2/4/97

QUARTERLY REPORT

ST. CHARLES COUNTY WELL FIELD

MONITORING PROJECT

GRANT NO. DE-FG05-89OR21864

Prepared by: Stanley Remington
October, November, and December 1996

MONTHLY REPORT

OCTOBER 1996

BY

Stanley Remington

Consulting Hydrologist

I. CHEMICAL ANALYSES

The results of the quarterly sampling with the Department of Energy were received and are appended. These samples were taken on September 19, 1996. All of the readings appear to be normal except that the gross beta reading from well PW-8 appears to be slightly high. On the other hand the total uranium content is low and well within the NPDES limits. Wells RMW-2 and PW-8 were sampled. Well RMW-2 showed a normal gross beta reading, that is, it was well below the NPDES limits and within historical values.

One sample was taken of the treated water from the raffinate pits at the old chemical plant site. Again, all of the chemical parameters were well within NPDES limits and subsequently the batch was released into the Missouri River. The results are appended.

The quarterly site and quarry water treatment plant effluent data summary - third quarter 1996 was received from the Department of Energy and is appended for your information.

Well PW-7 was sampled on October 22, 1996. The results have not yet been received.

II. REPORT

St. Charles County received a report of a study conducted by the Division of Environmental Quality of the Department of Natural Resources in Jefferson City, Missouri. The report deals with the results of an analysis for the virus monitoring done by the Missouri Department of Natural Resources Public Drinking Water

Program staff. There were no grand conclusions drawn from their limited study. They did say that it was evident that most alluvial aquifers in Missouri (even those recently flooded) have very few microbiological contaminants. Viruses are known to attach to clay particles. This may explain the relative absence of microbiological contaminants in the samples taken in this study. The report is appended as part of a repository of ground water data of the St. Charles County Well Field.

III. FUTURE PLANS

I will sample well PW-2 during mid-November 1996. A quarterly sampling done with the Department of Energy will take place during December 1996.

IV. CONFERENCES

I attended the tenth annual St. Louis Regional Environmental Conference held on October 9, 1996 for one day. There was a general session in the morning and breakout sessions after lunch. I attended the "Water Status Update" session where three different topics, all dealing with water, were given.

V. MISCELLANEOUS

Appended is the St. Charles County Monthly Water Sales Report for the month of September 1996. This is for your information.

AMERICAN TECHNICAL & ANALYTICAL SERVICES, INC.
875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 • FAX (314) 434-0080

October 22, 1996

Stanley M. Remington
956 Broadmoor Lane
St. Charles, MO 63301

RE: ATAS #16879.01-#16879.02
Weldon Spring

Dear Mr. Remington:

Enclosed are the analytical reports for the samples received in our laboratory on September 19, 1996.

If, in your review, you should have any questions or require additional information, please call Rhonda Tinker, Assistant Project Manager, or me at (314) 434-4570.

Thank you for choosing ATAS for your analytical needs.

Sincerely,

Richard H. Mannz
RT

Richard H. Mannz
Project Manager

Enclosures

RHM/dms

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
919 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1687901RA(261)
DATE : 10-22-96

SAMPLE MATRIX : WATER
ATAS EPISODE : #16879
DATE SUBMITTED: 09-19-96
PROJECT REF. : WELDON SPRING

RESULTS REPORTED IN pCi/L

CLIENT ID	ATAS ID	RADIONUCLIDE	RESULT
RMW-2	16879.01	GROSS ALPHA	2 +/- 3*
RMW-2	16879.01	GROSS BETA	8 +/- 5*
RMW-2	16879.01	TOTAL URANIUM (mg/L)	0.008
PW-8	16879.01	GROSS ALPHA	5 +/- 5*
PW-8	16879.01	GROSS BETA	25 +/-13*
PW-8	16879.01	TOTAL URANIUM (mg/L)	<0.005

VARIABILITY OF THE RADIOACTIVE DISINTERGRATION PROCESS (COUNTING ERROR) AT THE 95% CONFIDENCE LEVEL, 1.96σ.
pCi/L= PICOCURIES PER LITER
mg/L = PARTS PER MILLION(PPM)

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1687901EX(261)
DATE : 10-22-96

SAMPLE MATRIX : WATER
ATAS # : 16879.01
DATE SUBMITTED: 09-19-96
PROJECT : WELDON SPRING
SAMPLE ID : RMW-2

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE
			INORGANICS		
NITRATE-SPEC	1.0	mg/L	ND	09-20-96	SM 418B
			METALS		
ARSENIC	5.0	ug/L	106	10-02-96	SW 6010
BERYLLIUM	1.0	ug/L	ND	10-02-96	SW 6010
COPPER	2.0	ug/L	4.2	10-02-96	SW 6010
IRON	20.0	ug/L	9280	10-02-96	SW 6010
LEAD	3.0	ug/L	ND	10-02-96	SW 6010
MANGANESE	1.0	ug/L	1050	10-02-96	SW 6010
MERCURY	0.1	ug/L	ND	10-21-96	SW 7470
ZINC	4.0	ug/L	44.2	10-02-96	SW 6010

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 · FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1687901EX(261)
DATE : 10-22-96

SAMPLE MATRIX : WATER
ATAS # : 16879.02
DATE SUBMITTED: 09-19-96
PROJECT : WELDON SPRING
SAMPLE ID : PW-8

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE
			INORGANICS		
NITRATE-SPEC	1.05	mg/L	ND	09-20-96	SM 418B
			METALS		
ARSENIC	5.0	ug/L	5.6	10-02-96	SW 6010
BERYLLIUM	1.0	ug/L	ND	10-02-96	SW 6010
COPPER	2.0	ug/L	2.1	10-02-96	SW 6010
IRON	20.0	ug/L	7100	10-02-96	SW 6010
LEAD	3.0	ug/L	ND	10-02-96	SW 6010
MANGANESE	1.0	ug/L	972	10-02-96	SW 6010
MERCURY	0.1	ug/L	ND	10-21-96	SW 7470
ZINC	4.0	ug/L	23.8	10-02-96	SW 6010

ug/L = PARTS PER BILLION(PPB)
mg/L = PARTS PER MILLION(PPM)
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1687901EX(261)

DATE : 10-22-96

QA/QC

DESCRIPTION		PARAMETER	RESULTS	
METHOD BLANK	10-02-96	ARSENIC	<5.0	ug/L
METHOD BLANK	10-02-96	BERYLLIUM	<1.0	ug/L
METHOD BLANK	10-02-96	COPPER	<2.0	ug/L
METHOD BLANK	10-02-96	IRON	<20.0	ug/L
METHOD BLANK	10-02-96	LEAD	<3.0	ug/L
METHOD BLANK	10-02-96	MANGANESE	<1.0	ug/L
METHOD BLANK	10-21-96	MERCURY	<0.1	ug/L
METHOD BLANK	10-02-96	ZINC	<4.0	ug/L
METHOD BLANK	09-20-96	NITRATE	<1.0	mg/L
CONTROL SPIKE	10-02-96	ARSENIC	101 %	RECOVERY
CONTROL SPIKE	10-02-96	BERYLLIUM	99 %	RECOVERY
CONTROL SPIKE	10-02-96	COPPER	94 %	RECOVERY
CONTROL SPIKE	10-02-96	IRON	94 %	RECOVERY
CONTROL SPIKE	10-02-96	LEAD	89 %	RECOVERY
CONTROL SPIKE	10-02-96	MANGANESE	95 %	RECOVERY
CONTROL SPIKE	10-21-96	MERCURY	90 %	RECOVERY
CONTROL SPIKE	10-02-96	ZINC	95 %	RECOVERY
CONTROL SPIKE	09-20-96	NITRATE	99 %	RECOVERY

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CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1687901EX(261)
DATE : 10-22-96

SAMPLE MATRIX : WATER
ATAS # : 16879.01
DATE SUBMITTED: 09-19-96
DATE ANALYZED : 10-18-96
METHOD REF. : SW846-8330, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : RMW-2

RESULTS REPORTED IN ug/L OR PARTS PER BILLION(PPB)

EXPLOSIVE	QUANTITATION LIMIT	RESULTS
HMX	13.0	ND
RDX	14.0	ND
1,3,5-TNB	7.3	ND
TETRYL	10.0	ND
1,3-DNB	4.0	ND
NITROBENZENE	7.0	ND
2,6 DNT	9.4	ND
2,4 DNT	5.7	ND
2,4,6 TNT	6.4	ND
o-NITROTOLUENE	12.0	ND
p-NITROTOLUENE	8.0	ND
m-NITROTOLUENE	7.9	ND

ND NOT DETECTED ABOVE QUANTITATION LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1687901EX(261)
DATE : 10-22-96

SAMPLE MATRIX : WATER
ATAS # : 16879.02
DATE SUBMITTED: 09-19-96
DATE ANALYZED : 10-18-96
METHOD REF. : SW846-8330, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : PW-8

RESULTS REPORTED IN ug/L OR PARTS PER BILLION(PPB)

EXPLOSIVE	QUANTITATION LIMIT	RESULTS
HMX	13.0	ND
RDX	14.0	ND
1,3,5-TNB	7.3	ND
TETRYL	10.0	ND
1,3-DNB	4.0	ND
NITROBENZENE	7.0	ND
2,6 DNT	9.4	ND
2,4 DNT	5.7	ND
2,4,6 TNT	6.4	ND
o-NITROTOLUENE	12.0	ND
p-NITROTOLUENE	8.0	ND
m-NITROTOLUENE	7.9	ND

ND NOT DETECTED ABOVE QUANTITATION LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1687901EX(261)
DATE : 10-22-96

SAMPLE MATRIX : WATER
ATAS # : METHOD BLANK
DATE SUBMITTED: 09-19-96
DATE ANALYZED : 10-18-96
METHOD REF. : SW846-8330, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : METHOD BLANK

RESULTS REPORTED IN ug/L OR PARTS PER BILLION(PPB)

EXPLOSIVE	QUANTITATION LIMIT	RESULTS
HMX	13.0	ND
RDX	14.0	ND
1,3,5-TNB	7.3	ND
TETRYL	10.0	ND
1,3-DNB	4.0	ND
NITROBENZENE	7.0	ND
2,6 DNT	9.4	ND
2,4 DNT	5.7	ND
2,4,6 TNT	6.4	ND
o-NITROTOLUENE	12.0	ND
p-NITROTOLUENE	8.0	ND
m-NITROTOLUENE	7.9	ND

ND NOT DETECTED ABOVE QUANTITATION LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1687901EX(261)

DATE : 10-22-96

SAMPLE MATRIX : WATER
ATAS # : LABORATORY CONTROL SAMPLE
DATE SUBMITTED: 09-19-96
DATE ANALYZED : 10-18-96
METHOD REF. : SW846-8330, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : LABORATORY CONTROL SAMPLE

COMPOUND	PERCENT RECOVERY
HMX	99 %
RDX	99 %
1,3,5-TNB	108 %
TETRYL	81 %
1,3-DNB	106 %
TNT	100 %
NITROBENZENE	100 %
2,6 DNT	119 %
2,4 DNT	102 %
o-NITROTOLUENE	97 %
m-NITROTOLUENE	115 %
p-NITROTOLUENE	104 %

ATAS

AMERICAN TECHNICAL & ANALYTICAL SERVICES, Inc.

875 Fee Fee Road • Maryland Heights, MO 63043-3211 • Office (314) 434-4570 • FAX (314) 434-0080

CHAIN OF CUSTODY RECORD

ATAS Client Name: STAN REMINGTON

Project Name: WELDON SPRING

Project #:

Form Completed By: STAN REMINGTON

PO #:

Preservative: Ice / Chemical (see below)

Sample ID	Sample Date	Sample Time	Sample Matrix	Grab	Comp	No. of Containers	Nitrates	Gross α	Total U	Gross β	Metals	Nitrates	TSS				Remarks
RMW-2	9/19/96	0845		X			X	X	X	X	X	X					
PW-8	"	0915		X			X	X	X	X	X	X					
TREAT. PLANT	"	0830			X								X				

Relinquished by:	Received by:	Relinquished by:	Received by:
Signature: STAN REMINGTON	Signature: L. MASSENBERG	Signature:	Signature:
Printed Name: ST. CHARLES COUNTY	Printed Name: ATAS	Printed Name:	Printed Name:
Firm: SEPT. 19, 1996 10:40	Firm: 9-19-96 10:40	Firm:	Firm:
Date/Time	Date/Time	Date/Time	Date/Time

Turnaround Requirements
- ____ 1 to 2 working days
- ____ 3 working days
- ____ 5 working days
- ____ 10 working days
- ____ 15 working days

Preservative codes
- A - none
- B - HNO_3
- C - H_2SO_4
- D - NaOH
- E - HCl
- F - ____

SEND RESULTS TO (Name & Company): _____

Original to ATAS/Copy to Client

AMERICAN TECHNICAL & ANALYTICAL SERVICES, INC.

875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 • FAX (314) 434-0080

October 28, 1996

Stanley M. Remington
956 Broadmoor Lane
St. Charles, MO 63301

RE: ATAS #17155.01
Weldon Spring

Dear Mr. Remington:

Enclosed is the analytical report for the sample received in our laboratory on October 17, 1996.

If, in your review, you should have any questions or require additional information, please call Rhonda Tinker, Assistant Project Manager, or me at (314) 434-4570.

Thank you for choosing ATAS for your analytical needs.

