

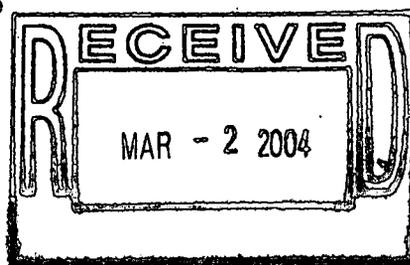
# Rocky Flats Environmental Technology Site

## Quarterly Environmental Monitoring Report



Rocky Flats Environmental Technology Site  
P.O. Box 464 • Golden, CO 80402-0464

April - June 1997



RF/RMRS-97-050

ADMIN RECORD

SW-A-004896

1/90

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# **Rocky Flats Environmental Technology Site Quarterly Environmental Monitoring Report**

## **April - June Highlights**

This report is produced and distributed quarterly as part of our ongoing Agreement in Principle and as a forum for the Rocky Flats Cleanup Agreement (RFCA) quarterly reporting requirement. Additional information about quarterly reporting will be formalized after completion of the Integrated Monitoring Plans (IMP) for the various media sampled.

### ***Airborne Effluent***

Isotopic and tritium data collected during second quarter 1997 are presented in this report. Isotopic data for this quarter are incomplete as a result of delays associated with analytical laboratory support outsourcing. Screening data for gross alpha and gross beta for all effluent sample locations collected during second quarter were within normal ranges. Formerly incomplete data from first quarter 1997 have been completed and are included in this report. All available tritium data from April and May 1997 are included, however no June 1997 data were available at the time of report preparation. All incomplete data will be reported when available. All reported data are within typical and expected ranges.

### ***Ambient Air***

Isotopic data collected during second quarter 1997 are presented in this report. Isotopic analytical data for this quarter are incomplete, as a result of delays associated with analytical laboratory support outsourcing. Specific on/off dates for both onsite and offsite ambient sampler locations are not shown as they were not available at the time of report preparation; these data will be presented at the meeting and will be published in the next report. No additional first quarter isotopic analytical data are available because of changes in data reporting processes. All incomplete data will be reported when available.

### ***Meteorology and Climatology***

Meteorology and Climatology data collected during second quarter 1997 are presented in this report. Meteorological data are routinely measured from instrumentation on a 61-meter tower located in the west buffer zone at an elevation of 1,870 meters above sea level. The summaries for April, May and June 1997 are included in this report. Compass points and windrose displaying the frequencies of wind direction and speed are presented to illustrate the typically large diurnal wind changes at the Site. Continued problems with report generation from the newly developed air quality database have prevented reprocessing of the January, February and March 1997 summaries. These data will be corrected and presented when available.

### ***Surface Water***

Surface water analytical data collected during second quarter 1997 for NPDES/FFCA permit compliance are presented in this report. All reported data are within historical ranges and permit limitations.

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## ***Hydrologic Monitoring and Rocky Flats Clean-up Agreement (RFCA) Monitoring***

Flow monitoring data for hydrologic monitoring (formerly performed by the USGS) and RFCA monitoring analytical and flow data collected during second quarter 1997 are presented in this report. Some additional first quarter 1997 analytical data have been included as they were incomplete for the last report. Incomplete RFCA data for second quarter 1997 will be presented when available.

Analytical data for a new performance monitoring station, Gaging Station GS32, appears on table 4-20. As flow cannot be accurately monitored at this location, only analytical data will be presented. The location is described as north of the Solar Ponds on a corrugated metal pipe draining the Building 779 sub-basin. This is a performance monitoring location sited for assessing surface-water impacts from the D&D of Building 779. Storm event samples are collected for selected radionuclides, water-quality parameters, and metals. This location is not included in the map presented in this report, but it will be included in the next quarterly report.

## Section 1: Air Data

*Table 1-1 Plutonium and Americium Airborne Effluent Data*

Month	Plutonium-239		Americium-241	
	Release ( $\mu\text{Ci}$ )	C Maximum ( $\text{pCi}/\text{m}^3$ )	Release ( $\mu\text{Ci}$ )	C Maximum ( $\text{pCi}/\text{m}^3$ )
<b>CY 1996</b>				
Jan - Dec	1.0590 $\pm$ 0.0918	0.0036 $\pm$ 0.0004	0.3274 $\pm$ 0.0351	0.0007 $\pm$ 0.0001
<b>CY 1997</b>				
January	0.0138 $\pm$ 0.0170	0.0001 $\pm$ 0.0001	0.0012 $\pm$ 0.0109	0.0001 $\pm$ 0.0001
February	0.0172 $\pm$ 0.0102	0.0001 $\pm$ 0.0001	-0.006 $\pm$ 0.0010 <sup>a</sup>	0.0000 $\pm$ 0.0000 <sup>a</sup>
March	0.0108 $\pm$ 0.0044	0.0003 $\pm$ 0.0001	-0.0070 $\pm$ 0.0049	0.0000 $\pm$ 0.0000
April	b	b	b	b
May	b	b	b	b
June	b	b	b	b
July				
August				
September				
October				
November				
December				
Year to Date	0.0418 $\pm$ 0.0203	0.0003 $\pm$ 0.0000	-0.0064 $\pm$ 0.0120	0.0001 $\pm$ 0.0000
<sup>a</sup> Nine locations are missing because of failed laboratory analysis. No sample remains for reanalysis. Results are final. <sup>b</sup> Incomplete laboratory analysis. Results will be reported when available.				

Table 1-2 Uranium Airborne Effluent Data

Month	Uranium-233, -234		Uranium-238	
	Release ( $\mu\text{Ci}$ )	C Maximum ( $\text{pCi}/\text{m}^3$ )	Release ( $\mu\text{Ci}$ )	C Maximum ( $\text{pCi}/\text{m}^3$ )
<b>CY 1996</b>				
Jan - Dec	-0.0391 $\pm$ 1.1258	0.0016 $\pm$ 0.0006	1.2560 $\pm$ 1.1556	0.0033 $\pm$ 0.0006
<b>CY 1997</b>				
January	-0.0931 $\pm$ 0.0556	0.0009 $\pm$ 0.0009	-0.0860 $\pm$ 0.0651	0.0008 $\pm$ 0.0009
February	-0.0660 $\pm$ 0.0612	0.0003 $\pm$ 0.0006	-0.0618 $\pm$ 0.0632	0.0003 $\pm$ 0.0006
March	-0.1634 $\pm$ 0.0349	0.0017 $\pm$ 0.0009	-0.1853 $\pm$ 0.0341	0.0009 $\pm$ 0.0008
April	a	a	a	a
May	a	a	a	a
June	a	a	a	a
July				
August				
September				
October				
November				
December				
Year to Date	-0.3226 $\pm$ 0.0898	0.0017 $\pm$ 0.0000	-0.3331 $\pm$ 0.0969	0.0009 $\pm$ 0.0000
<sup>a</sup> Incomplete laboratory analysis. Results will be reported when available.				

Table 1-3 Tritium Airborne Effluent Data

Month	Tritium	
	Release ( $\mu\text{Ci}$ )	C Maximum ( $\text{pCi}/\text{m}^3$ )
<b>CY 1996</b>		
Jan - Dec	5.973	218 $\pm$ 19
<b>CY 1997</b>		
January	0.691	60 $\pm$ 20
February	0.316	29 $\pm$ 23 <sup>a</sup>
March	1.245	141 $\pm$ 25 <sup>b</sup>
April	0.563 <sup>c</sup>	45 $\pm$ 25 <sup>c</sup>
May	0.222 <sup>d</sup>	48 $\pm$ 25 <sup>b</sup>
June	e	e
July		
August		
September		
October		
November		
December		
<b>Year to Date</b>	<b>3.3036</b>	<b>141 <math>\pm</math> 25</b>

<sup>a</sup> One location is missing because of failed laboratory analysis. No sample remains for reanalysis. Results are final.

<sup>b</sup> Two locations are missing because of failed laboratory analysis. No sample remains for reanalysis. Results are final.

<sup>c</sup> Twelve locations are missing because of failed laboratory analysis. Results will be reported when available.

<sup>d</sup> Seven locations are missing because of failed laboratory analysis. Results will be reported when available.

<sup>e</sup> Incomplete laboratory analysis. Results will be reported when available.

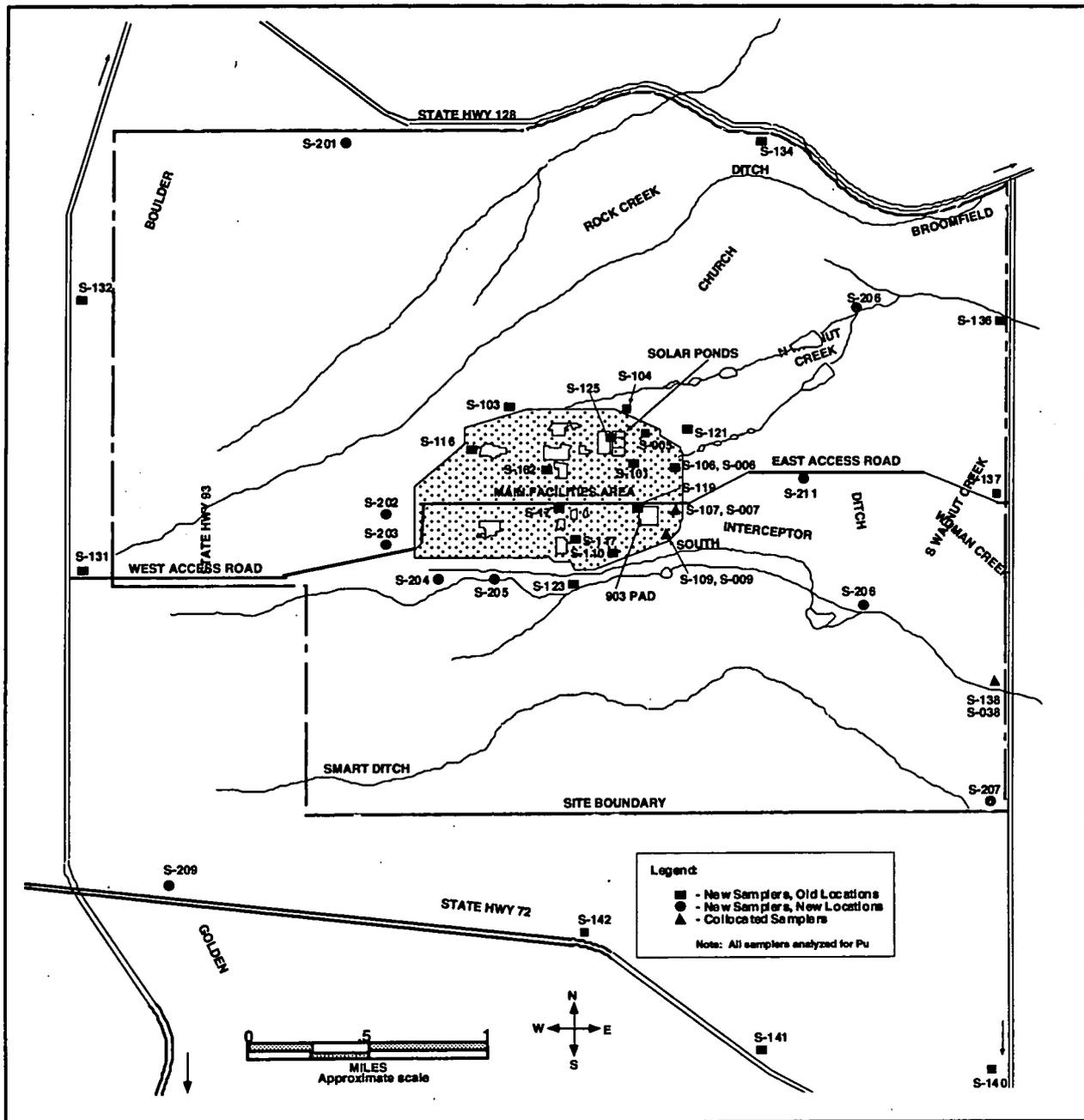


Figure 1-1 Location of Onsite and Perimeter Air Samplers

**Table 1-4 Plutonium Concentrations in Ambient Air for Onsite Samplers<sup>a</sup>**

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-107	b	b	b	b	b	b	b	b	b
S-107	b	b	b	b	b	b	b	b	b
S-107	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b

<sup>a</sup> These data have not been corrected for temperature.  
<sup>b</sup> Incomplete laboratory analysis. Results will be reported when available.

N/A = Not Applicable

**Table 1-5 Plutonium -239 Concentrations in Ambient Air for Perimeter Samplers<sup>a</sup>**

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-131	b	b	b	b	b	b	b	b	b
S-131	b	b	b	b	b	b	b	b	b
S-131	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b

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**Table 1-5 Plutonium -239 Concentrations in Ambient Air for Perimeter Samplers<sup>a</sup>**  
(continued)

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-140	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b
S-141	b	b	b	b	b	b	b	b	b
S-141	b	b	b	b	b	b	b	b	b
S-141	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b

<sup>a</sup> These data have not been corrected for temperature.  
<sup>b</sup> Incomplete laboratory analysis. Results will be reported when available.

N/A = Not Applicable

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**Table 1-6 Uranium-233, -234 Concentrations in Ambient Air for Onsite Samplers<sup>a</sup>**

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-107	b	b	b	b	b	b	b	b	b
S-107	b	b	b	b	b	b	b	b	b
S-107	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b

<sup>a</sup> These data have not been corrected for temperature.  
<sup>b</sup> Incomplete laboratory analysis. Results will be reported when available.  
 N/A = Not Applicable

**Table 1-7 Uranium-233, -234 Concentrations in Ambient Air for Perimeter Samplers<sup>a</sup>**

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-131	b	b	b	b	b	b	b	b	b
S-131	b	b	b	b	b	b	b	b	b
S-131	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b

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**Table 1-7 Uranium-233, -234 Concentrations in Ambient Air for Perimeter Samplers<sup>a</sup>**  
(continued)

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-141	b	b	b	b	b	b	b	b	b
S-141	b	b	b	b	b	b	b	b	b
S-141	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b

<sup>a</sup> These data have not been corrected for temperature.  
<sup>b</sup> Incomplete laboratory analysis. Results will be reported when available.  
 N/A = Not Applicable

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**Table 1-8 Uranium-238 Concentrations in Ambient Air for Onsite Samplers<sup>a</sup>**

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-107	b	b	b	b	b	b	b	b	b
S-107	b	b	b	b	b	b	b	b	b
S-107	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b

<sup>a</sup> These data have not been corrected for temperature.  
<sup>b</sup> Incomplete laboratory analysis. Results will be reported when available.  
 N/A = Not Applicable

**Table 1-9 Uranium-238 Concentrations in Ambient Air for Perimeter Samplers<sup>a</sup>**

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-131	b	b	b	b	b	b	b	b	b
S-131	b	b	b	b	b	b	b	b	b
S-131	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b

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**Table 1-9 Uranium-238 Concentrations in Ambient Air for Perimeter Samplers<sup>a</sup>**  
(continued)

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-141	b	b	b	b	b	b	b	b	b
S-141	b	b	b	b	b	b	b	b	b
S-141	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b

<sup>a</sup> These data have not been corrected for temperature.  
<sup>b</sup> Incomplete laboratory analysis. Results will be reported when available.  
 N/A = Not Applicable

**Table 1-10 Americium-241 Concentrations in Ambient Air for Onsite Samplers<sup>a</sup>**

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-107	b	b	b	b	b	b	b	b	b
S-107	b	b	b	b	b	b	b	b	b
S-107	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b
S-007	b	b	b	b	b	b	b	b	b

<sup>a</sup> These data have not been corrected for temperature.  
<sup>b</sup> Incomplete laboratory analysis. Results will be reported when available.  
 N/A = Not Applicable

**Table 1-11 Americium-241 Concentrations in Ambient Air for Perimeter Samplers<sup>a</sup>**

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-131	b	b	b	b	b	b	b	b	b
S-131	b	b	b	b	b	b	b	b	b
S-131	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-132	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-134	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-136	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-137	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-138	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b
S-140	b	b	b	b	b	b	b	b	b

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**Table 1-11 Americium-241 Concentrations in Ambient Air for Perimeter Samplers<sup>a</sup>**  
(continued)

Location	On Date	Off Date	Flow (m <sup>3</sup> )	Fine Conc (pCi/m <sup>3</sup> )	Fine Error (pCi/m <sup>3</sup> )	Coarse Conc (pCi/m <sup>3</sup> )	Coarse Error (pCi/m <sup>3</sup> )	Total Conc (pCi/m <sup>3</sup> )	Total Error (pCi/m <sup>3</sup> )
S-141	b	b	b	b	b	b	b	b	b
S-141	b	b	b	b	b	b	b	b	b
S-141	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-142	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-201	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-207	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-209	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b
S-038	b	b	b	b	b	b	b	b	b

<sup>a</sup> These data have not been corrected for temperature.  
<sup>b</sup> Incomplete laboratory analysis. Results will be reported when available.  
 N/A = Not Applicable

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## Section 2: Meteorology and Climatology

Table 2-1 Climatic Summary for April 1997

Date	Temperature (°F)			Dew-Point (°F)	Rel. Hum. (%)	Wind Speed (mph)		Press (mb)	Solar (kW-h/m <sup>2</sup> )	Water-Equiv Precip (in.)	
	High	Low	Mean	Mean	Mean	Mean	Peak Gust (1 sec)	Mean	Total	Total (15 min)	Peak
4/1	41.83	25.61	33.53	30.05	86.73	6.82	18.5	810.92	0.18	0.07	0.02
4/2	32.79	23.18	27.45	26.38	93.01	7.73	19.35	815.47	4.18	0.1	0.01
4/3	62.47	24.67	42.32	29.95	69.23	6.56	23.03	807.07	7.37	0	0
4/4	50.2	28.8	40.63	35.22	85.8	8.95	30.31	794.48	3.59	0.56	0.06
4/5	33.89	23.85	28.63	21.96	74.05	9.31	34.72	797.23	5.62	0	0
4/6	42.24	19.54	33.71	9.15	36.62	17.06	46.19	809.22	7.88	0	0
4/7	49.93	22.64	38.92	15.99	43.37	13.1	41.66	811.77	6.68	0	0
4/8	30.56	15.01	21.77	20.28	90.83	5.74	13.67	813.74	2.06	0	0
4/9	33.53	12.7	23.76	20.35	83.64	9.53	26.72	807.6	3.95	0.04	0.01
4/10	18.3	4.28	13.36	11.4	90.56	9.13	21.97	810.14	3.53	0.06	0.01
4/11	16.3	1.62	10.43	6	82.19	6.2	18.5	812.44	7.69	0.17	0.02
4/12	25.86	-0.02	15.65	3.95	67.92	5.28	12.09	811.99	8.22	0	0
4/13	45.59	16.39	33.68	12.68	47.39	5.38	14.72	810.37	8.36	0	0
4/14	54.03	34.77	45.27	15.32	31.66	12.54	42.29	810.07	2.86	0	0
4/15	58.87	35.1	48.09	26.54	48.63	10.18	36.62	815.35	6.59	0.06	0.01
4/16	57.79	33.46	46.15	35	72.08	5.47	15.77	817.73	8.12	0	0
4/17	67.96	43.21	57.53	22.79	32.62	7.33	20.83	815	7.78	0	0
4/18	69.1	46.09	59.08	24.59	30.25	7.97	37.88	811.43	5.64	0	0
4/19	69.94	47.01	61.39	24.89	29.37	13.76	36.51	809.19	6.7	0	0
4/20	64.02	43.95	56.71	32.52	43.46	11.27	42.2	808.96	5.12	0	0
4/21	57.51	29.71	49.65	25.75	41.12	17.07	63.24	808.33	5.48	0	0
4/22	53.1	30.09	41.27	27.99	64.63	7.1	32.19	811.46	5.67	0.03	0.01
4/23	52.66	30.43	42.06	34.11	76.72	7.63	28.4	806.99	5.25	0.43	0.04
4/24	41.79	25.48	31.33	32.58	98.43	8.71	27.46	808.57	1.48	2.16	0.06
4/25	42.91	25.18	34.86	28.5	84.2	5.34	12.51	814.13	7.53	0.01	0.01
4/26	47.66	25.7	37.89	30.06	81.62	6.41	15.88	815.43	6.35	0.11	0.02
4/27	64.76	30.16	47.29	31.13	63.76	8.86	16.93	810.07	7.79	0	0
4/28	63.21	43.14	53.38	35.42	55.64	9.98	33.24	806.41	4.36	0	0
4/29	59.74	37.24	49.05	33.29	59.49	15.98	69.87	803.02	7	0	0
4/30	54.97	31.53	44.9	25.52	52	12.53	45.36	807.76	8.03	0	0

Temperature (°F)			Humidity		Wind Speed		Press	Solar	Precipitation	
Mean High	Mean Low	Mean	Dew Point	Rel. Hum.	Mean (mph)	Monthly Max	Monthly Avg	Monthly Total	Total	Monthly Max
48.78	27.02	38.99	24.31	63.90	9.30	69.87	809.74	171.06	3.80	0.06

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# Day Wind Rose For the RFETS

Apr-97

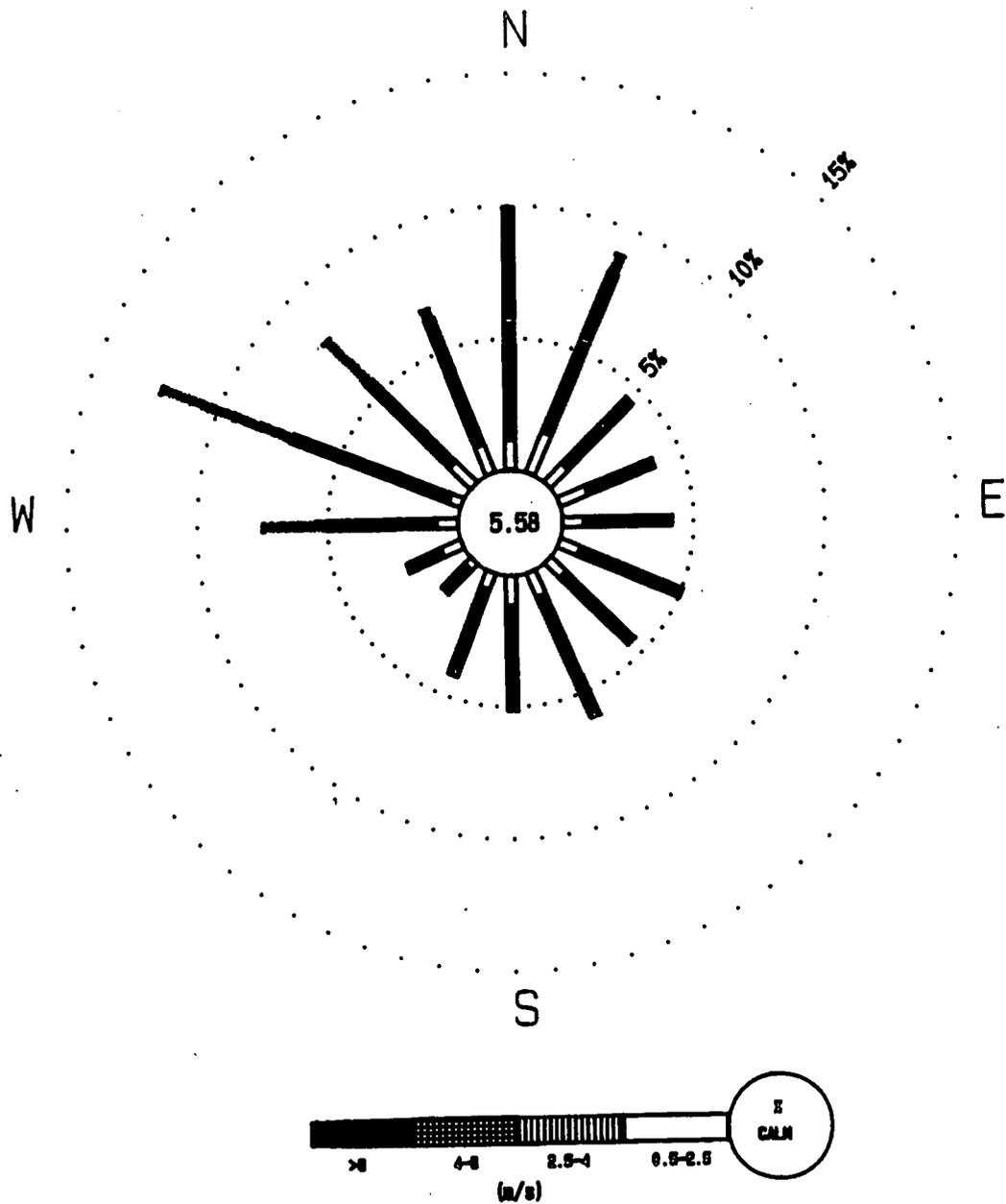


Figure 2-2 Day Windrose for the Rocky Flats Environmental Technology Site (April 1997)

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Table 2-2 Climatic Summary for May 1997

