1 of 1

**FOUR MILE CREEK SEMI-ANNUAL SAMPLING REPORT:
JANUARY 1993 SAMPLING EVENT (U)**

by

WSRC Contact - K. Dixon

Westinghouse Savannah River Company

Savannah River Site

Aiken, South Carolina 29808

Metcalf & Eddy, Inc.

MASTER

DOE Contract No. DE-AC09-89SR18035

This paper was prepared in connection with work done under the above contract number with the U. S. Department of Energy. By acceptance of this paper, the publisher and/or recipient acknowledges the U. S. Government's right to retain a nonexclusive, royalty-free license in and to any copyright covering this paper, along with the right to reproduce and to authorize others to reproduce all or part of the copyrighted paper.

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

for

**Submitted to:
Westinghouse Savannah River Company
Aiken, South Carolina**

Four Mile Creek Semi-Annual Sampling Report January 1993 Sampling Event

**Contract No. AA46327P
Task No. 26**

May 1993

Submitted by:

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from the Office of Scientific and Technical Information, P. O. Box 62, Oak Ridge, TN 37831; prices available from (615) 576-8401.

Available to the public from the National Technical Information Service, U. S. Department of Commerce, 5285 Port Royal Rd., Springfield, VA 22161.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	EXPERIMENTAL METHODS	1
2.1	Mobilization	1
2.1.1	Equipment List	3
2.1.2	Decontamination Procedures	4
2.2	Sample Collection Procedures	4
2.2.1	Groundwater	4
2.2.2	Surface Water Sampling	7
3.0	RESULTS	7
4.0	CONCLUSIONS	10
5.0	REFERENCES	16
APPENDIX A	Chain-of-custody records	
APPENDIX B	Metcalf & Eddy Surveillance	

LIST OF TABLES

1.1.	Sample Location Numbers and SRS Coordinates	2
2.1.	Duplicate and Triplicate Samples	6
3.1.	Water Quality Parameters Measured in the Field	8
4.1.	Summary of Conductivity Measurements	11
4.2.	Summary of pH Measurements	11

LIST OF FIGURES

4-1.	Conductivity Measurements in H-Area	12
4-2.	Conductivity Measurements in F-Area	13
4-3.	pH Measurements in H-Area	14
4-4.	pH Measurements in F-Area	15

1.0 INTRODUCTION

From 1955 to 1988 low-level radioactive wastewater generated by chemical separation processes within the General Separations Area (GSA) was discharged to seepage basins in the F and H Areas of the Savannah River Site (SRS). These basins were designed to permit the infiltration of the process wastewaters. As wastewater percolated downward through the basins, chemical and radioactive constituents were retained or sequestered in the subsoils.

An extensive study aimed at characterizing the groundwater seeping into Four Mile Creek and its associated seepage line was conducted in 1988 and 1989 (Haselow et al. 1990). Results of this study suggested that contaminants leaching from the F and H Area seepage basins were impacting the Four Mile Creek wetland system. The seepage basins were closed in 1988 and capped and sealed in 1990. This effectively eliminated the source of the contaminants and the hydraulic head driving the migration of contaminants from the basins. It has been hypothesized that, after the elimination of the source and head, annual rainfall amounts would be sufficient to dilute and flush out contaminants remaining in the subsoils and groundwaters beneath the basins. Westinghouse Savannah River Company has designed a semi-annual sampling and analytical program for the Four Mile Creek (FMC) seepage line and stream water to test the hypothesis.

Twelve (12) seepage line water and four (4) stream water sampling locations are included in the semi-annual monitoring. These sampling locations include three (3) background locations. Sampling locations were selected by WSRC based on previous sampling results. Sampling location numbers and SRS coordinates are presented in Table 1.1.

The first of the three scheduled semi-annual sampling events took place from July 20, 1992 through July 29, 1992. A report dated October 1992 presents the field results associated with the first sampling event. The second of the three scheduled semi-annual sampling events took place from January 25, 1993 through February 4, 1993. This report summarizes the results of the field monitoring obtained during this second event and presents a brief comparison to previous data.

2.0 EXPERIMENTAL METHODS

2.1 Mobilization

Labeled sample bottles, with preservatives added as necessary, "blue ice", and coolers were provided by the following pairs of subcontracted analytical laboratories: General Engineering Laboratories (non-radiological analyses)/Environmental Physics (radiological analyses); and

Four Mile Creek
Semi-Annual Sampling Report
January 1993 Sampling Event
Submitted May 6, 1993

Roy F. Weston (non-radiological analyses)/Clemson Technical Center(radiological analyses).
Additional bottles for on-site analysis of total activity were supplied by the WSRC-EMS
Radiological Laboratory. WSRC provided chain-of-custody forms.

Table 1.1. Sample Location Numbers and SRS Coordinates

Seepline	SRS Coordinates	
	North	East
H-Area		
HSP008	71005	56990
HSP029	71278	56257
HSP043	71644	55722
HSP060	71629	55190
HSP092	72672	54129
F-Area		
FSP012	73602	49644
FSP032	73367	50258
FSP047	73609	50607
FSP204	73281	48801
FSP290	73160	46865
Background ¹		
BG001	Seepline	
BG002	Seepline	
BG003	Stream water	
Stream Sites		
FMC0001H	70350	57050
FMC0002H	72600	53000
FMC0001F	72200	43900

¹ The locations of background samples were within the grid identified by Site Use Grid Maps 13 and 14 as 71750 N and 40000 E and 70000 E. The exact location was identified by ESS technical personnel.