Sincerely,

Richard H. Mannz
PM

Richard H. Mannz
Project Manager

Enclosures

RHM/dms

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1715501T(261)

DATE : 10-25-96

SAMPLE MATRIX : WATER
ATAS ID : 17155.01
DATE SUBMITTED: 10-17-96
PROJECT : WELDON SPRING

RESULTS REPORTED IN pCi/L

CLIENT ID	ATAS ID	RADIONUCLIDE	RESULT
P-ES34-101796-C	17155.01	GROSS ALPHA	3 +/- 4*
NP-ES34-101796-C	17155.01	GROSS BETA	10 +/- 8*
NP-ES34-101796-C	17155.01	TOTAL URANIUM (mg/L)	<0.005

* VARIABILITY OF THE RADIOACTIVE DISINTERGRATION PROCESS (COUNTING ERROR) AT THE 95% CONFIDENCE LEVEL, 1.96σ.
Ci/L= PICOCURIES PER LITER
= PARTS PER MILLION(PPM)

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1715501M(261)

DATE : 10-25-96

QA/QC

DESCRIPTION		PARAMETER	RESULTS	
METHOD BLANK	10-21-96	NITRATE	<1.0	mg/L
CONTROL SPIKE	10-21-96	NITRATE	97 %	RECOVERY

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
919 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1715501EX(261)
DATE : 10-25-96

SAMPLE MATRIX : WATER
ATAS # : METHOD BLANK
DATE SUBMITTED: 10-17-96
DATE EXTRACTED: 10-18-96
DATE ANALYZED : 10-21-96
METHOD REF. : SW846-8090, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : METHOD BLANK

RESULTS REPORTED IN ug/L OR PARTS PER BILLION(PPB)

EXPLOSIVE	REPORTING LIMIT	RESULTS
2,6 DNT	0.010	ND
2,4 DNT	0.020	ND

QA/QC SURROGATE RECOVERY

DECACHLOROBIPHENYL(30-150)	57 %
TETRACHLORO-M-XYLENE(30-150)	83 %

ND NOT DETECTED ABOVE QUANTITATION LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
919 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: QC0000EX(XXX)
DATE : 00-00-00

SAMPLE MATRIX : WATER
ATAS # : LABORATORY CONTROL SAMPLE
DATE SUBMITTED: 10-17-96
DATE EXTRACTED: 10-18-96
DATE ANALYZED : 10-21-96
METHOD REF. : SW846-8090, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : LABORATORY CONTROL SAMPLE

	LCS % REC.	LCSD % REC.	RPD
,6 DNT	61	61	0
,4 DNT	62	62	0

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1715501M(261)
DATE : 10-25-96

SAMPLE MATRIX : SOIL
ATAS # : 17155.01
DATE SUBMITTED: 10-17-96
PROJECT : WELDON SPRING
SAMPLE ID : NP-ES34-101796-C

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE
			INORGANICS		
NITRATE-SPEC	1.05	mg/L	3.81	10-21-96	SM 418B
			METALS		
ARSENIC	5.0	ug/L	ND	10-22-96	SW 6010
CHROMIUM	1.0	ug/L	1.4	10-22-96	SW 6010
LEAD	3.0	ug/L	ND	10-22-96	SW 6010
MANGANESE	1.0	ug/L	2.4	10-22-96	SW 6010
SELENIUM	5.0	ug/L	ND	10-22-96	SW 6010
MERCURY	0.1	ug/L	ND	10-22-96	SW 7470

g/L = PARTS PER MILLION(PPM)
D = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
919 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1715501EX(261)

DATE : 10-25-96

SAMPLE MATRIX : WATER
ATAS # : 17055.01
DATE SUBMITTED: 10-17-96
DATE EXTRACTED: 10-18-96
DATE ANALYZED : 10-21-96
METHOD REF. : SW846-8090, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : NP-EP34-101796-C

RESULTS REPORTED IN ug/L OR PARTS PER BILLION(PPB)

EXPLOSIVE	REPORTING LIMIT	RESULTS
2,6 DNT	0.010	ND
2,4 DNT	0.020	ND

QA/QC SURROGATE RECOVERY

DECACHLOROBIPHENYL(30-150)	17 %
TETRACHLORO-M-XYLENE(30-150)	29 %

ND NOT DETECTED ABOVE QUANTITATION LIMIT

C

ENVIRONMENTAL SAMPLE CHAIN-OF-CUSTODY / AUTHORIZATION FORM

WELDON SPRING SITE REMEDIAL ACTION PROJECT (WSSRAP)
7295 HIGHWAY 94 SOUTH, ST. CHARLES, MO 63304
TELEPHONE (314) 441-8086 TELEX (314) 447-0803

Validation Documentation ☐

ES&H 4.1.2.1, Rev.6, Effective 11/92

WSSRAP Contact:
Phone Number:
Request Number:

Lab/P.O. #:
Requisitioner: St. Charles
Dept/Cost Code:
Turnaround Time: ☐ Standard ☐ Accelerated ☐ Priority ☐ Urgent ☐ Emergency

#	Sample ID	QC	Date Sampled	Matrix	Cont.	Preserv.	Parameters WD 10-17-96 THS-EA-ACL	Arch. (Y/N)
	NP-ES34-101796-C		10-17-96	Water	1-1 liter	HNO3	As,Cr,Hg,Mn,Se,Pb 17155.01	N
					1-1 liter glass	Ice	2,4-DNT	
					1-1 liter	H2SO4	NO3	
					1-4 liter	HNO3	U, Gross alpha, Gross beta	

Sampler's Signature: [signature]
Checked By: [signature]
Technical Reviewer:

Relinquished By	Received By	Date	Time	Reason for Transfer	Seal Intact? (Y/N)	Cooler Temp
[signature]	[signature]	10/17/96	1250			
[signature]	[signature]	10/17/96	1310			

AUTHORIZATION

MK-F Procurement Date ES&H Date Site Shipping Officer Date

Joe R. Nichols
County Engineer - Water Dept.
St. Charles County

October 22, 1996

Mr. Stanley Remington
956 Broadmoor Lane
St. Charles, Mo. 63301

RE: VIRUS STUDY
FLOOD AFFECTED WELLS

Dear Stanley:

Attached are the results of the Missouri Department of Natural Resources tests taken on flood-affected wells for viruses study.

No conclusions have been drawn from this study, but most alluvial aguifers in Missouri have very few microbiological contaminants.

If you have any questions, please advise.

Sincerely,

Joe R Nichols

Joe R. Nichols
County Engineer

JRN/TRA/cia
Enclosure

cc: Mr. Lynn Bultman, Missouri American Water Company
Mr. Mike Dougherty, St. Charles County Public Water District #2

c:\highway\water\virus.cia

201 North Second Street • Suite 429 • Saint Charles, Missouri 63301-2874
314-949-7305 • Fax 314-949-7307

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

September 20, 1996

PWSD ID#MO6079507

Mr. Tom Aaron
St. Charles County CT-Weldon Springs
1635 South Highway 94
Defiance, MO 63341

Dear Mr. Aaron:

Enclosed are analysis results for the virus monitoring done by the Missouri Department of Natural Resources' Public Drinking Water Program staff. We contracted with a laboratory named Novotny-Microbiology at the University of New England in the State of Maine to complete the sample analysis.

Thank you for your help and cooperation in this effort. Very little is known about the occurrence of viruses in groundwater. It is our hope that these results will provide insight into the characteristics of groundwater and meaningful information on how flooding affects the quality of well water.

Included with your results is a summary explaining the scope of this project--to help you interpret the results. Also included is a summary of results from all systems tested. This will give you an overview of results statewide. If you have questions, please give me a call at (573)751-7834.

Sincerely,

PUBLIC DRINKING WATER PROGRAM

Kenneth Duzan

Kenneth Duzan
Environmental Specialist
Planning & Water Monitoring Section

KD:bw

Enclosures

c: St. Louis Regional Office

GENERAL INFORMATION
VIRUS AND RELATED PARAMETER MONITORING
conducted by the
MISSOURI DEPARTMENT OF NATURAL RESOURCES'
PUBLIC DRINKING WATER PROGRAM
September 20, 1996

INTRODUCTION

Little is known about the occurrence of viruses in groundwater. It is not known whether natural filtration of flood waters by upper geological layers (which eliminates bacteria, protozoans, and other microscopic contaminants) effectively eliminates viruses. This project was undertaken to develope an understanding of the occurrence of pathogenic and other viruses in groundwater. The study was also designed to supply information in a format usable by a cooperative effort between EPA and the American Water Works Association Research Foundation. The data obtained may be useful for efforts to further define the characteristics of vulnerability.

SCOPE OF WORK

During the months of March, April, May, and June of 1996, Public Drinking Water Program staff monitored flood-affected wells for viruses. Other parameters were also tested, both in the field and at the laboratory, from other samples collected at the same time.

Sampling was funded by a U.S. Environmental Protection Agency (EPA) grant for environmental testing for flood-affected water systems. The department chose to conduct virus sampling because of the lack of data, state and nationwide, on the occurrence and fate of viruses in groundwater. Recently developed technologies have made the collection, analysis, and identification of viral contaminants more accurate and less costly.

A number of enteric viruses have caused waterborne disease and may be responsible for many, if not most, of the outbreaks where a causative agent is not specifically indicated. Much is known about bacterial contamination, but little is known about viral contamination and it's relationship to the bacterial and overall chemical characteristics of groundwater.

This monitoring effort consisted of the following:

1. The filtration of at least 400 liters of water with an electrostatically-charged filter. Viruses are very small and have a negative charge. The filters used for this sampling were of a positive charge. Thus, as water passed over and through the filter, the negatively-charged viruses were attracted and held by the positive charge of the filter. At the laboratory, an extract was derived from the filter and various tests were conducted, as described below;

2. Two liters of water were collected for a complete inorganics scan. One liter was acidified with nitric acid at the time of collection and analyzed for metals at the laboratory. The other liter was not acidified and was analyzed for non-metals at the laboratory. The purpose of running a complete inorganics scan was to help in the overall understanding of virus occurrence or non-occurrence in relationship to the overall chemical characteristics of water;

3. The pH, temperature, and turbidity were checked in the field.

4. The samples were analyzed for bacteriophage viruses. Viruses that infect bacteria are known as **phages**. Many types of bacteria are infected with phages specific to that specific species of bacteria. Phages are being sugested as indicator organisms and are easier and more economical to test for than pathogenic viruses. Phages analyzed for are:

> **a. Male-Specific Coliphage**. These are viruses that infect *E. coli* by entering the cell through protrusions on the bacterium known as sex-pili. To analyze for these viruses, a culture of sex-pili bearing E. coli was prepared and exposed to an extract from the filter. If viable viruses were present, they infected the culture and visible "plaques"formed. These were counted and are being reported.
>
> **b. Somatic Phage.** Somatic means "of the body." Somatic Coliphages are viruses that infect E. coli by entering through the cell wall of the bacterial cell. The analysis process for somatic phages is the same as described above for male-specific coliphages.
>
> **c. Total Infective Viruses.** A number of enteric (intestinal) viruses have heen responsible for many outbreaks of waterborne disease. Monitoring for them is useful both because this group of viruses contains pathogens and because it is a potential indicator of other viral pathogens. This analysis method was accomplished by exposing a cell culture composed of African Green Monkey kidney cells to extracts from the filter. If they were present, the enteric viruses infected the cells, multiplied, and are now being enumerated.
>
> **d. Bactroides Phage.** Bactroides bacteria are anaerobic bacteria that inhabit the intestinal tract of warm-blooded animals. Some researchers are suggesting that bactroides phage is an indicator for viral contamination. A culture of bactroides bacteria was exposed to the filter extract, incubated, and examined for plaques;

5. Polymerase Chain Reaction (PCR) Analysis. PCR is a method used to identify enterovirus, Hepatitis A virus, Rotavirus, and Norwalk-like virus. PCR is a method of synthesizing DNA extracted from viruses. A successful PCR can result in several million-fold amplification of the starting DNA. DNA sequences are unique to each virus. This "cloning" produces an amount of genetic material that can be identified as belonging to a specific organism. At this time, the MDNR does not feel PCR has been perfected; therefore, we instructed the laboratory to archive a certain portion of the filter extract to be used at a later date for confirmatory analysis; and

6. Bacteriological Analysis. Three different bacterial indicators were cultured from a one-liter sample collected during sampling. The purpose was to determine if the presence of bacteria correlated with that of viruses. The following were all tested for in triplicate from the one-liter sample:

a. **Total Coliforms.** May indicate surface contamination.

b. **Fecal Coliforms.** Indicate fecal contamination from warm-blooded animals.

c. **Fecal Streptococcus.** Different warm-blooded animals have different ratios of fecal strep to fecal coliform; thus, if fecal strep and fecal coliforms were found, it might be possible to determine if human or animal sewage is responsible.

CONCLUSIONS

No grand conclusions have been drawn from this limited study; however, it is evident that most alluvial aquifers in Missouri (even those recently flooded) have very few microbiological contaminants. Viruses are known to attach to clay particles. This may explain their relative absence from the samples taken in this sturdy.

This information is being forwarded to EPA. They plan to upload it into a database containing the results of similar studies which have been completed nationwide. We hope this sampling effort, conducted by the Missouri Department of Natural Resources, Public Drinking Water Program with the help and cooperation of many public water systems, will contribute to an understanding of the dynamics of viruses in ground water.

