



Department of Energy

Oak Ridge Operations
Weldon Spring Site
Remedial Action Project Office
7295 Highway 94 South
St. Charles, Missouri 63304

September 24, 1991

ADDRESSEES:

**QUARTERLY ENVIRONMENTAL DATA SUMMARY FOR THE SECOND QUARTER, 1991
FOR THE WELDON SPRING SITE REMEDIAL ACTION PROJECT**

Enclosed for your information and use is a copy of the Quarterly Environmental Data Summary Report. The document summarizes the environmental monitoring data for the second quarter, highlights any potentially significant findings, and offers preliminary interpretations. Final interpretations will appear in the 1991 Annual Site Environmental Report.

The report concludes that no significant differences or changes in off-site exposures resulting from Weldon Spring Site contaminates have occurred during this reporting period.

If you have any questions please call Ken Lawver at (314) 441-8978.

Sincerely,


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

Enclosure:
As stated

LIST OF ADDRESSEES FOR LETTER DATED SEPTEMBER 24, 1991

Mr. Jack Stein, Director
Environmental Engineering & Site Services Department
Anheuser Busch
One Busch Place
St. Louis, Missouri 63118

Francis Howell School District
Consultant
Mr. Donald J. McQueen
Shannon & Wilson Inc.
11500 Olive Blvd. Suite 3276
St. Louis, Missouri 63141

Administrative Record (2 copies)
MK-Ferguson Company
Mary Gilbert
7295 Highway 94 South
St. Charles, Missouri 63304

Dr. Margaret MacDonell (3 copies)
Energy and Environmental Systems Division
Argonne National Laboratory
9700 South Cass Avenue, Building 362
Argonne, Illinois 60439

Mr. Stanley M. Remington
Consulting Hydrologist
2524 Westminister Drive
St. Charles, Missouri 63301

Mr. George Fahrner
892 California Trail
St. Charles, Missouri 63304

Ms Mary Halliday
3655 Highway D
Defiance, Missouri 63341

Ms Kay Drey
515 West Point Avenue
University City, Missouri 63130

Kathryn M. Linneman Branch
St. Charles City/County Library
2323 Elm Street
St. Charles, Missouri 63301

Mr. Robert Shoewe, Principal
Francis Howell High School
7001 Highway 94 South
St. Charles, Missouri 63304

Dr. David E. Bedan (5 copies)
Division of Environmental Quality
Missouri Department of Natural Resources
Post Office Box 176
Jefferson City, Missouri 65102

Mr. Dan Bauer
U.S. Department of Interior
Geological Survey, Mail Stop 200
1400 Independence Road
Rolla, Missouri 65401

Mr. Karl J. Daubel
Environmental Coordinator
Weldon Spring Training Area
7301 Highway 94 South
St. Charles, Missouri 63304

Mr. Lynn Bultman, Manager
Missouri Cities Water Company
3877 Highway 70
St. Peters, Missouri 63376

Mr. William Adams, EW-90
Assistant Manager for Environmental Restoration &
Waste Management
Oak Ridge Operations Office
U.S. Department of Energy
Post Office Box 2001
Oak Ridge, Tennessee 37831-8541

Spencer Road Branch
St. Charles City/County Library
425 Spencer Road
St. Peters, Missouri 63376

Mr. Tom Uhlenbrock
Environmental Reporter
St. Louis Post-Dispatch
900 North Tucker Boulevard
St. Louis, Missouri 63101

Mr. Peter J. Gross, SE-31 (3 copies)
Director of Environmental Protection Division
Oak Ridge Operations Office
U.S. Department of Energy
Post Office Box 2001
Oak Ridge, Tennessee 37831-8738

The Honorable Eugene Schwendemann
Presiding Commissioner
St. Charles County Courthouse
118 North Second Street
St. Charles, Missouri 63301

Mr. Dan Wall (4 copies)
Superfund Branch
U.S. Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Mr. Steve Iverson, Project Manager
Program and Project Management Division
U.S. Army Corps of Engineers
Kansas City District
601 East 12th Street
Kansas City, Missouri 64106
ATTN: CEMRKED-MD

Mr. Ali Avali
Project Manager
U.S. Army Toxic & Hazardous Materials Agency
ATTN: CETHA-IR-A
Building E4435
Aberdeen Proving Ground, Maryland 21010-5401

Mr. J.D. Berger
Oak Ridge Associated Universities
230 Warehouse Road
Building 1916-T2
Oak Ridge, Tennessee 37830

Francis Howell High School
Dr. John Oldani
7001 Highway 94 South
St. Charles, Missouri 63304

Kisker Road Branch
St. Charles City/County Library
1000 Kisker Road
St. Charles, Missouri 63303

Ms Meredith Hunter
258 Cedar Groves
St. Charles, Missouri 63303

Mr. Kenneth Gronewald
804 Birdie Hills Road
St. Peters, Missouri 63376

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QUARTERLY ENVIRONMENTAL DATA SUMMARY SECOND QUARTER 1991

Weldon Spring Site Remedial Action Project
Weldon Spring, Missouri

SEPTEMBER 1991

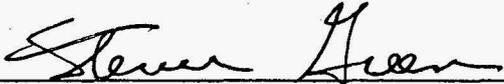
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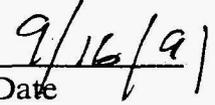


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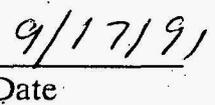
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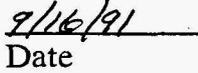

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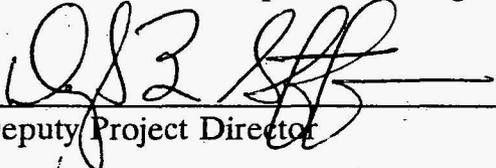

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 Quality Assurance Manager


 Date

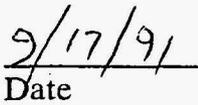

 Environmental Compliance Manager


 Date


 Deputy Project Director


 Date


 Project Director


 Date

Weldon Spring Site Remedial Action Project

Quarterly Environmental Data Summary Second Quarter 1991

Revision 0

September 1991

Prepared by

MK-FERGUSON COMPANY
and
JACOBS ENGINEERING GROUP
7295 Highway 94 South
St. Charles, Missouri 63303

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ABSTRACT AND WELDON SPRING SITE QUARTERLY SELF ASSESSMENT SECOND QUARTER 1991

The purpose of this Quarterly Environmental Data Summary is to provide preliminary data acquired as part of the Weldon Spring Site Remedial Action Project (WSSRAP) environmental monitoring program. The document summarizes the environmental data, highlights any potentially significant findings, and offers tentative interpretations. Validated data and final interpretations will appear in the 1991 Annual Site Environmental Report.

This report includes data from environmental monitoring activities at the Weldon Spring site (WSS) during the second quarter of 1991. Groundwater, surface water, and air were sampled in order to monitor potential exposure pathways. Analytical parameters included radionuclides, nitroaromatic compounds, inorganic anions, and direct gamma exposure. The results are used to calculate exposure doses (where applicable) 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 second quarter of 1991 relative to exposures calculated in previous quarters. Contaminated groundwater did not affect private water supplies or the St. Charles County well field. Surface water containing elevated uranium activity continued to impact the Femme Osage Slough. Off-site gamma, radon and air particulate exposures remained indistinguishable from background. Off-site monitoring demonstrated that exposure levels at the Francis Howell High School, the Busch Wildlife Area Headquarters, and the Weldon Spring Training Area remain indistinguishable from background levels.

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1 INTRODUCTION

This document is the fifth in a series of documents designed to provide a summary of 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 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 observations made in previous reports. The full interpretation of these data (as well as data in other quarterly summaries) will be undertaken in the 1991 ASER. It is recommended that interested readers refer to previous Environmental Monitoring Plans (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 are 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 was 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. The WSSRAP is taking corrective action to ensure more timely availability of data in the future. These data will be reported in the 1991 ASER. Sludges, soils, and biological specimens 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 1991 ASER. Included for the first time are QC data for the second quarter which are presented in tables throughout this document.

This information provides insight as to the performance of the laboratory and the quality of the data. This QC data is provided for information only. Final interpretation will be presented in the 1991 Annual Site Environmental Report (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

The groundwater at the chemical plant/raffinate pits/vicinity properties area is monitored on a semi-annual basis with the exception of MW-2001, MW-2002, MW-2003, MW-3003, MW-3006, MW-3008, MW-3009, MW-3023, MW-4012 and MW-4013 which are monitored quarterly. Monitoring well locations are shown in Figure 2-1. Data from the semiannual groundwater monitoring for the first half of 1991 are presented in this quarterly data summary, however, data from the quarterly monitored wells are presented in each QEDS.

2.1.1 Nitroaromatic Results

Table 2-1 contains nitroaromatic data from samples collected from the quarterly and semi-annual monitored groundwater wells at the CP/RP/VP area. Nitroaromatic compounds were detected in 22 samples. However, the data continue to reflect levels historically found and documented in previous environmental reports.

2.1.2 Radiological Results

The radiological results for samples from quarterly monitored wells at the WSCP/RP/VP are presented in Table 2-2. The upper bound for natural uranium background concentrations in groundwater at the WSCP/RP/VP has been determined to be 3.4 pCi/l. The EPA has not yet established drinking water standards for uranium; however, studies leading to proposed rulemaking are using uranium in the 10 pCi/l to 40 pCi/l range. The U.S. Department of Energy (DOE) has a health based derived concentration guideline (DCG) of 600 pCi/l in surface water effluent.

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

| SAMPLE ID | NB ($\mu\text{g/l}$) DL=0.03 | 1,3-DNB ($\mu\text{g/l}$) DL=0.09 | 2,4-DNT ($\mu\text{g/l}$) DL=0.03 | 2,6-DNT ($\mu\text{g/l}$) DL=0.01 | 2,4,6-TNT ($\mu\text{g/l}$) DL=0.03 | 1,3,5-TNB ($\mu\text{g/l}$) DL=0.03 |
|----------------|--------------------------------------|---|---|---|---|---|
| GW-2001-Q191 | ND | ND | 0.073 | 0.049 | ND | ND |
| GW-2002-Q191 | ND | ND | 0.063 | 0.34 | ND | ND |
| GW-2003-Q191 | ND | ND | 0.15 | 0.65 | ND | ND |
| GW-2004-040891 | ND | ND | ND | ND | ND | ND |
| GW-2005-050791 | ND | ND | 0.066 | 0.11 | ND | ND |
| GW-2006-040891 | ND | ND | ND | 2 | ND | 10 |
| GW-2007-010991 | ND | ND | ND | ND | ND | 17.5 |
| GW-2008-010791 | ND | ND | 0.05 | 0.89 | ND | 0.69 |
| GW-2009-010891 | ND | ND | ND | ND | ND | ND |
| GW-2010-010791 | ND | 0.14 | 0.6 | 0.93 | 0.44 | 0.19 |
| GW-2011-010891 | ND | ND | ND | ND | ND | ND |
| GW-2012-010891 | ND | ND | ND | ND | ND | ND |
| GW-2013-030791 | ND | 0.18 | 0.7 | 15 | 0.85 | 5 |
| GW-2014-022891 | ND | ND | 0.14 | 0.74 | ND | 2.8 |
| GW-2015-010991 | ND | ND | ND | ND | ND | ND |
| GW-2017-011591 | ND | ND | ND | ND | ND | ND |
| GW-2018-011591 | ND | ND | ND | ND | ND | ND |
| GW-2019-050991 | ND | ND | ND | ND | ND | ND |

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

| SAMPLE ID | NB ($\mu\text{g/l}$) DL=0.03 | 1,3-DNB ($\mu\text{g/l}$) DL=0.09 | 2,4-DNT ($\mu\text{g/l}$) DL=0.03 | 2,6-DNT ($\mu\text{g/l}$) DL=0.01 | 2,4,6-TNT ($\mu\text{g/l}$) DL=0.03 | 1,3,5-TNB ($\mu\text{g/l}$) DL=0.03 |
|----------------|--------------------------------------|---|---|---|---|---|
| GW-2020-052191 | ND | ND | ND | ND | ND | ND |
| GW-2021-052191 | ND | ND | ND | ND | ND | ND |
| GW-2022-050791 | ND | ND | ND | ND | ND | ND |
| GW-2023-051491 | ND | ND | ND | ND | ND | ND |
| GW-2024-052291 | ND | ND | ND | ND | ND | ND |
| GW-2025-052291 | ND | ND | ND | ND | ND | ND |
| GW-2026-052891 | ND | ND | ND | ND | ND | ND |
| GW-2027-052891 | ND | ND | ND | ND | ND | ND |
| GW-2028-050991 | ND | ND | ND | ND | ND | ND |
| GW-2029-051391 | ND | ND | ND | ND | ND | ND |
| GW-2030-050991 | ND | ND | 0.09 | 10 | 8.5 | 4.2 |
| GW-2031-050291 | ND | ND | ND | ND | ND | ND |
| GW-2032-053091 | ND | ND | 0.033 | 4.6 | 7.8 | 4 |
| GW-2033-052991 | ND | ND | 0.09 | 9.3 | 1.1 | 2 |
| GW-2034-060691 | ND | ND | ND | ND | ND | ND |
| GW-3001-013191 | ND | ND | 0.44 | 0.25 | ND | 0.09 |
| GW-3002-060491 | ND | ND | ND | ND | ND | ND |
| GW-3003-031891 | ND | ND | 0.059 | 0.085 | ND | ND |

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

| SAMPLE ID | NB ($\mu\text{g/l}$) DL=0.03 | 1,3-DNB ($\mu\text{g/l}$) DL=0.09 | 2,4-DNT ($\mu\text{g/l}$) DL=0.03 | 2,6-DNT ($\mu\text{g/l}$) DL=0.01 | 2,4,6-TNT ($\mu\text{g/l}$) DL=0.03 | 1,3,5-TNB ($\mu\text{g/l}$) DL=0.03 |
|----------------|--------------------------------------|---|---|---|---|---|
| GW-3006-031991 | ND | ND | ND | ND | ND | ND |
| GW-3008-Q191 | ND | ND | 0.08 | 0.16 | ND | ND |
| GW-3009-Q191 | ND | ND | ND | ND | ND | ND |
| GW-3010 | ABANDONED 1991 | | | | | |
| GW-3019-013091 | ND | ND | ND | ND | ND | ND |
| GW-3022-060491 | ND | ND | 0.12 | 0.034 | ND | ND |
| GW-3023-031991 | ND | ND | 2.6 | 4.5 | ND | ND |
| GW-4001-010991 | ND | ND | ND | ND | ND | 43.3 |
| GW-4002-011691 | ND | ND | 0.42 | 1.1 | 1.1 | 0.09 |
| GW-4003-011691 | ND | ND | ND | ND | ND | ND |
| GW-4004-021991 | ND | ND | ND | ND | ND | ND |
| GW-4005-021991 | ND | ND | ND | ND | ND | ND |
| GW-4005-050791 | ND | ND | ND | ND | ND | ND |
| GW-4006-010991 | ND | ND | ND | ND | ND | ND |
| GW-4007 | NS | NS | NS | NS | NS | NS |
| GW-4008-011691 | ND | ND | ND | ND | ND | ND |
| GW-4009-011791 | ND | ND | ND | ND | ND | ND |
| GW-4010-050691 | ND | ND | ND | ND | ND | ND |

