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QUARTERLY ENVIRONMENTAL DATA SUMMARY, FIRST QUARTER 1992

Enclosed for your information and use is a copy of the Quarterly Environmental Data Summary. This document summarized the environmental monitoring data for the first Quarter 1992, highlights any potentially significant findings, and offers preliminary interpretations. Final interpretations will appear in the 1992 Annual Site Environmental Report.

Two items were highlighted in the document. First, toluene was detected in nine samples. Toluene is not a contaminant at the WSSRAP. After data validation rejected the nine suspect data points and negative results were obtained on resampling, further investigation revealed that the tape used to secure labels to the sample vials was a likely source for the sample contamination. Second, methylene chloride was detected in one sample. Methylene Chloride, used to clean laboratory glassware, is one of the most common laboratory contaminants. Data validation rejected this suspect data point.

In summary, no significant differences were observed in off-site exposures during the first quarter of 1992 relative to previous quarters.

If you have any questions, please call Alan Gibson.

Sincerely,

Stephen H. McCracken
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

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QUARTERLY ENVIRONMENTAL DATA SUMMARY - FIRST QUARTER 1992

Weldon Spring Site Remedial Action Project
Weldon Spring, Missouri

JUNE 1992 **REV. 0**

U.S. Department of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

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DOE/OR/21548-299

Weldon Spring Site Remedial Action Project

Quarterly Environmental Data Summary - First Quarter 1992

Revision 0

June 1992

Prepared by

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for the

U.S. DEPARTMENT OF ENERGY
Oak Ridge Operations Office
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ABSTRACT AND WELDON SPRING SITE QUARTERLY SELF ASSESSMENT FIRST QUARTER 1992

The purpose of this *Quarterly Environmental Data Summary* is to provide to the public preliminary data acquired as part of the Weldon Spring Site Remedial Action Project (WSSRAP) environmental monitoring program. The document summarizes the preliminary environmental data, highlights any potentially significant findings, and offers tentative interpretations. Validated data and final interpretations will appear in the 1992 Annual Site Environmental Report.

This report includes preliminary data from environmental monitoring activities at the Weldon Spring site (WSS) during the first quarter of 1992. Groundwater, surface water, and air samples were collected in order to monitor potential exposure pathways. Analytical parameters included radionuclides, nitroaromatic compounds, inorganic anions, and direct gamma exposure. The results are used to evaluate possible exposure scenarios and assess the impact of the contaminants at the site on potentially exposed populations.

In summary, no significant differences were observed in off-site exposures during the first quarter of 1992 relative to exposures calculated in previous quarters. Contaminated groundwater did not affect the St. Charles County well field.

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1 INTRODUCTION

This document is the eighth in a series of quarterly reports which summarize the findings from the routine environmental monitoring programs at the Weldon Spring Site Remedial Action Project (WSSRAP). These documents supplement the Annual Site Environmental Report (ASER) by providing interested outside agencies and organizations with more frequent access to WSSRAP data. They provide data resulting from routine environmental sampling as described in the WSSRAP *Environmental Monitoring Plan* (EMP) (MKF and JEG 1992) and a brief interpretation of that data.

It is the goal of this document to summarize and briefly discuss the data, highlighting data that differ significantly from historical observations. The full interpretation of these data (as well as data in other quarterly summaries) will be undertaken in the 1992 ASER. It is recommended that interested readers refer to previous EMPs, ASERs, and project documents for more information on existing site conditions, site history, transport mechanisms, and quantified contaminant levels. The monitoring scheme for every calendar year is established prior to that year in the annual EMP. Each sampling location to be monitored during the upcoming year is identified in the EMP and the schedule of analytical parameters is tabulated for easy reference. These reports may be obtained by visiting the WSSRAP reading room or contacting the WSSRAP Community Relations Manager at (314) 441-8086.

These quarterly reports are intended to include data from all quarterly environmental monitoring programs conducted at the WSSRAP including groundwater, surface water, National Pollutant Discharge Elimination System (NPDES), radon gas, gamma radiation, and air particulates (including asbestos and radioactive particulates). However, because of delays in data delivery from the analytical laboratories, some of the data that were expected to be included in this report are not yet available for reporting. The unavailability of data is due to a nationwide shortage in analytical services. These data will be reported in the 1992 ASER. Sludges and soils are not sampled on a routine basis; therefore, analytical results for these parameters are not included in this report. Trend analyses are being prepared from historical data for surface water, groundwater and air pathways. These analyses will be presented in the 1992 ASER. Quality control (QC) data for the first quarter and all other quarters will be presented in the 1992 ASER.

2 GROUNDWATER MONITORING

The groundwater is sampled regularly at both the Weldon Spring Chemical Plant/raffinate pits/vicinity properties (WSCP/RP/VP) and the Weldon Spring Quarry (WSQ). Due to differences in the environmental settings and sources of contaminants, separate monitoring schedules are followed. Therefore, results of groundwater monitoring at the WSCP/RP/VP and WSQ will be discussed separately.

2.1 Chemical Plant/Raffinate Pits/Vicinity Properties

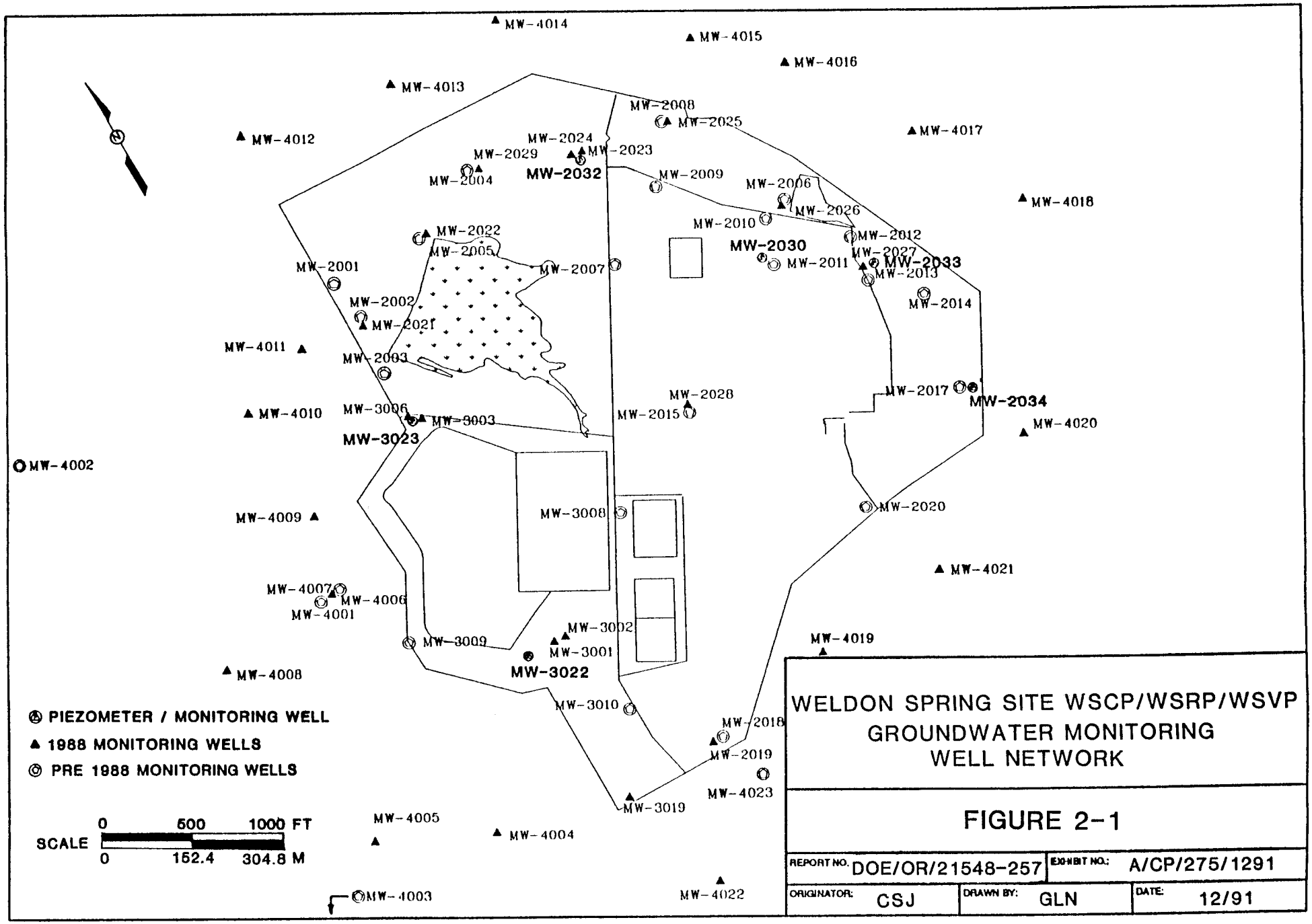
Groundwater at the chemical plant/raffinate pits/vicinity properties area is monitored on a quarterly or semi-annual basis (locations are given in Figure 2-1). The number of quarterly sampled wells has increased substantially; a complete list of wells scheduled for quarterly and semiannual sampling is given in the 1992 *Environmental Monitoring Plan* (EMP) (MKF and JEG 1992). Total uranium, inorganic anions, and nitroaromatic compounds are measured during each monitoring period for both quarterly and semiannual wells. Other radiological parameters are measured annually during the first period for all wells. Geochemical parameters (metals and inorganic anions) are measured each period for the quarterly wells only.

2.1.1 Nitroaromatic Results

Table 2-1 contains nitroaromatic data from samples collected from the quarterly monitored groundwater wells. Nitroaromatic compounds were detected in 14 of the 31 locations for which data are currently available. Concentration levels for these compounds are within their historical range. Some nitroaromatic compounds detected in monitoring wells GW-2030, GW-2032, and GW-2033 were the lowest recorded values to date.

2.1.2 Radiological Results

Total uranium results for samples from the quarterly monitored wells at the WSCP/RP/VP are presented in Table 2-2. The upper bound for natural uranium background concentration in groundwater at the WSCP/RP/VP has been determined to be 3.4 pCi/l (MKF and JEG 1989). The U.S. Environmental Protection Agency (EPA) has not yet established a drinking water standard for uranium; however, the proposed maximum contaminant



WELDON SPRING SITE WSCP/WSRP/WSVP
GROUNDWATER MONITORING
WELL NETWORK

FIGURE 2-1

REPORT NO. DOE/OR/21548-257		EXHIBIT NO.: A/CP/275/1291	
ORIGINATOR: CSJ	DRAWN BY: GLN	DATE: 12/91	

TABLE 2-1 First Quarter Nitroaromatic Data for Groundwater at the WSCP/RP/VP

Sample ID	NB (µg/l)	1,3-DNB (µg/l)	2,4-DNT (µg/l)	2,6-DNT (µg/l)	2,4,6-TNT (µg/l)	1,3,5-TNB (µg/l)
GW-2001-Q192	ND	ND	0.083	0.074	ND	0.031
GW-2002-012892	ND	ND	0.071	0.38	ND	ND
GW-2003-Q192	ND	ND	0.17	0.68	ND	ND
GW-2030-Q192	ND	ND	0.19	4.60	3.60	0.32
GW-2031			ABANDONED			
GW-2032-Q192	ND	ND	0.15	3.70	0.90	0.092
GW-2033-Q192	ND	ND	0.18	15.0	0.082	0.036
GW-3003-Q192	NA	NA	NA	NA	NA	NA
GW-3006-Q192	ND	ND	ND	ND	ND	ND
GW-3008-Q192	ND	ND	0.15	0.44	ND	ND
GW-3009-Q192	ND	ND	0.18	0.093	ND	0.17
GW-3023-Q192	NA	NA	NA	NA	NA	NA
GW-4001-010992	ND	0.22	6.00	3.50	1.30	46.0
GW-4002-Q192	ND	ND	ND	ND	ND	ND
GW-4003-Q192	ND	ND	ND	ND	ND	ND
GW-4004-Q192	ND	ND	ND	ND	ND	ND
GW-4005-Q192	ND	ND	ND	ND	ND	ND
GW-4006-Q192	ND	ND	0.16	3.60	ND	16.0
GW-4007-Q192	ND	ND	ND	ND	ND	ND
GW-4008-Q192	ND	ND	ND	ND	ND	ND
GW-4009-Q192	ND	ND	ND	ND	ND	ND
GW-4010-Q192	ND	ND	ND	ND	ND	ND
GW-4011-Q192	ND	ND	ND	ND	ND	ND
GW-4012-Q192	ND	ND	ND	ND	ND	ND
GW-4013-Q192	ND	ND	0.079	1.30	0.057	48.0
GW-4014-Q192	ND	ND	ND	0.082	0.037	0.44
GW-4015-Q192	ND	ND	0.14	1.30	ND	0.70
GW-4016-Q192	ND	ND	ND	ND	ND	ND
GW-4017-Q192	ND	ND	ND	ND	ND	ND

TABLE 2-1 First Quarter Nitroaromatic Data for Groundwater at the WSCP/RP/VP (Continued)

Sample ID	NB (µg/l)	1,3-DNB (µg/l)	2,4-DNT (µg/l)	2,6-DNT (µg/l)	2,4,6-TNT (µg/l)	1,3,5-TNB (µg/l)
GW-4018-Q192	ND	ND	ND	ND	ND	ND
GW-4019-Q192	NA	NA	NA	NA	NA	NA
GW-4020-Q192	ND	ND	ND	ND	ND	ND
GW-4021-Q192	ND	ND	ND	ND	ND	ND
GW-4022-Q192	ND	ND	ND	ND	ND	ND
GW-4023-Q192	ND	ND	0.10	0.062	ND	0.21

NA - Not Available
ND - Not Detected

TABLE 2-2 First Quarter Uranium and Inorganic Anion Data in Groundwater at the WSCP/RP/VP

Sample ID	NITRATE (mg/l)	SULFATE (mg/l)	URANIUM (pCi/l)
GW-2001-Q192	26.2	8.50	ND
GW-2002-012892	312	132	1.18
GW-2003-Q192	339	134	1.58
GW-2030-Q192	1.50	43.7	13.5
GW-2031	ABANDONED		
GW-2032-Q192	119	56.2	10.1
GW-2033-Q192	0.790	23.6	4.28
GW-3003-Q192	312	128	15.0
GW-3006-Q192	ND	23.8	ND
GW-3008-Q192	844	77.4	7.96
GW-3009-Q192	109	82.1	NA
GW-3023-Q192	308	353	10.3
GW-4001-010992	32.5	63.9	3.84
GW-4002-Q192	0.940	14.1	ND
GW-4003-Q192	0.760	33.5	ND
GW-4004-Q192	0.800	26.5	NA
GW-4005-Q192	2.00	25.3	NA
GW-4006-Q192	5.20	29.9	ND
GW-4007-Q192	0.190	14.5	3.33
GW-4008-Q192	ND	14.9	1.97
GW-4009-Q192	0.630	18.3	3.13
GW-4010-Q192	0.220	25.2	3.67
GW-4011-Q192	30.6	58.8	4.62
GW-4012-Q192	0.17	55.5	NA
GW-4013-Q192	5.20	43.5	3.60
GW-4014-Q192	5.20	27.8	4.28
GW-4015-Q192	0.20	13.3	NA
GW-4016-Q192	316	14.8	NA
GW-4017-Q192	NA	NA	NA

TABLE 2-2 First Quarter, Uranium and Inorganic Anion Data in Groundwater at the WSCP/RP/VP (Continued)

Sample ID	NITRATE (mg/l)	SULFATE (mg/l)	URANIUM (pCi/l)
GW-4018-Q192	6.29	8.00	NA
GW-4019-Q192	0.230	11.6	2.11
GW-4020-Q192	0.11	133	NA
GW-4021-Q192	ND	274	6.94
GW-4022-Q192	NA	NA	NA
GW-4023-Q192	1.89	76.2	4.62

ND - Not Detected
NA - Not Available

level (MCL) is 20 μg/l, which converts to 13.6 pCi/l (0.50 Bq/l) using a new site-specific conversion factor of 0.68 pCi/μg (assuming isotopic equilibrum). The increase to 13.6 pCi/l (0.50 Bq/l) from the previously reported value of 12 pCi/l (0.44 Bq/l) reflects improved quantification of the average U-234/U-238 activity ratios for uranium present at the Weldon Spring Site Remedial Action Project (WSSRAP). The U.S. Department of Energy (DOE) has a health-based, derived concentration guideline (DCG) of 600 pCi/l (22.2 Bq/l) in surface water effluent.