Sample Number: 6079507-04232

RESULTS OF VIRUS STUDY

PWS Name: St. Charles County CT-Weldon Springs
Tom Aaron
1635 South Highway 94
Defiance MO 63341

PWS ID: MO6079507
REGION: St. Louis
COUNTY: St. Charles
LOG NO: 25

DGLS Well #: 40665
Local Well #: #2

DATE COLLECTED: 04/23/96

Chloride		20.00	mg/L
Fluoride		0.29	mg/L
Nitrite Nitrogen	<	0.050	mg/L
Sulfate		51.00	mg/L
Aluminum	<	0.020	mg/L
Antimony	<	0.010	mg/L
Arsenic	<	0.0050	mg/L
Barium		0.370	mg/L
Beryllium	<	0.005	mg/L
Boron		0.077	mg/L
Cadmium	<	0.001	mg/L
Calcium		71.00	mg/L
Chromium	<	0.005	mg/L
Cobalt	<	0.050	mg/L
Copper	<	0.010	mg/L
Iron		3.900	mg/L
Lead	<	0.003	mg/L
Magnesium		18.00	mg/L
Manganese		0.420	mg/L
Molybdenum	<	0.05	mg/L
Nickel	<	0.01	mg/L
Potassium		6.0	mg/L
Selenium	<	0.01	mg/L
Silver	<	0.001	mg/L
Sodium		34.00	mg/L
Strontium		0.420	mg/L
Thallium	<	0.005	mg/L
Vanadium	<	0.05	mg/L
Zinc	<	0.010	mg/L

Total Sample Volume	950.00	liters
Water pH	7.5	
Water Temperature	15.0	C
Total Dissolved Solids	34	mg/L

Total Coliforms/100 ml	9.0
Fecal Coliforms/100 ml	0.0
Fecal Strep/100 ml	0.0
Male-Specific Coliphage/100 L	0.0
Somatic Coliphage/100 L	0.0
Bacteriodes Phage/100 L	0.0
Infective Viruses Most Probable Number/100 L	0.0000

Sample Number: 6079507-04233

RESULTS OF VIRUS STUDY

PWS Name: St. Charles County CT-Weldon Springs
Tom Aaron
1635 South Highway 94
Defiance MO 63341

PWS ID: MO6079507
REGION: St. Louis
COUNTY: St. Charles
LOG NO: 26

DGLS Well #: 40666
Local Well #: #3

DATE COLLECTED: 04/23/96

Chloride		21.00	mg/L
Fluoride		0.30	mg/L
Nitrite Nitrogen	<	0.050	mg/L
Sulfate		58.00	mg/L
Aluminum	<	0.020	mg/L
Antimony	<	0.010	mg/L
Arsenic	<	0.0050	mg/L
Barium		0.320	mg/L
Beryllium	<	0.005	mg/L
Boron		0.068	mg/L
Cadmium	<	0.001	mg/L
Calcium		67.00	mg/L
Chromium	<	0.005	mg/L
Cobalt	<	0.050	mg/L
Copper	<	0.010	mg/L
Iron		2.700	mg/L
Lead	<	0.003	mg/L
Magnesium		17.00	mg/L
Manganese		0.400	mg/L
Molybdenum	<	0.05	mg/L
Nickel	<	0.01	mg/L
Potassium		5.9	mg/L
Selenium	<	0.01	mg/L
Silver	<	0.001	mg/L
Sodium		34.00	mg/L
Strontium		0.390	mg/L
Thallium	<	0.005	mg/L
Vanadium	<	0.05	mg/L
Zinc	<	0.010	mg/L

Total Sample Volume	450.40	liters
Water pH	7.4	
Water Temperature	14.0	C
Total Dissolved Solids	35	mg/L

Total Coliforms/100 ml	0.0
Fecal Coliforms/100 ml	0.0
Fecal Strep/100 ml	0.0
Male-Specific Coliphage/100 L	0.0
Somatic Coliphage/100 L	0.0
Bacteriodes Phage/100 L	0.0
Infective Viruses Most Probable Number/100 L	0.0000

Sample Number: 6079507-04234

RESULTS OF VIRUS STUDY

PWS Name: St. Charles County CT-Weldon Springs
Tom Aaron
1635 South Highway 94
Defiance MO 63341

PWS ID: MO6079507
REGION: St. Louis
COUNTY: St. Charles
LOG NO: 27

DGLS Well #: 40667
Local Well #: #4A

DATE COLLECTED: 04/23/96

Chloride		24.00	mg/L
Fluoride		0.31	mg/L
Nitrite Nitrogen	<	0.050	mg/L
Sulfate		72.00	mg/L
Aluminum	<	0.020	mg/L
Antimony	<	0.010	mg/L
Arsenic	<	0.0050	mg/L
Barium		0.330	mg/L
Beryllium	<	0.005	mg/L
Boron		0.069	mg/L
Cadmium	<	0.001	mg/L
Calcium		68.00	mg/L
Chromium	<	0.005	mg/L
Cobalt	<	0.050	mg/L
Copper	<	0.010	mg/L
Iron		2.200	mg/L
Lead	<	0.003	mg/L
Magnesium		18.00	mg/L
Manganese		0.360	mg/L
Molybdenum	<	0.05	mg/L
Nickel	<	0.01	mg/L
Potassium		6.5	mg/L
Selenium	<	0.01	mg/L
Silver	<	0.001	mg/L
Sodium		44.00	mg/L
Strontium		0.410	mg/L
Thallium	<	0.005	mg/L
Vanadium	<	0.05	mg/L
Zinc	<	0.010	mg/L

Total Sample Volume	416.40	liters
Water pH	7.4	
Water Temperature	14.0	C
Total Dissolved Solids	36	mg/L

Total Coliforms/100 ml	0.0
Fecal Coliforms/100 ml	0.0
Fecal Strep/100 ml	0.0
Male-Specific Coliphage/100 L	0.0
Somatic Coliphage/100 L	0.0
Bacteriodes Phage/100 L	0.0
Infective Viruses Most Probable Number/100 L	0.0000

Sample Number: 6079507-04245

RESULTS OF VIRUS STUDY

PWS Name: St. Charles County CT-Weldon Springs
Tom Aaron
1635 South Highway 94
Defiance MO 63341

PWS ID: MO6079507
REGION: St. Louis
COUNTY: St. Charles
LOG NO: 28

DGLS Well #: 40668
Local Well #: #5

DATE COLLECTED: 04/24/96

Chloride		13.00	mg/L
Fluoride		0.24	mg/L
Nitrite Nitrogen	<	0.050	mg/L
Sulfate		30.00	mg/L
Aluminum	<	0.020	mg/L
Antimony	<	0.010	mg/L
Arsenic	<	0.0050	mg/L
Barium		0.420	mg/L
Beryllium	<	0.005	mg/L
Boron		0.091	mg/L
Cadmium	<	0.001	mg/L
Calcium		91.00	mg/L
Chromium	<	0.005	mg/L
Cobalt	<	0.050	mg/L
Copper	<	0.010	mg/L
Iron		5.700	mg/L
Lead	<	0.003	mg/L
Magnesium		19.00	mg/L
Manganese		0.670	mg/L
Molybdenum	<	0.05	mg/L
Nickel	<	0.01	mg/L
Potassium		5.2	mg/L
Selenium	<	0.01	mg/L
Silver	<	0.001	mg/L
Sodium		18.00	mg/L
Strontium		0.510	mg/L
Thallium	<	0.005	mg/L
Vanadium	<	0.05	mg/L
Zinc	<	0.010	mg/L

Total Sample Volume	567.80	liters
Water pH	8.2	
Water Temperature	16.0	C
Total Dissolved Solids	36	mg/L

Total Coliforms/100 ml	0.0
Fecal Coliforms/100 ml	0.0
Fecal Strep/100 ml	0.0
Male-Specific Coliphage/100 L	0.0
Somatic Coliphage/100 L	0.0
Bacteriodes Phage/100 L	0.0
Infective Viruses Most Probable Number/100 L	0.0000

Sample Number: 6079507-61796-6

RESULTS OF VIRUS STUDY

PWS Name: St. Charles County CT-Weldon Springs
Tom Aaron
1635 South Highway 94
Defiance MO 63341

PWS ID: MO6079507
REGION: St. Louis
COUNTY: St. Charles
LOG NO: 102

DGLS Well #: 40669
Local Well #: #6

DATE COLLECTED: 06/17/96

Chloride		19.00	mg/L
Fluoride		0.32	mg/L
Nitrite Nitrogen	<	0.050	mg/L
Sulfate		130.00	mg/L
Aluminum	<	0.020	mg/L
Antimony	<	0.010	mg/L
Arsenic	<	0.0050	mg/L
Barium		0.410	mg/L
Beryllium	<	0.005	mg/L
Boron		0.062	mg/L
Cadmium	<	0.001	mg/L
Calcium		83.00	mg/L
Chromium	<	0.005	mg/L
Cobalt	<	0.050	mg/L
Copper	<	0.010	mg/L
Iron		4.600	mg/L
Lead	<	0.003	mg/L
Magnesium		19.00	mg/L
Manganese		0.570	mg/L
Molybdenum	<	0.05	mg/L
Nickel	<	0.01	mg/L
Potassium		5.8	mg/L
Selenium	<	0.01	mg/L
Silver	<	0.001	mg/L
Sodium		31.00	mg/L
Strontium		0.490	mg/L
Thallium	<	0.005	mg/L
Vanadium	<	0.05	mg/L
Zinc		0.012	mg/L

Total Sample Volume	261.17	liters
Water pH	7.5	
Water Temperature	18.0	C
Total Dissolved Solids	0	mg/L

Total Coliforms/100 ml	0.0
Fecal Coliforms/100 ml	0.0
Fecal Strep/100 ml	0.0
Male-Specific Coliphage/100 L	0.0
Somatic Coliphage/100 L	0.0
Bacteriodes Phage/100 L	0.0
Infective Viruses Most Probable Number/100 L	0.0000

Sample Number: 6079507-61796-7

RESULTS OF VIRUS STUDY

PWS Name: St. Charles County CT-Weldon Springs
Tom Aaron
1635 South Highway 94
Defiance MO 63341

PWS ID: MO6079507
REGION: St. Louis
COUNTY: St. Charles
LOG NO: 103

DGLS Well #: 40670
Local Well #: #7

DATE COLLECTED: 06/17/96

Chloride		14.00	mg/L
Fluoride		0.26	mg/L
Nitrite Nitrogen	<	0.050	mg/L
Sulfate		79.00	mg/L
Aluminum	<	0.020	mg/L
Antimony	<	0.010	mg/L
Arsenic	<	0.0050	mg/L
Barium		0.480	mg/L
Beryllium	<	0.005	mg/L
Boron		0.066	mg/L
Cadmium	<	0.001	mg/L
Calcium		96.00	mg/L
Chromium	<	0.005	mg/L
Cobalt	<	0.050	mg/L
Copper	<	0.010	mg/L
Iron		6.400	mg/L
Lead	<	0.003	mg/L
Magnesium		23.00	mg/L
Manganese		0.600	mg/L
Molybdenum	<	0.05	mg/L
Nickel	<	0.01	mg/L
Potassium		4.6	mg/L
Selenium	<	0.01	mg/L
Silver	<	0.001	mg/L
Sodium		21.00	mg/L
Strontium		0.550	mg/L
Thallium	<	0.005	mg/L
Vanadium	<	0.05	mg/L
Zinc		0.011	mg/L

Total Sample Volume	423.92	liters
Water pH	7.1	
Water Temperature	18.0	C
Total Dissolved Solids	20	mg/L

Total Coliforms/100 ml	0.0
Fecal Coliforms/100 ml	0.0
Fecal Strep/100 ml	0.0
Male-Specific Coliphage/100 L	0.0
Somatic Coliphage/100 L	0.0
Bacteriodes Phage/100 L	0.0
Infective Viruses Most Probable Number/100 L	0.0000

Sample Number: 6079507-61796-9

RESULTS OF VIRUS STUDY

PWS Name: St. Charles County CT-Weldon Springs
Tom Aaron
1635 South Highway 94
Defiance MO 63341

PWS ID: MO6079507
REGION: St. Louis
COUNTY: St. Charles
LOG NO: 104

DGLS Well #: 40672
Local Well #: #9

DATE COLLECTED: 06/17/96

Chloride	<	10.00	mg/L
Fluoride		0.25	mg/L
Nitrite Nitrogen	<	0.050	mg/L
Sulfate		37.00	mg/L
Aluminum	<	0.020	mg/L
Antimony	<	0.010	mg/L
Arsenic	<	0.0050	mg/L
Barium		0.500	mg/L
Beryllium	<	0.005	mg/L
Boron		0.065	mg/L
Cadmium	<	0.001	mg/L
Calcium		100.00	mg/L
Chromium	<	0.005	mg/L
Cobalt	<	0.050	mg/L
Copper	<	0.010	mg/L
Iron		6.400	mg/L
Lead	<	0.003	mg/L
Magnesium		27.00	mg/L
Manganese		0.370	mg/L
Molybdenum	<	0.05	mg/L
Nickel	<	0.01	mg/L
Potassium		3.6	mg/L
Selenium	<	0.01	mg/L
Silver	<	0.001	mg/L
Sodium		6.50	mg/L
Strontium		0.570	mg/L
Thallium	<	0.005	mg/L
Vanadium	<	0.05	mg/L
Zinc	<	0.010	mg/L

Total Sample Volume	302.80	liters
Water pH	7.3	
Water Temperature	17.0	C
Total Dissolved Solids	22	mg/L

Total Coliforms/100 ml	0.0
Fecal Coliforms/100 ml	0.0
Fecal Strep/100 ml	0.0
Male-Specific Coliphage/100 L	0.0
Somatic Coliphage/100 L	0.0
Bacteriodes Phage/100 L	0.0
Infective Viruses Most Probable Number/100 L	0.0000