The sample bottles needed for one day of sampling were separated by station and carried to the sampling station.

2.1.1 Equipment List

The following equipment was used during seep line groundwater sampling:

Rubber gloves
Safety glasses
Clipboard, waterproof pens, waterproof markers
Field data logbook
Chain-of-custody forms
Shipping orders
Sample bottles
Backpacks
Shovel, post-hole digger, hatchet or axe
Peristaltic pump
Paper and cloth towels
Ziplock bags
Coolers with cool packs
Bubble pack
Sampling buckets (5-gallon) with lids
Water quality meters (pH, conductivity)
Silicone (Silastic) tubing
1 one-liter Nalgene bottle for each station sampled
0.45 micron filters and filtering equipment
Tyvek aprons

The following equipment was used during stream water sampling:

Rubber gloves
Safety glasses
Clipboard, waterproof pens, waterproof markers
Field data logbook
Chain-of-custody forms
Shipping orders
Sample bottles
Backpacks
Paper and cloth towels

Ziplock bags
Coolers with cool packs
Bubble pack
Water quality meters (pH, conductivity)
1 one-liter Nalgene bottle for each station sampled
0.45 micron filters and filtering equipment
Life jackets
Hip boots
Tyvek aprons

2.1.2 Decontamination Procedures

Cleaning and decontamination procedures for all sampling equipment are outlined below. All sampler parts were decontaminated prior to the collection of each sample.

Sampling equipment was first cleaned with Milli-Q water and phosphate-free laboratory detergent (Liquinox) using a brush if necessary to remove particulate matter and surface films. The equipment was then rinsed thoroughly with Milli-Q water. Finally, the equipment was rinsed two times with pesticide-grade methanol solvent and allowed to air dry. The dry equipment was wrapped with aluminum foil, when possible, to prevent contamination during storage and transport.

All decontamination rinse waters were discharged to the ground. The methanol was collected in a pan and allowed to evaporate.

2.2 Sample Collection Procedures

2.2.1 Groundwater

All sample locations had been permanently marked by WSRC with a 1" Schedule 40 grey PVC stake driven 2 feet below grade. A station identification number was written on a metal tag attached to each PVC stake.

After locating the sampling station, the sampling crew excavated a hole using a decontaminated stainless steel shovel. The hole was excavated within a 3 foot radius of the PVC stake. A 5-gallon plastic sampling bucket was placed into the hole and covered with a lid. One bucket was set at each location except locations HSP008, HSP043, FSP047 and FSP290 where two buckets were set. The additional bucket was needed in order to collect sufficient water for duplicate and QA samples.

Four Mile Creek
Semi-Annual Sampling Report
January 1993 Sampling Event
Submitted May 6, 1993

The buckets were set out one day prior to sample collection in order to allow the sediment in the water to settle. The time between setting the bucket and sample collection was recorded in the field notebook. During this second sampling event, the pH of the water entering the bucket was taken at the time the bucket was set. This information was recorded in the field log book.

The 40 ml GCMS/VOA vials and the 1-liter sample bottle, for water to be filtered for metals analysis, were filled first by dipping them into the bucket. This was done in such a manner as to avoid disturbance of the sediment. The VOA vial was filled completely so that no air bubbles were present in the sample.

The remaining samples were collected by pumping the water from the bucket to the remaining sample jars through silastic (silicone) tubing using a peristaltic pump powered by a 12-volt battery. New tubing was used for each sample location. The new tubing was flushed for 20 seconds with water from the bucket before the sampling crew collected the sample.

Samples collected for metals analysis were filtered in the field through a 0.45 micron membrane filter (to remove fine particulate matter from the water being analyzed). The filtering occurred within 4 hours of sample collection. The filtering apparatus was flushed with deionized or distilled water between filtering each sample. A battery-powered vacuum filter apparatus and 45 mm diameter filters were used during the first sampling event in June of 1992. An air-powered positive-pressure apparatus and 142 mm diameter filters were used during this second sampling event. This second method provided much more efficient filtering capabilities.

The pH and conductivity of the water at each location were measured at the time of sampling. These readings were taken directly from the water collected in the 5 gallon bucket and recorded in the field data logbook. The probes were rinsed with DI water prior to taking these measurements. The buckets were left in the ground at the completion of this second sampling event.

Blue ice was used to keep the samples cool from the time of sampling until they were received at the analytical laboratory.

At the following sampling locations, a 250 ml plastic sample container was filled with the water and sent to the WSRC EMS Radiological Laboratory to determine the total activity in the samples: HSP008, HSP029, HSP060, HSP092, FSP032, FSP204, FMC001F. These data were used to determine the packaging and shipping requirements of the specific samples.

The duplicate and triplicate samples collected during this sampling event are summarized in Table 2.1. Duplicate samples were collected at both HSP043 and FSP047 and sent to General Engineering/Environmental Physics and Roy F. Weston/Clemson for QA/QC purposes. A triplicate sample was collected from HSP008. This triplicate sample consisted of HSP008 sent to General Engineering/Environmental Physics; QA-1S sent to General Engineering/Environmental Physics and QA-1S sent to Roy F. Weston/Clemson. A triplicate sample was collected from FSP290. This triplicate sample consisted of FSP290 sent to General Engineering/Environmental Physics; QA-3S sent to General Engineering/Environmental Physics and QA-3S sent to Roy F. Weston/Clemson.