Uranium concentrations remained within historical ranges at most locations for which data are presently available. Higher than previously detected values have been recorded for GW-2030, GW-2032, GW-2033, GW-3023, GW-4013, and GW-4014. All of these higher values are only slightly elevated above previously high levels. At present, insufficient data are available to determine whether these values are part of an upward trend or are merely extremes within the normal range of variation for these wells.

Additional radiological parameters are measured for groundwater at all WSCP/RP/VP wells during the first monitoring period of each year. The results of these analyses are given in Table 2-3. Historically, concentration levels for these parameters have been below the detection limits. In general, the increase in detectable values for 1992 predominantly reflects improved analytical sensitivity rather than high concentration levels for these parameters. Exceptions are Th-230 and both radium isotopes. The elevated Th-230 values are thought to be an artifact of analytical interferences. The source of the slightly higher radium concentrations is unclear and is currently under investigation. All locations having apparently elevated Th-230, Ra-226, or Ra-228 values have been scheduled for resampling during the third quarter to confirm these results.

2.1.3 Sulfate and Nitrate Results

Sulfate and nitrate concentrations are measured during each monitoring period. Results of these analyses are given in Table 2-2. First quarter results are within historical ranges at all locations with the exception of nitrate in GW-4016. Because historical nitrate levels for this well have been below the detection limit, the first quarter measurement of 316 mg/l is being investigated. Laboratory validation has been requested for this sample.

TABLE 2-3 First Quarter Radiological Results for Groundwater at the WSCP/RP/VP

Sample ID	Th-228 (µg/l)	Th-230 (µg/l)	Th-232 (µg/l)	Ra-226 (µg/l)	Ra-228 (µg/l)	Po-210 (µg/l)	Pb-210 (µg/l)	Ac-227 (µg/l)
GW-2001-Q192	ND	1.74	ND	ND	ND	ND	ND	ND
GW-2002-012892	ND	1.43	ND	ND	ND	ND	ND	ND
GW-2003-Q192	ND	2.22	ND	ND	ND	ND	ND	ND
GW-2030-Q192	ND	ND	ND	1.00	1.10	NS	NS	NS
GW-2031				ABANDONED				
GW-2032-Q192	0.700	0.900	0.200	1.10	1.80	NS	NS	NS
GW-2033-Q192	ND	0.300	ND	1.20	ND	NS	NS	NS
GW-3003-Q192	ND	ND	ND	ND	ND	NS	NS	NS
GW-3006-Q192	ND	1.18	ND	ND	ND	ND	ND	ND
GW-3008-Q192	ND	ND	ND	0.700	2.00	NS	NS	NS
GW-3009-Q192	NA	NA	NA	NA	NA	NA	NA	NA
GW-3023-Q192	ND	ND	ND	0.300	ND	NS	NS	NS
GW-4001-010992	ND	2.61	ND	ND	ND	ND	ND	ND
GW-4002-Q192	ND	2.30	ND	0.287	ND	ND	ND	ND
GW-4003-Q192	ND	0.25	ND	ND	ND	NS	NS	NS
GW-4004-Q192	ND	ND	ND	ND	5.00	NS	NS	NS
GW-4005-Q192	ND	ND	ND	ND	5.00	NS	NS	NS
GW-4006-Q192	ND	6.63	ND	ND	ND	ND	ND	ND
GW-4007-Q192	ND	0.500	ND	3.40	ND	NS	NS	NS
GW-4008-Q192	ND	ND	0.50	ND	ND	NS	NS	NS
GW-4009-Q192	ND	ND	ND	ND	ND	NS	NS	NS
GW-4010-Q192	ND	ND	ND	ND	ND	NS	NS	NS
GW-4011-Q192	ND	ND	ND	ND	ND	NS	NS	NS
GW-4012-Q192	NA	NA	NA	NA	NA	NA	NA	NA
GW-4013-Q192	ND	ND	ND	0.400	1.10	NS	NS	NS
GW-4014-Q192	ND	ND	ND	ND	ND	NS	NS	NS
GW-4015-Q192	NA	NA	NA	NA	NA	NA	NA	NA
GW-4016-Q192	NA	NA	NA	NA	NA	NA	NA	NA
GW-4017-Q192	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 2-3 First Quarter Radiological Results for Groundwater at the WSCP/RP/VP (Continued)

Sample ID	Th-228 (µg/l)	Th-230 (µg/l)	Th-232 (µg/l)	Ra-226 (µg/l)	Ra-228 (µg/l)	Po-210 (µg/l)	Pb-210 (µg/l)	Ac-227 (µg/l)
GW-4018-Q192	NA	NA	NA	NA	NA	NA	NA	NA
GW-4019-Q192	ND	0.200	ND	ND	ND	NS	NS	NS
GW-4020-Q192	NA	NA	NA	NA	NA	NA	NA	NA
GW-4021-Q192	ND	ND	ND	ND	1.60	NS	NS	NS
GW-4022-Q192	NA	NA	NA	NA	NA	NA	NA	NA
GW-4023-Q192	ND	ND	ND	0.600	ND	NS	NS	NS

ND - Not Detected
NA - Not Available
NS - Not Sampled

2.1.4 Geochemical Results: Metals and Inorganic Anions

Table 2-4 contains the first quarter geochemical data (metals and inorganic anions) for quarterly monitored wells at the WSCP/RP/VP area. In 1992, the WSSRAP increased both the number of wells and the frequency of sampling for geochemical parameters. Many of these wells (especially in the GW-40XX and GW-203X series) had been sampled only two or three times prior to 1992, with the most recent sampling event occurring in 1988 or 1989. Thus comparisons with past concentration levels are inconclusive. For the majority of the wells, concentrations for the first quarter of 1992 are consistent with previously measured values; however, notable exceptions were observed for the GW-203X wells, which contained high levels of aluminum, iron, manganese, and moderately elevated lead. The source of these elevations is unclear and is currently being investigated. Improved analytical sensitivity has resulted in an increase in the number of wells showing detectable concentrations for Ar, Ba, Ni, Cr and K and does not reflect higher concentration levels for these parameters.

2.2 Weldon Spring Quarry

Groundwater at the WSQ has become radiologically and chemically contaminated as a result of contact with or migration from wastes present in the WSQ. Monitoring of the groundwater at and near the WSQ is of particular concern because of the proximity of the St. Charles County well field. The well field is located approximately 0.8 km (0.5 mi) to the south of the WSQ. Monitoring of contaminants in groundwater and the protection of the well field is a top priority at the WSSRAP.

Groundwater is currently being monitored at 48 wells located in and around the quarry area. Thirty-six monitoring wells installed by the DOE are currently utilized in or near the quarry. Four monitoring wells were installed by St. Charles County in 1986 and are currently included in the DOE's monitoring program. Eight St. Charles County municipal wells, and the treated and untreated water from the St. Charles County water treatment plant are also monitored for the presence of these contaminants. All monitoring well locations are shown in Figures 2-2 and 2-3. These wells monitor groundwater in both the bedrock and alluvial aquifers associated with the WSQ.

Two separate groundwater monitoring programs have been developed for the WSQ area. The first program is a bimonthly sampling of all wells north of the Femme Osage Slough and

TABLE 2-4 First Quarter Geochemical Results for Groundwater at the WSCP/RP/VP

Sample ID	Arsenic (µg/l)	Barium (µg/l)	Calcium (µg/l)	Chromium (µg/l)	Iron (µg/l)	Lithium (µg/l)	Magnesium (µg/l)	Manganese (µg/l)	Nickel (µg/l)	Lead (µg/l)	Silver (µg/l)
GW-2001-Q192	ND	227	93200	ND	ND	ND	43500	ND	ND	NS	NS
GW-2002-012892	ND	213	315000	ND	ND	521	103000	ND	ND	NS	NS
GW-2003-Q192	ND	136	256000	ND	ND	455	87400	ND	ND	NS	NS
GW-2030-Q192	ND	255	153000	ND	4780	ND	24000	163	18.0	26.3	ND
GW-2031	ABANDONED										
GW-2032-Q192	2.89	660	242000	21.7	23300	ND	69000	1060	41.5	33.7	ND
GW-2033-Q192	3.39	176	252000	ND	4780	ND	20000	255	12.2	37.6	ND
GW-3003-Q192	ND	168	230000	ND	ND	511	138000	8.90	ND	2.70	ND
GW-3006-Q192	ND	145	63500	ND	138	ND	51800	72.3	ND	ND	ND
GW-3008-Q192	ND	248	549000	ND	456	277	153000	72.4	ND	4.59	ND
GW-3009-Q192	ND	979	12400	ND	ND	ND	64300	7.59	46.1	ND	ND
GW-3023-Q192	NS	NS	366000	ND	1730	905	84800	90.8	ND	18.6	ND
GW-4001-010992	ND	101	88400	ND	ND	ND	33600	ND	ND	NS	NS
GW-4002-Q192	ND	115	44500	ND	ND	ND	32000	3.00	ND	ND	ND
GW-4003-Q192	ND	224	60500	ND	ND	ND	37500	ND	ND	NS	NS
GW-4004-Q192	ND	55.2	31600	ND	ND	ND	28900	ND	ND	7.00	ND
GW-4005-Q192	ND	82.0	45700	ND	ND	ND	27600	2.00	ND	21.39	ND
GW-4006-Q192	ND	170	51600	ND	ND	ND	22500	ND	ND	NS	NS
GW-4007-Q192	ND	75.9	29400	ND	120	ND	21100	47.4	ND	22.0	ND

TABLE 2-4 First Quarter Geochemical Results for Groundwater at the WSCP/RP/VP (Continued)

Sample ID	Arsenic (µg/l)	Barium (µg/l)	Calcium (µg/l)	Chromium (µg/l)	Iron (µg/l)	Lithium (µg/l)	Magnesium (µg/l)	Manganese (µg/l)	Nickel (µg/l)	Lead (µg/l)	Silver (µg/l)
GW-4008-Q192	ND	108	38700	ND	ND	ND	33000	34.7	ND	ND	ND
GW-4009-Q192	4.20	26.2	14000	8.40	ND	ND	8070	ND	ND	ND	ND
GW-4010-Q192	ND	69.4	55400	ND	ND	ND	39800	ND	ND	ND	ND
GW-4011-Q192	ND	109	59100	ND	ND	ND	40000	ND	ND	ND	ND
GW-4012-Q192	ND	40.2	25400	59.0	ND	ND	34600	ND	ND	2.39	ND
GW-4013-Q192	ND	147	143000	ND	ND	ND	52000	ND	ND	ND	ND
GW-4014-Q192	ND	117	65200	ND	74.4	ND	44000	45.9	ND	2.00	ND
GW-4015-Q192	ND	190	55100	ND	ND	ND	28100	ND	ND	4.00	ND
GW-4016-Q192	ND	240	42000	ND	ND	ND	28200	54.8	ND	3.29	ND
GW-4017-Q192	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GW-4018-Q192	ND	206	96600	ND	ND	ND	53800	ND	ND	2.70	ND
GW-4019-Q192	ND	187	38400	ND	ND	ND	45700	ND	ND	13.7	ND
GW-4020-Q192	ND	92.8	93700	26.6	ND	ND	62200	136	12.3	2.39	ND
GW-4021-Q192	ND	37.5	118000	ND	ND	ND	117000	47.8	ND	4.50	ND
GW-4022-Q192	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GW-4023-Q192	ND	91.3	96600	ND	ND	ND	39700	ND	ND	9.09	ND

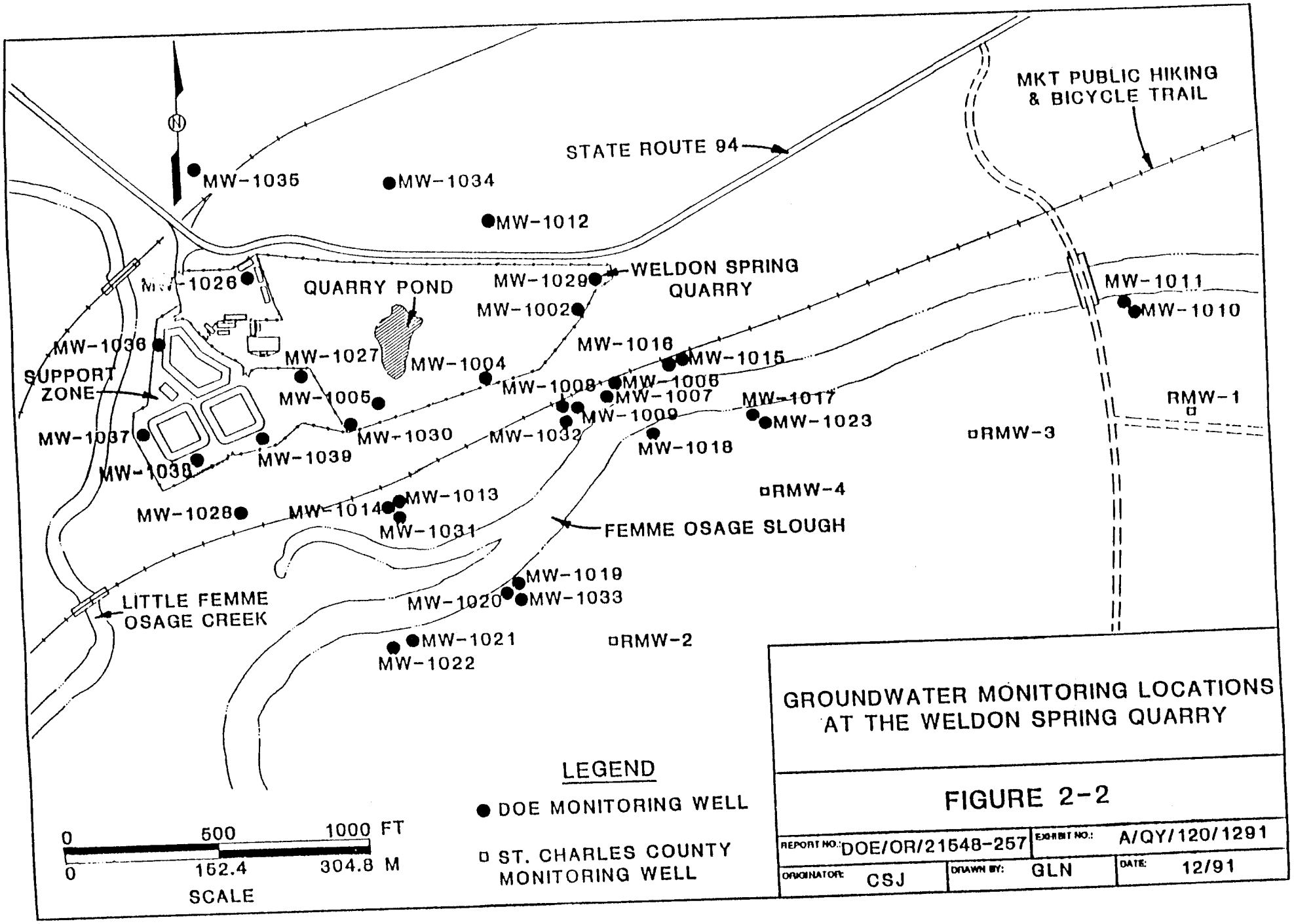
TABLE 2-4 First Quarter Geochemical Results for Groundwater at the WSCP/RP/VP (Continued)