Missouri Study-Microbe Data

UNE Log #	MO Sample #	Date Collected	TC/100 ml	FC/100 ml	Fecal Strep/100 ml	~~RNA phage/100 L~~ male-specific coliphage/100L	Somatic phage/100 L	Bacteriodes phage/100 L	Virus MPN/100L
1	4010136/03251	3/25/96	0	0	0	0	0	0	0
2	4010136/03252	3/25/96	0	0	0	0	0	0	0
3	4010710/03263	3/26/96	0	0	0	0	0	0	0
4	3010181/04021	4/2/96	3	0	0	0	0	0	0
5	3010181/04022	4/2/96	0	0	0	0	0	0	0
6	3010181/0402A	4/2/96	0	0	0	0	0	0	0
7	3010181/04027	4/2/96	0	0	0	0	0	0	0
8	3010181/04029	4/2/96	0	0	0	0	0	0	0
9	3010181/04033	4/3/96	1	0	0	0	0	0	0
10	3010181/04034	4/3/96	2	0	0	0	0	0	0
11	3010181/04035	4/3/96	0	0	0	10	0	0	0
12	3010181/04036	4/3/96	0	0	0	0	0	0	0
13	2010566/04081	4/8/96	0	0	0	0	0	0	0
14	2024259/04083	4/8/96	0	0	0	0	0	9	0
15	610707/04084	4/8/96	29	0	0	0	0	0	0
16	610707/04086	4/8/96	0	0	0	0	0	0	0
17	2024259/04091	4/9/96	1	0	0	0	0	0	0
18	610707/04095	4/9/96	2	0	0	0	0	0	0
19	1010786/04160	4/16/96	5	0	0	0	0	0	0
20	1010191/04162	4/16/96	0	0	0	0	0	3.2	0
21	1010265/04163	4/16/96	0	0	0	0	0	0	0
22	1010786/04167	4/16/96	0	0	0	0	0	0	0
23	1010851/04172	4/16/96	1	0	0	0	0	0	0
24	1010851/04173	4/16/96	2	0	0	0	0	0	0
25	6079507/04232	4/23/96	9	0	0	0	0	0	0
26	6079507/04233	4/23/96	0	0	0	0	0	0	0
27	6079507/04234	4/23/96	0	0	0	0	0	0	0
28	1071079/04231	4/24/96	0	0	0	0	0	0	0
29	1010346/04232	4/23/96	5	0	0	0	0	0	0
30	1010346/04232	4/23/96	0	0	0	0	0	0	0
31	1071079/04233	4/23/96	9	0	0	0	0	0	0
32	1010265/04234	4/23/96	0	0	0	0	0	0	0
33	1010265/04235	4/23/96	0	0	0	0	0	0	0
34	1070518/04291	4/29/96	0	0	0	0	0	0	0
35	1070518/04292	4/29/96	0	0	0	0	0	0	0
36	1010757/04291	4/29/96	0	0	0	0	0	0	0
27	1010757/04294	4/29/96	0	0	0	0	0	0	0
28	1010098/04304	4/30/96	0	0	0	0	0	0	0
39	1010098/04305	4/30/96	0	0	0	0	0	0	0
40	2010140/04304	4/30/96	0	0	0	0	0	0	0
41	2010140/04306	4/30/96	0	0	0	0	0	0	0

42	4010136/5196/3	5/1/96	0	0	0	0	0	0	0
43	4010710/5196/4	5/1/96	0	0	0	0	0	0	0
44	2010440/0506/1	5/6/96	240	0	0	0	0	0	0
45	2010440/0506/3	5/6/96	0	0	0	0	0	0	0
46	2010623/0506/4	5/6/96	0	0	0	0	0	0	0
47	2010623/0506/5	5/6/96	0	0	0	0	0	0	0
48	2010623/0506/7	5/6/96	10	0	0	0	0	0	0
49	2010134/0507/2	5/7/96	8	0	0	0	0	0	0
50	2010414/0507/3	5/7/96	200	0	0	0	0	0	0
51	1010399/0513/9	5/13/96	0	0	0	0	0	0	0
52	1010399/05131/4	5/13/96	2	0	0	0	0	0	0
53	1010399/05133/3	5/13/96	0	0	0	0	0	0	0
54	1010415/0513/9	5/13/96	3	0	0	0	0	0	1.307
55	1010415/0513/2	5/13/96	0	0	0	0	0	0	3.99
56	4010249/51396/3	5/13/96	12	2	10	0	66.7	0	2.231
57	2010109/0514/2	5/14/96	0	0	0	0	0	0	2.01
58	2010109/0514/3	5/14/96	0	0	0	0	0	0	0
59	2010420/0514/1	5/14/96	5	0	0	0	0	0	0
60	2010420/0514/2	5/14/96	0	0	0	0	0	0	0
61	2024355/0515/2	5/15/96	0	0	0	0	0	0	0
62	5010619/0521/4	5/21/96	0	0	0	0	0	0	0
63	5010619/0521/5	5/21/96	0	0	0	0	0	0	0
64	5010619/0621/6	5/21/96	0	0	0	0	0	0	0
65	5010763/0522/1	5/22/96	0	0	0	0	0	0	0
66	5010763/0522/2	5/22/96	0	0	0	0	0	0	0
67	1010265/0603/3	6/3/96	330	12	1	0	0	0	0.421
68	1010766/0603/7	6/3/96	2	0	0	0	0	0	0
69	1010766/0603/10	6/3/96	5	0	6	0	0	0	2.312
70	3010181/0604/A	6/4/96	0	0	0	0	0	0	0
71	301018106042	6/4/96	0	0	5	0	0	0	0.2234
72	3010181/0604/5	6/4/96	0	0	0	0	0	0	0.6482
73	3010181/0604/6	6/4/96	0	0	0	0	0	0	0.3249
74	3010181/0604/9	6/4/96	0	0	5	0	0	0	0
75	1010757/0604/1	6/4/96	7	0	1	0	0	0	0
76	1010191/0604/2	6/3/96	2260	149	115	0	0	0	0.2696
77	1010757/0604/4	6/4/96	32	0	1	0	0	0	0
78	3010181/0605/3	6/5/96	22	0	0	0	0	0	0
79	3010181/0605/4	6/5/96	0	0	2	0	0	0	0
80	1010851/0605/2	6/5/96	0	0	0	0	0	0	0
81	1010851/0605/3	6/5/96	0	0	0	0	0	0	0
82	1010346/0606/2	6/6/96	0	0	0	0	0	0	0
83	2010745/0611/4	6/11/96	0	0	0	0	0	0	0
84	2010745/0612/1	6/12/96	2	0	0	0	0	0	0

85	2024259/0612/1	6/12/96	0	0	0	0	0	0	0
86	2024259/0612/3	6/12/96	0	0	0	0	0	0	0
87	1071079/0612/1	6/12/96	2	0	0	0	0	0	0
88	1071079/0612/3	6/12/96	0	0	0	0	0	0	0
89	1070518/0612/1	6/12/96	0	0	0	0	0	0	0
90	4010136/61296/1	6/12/96	0	0	0	0	0	0	6.947
91	4010136/61296/2	6/12/96	0	0	0	0	0	0	1.054
92	4010136/61296/3	6/12/96	0	0	0	0	0	0	0
93	2010134/0612/2	6/12/96	104	0	0	0	0	0	0
94	2010414/0612/2	6/12/96	0	0	0	0	0	0	0
95	2010623/0613/05	6/13/96	52	0	0	0	0	0	0
96	2010623/0613/06	6/13/96	0	0	0	0	0	0	0
97	1010399/0613/33	6/13/96	4	0	0	0	0	0	0
98	1010399/0613/9	6/13/96	3	0	0	0	0	0	0
99	1010415/0613/13	6/13/96	33	0	0	0	0	0	0
100	1010399/0613/14	6/13/96	0	0	0	0	0	0	0
101	2010623/0616/7	6/16/96	5900	2	1	0	0	0	0
102	6079507/61796/6	6/17/96	0	0	0	0	0	0	0
103	6079507/61796/7	6/17/96	0	0	0	0	0	0	0
104	6079507/61796/9	6/17/96	0	0	0	0	0	0	0
105	5010619/0617/4	6/17/96	0	0	0	0	0	0	0
106	5010619/0617/6	6/17/96	0	0	0	0	0	0	0
107	2024355/0617/2	6/17/96	12400	0	70	0	0	0	0
108	1010098/0617/4	6/17/96	260	0	9	0	0	0	0
109	1010098/0617/5	6/17/96	2000	20	0	0	0	0	0
110	6010707/61896/6	6/18/96	0	0	0	0	0	0	0
111	6010707/61896/7	6/18/96	0	0	0	0	0	0	0
112	5010480/0619/1	6/19/96	0	0	0	0	0	0	0
113	4024606/62496/3	6/24/96	0	0	0	0	0	0	0
114	4010467/0626/1	6/26/96	0	0	0	0	0	0	0
115	4010382/0626/3	6/26/96	0	0	0	0	0	0	0
116	4010674/0627/1	6/27/96	0	0	0	0	0	0	0
117	4010777/0627/1	6/27/96	0	0	0	0	0	0	0

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

October 18, 1996

Distribution:

QUARTERLY SITE AND QUARRY WATER TREATMENT PLANT EFFLUENT DATA SUMMARY - THIRD QUARTER 1996

Enclosed please find the subject effluent data summary sheets for the batches of water treated and discharged during the third quarter of 1996. Eight batches (S#083 through S#090) and one batch (Q#046) have been treated and discharged from the site and quarry water treatment plants, respectively.

If you have any questions, please call me or Bruce Ballew at (314)441-8978.

Sincerely,

Jerry S. Van Fossen

Jerry S. Van Fossen
Deputy Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc w/o enclosure:
Martha Windsor, MDNR

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SUMMARY OF QWTP (BATCH 046) ANALYTICAL RESULTS

7/12/95 1330

FROM ALL AGENCIES RECEIVING SAMPLES ON 6/27/95

PARAMETER	NPDES LIMITS (mg/l)	PMC DATA RESULTS	MoDNR DATA RESULTS	EPA DATA RESULTS	ST. CHARLES COUNTY DATA RESULTS	ST. LOUIS COUNTY H & W DATA RESULTS
COD	90 / 60	<5.0 mg/l		NA	NA	NA
TSS	50 / 30	4.0 mg/l		NA	NA	NA
ARSENIC	0.1	<0.002 mg/l		NA	NA	
CHROMIUM	0.1	<0.0029 mg/l		NA	NA	
COPPER ***	1	0.0099 mg/l		NA	NA	
LEAD	0.1	<0.0014 mg/l		NA	NA	
MANGANESE	0.1	0.0184 mg/l		NA	NA	
MERCURY	0.004	<0.0001 mg/l		NA	NA	
SELENIUM	0.02	0.0029 mg/l		NA	NA	
CYANIDE, AMENABLE	0.0075	<0.005 mg/l		NA	NA	
2,4-DNT	0.22 ug/l	<0.01 ug/l		NA	NA	
FLUORIDE	4.0	0.15 mg/l		NA	NA	
NITRATE+NITRITE AS N	*	0.082 mg/l		NA	NA	
SULFATE	500	151 mg/l		NA	NA	
CHLORIDE	*	242 mg/l		NA	NA	
GROSS ALPHA	*	1.08 ±0.590 pCi/l		NA	NA	1.7 ±0.9 pCi/l
GROSS BETA	*	3.30 ±0.600 pCi/l		NA	NA	3.9 ±1.0 pCi/l
URANIUM, TOTAL	**	<0.016 pCi/l		NA	NA	<1.0 pCi/l
RADIUM-226 ***	*	<0.071 pCi/l		NA	NA	NA
RADIUM-228 ***	*	<0.550 pCi/l		NA	NA	NA
THORIUM-230 ***	*	<0.250 pCi/l		NA	NA	NA
THORIUM-232 ***	*	<0.120 pCi/l		NA	NA	NA
PRIORITY POLLUTANTS	(SEE BELOW)					
1. SEMI-VOA	*	NA	NA	NA	NA	NA
2. VOA	*	NA		NA	NA	NA
3. PCBs	*	<1.0 µg/l		NA	NA	NA
4. PESTICIDES	*	NA			NA	
5. METALS / OTHERS	*	NA			NA	
pH	6.0 – 9.0 S.U.	6.85	NA	NA	NA	NA

* = MONITORING ONLY, NO PERMIT DISCHARGE LIMITS

** = Design Value of 30 pCi / l; Not to Exceed 100 pCi / l

*** = Parameter required once/month. Sampled this batch.

NA = Not analyzed.

= Data received after batch was discharged

SUMMARY OF SWTP (BATCH 083) ANALYTICAL RESULTS

07/9/96 0800

From all parties receiving samples on 7/2/96

PARAMETER	NPDES LIMITS (mg/l) Unless noted	PMC DATA RESULTS	MoDNR DATA RESULTS	EPA DATA RESULTS	ST. CHARLES COUNTY DATA RESULTS	ST. LOUIS COUNTY H & W DATA RESULTS
COD	90 / 60	5 mg/l		NA	NA	NA
TSS	50 / 30	<2.0 mg/l		NA	NA	NA
ARSENIC	0.1	<0.005 mg/l		NA	NA	
CHROMIUM	0.1	<0.006 mg/l		NA	NA	
LEAD	0.1	0.002 mg/l		NA	NA	
MANGANESE	0.1	<0.003 mg/l		NA	NA	
MERCURY	0.004	<0.0001 mg/l		NA	NA	
SELENIUM	0.02	0.0098 mg/l		NA	NA	
CYANIDE, AMENABLE	0.0075	<0.004 mg/l		NA	NA	
2,4-DNT	0.22 ug/l	<0.015 ug/l		NA	NA	
FLUORIDE	4.0	1.74 mg/l		NA	NA	
NITRATE + NITRITE AS N	20	7.24 mg/l		NA	NA	
SULFATE	500	350 mg/l		NA	NA	
CHLORIDE	*	206 mg/l		NA	NA	
GROSS ALPHA	*	5.53 ±2.66 pCi/l		NA	NA	5.3 ±1.3 pCi/l
GROSS BETA	*	23.7 ±2.94 pCi/l		NA	NA	11.0 ±1.1 pCi/l
URANIUM, TOTAL	**	2.94 ±0.063 pCi/l		NA	NA	2.7 ±0.4 pCi/l
RADIUM-226 ***	*	Due 7/10/96		NA	NA	
RADIUM-228 ***	*	Due 7/10/96		NA	NA	
THORIUM-230 ***	*	Due 7/10/96		NA	NA	NA
THORIUM-232 ***	*	Due 7/10/96		NA	NA	NA
pH (Std. Units)	6 – 9	6.67		NA	NA	
PRIORITY POLLUTANTS	(SEE BELOW)					
1. SEMI-VOA	*	NA		NA	NA	NA
2. VOA	*	NA		NA	NA	NA
3. PCBs/PESTICIDES	****/*	<1.0 ug/l		NA	NA	NA
4. METALS/OTHERS	*	NA				