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

| SAMPLE ID | NB ($\mu\text{g/l}$) DL=0.03 | 1,3-DNB ($\mu\text{g/l}$) DL=0.09 | 2,4-DNT ($\mu\text{g/l}$) DL=0.03 | 2,6-DNT ($\mu\text{g/l}$) DL=0.01 | 2,4,6-TNT ($\mu\text{g/l}$) DL=0.03 | 1,3,5-TNB ($\mu\text{g/l}$) DL=0.03 |
|-------------------|--------------------------------------|---|---|---|---|---|
| GW-4011-011791 | ND | ND | ND | ND | ND | ND |
| GW-4012-Q191 | ND | ND | ND | ND | ND | ND |
| GW-4013-Q191 | ND | ND | 0.049 | 1.1 | 0.55 | 34 |
| GW-4014-061091 | ND | ND | ND | 0.028 | ND | 0.22 |
| GW-4015-061791 | ND | ND | 0.031 | 1.3 | ND | 0.56 |
| GW-4016-013191 | ND | ND | ND | ND | ND | ND |
| GW-4017-013191 | ND | ND | ND | ND | ND | ND |
| GW-4018-041791 | ND | ND | ND | ND | ND | ND |
| GW-4019-041691 | ND | ND | ND | ND | ND | ND |
| GW-4020-041691 | ND | ND | ND | ND | ND | ND |
| GW-4021-041791 | ND | ND | ND | ND | ND | ND |
| GW-4022-050791 | ND | ND | ND | ND | ND | ND |
| GW-4023-041791 | ND | ND | 0.097 | 0.055 | ND | 0.13 |
| GW-0000-060691 | ND | ND | ND | ND | ND | ND |
| GW-2033-052991-BB | ND | ND | ND | ND | ND | ND |
| GW-2021-052191-FB | ND | ND | ND | ND | ND | ND |

NS - NOT SAMPLED
BB - BAILER BLANK

ND - NOT DETECTED
FB - FIELD BLANK

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

| SAMPLE ID | Nitrate (mg/l) DL=0.1 | Sulfate (mg/l) DL=1.0 | Uranium (pCi/l) |
|----------------|-----------------------------|-----------------------------|--------------------|
| GW-2001-Q191 | 20.7 | 5.4 | ND |
| GW-2001-Q291 | 19.6 | 5.8 | NS |
| GW-2002-Q191 | 23 | 109 | ND |
| GW-2002-Q291 | 18.9 | 122 | NS |
| GW-2003-Q191 | 414 | 114 | 0.7 |
| GW-2003-Q291 | 51.6 | 133 | NS |
| GW-2004-040891 | 1 | 2.6 | ND |
| GW-2005-050791 | 253 | 20.1 | ND |
| GW-2006-040891 | 6 | 32.9 | ND |
| GW-2007-010991 | ND | 11 | 2 |
| GW-2008-010791 | 3.3 | 30.9 | 1.4 |
| GW-2009-010891 | 5.5 | 10.6 | 1.4 |
| GW-2010-010791 | 1.2 | 32.7 | 0.7 |
| GW-2011-010891 | 2 | 107 | 4.8 |
| GW-2012-010891 | 1.3 | 73.5 | 2 |
| GW-2013-030791 | 1.2 | 18 | 2.7 |
| GW-2014-022891 | 1.9 | 21 | 1.4 |
| GW-2015-010991 | 0.3 | 102 | 4.1 |
| GW-2017-011591 | 0.7 | 617 | 7.5 |
| GW-2018-011591 | 0.6 | 6.5 | 1.4 |
| GW-2019-050991 | ND | 30.7 | 1.4 |
| GW-2020-052191 | 0.9 | 136.4 | 3.4 |
| GW-2021-052191 | ND | 10.7 | ND |
| GW-2022-050791 | 0.616 | 12.8 | ND |
| GW-2023-051491 | ND | 16 | ND |
| GW-2024-052291 | ND | 31.4 | 1.4 |
| GW-2025-052291 | ND | 14.5 | ND |
| GW-2026-052891 | ND | 14.5 | 0.7 |

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

| SAMPLE ID | Nitrate (mg/l) DL=0.1 | Sulfate (mg/l) DL=1.0 | Uranium (pCi/l) |
|----------------|-----------------------------|-----------------------------|--------------------|
| GW-2027-052891 | ND | 10.5 | ND |
| GW-2028-050991 | ND | 74.1 | 0.7 |
| GW-2029-051391 | ND | 27.7 | 0.7 |
| GW-2030-050991 | 1.3 | 28.5 | 12.2 |
| GW-2031-050291 | 0.4 | 33.7 | 6.1 |
| GW-2032-053091 | 79 | 10 | 2 |
| GW-2033-052991 | ND | 0.9 | ND |
| GW-2034-060691 | ND | 15.5 | 3.4 |
| GW-3001-013191 | 336 | 20.9 | 4.1 |
| GW-3002-060491 | ND | 636.7 | 1.4 |
| GW-3003-Q191 | 4 | 149 | 19 |
| GW-3003-Q291 | 806 | 255 | NS |
| GW-3006-Q191 | 1 | 24.2 | ND |
| GW-3006-Q291 | ND | 21.6 | NS |
| GW-3008-Q191 | 1050 | 51.6 | 4.1 |
| GW-3008-053091 | 1010 | 1030 | NS |
| GW-3009-Q191 | 89 | 39.8 | 49.6 |
| GW-3009-Q291 | 0.724 | 55.7 | NS |
| GW-3010- | ABANDONED 1991 | | |
| GW-3019-013091 | ND | 4.7 | 8.2 |
| GW-3022-060491 | 88 | 1.2 | 3.4 |
| GW-3023-031991 | 275 | 558 | 7.5 |
| GW-3023-Q291 | 389 | 268 | NS |
| GW-4001-010991 | 43.3 | 62.5 | 3.4 |
| GW-4002-011691 | 1.2 | 18.1 | ND |
| GW-4003-011691 | 8.1 | NA | ND |
| GW-4004-021991 | 0.8 | 20.2 | ND |

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

| SAMPLE ID | Nitrate (mg/l) DL=0.1 | Sulfate (mg/l) DL=1.0 | Uranium (pCi/l) |
|-------------------|-----------------------------|-----------------------------|--------------------|
| GW-4005-021991 | 1.9 | 17.9 | 6.8 |
| GW-4005-050791 | 1.6 | 16.4 | 122.4 |
| GW-4006-010991 | 5.3 | 25.5 | 1.2 |
| GW-4007 | NS | NS | NS |
| GW-4008-011691 | ND | 27.4 | ND |
| GW-4009-011791 | ND | 20.9 | 2.7 |
| GW-4010-050691 | ND | 24.9 | 0.7 |
| GW-4010-070991 | ND | 25 | NS |
| GW-4011-011791 | 23 | 45.4 | 4.8 |
| GW-4012-Q191 | ND | 54 | 4.1 |
| GW-4012-Q291 | 180 | 9140 | NS |
| GW-4013-Q191 | 84.1 | 42 | 1.4 |
| GW-4013-061091 | 75.8 | 35.2 | NS |
| GW-4014-061091 | 1.55 | 25.9 | ND |
| GW-4015-061791 | 2 | 7.3 | NA |
| GW-4016-013191 | ND | ND | 5.4 |
| GW-4017-013191 | ND | 9.83 | 2.7 |
| GW-4018-041791 | 2.2 | 4.4 | ND |
| GW-4019-041691 | 0.2 | 3.7 | 3.4 |
| GW-4020-041691 | ND | 100 | 24.5 |
| GW-4021-041791 | ND | 221 | 8.2 |
| GW-4022-050791 | 0.1 | 43.7 | ND |
| GW-4023-041791 | 0.2 | 46.4 | ND |
| GW-0000-060691 | | | ND |
| GW-4022-050791-DU | | | 4.9 |
| GW-2021-052191-FB | ND | ND | |
| GW-0000-053091-WB | | | ND |

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

| SAMPLE ID | Nitrate (mg/l) DL=0.1 | Sulfate (mg/l) DL=1.0 | Uranium (pCi/l) |
|-------------------|-----------------------------|-----------------------------|--------------------|
| GW-2033-052991-BB | | | ND |
| GW-0000-052391-WB | | | 2.04 |
| GW-0000-061191 | | | ND |
| GW-2033-052991-BB | ND | ND | |
| GW-0000-052891-WB | | | 0.68 |

ND - NOT DETECTED
 NS - NOT SAMPLED
 NA - NOT AVAILABLE
 DU - DUPLICATE
 BB - BAILER BLANK
 FB - FIELD BLANK
 WB - WATER BLANK

The highest uranium level detected was 122.4 pCi/l from a sample obtained from Monitoring Well 4005. The other concentrations reported in Table 2-2 continue to indicate levels below the proposed drinking water standard for uranium.

2.1.3 Geochemical Results

Geochemical results for samples from quarterly monitored wells at the WSCP/RP/VP are presented in Table 2-3. Geochemical parameters were added to the *Environmental Monitoring Plan* for the 1991 monitoring year.

2.1.4 Inorganic Anion Results

Inorganic anion results for the quarterly monitored WSCP/RP/VP wells are shown in Table 2-2. The results reflect levels historically found in these wells.

2.2 Weldon Spring Quarry

Chemical and radiological wastes at the quarry are of particular concern because of their proximity to the St. Charles County well field. The well field is located approximately 0.8 km (0.5 mile) to the south of the Weldon Spring quarry. Monitoring of contaminants in groundwater and the protection of the well field is a top WSSRAP priority.

Groundwater is currently being monitored in 48 wells in and around the quarry. Thirty-six monitoring wells installed by the U.S. Department of Energy (DOE) currently exist 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 are also included in the DOE's monitoring program. All monitoring well locations are shown in Figures 2-2 and 2-3. These wells draw water from both bedrock and alluvial aquifers.

Two separate groundwater monitoring programs have been developed for the quarry. The first program is a bimonthly sampling of all wells north of the Femme Osage Slough and MW-1010 and MW-1011. The second program is a quarterly sampling of all wells south of the Femme Osage Slough, excluding MW-1010 and -1011 but including the St. Charles

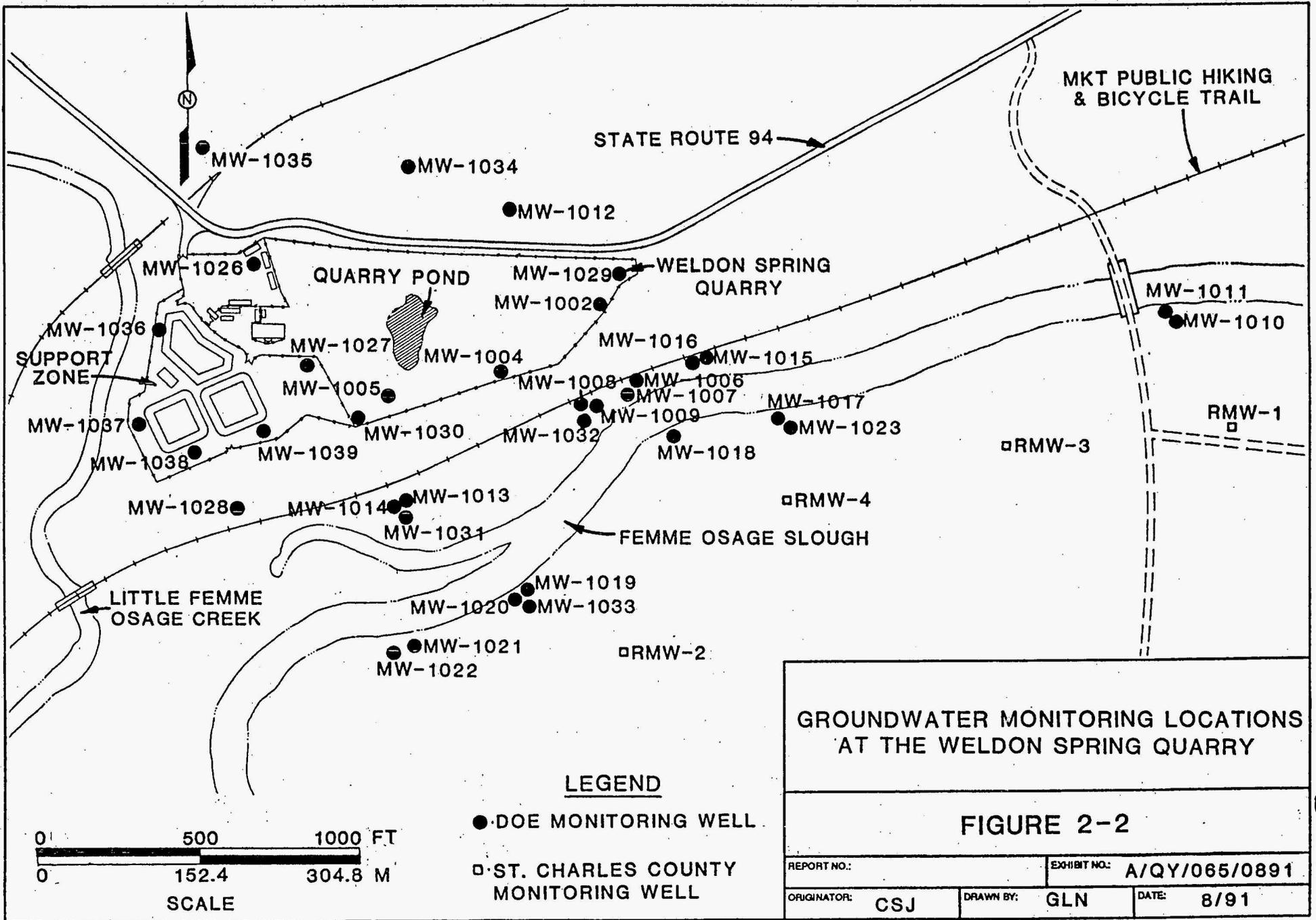
TABLE 2-3 Second Quarter Geochemical Data for Groundwater at the WSCP/RP/VP