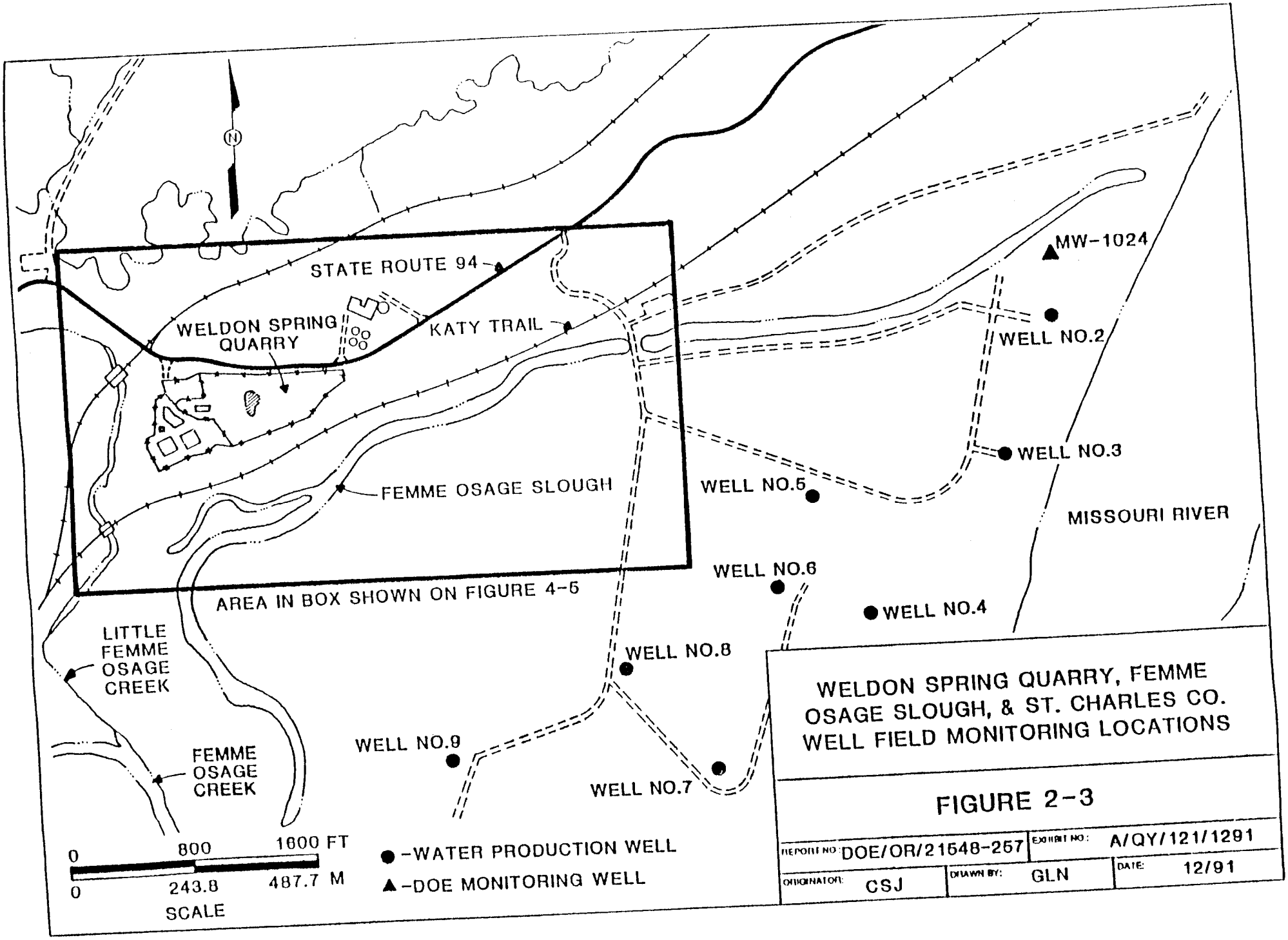
Sample ID	Potassium (µg/l)	Sodium (µg/l)	Strontium (µg/l)	Nitrite (mg/l)	Bromide (mg/l)	Chloride (mg/l)	Phosphorus Total (mg/l)	Silica, Dissolved (mg/l)	Alkalinity (mg/l)	Aluminum (µg/l)
GW-2001-Q192	1800	9140	103	ND	1.30	7.00	0.34	7.79	330	NS
GW-2002-012892	10200	127000	408	ND	ND	13.1	0.020	14.3	265	NS
GW-2003-Q192	6900	114000	460	ND	ND	8.90	0.050	11.8	270	NS
GW-2030-Q192	4770	54600	183	0.010	ND	39.5	0.130	8.40	470	2270
GW-2031					ABANDONED					
GW-2032-Q192	4130	67800	362	0.010	ND	21.4	0.84	7.00	400	13000
GW-2033-Q192	4400	87600	174	0.010	ND	10.7	0.370	9.30	550	1550
GW-3003-Q192	9920	160000	580	ND	ND	12.3	0.040	4.79	290	ND
GW-3006-Q192	925	18600	233	ND	ND	1.80	0.020	8.40	370	ND
GW-3008-Q192	2420	218000	1540	ND	ND	21.5	0.14	13.1	186	127
GW-3009-Q192	1150	26200	234	NS	ND	5.59	ND	12.3	168	ND
GW-3023-Q192	3310	229000	NS	1.30	ND	17.2	0.130	14.1	NS	579
GW-4001-010992	1530	20600	77.3	ND	ND	3.89	0.050	14.9	204	NS
GW-4002-Q192	867	4900	92.4	ND	ND	1.80	0.050	7.58	254	ND
GW-4003-Q192	1520	8880	118	0.110	0.440	8.09	ND	3.79	264	NS
GW-4004-Q192	964	10100	112	0.050	2.20	9.19	0.170	8.68	186	ND
GW-4005-Q192	2200	6770	156	ND	0.42	8.19	0.08	10.8	209	ND
GW-4006-Q192	ND	7440	59.0	ND	ND	2.39	0.020	12.2	162	NS
GW-4007-Q192	2940	28600	89.5	ND	ND	1.20	0.170	4.40	200	258

TABLE 2-4 First Quarter Geochemical Results for Groundwater at the WSCP/RP/VP (Continued)

Sample ID	Potassium (µg/l)	Sodium (µg/l)	Strontium (µg/l)	Nitrite (mg/l)	Bromide (mg/l)	Chloride (mg/l)	Phosphorus Total (mg/l)	Silica, Dissolved (mg/l)	Alkalinity (mg/l)	Aluminum (µg/l)
GW-4008-Q192	ND	3510	112	ND	0.590	3.29	0.080	10.0	220	ND
GW-4009-Q192	53400	37100	102	ND	ND	1.30	0.480	5.70	188	ND
GW-4010-Q192	1530	12400	174	ND	ND	1.89	0.080	6.79	190	ND
GW-4011-Q192	7620	69900	283	ND	0.440	6.40	0.650	14.8	280	ND
GW-4012-Q192	57800	50200	86.8	ND	ND	2.79	0.05	10.8	315	ND
GW-4013-Q192	6610	35700	153	0.010	ND	6.20	0.030	5.29	310	ND
GW-4014-Q192	ND	6460	162	ND	ND	4.09	ND	4.29	290	ND
GW-4015-Q192	1660	7470	63.4	ND	0.46	5.29	0.12	13.8	240	ND
GW-4016-Q192	920	7870	89.7	ND	ND	2.50	0.07	10.4	240	ND
GW-4017-Q192	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GW-4018-Q192	2440	8670	113	ND	ND	16.8	0.03	12.8	440	ND
GW-4019-Q192	ND	9880	173	ND	ND	1.60	0.030	2.89	290	ND
GW-4020-Q192	8540	24500	227	ND	ND	14.8	0.04	9.40	380	ND
GW-4021-Q192	ND	15000	223	ND	ND	1.80	0.05	10.3	510	ND
GW-4022-Q192	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GW-4023-Q192	ND	60300	176	ND	ND	14.9	0.02	14.7	470	ND

NA - Not Available
ND - Not Detected
NS - Not Sampled


N
STATE ROUTE 94
MKT PUBLIC HIKING & BICYCLE TRAIL
MW-1035
MW-1034
MW-1012
MW-1026
QUARRY POND
MW-1029
WELDON SPRING QUARRY
MW-1002
MW-1011
MW-1010
MW-1036
MW-1027
MW-1004
MW-1016
MW-1015
SUPPORT ZONE
MW-1005
MW-1008
MW-1006
MW-1007
MW-1017
RMW-1
MW-1009
MW-1023
MW-1037
MW-1030
MW-1032
RMW-3
MW-1018
MW-1039
MW-1038
RMW-4
MW-1013
MW-1028
MW-1014
MW-1031
FEMME OSAGE SLOUGH
MW-1019
LITTLE FEMME OSAGE CREEK
MW-1020
MW-1033
MW-1021
RMW-2
MW-1022
LEGEND
DOE MONITORING WELL
ST. CHARLES COUNTY MONITORING WELL
0
500
1000 FT
0
152.4
304.8 M
SCALE
GROUNDWATER MONITORING LOCATIONS AT THE WELDON SPRING QUARRY
FIGURE 2-2
REPORT NO.: DOE/OR/21548-257
EXHIBIT NO.: A/QY/120/1291
ORIGINATOR: CSJ
DRAWN BY: GLN
DATE: 12/91


N
STATE ROUTE 94
WELDON SPRING QUARRY
KATY TRAIL
FEMME OSAGE SLOUGH
AREA IN BOX SHOWN ON FIGURE 4-5
LITTLE FEMME OSAGE CREEK
FEMME OSAGE CREEK
MW-1024
WELL NO.2
WELL NO.3
WELL NO.5
WELL NO.6
WELL NO.4
WELL NO.8
WELL NO.9
WELL NO.7
MISSOURI RIVER
0 800 1600 FT
0 243.8 487.7 M
SCALE
●-WATER PRODUCTION WELL
▲-DOE MONITORING WELL
WELDON SPRING QUARRY, FEMME OSAGE SLOUGH, & ST. CHARLES CO. WELL FIELD MONITORING LOCATIONS
FIGURE 2-3
REPORT NO: DOE/OR/21548-257
EXHIBIT NO: A/QY/121/1291
ORIGINATOR: CSJ
DRAWN BY: GLN
DATE: 12/91

MW-1010 and MW-1011 located south of the slough. In addition, wells MW-1035, MW-1036, MW-1037, MW-1038, and MW-1039 will be sampled bimonthly until operation of the Weldon Spring Quarry water treatment plant is initiated. The second program is the quarterly sampling of all wells south of the Femme Osage Slough, excluding MW-1010 and MW-1011, but including the St. Charles County well field. Both the raw and treated waters from the St. Charles County water treatment plant are sampled.

2.2.1 Radiological Results

Radiological data are presented in Tables 2-5 and 2-6 for samples collected on the first bimonthly period and first quarter. The results show typical fluctuations near the average levels in the WSQ area with the exception of MW-1008 and MW-1032. Uranium concentrations in these wells exceeded the 1991 annual averages but do not exceed the 1991 results for MW-1004, which appear to be hydrologically related.

The monitoring wells south of the Femme Osage Slough, the St. Charles County monitoring wells, and the St. Charles County production wells are sampled annually for the radiological species of radium, thorium, gross alpha, and gross beta. The results of these samples analyses are presented in Table 2-7. The concentrations in these wells are consistent with historical values of waters in or near the WSQ.

2.2.2 Nitroaromatic Compounds Results

Analytical results for the first bimonthly period and first quarter for nitroaromatic compounds are presented in Tables 2-8 and 2-9, respectively. No monitoring wells south of the Femme Osage Slough showed detectable concentrations of nitroaromatic compounds during the first quarter of 1992. The distribution and magnitude of nitroaromatic contamination in wells near the quarry remain consistent with historical levels.

2.2.3 Inorganic Anions Results

Two inorganic anions, nitrate and sulfate, were sampled in all the wells monitored at the WSQ. The analytical results for the first bimonthly period and the first quarter are presented in Tables 2-5 and 2-6, respectively. These results are consistent with data reported in the

TABLE 2-5 First Bimonthly (Jan/Feb) Inorganic Anions and Uranium Results for Groundwater at the Weldon Spring Quarry

Sample ID	Nitrate (mg/l)	Sulfate (mg/l)	Uranium (pCi/l)
GW-1002-022592	0.870	57.6	2.92
GW-1004-021092	0.420	249	4400
GW-1005-021092	0.120	145	1700
GW-1006-012092	0.65	448	3160
GW-1007-012092	0.26	294	125
GW-1008-012092	0.41	296	5940
GW-1009-012092	0.23	294	2.14
GW-1010-021092	0.120	0.410	ND
GW-1011	Well Dry		
GW-1012-012792	1.20	72.3	2.65
GW-1013-012092	0.47	111	1050
GW-1014-012092	0.38	111	802
GW-1015-012092	5.59	307	1560
GW-1016-012092	2.20	270	734
GW-1026-011392	ND	88.3	ND
GW-1027-011392	0.26	102	1030
GW-1028-031292*	0.230	72.7	3.47
GW-1029-022592	0.560	74.4	2.72
GW-1030-021092	ND	98.4	ND
GW-1031-012192	0.34	28.8	20.2
GW-1032-012192	0.28	238	1560
GW-1034-022792	0.19	169	2.92
GW-1035-022792	ND	66.6	0.408
GW-1036-012792	ND	61.3	3.95
GW-1037-012792	ND	13.1	0.925
GW-1038-012792	ND	50.9	1.76
GW-1039-012292	ND	64.7	ND

ND - Not Detected
* - Sampled after the First Bimonthly Period

TABLE 2-6 First Quarter Inorganic Anions and Uranium Results for Groundwater at the Weldon Spring Quarry

Sample ID	Nitrate (mg/l)	Sulfate (mg/l)	Uranium (pCi/l)
GW-1017-Q192	0.28	2.10	ND
GW-1018-Q192	ND	35.0	ND
GW-1019-Q192	ND	3.70	ND
GW-1020-Q192	ND	18.9	ND
GW-1021-013092	ND	ND	ND
GW-1022-013092	ND	ND	ND
GW-1023-Q192	0.28	8.00	ND
GW-1024-Q192	ND	1.39	ND
GW-1033-Q192	0.14	12.5	NA
GW-RMW1-Q192	ND	41.6	ND
GW-RMW2-Q192	ND	21.7	5.50
GW-RMW3-Q192	ND	2.70	ND
GW-RMW4-Q192	ND	30.4	1.95
GW-PW02-Q192	ND	114	ND
GW-PW03-Q192	ND	104	ND
GW-PW04-Q192	ND	107	ND
GW-PW05-Q192	ND	77.3	ND
GW-PW06-Q192	ND	97.9	ND
GW-PW07-Q192	ND	66.8	ND
GW-PW08-Q192	ND	53.1	ND
GW-PW09-Q192	ND	40.0	ND
GW-RAWW-Q192	ND	91.7	ND
GW-FINW-Q192	0.77	92.4	ND