Date	Temperature (°F)			Dew-Point (°F)	Rel. Hum. (%)	Wind Speed (mph)		Press (mb)	Solar (kW-h/m <sup>2</sup> )	Water-Equiv. Precip (in.)	
	High	Low	Mean	Mean	Mean	Mean	Peak Gust (1 sec)	Mean	Total	Total	Peak (15 min)
5/1	53.28	30.83	44.35	23.15	46.66	18.56	67.24	801.13	5.69	0	0
5/2	47.17	28.11	39.58	20.37	49.38	11.17	46.73	810.1	4.77	0	0
5/3	62.78	29.41	46.78	27.18	54.41	10.03	35.46	816.1	7.57	0	0
5/4	74.25	42.91	62.06	26.89	31.63	8.16	40.84	814.99	7.28	0	0
5/5	69.84	39.58	58.15	35.86	49.88	7.24	27.35	817.01	8	0	0
5/6	76.39	52.9	65.79	28.71	28.48	11.92	40.3	812.61	6.22	0	0
5/7	90.3	14.61	61.26	30.91	35.73	15.68	46.19	812.65	4.09	0	0
5/8	87.48	7.39	46.83	27.74	46.9	6.63	20.52	819.75	6.85	0	0
5/9	94.21	26.47	52.1	27.98	42.94	6.61	15.25	819.85	8.43	0	0
5/10	91.08	49.19	63.35	25.29	28.49	6.41	21.15	817.01	8.05	0	0
5/11	81.37	-3.32	46.08	34.14	65.02	8.27	24.39	818.06	3.63	0.15	0.04
5/12	92.44	0.88	51.92	31.66	53.34	6	33.35	813.39	8.1	0	0
5/13	90.32	16.68	62.12	32.06	35.66	10.35	33.98	810.8	6.11	0	0
5/14	87.8	10.13	52.75	39.09	67.02	7.59	30.51	814.39	4.82	0.12	0.04
5/15	92.1	22.69	58.59	41.8	59.35	7.63	31.88	816.46	7.2	0	0
5/16	96.8	27.95	67.67	38.29	36.32	7.73	31.36	816.35	7.44	0	0
5/17	104.07	30.2	70.61	34.12	29.66	11.17	49.15	811.9	7.05	0	0
5/18	93.33	4.15	58.24	38.1	52.44	13.25	45.67	811.84	5.46	0.06	0.05
5/19	71.17	1.72	47.05	38.5	74.24	5.02	15.88	814.18	6.18	0	0
5/20	95.86	20.88	60.56	39.45	52.35	7.45	32.3	812.67	6.99	0	0
5/21	84.81	9.39	57.26	46.39	70.72	7.73	25.98	812.48	6.21	0.04	0.02
5/22	87.84	14.47	51.57	50.05	97.74	6.47	18.61	812.03	1.62	0.21	0.03
5/23	96.3	15.55	58.57	46.66	74.22	6.34	20.2	813.33	6.7	0	0
5/24	84.61	19.72	58.12	45.85	69.72	7.77	50.29	806.97	5.39	0.39	0.26
5/25	91.26	15.46	54.98	39.7	57.97	8.88	35.88	806	6.22	0.03	0.03
5/26	89.28	10.54	50.52	31.74	51.58	15.25	42.52	810.39	6.43	0.02	0.02
5/27	72.75	33.4	50.06	33.15	53.72	8.55	33.78	815.29	2.74	0	0
5/28	90.07	15.01	56.42	44.78	66.13	5.22	20.09	816.09	4.8	0	0
5/29	90.27	10.44	52.05	48.09	87.93	5.66	30.4	814.46	2.73	0.02	0.01
5/30	94.46	14	57.8	47	72.65	4.98	15.46	817.12	6.45	0	0
5/31	90.14	35.22	68.27	46.91	54	6.32	19.24	816.28	8.52	0	0

Temperature (°F)			Humidity		Wind Speed		Press	Solar	Precipitation	
Mean High	Mean Low	Mean	Dew Point	Rel. Hum.	Mean (mph)	Monthly Max	Monthly Avg	Monthly Total	Total	Monthly Max
84.64	20.86	55.85	36.18	54.72	8.71	67.24	813.60	187.74	1.04	0.26

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# Day Wind-Rose For the RFETS

May-97

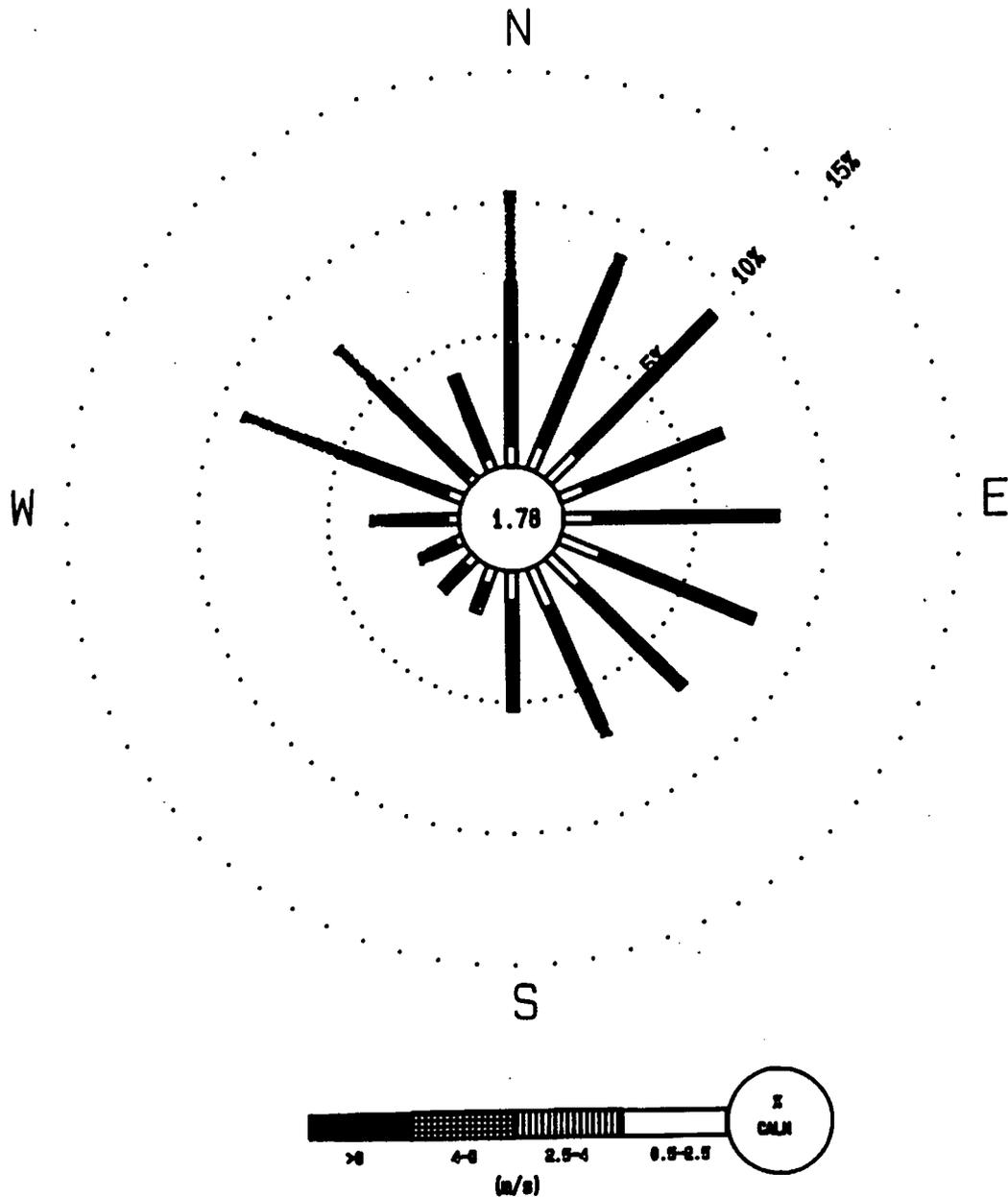


Figure 2-5 Day Windrose for the Rocky Flats Environmental Technology Site (May 1997)

# Night Wind Rose For the RFETS

May-97

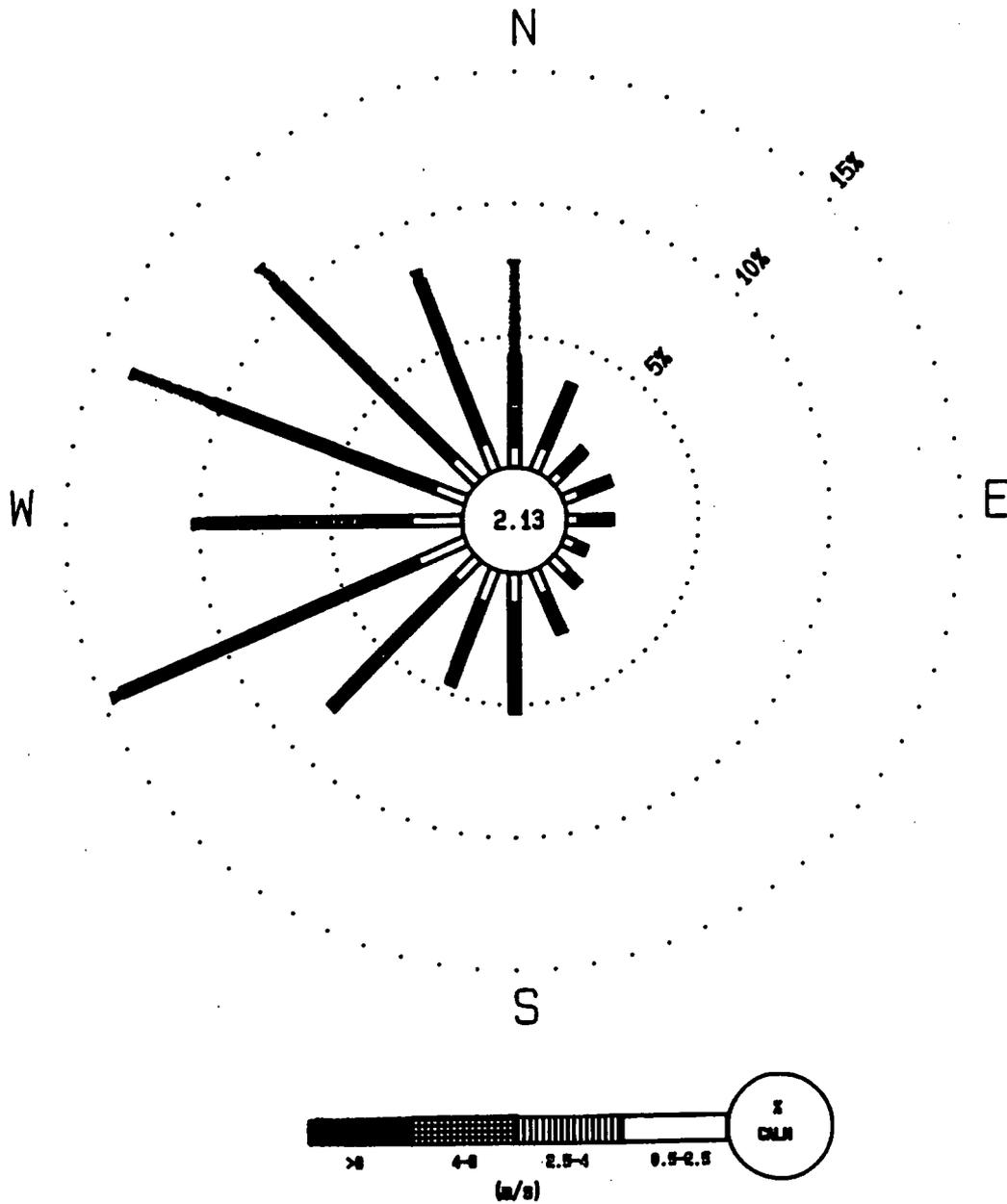


Figure 2-6 Night Windrose for the Rocky Flats Environmental Technology Site (May 1997)

Table 2-3 Climatic Summary for June 1997

Date	Temperature (°F)			Dew-Point (°F)	Rel. Hum. (%)	Wind Speed (mph)		Press (mb)	Solar (kW-h/m <sup>2</sup> )	Water-Equiv Precip (in.)	
	High	Low	Mean	Mean	Mean	Mean	Peak Gust (1 sec)	Mean	Total	Total	Peak (15 min)
6/1	117.37	25.41	71.54	48.43	50.82	9.24	40.1	811.12	7	0.08	0.04
6/2	94.05	24.6	61.2	53.85	77.3	10.27	34.61	812	6.58	0	0
6/3	94.84	16.72	60.53	47.74	65.63	6.61	19.35	817.42	7.11	0	0
6/4	88.63	47.61	63.02	49.98	67.14	6.76	21.46	814.87	8.71	0	0
6/5	98.56	28.44	66.67	49.42	60.42	6.71	27.35	809.32	6.28	0	0
6/6	92.1	19.69	59.52	52.86	80.6	9.64	38.19	811.55	4.66	0.7	0.06
6/7	93.29	19.71	58.32	50.76	77.9	9.76	34.09	810.89	6.89	0.04	0.01
6/8	83.3	40.87	57.24	51.57	84.79	5.86	18.5	810.4	3.25	0.11	0.04
6/9	91.22	18.23	52.71	50.93	93.62	7.53	20.52	815.03	2.32	0.02	0.01
6/10	91.71	21.06	57.27	50.22	80.65	6.3	28.09	814.32	5.6	0.02	0.01
6/11	87.96	19.33	66.56	40.06	44.6	12.32	36.51	812.09	6.25	0	0
6/12	73.04	42.48	59.15	48.59	72.77	7.99	38.62	810.43	5.55	0.1	0.05
6/13	63.34	44.15	54.27	51.41	90.95	7.53	19.87	810.72	4.43	0.02	0.01
6/14	75.85	46.36	61.2	52.18	76.63	8.02	41.46	811.24	6.91	0.25	0.21
6/15	72.41	46.47	60.54	46.28	67.94	8.7	32.82	810.97	6.72	0.01	0.01
6/16	69.4	44.51	60.13	46.36	64.06	7.14	26.3	812.56	6.98	0.05	0.03
6/17	77.16	52.9	65.25	47.47	55.63	7.34	33.04	813.91	6.64	0	0
6/18	84.78	52.92	69.72	49.18	54.8	7.11	52.51	814.22	5.41	0.01	0.01
6/19	95.68	52.88	76.56	43.52	35.13	11.13	46.73	812.65	6.99	0	0
6/20	85.71	57.87	77.26	41.04	31.28	8.09	33.47	809.68	6.66	0	0
6/21	81.66	58.71	70.13	48.93	51.47	12.79	57.03	812.11	7.2	0.04	0.03
6/22	87.82	62.33	76.58	43.21	34.56	8.47	44.31	811.24	8.08	0	0
6/23	77.99	57.11	70.69	46.52	47.03	9	60.73	811.47	5.72	0.03	0.01
6/24	76.91	53.37	65.86	45.91	55.04	8.42	22.31	814.38	6.29	0.08	0.07
6/25	74.77	50.23	63.01	51.67	71.49	6.74	37.14	816.92	7.1	0	0
6/26	80.24	49.48	67.26	48.64	58.4	7.45	27.35	816.86	7.7	0	0
6/27	84.4	63.5	74.65	36.89	28.56	8.23	47.98	815.13	5.98	0	0
6/28	85.91	59.11	74.35	36.87	29.57	8.1	43.57	813.02	5.48	0.03	0.03
6/29	83.68	53.89	71.78	40.01	36.96	7.21	28.72	811.9	8.55	0	0
6/30	88.3	58.78	74.83	33.96	26.56	8.92	25.13	810.54	9.01	0	0

Temperature (°F)			Humidity		Wind Speed		Press	Solar	Precipitation	
Mean High	Mean Low	Mean	Dew Point	Rel. Hum.	Mean (mph)	Monthly Max	Monthly Avg	Monthly Total	Total	Monthly Max
85.07	42.96	65.59	46.82	59.08	8.31	60.73	812.63	192.05	1.59	0.21

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# Wind Rose For the RFETS

Jun-97

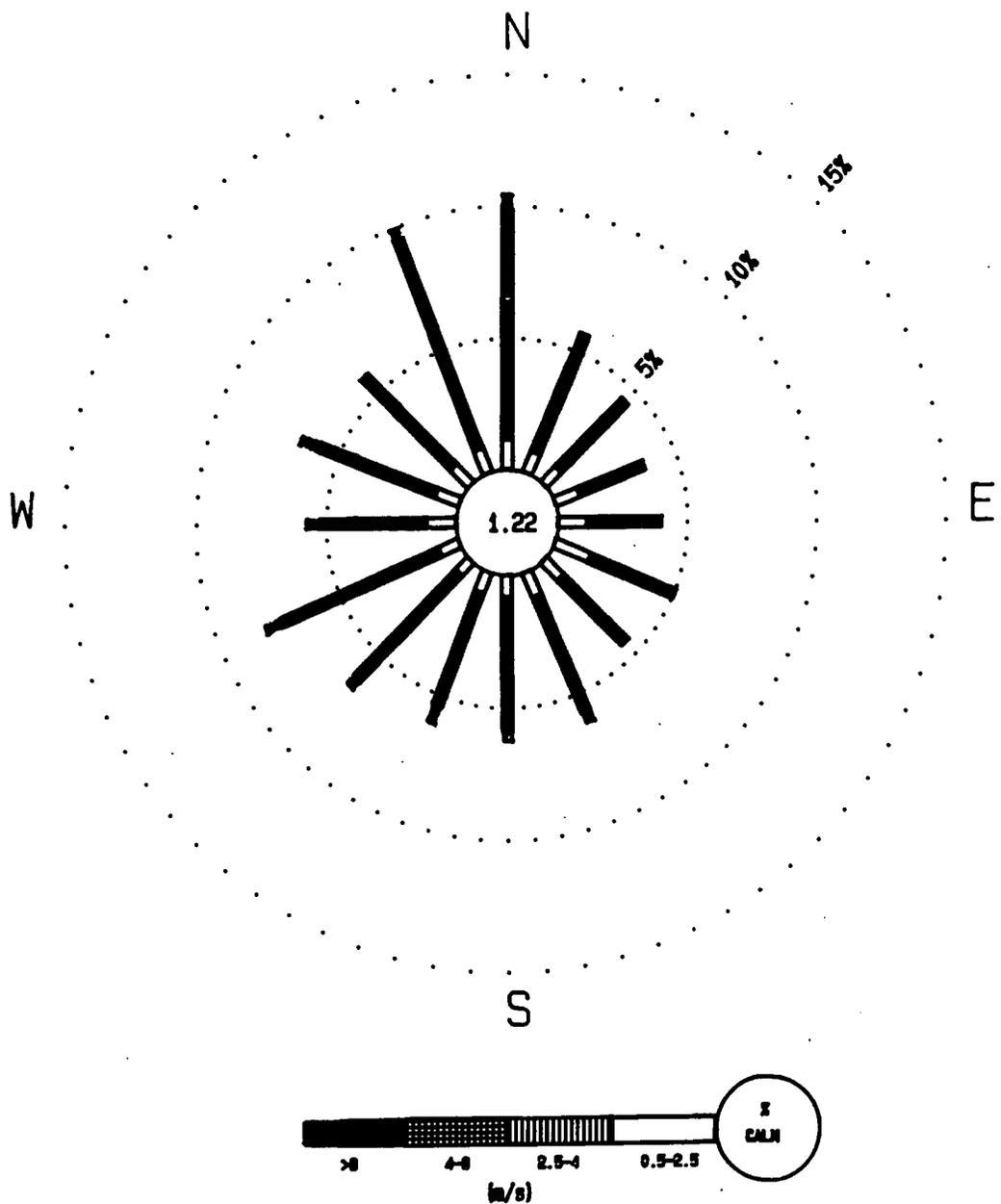


Figure 2-7 Windrose for the Rocky Flats Environmental Technology Site (June 1997)

# Day Wind Rose For the AFETS

Jun-97

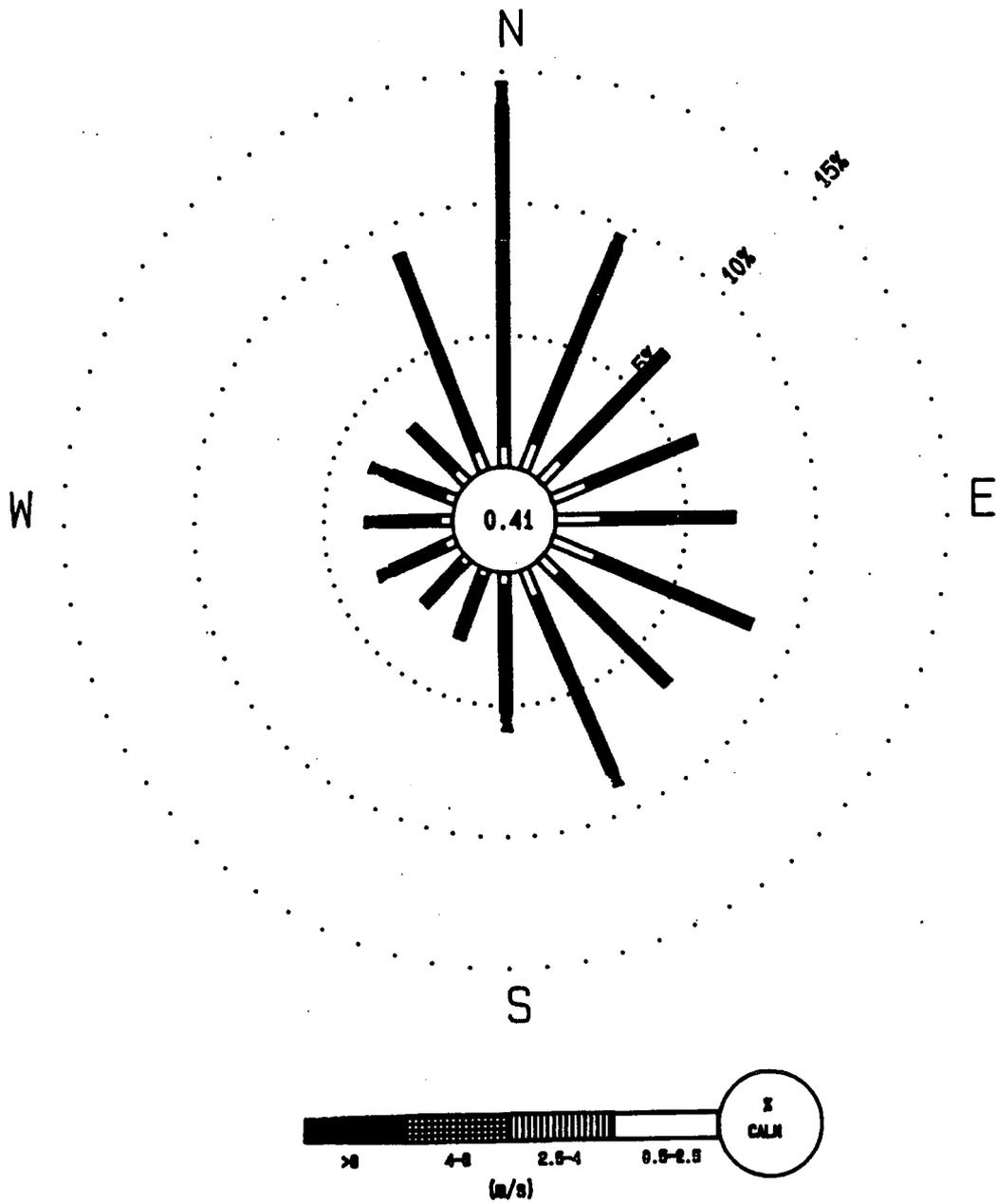


Figure 2-8 Day Windrose for the Rocky Flats Environmental Technology Site (June 1997)



### Section 3: Surface Water Data

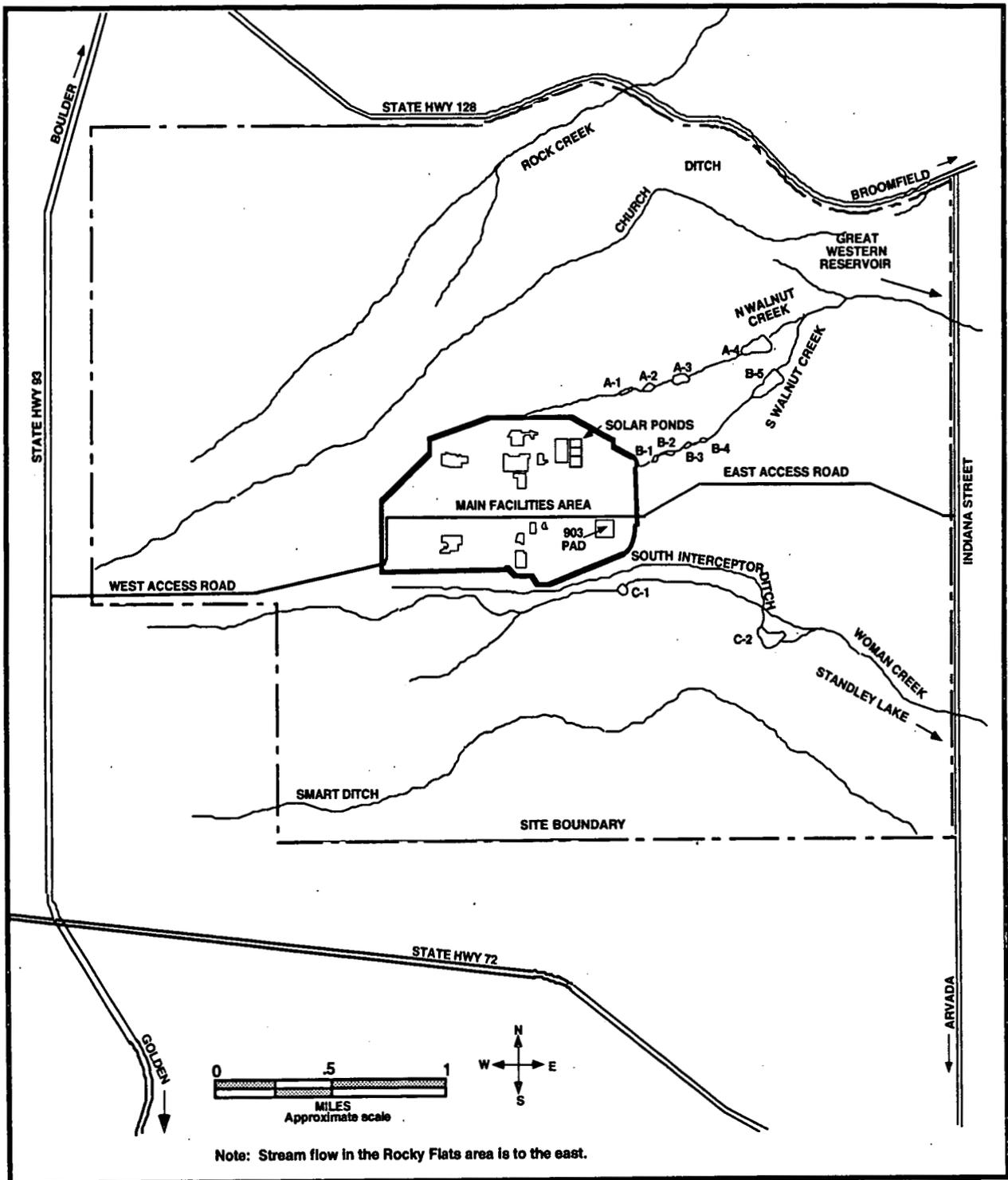


Figure 3-1 Holding Ponds and Liquid Effluent Water Courses

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Table 3-1 Pond B-3 (Outfall 001A)

Dates of Discharge: 04/01/97 - 06/30/97						
Parameter & Units	Measured 30-Day Average	Limit 30-Day Average	Measured 7-Day Average	Limit 7-Day Average	Measured Daily Maximum	Limit Daily Maximum
NO <sub>3</sub> /NO <sub>2</sub> mg/l	2.2 - 2.9	10	3.0 - 4.1	20	N/A	N/A
TRC mg/l	N/A	N/A	N/A	N/A	0.06 - 0.09	0.5
BOD <sub>5</sub> mg/l	5.0 - 11.8	a	N/A	N/A	6.6 - 29.7	a
CBOD <sub>5</sub> mg/l	4.2 - 8.5	a	N/A	N/A	5.4 - 21.0	a
TSS mg/l	<5 - 8.2	a	N/A	N/A	<5 - 10.8	a

<sup>a</sup> Report only

- N/A = Not Applicable
- TRC = Total Residual Chlorine
- TSS = Total Suspended Solids
- BOD<sub>5</sub> = Biochemical Oxygen Demand, 5-Day Test
- CBOD<sub>5</sub> = Carbonaceous Biochemical Oxygen Demand, 5-Day Test

Note: Results are the range of values measured during the reporting period.