Table 2.1. Duplicate and Triplicate Samples

Location	Sample Type	Sample Numbers and Analytical Laboratory	
		General Engineering/ Environmental Physics	Roy F. Weston/Clemson
HSP043	Duplicate	HSP043	HSP043
FSP047	Duplicate	FSP047	FSP047
HSP008	Triplicate	HSP008 QA-1S	QA-1S
FSP290	Triplicate	FSP290 QA-3S	QA-3S

Two trip blanks were included for the semi-annual sampling event (QA-2S and QA-4S). Two equipment rinsate samples (QA-3 and QA-4) were collected on February 2, 1993. Two samples of Milli-Q water, one from the source (QA-1) and one from the field carboy (QA-2), were collected on February 5, 1993 and sent to General Engineering.

Initially, collected samples were transported to the Health Protection office in the Central Shops area where the outside of the containers were scanned for radioactivity prior to shipping. The purpose of this scan was to identify any radiological health hazards associated with handling the samples. The samples were then transported to the laboratory at 704B where they remained until cleared for shipment. Part way through the second sampling event,

Four Mile Creek
Semi-Annual Sampling Report
January 1993 Sampling Event
Submitted May 6, 1993

the requirement for an HP scan of the bottles was eliminated. Shipping requirements were based on total activity analysis performed on samples from the seven preselected stations listed above.

2.2.2 Surface Water Sampling

Collection of the surface water samples was performed by dipping the sample container directly into the stream water. This collection method minimizes alteration of the sample. Also, the potential for sample cross contamination through the use of poorly decontaminated sampling equipment is eliminated. Sampling personnel wore hip boots and gloves to minimize exposure to potential contaminants.

The sample bottles to be used at each location were removed from the coolers and the bottle labels were completed with waterproof markers or ball point pens and covered with clear adhesive tape to prevent smudging. Surface grab samples were collected in the middle of the stream from the top of the water column. The container was placed into the water with the mouth of the container facing upstream such that water flowed directly into the container. Care was taken when opening and filling the bottles since some of the bottles contained carefully measured amounts of chemical preservatives.

All containers, except the VOA vials, were filled to the shoulder with water. VOA vials were filled completely and capped so that no air bubbles were present in the sample. Water collected for metals analysis was filtered in the field prior to preservation. The filled sample containers were capped tightly and placed in a plastic ziplock bag. The samples were placed in coolers and kept cool. The in-situ pH and conductivity of the stream was measured and recorded in field notebook at the time of sampling.

Evidence of sample collection, shipment, laboratory receipt and laboratory custody until sample disposal must be documented to ensure the sample traceability scheme. Documentation was accomplished through a chain-of-custody record that contains the necessary information for individual sample identification and lists the individuals responsible for sample collection, shipment, and receipt along with necessary signatures and dates. Completed chain-of-custody forms for this sampling event are presented in Appendix A.

3.0 RESULTS

The pH and conductivity measurements collected in the field are summarized in Table 3.1. The pH readings, taken at the time the bucket was set, for the H-Area seepline samples

**Table 3.1. Water Quality Parameters Measured in the Field
Four Mile Creek Seep Line and Stream Water**

Station	Date Sampled	Time Sampled	SRS Coordinates		Initial pH (pH units)	Collection pH (pH units)	Conductivity (umhos/cm)
			North	East			
H-AREA							
HSP008	1/27/93	9:45	71005	56990	6.62	6.21	248
HSP029	1/28/93	9:30	71278	56257	5.98	5.67	52
HSP043	1/27/93	12:20	71644	55722	6.31	6.81	97
HSP060	1/28/93	11:15	71629	55190	6.44	6.41	127
HSP092	1/28/93	12:40	72672	54129	5.90	5.86	50
Average					6.25	6.19	114.8
F-AREA							
FSP012	2/3/93	9:45	73602	49644	4.84	5.64	80
FSP032	2/2/93	10:45	73367	50258	5.80	4.12	47
FSP047	2/2/93	9:30	73609	50607	6.16	5.51	56
FSP204	2/3/93	8:55	73281	48801	5.85	4.75	193
FSP290	2/4/93	9:00	73160	46865	4.96	5.88	32
Average					5.52	5.18	81.6
BACKGROUND							
BG001	2/4/93	10:40			5.03	5.60	18
BG002	2/4/93	11:00			5.15	5.68	40
*BG003	2/3/93	11:30			N/A	5.31	19
Average (BG001 AND BG002)					5.09	5.64	26
STREAM SITES							
FMC001H	1/28/93	13:15	70350	57050	N/A	6.88	45
FMC002H	2/1/93	9:20	72600	53000	N/A	7.15	45
FMC001F	2/1/93	10:10	72200	43900	N/A	7.04	44
Average						7.02	44.7

* Stream Site

Four Mile Creek
Semi-Annual Sampling Report
January 1993 Sampling Event
Submitted May 6, 1993

ranged from 5.90 to 6.62 with an average value of 6.25. The pH readings, taken at the time the bucket was set, for the F-Area seepline samples ranged from 4.84 to 6.16 with an average value of 5.52. The average pH of the background seepline samples was 5.09, at the time the buckets were set.