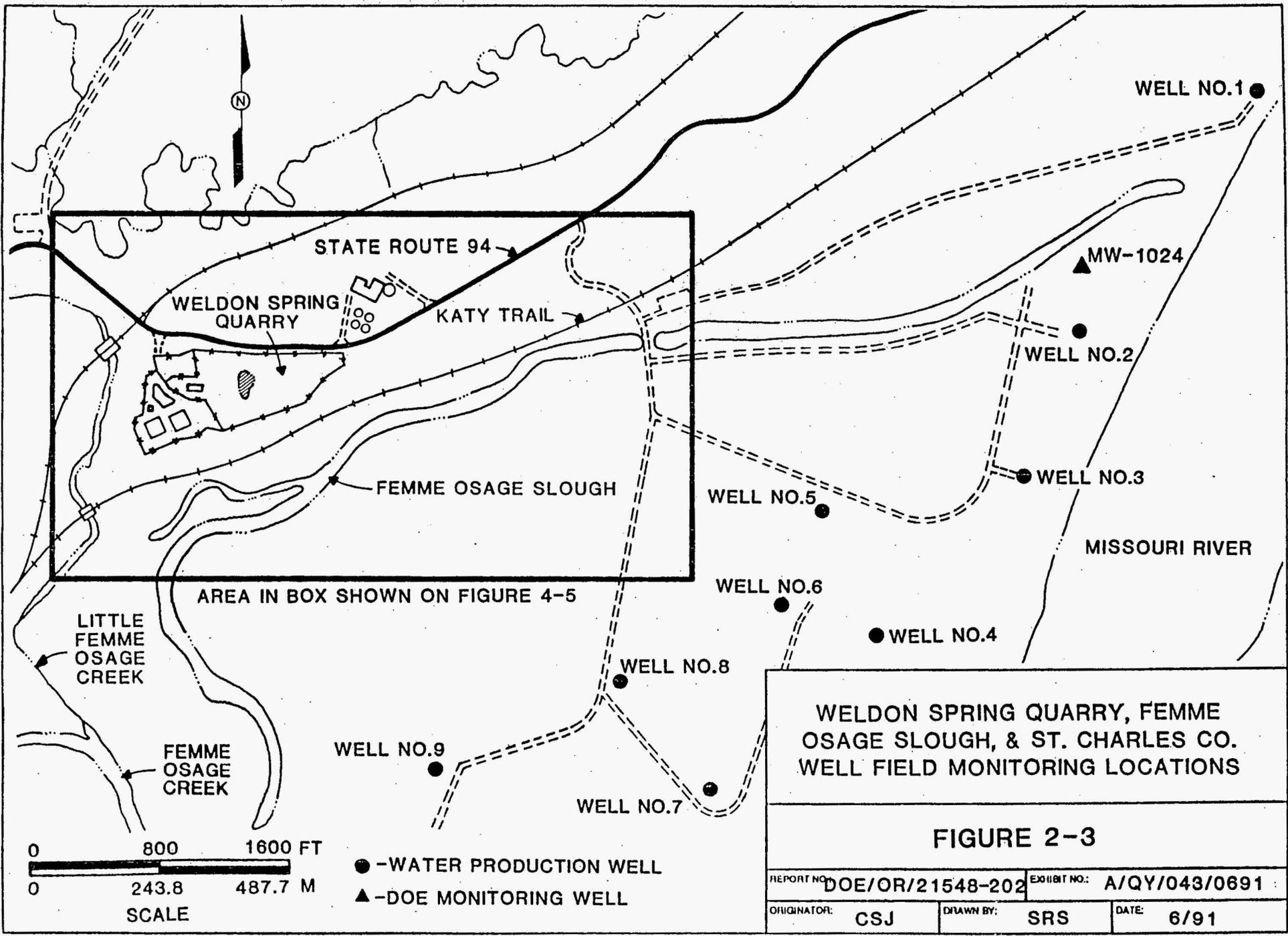
| | As ($\mu\text{g/l}$) DL=3.9 | Ba ($\mu\text{g/l}$) DL=12.9 | Ca ($\mu\text{g/l}$) DL=275.8 | Cr ($\mu\text{g/l}$) DL=9.3 | Co ($\mu\text{g/l}$) | Fe ($\mu\text{g/l}$) DL=37.2 | Li ($\mu\text{g/l}$) DL=13 | Mg ($\mu\text{g/l}$) DL=118.8 | Mn ($\mu\text{g/l}$) DL=4.8 | Ni ($\mu\text{g/l}$) DL=31.2 |
|--------------|-------------------------------------|--------------------------------------|---------------------------------------|-------------------------------------|---------------------------|--------------------------------------|------------------------------------|---------------------------------------|-------------------------------------|--------------------------------------|
| GW-2001-Q291 | ND | 189 | NS | ND | ND | ND | ND | 35700 | ND | ND |
| GW-2002-Q291 | ND | 152 | NS | ND | ND | ND | 392 | 72100 | ND | ND |
| GW-2003-Q291 | ND | 109 | 234000 | ND | NA | 41 | 405 | 85700 | ND | ND |
| GW-3003-Q291 | ND | 157 | 231000 | ND | NA | 44 | 417 | 122000 | 85.6 | ND |
| GW-3006-Q291 | ND | 133 | 50000 | ND | NA | 145 | ND | 40900 | 36.9 | ND |
| GW-3008-Q291 | ND | 322 | 664000 | ND | NA | ND | 204 | 161000 | ND | ND |
| GW-3009-Q291 | ND | 835 | 72100 | ND | NA | ND | ND | 43900 | ND | 52.4 |
| GW-3023-Q291 | ND | 230 | 440000 | 55 | NA | 21700 | 729 | 108000 | 538 | 54.2 |
| GW-4012-Q291 | ND | 77.1 | 47900 | 9.8 | NA | 115 | ND | 30300 | 9.1 | ND |
| GW-4013-Q291 | ND | 148 | 123000 | ND | NA | ND | 58.1 | 45600 | ND | 99 |

TABLE 2-3 Second Quarter Geochemical Data for Groundwater at the WSCP/RP/VP (Continued)

| | K ($\mu\text{g/l}$) DL=360 | Na ($\mu\text{g/l}$) DL=240 | Sr ($\mu\text{g/l}$) DL=1.5 | Nitrite ($\mu\text{g/l}$) DL=100 | Bromide ($\mu\text{g/l}$) DL=200 | Chloride ($\mu\text{g/l}$) DL=.001 | Phosphorus, Total ($\mu\text{g/l}$) DL=50 | Silica, Dissolved ($\mu\text{g/l}$) DL=1000 | Alkalinity (mg/l) DL=1 |
|--------------|------------------------------------|-------------------------------------|-------------------------------------|--|--|--|--|--|---|
| GW-2001-Q291 | 1300 | 8000 | 8.9 | ND | ND | 6600 | 41.3 | 9420 | 332 |
| GW-2002-Q291 | 8100 | 87800 | 306 | ND | NA | 821 | 44.6 | 10500 | 291 |
| GW-2003-Q291 | 6940 | 96600 | 344 | ND | 832 | 8680 | 37.9 | 8130 | 283 |
| GW-3003-Q291 | 8830 | 135000 | 538 | 193 | 1006 | 10800 | 58.1 | 6270 | 288 |
| GW-3006-Q291 | 1290 | 15500 | 196 | ND | 330 | 1510 | 22.7 | 6810 | 382 |
| GW-3008-Q291 | 2450 | 213000 | 1300 | ND | 362 | 15100 | 22.9 | 10900 | 250 |
| GW-3009-Q291 | 1530 | 17500 | 164 | ND | 271.1 | 3400 | 17.6 | 6270 | 165 |
| GW-3023-Q291 | 4430 | 213000 | 683 | 1020 | 321.3 | 15900 | 1150 | 5360 | 295 |
| GW-4012-Q291 | 11200 | 32300 | 169 | 180 | 262 | 2800 | 104 | 9500 | 329 |
| GW-4013-Q291 | ND | 27300 | 147 | ND | 884 | 5670 | 126 | 9650 | 321 |

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





WELDON SPRING QUARRY, FEMME OSAGE SLOUGH, & ST. CHARLES CO. WELL FIELD MONITORING LOCATIONS

FIGURE 2-3

| | | | |
|-------------|------------------|--------------|---------------|
| REPORT NO: | DOE/OR/21548-202 | EXHIBIT NO.: | A/QY/043/0691 |
| ORIGINATOR: | CSJ | DRAWN BY: | SRS |
| | | DATE: | 6/91 |

County well field. Both the raw and treated waters from the St. Charles County water treatment plant are also sampled.

2.2.1 Radiological Results

Radiological data are presented in Tables 2-4, 2-5, and 2-6 for samples collected on a bimonthly and quarterly bases. The results show typical fluctuations near the average levels in the WSQ area with no dramatic increases evident except in MW-1015 and MW-1016. The increases in these two wells from the first bimonthly to the second and third bimonthly sampling events are on a magnitude of 2 to 5 times. The wells will continue to be monitored closely.

2.2.2 Nitroaromatic Compounds Results

Analytical results for nitroaromatic compounds are presented in Tables 2-7, 2-8, and 2-9. No monitoring wells south of the Femme Osage Slough showed detectable concentrations of nitroaromatic compounds during the second quarter 1991. The distribution and magnitude of nitroaromatic contamination near the quarry remains unchanged with slight increases of 2,4,6-TNT and 1,3,5-TNB found in MW-1002, MW-1004, MW-1006, MW-1015, and MW-1016.

2.2.3 Inorganic Anions Results

Two inorganic anions--nitrate and sulfate--were measured in quarry wells. Tables 2-4, 2-5, and 2-6 display the analytical results for the second quarter of 1991, which are consistent with data reported in the previous environmental monitoring reports. The WSQ groundwater samples continue to indicate no significant groundwater contamination by nitrate. The groundwater samples continue to indicate background concentrations of sulfate in wells south of the Femme Osage Slough.

2.2.4 Metals Results

A selected group of quarry wells located south of the Femme Osage Slough were sampled for cadmium, lead, and mercury in addition to arsenic and barium. Analytical results for these metals are presented in Tables 2-10, 2-11, and 2-12. Results from the

TABLE 2-4 Second Bimonthly (March/April) Inorganic Anions and Radiological Results in Groundwater for the Weldon Spring Quarry

| SAMPLE ID | Nitrate (mg/l) | Sulfate (mg/l) | Uranium (pCi/l) |
|----------------------|-------------------|-------------------|--------------------|
| GW-1002-050191 | ND | 38.7 | NA |
| GW-1004-050191 | 0.15 | 68.1 | NA |
| GW-1005-050191 | ND | 248.2 | NA |
| GW-1006-043091 | 1.27 | 424 | 2992 |
| GW-1007-043091 | ND | 26.6 | 312.8 |
| GW-1008-043091 | ND | 243 | 3536 |
| GW-1009-043091 | ND | 318.8 | 8.8 |
| GW-1012-042991 | 1.5 | 60.7 | NA |
| GW-1013-043091 | ND | 97.2 | 884 |
| GW-1014-043091 | ND | 137.5 | 1224 |
| GW-1015-050291 | 2.81 | 386 | 1088 |
| GW-1016-050291 | 0.765 | 217 | 353.6 |
| GW-1026-042591 | ND | 10.8 | ND |
| GW-1027-042591 | ND | 112 | 605.2 |
| GW-1028-043091 | ND | 58.4 | ND |
| GW-1029-050191 | 1.02 | 183.8 | NA |
| GW-1030-050691 | 0.104 | 91 | ND |
| GW-1031-050291 | ND | 53.5 | 40.8 |
| GW-1032-050891 | ND | 207.6 | 340 |
| GW-0000-060691-WB | 1.62 | ND | |
| GW-0000-050791-WD-DU | | | ND |

ND - NOT DETECTED
 NA - NOT AVAILABLE
 WB - WATER BLANK
 DU - DUPLICATE

TABLE 2-5 Third Bimonthly (May/June) Inorganic Anions and Radiological Results in Groundwater for the Weldon Spring Quarry

| SAMPLE ID | Nitrate (mg/l) | Sulfate (mg/l) | Uranium (pCi/l) |
|-----------------|-------------------|-------------------|--------------------|
| GW-1002-060691 | NS | NS | 0.068 |
| GW-1002-061091 | 1.29 | 52.8 | NS |
| GW-1004-060391 | 0.12 | 261 | 4964.0 |
| GW-1005-060391 | ND | 176 | 2108.0 |
| GW-1006-060591 | 0.57 | 580.0 | 2516.0 |
| GW-1007-060591 | ND | ND | 46.2 |
| GW-1008-060591 | ND | 236.0 | 3604.0 |
| GW-1009-060591 | ND | 208.0 | ND |
| *GW-1010-061191 | NS | NS | ND |
| *GW-1011-061191 | NS | NS | 13.6 |
| GW-1012-061291 | NA | NA | 4.1 |
| GW-1013-060591 | ND | 133.0 | 952.0 |
| GW-1014-060591 | ND | 134.0 | 1224.0 |
| GW-1015-061091 | 2.19 | 327 | 503.2 |
| GW-1016-060691 | NS | NS | 1319.2 |
| GW-1016-061091 | 0.295 | 259 | NS |
| GW-1026-052391 | NA | NA | ND |
| GW-1027-052391 | NA | NA | 408.0 |
| GW-1028-052391 | NA | NA | 2.0 |
| GW-1029-060391 | ND | 75.1 | ND |
| GW-1030-061791 | NA | NA | 6.0 |
| GW-1031-061191 | NA | NA | 32.6 |
| GW-1032-050891 | NA | NA | 421.6 |
| GW-1032-060691 | NA | NA | 414.8 |
| GW-1032-061091 | ND | 208 | NA |
| GW-1033-061291 | NA | NA | 2.0 |
| GW-1034-062091 | 1.14 | 92.1 | ND |
| GW-1035-062091 | ND | 44.8 | ND |