Table 3-2 Sewage Treatment Plant (Outfall STPA)

Dates of Discharge: 04/01/97 – 06/30/97										
Parameter and Units	Measured 30-Day Avg	Limit 30-Day Avg	Measured 7-Day Avg	Limit 7-Day Avg	Measured Daily Min	Limit Daily Min	Measured Daily Max	Limit Daily Max	Observed Sheen	Measured Result
pH, SU	N/A	N/A	N/A	N/A	6.6 - 6.8	6.0	7.2 - 7.5	9.0	N/A	N/A
TSS, mg/l	<5	30	<5	45	N/A	N/A	N/A	N/A	N/A	N/A
Total Phosphorous, mg/l	0.95 - 1.8	8	N/A	N/A	N/A	N/A	1.8 - 3.6	12	N/A	N/A
TRC, mg/l	<0.02	<sup>a</sup>	<0.02-0.05	<sup>a</sup>	N/A	N/A	N/A	N/A	N/A	N/A
Total Chromium, mg/l	<4.8	50	N/A	N/A	N/A	N/A	<4.8	100	N/A	N/A
Fecal Coliform #/100 ml	<5 - 10	200 <sup>b</sup>	14 - 85	440 <sup>b</sup>	N/A	N/A	N/A	N/A	N/A	N/A
CBOD <sub>5</sub> mg/l	3.9 - 6.4	10	N/A	N/A	N/A	N/A	9.5 - 12.0	25	N/A	N/A
Oil & Grease	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<sup>c</sup>	N/A
<b>WET</b>										
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100

## Samples Collected: 04/01/97, 05/06/97, and 06/03/97

Antimony, µg/l	<22.3	<sup>a</sup>	N/A							
Arsenic, µg/l	<2.0	<sup>a</sup>	N/A							
Beryllium, µg/l	<1.5	<sup>a</sup>	N/A							
Cadmium, µg/l	<0.1	<sup>a</sup>	N/A							
Copper, µg/l	<2.7 - 3.2	<sup>a</sup>	N/A							
Iron, µg/l	58.3 - 119	<sup>a</sup>	N/A							
Lead, µg/l	<2.0	<sup>a</sup>	N/A							
Manganese, µg/l	22.9 - 30.1	<sup>a</sup>	N/A							
Mercury, µg/l	<0.2	<sup>a</sup>	N/A							
Nickel, µg/l	<13.2	<sup>a</sup>	N/A							
Silver, µg/l	<0.1	<sup>a</sup>	N/A							
Zinc, µg/l	8.6 - 23.5	<sup>a</sup>	N/A							
VOCs, µg/l	<sup>d</sup>	<sup>a</sup>	N/A							

<sup>a</sup> Report Only  
<sup>b</sup> Geometric

<sup>c</sup> No Sheen Observed  
<sup>d</sup> None detected above PQL

N/A = Not Applicable  
 SU = Standard Units  
 TSS = Total Suspended Solids  
 TRC = Total Residual Chlorine  
 CBOD<sub>5</sub> = Carbonaceous Biochemical Oxygen Demand, 5-Day Test  
 PQL = Practical quantitation limit is equal to 10 times the method detection limit and represents the quantity at which 70% of laboratories can be reported in the 95% upper confidence limit.  
 WET = (Whole Effluent Toxicity) Results for WET are given in percentage of effluent sample that will cause mortality to half the test result organisms within the time frame of the test. For example, >100% indicates that 100% pure effluent did not cause acute toxicity to at least half of the organisms. A lower percentage LC<sub>50</sub> (lethal concentration to 50% of test organisms) indicates a greater toxic effect because less of the sample is required to observe a sufficiently extensive adverse effect.

Note: Results are the range of values measured during the reporting period.

Table 3-3 Ponds – Interior and Terminal

Location, Parameter, and Units	Measured 30-Day Avg	Limit 30-Day Avg	Measured 7-Day Avg	Limit 7-Day Avg	Measured Daily Min	Limit Daily Min	Measured Daily Max	Limit Daily Max	Measured Result
<b>Discharged: 04/21/97 - 05/07/97 and 05/22/97 - 05/29/97</b>									
Pond A-3 (Outfall 002)									
pH, SU	N/A	N/A	N/A	N/A	6.9 - 7.6	6.0	8.1 - 8.3	9.0	N/A
NO <sub>3</sub> /NO <sub>2</sub> , mg/l	1.2 - 1.5	10	N/A	N/A	N/A	N/A	1.8 - 1.9	20	N/A
<b>Discharged: 04/03/97 - 04/13/97, 05/01/97 - 05/14/97, and 06/25/97 - 06/30/97</b>									
Pond A-4 (Outfall 005A)									
Total Chromium, mg/l	N/A	N/A	N/A	N/A	N/A	N/A	<4.8	50	N/A
<b>WET</b>									
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
<b>Discharged: 04/28/97 - 05/12/97</b>									
Pond B-5 (Outfall 006A)									
Total Chromium, mg/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	N/A
<b>WET</b>									
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
NO <sub>3</sub> /NO <sub>2</sub> , mg/l*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRC, mg/l*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>No Discharge</b>									
Pond C-2 (Outfall 007A)									
Total Chromium, mg/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	N/A
<b>WET</b>									
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
*Sample and analysis required only if Pond B-3 is bypassed.									
N/A = Not Applicable									
SU = Standard Units									
TRC = Total Residual Chlorine									
WET = (Whole Effluent Toxicity) Results for WET are given in percentage of effluent sample that will cause mortality to half the test result organisms within the time frame of the test. For example, >100% indicates that 100% pure effluent did not cause acute toxicity to at least half of the organisms. A lower percentage LC <sub>50</sub> (lethal concentration to 50% of test organisms) indicates a greater toxic effect because less of the sample is required to observe a sufficiently extensive adverse effect.									
Note: Results are the range of values measured during the reporting period.									

Table 3-4 Daily Transfer Flow Data Recorded for Pond B-5 to Pond A-4

Date	Pond B-5 to A-4 (gal)	Date	Pond B-5 to A-4 (gal)	Date	Pond B-5 to A-4 (gal)
4/1/97	No transfer	5/1/97	No transfer	6/1/97	No transfer
4/2/97	No transfer	5/2/97	No transfer	6/2/97	831,000
4/3/97	No transfer	5/3/97	No transfer	6/3/97	1,115,000
4/4/97	No transfer	5/4/97	No transfer	6/4/97	1,192,000
4/5/97	No transfer	5/5/97	No transfer	6/5/97	1,096,000
4/6/97	No transfer	5/6/97	No transfer	6/6/97	1,066,000
4/7/97	No transfer	5/7/97	No transfer	6/7/97	1,054,000
4/8/97	No transfer	5/8/97	No transfer	6/8/97	686,000
4/9/97	No transfer	5/9/97	No transfer	6/9/97	No transfer
4/10/97	No transfer	5/10/97	No transfer	6/10/97	No transfer
4/11/97	No transfer	5/11/97	No transfer	6/11/97	No transfer
4/12/97	No transfer	5/12/97	No transfer	6/12/97	No transfer
4/13/97	No transfer	5/13/97	No transfer	6/13/97	No transfer
4/14/97	1,063,000	5/14/97	No transfer	6/14/97	No transfer
4/15/97	1,480,000	5/15/97	No transfer	6/15/97	No transfer
4/16/97	1,446,000	5/16/97	No transfer	6/16/97	No transfer
4/17/97	1,400,000	5/17/97	No transfer	6/17/97	No transfer
4/18/97	1,345,000	5/18/97	No transfer	6/18/97	No transfer
4/19/97	1,271,000	5/19/97	No transfer	6/19/97	No transfer
4/20/97	1,057,000	5/20/97	No transfer	6/20/97	No transfer
4/21/97	1,056,000	5/21/97	No transfer	6/21/97	No transfer
4/22/97	1,015,000	5/22/97	No transfer	6/22/97	No transfer
4/23/97	956,000	5/23/97	No transfer	6/23/97	No transfer
4/24/97	717,000	5/24/97	No transfer	6/24/97	No transfer
4/25/97	No transfer	5/25/97	No transfer	6/25/97	No transfer
4/26/97	No transfer	5/26/97	No transfer	6/26/97	No transfer
4/27/97	No transfer	5/27/97	No transfer	6/27/97	No transfer
4/28/97	No transfer	5/28/97	No transfer	6/28/97	No transfer
4/29/97	No transfer	5/29/97	No transfer	6/29/97	No transfer
4/30/97	No transfer	5/30/97	No transfer	6/30/97	No transfer
		5/31/97	No transfer		
<b>Total</b>	<b>12,806,000</b>	<b>Total</b>	<b>No transfer</b>	<b>Total</b>	<b>7,040,000</b>



# Section 4: Hydrologic - Rocky Flats Clean-up Agreement

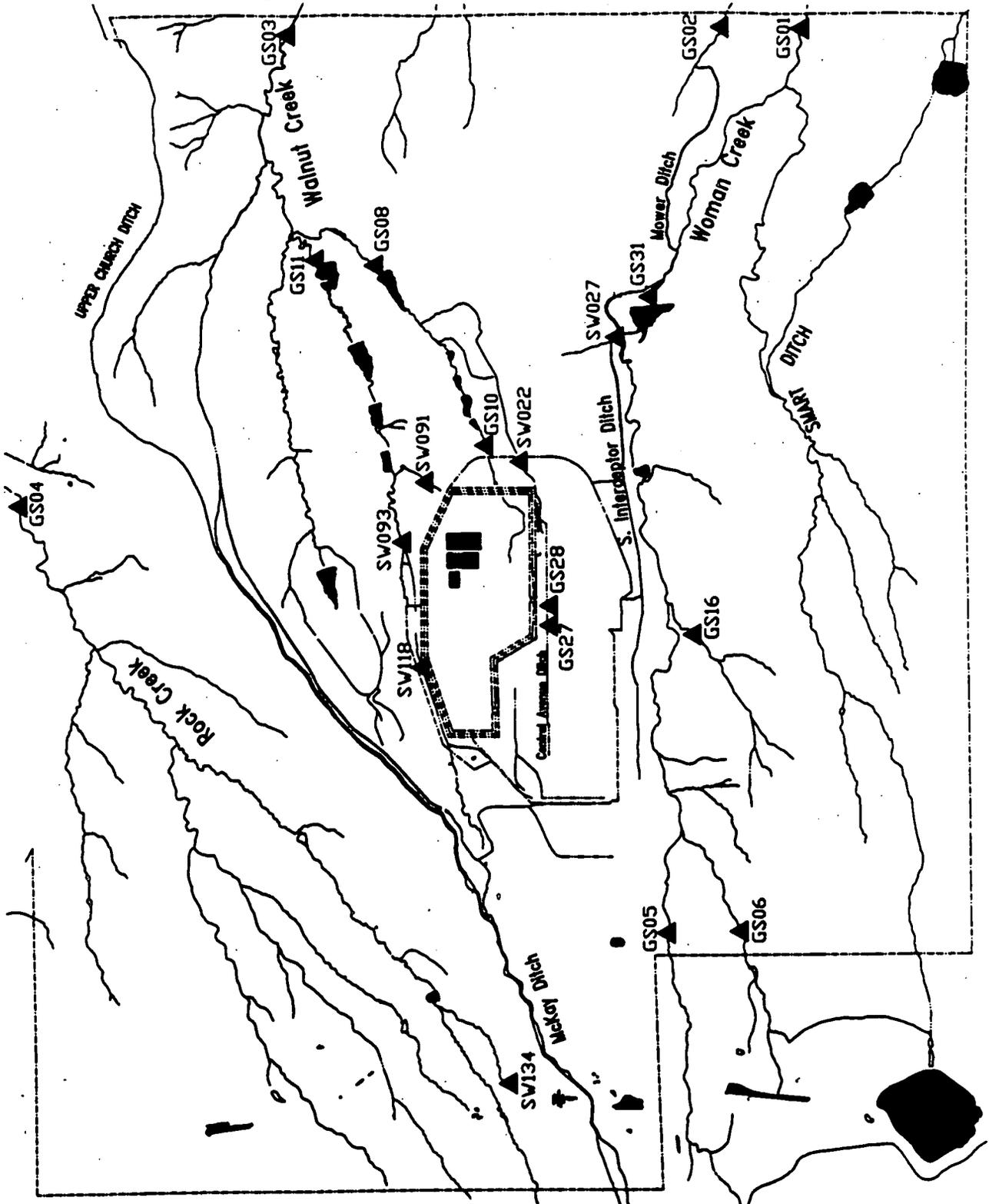


Figure 4-0 Gaging Station Locations

Key:  $\Delta$  Gaging Station Location

April - June 1997

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**Section 4.1 Flow Monitoring**

**Table 4-1 Gaging Station GS01: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.045	1.410	0.060			
2	0.072	1.029	0.048			
3	0.095	0.867	0.036			
4	0.151	0.726	0.031			
5	0.232	0.590	0.028			
6	0.126	0.508	0.026			
7	0.097	0.432	0.172			
8	0.086	0.353	0.191			
9	0.088	0.329	0.146			
10	0.089	0.298	0.163			
11	0.111	0.274	0.122			
12	0.167	0.363	0.063			
13	0.173	0.272	0.068			
14	0.127	0.232	0.094			
15	0.099	0.292	0.105			
16	0.108	0.231	0.056			
17	0.086	0.171	0.039			
18	0.075	0.130	0.029			
19	0.068	0.123	0.025			
20	0.058	0.122	0.022			
21	0.054	0.102	0.022			
22	0.050	0.189	0.021			
23	0.059	0.328	0.018			
24	3.593	0.235	0.016			
25	5.750	0.479	0.015			
26	13.158 <sup>a</sup>	0.274	0.014			
27	25.311 <sup>a</sup>	0.168	0.011			
28	19.528 <sup>a</sup>	0.131	0.007			
29	5.426 <sup>a</sup>	0.133	0.006			
30	2.006	0.129	0.004			
31	N/A	0.092	N/A			
<b>Mo. Avg. (cfs)</b>	2.570	0.355	0.055			

Monthly Discharge			
Cubic Feet	6,660,431	951,258	143,088
Gallons	49,823,490	7,115,902	1,070,376
Acre-Feet	152.88	21.83	3.28

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS01 is located at 39° 52' 40"N, 105° 09' 55"W, at Woman Creek and Indiana Street (See Section 4 Map). This station is a RFCA Point of Compliance, a Buffer Zone Monitoring Location and a monitoring point for water leaving the Site and flowing to Woman Creek Reservoir. This station collects samples for selected radionuclides using continuous flow-paced sampling and storm event sampling for selected water quality parameters, metals, and major ions.

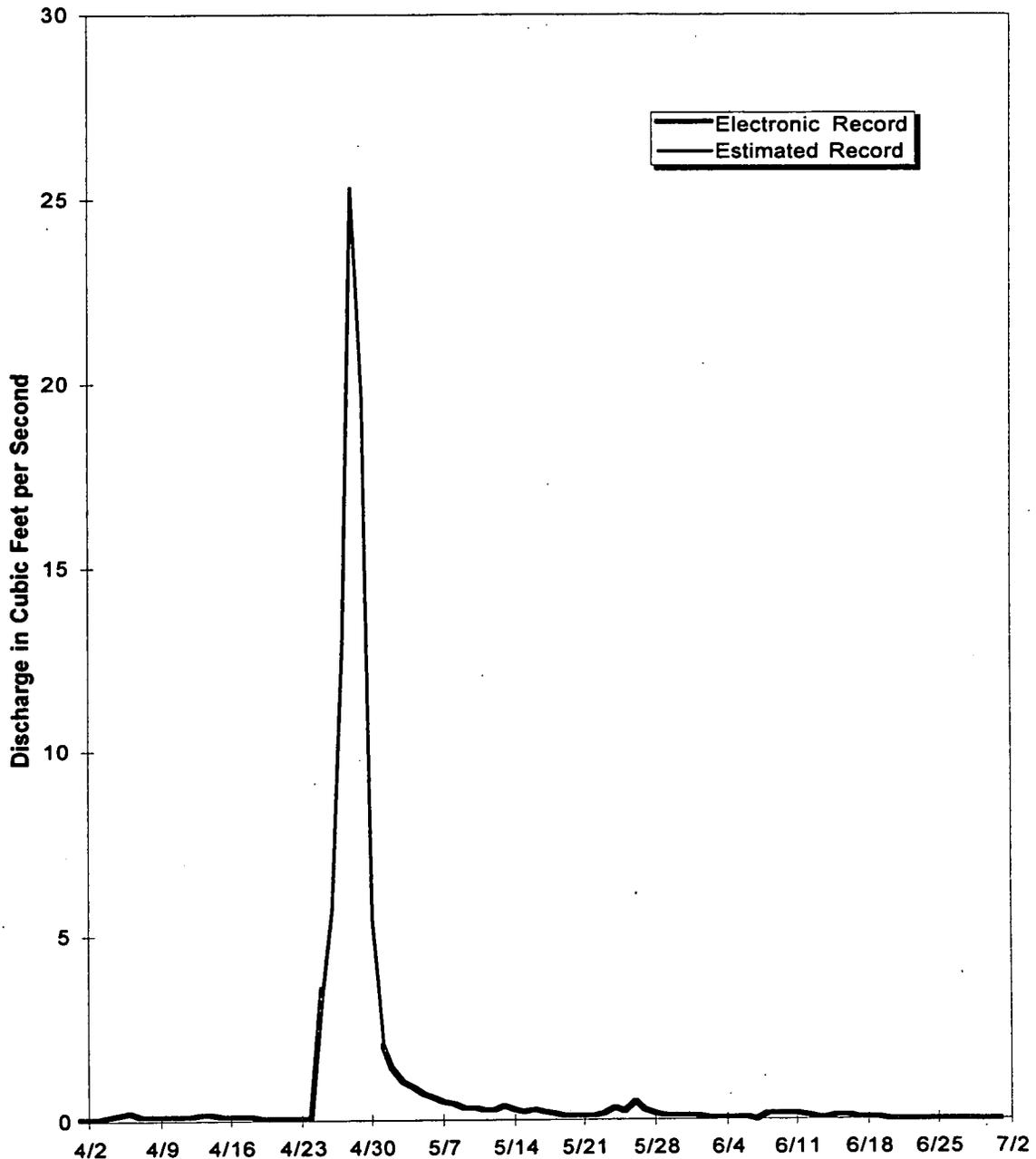


Figure 4-1 Mean Daily Discharge at Gaging Station GS01, Water Year 1997 (April, May, June 1997)

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**Table 4-2 Gaging Station GS02: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.004	0.016	0.000			
2	0.032	0.013	0.000			
3	0.157	0.010	0.000			
4	0.349	0.007	0.000			
5	0.974	0.004	0.000			
6	0.702	0.003	0.000			
7	0.315	0.002	0.000			
8	0.205	0.001	0.000			
9	0.191	0.000	0.000			
10	0.176	0.000	0.000			
11	0.250	0.000	0.000			
12	0.470	0.000	0.000			
13	0.710	0.000	0.000			
14	0.899	0.000	0.000			
15	0.470	0.000	0.000			
16	0.368	0.000	0.000			
17	0.273	0.000	0.000			
18	0.194	0.000	0.000			
19	0.154	0.000	0.000			
20	0.107	0.000	0.000			
21	0.069	0.000	0.000			
22	0.040	0.000	0.000			
23	0.012	0.000	0.000			
24	0.042	0.000	0.000			
25	0.078	0.000	0.000			
26	0.122	0.000	0.000			
27	0.303	0.000	0.000			
28	0.078	0.000	0.000			
29	0.025	0.000	0.000			
30	0.019	0.000	0.000			
31	NA	0.000	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.260</b>	<b>0.002</b>	<b>0.000</b>			

	Monthly Discharge		
Cubic Feet	672,682	4,896	0
Gallons	5,032,014	36,623	0
Acre-Feet	15.44	0.11	0.00

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

Gaging Station GS02 is located at 39° 52' 53"N and 105° 9' 55"W, at Mower Ditch and Indiana Street (See Section 4 Map). This station is a Buffer Zone Monitoring Location and is a monitoring point for water leaving the Site and flowing to Mower Reservoir. Storm event samples are collected for selected water quality parameters, metals, and major ions.

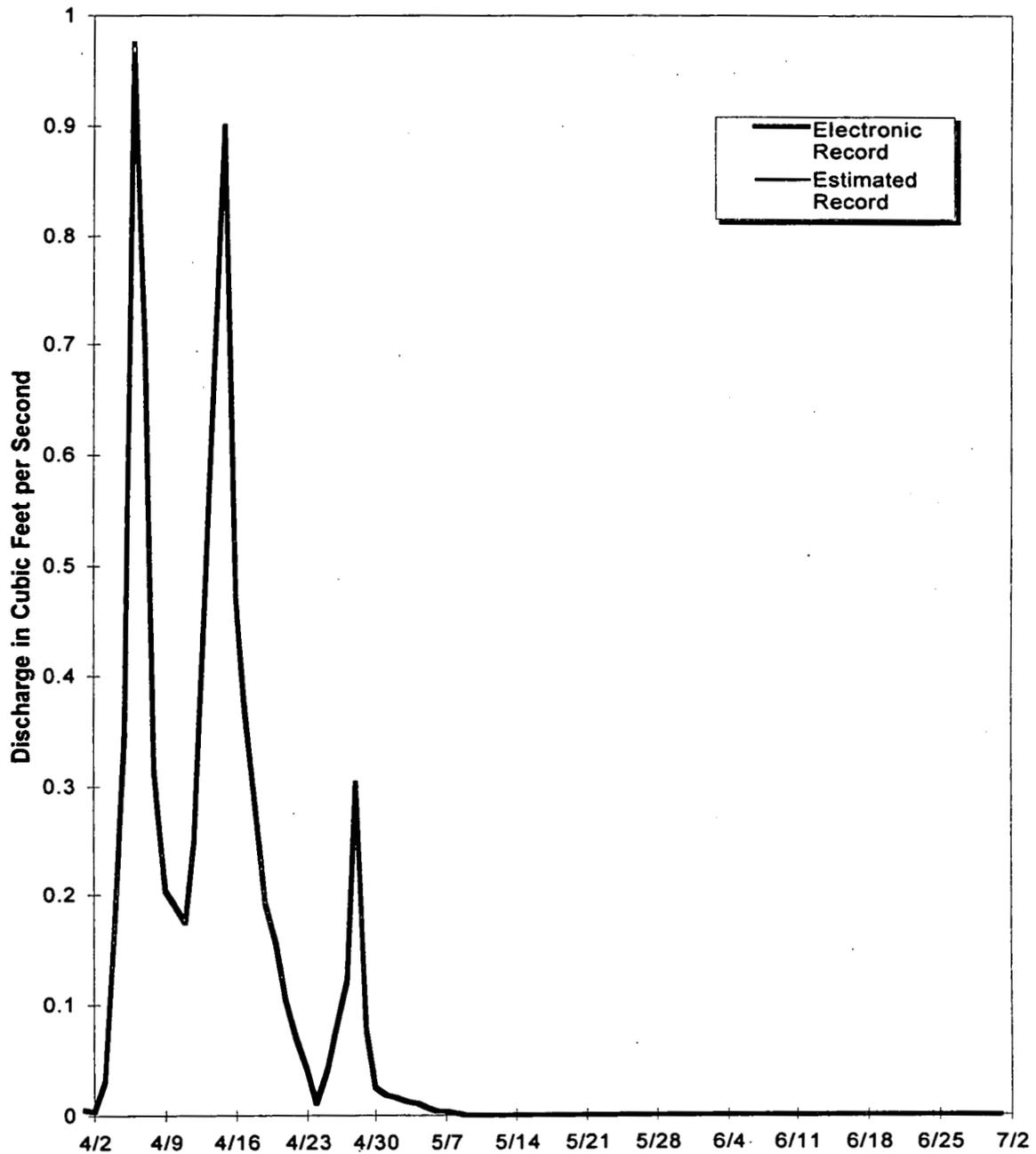


Figure 4-2 Mean Daily Discharge at Gaging Station GS02, Water Year 1997 (April, May, June 1997)

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Table 4-3 Gaging Station GS03: Mean Daily Discharge (Cubic Feet per Second)

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.001	3.362	0.002 <sup>a</sup>			
2	0.004	7.040	0.003 <sup>a</sup>			
3	0.915	6.667	0.003 <sup>a</sup>			
4	2.579	6.154	0.002 <sup>a</sup>			
5	2.851	5.646	0.000			
6	2.580	5.135	0.001			
7	2.304	4.262	0.033			
8	2.145	4.018	0.030			
9	1.541	3.645	0.020			
10	1.517	3.196	0.033 <sup>a</sup>			
11	1.432	2.700	0.021 <sup>a</sup>			
12	1.281	2.687	0.007 <sup>a</sup>			
13	1.557	1.313	0.005			
14	0.245	1.303	0.017			
15	0.121	0.058	0.009			
16	0.054	0.032	0.003			
17	0.021	0.033	0.002			
18	0.015	0.047	0.002			
19	0.036	0.036	0.002 <sup>a</sup>			
20	0.080	0.016	0.001 <sup>a</sup>			
21	0.069	0.010	0.001 <sup>a</sup>			
22	0.095	0.021	0.001 <sup>a</sup>			
23	0.048	0.025	0.001 <sup>a</sup>			
24	1.830	0.027	0.001 <sup>a</sup>			
25	6.439	0.033	0.552 <sup>a</sup>			
26	9.877	0.011	2.430			
27	14.969	0.002	2.363			
28	7.768	0.002	2.244			
29	4.736	0.001	2.088			
30	2.813	0.001	1.937			
31	NA	0.001	NA			
Mo. Avg. (cfs)	2.331	1.854	0.394			

	Monthly Discharge		
Cubic Feet	6,041,504	4,966,622	1,020,628
Gallons	45,193,594	37,152,917	7,634,828
Acre-Feet	138.67	114.00	23.43

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS03 is located at 39° 54' 7"N, 105° 9' 59"W, at Walnut Creek and Indiana Street (See Section 4 Map). This station is a RFCA Point of Compliance, a Buffer Zone Monitoring Location and a monitoring point for water leaving the Site and flowing to the Broomfield Diversion Ditch. This station collects samples for selected radionuclides using continuous flow-paced sampling and storm event sampling for selected water quality parameters, metals, and major ions.