The pH readings, taken at the time of sample collection, for the H-Area seepline samples ranged from 5.67 to 6.81 with an average value of 6.19. The pH readings, taken at the time of sample collection, for the F-Area seepline samples ranged from 4.12 to 5.88 with an average value of 5.18. The average pH of the background seepline samples was 5.64, at the time of sample collection.

All conductivity readings were taken at the time of sampling. The conductivity readings for the seepline samples in the H-Area ranged from 50 $\mu\text{mhos/cm}$ to 248 $\mu\text{mhos/cm}$ with an average value of 114.8 $\mu\text{mhos/cm}$. The conductivity readings for the seepline samples in the F-Area ranged from 32 $\mu\text{mhos/cm}$ to 193 $\mu\text{mhos/cm}$ with an average value of 81.6 $\mu\text{mhos/cm}$. The average conductivity of the background seepline samples was 29 $\mu\text{mhos/cm}$.

The pH readings for the stream samples ranged from 6.88 to 7.15 with an average value of 7.02. The pH of the background stream sample was 5.31. The conductivity readings for the stream samples ranged from 44 $\mu\text{mhos/cm}$ to 45 $\mu\text{mhos/cm}$ with an average value of 44.7 $\mu\text{mhos/cm}$. The conductivity of the background stream sample was 19 $\mu\text{mhos/cm}$.

The conductivity and pH of the seepline water were measured previously in March of 1989 (Haselow et al., 1990), in May of 1992 (Dixon et al., 1992), and in July of 1992 (first semi-annual sampling event). A summary of this previous data and the current data is presented in Tables 4.1 and 4.2 and shown graphically in Figures 4-1 through 4-4.

Figures 4-1 and 4-2 illustrate the conductivity measurements collected from the H-Area and the F-Area, respectively. A general trend of decreasing conductivity is evident in the H-Area with two minor exceptions. HSP008 and HSP092 increased slightly between July 1992 and January 1993. This decreasing trend is not seen in the F-Area. The conductivity measurements at sample locations FSP032 and FSP204 in the F-Area show a decreasing trend in conductivity. The measurements at sample location FSP012 show an increasing trend initially and then decrease between July 1992 and January 1993. The measurements at sample locations FSP047 and FSP290 show no decreasing or increasing trend. The average background conductivity of the seepline water collected during this sampling event was 29.5 $\mu\text{mhos/cm}$. Ninety-six percent of the data presented in Table 4.1 exceeds this background conductivity value.

**Four Mile Creek
Semi-Annual Sampling Report
January 1993 Sampling Event
Submitted May 6, 1993**

Figures 4-3 and 4-4 illustrate the pH measurements collected from the H-Area and the F-Area, respectively. No specific trend is evident in either of these figures. The average background pH of the seepline water collected during this sampling event was 4.91. Sixty-five percent of the data presented in Table 4.2 has a pH measurement which is greater than 4.91.

The background stream measurement for pH (5.80) and conductivity (20 umhos/cm) was exceeded in all of the downgradient stream samples.

Metcalf & Eddy conducted a surveillance of the sampling procedures to verify that sampling was being conducted in accordance with the approved task specific Quality Assurance Project Plan. The results of this surveillance is provided in Appendix B.

4.0 CONCLUSIONS

The average pH and conductivity values measured during this field event for the F-Area seepline samples, the H-Area seepline samples, and the stream samples are higher than the average pH and conductivity of the background seepline and stream water samples.

Whereas historical trends indicate decreasing conductivity in the H-Area seepline samples, no trends are evident in the conductivity measurements for the F-Area seepline. Historical pH measurements in both the F-Area and H-Area seepline samples show no general trends.

Draft Four Mile Creek
Semi-Annual Sampling Report
January 1993 Sampling Event
Submitted May 6, 1993

TABLE 4.1. SUMMARY OF CONDUCTIVITY MEASUREMENTS

H-AREA	CONDUCTIVITY (umhos/cm)				
	HSP008	HSP029	HSP043	HSP060	HSP092
Mar-89	556	257	413	473	ND
May-92	334	234	294	274	ND
Jul-92	237	97	155	173	33
Jan-93	248	52	97	127	50

F-AREA	CONDUCTIVITY (umhos/cm)				
	FSP012	FSP032	FSP047	FSP204	FSP290
Mar-89	30	174	52	895	49
May-92	58	138	125	311	28
Jul-92	106	95	88	277	46
Jan-93	80	47	56	193	32

TABLE 4.2. SUMMARY OF pH MEASUREMENTS

H-AREA	pH				
	HSP008	HSP029	HSP043	HSP060	HSP092
Mar-89	5.7	5.2	5.3	5.9	ND
May-92	5.6	6.1	6.2	5.6	ND
Jul-92	6.32	4.8	5.73	6.07	5.68
Jan-93	6.21	5.67	6.81	6.41	5.86

F-AREA	pH				
	FSP012	FSP032	FSP047	FSP204	FSP290
Mar-89	5.3	5	4.7	4.4	3.6
May-92	5.4	4.3	4.6	4.4	4.8
Jul-92	5.14	4.1	5.38	5.35	4.83
Jan-93	5.64	4.12	5.51	4.75	5.88

FIGURE 4-1. CONDUCTIVITY MEASUREMENTS IN H-AREA

FIGURE 4-2. CONDUCTIVITY MEASUREMENTS IN F-AREA

FIGURE 4-4. pH MEASUREMENTS IN F-AREA

FIGURE 4-3. pH MEASUREMENTS IN H-AREA

5.0 REFERENCES

Dixon, K.I. and V.A. Rogers. *Results of the First Quarter Tritium Survey of the F- and H-Area Seeplines: May 1992 (U)*. WSRC-TR-92-304, Savannah River Technology Center, Aiken, South Carolina.