TABLE 2-5 Third Bimonthly (May/June) Inorganic Anions and Radiological Results in Groundwater for the Weldon Spring Quarry (Continued)

| SAMPLE ID | Nitrate (mg/l) | Sulfate (mg/l) | Uranium (pCi/l) |
|----------------|-------------------|-------------------|--------------------|
| GW-1036-061391 | ND | 59.0 | NA |
| GW-1037-062791 | 0.126 | 13.9 | 17.0 |
| GW-1038-062691 | ND | 35.5 | 1.4 |
| GW-1039-062691 | ND | 28.7 | 1.4 |

NA - NOT AVAILABLE

NS - NOT SAMPLED

ND - NOT DETECTED

* - SPECIAL SAMPLING EVENT

TABLE 2-6 Second Quarter Inorganic Anions and Radiological Results for the WSQ

| SAMPLE ID | Nitrate (mg/l) | Sulfate (mg/l) | Uranium (pCi/l) | Gross Alpha (pCi/l) |
|--------------|-------------------|-------------------|--------------------|---------------------------|
| GW-1010-Q291 | ND | ND | ND | NS |
| GW-1011-Q291 | ND | 15.6 | 2.7 | NS |
| GW-1017-Q291 | ND | 10 | ND | NS |
| GW-1018-Q291 | ND | NA | ND | NS |
| GW-1019-Q291 | ND | 29 | ND | NS |
| GW-1020-Q291 | ND | 50 | 1.36 | NS |
| GW-1021-Q291 | ND | 20.8 | ND | NS |
| GW-1022-Q291 | ND | 54.5 | ND | NS |
| GW-1023-Q291 | ND | 1 | ND | NS |
| GW-1024-Q291 | ND | ND | ND | 0 +/- 4 |
| GW-RMW1-Q291 | ND | 22.8 | ND | 1 +/- 5 |
| GW-RMW2-Q291 | ND | 31.7 | 4.8 | 5 +/- 5 |
| GW-RMW3-Q291 | ND | 37.2 | 4.8 | 2 +/- 6 |
| GW-RMW4-Q291 | 0.7 | 34.2 | ND | 3 +/- 5 |
| GW-RAWW-Q291 | NS | NS | ND | 1 +/- 4 |
| GW-FINW-Q291 | NS | NS | ND | -1 +/- 2 |
| GW-PW02-Q291 | NS | NS | ND | 0 +/- 4 |
| GW-PW03-Q291 | NS | NS | ND | 0 +/- 4 |
| GW-PW04-Q291 | NS | NS | ND | -1 +/- 4 |
| GW-PW05-Q291 | NS | NS | ND | 1 +/- 4 |
| GW-PW06-Q291 | NS | NS | ND | 0 +/- 5 |
| GW-PW07-Q291 | NS | NS | ND | -3 +/- 5 |
| GW-PW08-Q291 | NS | NS | ND | -1 +/- 5 |

ND - NOT DETECTED
NS - NOT SAMPLED
NA - NOT AVAILABLE

TABLE 2-7 Second Bimonthly (March/April) Nitroaromatic Data for Groundwater at the Weldon Spring Quarry

| SAMPLE ID | NB ($\mu\text{g/l}$) | 1,3-DNB ($\mu\text{g/l}$) | 2,4-DNT ($\mu\text{g/l}$) | 2,6-DNT ($\mu\text{g/l}$) | 2,4,6-TNT ($\mu\text{g/l}$) | 1,3,5-TNB ($\mu\text{g/l}$) |
|-----------------|---------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------------|
| GW-1002-050191* | ND | 0.18 | ND | 11.0 | 27 | 160 |
| GW-1004-050191* | ND | ND | 2.8 | 7.3 | 19.0 | 8.0 |
| GW-1005-050191* | ND | ND | 0.14 | 0.059 | ND | ND |
| GW-1006-043091 | ND | ND | 0.09 | 4.1 | 28.0 | 130.0 |
| GW-1007-043091 | ND | ND | ND | ND | ND | ND |
| GW-1008-043091 | ND | ND | ND | 0.092 | 0.16 | ND |
| GW-1009-043091 | ND | ND | ND | ND | ND | ND |
| GW-1012-042991 | ND | ND | ND | ND | ND | ND |
| GW-1013-043091 | ND | ND | 0.17 | 0.047 | ND | ND |
| GW-1014-043091 | ND | ND | ND | ND | ND | ND |
| GW-1015-050291* | ND | ND | ND | 0.75 | 18.0 | 160.0 |
| GW-1016-050291* | ND | ND | ND | 0.13 | 2.2 | 16.0 |
| GW-1028-043091 | ND | ND | ND | ND | ND | ND |
| GW-1029-050191* | ND | ND | ND | ND | ND | ND |
| GW-1030-050691* | ND | ND | 0.046 | 0.012 | ND | ND |
| GW-1031-050291* | ND | ND | ND | ND | ND | ND |
| GW-1032-Q291 | ND | ND | 0.060 | 0.049 | ND | ND |

* - Sampled in May NA - NOT ANALYZED ND - NOT DETECTED

TABLE 2-8 Third Bimonthly (May/June) Nitroaromatic Data for Groundwater at the Weldon Spring Quarry

| SAMPLE ID | NB ($\mu\text{g/l}$) | 1,3-DNB ($\mu\text{g/l}$) | 2,4-DNT ($\mu\text{g/l}$) | 2,6-DNT ($\mu\text{g/l}$) | 2,4,6-TNT ($\mu\text{g/l}$) | 1,3,5-TNB ($\mu\text{g/l}$) |
|----------------|---------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------------|
| GW-1002-061091 | ND | 0.16 | ND | 8.6 | 21.0 | 140.0 |
| GW-1004-060391 | ND | ND | 2.6 | 5.8 | 14 | 5.4 |
| GW-1005-060391 | ND | ND | 0.13 | 0.054 | ND | ND |
| GW-1006-060591 | ND | ND | ND | 2.1 | 15.0 | 45.0 |
| GW-1007-060591 | ND | ND | ND | ND | ND | ND |
| GW-1008-060591 | ND | ND | ND | 0.088 | 0.094 | ND |
| GW-1009-060591 | ND | ND | ND | ND | ND | ND |
| GW-1010-061191 | ND | ND | ND | ND | ND | ND |
| GW-1011-061191 | ND | ND | ND | ND | ND | ND |
| GW-1012-061291 | ND | ND | ND | ND | ND | ND |
| GW-1013-060591 | ND | ND | 0.066 | 0.019 | ND | ND |
| GW-1014-060591 | ND | ND | ND | ND | ND | ND |
| GW-1015-061091 | ND | ND | ND | 0.16 | 4.0 | 30.0 |
| GW-1016-061091 | ND | ND | ND | 1.0 | 26.0 | 220.0 |
| GW-1026-052391 | ND | ND | ND | ND | ND | ND |
| GW-1027-052391 | ND | ND | 8.5 | 6.9 | 6.2 | 0.032 |
| GW-1028-052391 | ND | ND | ND | ND | ND | ND |
| GW-1029-060391 | ND | ND | ND | ND | ND | ND |
| GW-1030-061791 | ND | ND | 0.038 | ND | ND | ND |

TABLE 2-8 Third Bimonthly (May/June) Nitroaromatic Data for Groundwater at the Weldon Spring Quarry (Continued)

| SAMPLE ID | NB ($\mu\text{g/l}$) | 1,3-DNB ($\mu\text{g/l}$) | 2,4-DNT ($\mu\text{g/l}$) | 2,6-DNT ($\mu\text{g/l}$) | 2,4,6-TNT ($\mu\text{g/l}$) | 1,3,5-TNB ($\mu\text{g/l}$) |
|----------------|---------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------------|
| GW-1031-061191 | ND | ND | ND | ND | ND | ND |
| GW-1032-061091 | ND | ND | 0.52 | 0.27 | 0.48 | 0.053 |
| GW-1033-061291 | ND | ND | ND | ND | ND | ND |
| GW-1034-062091 | ND | ND | ND | ND | ND | ND |
| GW-1035-062091 | ND | ND | ND | ND | ND | ND |
| GW-1036-061391 | ND | ND | ND | ND | ND | ND |
| GW-1037-062791 | ND | ND | ND | ND | ND | ND |
| GW-1038-062691 | ND | ND | ND | ND | ND | ND |
| GW-1039-062691 | ND | ND | ND | ND | ND | ND |

ND - NOT DETECTED

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

| SAMPLE ID | NB ($\mu\text{g/l}$) | 1,3-DNB ($\mu\text{g/l}$) | 2,4-DNT ($\mu\text{g/l}$) | 2,6-DNT ($\mu\text{g/l}$) | 2,4,6-TNT ($\mu\text{g/l}$) | 1,3,5-TNB ($\mu\text{g/l}$) |
|--------------|---------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------------|
| GW-1010-Q291 | ND | ND | ND | ND | ND | ND |
| GW-1011-Q291 | ND | ND | ND | ND | ND | ND |
| GW-1017-Q291 | ND | ND | ND | ND | ND | ND |
| GW-1018-Q291 | ND | ND | ND | ND | ND | ND |
| GW-1019-Q291 | ND | ND | ND | ND | ND | ND |
| GW-1020-Q291 | ND | ND | ND | ND | ND | ND |
| GW-1021-Q291 | ND | ND | ND | ND | ND | ND |
| GW-1022-Q291 | ND | ND | ND | ND | ND | ND |
| GW-1023-Q291 | ND | ND | ND | ND | ND | ND |
| GW-1024-Q291 | ND | ND | ND | ND | ND | ND |
| GW-RMW1-Q291 | * | * | * | * | * | * |
| GW-RMW2-Q291 | ND | ND | ND | ND | ND | ND |
| GW-RMW3-Q291 | ND | ND | ND | ND | ND | ND |
| GW-RMW4-Q291 | ND | ND | ND | ND | ND | ND |
| GW-RAWW-Q291 | ND | ND | ND | ND | ND | ND |
| GW-FINW-Q291 | ND | ND | ND | ND | ND | ND |
| GW-PW02-Q291 | ND | ND | ND | ND | ND | ND |
| GW-PW03-Q291 | ND | ND | ND | ND | ND | ND |
| GW-PW04-Q291 | ND | ND | ND | ND | ND | ND |

TABLE 2-9 Second Quarter Nitroaromatic Data for Groundwater at the Weldon Spring Quarry (Continued)

| SAMPLE ID | NB ($\mu\text{g/l}$) | 1,3-DNB ($\mu\text{g/l}$) | 2,4-DNT ($\mu\text{g/l}$) | 2,6-DNT ($\mu\text{g/l}$) | 2,4,6-TNT ($\mu\text{g/l}$) | 1,3,5-TNB ($\mu\text{g/l}$) |
|--------------|---------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------------|
| GW-PW05-Q291 | ND | ND | ND | ND | ND | ND |
| GW-PW06-Q291 | ND | ND | ND | ND | ND | ND |
| GW-PW07-Q291 | ND | ND | ND | ND | ND | ND |
| GW-PW08-Q291 | ND | ND | ND | ND | ND | ND |
| GW-PW09-Q291 | ND | ND | ND | ND | ND | ND |

ND - NOT DETECTED

* - NOT ANALYZED

TABLE 2-10 Second Bimonthly (March/April) Results for Metals in Groundwater at the Weldon Spring Quarry

| | Arsenic ($\mu\text{g/l}$) | Barium ($\mu\text{g/l}$) |
|-----------------|--------------------------------|-------------------------------|
| GW-1002-050191* | ND | 42.9 |
| GW-1004-050191* | ND | 62.1 |
| GW-1005-050191* | ND | 96.1 |
| GW-1006-043091 | 5.9 | 42.3 |
| GW-1007-043091 | 9.1 | 408 |
| GW-1008-043091 | ND | 31 |
| GW-1009-043091 | 3.6 | 303 |
| GW-1012-042991 | ND | 135 |
| GW-1013-043091 | 2.6 | 119 |
| GW-1014-043091 | ND | 94.5 |
| GW-1015-050291* | ND | 118 |
| GW-1016-050291* | ND | 135 |
| GW-1026-042591 | 23.1 | 375 |
| GW-1027-042591 | ND | 137 |
| GW-1028-043091 | 3.8 | 282 |
| GW-1029-050191* | ND | 150 |
| GW-1030-050691* | ND | 134 |
| GW-1031-050291* | ND | 110 |
| GW-1032-050891* | ND | 126 |

ND - NOT DETECTED

* - May sampling event

TABLE 2-11 Third Bimonthly (May/June) Results for Metals in Groundwater at the Weldon Spring Quarry

| | Arsenic ($\mu\text{g/l}$) | Barium ($\mu\text{g/l}$) |
|----------------|--------------------------------|-------------------------------|
| GW-1002-061091 | ND | 130 |
| GW-1004-060391 | ND | 38.1 |
| GW-1005-060391 | ND | 62.1 |
| GW-1006-060591 | ND | 33.0 |
| GW-1007-060591 | 17.6 | 435.0 |
| GW-1008-060591 | ND | 40.7 |
| GW-1009-060591 | 2.57 | 394.0 |
| GW-1012 | NA | NA |
| GW-1013-060591 | ND | 131.0 |
| GW-1014-060591 | ND | 117.0 |
| GW-1015-061091 | ND | 127 |
| GW-1016-061091 | ND | 109 |
| GW-1026 | NA | NA |
| GW-1027 | NA | NA |
| GW-1028 | NA | NA |
| GW-1029-060391 | ND | 100 |
| GW-1030 | NA | NA |
| GW-1031 | NA | NA |
| GW-1032-061091 | 6.7 | 133 |
| GW-1033 | NA | NA |
| GW-1034-062091 | ND | 106 |
| GW-1035-062091 | ND | 198 |
| GW-1036-061391 | ND | 315 |
| GW-1037-062791 | 62.5 | 3130 |
| GW-1038-062691 | ND | 230 |
| GW-1039-062691 | 5.17 | 595 |

ND - NOT DETECTED
NA - NOT AVAILABLE

TABLE 2-12 Second Quarter Results for Metals in Groundwater at the Weldon Spring Quarry

| | Arsenic ($\mu\text{g/l}$) | Barium ($\mu\text{g/l}$) | Cadmium ($\mu\text{g/l}$) | Lead ($\mu\text{g/l}$) | Mercury ($\mu\text{g/l}$) |
|--------------|--------------------------------|-------------------------------|--------------------------------|-----------------------------|--------------------------------|
| GW-1010-Q291 | 84.9 | 331 | NS | NS | NS |
| GW-1011-Q291 | ND | 263 | NS | NS | NS |
| GW-1017-Q291 | 149 | 1030 | NS | NS | NS |
| GW-1018-Q291 | 112 | 597 | NS | NS | NS |
| GW-1019-Q291 | 71.4 | 710 | NS | NS | NS |
| GW-1020-Q291 | 13.7 | 418 | NS | NS | NS |
| GW-1021-Q291 | 72.3 | 745 | NS | NS | NS |
| GW-1022-Q291 | 117 | 455 | NS | NS | NS |
| GW-1023-Q291 | 3.7 | 320 | NS | NS | NS |
| GW-1024-Q291 | 6.2 | 436 | NS | NS | NS |
| GW-RMW1-Q291 | 6.4 | 510 | NS | NS | NS |
| GW-RMW2-Q291 | 14.2 | 206 | NS | NS | NS |
| GW-RMW3-Q291 | 34.5 | 505 | NS | NS | NS |
| GW-RMW4-Q291 | 5.7 | 145 | NS | NS | NS |
| GW-RAWW-Q291 | ND | 295 | NS | NS | NS |
| GW-FINW-Q291 | ND | 71.4 | NS | NS | NS |
| GW-PW02-Q291 | ND | 268 | NS | NS | NS |
| GW-PW03-Q291 | ND | 239 | NS | NS | NS |
| GW-PW04-Q291 | ND | 244 | NS | NS | NS |
| GW-PW05-Q291 | ND | 334 | NS | NS | NS |
| GW-PW06-Q291 | 4 | 376 | NS | NS | NS |
| GW-PW07-Q291 | ND | 530 | NS | NS | NS |
| GW-PW08-Q291 | 4.9 | 392 | NS | NS | NS |
| GW-PW09-Q291 | ND | 297 | ND | ND | ND |

ND - NOT DETECTED
NS - NOT SAMPLED

second and third bimonthly and second quarter analyses of arsenic and barium continue to indicate elevated concentrations in selected wells. The highest levels reported are 149 $\mu\text{g/l}$ for arsenic in MW-1017 and 1,030 $\mu\text{g/l}$ for barium also detected in MW-1017.