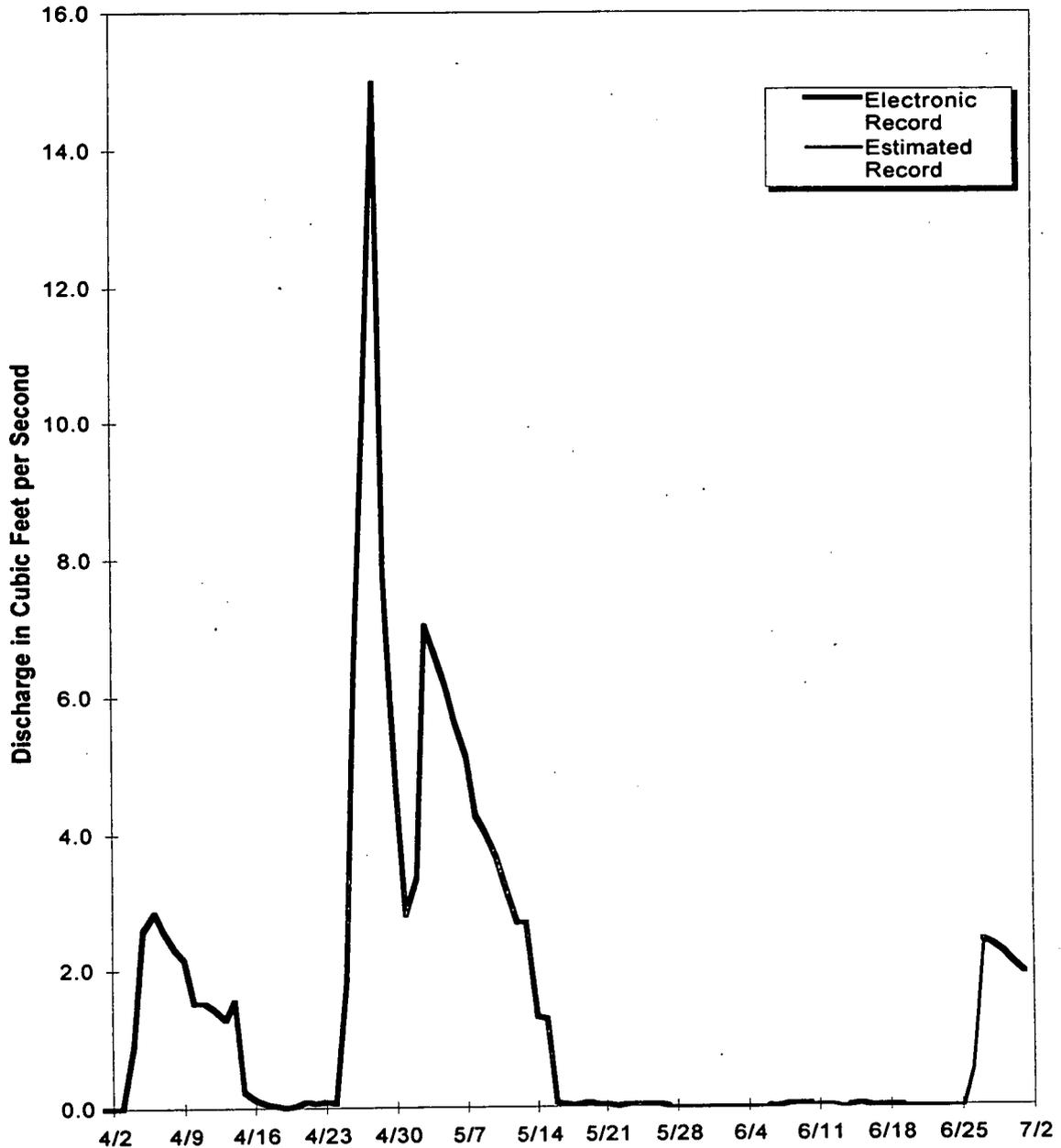


Figure 4-3 Mean Daily Discharge at Gaging Station GS03, Water Year 1997 (April, May, June 1997)

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Table 4-4 Gaging Station GS04 Mean Daily Discharge (Cubic Feet per Second)

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.168	2.122	0.176			
2	0.232	1.521	0.175			
3	0.355	3.318	0.154			
4	0.464	1.717	0.141			
5	0.879	0.988	0.129			
6	0.557	0.796	0.143			
7	0.377	0.647	0.531			
8	0.318	0.566	0.302			
9	0.307	0.517	0.318			
10	0.315	0.464	0.277			
11	0.356	0.467	0.216			
12	0.484	0.528	0.163			
13	0.748	0.414	0.162			
14	0.805	0.397	0.532			
15	0.550	0.420	0.261			
16	0.519	0.339	0.186			
17	0.417	0.287	0.147			
18	0.364	0.250	0.123			
19	0.325	0.267	0.095			
20	0.290	0.253	0.071			
21	0.269	0.233	0.045			
22	0.258	0.464	0.027			
23	0.291	0.443	0.016			
24	2.823	0.506	0.007			
25	4.652 <sup>a</sup>	0.537	0.001			
26	9.730 <sup>a</sup>	0.377	0.000			
27	14.629 <sup>a</sup>	0.283	0.000			
28	11.658 <sup>a</sup>	0.267	0.000			
29	5.047 <sup>a</sup>	0.278	0.000			
30	2.816	0.266	0.000			
31	NA	0.221	NA			
<b>Mo. Avg. (cfs)</b>	<b>2.033</b>	<b>0.650</b>	<b>0.147</b>			

Monthly Discharge			
Cubic Feet	5,270,562	1,741,209	379,994
Gallons	39,426,547	13,025,145	2,842,552
Acre-Feet	120.98	39.97	8.72
Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.			
<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.			

Gaging Station GS04 is located 39° 54' 57"N, 105° 11' 37"W, at Rock Creek and Highway 128 (See Section 4 Map). This station is a Buffer Zone Monitoring Location and is a monitoring point for water leaving the Site through the Rock Creek drainage flowing to Coal Creek. Storm event samples are collected for selected water quality parameters, metals, and major ions.

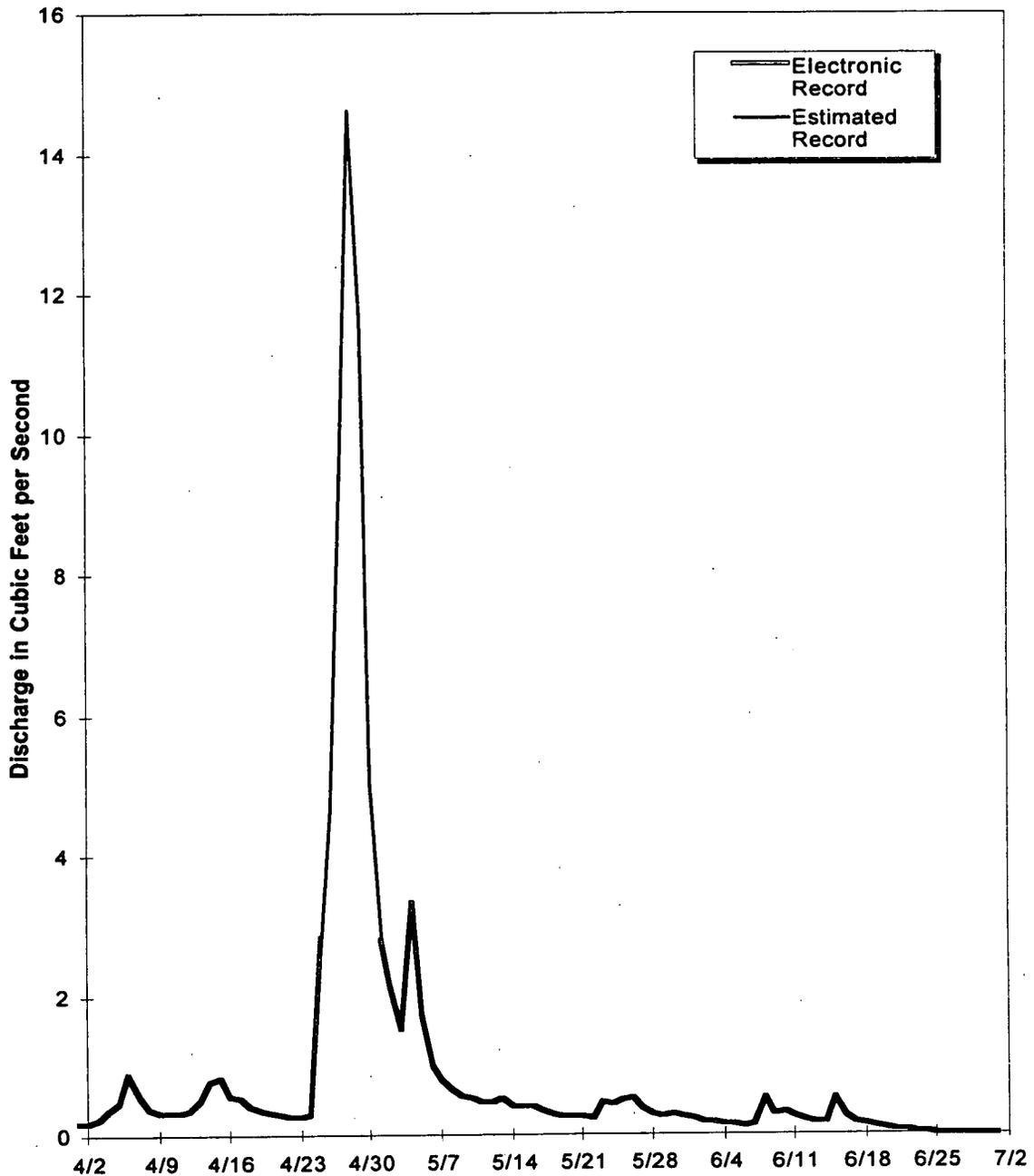


Figure 4-4 Mean Daily Discharge at Gaging Station GS04, Water Year 1997 (April, May, June 1997)

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**Table 4-5 Gaging Station GS05: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.035	0.346	0.048			
2	0.065	0.252	0.045			
3	0.100	0.228	0.038			
4	0.156	0.191	0.040			
5	0.318	0.168	0.039			
6	0.136	0.138	0.119			
7	0.080	0.087	0.241			
8	0.065	0.100	0.070			
9	0.063	0.123	0.091			
10	0.075	0.102	0.121			
11	0.124	0.104	0.038			
12	0.235	0.101	0.028			
13	0.349	0.087	0.035			
14	0.195	0.110	0.115			
15	0.125	0.103	0.035			
16	0.124	0.083	0.029			
17	0.083	0.072	0.028			
18	0.083	0.074	0.021			
19	0.070	0.070	0.019			
20	0.049	0.066	0.016			
21	0.046	0.072	0.020			
22	0.072	0.109	0.016			
23	0.162	0.085	0.014			
24	1.545	0.205	0.012			
25	3.700	0.118	0.011			
26	6.198 <sup>a</sup>	0.081	0.010			
27	9.181 <sup>a</sup>	0.070	0.009			
28	5.568 <sup>a</sup>	0.067	0.007			
29	1.051	0.069	0.006			
30	0.480	0.059	0.016			
31	NA	0.050	NA			
<b>Mo. Avg. (cfs)</b>	<b>1.018</b>	<b>0.116</b>	<b>0.045</b>			
<b>Monthly Discharge</b>						
Cubic Feet	2,638,129	310,189	115,426			
Gallons	19,734,578	2,320,375	863,445			
Acre-Feet	60.55	7.12	2.65			
<p>Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.</p> <p><sup>a</sup> No data available.</p>						

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Gaging Station GS05 is located 39° 53' 6"N, 105° 13' 17"W, at Kinnear Ditch and North Woman Creek (See Section 4 Map). This station is a Buffer Zone Monitoring Location and is a monitoring point for water entering North Woman Creek. Storm event samples are collected for selected water quality parameters, metals, and major ions.

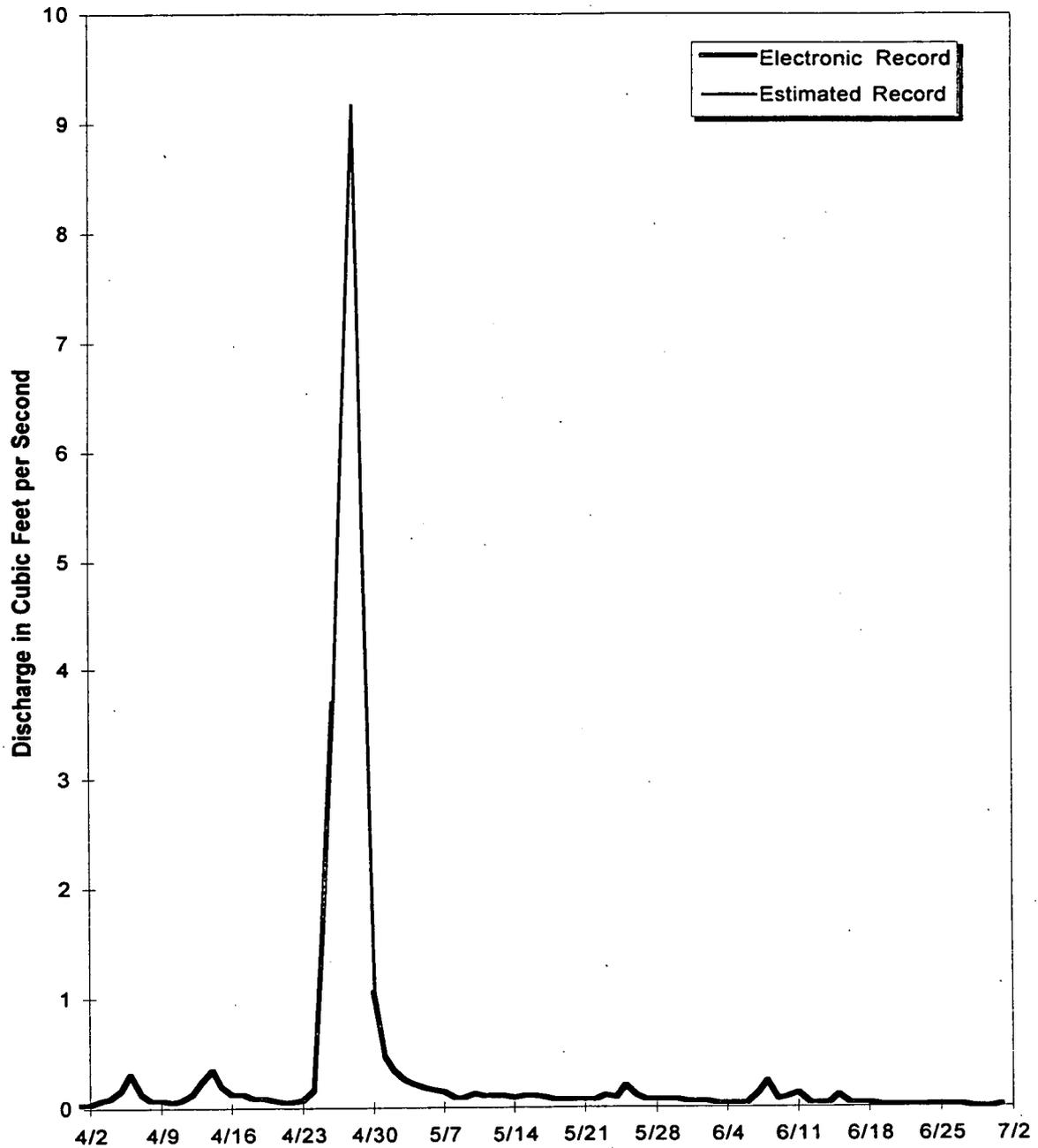


Figure 4-5 Mean Daily Discharge at Gaging Station GS05, Water Year 1997 (April, May, June 1997)

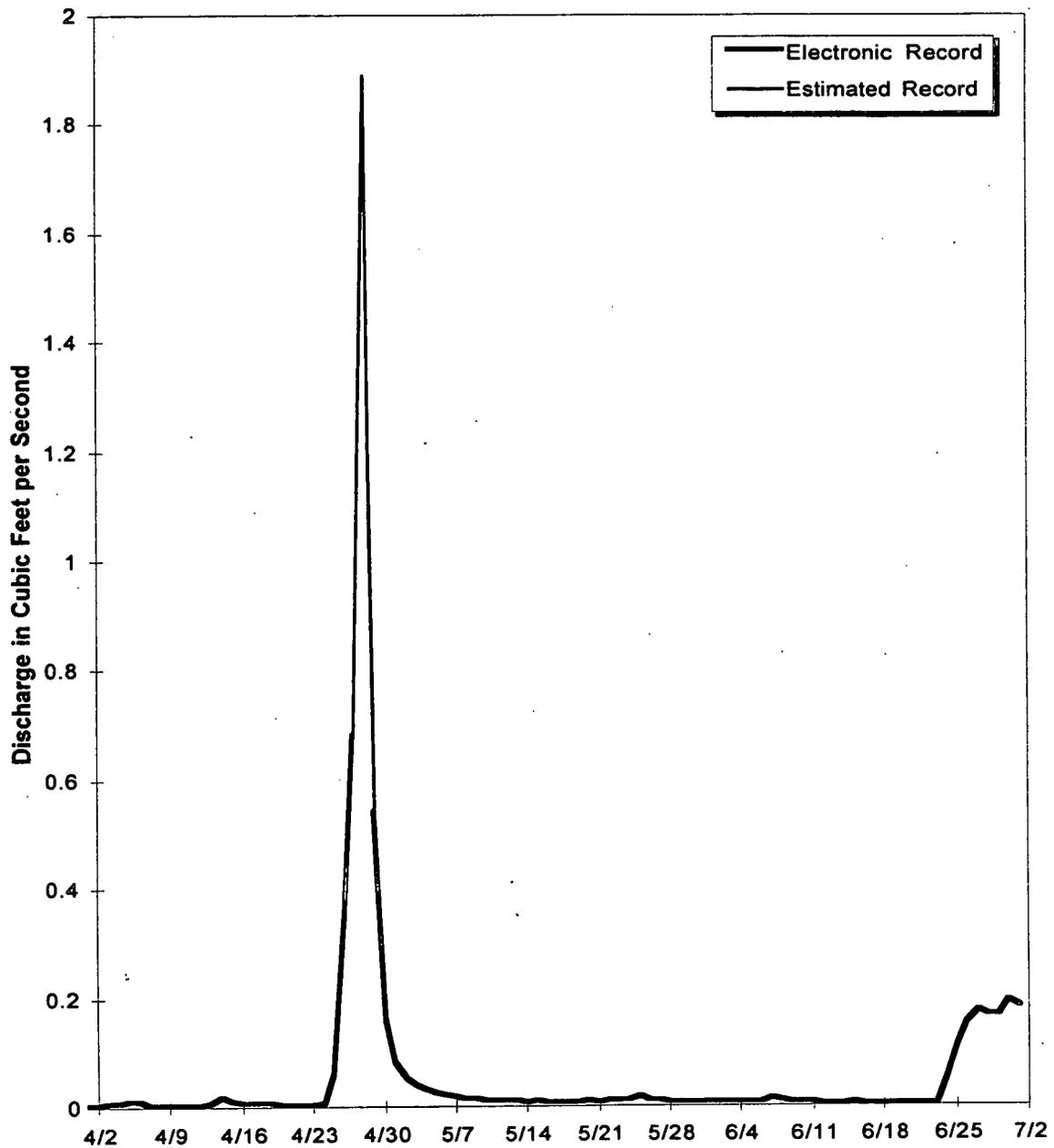
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**Table 4-6 Gaging Station GS06: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.004	0.054	0.006			
2	0.006	0.040	0.006			
3	0.007	0.033	0.006			
4	0.012	0.028	0.006			
5	0.010	0.023	0.006			
6	0.004	0.019	0.016			
7	0.002	0.016	0.010			
8	0.003	0.014	0.008			
9	0.003	0.012	0.007			
10	0.004	0.010	0.006			
11	0.005	0.011	0.004			
12	0.007	0.010	0.003			
13	0.017	0.008	0.004			
14	0.010	0.010	0.006			
15	0.008	0.009	0.004			
16	0.007	0.008	0.004			
17	0.006	0.008	0.004			
18	0.006	0.009	0.003			
19	0.005	0.010	0.003			
20	0.005	0.009	0.003			
21	0.004	0.010	0.003			
22	0.005	0.013	0.003			
23	0.006	0.010	0.048			
24	0.059	0.020	0.112			
25	0.350	0.012	0.152			
26	0.680	0.010	0.174			
27	1.890 <sup>a</sup>	0.008	0.167			
28	0.542	0.008	0.169			
29	0.161	0.008	0.193			
30	0.081	0.007	0.184			
31	NA	0.006	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.130</b>	<b>0.015</b>	<b>0.044</b>			

Monthly Discharge						
Cubic Feet	337,638	38,969	114,218			
Gallons	2,525,706	291,512	8,544,114			
Acre-Feet	7.75	0.89	2.62			
<p>Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.</p> <p><sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.</p>						

Gaging Station GS06 is located 39° 52' 53"N, 105° 13' 17"W, on South Woman Creek (See Section 4 Map). This station is a Buffer Zone Monitoring Location and is a monitoring point for water entering South Woman Creek. Storm event samples are collected for selected water quality parameters, metals, and major ions.



**Figure 4-6 Mean Daily Discharge at Gaging Station GS06, Water Year 1997 (April, May, June 1997)**

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**Table 4-7 Gaging Station GS08: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.000	1.652	0.000			
2	0.000	1.657	0.000			
3	0.000	1.553	0.000			
4	0.000	1.315	0.000			
5	0.000	1.340	0.000			
6	0.000	1.193	0.000			
7	0.000	1.079	0.000			
8	0.000	1.495	0.000			
9	0.000	1.551	0.000			
10	0.000	1.375	0.000			
11	0.000	0.990	0.000			
12	0.000	1.058	0.000			
13	0.000	0.000	0.000			
14	0.000	0.000	0.000			
15	0.000	0.000	0.000			
16	0.000	0.000	0.000			
17	0.000	0.000	0.000			
18	0.000	0.000	0.000			
19	0.000	0.000	0.000			
20	0.000	0.000	0.000			
21	0.000	0.000	0.000			
22	0.000	0.000	0.000			
23	0.000	0.000	0.000			
24	0.000	0.000	0.000			
25	0.000	0.000	0.000			
26	0.000	0.000	0.000			
27	0.000	0.000	0.000			
28	1.833	0.000	0.000			
29	3.515	0.000	0.000			
30	2.302	0.000	0.000			
31	NA	0.000	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.255</b>	<b>0.524</b>	<b>0.000</b>			

Monthly Discharge			
Cubic Feet	660,905	1,404,499	0
Gallons	4,943,915	10,506,382	0
Acre-Feet	15.17	32.24	0.00
Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.			

Gaging Station GS08 is located 39° 53' 54"N, 105° 10' 48"W, at the Pond B-5 Outfall on South Walnut Creek (See Section 4 Map). This station is a RFCA Point of Compliance and monitors water discharged from Pond B-5 to South Walnut Creek. This station collects samples for selected radionuclides using continuous flow-paced sampling.