Haselow, J.S., M. Harris, B.B. Looney, N.V. Halverson, J.B. Gladden. 1990. *Analysis of Soil and Water at the Four Mile Creek Seepline Near the F and H Area of the SRS (U)*. WSRC-RP-90-0591, Savannah River Laboratory, Aiken, South Carolina.

Westinghouse Savannah River Company, *Four Mile Creek Semi-Annual Sampling Report July 1992 Sampling Event*. October 1992.

APPENDIX A
Chain-of-custody records

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Well: HSP 008

Sampled By:

Date: 1-27-93 COC # 5067

Time: 0245 Duplicate Id:

**Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N**

Laboratory Work Request Form

Lab ID:

[illegible]

• optional:

.. pH: C-correct I-incorrect

First relinquisher is the sampler

Comments

Shipping Clearance Required

Stream water study.

Custody Transfer Record

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Well: HSP 008

Sampled By: SRTC

Date: 1-27-73 COC # 5068

Time: 0945 Duplicate Id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Laboratory Work Request Form

Lab ID:

[illegible]

- optional.
- pH: C-correct I-incorrect
- First relinquisher is the sampler

Comments

Shipping Clearance Required

Stream water study.

Custody Transfer Record

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Sampled By: SATC

Date: 1-27-13

Time: 0845 Duplicate Id:

Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N

Laboratory Work Request Form

Lab ID:

[illegible]

... First relinquisher is the sampler

• pH: C-correct I-incorrect

Conclusion

Comments

Shipping Clearance Required

Stream water study.

Custody Transfer Record

[illegible]

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Lab ID:

national	.. H: C:correct -incorrect	... First reloader is the sampler
----------	-----------------------------	-----------------------------------

Stream water study.

Custody Transfer Record

[illegible]

Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, S.C. 29808

Well: HSP 029

Sampled By: SRTC

Date: 1-28-93

COC # 5069

Time: 1430

Duplicate Id:

**Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N**

Laboratory Work Request Form

Lab ID:

[illegible]

	.. optional	** pH: C-correct incorrect	*** First relinquisher is the sampler
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			
56			
57			
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
77			
78			
79			
80			
81			
82			
83			
84			
85			
86			
87			
88			
89			
90			
91			
92			
93			
94			
95			
96			
97			
98			
99			
100			

Comments

Shipping Clearance Required

Stream water study.

Custody Transfer Record

[illegible]

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Lab ID: _____

• optional • pH: C-correct | incorrect •• First relinquisher is the sampler

Stream water study.

Custody Transfer Record

[illegible]

**Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N**

**Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N**

Lab ID:

• cautional	• OH: C-correct I-incorrect	• First retinowisher is the sampler
-------------	-----------------------------	-------------------------------------

Stream water study.

Custody Transfer Record

[illegible]

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Laboratory Work Request Form

Lab ID:

• optional • pH: C-correct I-incorrect •• First relinquisher is the sampler

Stream water study.

Custody Transfer Record

[illegible]

Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808

Sampled By: SATC

COC # 506D

Duplicate Id:

Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N

Lab ID:

[illegible]

• optional	** pH: C-correct I-incorrect	*** First relinquisher is the sampler
------------	------------------------------	---------------------------------------

Shipping Clearance Required

Stream water study.

Custody Transfer Record

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Time: 1430

Duplicate Id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Lab ID:

[illegible]

• optional .. pH: C-correct I-incorrect ... First relinquisher is the sampler

Stream water study.

Reason for Transfer:

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Time: 1430 Duplicate Id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#A86567N

Lab ID:

[illegible]

national	.. H: C-correct	.. First relinquisher is the sampler
.. H: C-correct	.. First relinquisher is the sampler	.. First relinquisher is the sampler

Stream water study

Reason for Transfer.

[illegible]

Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N

Well: FMC 001H
Date: 1-28-93
Time: 1430
Sampled By: SRTC
COC # 507B
Duplicate Id:

**Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, S.C. 29808**

[illegible]

Comments
Stream water study.

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Well: FMC 001H Sampled By: SRTC

Date: 1-28-93 COC # 507C

Time: 1430 Duplicate Id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N1

Laboratory Work Request Form

Lab ID:

[illegible]

• optional ** pH: C-correct I-incorrect *** First relinquiser is the sampler

Comments

Stream water study.

Custody Transfer Record

[illegible]

Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808

Time: 12.30 Duplicate Id:

**Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
C:CONTRACT#AA77609N**

Lab ID:

[illegible]

• optional • pH: C-correct I-incorrect *** First relinquisher is the sampler

Stream water study.

