	ND			1.8
KA-150	A		-4	30	wall	0.002			2.3
KA-151	A		-6	30	wall	ND			1.3
KA-152	A		22	30	wall	ND			0.91
KA-153	A	dup	26	38	TB-	0.001			0.26
KA-154	A	dup	26	38	TB-	0.002			3.0
KA-155		blank				0.001			ND
KA-156	A		10	39	TB-	0.001			2.6
KA-157	A		-5	47	wall	ND			3.5
KA-158	5/6	dup	w/middle		TB-6	0.001			2.1
KA-159	5/6	dup	w/middle		TB-6	0.001			2.2
KA-160		blank				0.001			0.70
KA-161	5/6		middle		TB-6	0.003			2.2
KA-162	5/6		middle		TB-10	0.002			1.2
KA-163	T line		north			0.027			11E
KA-164	T line		N-40			0.036			6.6E
KA-165	T line		N-80			0.091			6.5E

* EA = Indicated number of feet east of the baseline point 0,0.
SO = Indicates number of feet south of the baseline point 0,0.
0,0 is located at the northwest corner of each tank.
Samples identified under tank "A" were collected after excavation eliminated observable tank locations. 0,0 baseline for these samples was the northwest corner of tank 3000-1.

(?) = Sample numbers not recorded in field logbook.

Table 2. Borehole Sampling.

Sample No.	Well	Note	Depth (ft)	TPH	BETX (ppm)	Pb (ppb)	Date (1991)
B01CH3	MW-24		4	ND	.12 X	37.0	11/19
B01CH4	MW-25		8	ND	ND	2.5	11/25
B01CH5	MW-23		47	ND	ND	4.4	12/03
B01CH6	MW-24	dup	19	ND	ND	4.8	11/20
B01CH7	MW-24	dup	19	ND	ND	5.1	11/20
B01CH8	MW-25	dup	23	ND	ND	2.4	11/25
B01CH9	MW-23	dup	49	ND	ND	22.0	12/06
B01CJ0	MW-25	dup	23	ND	ND	1.9	11/25
B01CJ1	MW-23	dup	49	0.02	ND	3.3	12/04
B01CJ2	MW-24	eq blk	-	ND	ND	1.6	11/20
B01CJ3	MW-24		44	ND	ND	4.5	11/20
B01CJ5	MW-24		3				11/19
B01CJ6	MW-24	fld blk	-	ND	ND	8.5	11/20
B01CJ7	MW-24	tr blk	-	ND	ND		11/21
B01CJ8	MW-23	fld blk	-	ND	ND	0.7	12/06
B01CJ9	MW-23	tr blk	-		ND		12/04
B01CK0	MW-25	tr blk	-	ND	ND		11/26
B01CK1	MW-25	eq blk	-	ND	ND	0.8	11/26
B01CK2	MW-25	fld blk	-	ND	ND	0.7	11/26
B01CK3	MW-23	eq blk	-	ND	ND	0.9	12/04
B01CK4	MW-25		48	ND	ND	2.4	11/26

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Table 3. Groundwater Monitoring.

Sample No.	Well	Note	8240	BETX (ppm)	Pb (ppm)	TPH	TPA	Date (1992)
B05XQ1	MW-23			ND	ND	ND		2/19
B05XQ2	MW-23						ND	2/19
B05XQ3	MW-23	split						2/19
B05XQ4	MW-23	split						2/19
B05XQ5	MW-24			ND	ND	ND		2/19
B05XQ6	MW-24						ND	2/19
B05XQ7	MW-23			ND	ND	ND		2/19
B05XQ8	MW-23						ND	2/19
B05XQ9	MW-24	split						2/19
B05XR0	MW-24	split						2/19
B05XR1	MW-25			ND	ND	ND	ND	2/19
B05XR2	MW-25							2/19
B05XR3	MW-25	split						2/19
B05XR4	MW-25	split						2/19
B05XR5	MW-25			ND		ND		2/19
B06CZ3	MW-24			ND				7/07
B06CZ4	MW-24		ND		0.009			7/07
B06CZ5	MW-23			ND	0.010			7/07
B06CZ6	MW-23		ND		ND			7/07
B06CZ7	MW-25			ND	ND			7/07
B06CZ8	MW-25		ND		ND			7/07
B06CZ9	MW-23			ND				7/07
B06D00	MW-23							7/07
B06D01	MW-25			ND				7/07
B06D02	MW-25			ND				7/07
B06D03	MW-24			ND				7/07
B06D04	MW-24							7/07

4.3 SUMMARY AND FOLLOW UP

Small pockets of contaminated soil were found during removal of 3000-5 and 3000-6 UST. This soil was removed, and confirmation sampling indicated that cleanup had been effective. At the conclusion of tank removal and excavation in February 1991, hydrocarbon contamination remained in the soils beneath the 3000-1, -2, -3, and -4 UST. The excavation remained open until November 1991. In November, groundwater monitoring wells were drilled at the site of the 3000-1, -2, -3, and -4 UST. Soil samples were collected as part of drilling (Table 2).

Hydrocarbon contamination was not detected in soil samples collected during well drilling or in groundwater samples collected at the site (Table 3). Lead in the soils beneath the 3000-1, -2, -3, and -4 UST was elevated above general sitewide background expectations (DOE-RL 1992).

Groundwater monitoring will continue in 1993 in accordance with the remediation plan. Samples will be analyzed for Total Petroleum Hydrocarbons (EPA Method 3510/8015) and (EPA Method 5030/8015), BETX (EPA 5030/8020), and Total Lead (EPA Method 3010/7421). Decisions regarding future work or closure at the 3000-1, -2, -3, and -4 UST site will be made after at least 1 year of groundwater monitoring.

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4

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Title of Conference or Meeting	Group or Society Sponsoring
NA	NA

Date(s) of Conference or Meeting	City/State	Will proceedings be published?	Will material be handed out?
NA	NA	[] Yes [X] No	[] Yes [X] No

Title of Journal: NA

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