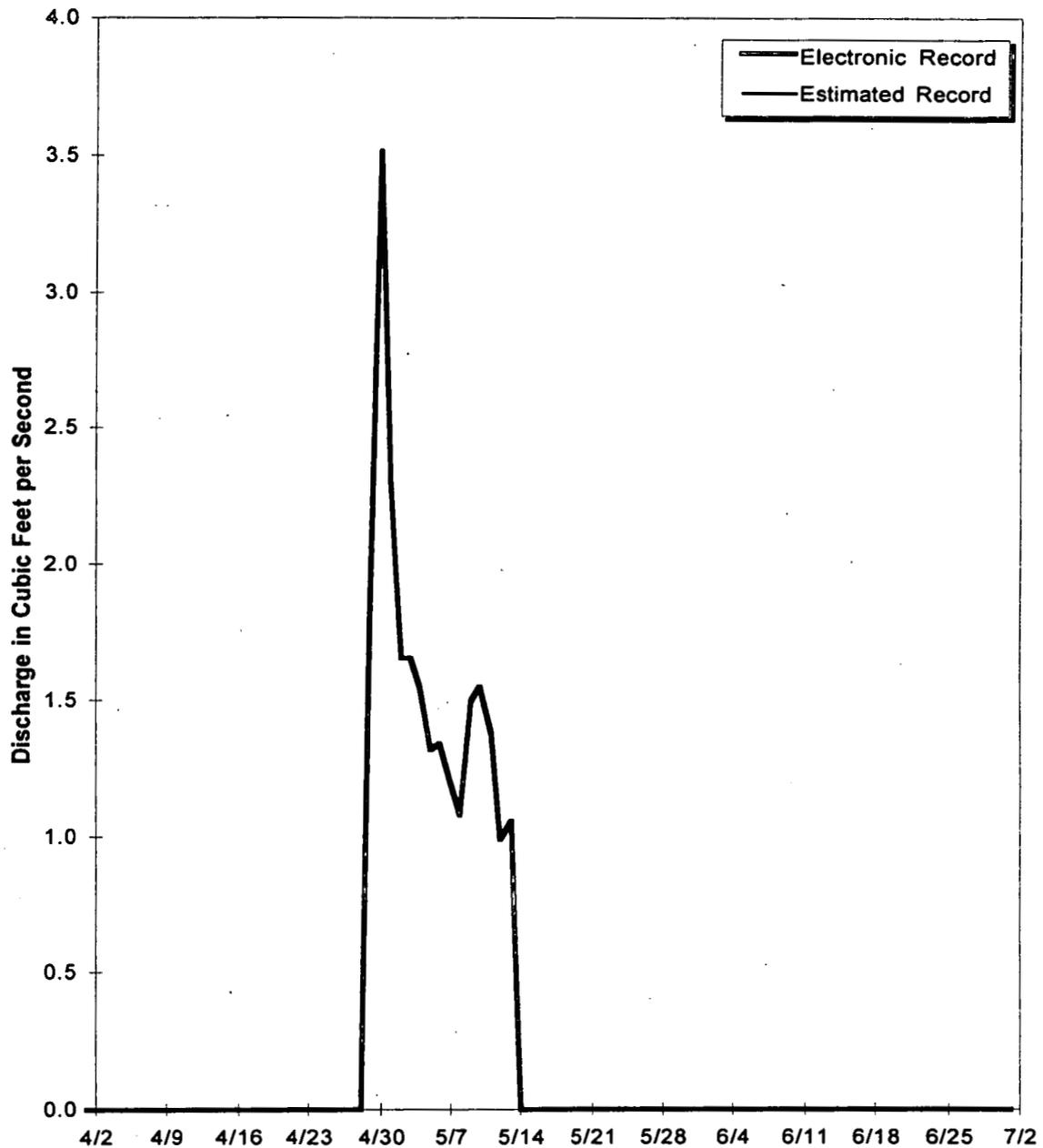


Figure 4-7 Mean Daily Discharge at Gaging Station GS08, Water Year 1997 (April, May, June 1997)

**Table 4-8 Gaging Station GS10: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.054	0.162	0.082			
2	0.244	0.135	0.076			
3	0.110	0.124	0.071			
4	0.961	0.116	0.071			
5	0.519	0.110	0.072			
6	0.098	0.103	1.218 <sup>a</sup>			
7	0.073	0.099	0.370			
8	0.066	0.093	0.160			
9	0.063	0.090	0.127			
10	0.100	0.088	0.131			
11	0.335	0.136	0.101			
12	0.226	0.106	0.126			
13	0.176	0.092	0.131			
14	0.094	0.122	0.369			
15	0.108	0.105	0.095			
16	0.121	0.089	0.101			
17	0.075	0.087	0.090			
18	0.068	0.082 <sup>a</sup>	0.084			
19	0.062	0.088	0.078			
20	0.080	0.082	0.073			
21	0.060	0.111	0.071			
22	0.061	0.401	0.068			
23	0.201	0.112	0.067			
24	3.224 <sup>a</sup>	0.356	0.101			
25	3.691	0.114	0.071			
26	1.980	0.106	0.073			
27	1.352	0.094	0.075			
28	0.448	0.080	0.077			
29	0.254	0.081	0.075			
30	0.178	0.073	0.068			
31	NA	0.069	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.503</b>	<b>0.120</b>	<b>0.146</b>			

**Monthly Discharge**

Cubic Feet	1,303,003	320,417	377,816
Gallons	9,747,144	2,396,885	2,826,260
Acre-Feet	29.91	7.35	8.67

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS10 is located 39° 53' 35"N, 105° 11' 27"W on South Walnut Creek above the Pond B-1 Bypass (See Section 4 Map). This station is a RFCA Action Level Framework and a New Source Detection Location and monitors water leaving the Site Industrial Area and entering the B-Series Ponds and South Walnut Creek. This station collects samples for selected radionuclides, metals, and water quality parameters using continuous flow-paced sampling.

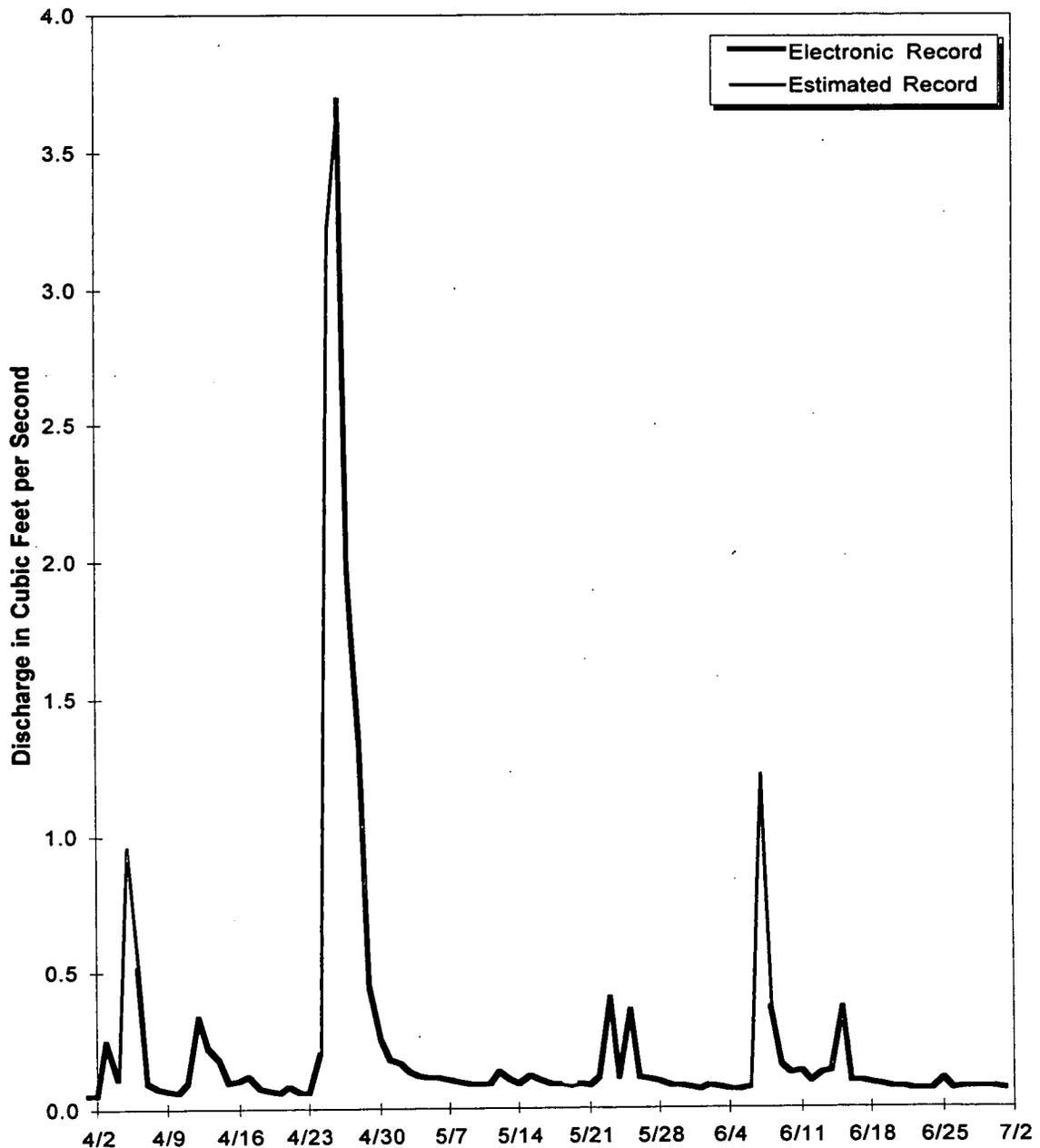


Figure 4-8 Mean Daily Discharge at Gaging Station GS10, Water Year 1997 (April, May, June 1997)

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Table 4-9 Gaging Station GS11: Mean Daily Discharge (Cubic Feet per Second)

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.000	1.850	0.000			
2	0.000	4.965	0.000			
3	1.646	4.744	0.000			
4	2.839	4.591	0.000			
5	2.755	4.188	0.000			
6	2.526	3.794	0.000			
7	2.275	3.065	0.000			
8	2.084	2.595	0.000			
9	1.482	2.118	0.000			
10	1.517	1.879	0.000			
11	1.432	1.790	0.000			
12	1.276	1.617	0.000			
13	1.225	1.366	0.000			
14	0.000	1.072	0.000			
15	0.000	0.000	0.000			
16	0.000	0.000	0.000			
17	0.000	0.000	0.000			
18	0.000	0.000	0.000			
19	0.000	0.000	0.000			
20	0.000	0.000	0.000			
21	0.000	0.000	0.000			
22	0.000	0.000	0.000			
23	0.000	0.000	0.000			
24	0.000	0.000	0.000			
25	0.000	0.000	1.197			
26	0.000	0.000	2.679			
27	0.000	0.000	2.494			
28	0.000	0.000	2.353 <sup>a</sup>			
29	0.000	0.000	2.203 <sup>a</sup>			
30	0.000	0.000	2.053 <sup>a</sup>			
31	NA	0.000	NA			
<b>Mo. Avg (cfs)</b>	<b>0.702</b>	<b>1.279</b>	<b>0.433</b>			

Monthly Discharge			
Cubic Feet	1,819,219	3,424,412	1,121,374
Gallons	13,608,704	25,616,379	8,388,459
Acre-Feet	41.76	78.60	25.74

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.



**Table 4-10 Gaging Station GS16: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.099	0.165	0.078			
2	0.135	0.151	0.077			
3	0.216	0.151	0.072			
4	0.282	0.138	0.069			
5	0.297	0.133	0.067			
6	0.164	0.121	0.210			
7	0.124	0.112	0.191			
8	0.120	0.117	0.117			
9	0.123	0.120	0.117			
10	0.187	0.111	0.119			
11	0.226	0.139	0.081			
12	0.282	0.145	0.082			
13	0.322	0.114	0.108			
14	0.181	0.139	0.157			
15	0.147	0.143	0.081			
16	0.154	0.112	0.079			
17	0.122	0.096	0.076			
18	0.116	0.099	0.067			
19	0.106	0.113	0.058			
20	0.103	0.100	0.051			
21	0.099	0.106	0.051			
22	0.105	0.203	0.046			
23	0.143	0.145	0.048			
24	0.672	0.199	0.054			
25	0.591	0.147	0.055			
26	0.804	0.112	0.051			
27	1.785 <sup>a</sup>	0.095	0.044			
28	1.237	0.102	0.044			
29	0.271	0.114	0.041			
30	0.183	0.103	0.038			
31	NA	0.086	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.313</b>	<b>0.127</b>	<b>0.081</b>			

Monthly Discharge			
Cubic Feet	811,911	339,762	209,743
Gallons	6,073,519	2,541,598	1,568,987
Acre-Feet	18.64	7.80	4.81

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS16 is located 39° 53' 1"N, 105° 12' 8"W along Antelope Springs Gulch, south of Woman Creek (See Section 4 Map). This station is a Buffer Zone Monitoring Location and is a monitoring point for water entering Woman Creek from Antelope Springs. No samples are collected at this location.

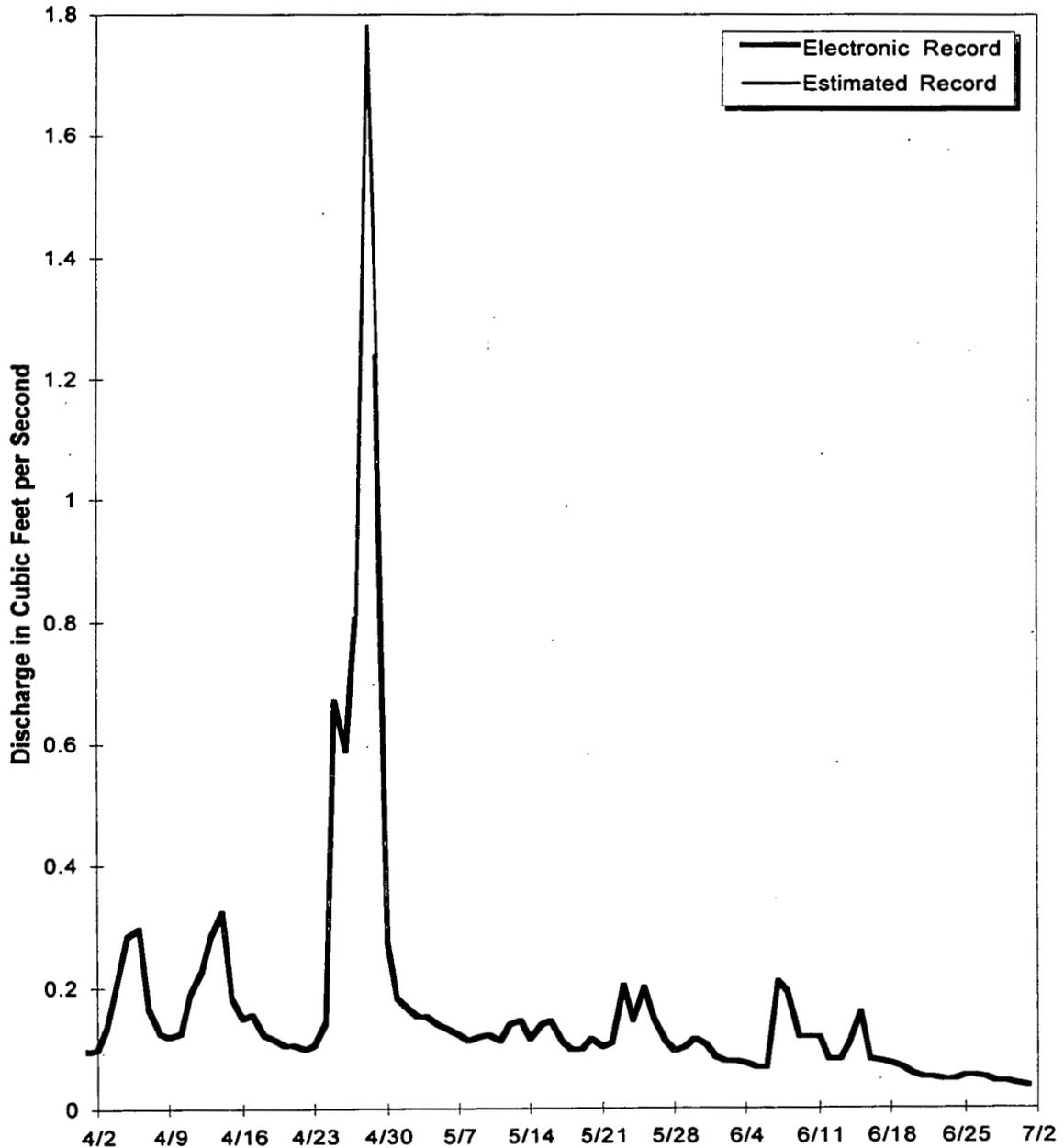


Figure 4-10 Mean Daily Discharge at Gaging Station GS16, Water Year 1997 (April, May, June 1997)

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**Table 4-11 Gaging Station GS27: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.0000	0.0000	0.0000			
2	0.0002	0.0000	0.0000			
3	0.0000	0.0000	0.0000			
4	0.0029	0.0000	0.0000			
5	0.0002	0.0000	0.0000			
6	0.0000	0.0000	0.0040			
7	0.0000	0.0000	0.0001*			
8	0.0000	0.0000	0.0001*			
9	0.0000	0.0000	0.0000*			
10	0.0000	0.0000	0.0000*			
11	0.0010	0.0000	0.0000			
12	0.0006	0.0000	0.0000			
13	0.0000	0.0000	0.0000			
14	0.0000	0.0000	0.0007			
15	0.0000	0.0000	0.0000			
16	0.0000	0.0000	0.0000			
17	0.0000	0.0000	0.0000			
18	0.0000	0.0000	0.0000			
19	0.0000	0.0000	0.0000			
20	0.0000	0.0000	0.0000			
21	0.0000	0.0000	0.0000			
22	0.0000	0.0007	0.0000			
23	0.0004	0.0000	0.0000			
24	0.0112	0.0006	0.0001			
25	0.0143	0.0000	0.0000			
26	0.0070	0.0000	0.0000			
27	0.0012	0.0000	0.0000			
28	0.0000	0.0000	0.0000			
29	0.0000	0.0000	0.0000			
30	0.0000	0.0000	0.0000			
31	NA	0.0000	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.001</b>	<b>0.000</b>	<b>0.000</b>			

Monthly Discharge			
Cubic Feet	3,371	111	437
Gallons	25,215	833	3,268
Acre-Feet	0.077	0.003	0.010
<p>Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.</p> <p><sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.</p>			

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Gaging Station GS27 is located at State Plane 2080529; 751216, at the small drainage ditch NW of Building 884 (See Section 4 Map). This location is a Performance and Best Management Practices Monitoring Location and monitors water draining from the Building 889 area. Storm event samples are collected for selected radionuclides, water quality parameters, and metals.

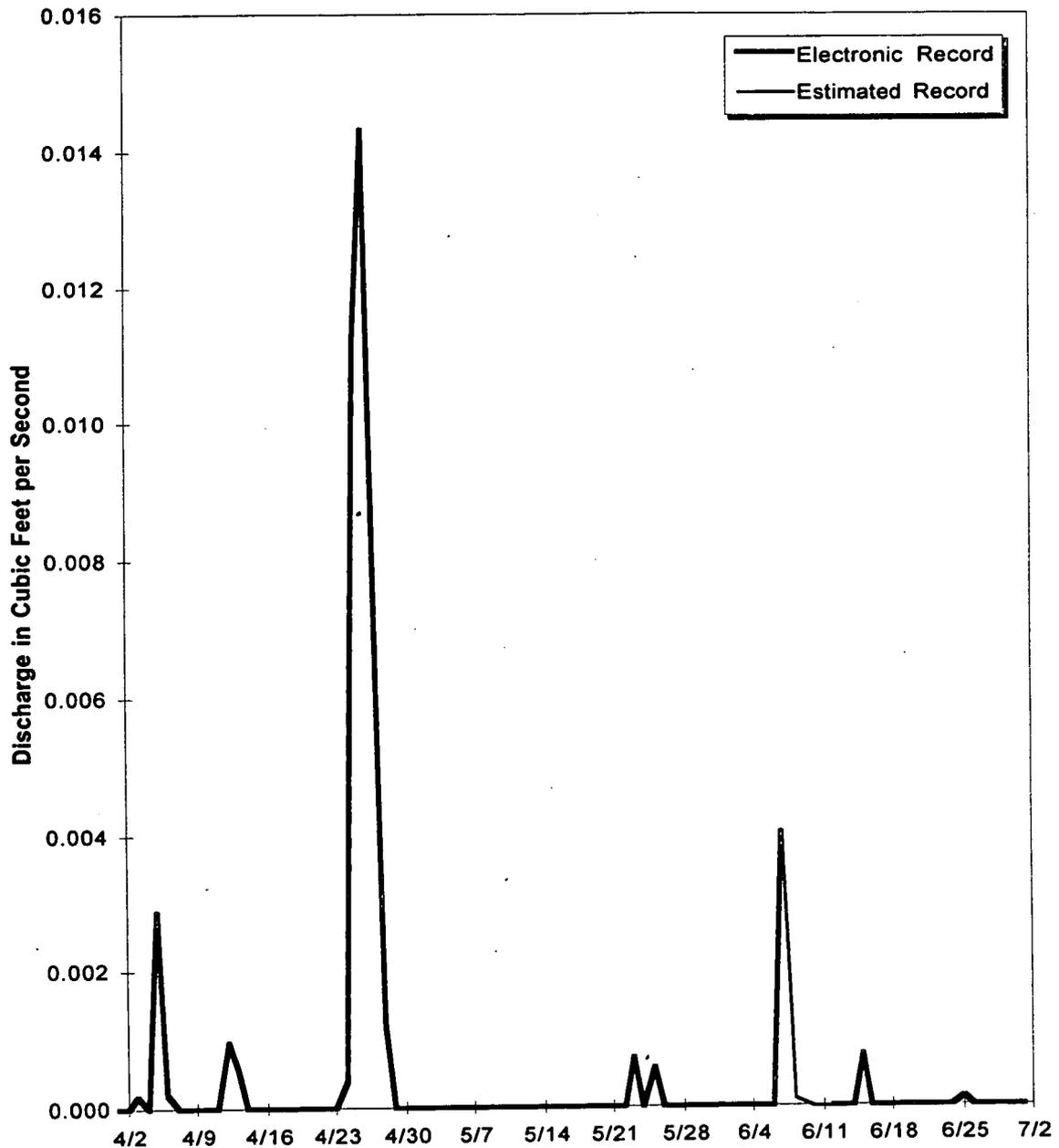


Figure 4-11 Mean Daily Discharge at Gaging Station GS27, Water Year 1997 (April, May, June 1997)

Table 4-12 Gaging Station GS28 Mean Daily Discharge (Cubic Feet per Second)

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.0000	0.0000	0.0000			
2	0.0000	0.0000	0.0000			
3	0.0000	0.0000	0.0000			
4	0.0028	0.0000	0.0000			
5	0.0056	0.0000	0.0000			
6	0.0000	0.0000	0.0114			
7	0.0000	0.0000	0.0000			
8	0.0000	0.0000	0.0000			
9	0.0000	0.0000	0.0000			
10	0.0000	0.0000	0.0000			
11	0.0000	0.0000	0.0000			
12	0.0000	0.0000	0.0000			
13	0.0006	0.0000	0.0000			
14	0.0000	0.0000	0.0000			
15	0.0000	0.0000	0.0000			
16	0.0000	0.0000	0.0000			
17	0.0000	0.0000	0.0000			
18	0.0000	0.0000	0.0000			
19	0.0000	0.0000	0.0000			
20	0.0000	0.0000	0.0000			
21	0.0000	0.0000	0.0000			
22	0.0000	0.0000	0.0000			
23	0.0000	0.0000	0.0000			
24	0.0473	0.0000	0.0000			
25	0.0562	0.0000	0.0000			
26	0.0292	0.0000	0.0000			
27	0.0479	0.0000	0.0000			
28	0.0000	0.0000	0.0000			
29	0.0000	0.0000	0.0000			
30	0.0000	0.0000	0.0000			
31	NA	0.0000	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.0063</b>	<b>0.0000</b>	<b>0.0004</b>			

	Monthly Discharge		
Cubic Feet	16,381	0	984
Gallons	122,538	0	7,359
Acre-Feet	0.376	0.000	0.023

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

Gaging Station GS28 is located at State Plane 2084010; 749282, at the drainage ditch NE of Building 889 (See Section 4 Map). This location is a Performance Monitoring Location and monitors water draining from the Building 889 area. Storm event samples are collected for selected radionuclides, water quality parameters, and metals.