3 SURFACE WATER MONITORING

Routine samples were collected during the second quarter of 1991 from both on-site and off-site surface water and spring 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 1991 ASER.

3.1 Chemical Plant/Raffinate Pits/Vicinity Properties

During the second quarter, surface water samples were collected from the 13 surface water sampling locations shown in Figure 3-1 and analyzed for uranium. The results, presented in Table 3-1, indicate that conditions remain similar to values measured historically.

3.2 Weldon Spring Quarry

Surface water samples were collected from the 10 locations shown in Figure 3-2 and three locations in Figure 3-3. Samples were analyzed for uranium, arsenic, and barium and the results are presented in Table 3-2. However, only the uranium results are available at this time. The results of all samples indicate no apparent changes in environmental conditions, although as seen in the previous first quarter, the uranium levels within the slough remain slightly elevated. The highest measured level was 312 pCi/l detected at sampling location SW-1004.

The second quarter uranium values measured in the Missouri River were almost the same as the values detected during the previous quarter. Historically, the levels of uranium at these locations have fluctuated (due to either natural fluctuations or analytical variability) such that uranium concentrations have been higher at upstream locations than downstream, and vice versa. The U.S. Department of Energy (DOE) has increased monitoring of the Missouri River prior to the operation of the Weldon Spring Site Remedial Action Project (WSSRAP) quarry water treatment plant to ascertain the preoperational (background) levels in the river. In addition, the National Pollution Discharge Elimination System (NPDES) permit for the quarry water treatment plant requires additional monitoring of the river. This

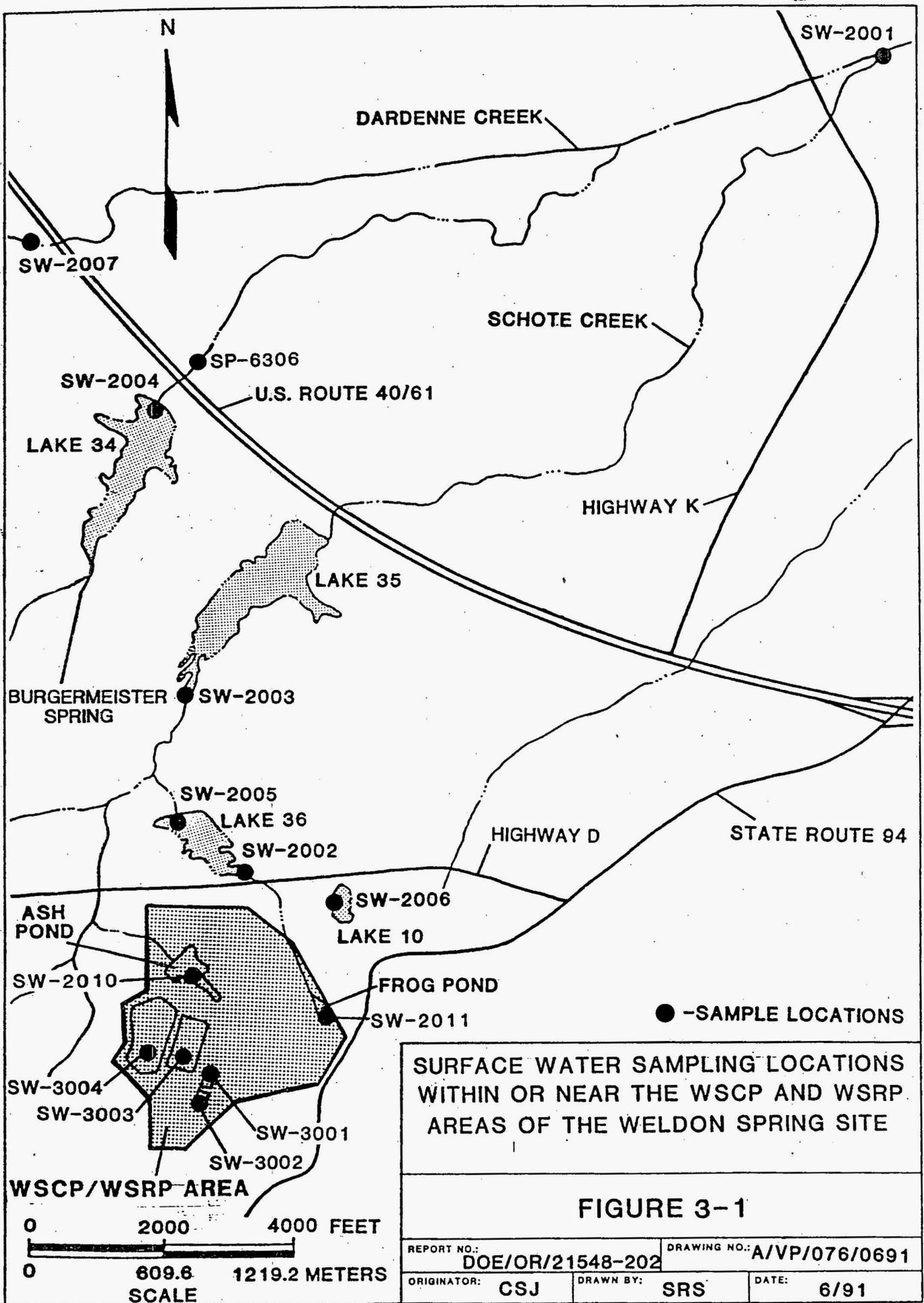
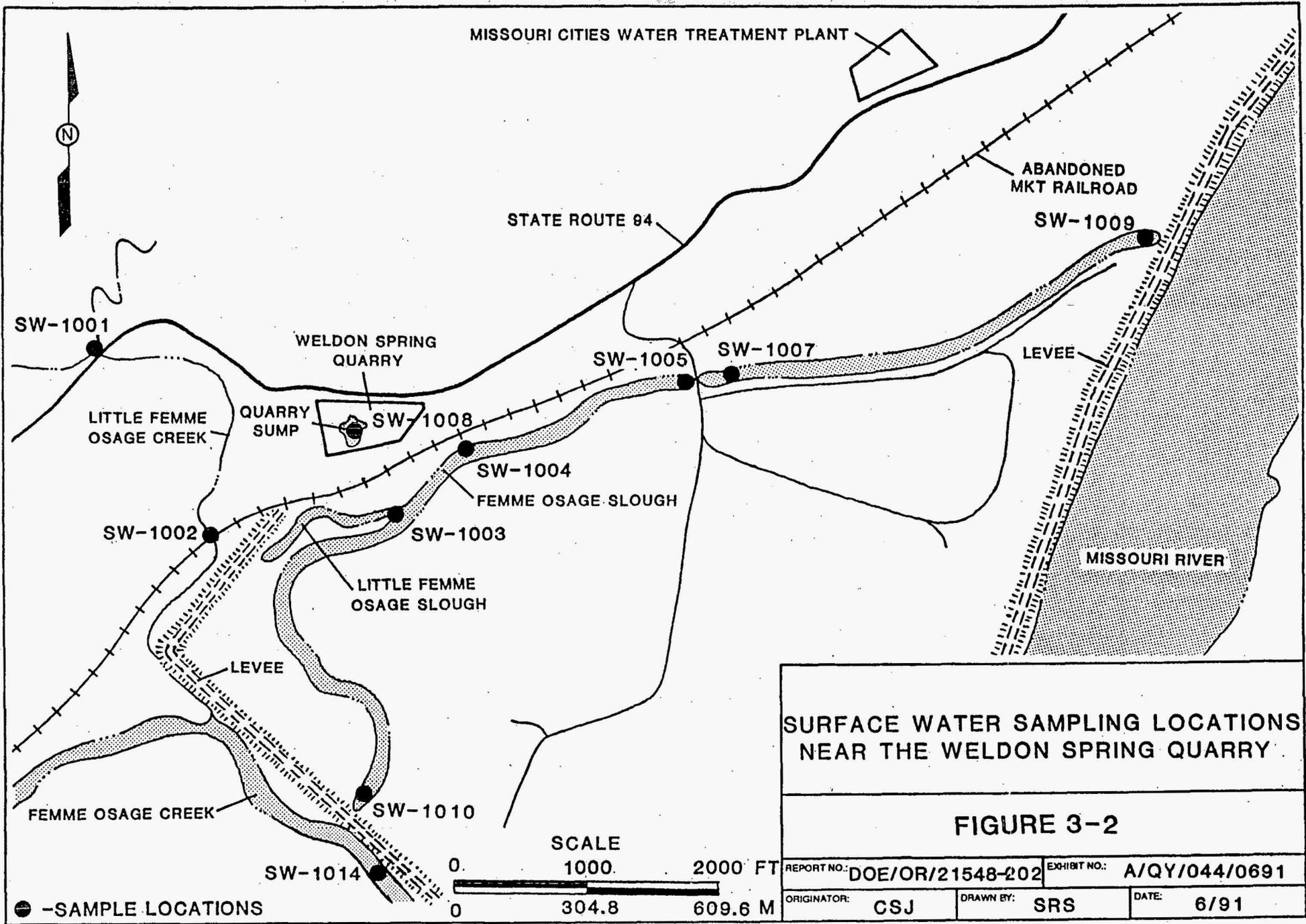


TABLE 3-1 Second Quarter Uranium Results in Surface Water at the WSCP/RP/VP

| WSSRAP_ID | TOTAL URANIUM (pCi/l) |
|-----------------|-----------------------|
| SW-2001 | 4.0 |
| SW-2002 | 16.0 |
| SW-2003 | 8.0 |
| SW-2004 | 19.0 |
| SW-2005 | 18.0 |
| SW-2007 | ND |
| SW-2010 | 513 |
| SW-2011 | 120 |
| SW-3001 | 129 |
| SW-3002 | 448 |
| SW-3003 | 165 |
| SW-3004 | 1770 |
| SW-3002-Q291-DU | 482.8 |

NA - NOT AVAILABLE AT THIS TIME

DU - DUPLICATE SAMPLE



SURFACE WATER SAMPLING LOCATIONS
NEAR THE WELDON SPRING QUARRY

FIGURE 3-2

| | |
|------------------------------|----------------------------|
| REPORT NO.: DOE/OR/21548-202 | EXHIBIT NO.: A/QY/044/0691 |
| ORIGINATOR: CSJ | DRAWN BY: SRS |
| DATE: 6/91 | |

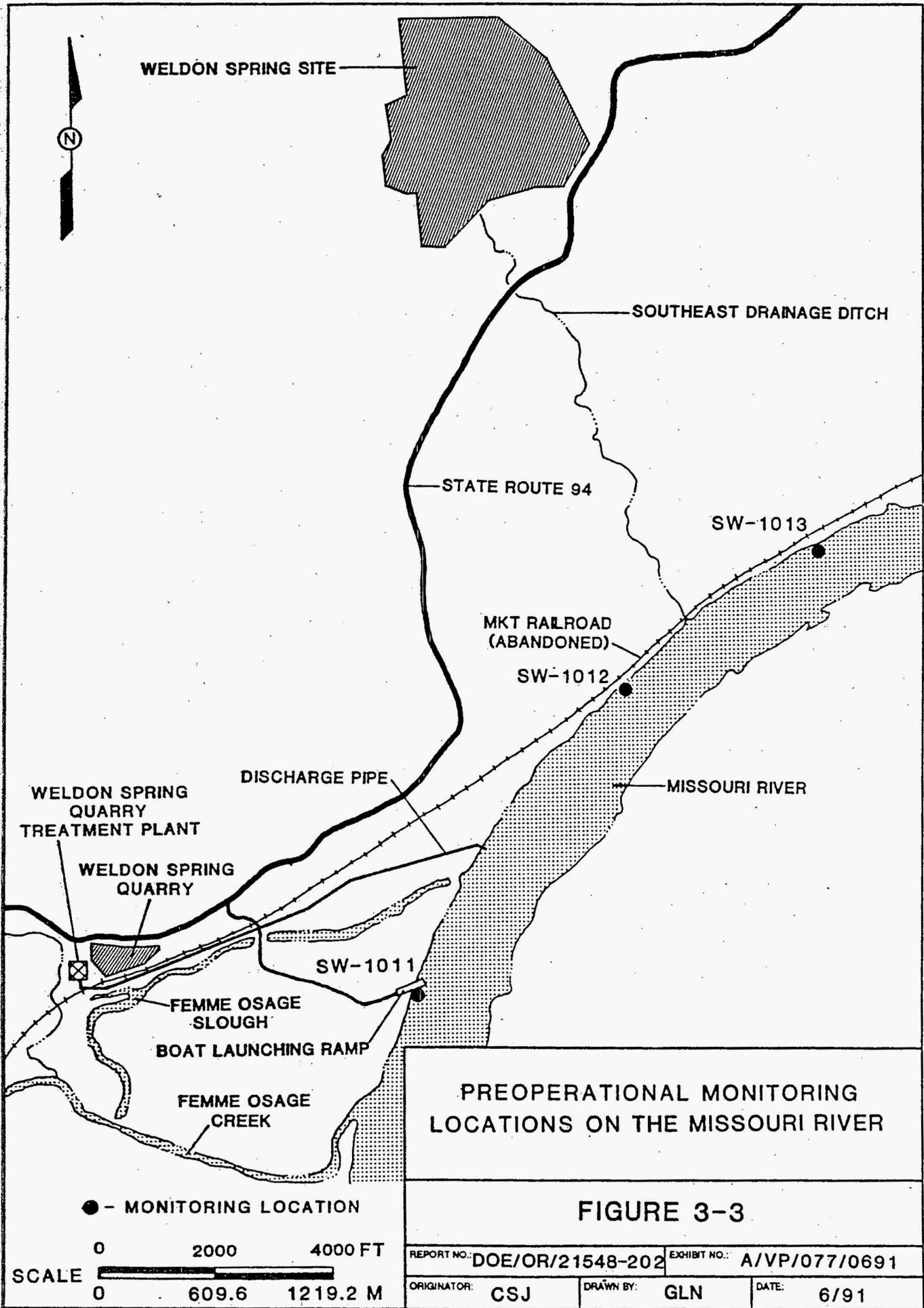


TABLE 3-2 Second Quarter Uranium Results in Surface Water at the Weldon Spring Quarry

| WSSRAP ID | TOTAL URANIUM (pCi/l) |
|-----------------|-----------------------|
| SW-1001 | ND |
| SW-1002 | ND |
| SW-1003 | 156.4 |
| SW-1004 | 312.8 |
| SW-1005 | 63.92 |
| SW-1007 | 11.56 |
| SW-1008 | 442 |
| SW-1009 | 11.56 |
| SW-1010 | 156.4 |
| SW-1010-Q291-DU | 361.8 |
| SW-1011 | 2.04 |
| SW-1012 | ND |
| SW-1013 | ND |
| SW-1014 | 0.68 |