* = Monitoring Parameter

** = Design Value of 30 pCi / l; Not to Exceed 100 pCi / l

*** = Monitoring parameter once per month.

**** = Effective limit of 1 µg/l

NA = NOT ANALYZED

= Data received after batch was discharged

SUMMARY OF SWTP (BATCH 084) ANALYTICAL RESULTS

08/26/96 1000

From all parties receiving samples on 7/15/96

PARAMETER	NPDES LIMITS (mg/l) Unless noted	PMC DATA RESULTS	MoDNR DATA RESULTS	EPA DATA RESULTS	ST. CHARLES COUNTY DATA RESULTS	ST. LOUIS COUNTY H & W DATA RESULTS
COD	90 / 60	<20 mg/l		NA	NA	NA
TSS	50 / 30	<12 mg/l		NA	NA	NA
ARSENIC	0.1	<0.003 mg/l	[redacted]	NA	NA	
CHROMIUM	0.1	<0.004 mg/l		NA	NA	
LEAD	0.1	<0.002 mg/l		NA	NA	
MANGANESE	0.1	0.0016 mg/l	[redacted]	NA	NA	
MERCURY	0.004	<0.0002 mg/l		NA	NA	
SELENIUM	0.02	0.0067 mg/l		NA	NA	
CYANIDE, AMENABLE	0.0075	<0.004 mg/l		NA	NA	
2,4-DNT	0.22 ug/l	<0.20 ug/l	[redacted]	NA	NA	
FLUORIDE	4.0	2.1 mg/l		NA	NA	
NITRATE + NITRITE AS N	20	6.2 mg/l	[redacted]	NA	NA	
SULFATE	500	300 mg/l		NA	NA	
CHLORIDE	*	140 mg/l		NA	NA	
GROSS ALPHA	*	13.9 ±6.5 pCi/l	[redacted]	NA	NA	6.0 ±1.7 pCi/l
GROSS BETA	*	12.8 ±4.6 pCi/l	[redacted]	NA	NA	11.2 ±1.1 pCi/l
URANIUM, TOTAL	**	2.57 ±0.14 pCi/l	[redacted]	NA	NA	2.2 ±0.4 pCi/l
RADIUM-226 ***	*	NA		NA	NA	
RADIUM-228 ***	*	NA		NA	NA	
THORIUM-230 ***	*	NA		NA	NA	NA
THORIUM-232 ***	*	NA		NA	NA	NA
pH (Std. Units)	6 – 9	7.21		NA	NA	
PRIORITY POLLUTANTS	(SEE BELOW)					
1. SEMI-VOA	*	NA		NA	NA	NA
2. VOA	*	NA		NA	NA	NA
3. PCBs/PESTICIDES	****/*	<0.8 ug/l / NA	[redacted]	NA	NA	NA
4. METALS/OTHERS	*	NA				

* = Monitoring Parameter

** = Design Value of 30 pCi / l; Not to Exceed 100 pCi / l

*** = Monitoring parameter once per month. Ra and Th sampled in batch S083 for July 1996.

**** = Effective limit of 1 µg/l

NA = NOT ANALYZED

[redacted] = Data received after batch was discharged

SUMMARY OF SWTP (BATCH 085) ANALYTICAL RESULTS

07/29/96 0845

From all parties receiving samples on 7/22/96

PARAMETER	NPDES LIMITS (mg/l) Unless noted	PMC DATA RESULTS	MoDNR DATA RESULTS	EPA DATA RESULTS	ST. CHARLES COUNTY DATA RESULTS	ST. LOUIS COUNTY H & W DATA RESULTS
COD	90 / 60	<20 mg/l		NA	NA	NA
TSS	50 / 30	<12 mg/l		NA	NA	NA
ARSENIC	0.1	<0.002 mg/l	[redacted]	NA	NA	
CHROMIUM	0.1	<0.001 mg/l		NA	NA	
LEAD	0.1	<0.001 mg/l		NA	NA	
MANGANESE	0.1	0.0029 mg/l	[redacted]	NA	NA	
MERCURY	0.004	<0.0002 mg/l		NA	NA	
SELENIUM	0.02	<0.003 mg/l		NA	NA	
CYANIDE, AMENABLE	0.0075	<0.004 mg/l		NA	NA	
2,4-DNT	0.22 ug/l	<0.20 µg/l	[redacted]	NA	NA	
FLUORIDE	4.0	1.7 mg/l		NA	NA	
NITRATE + NITRITE AS N	20	<0.05 mg/l	[redacted]	NA	NA	
SULFATE	500	330 mg/l		NA	NA	
CHLORIDE	*	170 mg/l		NA	NA	
GROSS ALPHA	*	8.5 ± 5.3 pCi/l	[redacted]	NA	NA	7.4 ± 1.9 pCi/l
GROSS BETA	*	15.4 ± 5.3 pCi/l	[redacted]	NA	NA	11.8 ± 1.1 pCi/l
URANIUM, TOTAL	**	2.62 ± 0.14 pCi/l	[redacted]	NA	NA	3.0 ± 0.4 pCi/l
RADIUM-226 ***	*	Due 8/2		NA	NA	
RADIUM-228 ***	*	Due 8/2		NA	NA	
THORIUM-230 ***	*	Due 8/2		NA	NA	NA
THORIUM-232 ***	*	Due 8/2		NA	NA	NA
pH (Std. Units)	6 – 9	6.39		NA	NA	
PRIORITY POLLUTANTS	(SEE BELOW)					
1. SEMI-VOA	*	NA		NA	NA	NA
2. VOA	*	NA		NA	NA	NA
3. PCBs/PESTICIDES	****/*	<0.80 µg/l/NA	[redacted]	NA	NA	NA
4. METALS/OTHERS	*	NA				

* = Monitoring Parameter

** = Design Value of 30 pCi / l; Not to Exceed 100 pCi / l

*** = Monitoring parameter once per month.

**** = Effective limit of 1 µg/l

NA = NOT ANALYZED

[redacted] = Data received after batch was discharged

SUMMARY OF SWTP (BATCH 086) ANALYTICAL RESULTS

08/09/96 0745

From all parties receiving samples on 8/05/96

PARAMETER	NPDES LIMITS (mg/l) Unless noted	PMC DATA RESULTS	MoDNR DATA RESULTS	EPA DATA RESULTS	ST. CHARLES COUNTY DATA RESULTS	ST. LOUIS COUNTY H & W DATA RESULTS
COD	90 / 60	6.00 mg/l		NA	NA	NA
TSS	50 / 30	1.00 mg/l		NA	NA	NA
ARSENIC	0.1	<0.002 mg/l		NA	NA	
CHROMIUM	0.1	<0.0023 mg/l		NA	NA	
LEAD	0.1	<0.0014 mg/l		NA	NA	
MANGANESE	0.1	0.0012 mg/l		NA	NA	
MERCURY	0.004	<0.00010 mg/l		NA	NA	
SELENIUM	0.02	<0.0028 mg/l		NA	NA	
CYANIDE, AMENABLE	0.0075	<0.005 mg/l		NA	NA	
2,4-DNT	0.22 ug/l	<0.01 ug/l		NA	NA	
FLUORIDE	4.0	2.25 mg/l		NA	NA	
NITRATE + NITRITE AS N	20	0.28 mg/l		NA	NA	
SULFATE	500	310 mg/l		NA	NA	
CHLORIDE	*	135 mg/l		NA	NA	
GROSS ALPHA	*	4.0 ±4.8 pCi/l		NA	NA	5.3 ±1.6 pCi/l
GROSS BETA	*	13 ±9 pCi/l		NA	NA	11.4 ±1.1 pCi/l
URANIUM, TOTAL	**	2.0 pCi/l		NA	NA	2.3 ±0.4 pCi/l
RADIUM-226 ***	*	1.1 ±0.8 pCi/l		NA	NA	
RADIUM-228 ***	*	3.6 ±1.2 pCi/l		NA	NA	
THORIUM-230 ***	*	<0.2 pCi/l		NA	NA	NA
THORIUM-232 ***	*	<0.1 pCi/l		NA	NA	NA
pH (Std. Units)	6 – 9	6.42		NA	NA	
PRIORITY POLLUTANTS	(SEE BELOW)					
1. SEMI-VOA	*	NA		NA	NA	NA
2. VOA	*	NA		NA	NA	NA
3. PCBs/PESTICIDES	****/*	<1.00 ug/l / NA		NA	NA	NA
4. METALS/OTHERS	*	NA				

* = Monitoring Parameter

** = Design Value of 30 pCi / l; Not to Exceed 100 pCi / l

*** = Monitoring parameter once per month.

**** = Effective limit of 1 µg/l

NA = NOT ANALYZED

= Data received after batch was discharged

SUMMARY OF SWTP (BATCH 087) ANALYTICAL RESULTS

08/29/96 1610

From all parties receiving samples on 8/26/96

PARAMETER	NPDES LIMITS (mg/l) Unless noted	PMC DATA RESULTS	MoDNR DATA RESULTS	EPA DATA RESULTS	ST. CHARLES COUNTY DATA RESULTS	ST. LOUIS COUNTY H & W DATA RESULTS
COD	90 / 60	5.00 mg/l		NA	NA	NA
TSS	50 / 30	2.00 mg/l		NA	NA	NA
ARSENIC	0.1	<0.002 mg/l		NA	NA	
CHROMIUM	0.1	<0.0023 mg/l		NA	NA	
LEAD	0.1	<0.0014 mg/l		NA	NA	
MANGANESE	0.1	0.0018 mg/l		NA	NA	
MERCURY	0.004	<0.0001 mg/l		NA	NA	
SELENIUM	0.02	<0.0028 mg/l		NA	NA	
CYANIDE, AMENABLE	0.0075	<0.005 mg/l		NA	NA	
2,4-DNT	0.22 ug/l	<0.01 ug/l		NA	NA	
FLUORIDE	4.0	2.89 mg/l		NA	NA	
NITRATE + NITRITE AS N	20	2.54 mg/l		NA	NA	
SULFATE	500	120 mg/l		NA	NA	
CHLORIDE	*	90.1 mg/l		NA	NA	
GROSS ALPHA	*	8.8 ± 4.5 pCi/l		NA	NA	3.6 ±1.4 pCi/l
GROSS BETA	*	15.8 ± 3.2 pCi/l		NA	NA	7.8 ±1.1 pCi/l
URANIUM, TOTAL	**	1.999 ± 0.10 pCi/l		NA	NA	1.9 ±0.3 pCi/l
RADIUM-226 ***	*	NA		NA	NA	
RADIUM-228 ***	*	NA		NA	NA	
THORIUM-230 ***	*	NA		NA	NA	NA
THORIUM-232 ***	*	NA		NA	NA	NA
pH (Std. Units)	6 – 9	6.92		NA	NA	
PRIORITY POLLUTANTS	(SEE BELOW)					
1. SEMI-VOA	*	NA		NA	NA	NA
2. VOA	*	NA		NA	NA	NA
3. PCBs/PESTICIDES	****/*	< 1.0 ug/l / NA		NA	NA	NA
4. METALS/OTHERS	*	NA				

* = Monitoring Parameter

** = Design Value of 30 pCi / l; Not to Exceed 100 pCi / l

*** = Monitoring parameter once per month. Collected in batch S086 for August 1996.

**** = Effective limit of 1 µg/l

NA = NOT ANALYZED

= Data received after batch was discharged

SUMMARY OF SWTP (BATCH 088) ANALYTICAL RESULTS

09/25/96 1500

From all parties receiving samples on 9/18/96

PARAMETER	NPDES LIMITS (mg/l) Unless noted	PMC DATA RESULTS	MoDNR DATA RESULTS	EPA DATA RESULTS	ST. CHARLES COUNTY DATA RESULTS	ST. LOUIS COUNTY H & W DATA RESULTS
COD	90 / 60	<5.0 mg/l		NA	NA	NA
TSS	50 / 30	5.00 mg/l		NA	NA	NA
ARSENIC	0.1	<0.003 mg/l		NA	NA	
CHROMIUM	0.1	<0.002 mg/l		NA	NA	
LEAD	0.1	<0.002 mg/l		NA	NA	
MANGANESE	0.1	0.0051 mg/l		NA	NA	
MERCURY	0.004	<0.00010 mg/l		NA	NA	
SELENIUM	0.02	0.0075 mg/l		NA	NA	
CYANIDE, AMENABLE&TOTAL	0.0075	<0.004 mg/l		NA	NA	
2,4-DNT	0.22 ug/l	<0.015 ug/l		NA	NA	
FLUORIDE	4.0	<0.01 mg/l		NA	NA	
NITRATE + NITRITE AS N	20	0.212 mg/l		NA	NA	
SULFATE	500	3.37 mg/l		NA	NA	
CHLORIDE	*	9.32 mg/l		NA	NA	
GROSS ALPHA	*	0.430 ± 0.694 pCi/l		NA	NA	<1.0 pCi/l
GROSS BETA	*	1.17 ± 1.26 pCi/l		NA	NA	<1.0 pCi/l
URANIUM, TOTAL	**	0.2 ± 0.0047 pCi/l		NA	NA	<1.0 pCi/l
RADIUM-226 ***	*	DUE 9/26		NA	NA	
RADIUM-228 ***	*	DUE 9/26		NA	NA	
THORIUM-230 ***	*	DUE 9/26		NA	NA	NA
THORIUM-232 ***	*	DUE 9/26		NA	NA	NA
pH (Std. Units)	6 - 9	7.27		NA	NA	
PRIORITY POLLUTANTS	(SEE BELOW)					
1. SEMI-VOA	*	NA		NA	NA	NA
2. VOA	*	NA		NA	NA	NA
3. PCBs/PESTICIDES	****/*	<1.0 ug/l / NA		NA	NA	NA
4. METALS/OTHERS	*	NA				