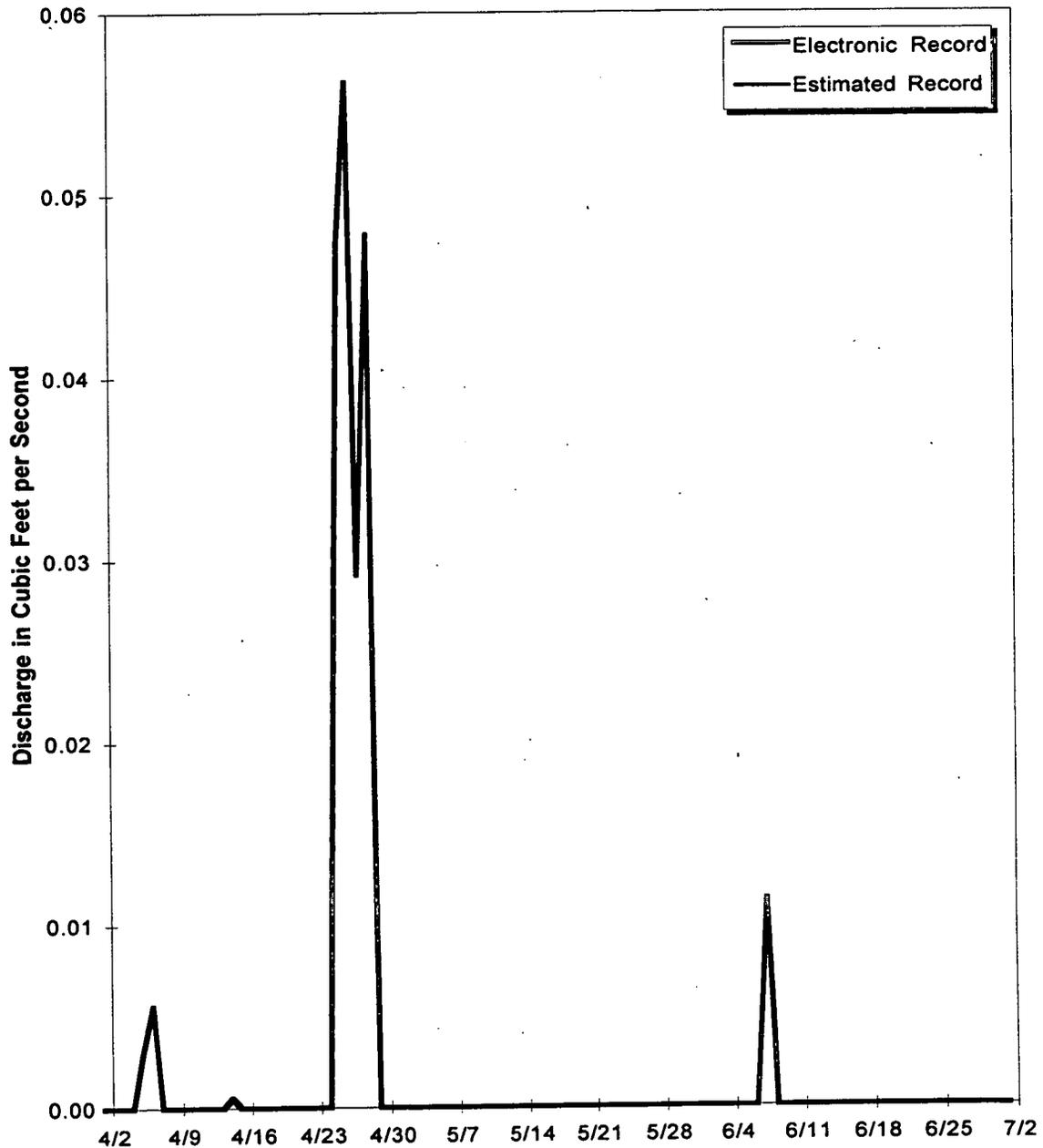


Figure 4-12 Mean Daily Discharge at Gaging Station GS28, Water Year 1997 (April, May, June 1997)

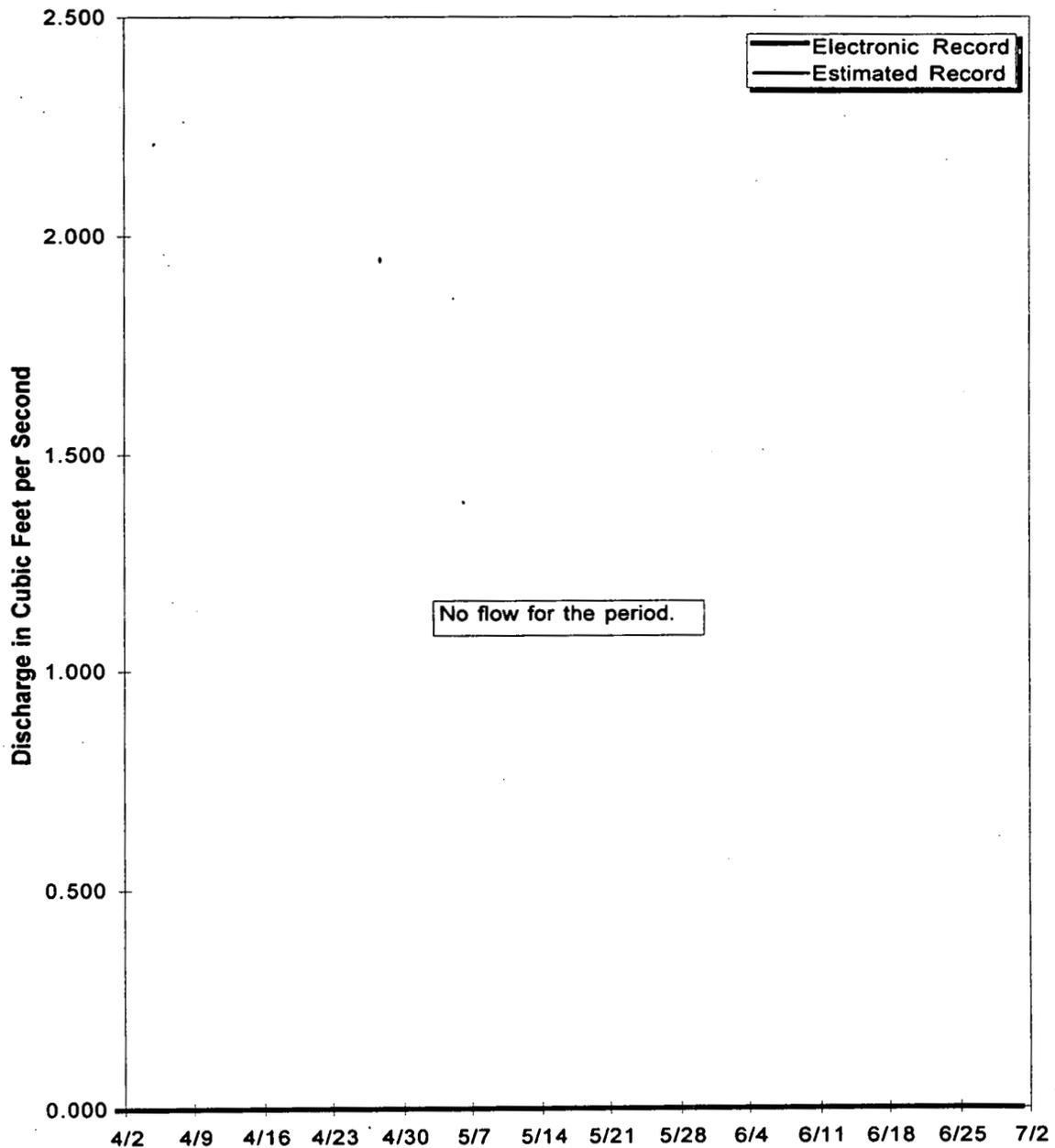
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**Table 4-13 Gaging Station GS31: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.000	0.000	0.000			
2	0.000	0.000	0.000			
3	0.000	0.000	0.000			
4	0.000	0.000	0.000			
5	0.000	0.000	0.000			
6	0.000	0.000	0.000			
7	0.000	0.000	0.000			
8	0.000	0.000	0.000			
9	0.000	0.000	0.000			
10	0.000	0.000	0.000			
11	0.000	0.000	0.000			
12	0.000	0.000	0.000			
13	0.000	0.000	0.000			
14	0.000	0.000	0.000			
15	0.000	0.000	0.000			
16	0.000	0.000	0.000			
17	0.000	0.000	0.000			
18	0.000	0.000	0.000			
19	0.000	0.000	0.000			
20	0.000	0.000	0.000			
21	0.000	0.000	0.000			
22	0.000	0.000	0.000			
23	0.000	0.000	0.000			
24	0.000	0.000	0.000			
25	0.000	0.000	0.000			
26	0.000	0.000	0.000			
27	0.000	0.000	0.000			
28	0.000	0.000	0.000			
29	0.000	0.000	0.000			
30	0.000	0.000	0.000			
31	NA	0.000	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>			

Monthly Discharge						
Cubic Feet	0	0	0			
Gallons	0	0	0			
Acre-Feet	0.00	0.00	0.00			
Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.						

Gaging Station GS31 is located at State Plane 2089268; 747506, at the Pond C-2 Outfall (See Section 4 Map). This station is a RFCA Point of Compliance and monitors water discharged from Pond C-2. This station collects samples for selected radionuclides using continuous flow-paced sampling.



**Figure 4-13 Mean Daily Discharge at Gaging Station GS31, Water Year 1997 (April, May, June 1997)**

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**Table 4-14 Gaging Station SW022 Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.000	0.000	0.000			
2	0.044	0.000	0.000			
3	0.000	0.000	0.000			
4	0.380	0.000	0.000			
5	0.186	0.000	0.000			
6	0.000 <sup>a</sup>	0.000	0.409			
7	0.000	0.000	0.182			
8	0.000	0.000	0.005			
9	0.000	0.000	0.000			
10	0.000	0.000	0.000			
11	0.099 <sup>a</sup>	0.000	0.000			
12	0.044 <sup>a</sup>	0.000	0.000			
13	0.014 <sup>a</sup>	0.000	0.001			
14	0.000 <sup>a</sup>	0.000	0.125			
15	0.000	0.000	0.000			
16	0.000	0.000	0.000			
17	0.000	0.000	0.000			
18	0.000	0.000	0.000			
19	0.000	0.000	0.000			
20	0.000	0.000	0.000			
21	0.000	0.000	0.000			
22	0.000	0.088	0.000			
23	0.007	0.000	0.000			
24	1.371 <sup>a</sup>	0.106	0.000			
25	1.848	0.004	0.000			
26	0.758	0.000	0.000			
27	0.410	0.000	0.000			
28	0.071	0.000	0.000			
29	0.018	0.007	0.000			
30	0.002	0.000	0.000			
31	NA	0.000	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.175</b>	<b>0.007</b>	<b>0.024</b>			

**Monthly Discharge**

Cubic Feet	453,710	17,766	62,369
Gallons	3,393,985	132,898	466,556
Acre-Feet	10.41	0.41	1.43

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station SW022 is located 39° 53' 30"N, 105° 11' 30"W, at the Central Avenue Ditch at the Inner East Gate (See Section 4 Map). This location is a RFCA New Source Detection Location and monitors water in the Central Avenue Ditch entering the B-Series Ponds and South Walnut Creek. Storm event samples are collected for selected radionuclides.

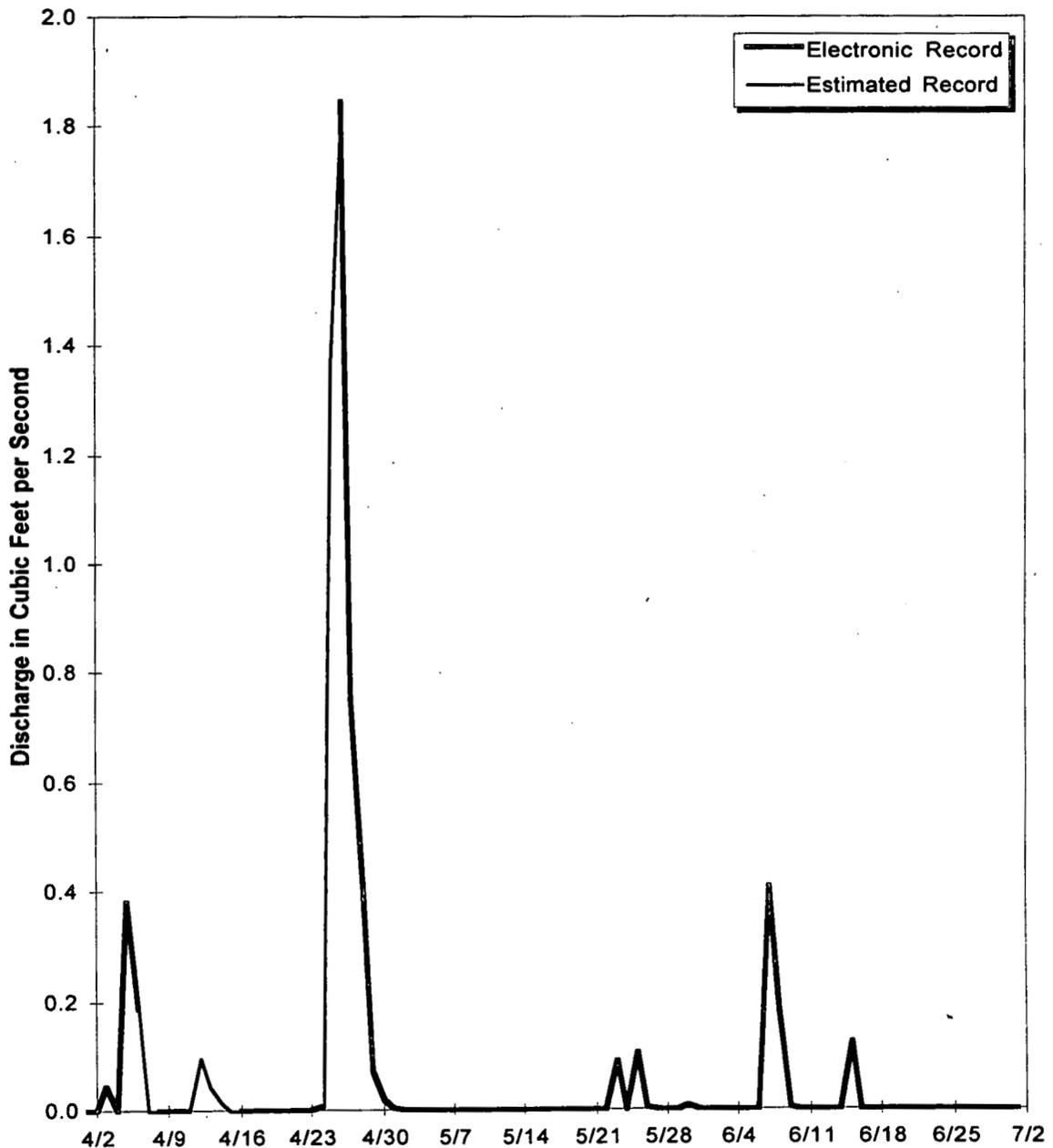


Figure 4-14 Mean Daily Discharge at Gaging Station SW022, Water Year 1997 (April, May, June 1997)

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**Table 4-15 Gaging Station SW027: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.000	0.020	0.000			
2	0.000	0.005	0.000			
3	0.000	0.003	0.000			
4	0.034	0.002	0.000			
5	0.445	0.001	0.000			
6	0.051	0.001	0.000			
7	0.005	0.001	0.362			
8	0.002	0.001	0.009			
9	0.001	0.000	0.003			
10	0.001	0.000	0.002			
11	0.001	0.000	0.001			
12	0.054	0.000	0.000			
13	0.156	0.000	0.000			
14	0.054	0.000	0.077			
15	0.007	0.000	0.011			
16	0.003	0.000	0.004			
17	0.002	0.000	0.001			
18	0.002	0.000	0.000			
19	0.001	0.000	0.000			
20	0.000	0.000	0.000			
21	0.000	0.000	0.000			
22	0.000	0.000	0.000			
23	0.000	0.011	0.000			
24	1.046	0.048	0.000			
25	1.519	0.080	0.000			
26	1.193	0.005	0.000			
27	1.229	0.002	0.000			
28	0.474	0.001	0.000			
29	0.085	0.000	0.000			
30	0.022	0.000	0.000			
31	NA	0.000	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.213</b>	<b>0.006</b>	<b>0.016</b>			

Monthly Discharge						
Cubic Feet	552,090	15,687	40,661			
Gallons	4,129,923	117,346	304,162			
Acre-Feet	12.67	0.36	0.93			
Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.						

Gaging Station SW027 is located 39° 53' 12"N, 105° 11' 4"W, at the South Interceptor Ditch above Pond C-2 (See Section 4 Map). This station is a RFCA Action Level Framework and a New Source Detection Location and monitors water in the South Interceptor Ditch entering Pond C-2. This station collects samples for selected radionuclides, metals, and water quality parameters using continuous flow-paced sampling.

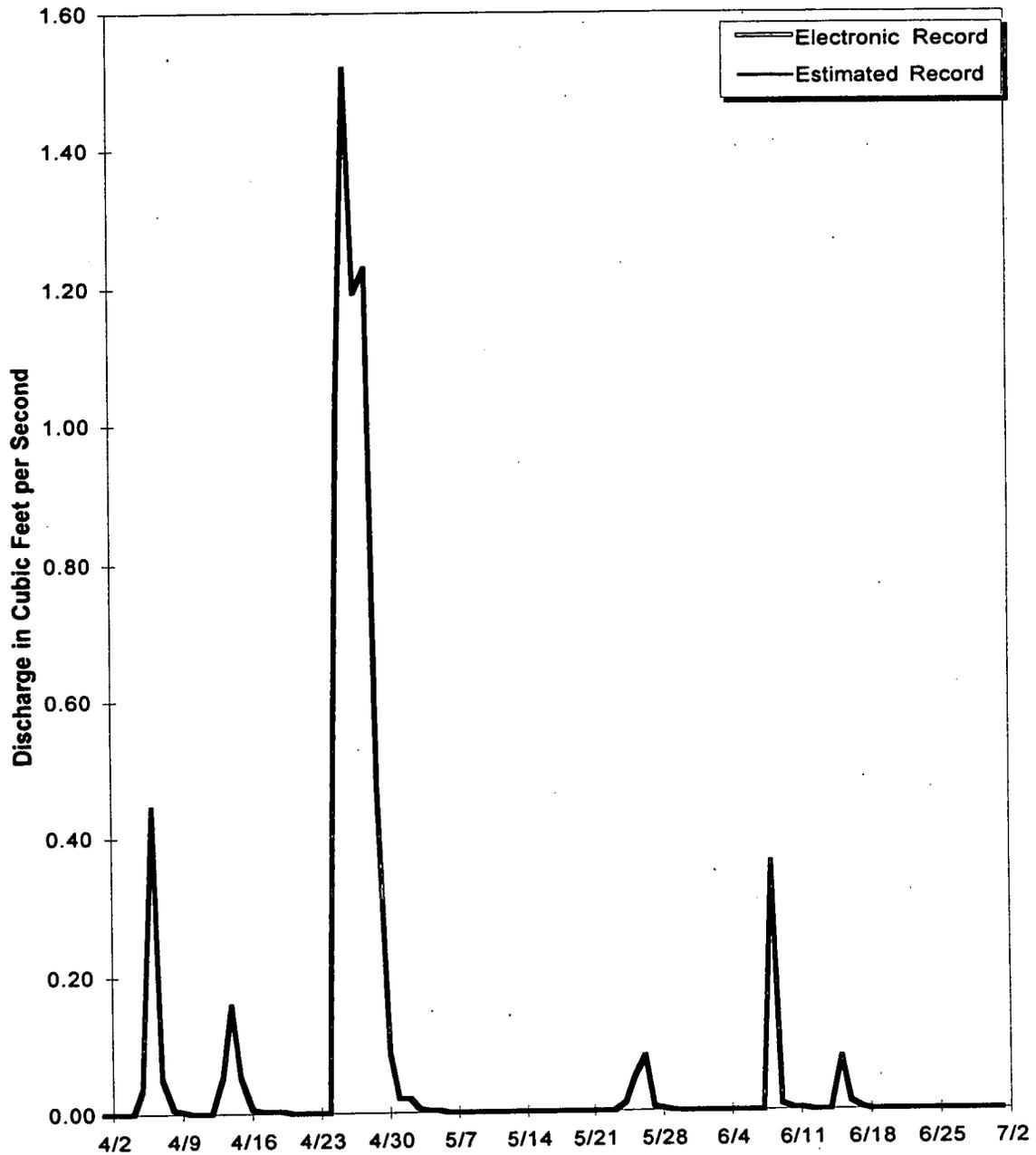


Figure 4-15 Mean Daily Discharge at Gaging Station SW027, Water Year 1997 (April, May, June 1997)

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Table 4-16 Gaging Station SW091: Mean Daily Discharge (Cubic Feet per Second)

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.0000	0.0003	0.0000 <sup>a</sup>			
2	0.0000	0.0001	0.0000 <sup>a</sup>			
3	0.0000	0.0001 <sup>a</sup>	0.0000 <sup>a</sup>			
4	0.0002 <sup>a</sup>	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>			
5	0.0007 <sup>a</sup>	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>			
6	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>	0.0012 <sup>a</sup>			
7	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>			
8	0.0000	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>			
9	0.0000	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>			
10	0.0000	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>			
11	0.0006 <sup>a</sup>	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>			
12	0.0007 <sup>a</sup>	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>			
13	0.0012 <sup>a</sup>	0.0000 <sup>a</sup>	0.0001			
14	0.0001 <sup>a</sup>	0.0000 <sup>a</sup>	0.0002			
15	0.0003	0.0000 <sup>a</sup>	0.0002			
16	0.0001	0.0000 <sup>a</sup>	0.0000			
17	0.0000 <sup>a</sup>	0.0000 <sup>a</sup>	0.0000			
18	0.0000	0.0000 <sup>a</sup>	0.0000			
19	0.0000	0.0000 <sup>a</sup>	0.0000			
20	0.0000	0.0000 <sup>a</sup>	0.0000			
21	0.0000	0.0000 <sup>a</sup>	0.0000			
22	0.0000	0.0000 <sup>a</sup>	0.0000			
23	0.0001	0.0000 <sup>a</sup>	0.0000			
24	0.0144	0.0000 <sup>a</sup>	0.0000			
25	0.0486	0.0000 <sup>a</sup>	0.0000			
26	0.0481	0.0000 <sup>a</sup>	0.0000			
27	0.0276	0.0000 <sup>a</sup>	0.0000			
28	0.0071	0.0000 <sup>a</sup>	0.0000			
29	0.0041	0.0000 <sup>a</sup>	0.0000			
30	0.0005	0.0000 <sup>a</sup>	0.0000			
31	NA	0.0000 <sup>a</sup>	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.005</b>	<b>0.000</b>	<b>0.000</b>			

Monthly Discharge						
Cubic Feet	13,332	47	153			
Gallons	99,727	354	1,141			
Acre-Feet	0.3060	0.0011	0.0035			
<p>Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.</p> <p><sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.</p>						

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Gaging Station SW091 is located at State Plane 2086064; 751322, along the drainage NE of the Solar Ponds draining to the A-Series Ponds (See Section 4 Map). This location is a RFCA New Source Detection Location and monitors water draining from the area NE of the Solar Ponds. Storm event samples are collected for selected radionuclides.

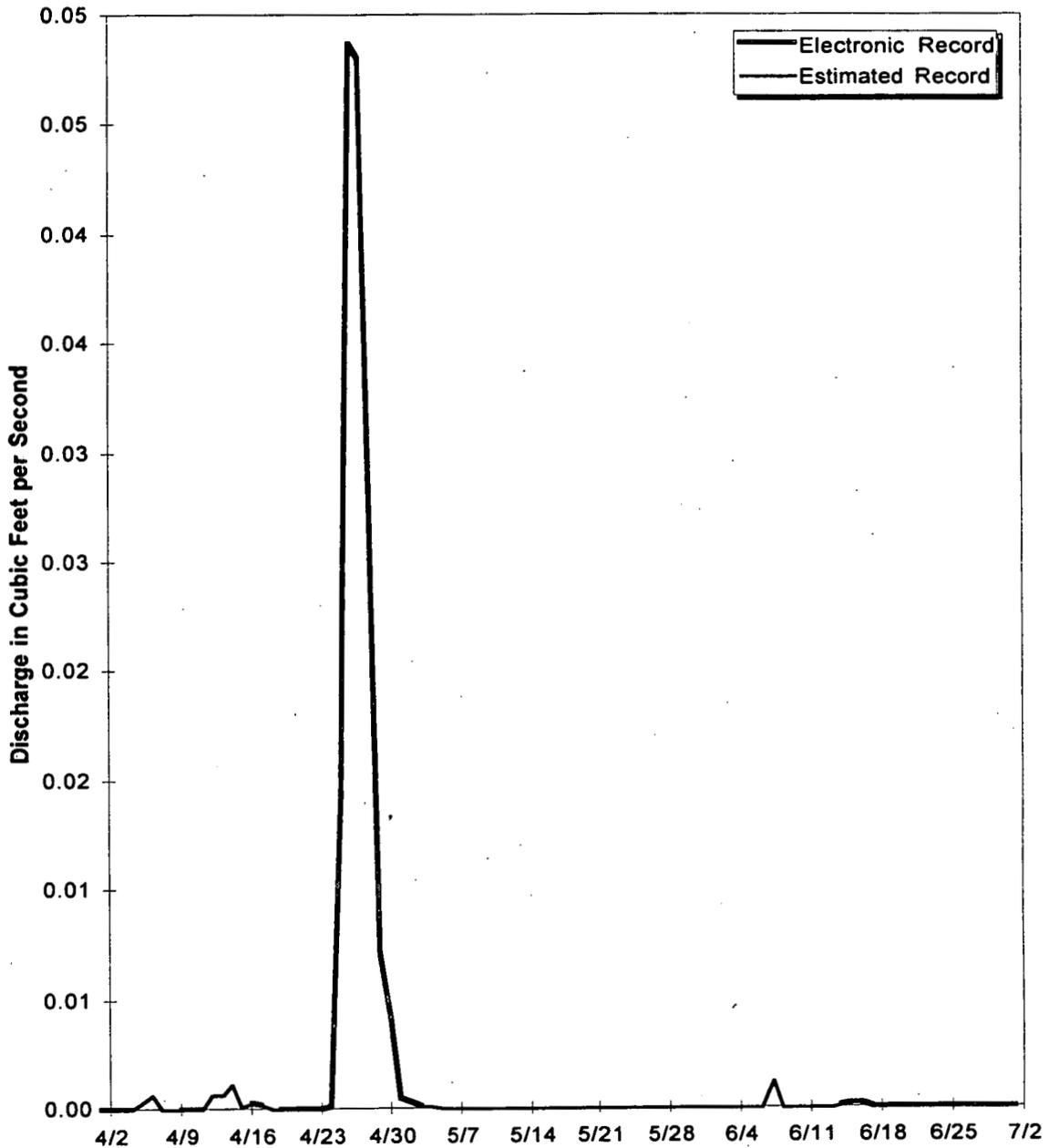


Figure 4-16 Mean Daily Discharge at Gaging Station SW091, Water Year 1997 (April, May, June 1997)

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Table 4-17 Gaging Station SW093: Mean Daily Discharge (Cubic Feet per Second)

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.055	0.375	0.108			
2	0.266	0.299	0.102			
3	0.166	0.287	0.096			
4	0.901	0.252	0.092			
5	0.814	0.214	0.077			
6	0.228	0.191	0.967			
7	0.172	0.157	0.530			
8	0.128	0.129	0.154			
9	0.109	0.122	0.032			
10	0.137	0.114	0.053			
11	0.398	0.186	0.064			
12	0.472	0.153	0.109			
13	0.370	0.130	0.203			
14	0.242	0.166	0.417			
15	0.220	0.151	0.134			
16	0.243	0.132	0.123			
17	0.181	0.126	0.102			
18	0.142	0.133	0.089			
19	0.127	0.128	0.078			
20	0.118	0.122	0.067			
21	0.112	0.153	0.064			
22	0.100	0.441	0.056			
23	0.238	0.199	0.048			
24	3.749	0.535	0.106			
25	4.048	0.216	0.049			
26	3.442	0.150	0.044			
27	3.044	0.117	0.033			
28	1.396	0.144	0.032			
29	0.727	0.130	0.055			
30	0.458	0.115	0.026			
31	NA	0.108	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.760</b>	<b>0.189</b>	<b>0.137</b>			

Monthly Discharge			
Cubic Feet	1,970,287	507,499	355,034
Gallons	14,738,770	3,796,356	2,655,842
Acre-Feet	45.22	11.65	8.15

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

Gaging Station SW093 is located 39° 53' 51"N, 105° 11' 48"W, along North Walnut Creek at the 72" culvert 1000 feet above the Pond A-1 Bypass (See Section 4 Map). This station is a RFCA Action Level Framework and a New Source Detection Location and monitors water leaving the Site Industrial Area and entering the A-Series Ponds and North Walnut Creek. This station collects samples for selected radionuclides, metals, and water quality parameters using continuous flow-paced sampling.