ND - Not Detected
NA - Not Available

TABLE 2-7 First Quarter Radiological Results for Groundwater at the WSQ

Sample ID	Th-228 (pCi/l)	Th-230 (pCi/l)	Th-232 (pCi/l)	Ra-226 (pCi/l)	Ra-228 (pCi/l)	Gross Alpha (pCi/l)	Gross Beta (pCi/l)
GW-1017-Q192	ND	3.55	ND	1.21	ND	ND	ND
GW-1018-Q192	ND	ND	ND	ND	3.00	ND	ND
GW-1019-Q192	0.232	ND	0.198	ND	3.00	ND	ND
GW-1020-Q192	ND	ND	ND	ND	ND	ND	ND
GW-1021-013092	ND	2.43	ND	1.65	ND	ND	ND
GW-1022-013092	ND	2.70	ND	0.431	ND	ND	ND
GW-1023-Q192	ND	3.40	ND	0.983	ND	ND	ND
GW-1024-Q192	0.15	0.22	ND	ND	ND	ND	ND
GW-1033-Q192	NA	NA	NA	NA	NA	NA	NA
GW-RMW1-Q192	ND	ND	ND	ND	5.36	ND	ND
GW-RMW2-Q192	ND	ND	ND	ND	ND	ND	ND
GW-RMW3-Q192	ND	ND	ND	ND	5.16	ND	ND
GW-RMW4-Q192	ND	ND	ND	ND	4.80	ND	ND
GW-PW02-Q192	ND	0.12	ND	ND	ND	ND	ND
GW-PW03-Q192	ND	ND	ND	ND	ND	ND	ND
GW-PW04-Q192	ND	ND	ND	ND	ND	ND	ND
GW-PW05-Q192	ND	ND	ND	ND	ND	ND	ND
GW-PW06-Q192	ND	ND	ND	ND	ND	ND	ND
GW-PW07-Q192	ND	ND	ND	ND	ND	ND	ND
GW-PW08-Q192	ND	ND	ND	ND	ND	ND	ND
GW-PW09-Q192	ND	ND	ND	ND	ND	ND	ND
GW-RAWW-Q192	ND	ND	ND	ND	6.59	ND	ND
GW-FINW-Q192	ND	ND	ND	ND	5.95	ND	ND

ND - Not Detected
NA - Not Available

TABLE 2-8 First Bimonthly (Jan/Feb) Nitroaromatic Data Results for Groundwater at the Weldon Spring Quarry

Sample ID	NB (µg/l)	1,3-DNB (µg/l)	2,4-DNT (µg/l)	2,6-DNT (µg/l)	2,4,6-TNT (µg/l)	1,3,5-TNB (µg/l)
GW-1002-022592	ND	ND	ND	ND	ND	207
GW-1004-021092	ND	ND	2.80	4.60	14.0	4.50
GW-1005-021092	ND	ND	0.14	0.040	ND	ND
GW-1006-012092	ND	ND	0.19	2.20	5.80	26.0
GW-1007-012092	ND	ND	ND	ND	ND	ND
GW-1008-012092	ND	ND	ND	0.096	0.22	0.047
GW-1009-012092	ND	ND	ND	ND	ND	ND
GW-1010-021092	ND	ND	ND	ND	ND	ND
GW-1011			Well Dry			
GW-1012-012792	ND	ND	ND	ND	ND	ND
GW-1013-012092	ND	ND	0.097	0.030	ND	ND
GW-1014-012092	ND	ND	0.042	0.014	ND	ND
GW-1015-012092	ND	0.12	0.060	1.00	30.0	220
GW-1016-012092	ND	ND	ND	0.23	5.80	38.0
GW-1026-011392	ND	ND	ND	ND	ND	ND
GW-1027-011392	ND	ND	9.00	3.10	3.80	0.033
GW-1028-031292*	NA	NA	NA	NA	NA	NA
GW-1029-022592	ND	ND	ND	ND	ND	ND
GW-1030-021092	ND	ND	0.040	ND	ND	ND
GW-1031-012192	ND	ND	ND	ND	ND	ND
GW-1032-012192	ND	ND	0.067	1.10	3.00	0.043
GW-1034-022792	ND	ND	ND	ND	ND	ND
GW-1035-022792	ND	ND	ND	ND	ND	ND
GW-1036-012792	ND	ND	ND	ND	ND	ND
GW-1037-012792	ND	ND	ND	ND	ND	ND
GW-1038-012792	ND	ND	ND	ND	ND	ND
GW-1039-012292	ND	ND	ND	ND	ND	ND

ND - Not Detected
NA - Not Available
* - Sampled after the First Bimonthly Period

TABLE 2-9 First Quarter Nitroaromatic Data for Groundwater at the Weldon Spring Quarry

Sample ID	NB (µg/l)	1,3-DNB (µg/l)	2,4-DNT (µg/l)	2,6-DNT (µg/l)	2,4,6-TNT (µg/l)	1,3,5-TNB (µg/l)
GW-1017-Q192	ND	ND	ND	ND	ND	ND
GW-1018-Q192	ND	ND	ND	ND	ND	ND
GW-1019-Q192	ND	ND	ND	ND	ND	ND
GW-1020-Q192	ND	ND	ND	ND	ND	ND
GW-1021-013092	ND	ND	ND	ND	ND	ND
GW-1022-013092	ND	ND	ND	ND	ND	ND
GW-1023-Q192	ND	ND	ND	ND	ND	ND
GW-1024-Q192	ND	ND	ND	ND	ND	ND
GW-1033-Q192	ND	ND	ND	ND	ND	ND
GW-RMW1-Q192	ND	ND	ND	ND	ND	ND
GW-RMW2-Q192	ND	ND	ND	ND	ND	ND
GW-RMW3-Q192	ND	ND	ND	ND	ND	ND
GW-RMW4-Q192	ND	ND	ND	ND	ND	ND
GW-PW02-Q192	ND	ND	ND	ND	ND	ND
GW-PW03-Q192	ND	ND	ND	ND	ND	ND
GW-PW04-Q192	ND	ND	ND	ND	ND	ND
GW-PW05-Q192	ND	ND	ND	ND	ND	ND
GW-PW06-Q192	ND	ND	ND	ND	ND	ND
GW-PW07-Q192	ND	ND	ND	ND	ND	ND
GW-PW08-Q192	ND	ND	ND	ND	ND	ND
GW-PW09-Q192	ND	ND	ND	ND	ND	ND
GW-RAWW-Q192	ND	ND	ND	ND	ND	ND
GW-FINW-Q192	ND	ND	ND	ND	ND	ND

ND - Not Detected
NA - Not Available

previous environmental monitoring reports. The WSQ groundwater samples continue to indicate no significant nitrate contamination of the groundwater. The results indicate that elevated sulfate levels are present in groundwater within the WSQ and north of the Femme Osage Slough.

2.2.4 Metals Results

All the wells in the WSQ monitoring program are sampled for arsenic and barium. The St. Charles county production wells are also analyzed for lead, cadmium, and mercury. The results for the first bimonthly period and first quarter are presented in Tables 2-10 and 2-11, respectively. Arsenic levels were consistent with historical values for groundwater in the vicinity of the WSQ. Elevated barium levels have remained in the wells in the vicinity of the Femme Osage Slough.

2.2.5 Organics Results

The St. Charles County RMW series monitoring wells, the St. Charles County production wells, untreated and treated water from the St. Charles County water treatment plant, and monitoring well MW-1024 were sampled in the first quarter for organics; volatile and semi-volatile, pesticides, and polychlorinated biphenyls (PCBs). A listing of the parameters analyzed is in Appendix A. The results of the analyses indicated slight concentrations of toluene at nine of the 14 sampling locations. The concentration of toluene appears to be attributed to the sealing of the sample vials and labels with clear adhesive tape. Resampling of several of the wells which previously indicated toluene concentrations reported non-detects of toluene. A concentration of methylene chloride (9 μg/l) was indicated in RMW-2. This slight concentration was attributed to typical laboratory contamination as a result of container cleaning practices. No detectable concentrations of pesticides or PCBs were indicated at any of the sampling locations.

2.3 Springs

Five springs around the Weldon Spring site (WSS) were sampled during the first quarter (see Figure 2-4). Previous spring monitoring indicated that waters from six perennial springs and one wet-weather spring are measurably influenced by site-related contaminants. These springs include SP-5301 through SP-5304, SP-6301, SP-6302, and SP-6306. All spring samples were analyzed for uranium. Analytical results for these are not available at this time.

TABLE 2-10 First Bimonthly (Jan/Feb) Metal Results in Groundwater at the Weldon Spring Quarry

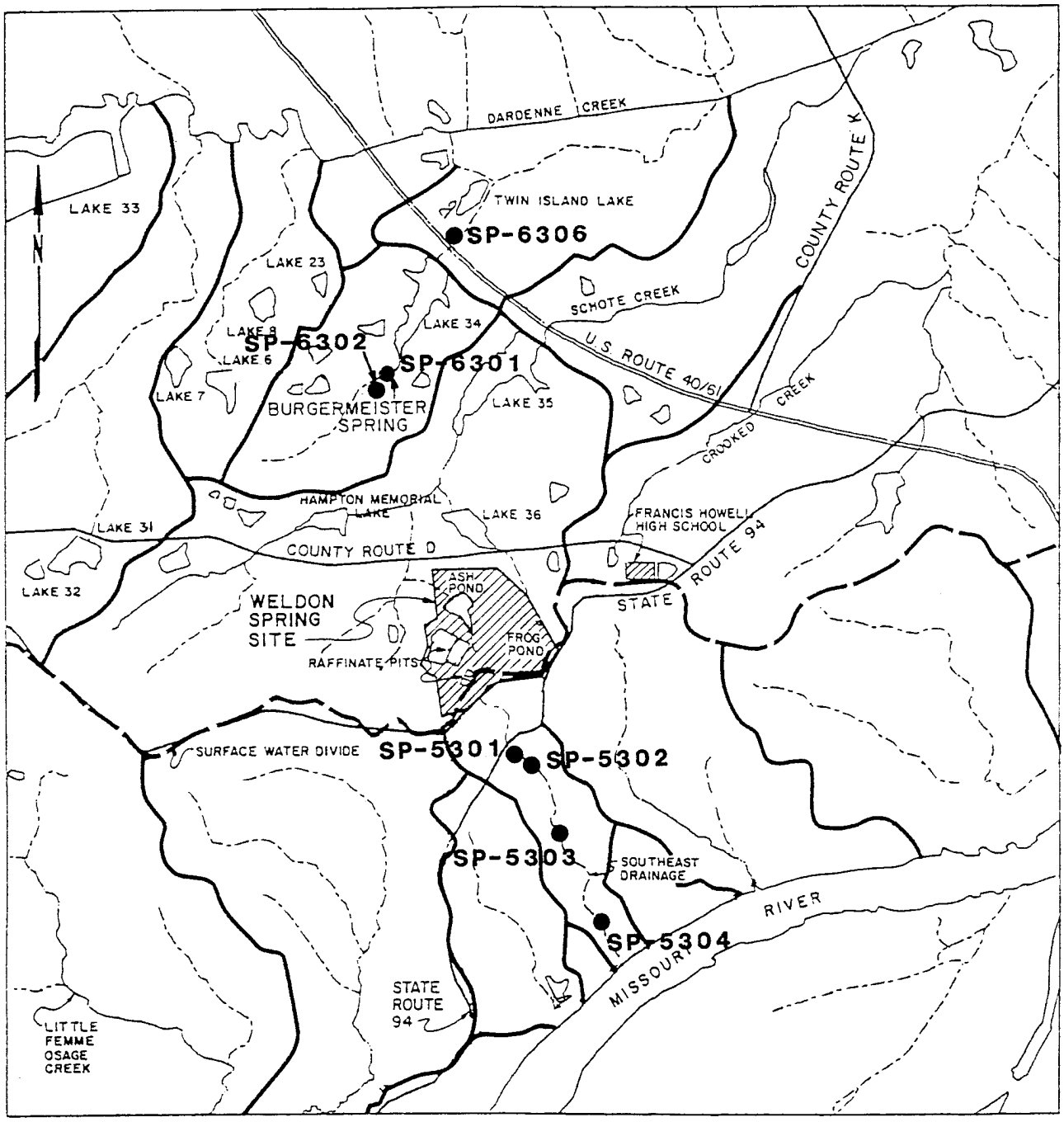
Sample ID	Arsenic (µg/l)	Barium (µg/l)
GW-1002-022592	ND	120
GW-1004-021092	ND	38.5
GW-1005-021092	ND	57.3
GW-1006-012092	ND	47.9
GW-1007-012092	20.3	349
GW-1008-012092	ND	47.3
GW-1009-012092	8.80	486
GW-1010-021092	102	356
GW-1011	Well Dry	
GW-1012-012792	ND	131
GW-1013-012092	2.89	156
GW-1014-012092	ND	219
GW-1015-012092	ND	126
GW-1016-012092	ND	140
GW-1026-011392	21.6	389
GW-1027-011392	ND	148
GW-1028-031292*	ND	293
GW-1029-022592	ND	38.8
GW-1030-021092	7.40	404
GW-1031-012192	ND	96.9
GW-1032-012192	ND	95.4
GW-1034-022792	ND	155
GW-1035-022792	ND	256
GW-1036-012792	ND	308
GW-1037-012792	ND	549
GW-1038-012792	ND	248
GW-1039-012292	ND	509

ND - Not Detected
NA - Not Available
* - Sampled after the first bimonthly period

TABLE 2-11 First Quarter Results for Metals in Groundwater at the Weldon Spring Quarry

Sample ID	Arsenic (µg/l)	Barium (µg/l)	Lead (µg/l)	Cadmium (µg/l)	Mercury (µg/l)
GW-1017-Q192	146	985	NR	NR	NR
GW-1018-Q192	123	581	NR	NR	NR
GW-1019-Q192	69.8	838	NR	NR	NR
GW-1020-Q192	27.4	413	NR	NR	NR
GW-1021-013092	76.0	899	NR	NR	NR
GW-1022-013092	147	584	NR	NR	NR
GW-1023-Q192	72.0	316	NR	NR	NR
GW-1024-Q192	10.6	550	NR	NR	NR
GW-1033-Q192	ND	241	NR	NR	NR
GW-RMW1-Q192	7.70	423	NR	NR	NR
GW-RMW2-Q192	14.1	265	NR	NR	NR
GW-RMW3-Q192	39.3	629	NR	NR	NR
GW-RMW4-Q192	26.5	225	NR	NR	NR
GW-PW02-Q192	ND	347	4.90	ND	ND
GW-PW03-Q192	ND	278	2.70	ND	ND
GW-PW04-Q192	ND	281	ND	ND	ND
GW-PW05-Q192	ND	332	ND	ND	ND
GW-PW06-Q192	ND	284	ND	ND	ND
GW-PW07-Q192	ND	468	ND	ND	ND
GW-PW08-Q192	2.39	426	ND	ND	ND
GW-PW09-Q192	2.79	496	ND	ND	ND
GW-RAWW-Q192	ND	363	NS	NS	NS
GW-FINW-Q192	ND	89.0	NS	NS	NS