* = Monitoring Parameter

** = Design Value of 30 pCi / l; Not to Exceed 100 pCi / l

*** = Monitoring parameter once per month.

**** = Effective limit of 1 µg/l

NA = NOT ANALYZED

[redacted] = Data received after batch was discharged

SUMMARY OF SWTP (BATCH 089) ANALYTICAL RESULTS

09/17/96 1300

From all parties receiving samples on 9/9/96

PARAMETER	NPDES LIMITS (mg/l) Unless noted	PMC DATA RESULTS	MoDNR DATA RESULTS	EPA DATA RESULTS	ST. CHARLES COUNTY DATA RESULTS	ST. LOUIS COUNTY H & W DATA RESULTS
COD	90 / 60	7.74 mg/l		NA	NA	NA
TSS	50 / 30	<5.00 mg/l		NA	NA	NA
ARSENIC	0.1	0.0021 mg/l		NA	NA	
CHROMIUM	0.1	<0.0052 mg/l		NA	NA	
LEAD	0.1	0.0013 mg/l		NA	NA	
MANGANESE	0.1	0.00099 mg/l		NA	NA	
MERCURY	0.004	<0.00010 mg/l		NA	NA	
SELENIUM	0.02	<0.003 mg/l		NA	NA	
CYANIDE, AMENABLE	0.0075	<0.004 mg/l		NA	NA	
2,4-DNT	0.22 ug/l	<0.015 ug/l		NA	NA	
FLUORIDE	4.0	2.3 mg/l		NA	NA	
NITRATE + NITRITE AS N	20	3.2 mg/l		NA	NA	
SULFATE	500	313 mg/l		NA	NA	
CHLORIDE	*	235 mg/l		NA	NA	
GROSS ALPHA	*	7.13 ± 4.05 pCi/l		NA	NA	4.0 ± 1.5 pCi/l
GROSS BETA	*	27.1 ± 4.33 pCi/l		NA	NA	8.0 ± 1.1 pCi/l
URANIUM, TOTAL	**	2.37 ± 0.049 pCi/l		NA	NA	2.7 ± 0.4 pCi/l
RADIUM-226 ***	*	DUE 9/17		NA	NA	
RADIUM-228 ***	*	DUE 9/17		NA	NA	
THORIUM-230 ***	*	DUE 9/17		NA	NA	NA
THORIUM-232 ***	*	DUE 9/17		NA	NA	NA
pH (Std. Units)	6 - 9	6.76		NA	NA	
PRIORITY POLLUTANTS	(SEE BELOW)					
1. SEMI-VOA	*	NA		NA	NA	NA
2. VOA	*	NA		NA	NA	NA
3. PCBs/PESTICIDES	****/*	<1.0 ug/l / NA		NA	NA	NA
4. METALS/OTHERS	*	NA				

* = Monitoring Parameter

** = Design Value of 30 pCi / l; Not to Exceed 100 pCi / l

*** = Monitoring parameter once per month.

**** = Effective limit of 1 µg/l

NA = NOT ANALYZED

= Data received after batch was discharged

SUMMARY OF SWTP (BATCH 090) ANALYTICAL RESULTS

10/7/96 0800

From all parties receiving samples on 9/30/96

PARAMETER	NPDES LIMITS (mg/l) Unless noted	PMC DATA RESULTS	MoDNR DATA RESULTS	EPA DATA RESULTS	ST. CHARLES COUNTY DATA RESULTS	ST. LOUIS COUNTY H & W DATA RESULTS
COD	90 / 60	5.4 mg/l		NA	NA	NA
TSS	50 / 30	2.00 mg/l		NA	NA	NA
ARSENIC	0.1	<0.003 mg/l		NA	NA	
CHROMIUM	0.1	<0.002 mg/l		NA	NA	
LEAD	0.1	<0.002 mg/l		NA	NA	
MANGANESE	0.1	0.002 mg/l		NA	NA	
MERCURY	0.004	<0.0001 mg/l		NA	NA	
SELENIUM	0.02	0.0053 mg/l		NA	NA	
CYANIDE, AMENABLE	0.0075	<0.004 mg/l		NA	NA	
2,4-DNT	0.22 ug/l	<0.015 µg/l		NA	NA	
FLUORIDE	4.0	2.28 mg/l		NA	NA	
NITRATE + NITRITE AS N	20	3.79 mg/l		NA	NA	
SULFATE	500	244 mg/l		NA	NA	
CHLORIDE	*	202 mg/l		NA	NA	
GROSS ALPHA	*	12 ±5 pCi/l		NA	NA	3.0 ±1.2 pCi/l
GROSS BETA	*	22 ±7 pCi/l		NA	NA	6.3 ±1.1 pCi/l
URANIUM, TOTAL	**	1.7 pCi/l		NA	NA	1.6 ±0.3 pCi/l
RADIUM-226 ***	*	0.6 ±0.2 pCi/l		NA	NA	
RADIUM-228 ***	*	0.9 ±0.6 pCi/l		NA	NA	
THORIUM-230 ***	*	0.0 ±0.3 pCi/l		NA	NA	NA
THORIUM-232 ***	*	0.0 ±0.1 pCi/l		NA	NA	NA
pH (Std. Units)	6 – 9	6.38		NA	NA	
PRIORITY POLLUTANTS	(SEE BELOW)					
1. SEMI-VOA	*	NA		NA	NA	NA
2. VOA	*	<10 µg/l		NA	NA	NA
3. PCBs/PESTICIDES	****/*	<1.0 µg/l / NA		NA	NA	NA
4. METALS/OTHERS	*	NA				

* = Monitoring Parameter

** = Design Value of 30 pCi / l; Not to Exceed 100 pCi / l

*** = Monitoring parameter once per month.

**** = Effective limit of 1 µg/l

NA = NOT ANALYZED

= Data received after batch was discharged

ST. CHARLES COUNTY MONTHLY WATER SALES REPORT

DATE OF REPORT 10/02/96

MONTH OF REPORT SEPTEMBER

WATER PRODUCTION			401,971,000
WASHWATER USED			7,256,000
DELIVERED TO SYSTEM			394,715,000
MO. AMERICAN WATER	ADJUSTMENT FOR AUG96		8,610,000
	BOOSTER STATION		264,365,000
67004132835-007	FRANCIS HOWELL		51,000
67004132850-007	MO. HWYS & TRANS.		4,500
67004133000-004	M.K. FERGUSEN		831,000
67004133040-015	M.K. FERGUSEN		680,000
67004133010-002	M.K. FERGUSEN		231,000
67004133020-000	M.K. FERGUSEN		29,000
67004132855-002	FRANCIS HOWELL		601,000
67004132890-009	M.K. FERGUSEN		62,000
67095018237-000	M.K. FERGUSEN		2,000
		TOTAL	275,466,500
WATER DISTICT #2			
	24" EAST LINE		0
	24" WEST LINE		84,501,000
	BYPASS		0
		TOTAL	84,501,000
WATER DISTICT #2			
	NEW MELLE	TOTAL	9,233,000
NATIONAL GUARD AREA			
	BLGD S-61		1,000
	WASH RACK		2,000
		TOTAL	3,000
TOTAL WATER SALES	**********		369,203,500

ST. CHARLES COUNTY WATER DEPARTMENT

SEPT.96

INVENTORY OF CHEMICALS

	LIME		CHLORIN
PREVIOUS BALANCE	198297		5953

RECIEVED	INV. # DATE		INV. # DATE	
	162895.9/3	49280	1836 9/5	8000
	308800.9/5	46500	1883 9/11	8000
	309034.9/6	46520	1950 9/20	8000
	309510.9/11	49940		
	310050.9/13	49040		
	310530.9/17	44800		
	310931.9/19	48660		
	311049.9/20	48500		
	311547.9/24	48340		
	311951.9/26	49600		
	312095.9/27	50160		

**********	581760	**********	24000
TOTAL AMOUNT	780057		29953
USED	601798		22870
BALANCE	178259		7083
#/1000 GALLON	1.49		0.0575
PARTS/MILLION	169		6.39
AVG. #/DAY	20260		762
# USED Y TO D	4125283.		170863.

MONTHLY REPORT

NOVEMBER 1996

BY

Stanley Remington

Consulting Hydrologist

I. CHEMICAL ANALYSES

The results from sampling well PW-7 were received and are appended. All of the results were within historical ranges and well within the NPDES limits.

Appended are the results of samples for raw and finished water taken at the St. Charles Water Treatment Plant during September 1996. These samples were taken by the St. Louis County Department of Health. They tested only for gross alpha and beta. The tests showed very low readings for both the treated and untreated waters. This water is a composite of all the pumping wells from the St. Charles County Well Field.

Well PW-2 was sampled on November 14, 1996. The results have not yet been received.

II. FUTURE PLANS

I will sample wells RMW-2 and PW-9 during December 1996. This will be a yearly sampling done in coordination with the Department of Energy. Many chemical constituents, not normally tested for, will be added to the analyses. As I said, this is done once yearly.

III. MISCELLANEOUS

Appended is the St. Charles County Monthly Water Sales Report.

IV. REPORTS

The Quarterly Environmental Data Summary for the Third Quarter 1996 was received. It concluded that "All data received and verified during the third quarter was within a permissible range of variability with the exception of the data

described in the report. Only some groundwater samplings showed higher than normal ranges."

Two consecutive new highs (90.1 ug/l and 130 ug/l) * were reported for arsenic from the QEDS. It was suspected that these were related to river level fluctuations since upgradient locations north of the Femme Osage Slough do not have elevated arsenic values. The second quarter 1996 data indicated that the arsenic concentration at 72.8 ug/l is decreasing from the first quarter historic high of 130 ug/l. Continuous trends are monitored to determine the need for additional possible action. All other QEDS were within historical range or below reporting criteria.

* WELL RMW-2

AMERICAN TECHNICAL & ANALYTICAL SERVICES, INC.
875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 • FAX (314) 434-0080

November 13, 1996

Stanley M. Remington
956 Broadmoor Lane
St. Charles, MO 63301

RE: ATAS #17194.01
Weldon Spring

Dear Mr. Remington:

Enclosed is the analytical report for the sample received in our laboratory on October 22, 1996.

If, in your review, you should have any questions or require additional information, please call Rhonda Tinker, Assistant Project Manager, or me at (314) 434-4570.

Thank you for choosing ATAS for your analytical needs.

Sincerely,

Richard H Mannz RT

Richard H. Mannz
Project Manager

Enclosures

RHM/dms

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1719401EX(261)
DATE : 11-13-96

SAMPLE MATRIX : WATER
ATAS # : 17194.01
DATE SUBMITTED: 10-22-96
DATE EXTRACTED: 10-25-96
DATE ANALYZED : 10-25-96
METHOD REF. : SW846-8330, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : PW-7

RESULTS REPORTED IN ug/L OR PARTS PER BILLION(PPB)

EXPLOSIVE	QUANTITATION LIMIT	RESULTS
HMX	13.0	ND
RDX	14.0	ND
1,3,5-TNB	7.3	ND
TETRYL	10.0	ND
1,3-DNB	4.0	ND
NITROBENZENE	7.0	ND
2,6 DNT	9.4	ND
2,4 DNT	5.7	ND
2,4,6 TNT	6.4	ND
o-NITROTOLUENE	12.0	ND
p-NITROTOLUENE	8.0	ND
m-NITROTOLUENE	7.9	ND

ND= NOT DETECTED ABOVE QUANTITATION LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1719401EX(261)

DATE : 11-13-96

SAMPLE MATRIX : WATER
ATAS # : METHOD BLANK
DATE SUBMITTED: 10-22-96
DATE EXTRACTED: 10-25-96
DATE ANALYZED : 10-25-96
METHOD REF. : SW846-8330, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : METHOD BLANK

RESULTS REPORTED IN ug/L OR PARTS PER BILLION(PPB)

EXPLOSIVE	QUANTITATION LIMIT	RESULTS
HMX	13.0	ND
RDX	14.0	ND
1,3,5-TNB	7.3	ND
TETRYL	10.0	ND
1,3-DNB	4.0	ND
NITROBENZENE	7.0	ND
2,6 DNT	9.4	ND
2,4 DNT	5.7	ND
2,4,6 TNT	6.4	ND
o-NITROTOLUENE	12.0	ND
p-NITROTOLUENE	8.0	ND
m-NITROTOLUENE	7.9	ND

ND= NOT DETECTED ABOVE QUANTITATION LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1719401EX(261)

DATE : 11-13-96

SAMPLE MATRIX : WATER
ATAS # : LABORATORY CONTROL SPIKE
DATE SUBMITTED: 10-22-96
DATE EXTRACTED: 10-25-96
DATE ANALYZED : 10-25-96
METHOD REF. : SW846-8330, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : LABORATORY CONTROL SPIKE

COMPOUND	PERCENT RECOVERY
HMX	*20 %
RDX	102 %
1,3,5-TNB	103 %
TETRYL	82 %
1,3-DNB	100 %
TNT	97 %
NITROBENZENE	104 %
2,6 DNT	117 %
2,4 DNT	99 %
o-NITROTOLUENE	97 %
p-NITROTOLUENE	112 %
m-NITROTOLUENE	109 %

* OUTSIDE ADVISORY LIMITS

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
919 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1719401RA(261)

DATE : 11-13-96

SAMPLE MATRIX : WATER
ATAS EPISODE : #17194
DATE SUBMITTED: 10-22-96
PROJECT REF. : WELDON SPRING

RESULTS REPORTED IN pCi/L

CLIENT ID	ATAS ID	RADIONUCLIDE	RESULT
PW-7	17194.01	GROSS ALPHA	6 +/- 4*
PW-7	17194.01	GROSS BETA	9 +/- 6*
PW-7	17194.01	TOTAL URANIUM (mg/L)	<0.005

* VARIABILITY OF THE RADIOACTIVE DISINTERGRATION PROCESS (COUNTING ERROR) AT THE 95% CONFIDENCE LEVEL, 1.96σ.
pCi/L= PICOCURIES PER LITER
mg/L = PARTS PER MILLION(PPM)

ATAS

AMERICAN TECHNICAL & ANALYTICAL SERVICES, Inc.