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Well: FMC 002H

Sampled By: SATC

Date: 2-1-93

COC # 507E

Time: 1230

Duplicate id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Laboratory Work Request Form

Lab ID:

[illegible]

• optional • pH: C-correct I-incorrect •• First relinquisher is the sampler

Comments

Stream water study.

Custody Transfer Record

[illegible]

Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N

Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, S.C. 29808

Well: FSP 012
Date: 2-3-93
Time: 1200

Laboratory Work Request Form

[illegible]

	.. CH..C	correct	incorrect	...	First relinquisher is the sampler
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					
90					
91					
92					
93					
94					
95					
96					
97					
98					
99					
100					

Comments

Silvum water study.

Custody Transfer Form

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, S.C. 29808**

Well: FSP 012
Date: 2-3-93
Time: 1200

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

[illegible]

* optional ** pH: C-correct | -incorrect *** First relinquisher is the sampler

Comments

Sivam water study.

Custody Transfer Record

[illegible]

Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRAC#AA77609F!

Well: FSP 032
Sampled By: SINTC
COC #: 5073
Duplicate Id:
Date: 2-2-93
Time: 1325

**Savannah River Site
Environmental Protection Department
Building 7/15 A
Aiken, S.C. 29808**

Laboratory Work Request Form

Lab ID:

[illegible]

... First relinquisher is the sampler

• cultural • pH: C-correct I-incorrect

Comments

Shipping Clearance Required

Shivam water study.

Custody Transfer Record

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, S.C. 29808**

Time: 1325 Duplicate Id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Lab ID:

[illegible]

* optional ** pH: C-correct I-incorrect *** First relinquisher is the sampler

Comments

Shipping Clearance Required

Stream water study.

Custody Transfer Record

[illegible]

Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, SC 29808

Well: FSP 047
Date: 2-2-13
Time: 1325

Sampled By: SRTC
COC # 5075
Duplicate Id:

Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77603N

Lab ID:

[illegible]

* updated	** ptt: C-correct l:incorrect	*** First relinquisher is the sampler
-----------	-------------------------------	---------------------------------------

Comments

Stream water study.

Custody Transfer Record

[illegible]

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Wall: FSP 047 Sampled By: SRTC

Sampled By: SRTC

Date: 2-2-93 COC # 5076

COC # 5076

Time: 1325 Duplicate Id:

Duplicate Id:

Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, S.C. 29808

Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, S.C. 29808

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Laboratory Work Request Form

[illegible][illegible]

... First relinquisher is the sampler

... First relinquisher is the sampler

Comments

Stream water study.

Custody Transfer Record

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Well: FSP-~~000~~ 047 Sampled By: SATC

Date: 2-2-93

Time: 1325 Duplicate Id:

Ship To: Roy F. Weston, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313
(215)524-7360
CONTRACT# AA77610N

[illegible]

• optional
• pH: C-correct | incorrect
••• First relinquisher is the sampler

Comments

Stream water study.

Items	Relinquished By ... Name (Signature)	Date	Time	Received By Name (Signature)	Date	Time	Reason for Transfer*
1-10	Patty Thomas	2-3-83	1040	Rady/O. Williams	2-3-83	1040	

Ship To: Clemson Technical Center, Inc.
100 Technology Drive
Anderson, SC 29625
(803)648-2413
Contract#AA86566N

Well: FSP-~~200~~-^{13 21/13}047 Sampled By: SRTC
Date: 2-2-93 COC # 50A5
Time: 1325 Duplicate Id:

Laboratory Work Request Form

[illegible]

• optional ** pH: C-correct I-incorrect *** First relinquisher is the sampler

Stream water study.

Custody Transfer Record

[illegible]

Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, S.C. 29808

Sampled By: SATC

COC # 5077

Duplicate Id:

**Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N**

Lab ID:

[illegible]

.. pH: C-correct | i-incorrect ... First relinquisher is the sampler

Comments:

Shipping Clearance Required

Sireum water study.

Custody Transfer Record

Items	Relinquished By ... (Sampler)	Date	Time	Received By	Date/ Time	Reason for Transfer*
1-10	M. C. Dine	2-5-93	1005	K L D ✓	2/65/93 2/65/93 1005	
A11	C. D. D. ✓	2/5/93	1005	Boddy Jc	2/21/98 2-5-93 1005	

[illegible]

Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808

Sampled By: SRTC

Date: 2-4-93 COC # 507A

Time: 1200 Duplicate Id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
C:CONTRACT#AA86567N

Laboratory Work Request Form

Lab ID:

[illegible]

* optional ** pH: C-correct I-incorrect *** First relinquisher is the sampler

Comments:

Stream water study

Custody Transfer Record

[illegible]

Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808

Well: FMC 001F Sampled By: SRTC
Date: 2-1-93 COC # 507F
Time: 1230 Duplicate Id:

**Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77605N**

[illegible]

Comments

Shipping Clearance Required

Sirum water study.

[illegible]

Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, S.C. 29808

Well: FMC 001F Sampled By: SATC

**2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171**

Date: 2-1-93 COC # 5080

Time: 1230 Duplicate Id:

Laboratory Work Request Form

Lab ID:

[illegible]

option 1	option 2	option 3	option 4	option 5
..	oH	C:correct	incorrect	... First relinquisher is the sampler

Comments

Shipping Clearance Required

Stream water study:

Custody Transfer Record

[illegible]

Channahon River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808

Well: BG 001
Date: 2-4-93
Time: 1200

**Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N**

[illegible]

.. pH: C-correct I-incorrect ... First relinquisher is the sampler

Shrimp water study.