ND - Not Detected
NA - Not Available
NR - Not Required
NS - Not Sampled



● · SPRING

0 3200 6400 FT

0 975.4 1950.7 M

SCALE

SPRINGS IN THE VICINITY OF THE WSS

FIGURE 2-4

REPORT NO.:		EXHIBIT NO.: A/VP/040/0592	
ORIGINATOR: MGT	DRAWN BY: GLN	DATE: 5/92	

3 SURFACE WATER MONITORING

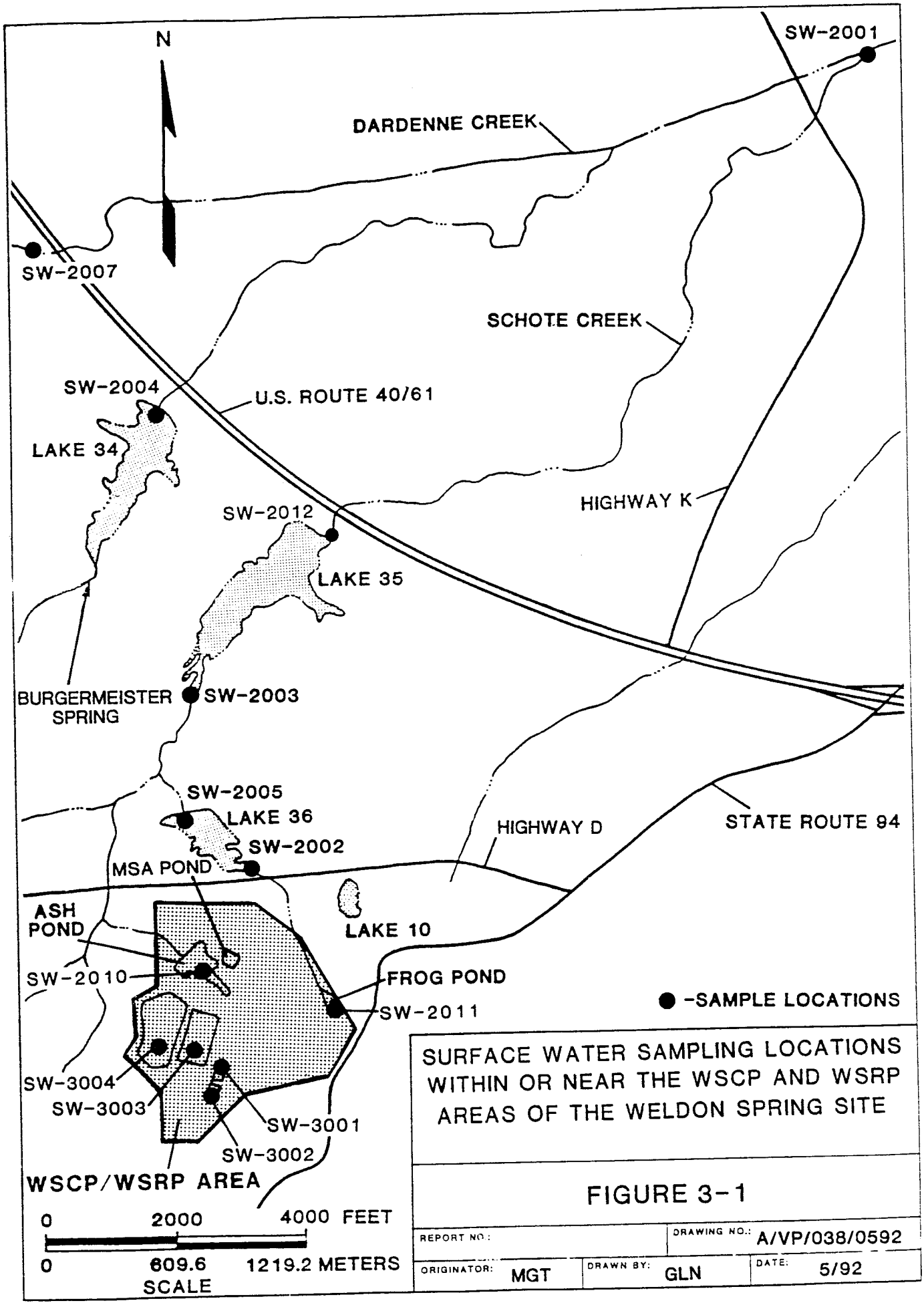
Routine samples were collected during the first quarter of 1992 from both on-site and off-site surface water locations. All surface water samples were analyzed without filtering, unless a specific comparison of dissolved versus total contaminant concentrations was desired. Some analytical results are not available at this time; however, they will be presented in the 1992 Annual Site Environmental Report (ASER).

3.1 Chemical Plant/Raffinate Pits/Vicinity Properties

During the first quarter, surface water samples were collected from the 10 of 15 surface water sampling locations shown in Figure 3-1 and analyzed for uranium. Monitoring location SW-2016 was added to the surface water monitoring plan due to an elevated uranium concentration reported by the U.S. Geological Survey (USGS) at that location. Monitoring point SW-2016 is located at the intersection of Dardenne Creek and County Highway N and is now the furthest location downstream at which to measure contaminant levels in Dardenne Creek after receiving the Schote Creek contribution. Results from SW-2002 indicated an elevated uranium concentration of 171 pCi/l (6.3 Bq/l). Although this value is greater than the 1991 annual average it does not exceed the historical high of 240 pCi/l (8.9 Bq/l) for this location. The results, presented in Table 3-1, indicated that conditions at the other sampling locations remain consistent with historical values.

3.2 Weldon Spring Quarry

Surface water samples were collected for uranium and metals (arsenic and barium) analyses from the 13 locations shown in Figures 3-2 and 3-3. The results are presented in Table 3-2. First quarter uranium and metals concentrations for the sampling locations in the Femme Osage Slough and Little Femme Osage Creek remain within historical ranges. The highest measured uranium concentration of 2060 pCi/l (76.2 Bq/l) was detected at the quarry pond (SW-1008) and is within the historical range. In addition, nitroaromatics, radionuclides, nitrate, and sulfate were measured for SW-1008. The results for the radiological parameters were not available for incorporation into this data summary. Table 3-3 presents the results of the nitroaromatic analyses which are within historical ranges. Uranium and barium values for all three Missouri River samples (SW-1011, SW-1012, and SW-1013) are higher than previously



SURFACE WATER SAMPLING LOCATIONS WITHIN OR NEAR THE WSCP AND WSRP AREAS OF THE WELDON SPRING SITE

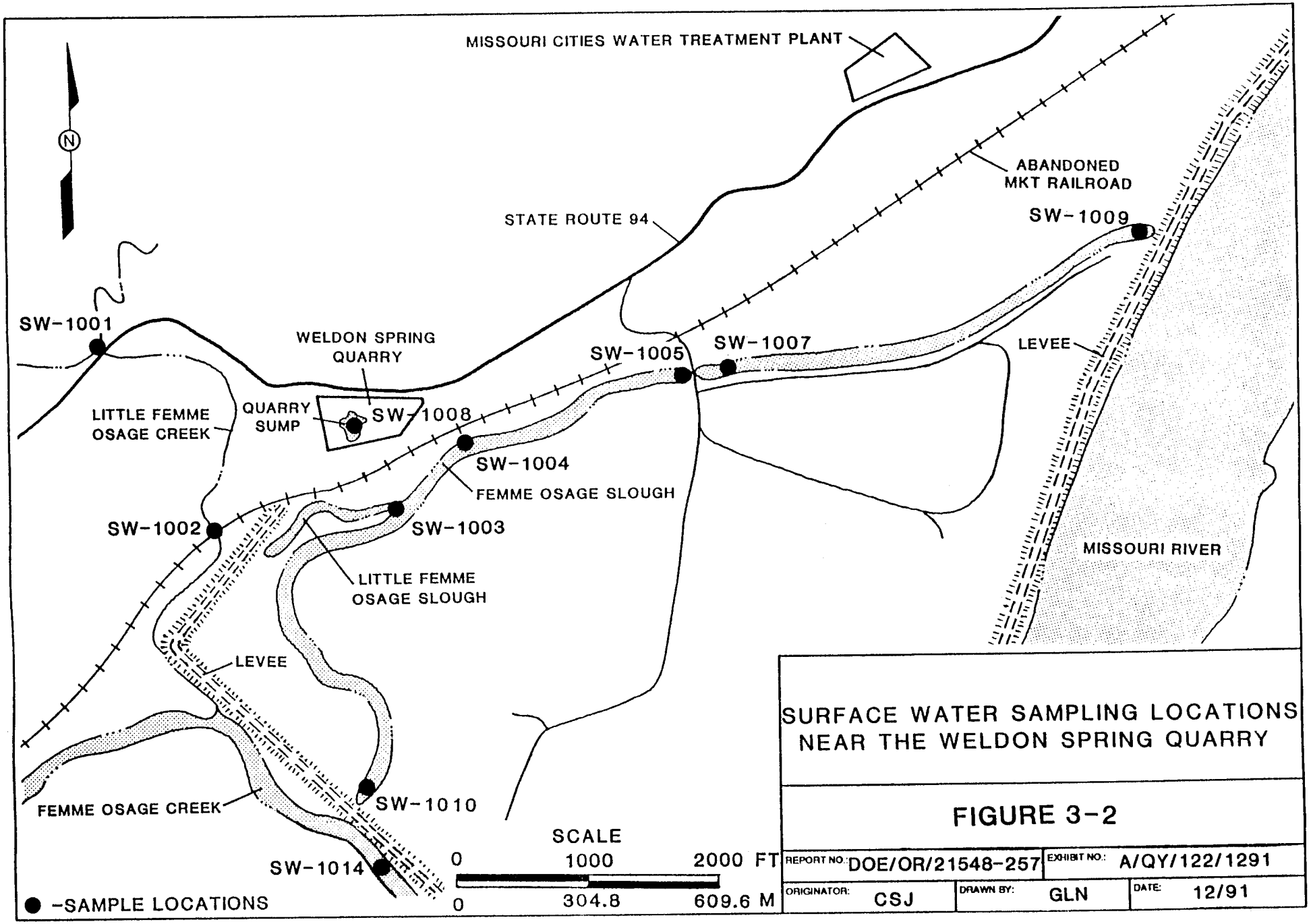
FIGURE 3-1

REPORT NO.:		DRAWING NO.: A/VP/038/0592	
ORIGINATOR: MGT	DRAWN BY: GLN	DATE: 5/92	

TABLE 3-1 First Quarter Results for Uranium in Surface Water at the WSCP/WSRP/WSVP

Sample ID	Uranium (pCi/l)
SW-2001-Q192	NA
SW-2002-Q192	171
SW-2003-Q192	13.7
SW-2004-Q192	17.8
SW-2005-Q192	35.6
SW-2007-Q192	NA
SW-2010-Q192*	NA
SW-2011-Q192*	NA
SW-2012**	No Flow
SW-2016-Q192	NA
SW-3001	NR
SW-3002	NR
SW-3003	NR
SW-3004	NR
SW-5311	NS

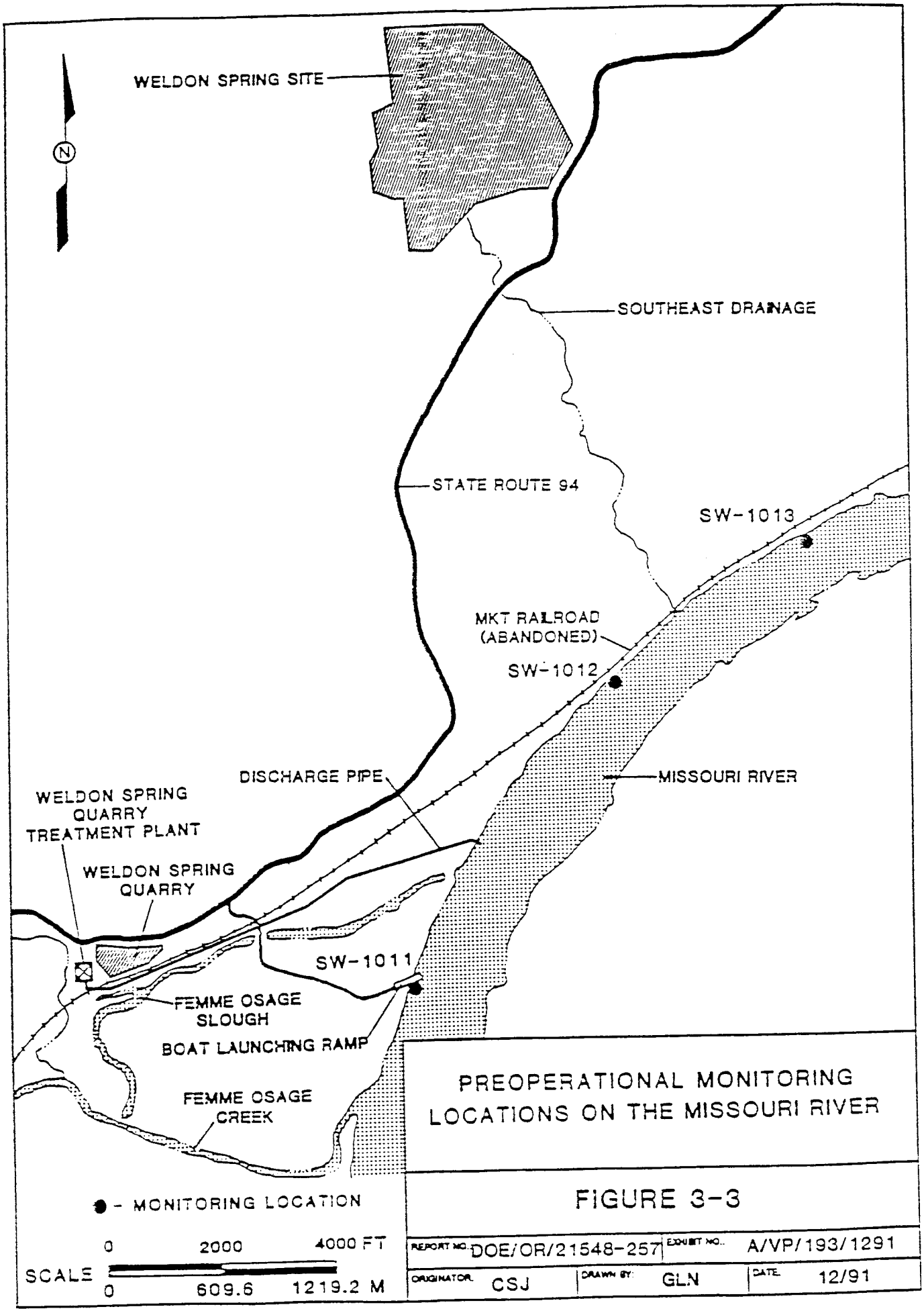
ND - Not Detected
NA - Not Available
NR - Not Required
NS - Not Sampled
* - Samples after the first quarter
** - To be sampled when flow is available



SURFACE WATER SAMPLING LOCATIONS NEAR THE WELDON SPRING QUARRY

FIGURE 3-2

REPORT NO.: DOE/OR/21548-257	EXHIBIT NO.: A/QY/122/1291		
ORIGINATOR: CSJ	DRAWN BY: GLN	DATE: 12/91	



PREOPERATIONAL MONITORING LOCATIONS ON THE MISSOURI RIVER

FIGURE 3-3

REPORT NO. DOE/OR/21548-257		EXHIBIT NO.	A/VP/193/1291
ORIGINATOR CSJ	DRAWN BY: GLN	DATE 12/91	

TABLE 3-2 First Bimonthly (Jan/Feb) Results for Uranium and Metals in Surface Water at the Weldon Spring Quarry

Sample ID	Uranium (pCi/l)	Arsenic (µg/l)	Barium (µg/l)
SW-1001-022192	0.748	NA	NA
SW-1002-022192	1.36	NA	NA
SW-1003-013192	47.0	2.29	89.4
SW-1004-013192	53.0	ND	65.7
SW-1005-013192	10.0	3.79	120
SW-1007-013192	13.0	2.20	125
SW-1008-021992	NA	NA	NA
SW-1009-013192	14.0	ND	123
SW-1010-013192	39.0	ND	60.7
SW-1011-022192	9.79	NA	NA
SW-1012-022192	9.11	NA	NA
SW-1013-022192	10.0	NA	NA
SW-1014-013192	ND	ND	77.8

ND - Not Detected
NA - Not Available

TABLE 3-3 First Bimonthly (Jan/Feb) Radiological Results for SW-1008

Parameter	Concentration	Units
Nitrobenzene	ND	µg/l
1,3-DNB	ND	µg/l
2,4-DNT	4.94	µg/l
2,6-DNT	ND	µg/l
2,4,6-TNT	ND	µg/l
1,3,5-TNB	ND	µg/l
Nitrate	NA	mg/l
Sulfate	NA	mg/l

ND - Not Detected
NA - Not Available

measured values for these locations. These elevations are not related to conditions at the Weldon Spring site and likely reflect spring run-off from up-river crystalline rock terrain.