875 Fee Fee Road • Maryland Heights, MO 63043-3211 • Office (314) 434-4570 • FAX (314) 434-0080

PAGE ___ OF ___

CHAIN OF CUSTODY RECORD

ATAS Client Name: STAN REMINGTON

Project Name: WELDON SPRING

Project #:

Form Completed By: S. REMINGTON

PO #:

Preservative: Ice Chemical (see below)

Lab Use Only — Initials: LM — Date: 10-22-96 — Location/Temp: AL-[illegible] 15°C

Sample ID	Sample Date	Sample Time	Sample Matrix	Grab	Comp	No. of Containers	TOTAL U	GROSS α	GROSS β	NITROS	TSS						Remarks	Lab Use Only
PW-7	10/22/96	1300		X			X	X	X	X								17[illegible]
TREAT-PLANT	"	"			X						X							[illegible]

Relinquished by:	Received by:	Relinquished by:	Received by:
Signature: [signature]	Signature: [signature]	Signature:	Signature:
Printed Name: STAN REMINGTON	Printed Name: WALTER DOSSIP	Printed Name:	Printed Name:
Firm: ST. CHARLES COUNTY	Firm: ATAS	Firm:	Firm:
Date/Time: Oct. 22, 1996 1425	Date/Time: 10/22/96 1426	Date/Time:	Date/Time:

Turnaround Requirements

___ 1 to 2 working days

___ 3 working days

___ 5 working days

___ 10 working days

___ 15 working days

Preservative codes

A - none

B - HNO_3

C - H_2SO_4

D - NaOH

E - HCl

F - _____

SEND RESULTS TO (Name & Company): _____

Original to ATAS/Copy to Client

Joe R. Nichols
County Engineer - Water Dept.
St. Charles County

November 1, 1996

Mr. Stanley M. Remington
956 Broadmoor Lane
St. Charles, Mo. 63301

RE: Radioactivity Tests
St. Charles County Water Plant

Dear Stanley,

Attached please find results of tests on raw and finished water for the period September 1 through September 30, 1996.

If you have any questions, please advise.

Sincerely,

Joe R Nichols

Joe R. Nichols
County Engineer

JRN/cia
Enclosure

cc: Mr. Tom Engle, Director of Administration

o:\hiway\water\stlcosample

201 North Second Street • Suite 429 • Saint Charles, Missouri 63301-2874
314-949-7305 • Fax 314-949-7307

St. Louis County Department of Health

SAMPLE ANALYSIS REQUEST

Date Received 10/04/96 y

ATTENTION: St. Louis County Department of Health
Environmental Health Laboratories

SAMPLE NUMBER: PWSD I.D. 6079507 - St. Charles County Water

DATE COLLECTED: 09-01 — 09-30-96

COLLECTED BY: First Shift Operator

ADDRESS: 1635 South HWY 94

Defiance, MO Zip Code 63341

TELEPHONE NO.: (314) 926-9222 (Plant 447-0510) Thomas Aaron

ANALYSIS REQUESTED: FINISH

X GROSS ALPHA X GROSS BETA ____ RA-226 ____ RA-228

____ OTHER (Identify) ____

SCT 96-10

FOR LABORATORY USE ONLY

10/22/96

	RESULTS (pCi/L)	*MDL (pCi/L)
Gross Alpha	1.7 ± 1.0	1.0
Gross Beta	5.1 ± 0.6	1.0
Radium 226		0.1
Radium 228		1.0
Other (Identify)		

Procedure used: Measurement of Radioactivity in Drinking Water
EPA-600/4-80-032

COMMENTS: * MDL is the minimum detectable limit.

ANALYSIS PERFORMED BY: ST. LOUIS COUNTY DEPARTMENT OF HEALTH
ENVIRONMENTAL HEALTH LABORATORIES
111 So. Meramec - 5th floor
Clayton, MO 63105
(314) 854-6324

ELAB/RAD-WTR/5/96

St. Louis County Department of Health

SAMPLE ANALYSIS REQUEST

Date Received 10/04/96

ATTENTION: St. Louis County Department of Health
Environmental Health Laboratories

SAMPLE NUMBER: PWSD I.D. 6079507 - St. Charles County Water

DATE COLLECTED: 09-01 — 09-30-96

COLLECTED BY: First Shift Operator

ADDRESS: 1635 South HWY 94

Defiance, MO Zip Code 63341

TELEPHONE NO.: (314) 926-9222 (Plant 447-0510) Thomas Aaron

ANALYSIS REQUESTED: RAW

X GROSS ALPHA X GROSS BETA ____ RA-226 ____ RA-228

____ OTHER (Identify) ____

SCR96-10

FOR LABORATORY USE ONLY

10/22/96

	RESULTS (pCi/L)	*MDL (pCi/L)
Gross Alpha	< 1.0	1.0
Gross Beta	4.5 ± 0.6	1.0
Radium 226		0.1
Radium 228		1.0
Other (Identify)		

Procedure used: Measurement of Radioactivity in Drinking Water
EPA-600/4-80-032

COMMENTS: * MDL is the minimum detectable limit.

ANALYSIS PERFORMED BY: ST. LOUIS COUNTY DEPARTMENT OF HEALTH
ENVIRONMENTAL HEALTH LABORATORIES
111 So. Meramec - 5th floor
Clayton, MO 63105
(314) 854-6324

ELAB/TAO-WTR/SW

ST. CHARLES COUNTY MONTHLY WATER SALES REPORT

DATE OF REPORT	11-1-96		
MONTH OF REPORT	OCTOBER 1996		
WATER PRODUCTION			315,473,000
WASHWATER USED			7,468,000
DELIVERED TO SYSTEM			308,005,000
MO. AMERICAN WATER	FLUSH 24" DOE		1,500,000
	BOOSTER STATION		191,132,000
67004132835-007	FRANCIS HOWELL		33,000
67004132850-007	MO. HWYS & TRANS.		11,700
67004133000-004	M.K. FERGUSEN		846,500
67004133040-015	M.K. FERGUSEN		440,000
67004133010-002	M.K. FERGUSEN		375,500
67004133020-000	M.K. FERGUSEN		27,000
67004132855-002	FRANCIS HOWELL		592,000
67004132890-009	M.K. FERGUSEN		89,000
67095018237-000	M.K. FERGUSEN		176,000
		TOTAL	195,222,700
WATER DISTICT #2			
	24" EAST LINE		0
	24" WEST LINE		72,131,000
	BYPASS		0
		TOTAL	72,131,000
WATER DISTICT #2			
	NEW MELLE	TOTAL	6,411,000
NATIONAL GUARD AREA			
	BLGD S-61		0
	WASH RACK		2,000
		TOTAL	2,000
TOTAL WATER SALES	**********		273,766,700

ST. CHARLES COUNTY WATER DEPARTMENT

OCTOBER 1996

INVENTORY OF CHEMICALS

		LIME			CHLORIN
PREVIOUS BALANCE		178259			7083
RECIEVED	INV. # DATE		INV. # DATE		
	312674.10-01	49440	2046	10-03	8000
	313090.10-03	49100	2107	10-17	8000
	313977.10-08	50740			
	314314.10-10	49580			
	314960.10-15	49480			
	315348.10-17	48760			
	316124.10-23	48940			
	316475.10-24	51980			
	317135.10-29	50160			
	317609.10-31	49920			
	**********	498100	**********		16000
	TOTAL AMOUNT	676359			23083
	USED	447767			17645
	BALANCE	228592			5438
	#/1000 GALLON	1.42			0.056
	PARTS/MILLION	167			7
	AVG. #/DAY	14529			573
	# USED Y TO D	4573050.			188508.

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

November 12, 1996

Distribution:

QUARTERLY ENVIRONMENTAL DATA SUMMARY FOR THIRD QUARTER 1996

In support of the Weldon Spring Site Remedial Action Project Federal Facilities Agreement a copy of the Quarterly Environmental Data Summary (QEDS) for the third quarter of 1996 is enclosed.

The data presented in this letter and attachments constitutes the QEDS. The data were received from the contract laboratories, were verified by the Weldon Spring Site verification group and, with the exception of air monitoring data, were merged into the database during the third quarter of 1996. The air monitoring data presented are the most recent complete sets of quarterly data. Air data are not stored in the data base.

Significant data, defined as data values that have exceeded defined "above normal" values, are discussed in this letter for *Environmental Monitoring Plan* (EMP)-generated data only. Above- normal values are based, in ES&H procedures, on historic high values, DOE Derived Concentration Guides (DCGs), NPDES limits and other guidelines. The procedures also establish actions to be taken in the event that above-normal data occur.

All data received and verified during the third quarter were within a permissible range of variability with the exception of those detailed below. Above normal occurrences are cited for groundwater data. There were none for air, NPDES, surface water or springs. The following discussion offers a brief summary of the data which met the above normal criteria merged during the third quarter and updates on past reported above normal data. The attached tables present all the data merged into the data base during the third quarter 1996 for groundwater, NPDES, surface water, and springs and the most recent air data.

NPDES

There were no above normals for NPDES outfalls during the third quarter of 1996. NPDES storm water outfalls were out of compliance several times for settleable solids during the second

quarter 1996. Sampling locations where subsequent samples showing compliance were noted in the second quarter QEDS are not discussed below. Settleable solids analyses are conducted on site and are not entered in the data base.

* NP-0010-060696

Settleable solids for this sample were 38.0 ml/l/hr with a permitted limit of 1.0 ml/l/hr. The noncompliance occurred when storm water flowed between and under the bales in a straw bale dike. Subsequent samples on July 22, August 23, and September 23, 1996, were in compliance with the permit limit of 1.0 ml/l/hr.

* NP-0116-060696

Settleable solids for this sample were 15.0 ml/l/hr with a permitted limit of 1.0 ml/l/hr. The noncompliance occurred when storm water flowed between and under the bales in a straw bale dike. No subsequent samples have been collected at this outfall; however, sampling of Outfall NP-0010 represents this outfall in accordance with the NPDES permit MO-0107701.

Measures that have been taken to prevent reoccurrences of the above noncompliances have been: establishment of vegetation, riprapping of channels, removal of sediment from channels, and completion of the CMSA sediment basin.

The analytical results for the NPDES outfalls are reported in the quarterly discharge monitoring report as well as in this report.

GROUNDWATER

Weldon Spring Chemical Plant Site

Site Water Treatment Plant

* Sample No.s GW-2040-Q196 and GW-2040-Q296

The first quarter 1996 sample (GW-2040-Q196) lead value (4.9 ug/l) was above baseline (3.3 ug/l) but below the drinking water quality standard of 15 ug/l The second quarter sample data (13.1 ug/l) indicates that this location is again above baseline for lead. Monitoring well MW-2040 is located on the north side of the site water treatment plant equalization basin. Three additional wells, which monitor the equalization basin which are 100 to 150 ft down-gradient and cross-gradient from MW-2040, show no lead impact. The elevated lead values are most likely due to leaching of metals from the stainless steel that is the well construction material. Treatment plant influent lead values were not elevated and no other anomalous basin leachate values (e.g., elevated uranium) were identified. Third quarter

data will be carefully reviewed, and if elevated lead persists, the well will be purged three full casing volumes prior to sampling, to reduce the potential for collecting water that has been in prolonged contact with stainless steel well materials.

A barium value for the GW-2040-Q196 sample was also reported as elevated in the second quarter QEDS; however, the concentration was mistakenly compared to the wrong baseline value. Because there was no elevated level no discussion is necessary.

Chemical Plant Vicinity

* Sample No.s GW-2038-Q296 and GW-2038-062696

Volatile Organic Compounds (VOCs), trichloroethane (TCE) and 1,2-dichloroethene (DCE), were detected at the MW-2038 groundwater monitoring location during the second quarter of 1996. MW-2038 is located along the south side of Raffinate Pit 3 and is not monitored for VOC's as part of the Environmental Monitoring Program. VOC's were analyzed during the second quarter sampling event to identify potential contaminant mobility increase due to disturbance of discarded drums in the southeast corner of Raffinate Pit 4 and to investigate reported hexane detections in sludges from Raffinate pit 3. Both samples exceeded the MCL for TCE of 5 μg/l (GW-2038-Q296 = 766 ug/l and GW-2038-062696 = 9000 ug/l). DCE detected levels were below the MCL of 70 ug/l for both samples. The VOC impact investigation is ongoing, and additional sample analyses for VOC and other investigation requirements are being developed.

* Sample No.s GW-3025-Q296 and GW-3025-062696

TCE was detected in these samples from MW-3025 during the second quarter of 1996. This location is along the east side of Raffinate Pit 3 and is included in the current VOC investigation described in the previous paragraph. Both samples exceeded the MCL for TCE of 5 μg/l (GW-3025-Q296 = 11.0 ug/l and GW-3025 = 15.0 ug/l). Third quarter TOC data will be merged in the data-base during fourth quarter 1996 and will be reported in the subsequent QEDS.

<u>Weldon Spring Quarry Site</u>

Quarry Water Treatment Plant

* Sample No.s GW-1035-040896 and GW-1035-Q396

The GW-1035-040896 (second quarter) chloride value (37.6 mg/l) was reported as above baseline (14.9 mg/l) in the previous QEDS. The third quarter value (28.0 mg/l) indicates the chloride

concentration is decreasing as expected, but it remains above baseline. Continued decrease in chloride concentration is expected and subsequent samples will be reviewed to monitor this location.

* Sample No.s GW-1036-Q196 and GW-1036-Q296

Chloride concentrations above baseline were reported in previous QEDS for this location. The second quarter 1996 sample indicates that the chloride concentration (518 mg/l) remains above baseline. The Quarry Water Treatment Plant Equalization Basin has not been receiving influent for a great part of 1996. The chloride impact is most likely due to the use of hydrochloric acid used for cleaning equipment during repairs at the decontamination pad. The cracks in the decontamination pad were repaired in August 1996, and the chloride values are expected to decrease in subsequent samples, which are expected to be in the database in fourth quarter 1996.

* Sample No.s GW-1040-Q196 and GW-1040-Q296

Two consecutive new chloride highs that were above baseline (10.9 mg/l) for this location have been reported during the first and second quarters of 1996. Sulfate was also elevated (200 mg/l) above baseline (114 mg/l) for the first quarter 1996 sample. The elevated chloride values are likely due to HCl used in the quarry decontamination area during remedial action efforts. Cracks in the decontamination pad at the quarry were repaired in August 1996. The third quarter of 1996 will be entered in the database during the fourth quarter, and then will be reported in the subsequent QEDS. Subsequent data will be reviewed and compared with equalization basin leachate analyses in order to isolate the source of the high value.

St. Charles County Well Field

* Sample No.s GW-RMW2-Q196 and GW-RMW2-Q296

Two consecutive new highs (90.1 μg/l and 130 μg/l) were reported for arsenic in the previous QEDS. It was suspected that these were related to river level fluctuations since upgradient locations north of the Femme Osage Slough do not have elevated arsenic values. The second quarter 1996 data indicate that the arsenic concentration, at 72.8 μg/l, is decreasing from the first quarter historic high of 130 μg/l.