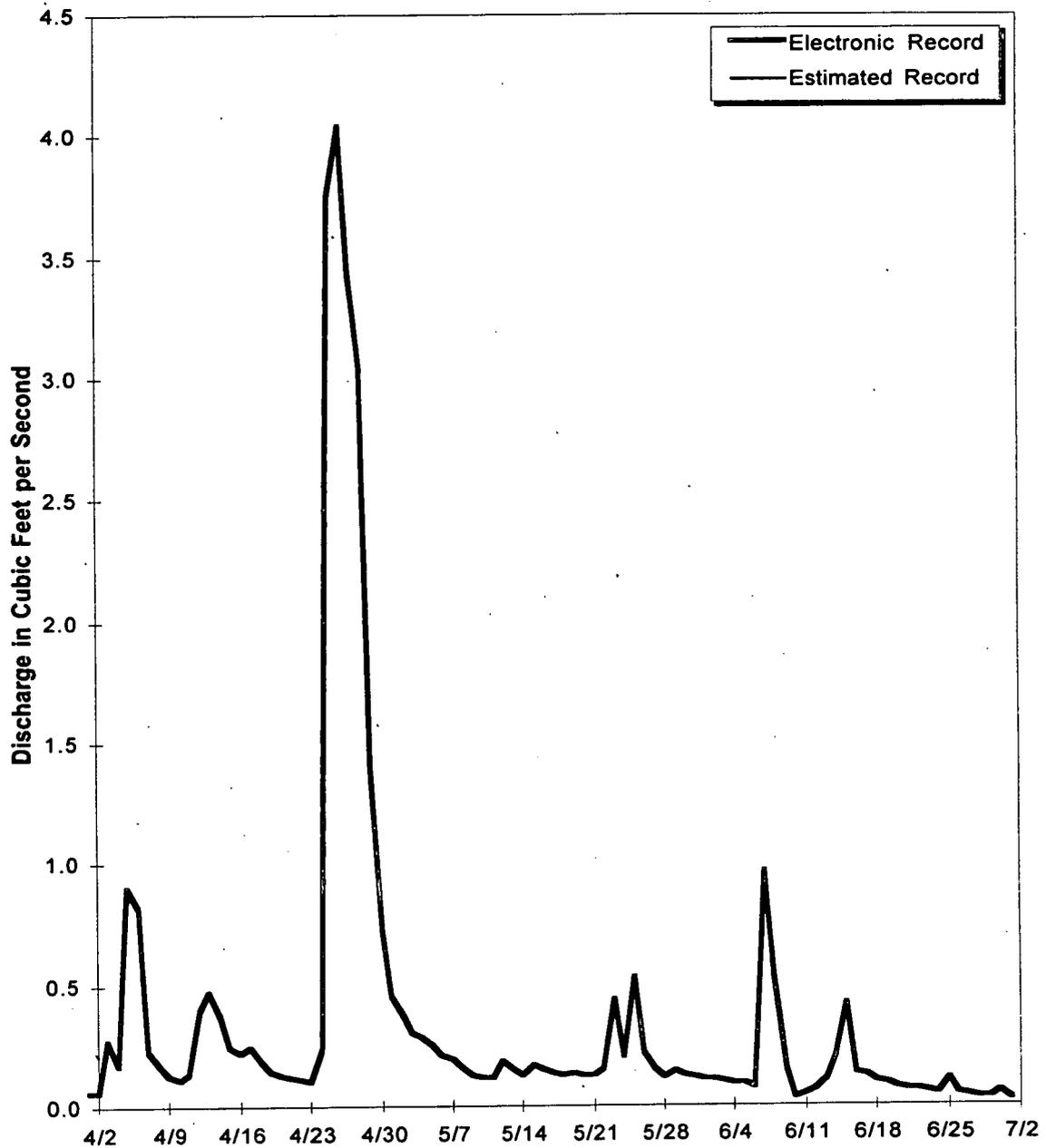


Figure 4-17 Mean Daily Discharge at Gaging Station SW093, Water Year 1997 (April, May, June 1997)

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**Table 4-18 Gaging Station SW118: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.020	0.126	0.011			
2	0.068	0.123	0.011			
3	0.078	0.106	0.010			
4	0.170	0.084	0.009			
5	0.234	0.066	0.008			
6	0.127	0.060 <sup>a</sup>	0.067			
7	0.088	0.055 <sup>a</sup>	0.073			
8	0.084	0.050 <sup>a</sup>	0.042			
9	0.076	0.045	0.041			
10	0.104	0.039	0.025			
11	0.137 <sup>a</sup>	0.059	0.013			
12	0.149 <sup>a</sup>	0.073	0.012			
13	0.133 <sup>a</sup>	0.054	0.020			
14	0.118 <sup>a</sup>	0.059	0.048			
15	0.113 <sup>a</sup>	0.053	0.027			
16	0.102	0.037	0.017			
17	0.074	0.027	0.012			
18	0.048	0.028	0.009			
19	0.031	0.041	0.005			
20	0.023	0.032	0.004			
21	0.021	0.027	0.003			
22	0.021	0.068	0.002			
23	0.022	0.068	0.001			
24	0.527	0.096	0.002			
25	0.613	0.082	0.003			
26	0.531	0.056	0.002			
27	0.489	0.040	0.000			
28	0.316	0.034	0.000			
29	0.175	0.035	0.000			
30	0.137	0.026	0.000			
31	NA	0.018	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.166</b>	<b>0.057</b>	<b>0.016</b>			

**Monthly Discharge**

Cubic Feet	415,349	152,774	41,059
Gallons	3,107,027	1,142,828	307,142
Acre-Feet	9.53	3.51	0.94

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.

<sup>a</sup> Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station SW118 is located 39° 53' 47"N, 105° 12' 16"W, along North Walnut Creek above Portal 3 (See Section 4 Map). This station is a Buffer Zone Monitoring Location and monitors water leaving the NW portion of the Site Industrial Area and entering North Walnut Creek. No samples are collected at this location.

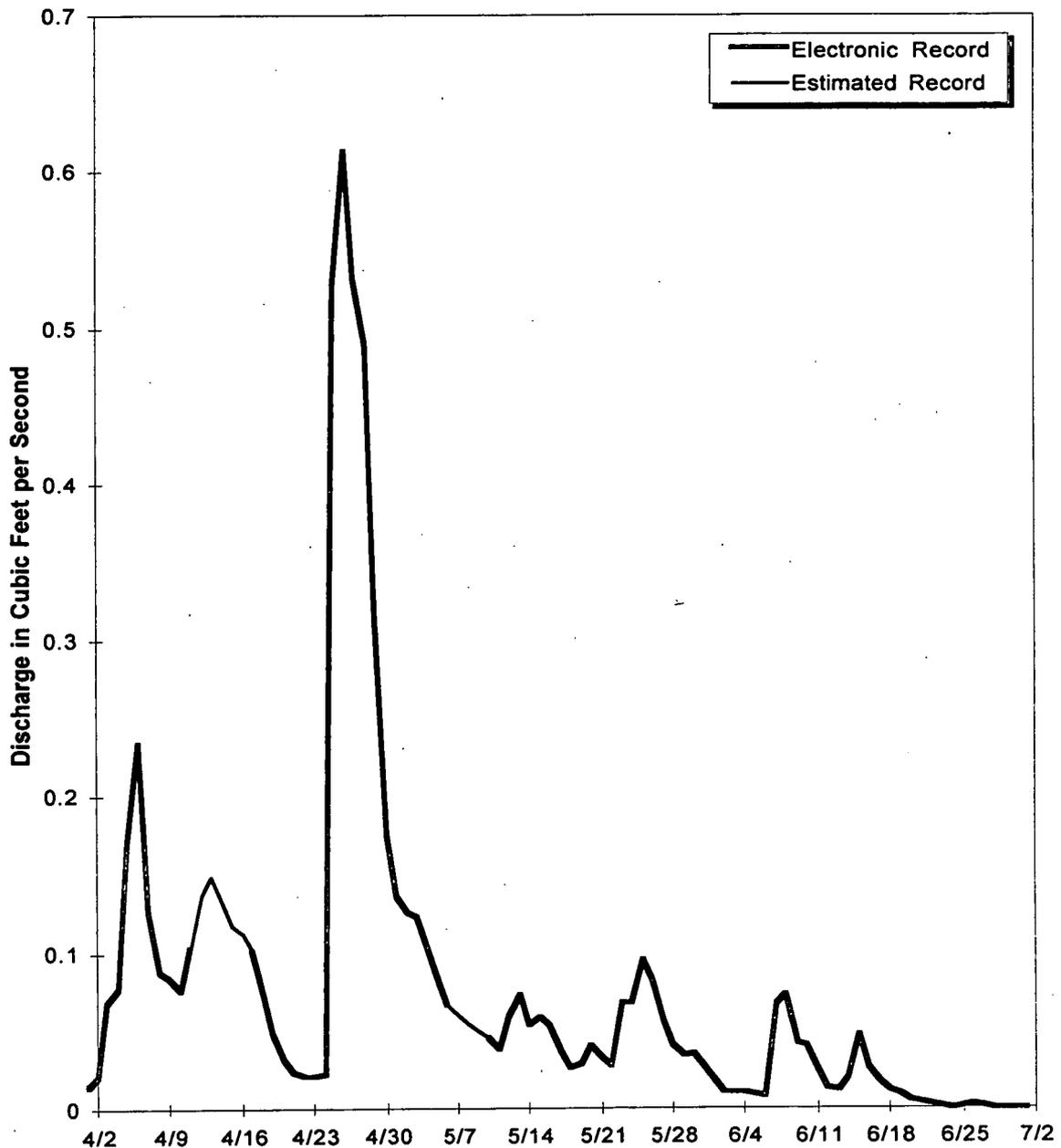


Figure 4-18 Mean Daily Discharge at Gaging Station SW118, Water Year 1997 (April, May, June 1997)

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**Table 4-19 Gaging Station SW134: Mean Daily Discharge (Cubic Feet per Second)**

Date	April 1997	May 1997	June 1997	July 1997	August 1997	September 1997
1	0.000	0.280	0.000			
2	0.000	0.000	0.000			
3	0.000	0.000	0.000			
4	0.002	0.000	0.000			
5	0.000	0.000	0.059			
6	0.000	0.000	0.013			
7	0.082	0.055	0.001			
8	0.000	0.000	0.000			
9	0.000	0.000	0.000			
10	0.000	0.000	0.000			
11	0.001	0.000	0.101			
12	0.000	0.036	0.000			
13	0.000	0.000	0.000			
14	0.000	0.000	0.004			
15	0.000	0.000	0.000			
16	0.000	0.032	0.000			
17	0.000	0.000	0.063			
18	0.122	0.000	0.000			
19	0.000	0.000	0.000			
20	0.000	0.000	0.000			
21	0.000	0.000	0.000			
22	0.000	0.000	0.000			
23	0.000	0.000	0.000			
24	0.035	0.057	0.000			
25	0.028	0.000	0.000			
26	0.024	0.000	0.000			
27	0.001	0.038	0.000			
28	0.000	0.000	0.065			
29	0.263	0.000	0.017			
30	0.275	0.000	.			
31	NA	0.000	NA			
<b>Mo. Avg. (cfs)</b>	<b>0.028</b>	<b>0.016</b>	<b>0.011<sup>a</sup></b>			

Monthly Discharge						
Cubic Feet	72,100	43,091	27,980 <sup>b</sup>			
Gallons	539,347	322,340	209,304 <sup>b</sup>			
Acre-Feet	1.65	0.99	0.64 <sup>b</sup>			
<p>Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.</p> <p><sup>a</sup> No data available.</p> <p><sup>b</sup> Partial data.</p>						

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Gaging Station SW134 is located 39° 53' 31"N, 105° 13' 44"W, at Rock Creek below Jefferson County Gravel Pit (See Section 4 Map). This station is a Buffer Zone Monitoring Location and monitors water pump discharged from gravel pits and entering Rock Creek. Storm event samples are collected for selected water quality parameters, metals, and major ions.

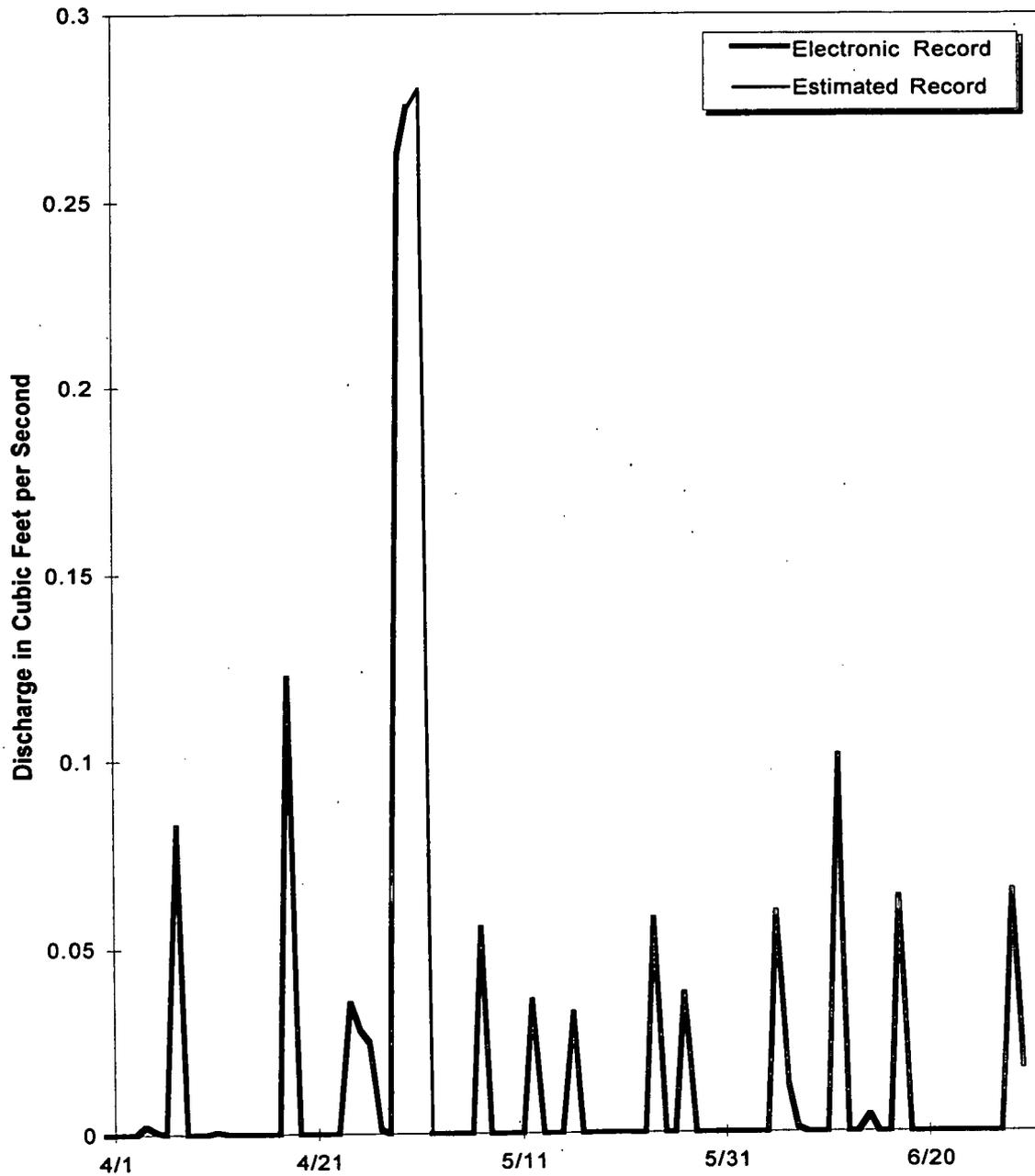


Figure 4-19 Mean Daily Discharge at Gaging Station SW134, Water Year 1997 (April, May, June 1997)

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Section 4.2: Water Quality Data

Table 4-20 Radionuclides, 2nd Quarter 1997

Loc	Sample Date	Pu-239, -240 (pCi/l)	Am-241 (pCi/l)	Total U (pCi/l)	Tritium (pCi/l)
GS01	03/24/97 - 04/03/97	0.007	0.004	•	80
GS01	04/03/97 - 04/17/97	0.000	0.004	•	60
GS01	04/17/97 - 04/24/97	0.002	0.004	•	0
GS01	04/24/97 - 04/25/97	0.003	0.002	•	110
GS01	04/26/97 - 04/28/97	0.019	0.005	•	0
GS01	04/28/97 - 05/01/97	0.005	0.000	•	93
GS01	05/01/97 - 05/29/97	0.006	0.004	•	325
GS01	05/29/97 - present	c	c	•	c
GS03	04/03/97 - 04/05/97	0.022	0.022	•	20
GS03	04/05/97 - 04/08/97	0.007	0.011	•	40
GS03	04/08/97 - 04/15/97	0.220	0.059	•	d
GS03	04/15/97 - 04/26/97	0.018	0.012	•	0
GS03	04/26/97 - 04/28/97	0.036	0.011	•	2
GS03	04/28/97 - 05/01/97	0.005	0.016	•	110
GS03	05/01/97 - 05/03/97	0.016	0.014	•	150
GS03	05/03/97 - 05/06/97	0.021	0.009	•	52
GS03	05/06/97 - 05/07/97	0.013	0.013	•	250
GS03	05/07/97 - 05/09/97	0.005	0.004	•	240
GS03	05/09/97 - 05/15/97	0.027	0.020	•	148
GS03	05/15/97 - 06/25/97	b	b	•	b
GS03	06/25/97 - 06/27/97	b	b	•	b
GS03	06/27/97 - 07/01/97	b	b	•	b
GS08	04/28/97 - 05/01/97	0.017	0.013	2.005	•
GS08	05/01/97 - 05/06/97	0.006	0.000	2.253	•
GS08	05/06/97 - 05/12/97	0.008	0.005	2.596	•
GS10	03/17/97 - 03/28/97	0.120	0.103	3.619	•
GS10	03/28/97 - 04/02/97	0.300	0.140	3.794	•
GS10	04/02/97 - 04/11/97	0.150	0.110	2.020	•
GS10	04/11/97 - 04/24/97	0.410	0.140	2.380	•
GS10	04/24/97 - 04/25/97	0.086	0.045	1.334	•
GS10	04/25/97 - 04/26/97	0.070	0.033	1.475	•
GS10	04/26/97 - 05/12/97	0.086	0.120	4.881	•
GS10	05/12/97 - 05/25/97	0.380	0.300	3.478	•
GS10	05/25/97 - 06/08/97	0.134	0.106	2.491	•
GS10	06/08/97 - 06/12/97	0.056	0.052	3.930	•
GS10	06/12/97 - 06/16/97	0.088	0.077	2.886	•
GS10	06/16/97 - 06/23/97	b	b	b	•
GS10	06/23/97 - 06/30/97	b	b	b	•
GS11	04/03/97 - 04/05/97	0.004	0.004	2.628	•
GS11	04/05/97 - 04/08/97	0.000	0.003	2.534	•
GS11	04/08/97 - 04/14/97	0.001	0.008	2.657	•
GS11	05/01/97 - 05/06/97	0.006	0.005	2.127	•
GS11	05/06/97 - 05/08/97	0.006	0.002	1.783	•
GS11	05/08/97 - 05/14/97	0.006	0.003	2.061	•
GS11	06/25/97 - 06/27/97	b	b	b	•
GS11	06/27/97 - 07/01/97	b	b	b	•
GS27	04/02/97	0.870	0.330	0.653	•
GS27	04/04/97	3.000	0.770	0.414	•
GS27	04/23/97	1.900	0.530	0.253	•
GS27	05/24/97	3.000	0.640	0.781	•
GS28	04/04/97	0.075	0.027	0.641	•
GS28	04/24/97	0.058	0.013	0.330	•
GS28	04/25/97	0.064	0.012	1.116	•

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Table 4-20 Radionuclides, 2nd Quarter 1997 (continued)

Loc	Sample Date	Pu-239, -240 (pCi/l)	Am-241 (pCi/l)	Total U (pCi/l)	Tritium (pCi/l)
GS28	06/06/97	0.038	0.013	0.661	*
GS32	04/25/97	0.960	0.630	0.795	*
GS32	05/22/97	0.180	0.330	0.250	*
GS32	06/06/97	0.387	0.237	0.554	*
SW022	04/02/97	0.082	0.018	2.046	*
SW022	04/04/97	0.230	0.056	2.314	*
SW022	04/23/97	0.060	0.014	0.971	*
SW022	05/22/97	0.019	0.009	0.560	*
SW022	06/06/97	0.030	0.023	0.818	*
SW027	10/01/96 - 04/05/97	0.007	0.004	1.776	*
SW027	04/05/97 - 04/24/97	0.022	0.008	1.006	*
SW027	04/24/97 - 04/25/97	0.010	0.001	1.950	*
SW027	04/25/97 - 04/26/97	0.049	0.007	1.277	*
SW027	04/26/97 - 05/01/97	0.070	0.008	3.080	*
SW027	05/01/97 - 08/05/97	b	b	b	*
SW091	04/24/97	0.230	0.200	2.577	*
SW091	04/25/97	0.700	0.240	4.390	*
SW093	03/24/97 - 03/28/97	0.008	0.004	3.695	*
SW093	03/28/97 - 04/02/97	0.038	0.007	4.010	*
SW093	04/02/97 - 04/11/97	0.025	0.026	1.764	*
SW093	04/13/97 - 04/24/97	0.042	0.017	2.059	*
SW093	04/24/97 - 04/25/97	0.027	0.016	1.200	*
SW093	04/25/97 - 04/26/97	0.100	0.033	1.250	*
SW093	04/26/97 - 05/07/97	0.015	0.006	2.045	*
SW093	05/07/97 - 05/25/97	0.009	0.013	3.347	*
SW093	05/25/97 - 06/08/97	0.015	0.006	2.829	*
SW093	06/08/97 - 06/16/97	0.044	0.029	2.572	*
SW093	06/16/97 - 06/24/97	b	b	b	*
SW093	06/24/97 - 07/01/97	b	b	b	*

\* Not applicable.  
b Incomplete analysis.  
c Composite sample in progress.

Table 4-21 Metals, 2nd Quarter 1997

Loc	Sample Date	Be (µg/L)	Dissolved Cd (µg/L)	Cr (µg/L)	Dissolved Ag (µg/L)
GS10	03/17/97 - 03/28/97	undetect	undetect	undetect	undetect
GS10	03/28/97 - 04/02/97	undetect	0.13	undetect	undetect
GS10	04/02/97 - 04/11/97	undetect	0.11	5	undetect
GS10	04/11/97 - 04/24/97	undetect	undetect	undetect	undetect
GS10	04/24/97 - 04/25/97	undetect	0.13	undetect	undetect
GS10	04/25/97 - 04/26/97	undetect	0.1	undetect	undetect
GS10	04/26/97 - 05/12/97	a	a	a	a
GS10	05/12/97 - 05/25/97	undetect	undetect	undetect	undetect
GS10	05/25/97 - 06/08/97	undetect	undetect	undetect	undetect
GS10	06/08/97 - 06/12/97	undetect	a	undetect	a
GS10	06/12/97 - 06/16/97	undetect	a	undetect	a
GS10	06/16/97 - 06/23/97	b	b	b	b
GS10	06/23/97 - 06/30/97	undetect	undetect	undetect	undetect
SW027	10/01/96 - 04/05/97	undetect	undetect	undetect	undetect
SW027	04/05/97 - 04/24/97	undetect	undetect	undetect	undetect
SW027	04/24/97 - 04/25/97	undetect	undetect	undetect	undetect
SW027	04/25/97 - 04/26/97	undetect	undetect	undetect	undetect
SW027	04/26/97 - 05/01/97	undetect	0.11	undetect	undetect
SW027	05/01/97 - 08/05/97	b	b	b	b
SW093	03/10/97 - 03/24/97	undetect	undetect	undetect	undetect
SW093	03/24/97 - 03/28/97	undetect	0.17	undetect	undetect
SW093	03/28/97 - 04/02/97	undetect	undetect	undetect	undetect
SW093	04/02/97 - 04/11/97	undetect	undetect	undetect	undetect
SW093	04/13/97 - 04/24/97	undetect	undetect	undetect	undetect
SW093	04/24/97 - 04/25/97	undetect	undetect	undetect	undetect
SW093	04/25/97 - 04/26/97	undetect	undetect	undetect	undetect
SW093	04/26/97 - 05/07/97	undetect	undetect	undetect	undetect
SW093	05/07/97 - 05/25/97	undetect	undetect	undetect	undetect
SW093	05/25/97 - 06/08/97	undetect	undetect	undetect	undetect
SW093	06/08/97 - 06/16/97	undetect	a	undetect	a
SW093	06/16/97 - 06/24/97	b	b	b	b
SW093	06/24/97 - 07/01/97	undetect	undetect	undetect	0.04

a Not collected.  
 b Incomplete analysis.