4 EFFLUENT MONITORING

The National Pollutant Discharge Elimination System (NPDES) permit process is authorized by Section 402(a)(1) of the Clean Water Act of 1977. The authority to issue permits is delegated to the State of Missouri by the U.S. Environmental Protection Agency (EPA). The State of Missouri has issued four NPDES permits to the U.S. Department of Energy (DOE) allowing the discharge of stormwater and treated wastewater to waters of the state. The permits require that samples of the wastewater be collected periodically and the results reported to the Missouri Department of Natural Resources. The following sections contain the analytical results for samples collected during January, February, and March of 1992.

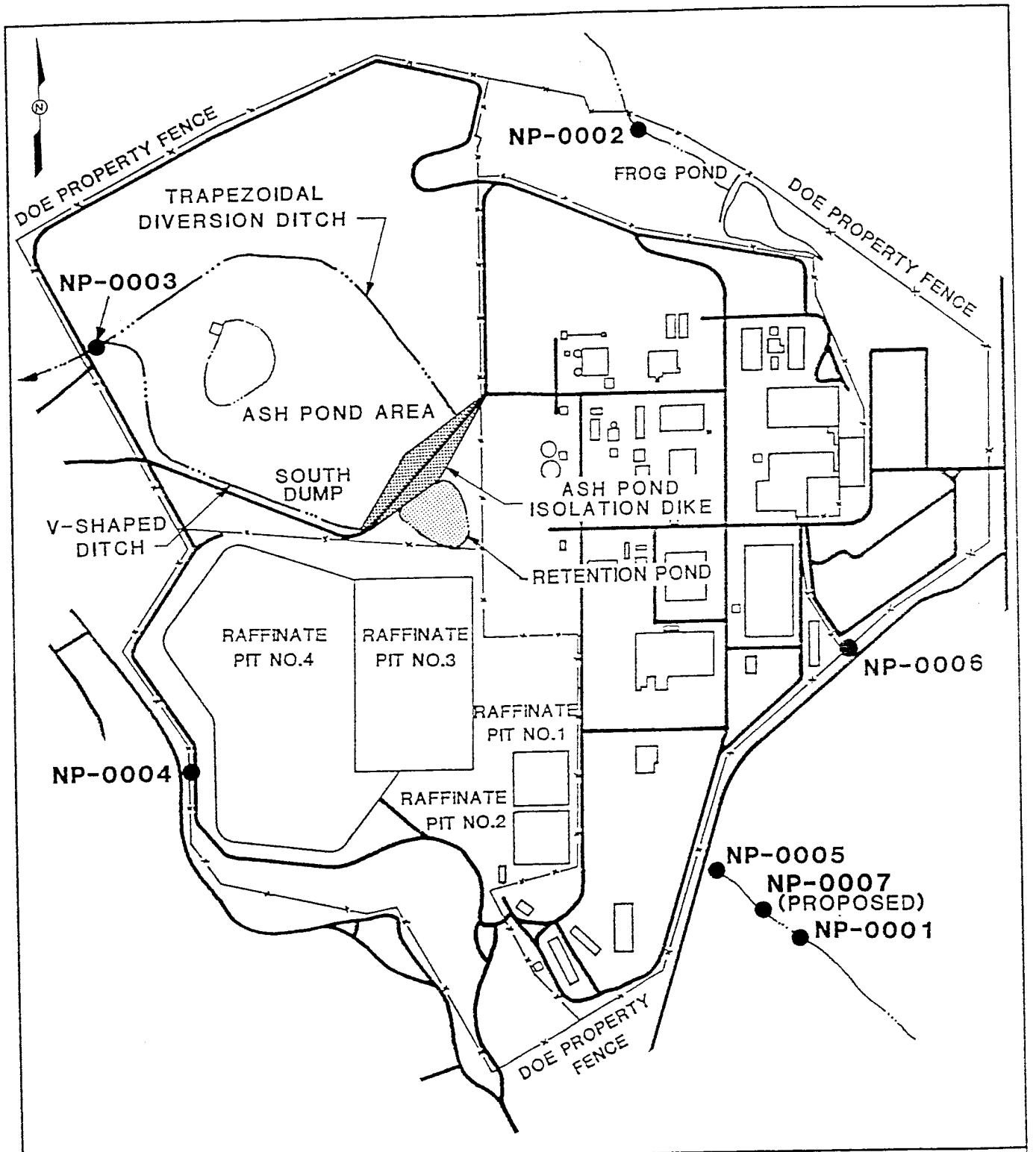
4.1 National Pollutant Discharge Elimination System Data Review

Effluent samples were collected and analyzed in compliance with the Weldon Spring site NPDES permits. Permit No. MO-0107701 was issued on October 1, 1990, and currently addresses the five storm water and two wastewater discharges shown in Figure 4-1. Outfalls NP-0001 through NP-0005 represent storm water discharges; Outfall NP–0006 represents the treated wastewater discharge associated with the administration building sanitary wastewater treatment plant; and Outfall NP-0007 represents the site water treatment plant, which is under construction, but not yet completed. There was no discharge from NP-0007. Outfalls NP-0006 and NP-0007 have effluent limitations. The five storm water outfalls have monitoring requirements only. First quarter 1992 analytical data for each outfall are presented in Table 4-1.

Permit No. MO-0108987 was issued on May 5, 1989, for Outfall NP-1001 of the Weldon Spring Quarry water treatment plant. The plant construction is not complete, and no discharge took place during the first quarter of 1992.

NPDES permit No. MO-G340001 was issued on December 19, 1991. This permit is for discharge of uncontaminated water used for new tank and basin testing at the quarry water treatment plant. First quarter 1992 analytical data is presented in Table 4-2. This permit number has been changed to MO-G680001.

NPDES permit No. MO-G340002 was issued on February 7, 1992. This permit is for discharge of uncontaminated water used for new tank and basin testing at the site water treatment



NPDES SURFACE WATER SAMPLING LOCATIONS AT THE WSCP/RP

FIGURE 4-1

SCALE 0 500 1000 FT
0 152.4 304.8 M

REPORT NO.: DOE/OR/21548-257		EXHIBIT NO.: A/CP/050/0592	
ORIGINATOR: TW	DRAWN BY: GLN	DATE: 5/92	

TABLE 4-1 Results of Monthly NPDES Monitoring for NP-0001 through NP-0006

Outfall NP-0001 NPDES data for Q1 1992

DATE SAMPLED	FLOW	SUSP. SOLIDS	SET. SOLIDS	NITRATE	pH	LITHIUM	GROSS ALPHA	TOTAL URANIUM	
UNITS	GPD**	mg/l	ml/l/hr	mg/l	pH units	mg/l	pCi/l	mg/l	pCi/l
Jan. 8	4320	13.0	ND (0.1)	0.48	7.1	ND (0.1)	732	1.6	1090
Feb. 12	5970	11.0	ND (0.1)	0.45	6.3	ND (0.1)	150	0.271	184

Outfall NP-0002 NPDES data for Q1 1992

DATE SAMPLED	FLOW	SUSP. SOLIDS	SET. SOLIDS	NITRATE	pH	LITHIUM	GROSS ALPHA	TOTAL URANIUM	
UNITS	GPD**	mg/l	ml/l/hr	mg/l	pH units	mg/l	pCi/l	mg/l	pCi/l
Jan. 8	43800	6.0	ND (0.1)	0.58	6.6	ND (0.1)	310	0.643	437
Feb. 24	14400	ND (5.0)	ND (0.1)	0.89	5.7	ND (0.1)	270	0.420	286
Mar. 4	900	8.0	ND (0.1)	0.97	6.3	ND (0.1)	260	0.422	287

Outfall NP-0003 NPDES data for Q1 1992

DATE SAMPLED	FLOW	SUSP. SOLIDS	SET. SOLIDS	NITRATE	pH	LITHIUM	GROSS ALPHA	TOTAL URANIUM	
UNITS	GPD**	mg/l	ml/l/hr	mg/l	pH units	mg/l	pCi/l	mg/l	pCi/l
Jan. 8	43000	63.0	ND (0.1)	8.3	7.0	ND (0.1)	163	.349	237
Feb. 12	5100	10.0	ND (0.1)	1.8	6.4	ND (0.1)	820	1.7	1156
Feb. 24	45600	10.0	ND (0.1)	4.09	6.0	ND (0.1)	1590	2.47	1680
Feb. 26	72000	14.0	ND (0.1)	- -	- -	- -	- -	- -	- -
Mar. 4	25000	ND (5)	ND (0.1)	3.39	6.6	ND (0.1)	1500	1.59	1081
Mar. 25	29000	3460	ND (0.1)	0.62	6.17	ND (0.1)	120	.0472	32

TABLE 4-1 Results of Monthly NPDES Monitoring for NP-0001 through NP-0006 (Continued)

DATE SAMPLED	FLOW	SUSP. SOLIDS	SET. SOLIDS	NITRATE	pH	LITHIUM	GROSS ALPHA	TOTAL URANIUM	
UNITS	GPD**	mg/l	ml/l/hr	mg/l	pH units	mg/l	pCi/l	mg/l	pCi/l
Mar. 31	72000	- -	ND (0.1)	- -	6.87	- -	- -	- -	- -

Outfall NP-0004 NPDES data for Q1 1992

DATE SAMPLED	FLOW	SUSP. SOLIDS	SET. SOLIDS	NITRATE	pH	LITHIUM	GROSS ALPHA	TOTAL URANIUM	
UNITS	GPD**	mg/l	ml/l/hr	mg/l	pH units	mg/l	pCi/l	mg/l	pCi/l
Mar. 2	720	97	ND (0.1)	0.57	7.1	ND (0.1)	10	.009	6.12

Outfall NP-0005 NPDES data for Q1 1992

DATE SAMPLED	FLOW	SUSP. SOLIDS	SET. SOLIDS	NITRATE	pH	LITHIUM	GROSS ALPHA	TOTAL URANIUM	
UNITS	GPD**	mg/l	ml/l/hr	mg/l	pH units	mg/l	pCi/l	mg/l	pCi/l
Jan. 8	25800	6.0	ND (0.1)	129	6.6	ND (0.1)	338	.691	470
Feb. 6	720	9890	60	0.62	- -	0.142	92	.0799	54
Feb. 24	2900	9.0	ND (0.1)	76.2	5.9	ND (0.1)	450	.556	378
Mar. 18	144000	270	ND (0.1)	4.26	5.5	.0044	220	.279	190

TABLE 4-1 Results of Monthly NPDES Monitoring for NP-0001 through NP-0006 (Continued)

Outfall NP-0006 NPDES data for Q1 1992

DATE SAMPLED	FLOW	SUSP. SOLIDS	BOD	FECAL COLIFORMS	pH
UNITS	GPD**	mg/l	mg/l	Colonies/100 ml	pH units
Jan. 15	3555	6.0	ND (6.0)	ND (1.0)	7.4
Feb. 12	4200	23.0*	ND (3.0)	ND (10.0)	7.0
Mar. 4	3420	9.0	11.6*	ND (1.0)	6.4
Mar. 27	- -	3.0	13.0*	0	7.0

* Indicates value/values which exceeded effluent limitation.
** Indicates flow rate at time of sample collection.
ND Not detected, detection limit is in parentheses.
-- Indicates analysis not done on this parameter.

plant. There was no discharge under this permit for the first quarter of 1992. This permit number has been changed to MO-G680002.

4.1.1 Radiological Analysis

Gross alpha and uranium analyses corresponded reasonably well with past data. There were higher than average uranium levels reported in samples collected from outfalls NP-0001 and NP-0003, but the levels were lower than recorded historical highs. The peak for NP-0001 was 1,090 pCi/l (1.6 mg/l) and for NP-0003, 1,680 pCi/l (2.47 mg/l). Uranium levels were similarly higher at outfalls NP-0001 and NP-0003 during the first quarter of 1991.

The stormwater outfalls had the following ranges of uranium concentrations. The process sewer outfall NP-0001 had only two sample values of 184 pCi/l (0.271 mg/l) and 1,090 pCi/l (1.6 mg/l). The Frog Pond outfall NP-0002 had values of 286 pCi/l (0.420 mg/l) to 437 pCi/l (0.643 mg/l). The Ash Pond outfall NP-0003, had values of 32 pCi/l (0.0472 mg/l) to 1,680 pCi/l (2.47 mg/l). A single sample was analyzed for outfall NP-0004 behind Raffinate Pit 4 with a value of 6.12 pCi/l (0.009 mg/l) and the southeast drainage outfall NP-0005 had values from 54 pCi/l (0.0799 mg/l) to 470 pCi/l (0.691 mg/l).

In addition to the required radiological monitoring, gross beta was quantified at 110 pCi/l (4.07 Bq/l) at outfall NP-0002 for the March 4, 1992, sample; at 630 (23.3 Bq/l) and 180 pCi/l (6.66 Bq/l) at outfall NP-0003 for the March 4 and March 25, 1992, samples; and at 11 pCi/l (0.41 Bq/l) at outfall NP-0004 for the March 2, 1992, sample.

Hydrostatic test water pumped from the quarry water treatment plant basins was analyzed for uranium in addition to the required permit parameters. The analyses showed that uranium was not present at detectable levels; see Table 4-2.

4.1.2 Other Analysis

Other analyses for NP-0001 through NP-0005 include physical analyses (settleable solids and total suspended solids) and chemical analyses (nitrate, pH, and lithium). First quarter 1992 values generally correspond to past values for the majority of parameters. Exceptions were high total suspended solids (TSS) values at NP-0003 on March 25, 1992, and at NP-0005 on February 6 and March 18, 1992; a high settleable solids (SS) level at NP-0005 on

Table 4-2 Results of NPDES Monitoring for Permit MO-G340001

Date Sampled	Flow*	Oil and Grease	Susp. Solids	Total Uranium		pH
Units	Gallons	mg/l	mg/l	mg/l	pCi/l	
Feb. 4		ND (5.0)	ND (5.0)	- -	ND (.68)	7.6, 7.7
Feb. 5		ND (5.0)	5.0	- -	ND (.68)	7.4
Feb. 6		ND (5.0)	7.0	- -	ND (.68)	7.9
TOTAL	1,000,000	- -	- -	- -	- -	- -

ND Not detected, detection limit is in parentheses.
- - Not applicable.
* Total flow was determined by calculating the volume pumped from the basin.