The previously described data were highlighted as varying from historical ranges and, as a result, are subject to more focused attention by the WSSRAP Environmental Protection Group. Continuous trends are monitored to determine the need for

additional possible action. Except for the highlighted data, all other indicators subject to reporting in the QEDS were within historic range or below reporting criteria.

If you have any questions, please contact the WSSRAP Community Relations Department at (314)441-8086.

Sincerely,

Jerry S. Van Fossen

Jerry S. Van Fossen
Deputy Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

MONTHLY REPORT

DECEMBER 1996

BY

Stanley Remington

Consulting Hydrologist

I. CHEMICAL ANALYSIS

The results of the sampling of well PW-2 have been received and are appended. The sampling was done on November 14, 1996. The chemical parameters that we are looking for in this well are the nitroaromatics, otherwise known as explosives. There was no detection of any explosives, that is TNT or DNT. The radioactive elements were all within historical ranges and well below the NPDES limits. Wells PW-9 and RMW-2 were sampled on December 16, 1996. The results have not yet been received. I was originally planning on a yearly sampling but the Department of Energy said that it was no longer necessary to test for all of the elements listed in this yearly sampling because most of the elements have never been detected in the past ten years. Also they are now sure that the elements have never been present at the old Chemical Plant Site. So as a result I only tested for the quarterly sampling parameters. The results have not yet arrived. I am particularly interested in the arsenic contents from well RMW-2. The last two times this was tested, the arsenic value was high.

II. FUTURE PLANS

I will sample well PW-4 during the month of January 1997.

III. MISCELLANEOUS

Appended are the St. Charles County Water Department's Monthly Water Sales Report and analyses for Gross alpha and beta performed by the St. Louis County Department of Health. This was done for the raw and treated waters from all of the pumping wells. The period covered was from 10/1/96 through 10/31/96.

AMERICAN TECHNICAL & ANALYTICAL SERVICES, INC.
875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 • FAX (314) 434-0080

December 11, 1996

Stanley M. Remington
956 Broadmoor Lane
St. Charles, MO 63301

RE: ATAS #17409.01
Weldon Spring

Dear Mr. Remington:

Enclosed is the analytical report for the sample received in our laboratory on November 14, 1996.

If, in your review, you should have any questions or require additional information, please call Rhonda Tinker, Assistant Project Manager, or me at (314) 434-4570.

Thank you for choosing ATAS for your analytical needs.

Sincerely,

Richard H Mannz

Richard H. Mannz
Project Manager

Enclosures

RHM/dms

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
919 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1740901RA(266)

DATE : 12-11-96

SAMPLE MATRIX : WATER
ATAS EPISODE : #17409
DATE SUBMITTED: 11-14-96
PROJECT REF. : WELDON SPRING

RESULTS REPORTED IN pCi/L

CLIENT ID	ATAS ID	RADIONUCLIDE	RESULT
PW-2	17409.01	GROSS ALPHA	1 +/- 2*
PW-2	17409.01	GROSS BETA	8 +/- 5*
PW-2	17409.01	TOTAL URANIUM (mg/L)	<0.005

* VARIABILITY OF THE RADIOACTIVE DISINTERGRATION PROCESS (COUNTING ERROR) AT THE 95% CONFIDENCE LEVEL, 1.96σ.
pCi/L= PICOCURIES PER LITER
mg/L = PARTS PER MILLION(PPM)

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1740901EX(266)
DATE : 12-11-96

SAMPLE MATRIX : WATER
ATAS # : 17409.01
DATE SUBMITTED: 11-14-96
DATE EXTRACTED: 11-20-96
DATE ANALYZED : 11-20-96
METHOD REF. : SW846-8330, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : PW-2

RESULTS REPORTED IN ug/L OR PARTS PER BILLION(PPB)

EXPLOSIVE	QUANTITATION LIMIT	RESULTS
HMX	13.0	ND
RDX	14.0	ND
1,3,5-TNB	7.3	ND
TETRYL	10.0	ND
1,3-DNB	4.0	ND
NITROBENZENE	7.0	ND
2,6 DNT	9.4	ND
2,4 DNT	5.7	ND
2,4,6 TNT	6.4	ND
o-NITROTOLUENE	12.0	ND
p-NITROTOLUENE	8.0	ND
m-NITROTOLUENE	7.9	ND

ND= NOT DETECTED ABOVE QUANTITATION LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1740901EX(266)
DATE : 12-11-96

SAMPLE MATRIX : WATER
ATAS # : METHOD BLANK
DATE SUBMITTED: 11-14-96
DATE EXTRACTED: 11-20-96
DATE ANALYZED : 11-20-96
METHOD REF. : SW846-8330, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : METHOD BLANK

RESULTS REPORTED IN ug/L OR PARTS PER BILLION(PPB)

EXPLOSIVE	QUANTITATION LIMIT	RESULTS
HMX	13.0	ND
RDX	14.0	ND
1,3,5-TNB	7.3	ND
TETRYL	10.0	ND
1,3-DNB	4.0	ND
NITROBENZENE	7.0	ND
2,6 DNT	9.4	ND
2,4 DNT	5.7	ND
2,4,6 TNT	6.4	ND
o-NITROTOLUENE	12.0	ND
p-NITROTOLUENE	8.0	ND
m-NITROTOLUENE	7.9	ND

ND= NOT DETECTED ABOVE QUANTITATION LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: STANLEY M. REMINGTON
956 BROADMOOR LANE
ST. CHARLES, MO 63301
ATTN: STANLEY M. REMINGTON

REPORT: 1740901EX(266)
DATE : 12-11-96

SAMPLE MATRIX : WATER
ATAS # : LABORATORY CONTROL SAMPLE
DATE SUBMITTED: 11-14-96
DATE EXTRACTED: 11-20-96
DATE ANALYZED : 11-20-96
METHOD REF. : SW846-8330, EPA METHODOLOGY
PROJECT : WELDON SPRING
SAMPLE ID : LABORATORY CONTROL SAMPLE

COMPOUND	PERCENT RECOVERY
HMX	96 %
RDX	92 %
1,3,5-TNB	103 %
TETRYL	75 %
1,3-DNB	101 %
TNT	96 %
NITROBENZENE	104 %
2,6 DNT	111 %
2,4 DNT	97 %
o-NITROTOLUENE	93 %
p-NITROTOLUENE	106 %
m-NITROTOLUENE	105 %

AMERICAN TECHNICAL & ANALYTICAL SERVICES, Inc.

875 Fee Fee Road • Maryland Heights, MO 63043-3211 • Office (314) 434-4570 • FAX (314) 434-0060

PAGE ____ OF ____

CHAIN OF CUSTODY RECORD

ATAS Client Name: STAN REMINGTON

Project Name: WELDON SPRING

Project #:

Form Completed By: S. REMINGTON

PO #:

Sample ID	Sample Date	Sample Time	Sample Matrix	Grab	Comp	No. of Containers	NITROAROMATICS	GROSS α	GROSS β	TOTAL U	TSS					Remarks	Lab Use Only Initials LM Date 11-14-96 Location/Temp AL-69.152
PW-2	11/14/96	1030		X			X	X	X	X							17409.01
TREAT. PLANT	11/14/96	0900			X						X						

Type of Analysis

Preservative: Ice Chemical (see below)

Relinquished by:	Received by:	Relinquished by:	Received by:
S. Remington	L. Messbeer		
Signature: S. REMINGTON	Signature: L. MESSBEER	Signature	Signature
Printed Name: WELDON SPRING	Printed Name: ATAS	Printed Name	Printed Name
Firm: 11/14/96 1215	Firm: 11-14-96 1215	Firm	Firm
Date/Time	Date/Time	Date/Time	Date/Time

Turnaround Requirements

____ 1 to 2 working days

____ 3 working days

____ 5 working days

____ 10 working days

____ 15 working days

Preservative codes

A - none
B - HNO_3
C - H_2SO_4
D - NaOH
E - HCl
F - _____

SEND RESULTS TO (Name & Company) : _____

Original to ATAS/Copy to Client

Joe R. Nichols
County Engineer - Water Dept.
St. Charles County

December 5, 1996

Mr. Stanley M. Remington
956 Broadmoor Lane
St. Charles, Mo. 63301

RE: Sample Analysis
St. Charles County Water Plant

Dear Stanley,

Enclosed for your review and report, please find laboratory test results for gross alpha and gross beta for the raw and finished water taken at the Water Plant for the period 10/1/96 to 10/31/96.

Please advise if you have any comments.

Sincerely,

Joe R Nichols

Joe R. Nichols
County Engineer

JRN/cia
Enclosure

cc: Mr. Tom Engle, Director of Administration
Mr. Tom Aaron, Water Department Superintendent

o:\hiway\water\sticosample

201 North Second Street • Suite 429 • Saint Charles, Missouri 63301-2874
314-949-7305 • Fax 314-949-7307

St. Louis County Department of Health

12-12-969

SAMPLE ANALYSIS REQUEST

Date Received 11/05/96

ATTENTION: St. Louis County Department of Health
Environmental Health Laboratories

SAMPLE NUMBER: Raw Water-Monthly Composite Sample

DATE COLLECTED: 10/01/96 to 10/31/96

COLLECTED BY: First Shift Operator / St. Charles County Water

ADDRESS: 1635 South Highway 94

Defiance, MO Zip Code 63341

TELEPHONE NO.: (314) 926-9222

ANALYSIS REQUESTED:

X GROSS ALPHA X GROSS BETA ____ RA-226 ____ RA-228

____ OTHER (Identify) ____

SCR96-11

FOR LABORATORY USE ONLY

	RESULTS (pCi/L)	*MDL (pCi/L)
Gross Alpha	2.2 ± 1.2	1.0
Gross Beta	4.7 ± 0.6	1.0
Radium 226		0.1
Radium 228		1.0
Other (Identify)		

11/25/96 MLH JH LM

Procedure used: Measurement of Radioactivity in Drinking Water
EPA-600/4-80-032

COMMENTS: * MDL is the minimum detectable limit.

ANALYSIS PERFORMED BY: ST. LOUIS COUNTY DEPARTMENT OF HEALTH
ENVIRONMENTAL HEALTH LABORATORIES
111 So. Meramec - 5th floor
Clayton, MO 63105
(314) 854-6324

ENV-LAB/RAD-WTR/5/96

St. Louis County Department of Health

11/12/96

SAMPLE ANALYSIS REQUEST

Date Received 11/05/96

ATTENTION: St. Louis County Department of Health
Environmental Health Laboratories

SAMPLE NUMBER: Finish Water-Monthly Composite Sample

DATE COLLECTED: 10/01/96 to 10/31/96

COLLECTED BY: First Shift Operator / St. Charles County Water

ADDRESS: 1635 South Highway 94

Defiance, MO Zip Code 63341

TELEPHONE NO.: (314) 926-9222

ANALYSIS REQUESTED:

X GROSS ALPHA X GROSS BETA ____ RA-226 ____ RA-228

____ OTHER (Identify) ____

SCT96-11

FOR LABORATORY USE ONLY

	RESULTS (pCi/L)	*MDL (pCi/L) 11/25/96
Gross Alpha	1.2 ± 1.0	1.0
Gross Beta	4.1 ± 0.5	1.0
Radium 226		0.1
Radium 228		1.0
Other (Identify)		

JH

Procedure used: Measurement of Radioactivity in Drinking Water
EPA-600/4-80-032

COMMENTS: * MDL is the minimum detectable limit.

ANALYSIS PERFORMED BY: ST. LOUIS COUNTY DEPARTMENT OF HEALTH
ENVIRONMENTAL HEALTH LABORATORIES
111 So. Meramec - 5th floor
Clayton, MO 63105
(314) 854-6324

ENV-LAB/RAD-WTR/5/96

ST. CHARLES COUNTY MONTHLY WATER SALES REPORT

DATE OF REPORT 12-2-96

MONTH OF REPORT NOVEMBER

WATER PRODUCTION			283,008,000
WASHWATER USED			6,295,000
DELIVERED TO SYSTEM			276,713,000
MO. AMERICAN WATER	FLUSH 18"@DOE		2,000,000
	BOOSTER STATION		156,191,000
67004132835-007	FRANCIS HOWELL		27,000
67004132850-007	MO. HWYS & TRANS.		1,700
67004133000-004	M.K. FERGUSEN		498,000
67004133040-015	M.K. FERGUSEN		669,000
67004133010-002	M.K. FERGUSEN		155,000
67004133020-000	M.K. FERGUSEN		9,500
67004132855-002	FRANCIS HOWELL		458,000
67004132890-009	M.K. FERGUSEN		46,000
67095018237-000	M.K. FERGUSEN		207,000
		TOTAL	160,262,200
WATER DISTICT #2			
	24" EAST LINE		0
	24" WEST LINE		72,612,000
	BYPASS		0
		TOTAL	72,612,000
WATER DISTICT #2			
	NEW MELLE	TOTAL	7,342,000
NATIONAL GUARD AREA			
	BLGD S-61		0
	WASH RACK		0
		TOTAL	0
TOTAL WATER SALES	**********		240,216,200

ST. CHARLES COUNTY WATER DEPARTMENT

NOV 96

INVENTORY OF CHEMICALS

	LIME	CHLORIN
PREVIOUS BALANCE	228592	5438

RECIEVED	DATE	INV. #		DATE	INV. #	
	11-5	318247.	48360	11-4	962209	8000
	11-7	318657.	49680	11-15	962276	8000
	11-12	319242.	52000			
	11-14	319659.	48880			
	11-19	320232.	49680			
	11-21	320653.	51860			
	11-26	321381.	47540			
	11-27	321577.	49020			

**********	396720	**********	16000
TOTAL AMOUNT	625312		21438
USED	379669		16500
BALANCE	245643		4938
#/1000 GALLON	1.34		0.0583
PARTS/MILLION	160		6.99
AVG. #/DAY	12656		550
# USED Y TO D	4952719.		205008.