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, SC 29808**

Well: BG 002
Sampled By: SRTC

Date: 7-4-93 COC # 5084

Time: 17.207 Duplicate Id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Laboratory Work Request Form

Lab ID:

[illegible]

... First relinquisher is the sampler

Comments

Stream water study.

Custody Transfer Record

Items	Relinquished By ...	Date	Time	Received By	Date	Time	Reason for Transfer *
1-1	W. N. Q. (Sampler)	2-5-93	1005	K L D	2/05/93	1005	
2	W. N. Q. L-D	2/5/93	1005	Bobby Ann	2/5/93	1005	

Savannah River Site
Environmental Protection Department
Building 7/35 A
Aiken, S.C. 29808

Well: BG 003
Date: 2-3-93
Time: 1200

Sampled By: SRTC
COC # 5085
Duplicate Id:

**Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N**

Laboratory Work Request Form

Lab ID:

[illegible]

... First relinquisher is the sampler

.. pH: C-correct I-incorrect

Additional:

Comments

Stream water study.

Custody Transfer Record

[illegible]

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#A865671

Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, SC 29808

Well: BG 003
Date: 2-3-13
Time: 1200
Sampled By: SRTC
COC # 5086
Duplicate Id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA8656711

Laboratory Work Request Form

[illegible]

* optional ** pH: C-correct I: incorrect *** First relinquiser is the sampler

Comments

Stream water study.

Custody Transfer Record

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Well: QA 1S
Date: 1-27-93
Time: 0945
Sampled By: SRTC
COC # 509A
Duplicate Id:

Ship To: Roy F. Weston, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313
(215)524-7360
CONTRACT# AA77610N

Laboratory Work Request Form

[illegible]

• optional •• pH: C-correct I-incorrect ••• First relinquisher is the sampler

Comments

Shipping Clearance Required

Stream water study.

Return coolers + styrofoam packs.

Custody Transfer Record

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Well: QA 1S
Date: 1-27-13
Time: 0715
Sampled By: SRTC
COC # 509F
Duplicate Id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA865671

Laboratory Work Request Form

Lab ID:

[illegible]

• optional .. pH: C-correct I-incorrect ... First relinquisher is the sampler

Comments

Shipping Clearance Required

Stream water study.

Custody Transfer Record

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Ship To: Clemson Technical Center, Inc.
100 Technology Drive
Anderson, SC 29625
(803)648-2413
Contract#AA86566N

Well: QA 1S
Date: 1-27-93
Time: 0945
Sampled By: SRTC
COC # 50A2
Duplicate Id:

Laboratory Work Request Form

Lab ID: _____

[illegible]

.. optional .. pH: C-correct | -incorrect *** First relinquisher is the sampler

Comments

Shipping Clearance Required

ing Clearance Required
Stream water study. Return coolers & styrofoam packers.

Custody Transfer Record

Items	Relinquished By ***	Date	Time	Received By	Date	Time	Reason for Transfer *
1-6	Perry, <i>[Signature]</i> Chen, <i>[Signature]</i>	02/01/93	12:40	Chen, <i>[Signature]</i>	02-01-93	12:40	
		02-01-93	12:40				

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Well: QA 2S
Date: 2-4-93
Time: 1200
Sampled By: SRTC
COC # 50A0
Duplicate Id:

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86507N

Laboratory Work Request Form

[illegible]

Constituents	Optional	** pH: C-correct I-incorrect	** First relinquisher is the sampler

Stream water study.

Custody Transfer Record

[illegible]

Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S C 29808

Well: QA 3S
Date: 2-4-93
Time: 1200

Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA7760JN

[illegible]

Optional	** pH: C-correct	Incorrect	*** First relinquisher is the sampler
----------	------------------	-----------	---------------------------------------

Stream water study.

[illegible]

**Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808**

Well: QA 3S Sampled By: SRTC

Date: 7-4-98 COC # 509E

Time: 1800 Duplicate Id:

Ship To: Roy F. Weston, Inc.
208 Welsh Pool Road
Lionville, PA 19341-1313
(215)524-7360
CONTRACT# AA77610N

Laboratory Work Request Form

Lab ID:

[illegible]

* optional
** pH: C-correct I-incorrect
*** First relinquisher is the sampler

Comments

Stream water study.

Custody Transfer Record

Items	Relinquished By ...	Date	Time	Received By	Date	Time	Reason for Transfer *
1-10	JM Nodda (Sampler)	2-5-93	1115	K L D -	2/5/93	1115	
All	JM K L D -	2/5/93	1145	Barney O.L.C. Stephens	2/5/93	1145	

Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808

Well: QA 49-35
Date: 2/1-93
Time: 1200
Sampled By: SRTC
COC # 50A6
Duplicate Id:

Ship To: Clemson Technical Center, Inc.
100 Technology Drive
Anderson, SC 29625
(803)648-2413
Contract#AA86566N

Laboratory Work Request Form

Lab ID:

[illegible]

• optional • pH: C-correct I-incorrect *** First relinquisher is the sampler

Comments

Stream water study.