February 6, 1992; and high nitrate values at NP-0005 on January 8, 1992, and February 24, 1992.

The elevated TSS value at NP-0003 may have been caused by runoff from the construction of the material storage area (MSA) Phase II and III; no other causes could be determined. The high total suspended solids (TSS) value at outfall NP-0005 on February 6, 1992, was the result of an off-site water line break. There was no other flow at the time and the discharge was very short term. The high TSS value at NP-0005 on March 18, 1992 can be attributed to the ongoing construction at the site water treatment plant and off site water line construction by Missouri Cities Water Company. The high settleable solids level at NP-0005 on February 6, 1992, was also caused by the water line break. The high nitrate levels at NP-0005 may also have been caused by ongoing construction at the site water treatment plant area.

The permit for the discharge from the administration building treatment plant at outfall NP-0006 has effluent limitations and a requirement to monitor once per quarter. Flow must be measured once a month. The Subcontractor monitors the effluent once a month to assess plant performance, thus generating two additional sample analyses a quarter. The NPDES permit specifies effluent limitations for biochemical oxygen demand (BOD), TSS, pH, and fecal coliform at this outfall. The limits for BOD are 10 mg/l monthly average and 15 mg/l weekly average; for TSS, 15 mg/l monthly average and 20 mg/l weekly average; for fecal coliform, 400 colonies per 100 ml monthly average and 1,000 colonies per 100 ml daily maximum. The effluent exceeded permit limits twice during the quarter. On February 12, 1992, the total suspended solids were 23 mg/l, exceeding the monthly average limit of 15 mg/l. During March BOD results were 11.6 mg/l and 13 mg/l. These results were in compliance with the weekly limit of 15 mg/l, but the monthly average of 12.3 mg/l was out of compliance with the monthly average limit of 10 mg/l. The Subcontractor is continuing to make operational changes to improve plant performance. In addition, the plans to add a flow equalization system are at the 60% design review phase. The equalization of flow will greatly improve the operation of the plant. An application for a construction permit will be submitted to the Missouri Department of Natural Resources when plans and specifications are complete. Until the flow equalization is added, the treatment plant will be monitored more frequently than would normally be required.

Hydrostatic test water pumped from the quarry water treatment plant basins was in compliance with permitted units (Table 4-2).

5 AIR MONITORING

5.1 Radon Gas

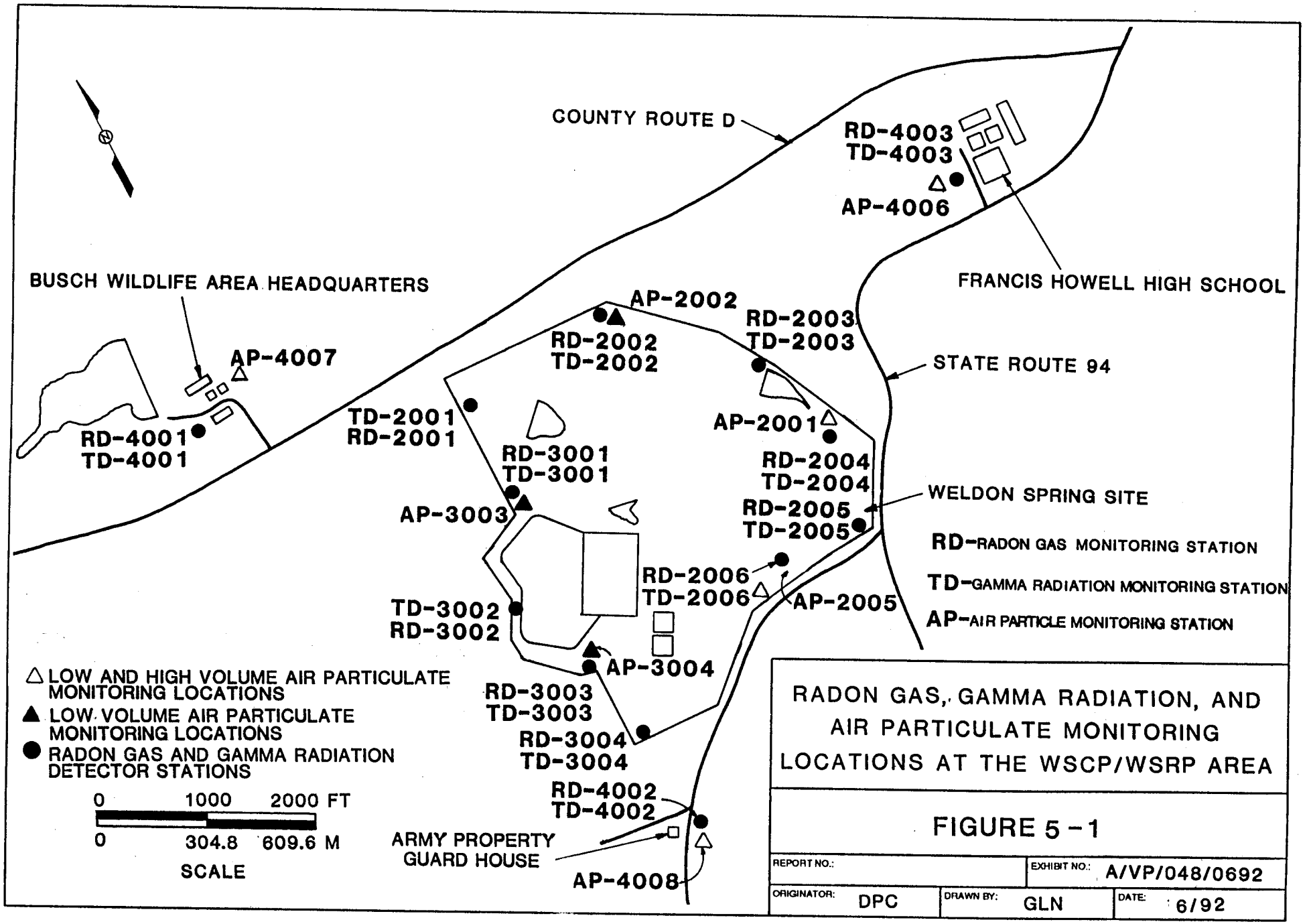
The radon gas monitoring program utilizes a pair of radon detectors at each of 25 permanent locations; each detector is exchanged quarterly. These detectors are deployed at six locations at the Weldon Spring Chemical Plant, eight locations at the Weldon Spring Quarry, four locations at the Weldon Spring raffinate pits, and seven off-site locations. Radon monitoring locations are shown in Figures 5-1, 5-2, and 5-3. On-site detectors are distributed around the perimeter fences to ensure adequate detection of radon dispersing from the properties under various atmospheric conditions. Locations RD-4001, RD-4004, RD-4005, RD-4006 and RD-4007 were used to monitor background levels near the site.

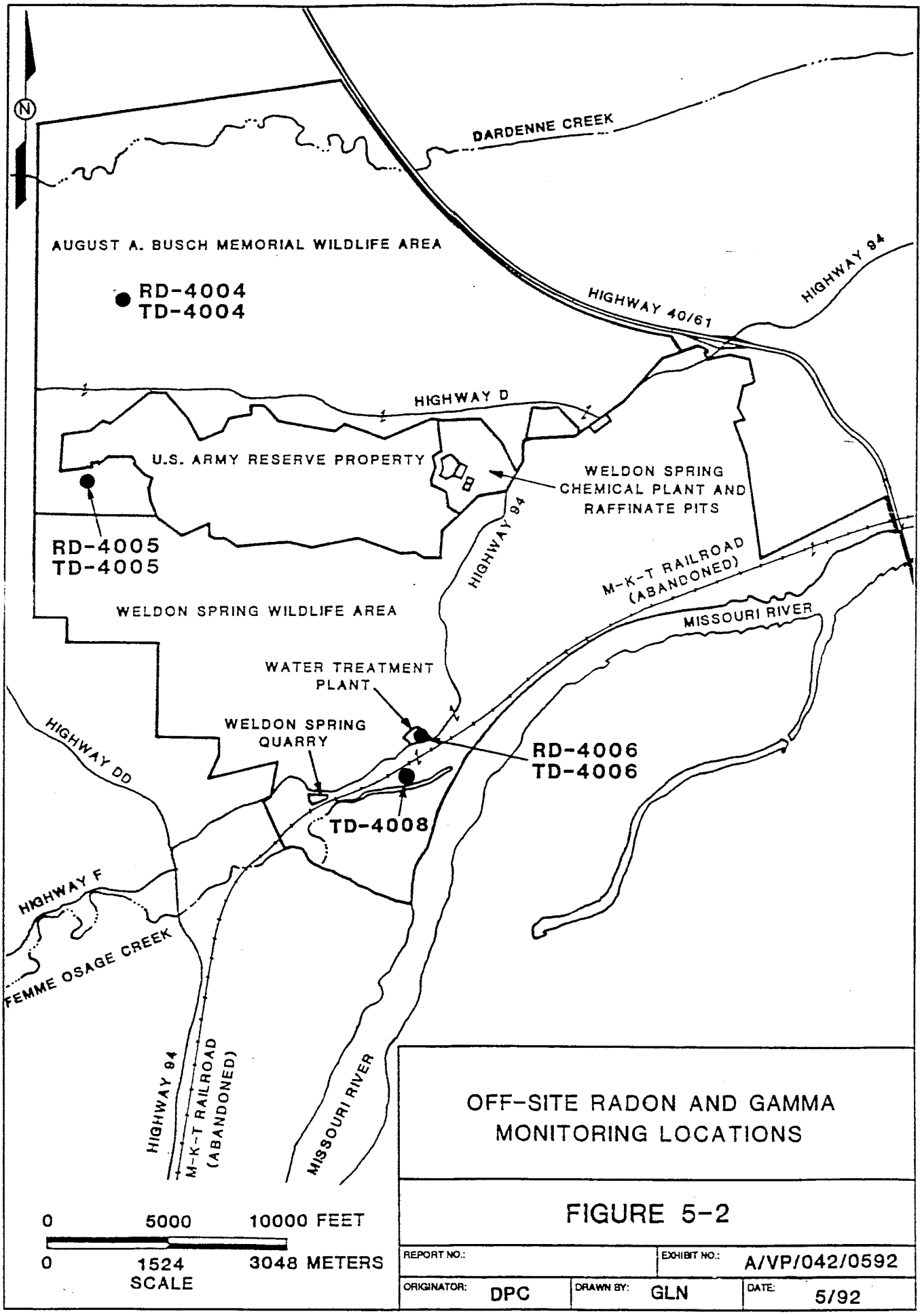
Two new monitoring stations (RD/TD-1007 and RD/TD-1008) were added to the western and northern quarry water treatment plant perimeters in addition to the relocation of monitoring station (RD/TD-1005) from the western quarry inner fence perimeter to the southern quarry water treatment plant perimeter. Another background monitoring station (RD/TD-4007) was added and is located west of Femme Osage Creek (Figure 5-3).

Table 5-1 summarizes the first quarter 1992 radon concentrations detected at all site perimeter and off-site monitoring locations. Also contained in Table 5-1 is a comparison of the measured concentration with the Federally permitted radon concentration (for unrestricted areas) of 3 pCi/l (111 Bq/m^3) above background as authorized by U.S. Department of Energy (DOE) Order 5400.5.

An average ambient background concentration was determined by calculating the arithmetic average for the five background locations. This data yielded an average ambient background radon concentration of 0.3 pCi/l (11.1 Bq/m^3) for the first quarter of 1992. This concentration was then subtracted from the concentration for each monitoring station, and compared to the DOE guideline of 3 pCi/l (111 Bq/m^3) above background.

Radon concentrations at the site and quarry perimeters and at off-site locations for the first quarter of 1992 were within the typical range expected during periods of normal precipitation as was the condition for this period. The quarterly radon concentrations at the

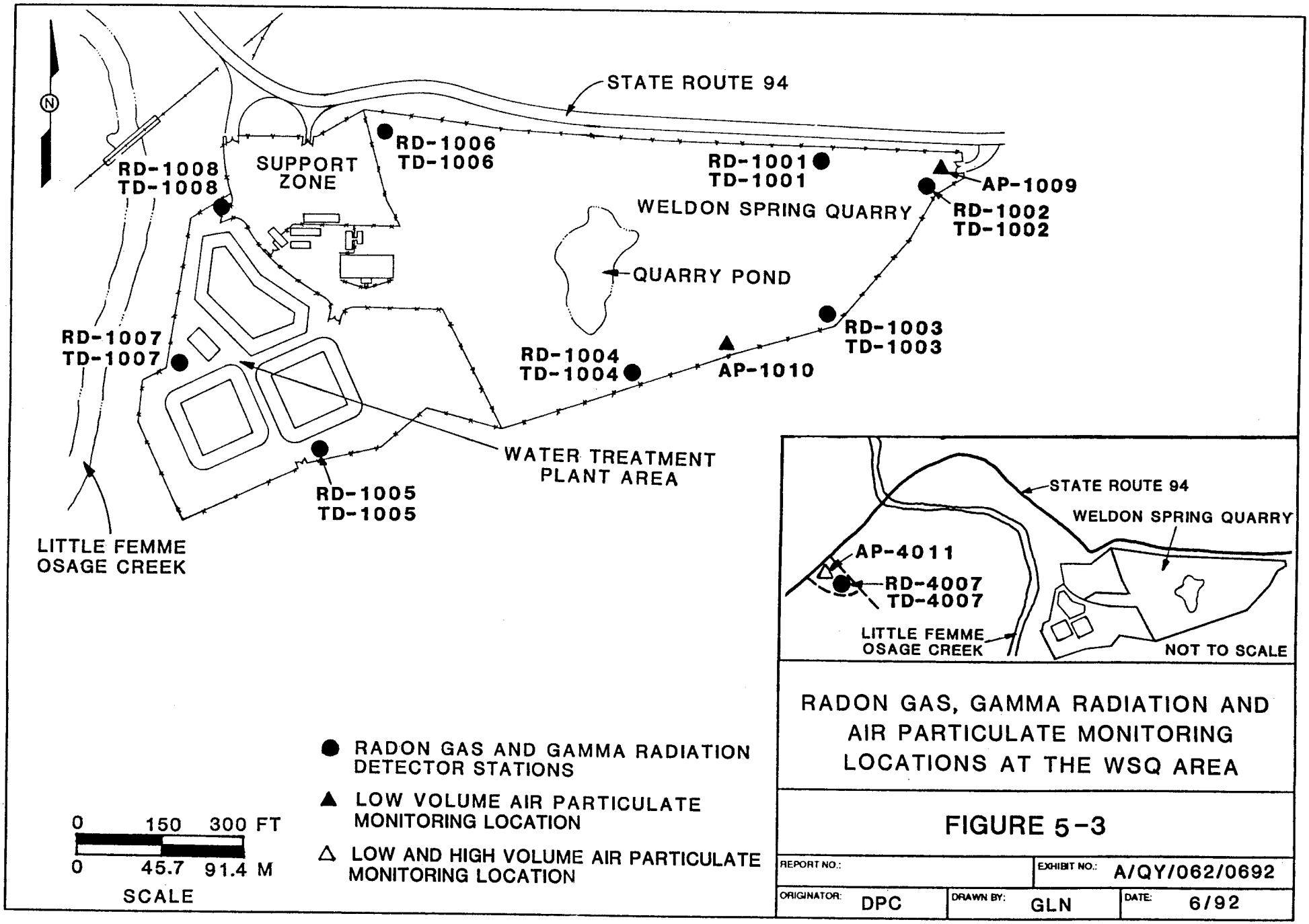

COUNTY ROUTE D
RD-4003
TD-4003
AP-4006
FRANCIS HOWELL HIGH SCHOOL
BUSCH WILDLIFE AREA HEADQUARTERS
AP-4007
RD-4001
TD-4001
AP-2002
RD-2002
TD-2002
RD-2003
TD-2003
STATE ROUTE 94
TD-2001
RD-2001
AP-2001
RD-3001
TD-3001
RD-2004
TD-2004
WELDON SPRING SITE
AP-3003
RD-2005
TD-2005
RD-2006
TD-2006
AP-2005
TD-3002
RD-3002
AP-3004
RD-3003
TD-3003
RD-3004
TD-3004
RD-4002
TD-4002
ARMY PROPERTY
GUARD HOUSE
AP-4008
RD-RADON GAS MONITORING STATION
TD-GAMMA RADIATION MONITORING STATION
AP-AIR PARTICLE MONITORING STATION
△ LOW AND HIGH VOLUME AIR PARTICULATE MONITORING LOCATIONS
▲ LOW VOLUME AIR PARTICULATE MONITORING LOCATIONS
● RADON GAS AND GAMMA RADIATION DETECTOR STATIONS
0 1000 2000 FT
0 304.8 609.6 M
SCALE
RADON GAS, GAMMA RADIATION, AND AIR PARTICULATE MONITORING LOCATIONS AT THE WSCP/WSRP AREA
FIGURE 5-1
REPORT NO.:
EXHIBIT NO.: A/VP/048/0692
ORIGINATOR: DPC
DRAWN BY: GLN
DATE: 6/92