ND - NOT DETECTED

monitoring increases the DOE's capability to ensure the safety of the public and the environment.

Arsenic and barium results in the second quarter for samples collected from the Missouri River were not available.

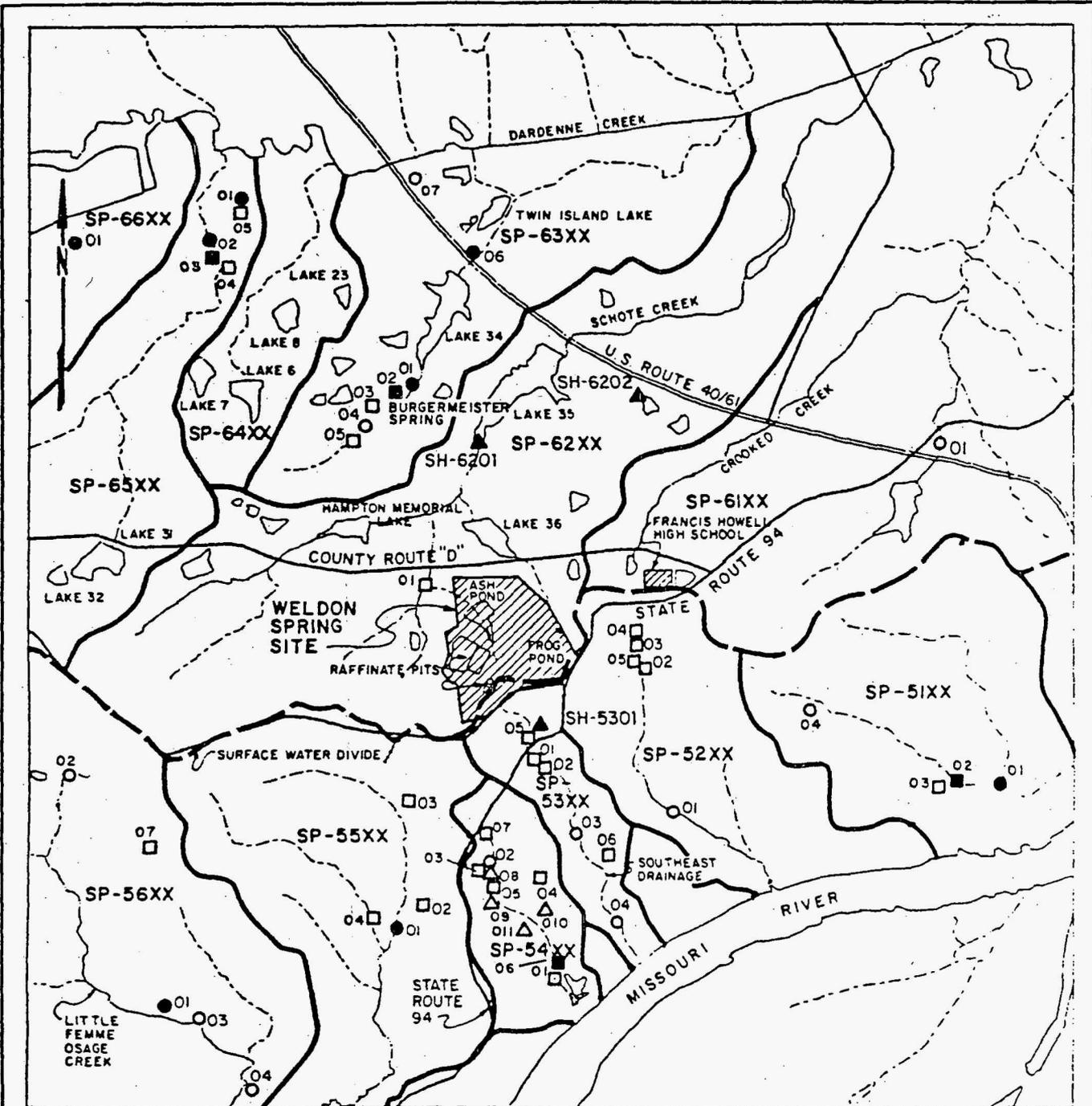
The analytical results for the six nitroaromatic compounds within the quarry sump were not available at the time of this report. The ponded water is to be treated for nitroaromatic compounds and other organics upon completion of the quarry water treatment plant.

3.3 Springs

Eleven springs around the Weldon Spring site (WSS) are sampled quarterly (see Figure 3-4 for spring locations). 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-6301, SP-6302, SP-6306, and SP-5301 through SP-5304. All spring samples are analyzed for uranium with a select few analyzed for nitroaromatics, inorganics and metals. Available analytical results for these parameters are listed in Tables 3-3 and 3-4. Values for these parameters remain consistent with their historical values.

3.4 National Pollutant Discharge Elimination System Data Review

Surface water and effluent samples were collected and analyzed in compliance with the Weldon Spring Site National Pollutant Discharge Elimination System (NPDES) permit. This permit (Number MO-0107701) was issued in November 1988 and currently addresses these seven storm water and wastewater discharges shown in Figure 3-5. Outfalls NP-0001 through NP-0005 represent storm water discharge and NP-0006 represents the treated effluent discharge associated with the administration building sanitary wastewater treatment plant. Outfall NP-0007 represents the new site contaminated water treatment plant which is under contract but not yet constructed. Outfalls NP-0006 and NP-0007 have effluent limitations. The five surface water outfalls have monitoring requirements only. Second quarter 1991 analytical data for each outfall is presented in Table 3-5.

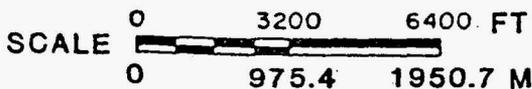


SOURCE: MDNR, 1989

LEGEND :

- SURFACE WATER DIVIDE BETWEEN MISSISSIPPI RIVER AND MISSOURI RIVER
- DRAINAGE BOUNDARY
- - - CREEK OR SURFACE DRAINAGE
- POND OR LAKE
- PERENNIAL SPRING WITH LARGE MAXIMUM FLOW
- PERENNIAL SPRING WITH SMALL MAXIMUM FLOW
- WET WEATHER SPRING WITH LARGE MAXIMUM FLOW
- WET WEATHER SPRING WITH SMALL MAXIMUM FLOW
- ▲ SHALLOW HOLE (SH)
- △ SEEP

SP-63XX SPRING OR SEEP IN DESIGNATED DRAINAGE AREA NUMBER 63. XX REPRESENTS THE DESIGNATED SPRING NUMBER IN DRAINAGE 63.



SPRINGS AND SEEPS IN THE VICINITY OF THE WSS

FIGURE 3-4

| | |
|------------------------------|----------------------------|
| REPORT NO.: DOE/OR/21548-202 | EXHIBIT NO.: A/VP/078/0691 |
| ORIGINATOR: CSJ | DRAWN BY: GLN |
| | DATE: 6/91 |

TABLE 3-3 Second Quarter Uranium Results in Springs Near the Weldon Spring Site

| WSSRAP ID | TOTAL URANIUM (pCi/l) |
|-----------------|-----------------------|
| SP-5201 | NA |
| SP-5203 | NA |
| SP-5301 | NA |
| SP-5302 | NA |
| SP-5303 | 129 |
| SP-5304 | 163 |
| SP-5503 | NA |
| SP-5601 | ND |
| SP-6301 | NA |
| SP-6301-Q291-DU | 136.0 |
| SP-6302 | NA |
| SP-6303 | NA |
| SP-6306 | 16.32 |

NA - NOT AVAILABLE
 ND - NOT DETECTED
 DU - DUPLICATE SAMPLE

TABLE 3-4 Second Quarter Nitroaromatic Results in Springs Near the Weldon Spring Site

| WSSRAP_ID | 1,3,5-TRINITROBENZENE | 1,3-DINITROBENZENE | 2,4,6-TNT | 2,4-DNT | 2,6-DNT | NITROBENZENE |
|-----------|-----------------------|--------------------|-----------|---------|---------|--------------|
| SP-5601 | ND | ND | ND | ND | 0.041 | ND |
| SP-6301 | NA | NA | NA | NA | NA | NA |
| SP-6302 | NA | NA | NA | NA | NA | NA |
| SP-6303 | NA | NA | NA | NA | NA | NA |
| SP-6306 | ND | ND | ND | ND | ND | ND |

ND - NOT DETECTED

NA - NOT AVAILABLE

3.4.1 Radiological Analysis

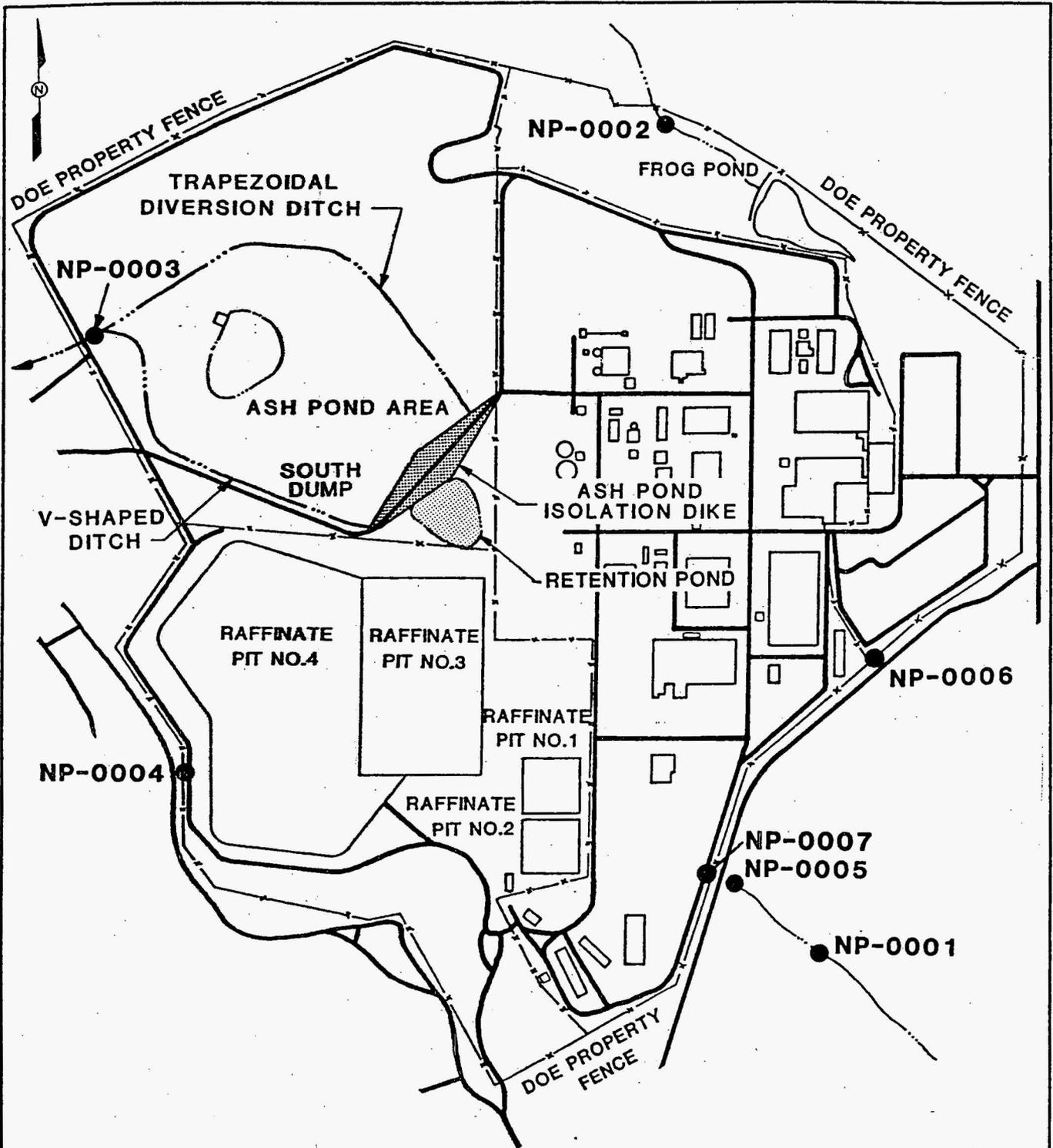
Gross Alpha and Total Uranium analyses correspond reasonably well with past data. The highest uranium levels were present in surface flow from the southeast portion of the site (NP-0001 and NP-0005). The peaks for these points were 666 pCi/l and 571 pCi/l, respectively.