Custody Transfer Record

Items	Relinquished By ... (Sampler)	Date	Time	Received By	Date	Time	Reason for Transfer
1-G	W. H. D.	2-5-93	1115	K. L. D.	2/5/93	1115	
A-1	W. H. D.	2/5/93	1145	Kathy O. K. D.	2/5/93	1145	

Savannah River Site
Environmental Protection Department
Building 735 A
Aiken, S.C. 29808

Well: QA 4S
Date: 1-28-13
Time: 4:30
Sampled By: SRTC
COC # 509C
Duplicate Id:

Ship To: General Engineering Laboratories
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA77609N

Lab ID: _____

[illegible]

.. pH: C-correct I-incorrect ... First relinquisher is the sampler

Comments
Stream water study.

Custody Transfer Record

[illegible]

Savannah River Site
Environmental Protection Department
Building 735-A
Aiken, S.C. 29808

Well: QA 4S
Date: 1-28-93
Time: 1430

Ship To: Environmental Physics, Inc.
2040 Savage Road
Charleston, S.C. 29414
(803) 556-8171
CONTRACT#AA86567N

Laboratory Work Request Form

[illegible]

.. pH: C-correct I-incorrect *** First relinquisher is the sampler

Comments:

Stream water study.

Custody Transfer Record

[illegible]

General Engineering Laboratories
2040 Savage Road
Charleston, South Carolina 29414
PO Box 30712
Charleston, South Carolina 29417
803 556 8171

White • with collector Yellow • file Pink • with report

General Engineering Laboratories
2040 Savage Road
Charleston, South Carolina 29414
PO Box 30712
Charleston, South Carolina 29417
803-556 8171

Client Name / Facility Name

Collected By / Company

WA-4

1

—Inquired by:

1975-1976

pile • sample c

1

White • sample collector Yellow • file Pink • with report

Yellow • file

White • sample collector

APPENDIX B
Metcalf & Eddy Surveillance

July 28, 1992

010005-0001

To: Gregg Mooney
From: Peter Boucher
Subject: Quality Assurance Surveillance for
Four Mile Creek
Task Order No. 26

SURVEILLANCE NARRATIVE

On Wednesday and Thursday July 22 and 23, 1992, I conducted a quality assurance surveillance of surface and groundwater sampling conducted by Normandeau Associates, Inc. (NAI) at Four Mile Creek which is currently under investigation under Task Order No. 26. The purpose of the surveillance was to monitor the sampling operation for consistency with quality assurance procedures developed for the project. Accordingly, I checked that the equipment, equipment decontamination, instrument calibration, and sampling procedures, were in conformance with procedures outlined in the Quality Assurance Project Plan prepared by M&E dated June 1992. I also checked that health and safety procedures were followed as outlined in the SHERP dated July 10, 1992.

NAI personnel conducting the work included Kathy Herring, Alan Stuart, and Ryan Brady. On Wednesday, I observed the collection of surface water at one station. On Thursday, I observed collection of groundwater at one station where the sampling bucket had been installed on Tuesday.

The surveillance was conducted by reviewing the aforementioned QAPP and generating a series of checklists outlining the critical steps in each phase of the sampling. Actual operations in the field were compared with the checklists. The checklists used and related comments on the operation follow.

CHECKLISTS AND COMMENTS

Equipment

Field data sheets	yes
Prelabeled sample bottles	yes
Pump/Battery/Tygon	yes
Sample Buckets (5 gal)	yes
Waterproof pens	see below
Rubber gloves	yes
Water quality meters	yes
Hip boots	yes
Ice	yes
Filter	yes
Mobile phone	yes
First Aid Kit	yes
Fire extinguisher	yes

MSDS

see below

Comments - The ink used to label the first set of bottles became blurred when the bottles were wet. Permanent markers or ballpoint pens should be used. The MSDS for tritium was not available yet and is to be provided by the STR. An MSDS for Methanol is available in the SHERP.

Instruments

Calibrate before sampling	yes
Calibration logbook	yes

Comments - Calibration was conducted before sampling at each station and the results recorded in a logbook.

Sampling Procedures

Bottles have preservative	yes
PVC stake marks station	yes
Change tubing at each station	yes
Flush pump for 20 secs between samples	yes
Place samples on ice	yes
pH/cond/orp	yes
Sample VOAs and metals first	yes
Bottle marked with station, date and time	yes
Rinse probes with DI between measurements	yes
Metals samples filtered	yes
Do not overflow bottles	yes

Comments - The groundwater sample was very turbid and may not accurately reflect the quality of groundwater entering Four Mile Creek. The samplers attempted to collect water from the surface, but the turbidity was present throughout the water in the bucket, and may have been caused by the disturbance of installing the bucket, and possibly by a light overnight rain. Material excavated for the bucket was dumped directly adjacent to the hole, possibly contributing to the turbidity. This material should be cast further away from the hole to minimize erosion and turbidity in the event of rain. It should be noted in the lab reports and in the final report that the water quality results were influenced by turbidity resulting from the sampling technique.

A new length of tygon tubing was used for each sample. Part of the surface water filtering was conducted without gloves and several filters were handled with bare hands. Nitrile gloves should be worn whenever handling samples and during filtering.

Sample bottles were pre-preserved. However, the turbidity of the samples may have added considerable alkalinity. The pH of the samples should be checked and the preservative augmented if necessary.

**DATE
FILMED**

10 / 7 / 93

END