OFF-SITE RADON AND GAMMA MONITORING LOCATIONS

FIGURE 5-2

REPORT NO.:		EXHIBIT NO.:	A/VP/042/0592
ORIGINATOR: DPC	DRAWN BY: GLN	DATE: 5/92	



RADON GAS, GAMMA RADIATION AND AIR PARTICULATE MONITORING LOCATIONS AT THE WSQ AREA

FIGURE 5-3

REPORT NO.:		EXHIBIT NO.: A/QY/062/0692
ORIGINATOR: DPC	DRAWN BY: GLN	DATE: 6/92

TABLE 5-1 First Quarter 1992 Track Etch Radon Monitoring Results[a]

Location ID	1st Quarter pCi/l	Percent of Guideline [b]
WSQ		
RD-1001	1.1	27
RD-1002	1.9	53
RD-1003	0.7	13
RD-1004	0.4	3
RD-1005	0.4	3
RD-1006	0.4	3
RD-1007	0.5	7
RD-1008	0.4	3
WSCP		
RD-2001	0.3	0
RD-2002	0.2	0
RD-2003	0.3	0
RD-2004	0.3	0
RD-2005	0.3	0
RD-2006	0.3	0
WSRP		
RD-3001	0.3	0
RD-3002	0.4	0
RD-3003	0.3	0
RD-3004	0.2	0
OFF-SITE		
RD-4001*	0.2	0
RD-4002	0.4	3
RD-4003	0.4	3
RD-4004*	0.3	0
RD-4005*	0.4	3

TABLE 5-1 First Quarter 1992 Track Etch Radon Monitoring Results[a] (Continued)

Location ID	1st Quarter pCi/l	Percent of Guideline [b]
RD-4006*	0.4	3
RD-4007*	0.4	3

(a) Results include natural background.

(b) Percent of guideline calculated by taking the quarterly average minus the average of the background stations divided by the DOE concentration guideline for Rn-222 which is 3 pCi/l (111 Bq/m^3)(Annual average above background) for uncontrolled areas.

* Denotes Background Station.

Weldon Spring Chemical Plant/Raffinate Pit (WSCP/RP) area averaged 0.3 pCi/l (11.1 Bq/m^3) while the quarterly radon concentrations at the Weldon Spring quarry (WSQ) averaged 0.7 pCi/l (26.8 Bq/m^3). The quarterly radon concentrations (background included) ranged from 0.2 pCi/l (7.4 Bq/m^3) at three monitoring locations to 1.9 pCi/l (70.3 Bq/m^3) at monitoring location RD-1002.

Radon concentrations found at the quarry are higher than concentrations measured at other locations because the radium concentrations in quarry wastes are typically much higher than in other areas. Also, the quarry is a large depression with side walls ranging from 3 m to 15 m (10 ft to 50 ft) high which tends to trap emanating radon within the quarry and raise the concentrations along the quarry perimeter.

5.2 Gamma Radiation Exposure

To monitor exposure from gamma radiation, spherical environmental thermoluminescent dosimeters (TLDs) were deployed at 26 locations. The gamma monitoring station locations are identified in Figures 5-1, 5-2, and 5-3 with a prefix TD-.

Table 5-2 summarizes the first quarter results of total gamma radiation monitoring at the 18 Weldon Spring site (WSS) perimeter monitoring stations, Francis Howell High School, the Weldon Spring Army Reserve Training Area, and at the six background monitoring stations.

The annual average background gamma exposure rates measured with TLDs in 1989, 1990, and 1991 were 68 mR/year, 62 mR/year, and 69 mR/year, respectively. The gamma exposure rates measured with TLDs in the first quarter of 1992 were consistent with 1989 through 1991 data. In fact, the first quarter TLD data were consistently lower than data from first quarter 1991 at all locations. This result was unexpected as the off-site laboratory increased the gamma response function by 15% prior to reporting the fourth quarter 1991 results. This increase was observed in the fourth quarter 1991 results and was expected to be reflected in the results for the first quarter 1992. However, the first quarter 1992 results at all locations were lower than those reported in the first quarter of 1991 and much lower than the results reported for the fourth quarter 1991. There were no problems identified through on-site investigations as to what caused the elevated TLD readings for the last quarter of 1991. Thus, different types of TLDs have been placed at a few locations on site for the second quarter and will be handled separately.

TABLE 5-2 First Quarter 1992 Environmental TLD Monitoring Results[a]

Location ID	1st Quarter mrem
WSQ	
TD-1001	22
TD-1002	18
TD-1003	21
TD-1004	17
TD-1005	18
TD-1006	17
TD-1007	19
TD-1008	16
WSCP	
TD-2001	17
TD-2002	15
TD-2003	18
TD-2004	18
TD-2005	15
TD-2006	16
WSRP	
TD-3001	17
TD-3002	13
TD-3003	17
TD-3004	14
OFF-SITE	
TD-4001*	19
TD-4002	17
TD-4003	--
TD-4004*	15

TABLE 5-2 First Quarter 1992 Environmental TLD Monitoring Results[a] (Continued)

Location ID	1st Quarter mrem
TD-4005*	17
TD-4006*	17
TD-4007*	17
TD-4008*	18

(a) Results include natural background.
\- Denotes loss of TLD.
* Denotes background station.

These experimental TLDs will likely provide insight as to whether or not laboratory handling and processing were responsible for the unusual fourth quarter results.

5.3 Radioactive Air Particulates

Eleven low volume air particulate samplers monitor the Weldon Spring site continuously. Five of these (AP–2001, AP-2002, AP-3003, AP-3004, and AP-2005) are located around the Weldon Spring Chemical Plant (WSCP) perimeter and two are located around the quarry perimeter as shown in Figure 5-3. Three monitoring stations (AP-4006, AP-4008, and AP-4011) are located off site at sensitive receptor locations including Francis Howell High School, the Army Reserve property, and near a residential site west of the quarry. The monitoring station at the August A. Busch Wildlife Area (ABWA) (AP-4007) is used to monitor background levels in the vicinity of the WSCP. The off-site monitoring stations are also shown in Figure 5-2.

The sampling station near the ABWA headquarters is used as a background air monitoring station. This station is approximately 0.8 km (0.5 mile) from the WSCP perimeter in a northwestern direction. The terrain between the WSCP and this sampling station is hilly and forested, providing a significant physical barrier to airborne particulates originating from the WSCP/RP area.

Table 5-3 summarizes the quarterly average concentrations and the standard deviations for the 11 air monitoring locations. The quarterly average concentration for each monitoring location was calculated by averaging all weekly air particulate analysis results including results lower than the instruments lower limit of detection (LLD). The corresponding standard deviation for each monitoring location was also calculated using all weekly air particulate analysis results. Due to maintenance, all monitors were not operating the entire 13 weeks as indicated in Table 5-3. However, the sensitive receptor monitoring stations (AP-4006, AP-4008, and AP-4011) were in operation the entire quarter. These stations are also equipped with high volume air samplers which are the focus of the WSS National Emissions Standards for Hazardous Air Pollutants (NESHAPs) plan. The high volume monitoring results will be presented in the 1992 calendar year Annual Site Environmental Report.

The first quarter long-lived gross alpha concentrations ranged from 7.5×10^{-16} μCi/ml to 1.06×10^{-15} μCi/ml an average background concentration of with 1.05×10^{-15} μCi/ml detected at the background station.

TABLE 5-3 First Quarter 1992 Radiological Air Particulate Monitoring Results

Monitor Identification Number	Quarterly AVG. CONCENTRATION (μCi/ml)	STANDARD DEVIATION (μCi/ml)	NUMBER OF WEEKS COLLECTED	NUMBER OF VALUES ABOVE LLD
AP-2001	8.40E-16	2.42E-16	13	13
AP-2002	9.15E-16	5.62E-16	13	10
AP-3003	8.09E-16	5.34E-16	11	9
AP-3004	9.04E-16	3.59E-16	13	10
AP-2005	8.38E-16	3.72E-16	13	10
AP-4006	7.63E-16	4.16E-16	13	9
AP-4007*	1.05E-15	3.99E-16	13	13
AP-4008	1.06E-15	3.61E-16	12	12
AP-1009	9.87E-16	3.25E-16	12	12
AP1010	7.48E-16	7.35E-16	13	8
AP-4011	8.53E-16	3.53E-16	13	12

* Indicates background monitor station.
To convert μCi/ml to Bq/m^3, multiply by 3.7E10.

5.4 Asbestos

No environmental asbestos monitoring was performed in the first quarter of 1992.

6 REFERENCES

MK-Ferguson Company and Jacobs Engineering Group, 1989. *Phase II Groundwater Quality Assessment for the Weldon Spring Site, Chemical Plant, Raffinate Pits and Surrounding Vicinity Properties*, Rev. 0. DOE/OR/21548-078. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. September.

MK-Ferguson Company and Jacobs Engineering Group, 1992. *Environmental Monitoring Plan*, Rev. 1. DOE/OR/21548-237. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, MO. January.

DOE Orders

5400.5 *Radiation Protection of the Public and the Environment*

APPENDIX A

LISTING OF VOLATILES, SEMI-VOLATILES AND PESTICIDE/PCB'S

VOLATILES

1,1,1-TRICHLOROETHANE
1,1,2,2-TETRACHLOROETHANE
1,1,2-TRICHLOROETHANE
1,1-DICHLOROETHANE
1,1-DICHLOROETHENE
1,2-DICHLOROETHANE
1,2-DICHLOROETHENE (TOTAL)
1,2-DICHLOROPROPANE
2-BUTANONE
2-HEXANONE
4-METHYL-2-PENTANONE
ACETONE
BENZENE
BROMODICHLOROMETHANE
BROMOFORM
BROMOMETHANE
CARBON DISULFIDE
CARBON TETRACHLORIDE
CHLOROBENZENE
CHLOROETHANE
CHLOROFORM
CHLOROMETHANE
CIS-1,3-DICHLOROPROPENE
DIBROMOCHLOROMETHANE
ETHYL BENZENE
METHYLENE CHLORIDE
STYRENE
TETRACHLOROETHENE
TOLUENE
TRANS-1,3-DICHLOROPROPENE
TRICHLOROETHENE
VINYL ACETATE
VINYL CHLORIDE
XYLENES, TOTAL

SEMI-VOLATILES

1,2,4-TRICHLOROBENZENE
1,2-DICHLOROBENZENE
1,3-DICHLOROBENZENE
1,4-DICHLOROBENZENE
2,4,5-TRICHLOROPHENOL
2,4,6-TRICHLOROPHENOL
2,4-DICHLOROPHENOL
2,4-DIMETHYLPHENOL
2,4-DINITROPHENOL
2,4-DINITROTOLUENE
2,6-DINITROTOLUENE
2-CHLORONAPHTHALENE
2-CHLOROPHENOL
2-METHYLNAPHTHALENE
2-METHYLPHENOL
2-NITROANILINE
2-NITROPHENOL
3,3'-DICHLOROBENZIDINE
3-NITROANILINE
4,6-DINITRO-2-METHYLPHENOL
4-BROMOPHENYL PHENYL ETHER
4-CHLORO-3-METHYL PHENOL
4-CHLOROANILINE
4-CHLOROPHENYL PHENYL ETHER
4-METHYLPHENOL
4-NITROANILINE
4-NITROPHENOL
ACENAPHTHENE
ACENAPHTHYLENE
ANTHRACENE
BENZO(A)ANTHRACENE
BENZO(A)PYRENE
BENZO(B)FLUORANTHENE
BENZO(G,H,I)PERYLENE
BENZO(K)FLUORANTHENE
BENZOIC ACID
BENZYL ALCOHOL
BIS(2-CHLOROETHOXY)METHANE
BIS(2-CHLOROETHYL)ETHER
BIS(2-CHLOROISOPROPYL)ETHER
BIS(2-ETHYLHEXYL)PHTHALATE
BUTYLBENZYLPHTHALATE
CHRYSENE
DI-N-BUTYL PHTHALATE
DI-N-OCTYL PHTHALATE
DIBENZO(A,H)ANTHRACENE
DIBENZOFURAN
DIETHYLPHTHALATE
DIMETHYLPHTHALATE
FLUORANTHENE
FLUORENE
HEXACHLOROBENZENE
HEXACHLOROBUTADIENE
HEXACHLOROCYCLOPENTADIENE
HEXACHLOROETHANE
INDENO(1,2,3-CD)PYRENE
ISOPHORONE
N-NITROSO-DI-N-PROPYLAMINE
N-NITROSODIPHENYLAMINE
NAPHTHALENE
NITROBENZENE
PENTACHLOROPHENOL
PHENANTHRENE
PHENOL
PYRENE

PESTICIDE/PCB'S

4,4'-DDD
4,4'-DDE
4,4'-DDT
ALDRIN
ALPHA-BHC
ALPHA-CHLORDANE
HEPTACHLOR EPOXIDE
AROCLOR - 1016
AROCLOR - 1221
AROCLOR - 1232
AROCLOR - 1242
AROCLOR - 1248
AROCLOR - 1254
METHOXYCHLOR
AROCLOR-1260
BETA-BHC
DELTA-BHC
DIELDRIN
ENDOSULFAN I
ENDOSULFAN II
TOXAPHENE
ENDOSULFAN SULFATE
ENDRIN
ENDRIN KETONE
GAMMA-BHC (LINDANE)
GAMMA-CHLORDANE
HEPTACHLOR