Other outfalls exhibited the following peaks of uranium concentrations. NP-0002, the drainage from the Frog Pond area, was measured at 150 pCi/l. NP-0003, with drainage from the Ash Pond area, was measured at 156 pCi/l. A uranium concentration of 9.5 pCi/l was present in the sample collected from NP-0004, behind raffinate pit No. 4.

3.4.2 Other Analysis

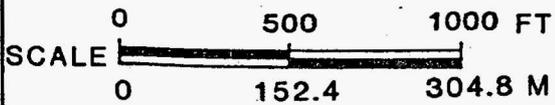
Other analyses include physical analysis (settleable solids and suspended solids) and chemical analysis (nitrate, pH, and lithium). Second quarter 1991 values generally correspond to past values for the majority of parameters. The Ash Pond weir (NP-0003) discharged an excessive amount of solids because of erosion from a new construction activity on the day the samples were taken.

The discharge from the administration building treatment plant, NP-0006, has effluent limitations for quarterly samples. In addition to this quarterly monitoring, the subcontractor monitors the same parameters monthly, to assess plant performance. The NPDES permit contains effluent limitations on biochemical oxygen demand (BOD), total suspended solids (TSS), and fecal coliform at this outfall. These limits are 15 mg/l (BOD), and 20 mg/l (TSS), for weekly averages with maximum daily fecal coliform of 1,000 colonies per 100 ml. NPDES permit limits were not exceeded in the second of quarter 1991 at this outfall.



NPDES MONITORING LOCATIONS

FIGURE 3-5



| | |
|------------------------------|----------------------------|
| REPORT NO.: DOE/OR/21548-202 | EXHIBIT NO.: A/CP/149/0991 |
| ORIGINATOR: CSJ | DRAWN BY: GLN |
| | DATE: 9/91 |

TABLE 3-5 Results of Monthly NPDES Monitoring for NP-0001 through NP-0006

Outfall NP-0001 NPDES data for Q2 1991

| DATE SAMPLED | FLOW | SUSP. SOLIDS | SET. SOLIDS | NITRATE | pH | LITHIUM | GROSS ALPHA | TOTAL URANIUM | |
|--------------|--------|--------------|-------------|---------|------|---------|-------------|---------------|-------|
| UNITS | GPD | mg/l | ml/l | mg/l | | mg/l | pCi/l | mg/l | pCi/l |
| Apr. 15 | 22,000 | 4.0 | <0.1 | 1.08 | 7.93 | ND | 480 | 0.98 | 666 |

Outfall NP-0002 NPDES data for Q2 1991

| DATE SAMPLED | FLOW | SUSP. SOLIDS | SET. SOLIDS | NITRATE | pH | LITHIUM | GROSS ALPHA | TOTAL URANIUM | |
|--------------|---------|--------------|-------------|---------|------|---------|-------------|---------------|-------|
| UNITS | GPD | mg/l | ml/l | mg/l | | mg/l | pCi/l | mg/l | pCi/l |
| Apr. 15 | 637,000 | 26 | <0.1 | 1.09 | 7.27 | ND | 110 | 0.2 | 136 |
| May 16 | 82,000 | 9 | <0.1 | ND | 6.01 | ND | 140 | 0.22 | 150 |
| June | DRY | | | | | | | | |

Outfall NP-003 NPDES data for Q2 1991

| DATE SAMPLED | FLOW | SUSP. SOLIDS | SET. SOLIDS | NITRATE | pH | LITHIUM | GROSS ALPHA | TOTAL URANIUM | |
|--------------|--------------|--------------|-------------|---------|-------|---------|-------------|---------------|-------|
| UNITS | GPD | mg/l | ml/l | mg/l | | mg/l | pCi/l | mg/l | pCi/l |
| Apr. 15 | 800,000 | 7,930 | 0.2 | 0.96 | 7.18 | 0.176 | 640 | 0.13 | 88 |
| May 16 | 53,000 | 32 | <0.1 | 0.89 | 5.92* | ND | 120 | 0.23 | 156 |
| June | No Discharge | | | | | | | | |

* Indicates value which exceeded effluent limitation

TABLE 3-5 Results of Monthly NPDES Monitoring for NP-0001 through NP-0006 (Continued)

Outfall NP-0004 NPDES data for Q2 1991

| DATE SAMPLED | FLOW | SUSP. SOLIDS | SET. SOLIDS | NITRATE | pH | LITHIUM | GROSS ALPHA | TOTAL URANIUM | |
|--------------|-------------|--------------|--------------|---------|------|---------|-------------|---------------|-------|
| UNITS | GPD | mg/l | ml/l | mg/l | | mg/l | pCi/l | mg/l | pCi/l |
| June 13 | Not Flowing | 890 | Not Obtained | 48 | 7.35 | 0.038 | ND | 0.002 | 1.4 |

Outfall NP-0005 NPDES data for Q2 1991

| DATE SAMPLED | FLOW | SUSP. SOLIDS | SET. SOLIDS | NITRATE | pH | LITHIUM | GROSS ALPHA | TOTAL URANIUM | |
|--------------|--------------|--------------|-------------|---------|-------|---------|-------------|---------------|-------|
| UNITS | GPD | mg/l | ml/l | mg/l | | mg/l | pCi/l | mg/l | pCi/l |
| Apr. 15 | 164,000 | 7 | <0.1 | 6.1 | 7.58 | ND | 440 | 0.84 | 571 |
| May 16 | 11,000 | 16 | <0.1 | 9.17 | 5.54* | ND | 550 | 0.74 | 503 |
| June | No Discharge | | | | | | | | |

* Indicates value which exceeded effluent limitation

Outfall NP-0006 NPDES data for Q2 1991

| DATE SAMPLED | FLOW | SUSP. SOLIDS | BOD | FECAL COLIFORMS | pH |
|--------------|-------|--------------|------|-----------------|------|
| UNITS | GPD | mg/l | mg/l | No./100 ml | |
| Apr. 3 | 1,530 | 10 | <3.0 | <1 | 6.5 |
| May 22 | 2,500 | 1 | 9.3 | <1 | 6.6 |
| June 5 | 1,620 | 5 | <3.0 | <1 | 6.25 |

4 AIR MONITORING

4.1 Radon Gas

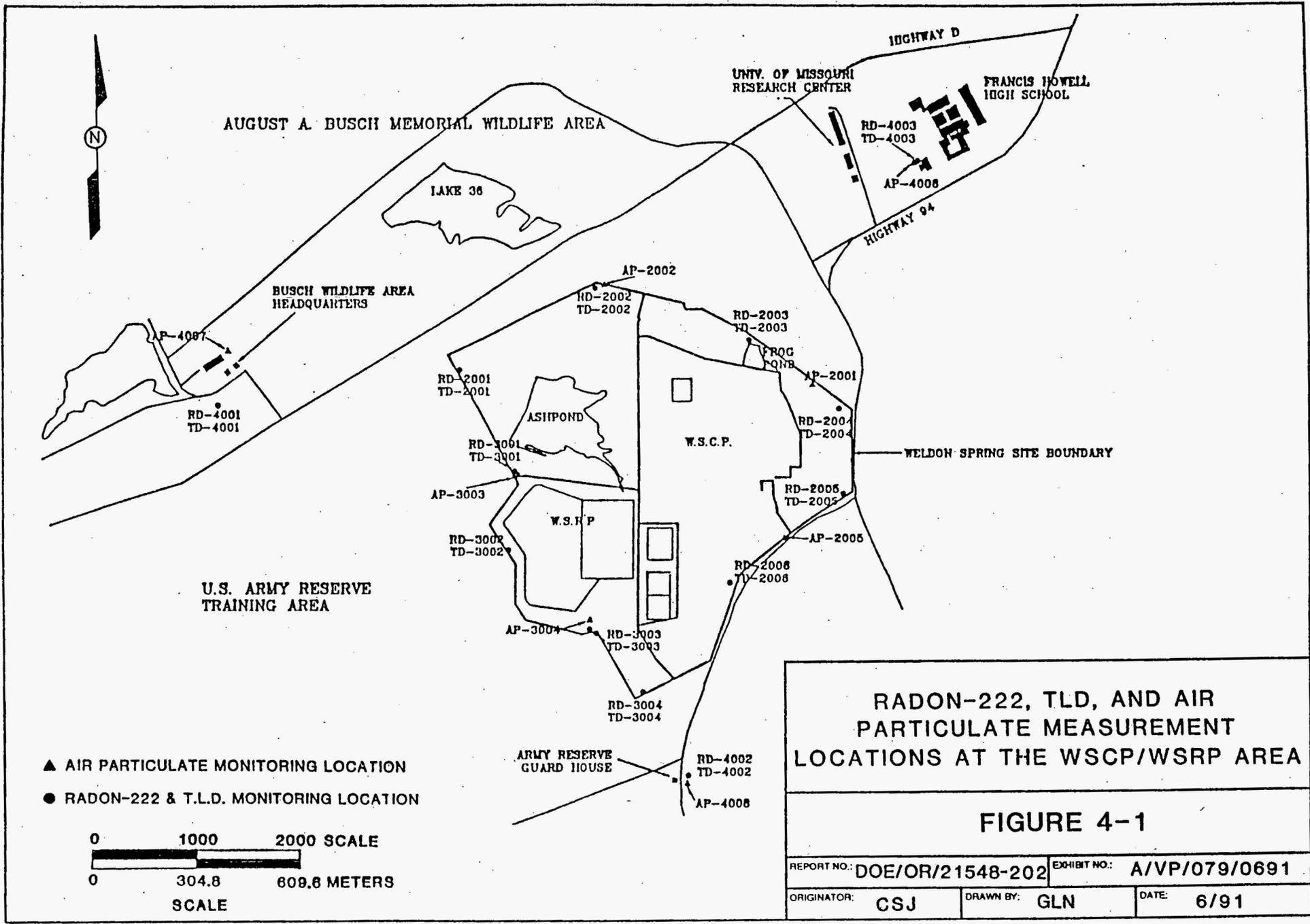
The radon gas monitoring program utilizes a pair of radon detectors at each of 22 permanent locations; each detector is exchanged quarterly. These detectors are deployed at six locations at the Weldon Spring Chemical Plant, six locations at the Weldon Spring quarry, four locations at the Weldon Spring raffinate pits, and six off-site locations. Radon monitoring locations are shown in Figures 4-1, 4-2, and 4-3. 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, and RD-4006 were used to monitor background levels near the site.

Table 4-1 summarizes the second quarter 1991 radon concentrations detected at all site perimeter and off-site monitoring locations. Also contained in Table 4-1 is a comparison of the measured concentration with the Federally permitted radon concentration (for unrestricted areas) of 3 pCi/l (110 Bq/m³) 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 four background locations. This data yielded an average ambient background radon concentration of 0.3 pCi/l for the second quarter of 1991. This concentration was then subtracted from the concentration for each monitoring station, and compared to the DOE guideline of 3 pCi/l above background.

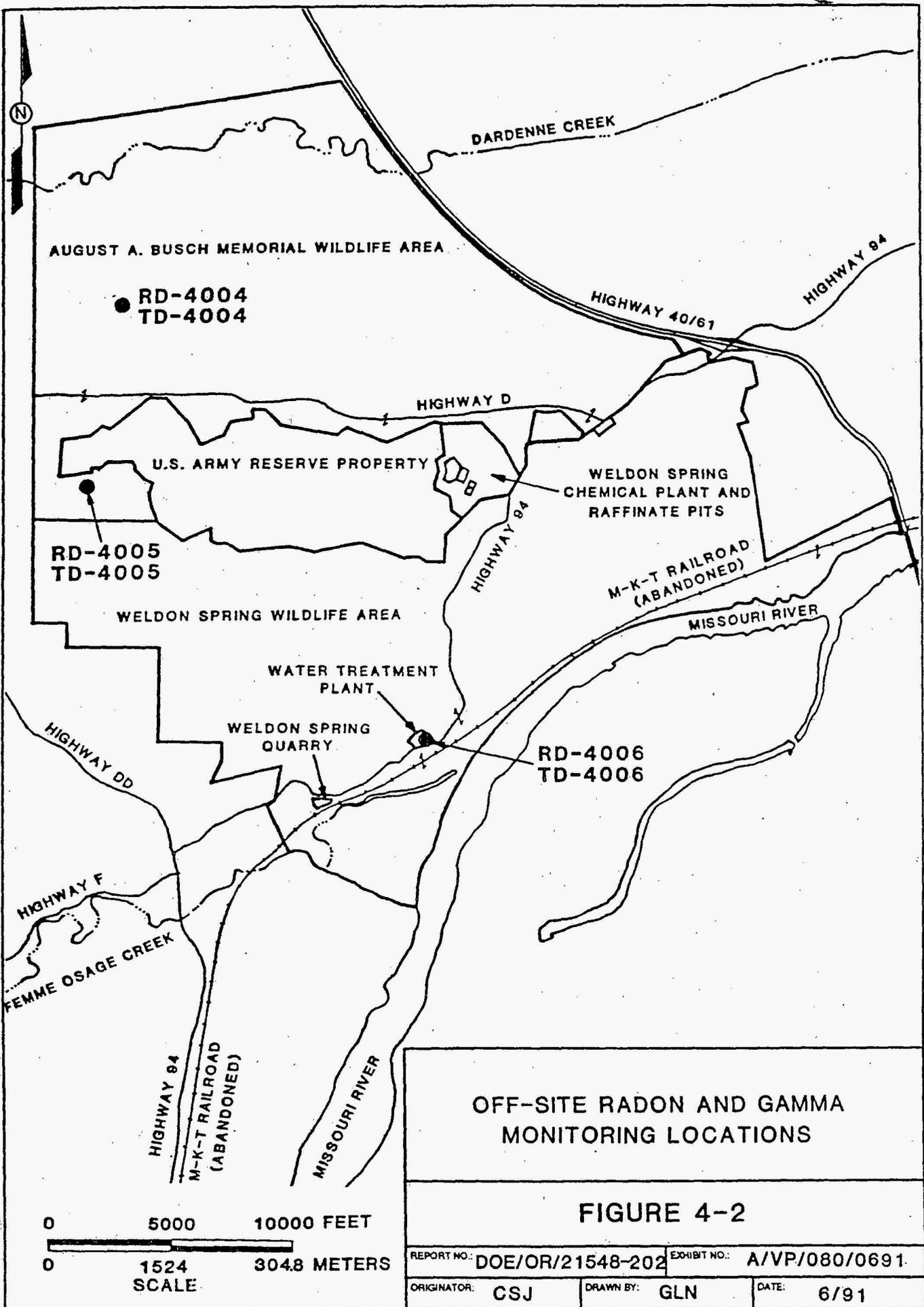
Radon concentrations at the site and quarry perimeters and at off-site locations for the second quarter of 1991 were within the typical range expected during years of normal precipitation. The quarterly radon concentrations (background included) ranged from 0.1 pCi/l at RD-2002 to 1.3 pCi/l at monitoring location RD-1001 and RD-1002.

Radon concentrations found in the quarry are higher than concentrations measured at other locations because the radium concentrations in quarry wastes are typically much higher than other areas, and because the quarry is a large depression with side walls ranging from 3 m to 15 m (10 ft to 50 ft) high. In conjunction with stable meteorological conditions,



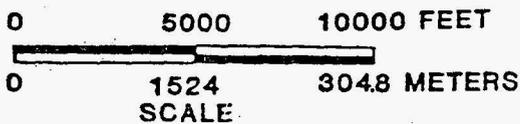
RADON-222, TLD, AND AIR PARTICULATE MEASUREMENT LOCATIONS AT THE WSCP/WSRP AREA

FIGURE 4-1

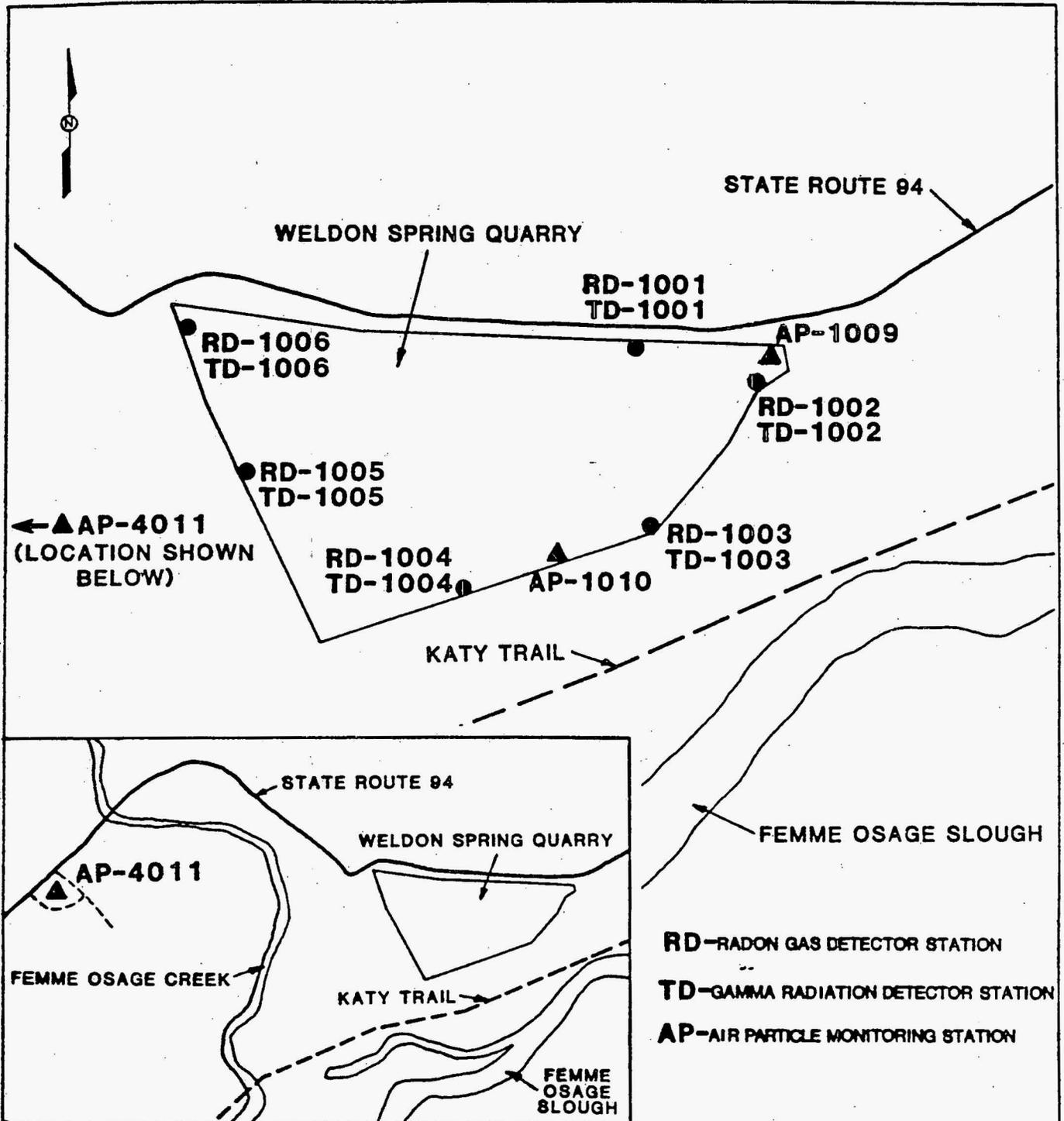


OFF-SITE RADON AND GAMMA MONITORING LOCATIONS

FIGURE 4-2



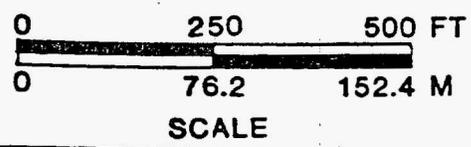
| | | | |
|-------------|------------------|--------------|----------------|
| REPORT NO.: | DOE/OR/21548-202 | EXHIBIT NO.: | A/VP/080/0691. |
| ORIGINATOR: | CSJ | DRAWN BY: | GLN |
| | | DATE: | 6/91 |



NOT TO SCALE

RADON-222, THERMO LUMINESCENT DOSIMETER (TLD) AND AIR PARTICULATE MEASUREMENT LOCATIONS AT THE WELDON SPRING QUARRY

FIGURE 4-3



| | |
|------------------------------|----------------------------|
| REPORT NO.: DOE/OR/21548-202 | EXHIBIT NO.: A/QY/049/0691 |
| ORIGINATOR: CSJ | DRAWN BY: GLN |
| | DATE: 6/91 |

TABLE 4-1 1991 Track Etch Radon Results^(a)

| Location I.D. | 2nd quarter pCi/l | Percent of Guidance ^(b) |
|---------------|----------------------|---------------------------------------|
| WSQ | | |
| RD-1001 | 1.3 | 33 |
| RD-1002 | 1.3 | 33 |
| RD-1003 | 0.5 | 7 |
| RD-1004 | 0.4 | 3 |
| RD-1005 | 0.4 | 3 |
| RD-1006 | 0.4 | 3 |
| WSCP | | |
| RD-2001 | 0.3 | 0 |
| RD-2002 | 0.1 | 0 |
| RD-2003 | 0.3 | 0 |
| RD-2004 | 0.3 | 0 |
| RD-2005 | 0.2 | 0 |
| RD-2006 | 0.2 | 0 |
| WSRP | | |
| RD-3001 | 0.2 | 0 |
| RD-3002 | 0.3 | 0 |
| RD-3003 | 0.3 | 0 |
| RD-3004 | 0.3 | 0 |
| OFF-SITE | | |
| RD-4001* | 0.3 | 0 |
| RD-4002 | 0.2 | 0 |
| RD-4003 | 0.2 | 0 |
| RD-4004* | 0.3 | 0 |
| RD-4005* | 0.2 | 0 |
| RD-4006* | 0.3 | 0 |

(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 (100 Bq/m³) (Annual average above background) for uncontrolled areas.

• Denotes Background Station

this configuration tends to trap emanating radon within the quarry and raise the concentrations along the quarry perimeter.

4.2 Gamma Radiation Exposure

To monitor exposure from gamma radiation, spherical environmental thermoluminescent dosimeters (TLDs) were deployed at 22 locations. The gamma monitoring station locations are the same as the ambient radon monitoring locations (see Section 4.1).

Table 4-2 summarizes the first and second quarter results of total gamma radiation monitoring at the 16 Weldon Spring site (WSS) perimeter monitoring stations, the Francis Howell High School, the Weldon Spring Army Reserve Training Area, and at the four background monitoring stations.

The annual average background gamma exposures measured with TLDs in 1989 and 1990 were 68 mR/year and 62 mR/year, respectively. The gamma exposures measured with TLDs in the first and second quarter of 1991 were consistent with 1989 and 1990 data. This was expected because no significant changes in the configuration or location of the wastes have occurred.

4.3 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 4-3. 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 (AP-4007) is used to monitor background levels in the vicinity of the WSCP. The off-site monitoring stations are also shown in Figure 4-2.

TABLE 4-2 1991 Environmental TLD Results^(a)

| Location I.D. | 1st Quarter mrem | 2nd Quarter mrem |
|---------------|------------------|------------------|
| WSQ | | |
| TD-1001 | 24 | 17 |
| TD-1002 | 20 | 15 |
| TD-1003 | 20 | 20 |
| TD-1004 | 19 | 17 |
| TD-1005 | 20 | 17 |
| TD-1006 | 19 | 18 |
| WSCP | | |
| TD-2001 | 18 | 16 |
| TD-2002 | 17 | 16 |
| TD-2003 | 18 | 17 |
| TD-2004 | 19 | 17 |
| TD-2005 | 18 | 14 |
| TD-2006 | 17 | 15 |
| WSRP | | |
| TD-3001 | 22 | 14 |
| TD-3002 | 17 | 13 |
| TD-3003 | 19 | 17 |
| TD-3004 | 16 | 14 |
| OFF-SITE | | |
| TD-4001* | 18 | 16 |
| TD-4002 | 16 | 13 |
| TD-4003 | 16 | 12 |
| TD-4004* | 19 | - |
| TD-4005* | 16 | 13 |
| TD-4006* | 17 | 15 |

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

The sampling station near the August A. Busch Wildlife Area (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/ Weldon Spring raffinate pits (WSRP). In addition, winds from the southeast are relatively rare at the WSCP.

Table 4-3 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 either the weekly air particulate analysis results or the counting instrument's lower limit of detection (LLD), whichever was greater. The "<" sign in Table 4-3 appears when the actual average is less than the calculated average due to the use of LLD values in the calculation. The standard deviation for each of the monitoring locations was calculated using only results that were above the LLD. Due to maintenance, all monitors were not operating the entire 13 weeks as indicated in Table 4-3. However, the sensitive receptor monitoring stations (AP-4006, AP-4008, and AP-4011) were in operation the majority of the time and these stations are also equipped with high volume air monitoring. The high volume air monitors are part of the WSS radionuclide National Emissions Standards for Hazardous Air Pollutants (NESHAPs) requirements and were in operation the entire 13 weeks. The high volume monitoring results will be presented in the *Annual Site Environmental Report*.

The first quarter net alpha concentrations ranged from $<9.19 \times 10^{-16} \mu\text{Ci/ml}$ to $<1.28 \times 10^{-15} \mu\text{Ci/ml}$ with $1.12 \times 10^{-15} \mu\text{Ci/ml}$ detected at the background station.

4.4 Asbestos

No environmental asbestos monitoring was performed in the second quarter of 1991.

TABLE 4-3 Radiological Air Particulate Second Quarter 1991

| MONITOR IDENTIFICATION NUMBER | QUARTERLY AVG. CONCENTRATION (1E-15 μ Ci/ml) | STANDARD DEVIATION | NUMBER OF WEEKS COLLECTED | NUMBER OF VALUES ABOVE LLD |
|-------------------------------|--|--------------------|---------------------------|----------------------------|
| AP-2001 | <9.62E-16 | 2.83E-16 | 10 | 7 |
| AP-2002 | <1.06E-15 | 4.50E-16 | 10 | 5 |
| AP-3003 | <1.23E-15 | 5.11E-16 | 10 | 7 |
| AP-3004 | <9.19E-16 | NA | 4 | 1 |
| AP-2005 | <1.20E-15 | 6.26E-16 | 13 | 7 |
| AP-4006 | <9.49E-16 | 2.64E-16 | 13 | 8 |
| AP-4007* | 1.12E-15 | 3.72E-16 | 9 | 9 |
| AP-4008 | <1.08E-15 | 4.12E-16 | 12 | 6 |
| AP-1009 | <1.28E-15 | 3.67E-16 | 10 | 8 |
| AP1010 | <1.04E-15 | 4.53E-16 | 12 | 9 |
| AP-4011 | <1.19E-15 | 5.26E-16 | 12 | 8 |

* Indicates background monitor station.
 To convert μ Ci/ml to Bq/M³, multiply by 3.7E10.
 NA Not available

DISTRIBUTION LIST

Mr. Dan Wall (4 copies)
Superfund Branch
U.S. Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dr. David E. Bedan (5 copies)
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Mr. Stanley M. Remington
Consulting Hydrologist
2524 Westminster Drive
St. Charles, Missouri 63301

The Honorable Eugene Schwendemann
Presiding Commissioner
St. Charles County Courthouse
118 North Second Street
St. Charles, Missouri 63301

Mr. Steve Iverson, Project Manager
Program and Project Management Division
U.S. Army Corps of Engineers
Kansas City District
601 East 12th Street
Kansas City, Missouri 64106
ATTN: CEMRKED-TD

Project Manager
U.S. Army Toxic & Hazardous Materials Agency
ATTN: CETHA-IR-A
Building E4435
Aberdeen Proving Ground, Maryland 21010-5401

Mr. Karl J. Daubel
Environmental Coordinator
Weldon Spring Training Area
7301 Highway 94 South
St. Charles, Missouri 63303

Mr. Dan Bauer
U.S. Department of Interior
Geological Survey, Mail Stop 200
1400 Independence Road
Rolla, Missouri 65401

Mr. J.D. Berger
Oak Ridge Associated Universities
230 Warehouse Road
Building 1916-T2
Oak Ridge, Tennessee 37830

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Francis Howell High School Consultant
Mr. Donald J. McQueen
Shannon & Wilson, Inc.
11500 Olive Blvd., Suite 3276
St. Louis, Missouri 63141

Mr. Tom Uhlenbrock
Env. Editor
St. Louis Post-Dispatch
900 N. Tucker Blvd.
St. Louis, MO 63101

Mr. Mike Richter
Anheuser Busch
Environmental Engineering &
Site Services Department
One Busch Place
St. Louis, MO 63118

Mr. Lynn Bultman
Missouri Cities Water Company
3877 Highway 70
St. Peters, MO 63376