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Table 4-22 Water Quality Parameters, 2nd Quarter 1997

Loc	Sample Date	Hardness (mg/l)
GS10	03/17/97 - 03/28/97	182
GS10	03/28/97 - 04/02/97	194
GS10	04/02/97 - 04/11/97	103
GS10	04/11/97 - 04/24/97	111
GS10	04/24/97 - 04/25/97	73.6
GS10	04/25/97 - 04/26/97	61.7
GS10	04/26/97 - 05/12/97	<sup>a</sup>
GS10	05/12/97 - 05/25/97	188
GS10	05/25/97 - 06/8/97	139.5
GS10	06/08/97 - 06/12/97	<sup>a</sup>
GS10	06/12/97 - 06/16/97	<sup>a</sup>
GS10	06/16/97 - 06/23/97	<sup>b</sup>
GS10	06/23/97 - 06/30/97	220
SW027	10/01/96 - 04/05/97	141
SW027	04/05/97 - 04/24/97	93.5
SW027	04/24/97 - 04/25/97	103
SW027	04/25/97 - 04/26/97	93.5
SW027	04/26/97 - 05/01/97	121
SW027	05/01/97 - 08/05/97	<sup>b</sup>
SW093	03/10/97 - 03/24/97	300
SW093	03/24/97 - 03/28/97	256
SW093	03/28/97 - 04/02/97	256
SW093	04/02/97 - 04/11/97	153
SW093	04/13/97 - 04/24/97	151
SW093	04/24/97 - 04/25/97	95.5
SW093	04/25/97 - 04/26/97	79.6
SW093	04/26/97 - 05/07/97	139
SW093	05/07/97 - 05/25/97	220
SW093	05/25/97 - 06/08/97	182
SW093	06/08/97 - 06/16/97	<sup>a</sup>
SW093	06/16/97 - 06/24/97	<sup>b</sup>
SW093	06/24/97 - 07/01/97	300

<sup>a</sup> Not collected.<sup>b</sup> Incomplete analysis.

Table 4-23 Hydrologic Water Quality Parameters and Major Ions, 2ns Quarter 1997

Location	Sample Date	TSS (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	Cl (mg/l)	F (mg/l)	SO <sub>4</sub> (mg/l)	HCO <sub>3</sub> (mg/l)
GS01	04/04/97	46.1	65.3	19.85	54.95	2.58	49.15	0.685	75.7	202.5
GS01	05/25/97	2.4	54.9	16.1	39.8	2.08	38.4	0.68	39.5	188
GS02	02/19/97	1.6	53.4	11.5	26.9	1.42	34.8	0.41	28.7	153
GS02	04/03/97	2	58.7	13.2	31.1	1.25	46.5	0.47	31.4	170
GS03	06/07/97	26	55.9	15.35	66.2	5.86	98.1	0.635	36.15	167
GS04	02/18/97	1.5	37	8.37	24.9	1.6	12.5	0.36	36.2	122
GS04	04/12/97	1.5	44.4	10.1	28.1	1.49	18.9	0.39	31.1	130
GS04	05/22/97	3.6	37	8.54	22.3	1.73	11	0.52	28.4	126
GS04	06/06/97	10.8	38.2	8.67	20.8	2.53	9.1	0.39	21.4	134
GS05	04/04/97	108	28	7.47	17.8	2.02	27.8	0.25	14	76.2
GS05	04/12/97	2.8	36.9	9.88	42.5	1.69	73.5	0.37	28.1	75
GS05	04/23/97	106	26.4	6.86	21.8	2.23	9.5	0.29	12.3	33.3
GS05	06/06/97	177	24.8	7.7	9.19	4.15	9.2	0.26	5.3	73.6
GS06	04/23/97	58	14.2	4.65	8.64	4.81	34.3	0.37	15.7	71.5
GS06	06/23/97	.	.	.	.	.	.	.	.	.
SW134	01/03/97	130	39.05	8.51	18.25	1.93	11.65	0.375	48.15	89.55
SW134	02/18/97	99.6	30.1	6.14	14.3	1.92	8.2	0.26	31.6	71.3
SW134	05/24/97	26	28.95	6.245	16.1	1.06	9.8	0.5	39.55	69.8

<sup>a</sup> Incomplete analysis.

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## **Appendix A: Rocky Flats Environmental Technology Site 1995 Public Radiation Dose Assessment**

### **Introduction**

A public radiation dose assessment was performed for calendar year 1995 (CY95) to support the requirements of DOE Order 5400.5, "Radiation Protection of the Public and the Environment." This DOE Order states that the radiation dose to the public will be assessed from exposures to radiation sources from routine activities at a DOE facility and from property released subsequent to remedial action at that facility. This public radiation dose will be compared with the annual radiation dose limit of 100 mrem from this Order to assure that the radiation dose limit is not exceeded. The member of the public that received the highest radiation dose from radiation sources at the Rocky Flats Environmental Technology Site (Site) is called the maximally exposed individual (MEI). The radiation dose received by the MEI will be compared with the annual radiation dose limit of 100 mrem. For CY95, the MEI was located at 96th and Indiana Avenue. The radiation dose received by this MEI was 0.13 mrem. This radiation dose is well within the annual radiation dose limit of 100 mrem.

### **Radiation Protection Standards for the Public**

Standards for protection of the public from radiation sources are based on the concept of radiation dose. This concept provides a means for quantifying the biological effect or risk from all types of radiation on a common basis. Radiation dose is expressed in rem or mrem (1 rem = 1,000 mrem). Radiation protection standards are based on guidance from the National Council on Radiation Protection and Measurement (NCRP) and the International Commission on Radiological Protection (ICRP). These organizations are internationally recognized for their expertise in radiation protection principles. DOE Order 5400.5 prescribes an annual public radiation dose limit of 100 mrem which is based on guidance from the NCRP and ICRP.

### **Radiation Dose Assessment Methodology**

In order to assess the radiation dose to a member of the public from radiation sources at the Site, a number of steps need to be followed. These steps are:

1. The radiation sources at the Site that release radioactive material to the environment need to be analyzed, and the releases from these sources need to be quantified,
2. The members of the public closest to the boundary of the Site need to be located,
3. The exposure pathways (inhalation, ingestion, etc.) by which these members of the public may be exposed to the released radioactive material need to be defined, and
4. The radiation dose received by these members of the public need to be assessed.

DOE Order 5400.5 encourages the use of realistic, but conservative, approaches to radiation dose assessment. The radiation dose assessment performed in this report uses this approach.

### ***Sources of Radioactive Material***

The radioactive material released to the environment at the Site include isotopes of americium, plutonium, uranium, and tritium. For CY95, these radioactive materials were released from the Site through air emissions and through surface water emissions. There have also been past releases from the Site that have deposited americium and plutonium on surface soils east of the Site. These surface soils are currently being investigated as Operable Unit #3 at the Site. Emissions of radioactive material in air and water plus past depositions of radioactive material in surface soils will be used to assess the radiation dose to the public during CY95.

The radioactive material released in air from the Site is quantified in the *1995 Radionuclide Air Emissions Annual Report*. This report was developed to comply with the requirements from the Environmental Protection Agency (EPA) in Title 40 of the Code of Federal Regulations (CFR), Part 61 and from the Colorado Air Quality Control Commission Regulations. All sources of radioactive material (both point sources and area sources) at the Site are assessed in this report with their associated air emissions. Air emissions are then translated into air concentrations of radioactive material outside of the boundary of the Site. Air concentrations of radioactive material from this report are used to quantify the amount of radioactive material inhaled by members of the public. The deposition rate of radioactive material onto surface soils is also delineated in this report. Surface soil concentrations of radioactive material will be used to quantify the amount of radioactive material ingested in soil by a member of the public as well as to quantify external radiation exposure to a member of the public.

The radioactive material released in water from the Site is quantified through routine surface water monitoring activities. In 1995, Ponds A-4, B-5, and C-2 released water offsite in a batch manner. The pond water was analyzed for radioactive material before each release from the Site. The volume of water was recorded for each release. Volume weighted average surface water concentrations of radioactive material are used to quantify the amount of radioactive material ingested by members of the public.

Because of past releases of radioactive material at the Site, there are elevated levels of radioactive material in surface soils east of the Site. The amount of radioactive material in surface soils is documented in the *Final Resource Conservation and Recovery Act Facility Investigation/Remedial Investigation Report for Operable Unit #3 (Offsite Areas)*. Surface soil samples taken to support the Operable Unit #3 Report will be used to quantify the amount of radioactive material near a member of the public. Surface soil concentrations of radioactive material will be used to quantify the amount of radioactive material ingested in soil by a member of the public as well as to quantify external radiation exposure to a member of the public.

## **Location of Members of the Public Surrounding the Site**

In order to compare the radiation dose to a member of the public with radiation dose limits, it is necessary to identify the MEI member of the public. This member of the public will receive the highest radiation dose from radioactive material released from the Site. The radiation dose received by the MEI member of the public will be used to compare with public radiation dose limits.

To identify the MEI member of the public, six locations surrounding the Site were investigated. The nearest member of the public was assessed in the north, northwest, southwest, south, and east (2 locations) directions from the Site. All of these locations are residential.

## **Exposure Pathway Analysis**

The most significant exposure pathways for a resident will be assessed in this radiation dose assessment. The exposure pathways of 1) inhalation of radioactive material in air, 2) ingestion of radioactive material in surface soil, 3) external exposure from radioactive material in surface soil, and 4) ingestion of surface water will be assessed in this radiation dose assessment. The ingestion of homegrown produce was not assessed because of the high dilution of radioactive material deposited on surface soil during tilling.

All of these exposure pathways though may not be applicable to each of the six locations being examined and/or may not be significant to each of these six locations at the boundary of the Site. This is because surface water is preferentially released to the east of the Site and because the surface soils east of the Site contain elevated concentrations of radioactive material. Therefore, the ingestion of radioactive material in surface water will only be applicable to those locations east of the Site. Also, the ingestion of radioactive material in surface soil as well as the external exposure from radioactive material in surface soil will be most significant east of the Site.

For the inhalation of radioactive material in air, ingestion of radioactive material in surface soil and external exposure from radioactive material in surface soil exposure pathways, the EPA's reasonable maximum exposure (RME) parameters for a resident will be used from the *Rocky Flats Site-Specific Exposure Factors for Quantitative Human Health Risk Assessment* (DOE Letter 95-DOE-08453, dated June 15, 1995). The RME parameters represent the maximum exposure reasonably expected by an individual.

For the ingestion of surface water exposure pathway, it is reasonable to assume that a resident would not use the surface water released from the Site for household use. This is because the surface water is released intermittently from the Site, and therefore, is not a reliable water supply. Also, surface water is released to a waterway that is not used as a drinking water supply. Surface water released from the Site is diverted around Great Western Reservoir to Big Dry Creek and subsequently to the South Platte River. Big Dry Creek contributes less than 0.2 percent to the total flow in the South Platte River. There is no drinking water supply use of the South Platte River from the confluence of Big Dry Creek along the entire reach to the confluence of the North Platte River in Nebraska. Because of these circumstances, it is reasonable to assume that a resident would not use the surface water released from the Site for household use. It is reasonable to assume though

that the residents near the eastern boundary of the Site come into contact with surface waters released from the Site in a recreational capacity. The RME exposure parameters for an open space user from the *Rocky Flats Site-Specific Exposure Factors for Quantitative Human Health Risk Assessment* (DOE Letter 95-DOE-08453, dated June 15, 1995) will be used for the ingestion of surface water exposure pathway. It is therefore assumed that residents wade in the surface waters periodically and incidentally ingest surface water at these times.

### ***Radiation Dose Assessment***

In order to develop the radiation dose to the MEI member of the public, the location of the MEI must be decided. From the *1995 Radionuclide Air Emissions Annual Report*, the individual receiving the highest radiation dose through the air inhalation pathway was located at 96th and Indiana Avenue which is east of the Site. Since surface water is released east of the Site and surface soils east of the Site contain elevated levels of americium and plutonium, the MEI individual for CY95 is located at 96th and Indiana Avenue.

To calculate radiation dose because of inhalation and ingestion, concentrations of radioactive material in air, water, and soil are first multiplied by the amount of time the MEI is exposed to these media (i.e., 24 hrs/day, 350 days/yr, etc.) and then the intake rates (i.e., breathing rate, water ingestion rate, etc.) appropriate to the MEI individual. This product is the total amount of radioactive material inhaled and ingested by the MEI individual. The total amount of radioactive material inhaled and ingested is then multiplied by the radiation dose conversion factors found in Federal Guidance Report No. 11, *Limiting Values of Radionuclide Intake and Air Concentrations and Dose Conversion Factors for Inhalation, Submersion, and Ingestion*, to calculate the radiation dose to the MEI because of inhalation and ingestion of radioactive material.

To calculate radiation dose because of external irradiation, concentrations of radioactive material in soil are multiplied by the external radiation dose conversion factors found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil*.

The radiation dose received by the MEI individual is 0.13 mrem. This radiation dose is well within the radiation dose limit of 100 mrem in DOE Order 5400.5. The following table (Table A-1) gives the breakdown of radiation dose by radionuclide and by exposure pathway for the MEI individual.

### ***Collective Dose***

DOE Order 5400.5 requires the assessment of collective population radiation dose to a distance of 80 km (50 miles). Collective population dose is calculated as the average radiation dose to an individual in a specified area, multiplied by the number of individuals in that area. In assessing the 1995 collective population dose to the public from the Site, the assessment was limited to airborne emissions of radioactive materials from the Site as the major contributor to population dose.

The collective dose assessment was performed in the 1995 Radionuclide Air Emissions Annual Report using the computer model CAP88-PC. The population surrounding the Site was based on 1994 data adjusted for regional growth. The collective dose was calculated to be 0.094 person-rem for CY95.

*Table A-1 Radiation Dosage by Radionuclide for 1995*

Radionuclide	Soil Inhalation Radiation Dose (mrem)	Soil Ingestion Radiation Dose (mrem)	External Irradiation Radiation Dose (mrem)	Water Ingestion Radiation Dose (mrem)	Total Radiation Dose By Radionuclide (mrem)
Am-241	1.47E-03	4.23E-02	4.01E-03	2.95E-05	4.78E-02
Pu-239/240	3.97E-03	7.95E-02	3.79E-05	6.74E-05	8.36E-02
U-234	5.69E-04	9.25E-12	9.90E-14	2.32E-04	8.01E-04
U-235	2.21E-05	3.43E-13	3.67E-12	1.08E-05	3.29E-05
U-238	5.57E-04	8.93E-12	4.66E-14	2.21E-04	7.78E-04
H-3	2.37E-05	0	0	1.79E-06	2.55E-05
<b>Total</b>	<b>6.6E-03</b>	<b>1.2E-01</b>	<b>4.0E-03</b>	<b>5.6E-04</b>	<b>1.3E-01</b>



## **Appendix B: Rocky Flats Environmental Technology Site 1996 Public Radiation Dose Assessment**

### **Introduction**

A public radiation dose assessment was performed for calendar year 1996 (CY96) to support the requirements of DOE Order 5400.5, "Radiation Protection of the Public and the Environment." This DOE Order states that the radiation dose to the public will be assessed from exposures to radiation sources from routine activities at a DOE facility and from property released subsequent to remedial action at that facility. This public radiation dose will be compared with the annual radiation dose limit of 100 mrem from this Order to assure that the radiation dose limit is not exceeded. The member of the public that received the highest radiation dose from radiation sources at the Rocky Flats Environmental Technology Site (Site) is called the maximally exposed individual (MEI). The radiation dose received by the MEI will be compared with the annual radiation dose limit of 100 mrem. For CY96, the MEI was located at Mower Lake. The radiation dose received by this MEI was 0.42 mrem. This radiation dose is well within the annual radiation dose limit of 100 mrem.

### **Radiation Protection Standards for the Public**

Standards for protection of the public from radiation sources are based on the concept of radiation dose. This concept provides a means for quantifying the biological effect or risk from all types of radiation on a common basis. Radiation dose is expressed in rem or mrem (1 rem = 1,000 mrem). Radiation protection standards are based on guidance from the National Council on Radiation Protection and Measurement (NCRP) and the International Commission on Radiological Protection (ICRP). These organizations are internationally recognized for their expertise in radiation protection principles. DOE Order 5400.5 prescribes an annual public radiation dose limit of 100 mrem which is based on guidance from the NCRP and ICRP.

### **Radiation Dose Assessment Methodology**

In order to assess the radiation dose to a member of the public from radiation sources at the Site, a number of steps need to be followed. These steps are:

1. The radiation sources at the Site that release radioactive material to the environment need to be analyzed, and the releases from these sources need to be quantified,
2. The members of the public closest to the boundary of the Site need to be located,
3. The exposure pathways (inhalation, ingestion, etc.) by which these members of the public may be exposed to the released radioactive material need to be defined, and
4. The radiation dose received by these members of the public need to be assessed.

DOE Order 5400.5 encourages the use of realistic, but conservative, approaches to radiation dose assessment. The radiation dose assessment performed in this report uses this approach.

### ***Sources of Radioactive Material***

The radioactive material released to the environment at the Site include isotopes of americium, plutonium, uranium, and tritium. For CY96, these radioactive materials were released from the Site through air emissions and through surface water emissions. There have also been past releases from the Site that have deposited americium and plutonium on surface soils east of the Site. These surface soils are currently being investigated as Operable Unit #3 at the Site. Emissions of radioactive material in air and water plus past depositions of radioactive material in surface soils will be used to assess the radiation dose to the public during CY96.

The radioactive material released in air from the Site is quantified in the *1996 Radionuclide Air Emissions Annual Report*. This report was developed to comply with the requirements from the Environmental Protection Agency (EPA) in Title 40 of the Code of Federal Regulations (CFR), Part 61 and from the Colorado Air Quality Control Commission Regulations. All sources of radioactive material (both point sources and area sources) at the Site are assessed in this report with their associated air emissions. Air emissions are then translated into air concentrations of radioactive material outside of the boundary of the Site. Air concentrations of radioactive material from this report are used to quantify the amount of radioactive material inhaled by members of the public. The deposition rate of radioactive material onto surface soils is also delineated in this report. Surface soil concentrations of radioactive material will be used to quantify the amount of radioactive material ingested in soil by a member of the public as well as to quantify external radiation exposure to a member of the public.

The radioactive material released in water from the Site is quantified through routine surface water monitoring activities. In 1996, Ponds A-4 and B-5 released water offsite in a batch manner. Pond C-2 did not release any water offsite in 1996. The pond water was analyzed for radioactive material before each release from the Site. The volume of water was recorded for each release. Volume weighted average surface water concentrations of radioactive material are used to quantify the amount of radioactive material ingested by members of the public.

Because of past releases of radioactive material at the Site, there are elevated levels of radioactive material in surface soils east of the Site. The amount of radioactive material in surface soils is documented in the *Final Resource Conservation and Recovery Act Facility Investigation/Remedial Investigation Report for Operable Unit #3 (Offsite Areas)*. Surface soil samples taken to support the Operable Unit #3 Report will be used to quantify the amount of radioactive material near a member of the public. Surface soil concentrations of radioactive material will be used to quantify the amount of radioactive material ingested in soil by a member of the public as well as to quantify external radiation exposure to a member of the public.

## **Location of Members of the Public Surrounding the Site**

In order to compare the radiation dose to a member of the public with radiation dose limits, it is necessary to identify the MEI member of the public. This member of the public will receive the highest radiation dose from radioactive material released from the Site. The radiation dose received by the MEI member of the public will be used to compare with public radiation dose limits.

To identify the MEI member of the public, seven locations surrounding the Site were investigated. The nearest member of the public was assessed in the north, northwest, southwest, south, and east (3 locations) directions from the Site. All of these locations are residential.

## **Exposure Pathway Analysis**

The most significant exposure pathways for a resident will be assessed in this radiation dose assessment. The exposure pathways of 1) inhalation of radioactive material in air, 2) ingestion of radioactive material in surface soil, 3) external exposure from radioactive material in surface soil, and 4) ingestion of surface water will be assessed in this radiation dose assessment. The ingestion of homegrown produce was not assessed because of the high dilution of radioactive material deposited on surface soil during tilling.

All of these exposure pathways though may not be applicable to each of the six locations being examined and/or may not be significant to each of these six locations at the boundary of the Site. This is because surface water is preferentially released to the east of the Site and because the surface soils east of the Site contain elevated concentrations of radioactive material. Therefore, the ingestion of radioactive material in surface water will only be applicable to those locations east of the Site. Also, the ingestion of radioactive material in surface soil as well as the external exposure from radioactive material in surface soil will be most significant east of the Site.

For the inhalation of radioactive material in air, ingestion of radioactive material in surface soil and external exposure from radioactive material in surface soil exposure pathways, the EPA's reasonable maximum exposure (RME) parameters for a resident will be used from the *Rocky Flats Site-Specific Exposure Factors for Quantitative Human Health Risk Assessment* (DOE Letter 95-DOE-08453, dated June 15, 1995). The RME parameters represent the maximum exposure reasonably expected by an individual.

For the ingestion of surface water exposure pathway, it is reasonable to assume that a resident would not use the surface water released from the Site for household use. This is because the surface water is released intermittently from the Site, and therefore, is not a reliable water supply. Also, surface water is released to a waterway that is not used as a drinking water supply. Surface water released from the Site was diverted around Great Western Reservoir to Big Dry Creek and subsequently to the South Platte River. Big Dry Creek contributes less than 0.2 percent to the total flow in the South Platte River. There is no drinking water supply use of the South Platte River from the confluence of Big Dry Creek along the entire reach to the confluence of the North Platte River in Nebraska. Because of these circumstances, it is reasonable to assume that a resident would not use the surface water released from the Site for household use. It is reasonable to assume though

that the residents near the eastern boundary of the Site come into contact with surface waters released from the Site in a recreational capacity. The RME exposure parameters for an open space user from the *Rocky Flats Site-Specific Exposure Factors for Quantitative Human Health Risk Assessment* (DOE Letter 95-DOE-08453, dated June 15, 1995) will be used for the ingestion of surface water exposure pathway. It is therefore assumed that residents wade in the surface waters periodically and incidentally ingest surface water at these times.

### **Radiation Dose Assessment**

In order to develop the radiation dose to the MEI member of the public, the location of the MEI must be decided. From the *1996 Radionuclide Air Emissions Annual Report*, the individual receiving the highest radiation dose through the air inhalation pathway was located on McCaslin Blvd., north of the Site. Since surface water is preferentially released to the east of the Site and the surface soils east of the Site contain elevated concentrations of radioactive material, the three locations east of the Site were investigated along with the location north of the Site to determine the MEI individual. After assessing the radiation dose to an individual at all four locations, the MEI individual for CY96 is located at Mower Lake.

To calculate radiation dose because of inhalation and ingestion, concentrations of radioactive material in air, water, and soil are first multiplied by the amount of time the MEI is exposed to these media (i.e., 24 hrs/day, 350 days/yr, etc.) and then the intake rates (i.e., breathing rate, water ingestion rate, etc.) appropriate to the MEI individual. This product is the total amount of radioactive material inhaled and ingested by the MEI individual. The total amount of radioactive material inhaled and ingested is then multiplied by the radiation dose conversion factors found in Federal Guidance Report No. 11, *Limiting Values of Radionuclide Intake and Air Concentrations and Dose Conversion Factors for Inhalation, Submersion, and Ingestion*, to calculate the radiation dose to the MEI because of inhalation and ingestion of radioactive material.

To calculate radiation dose due to external irradiation, concentrations of radioactive material in soil are multiplied by the external radiation dose conversion factors found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil*.

The radiation dose received by the MEI individual is 0.42 mrem. This radiation dose is well within the radiation dose limit of 100 mrem in DOE Order 5400.5. The following table (Table B-1) gives the breakdown of radiation dose by radionuclide and by exposure pathway for the MEI individual.

### **Collective Dose**

DOE Order 5400.5 requires the assessment of collective population radiation dose to a distance of 80 km (50 miles). Collective population dose is calculated as the average radiation dose to an individual in a specified area, multiplied by the number of individuals in that area. In assessing the 1996 collective population dose to the public from the Site, the assessment was limited to airborne emissions of radioactive materials from the Site as the major contributor to population dose.

The collective dose assessment was performed in the *1996 Radionuclide Air Emissions Annual Report* using the computer model CAP88-PC. The population surrounding the Site was based on 1994 data adjusted for regional growth. The collective dose was calculated to be 10.5 person-rem for CY96.

**Table B-1 Radiation Dosage by Radionuclide for 1996**

Radionuclide	Soil Inhalation Radiation Dose (mrem)	Soil Ingestion Radiation Dose (mrem)	External Irradiation Radiation Dose (mrem)	Water Ingestion Radiation Dose (mrem)	Total Radiation Dose By Radionuclide (mrem)
Am-241	1.29E-02	5.84E-02	5.54E-03	1.65E-05	7.69E-02
Pu-239/240	1.63E-02	2.70E-01	1.28E-04	4.19E-05	2.86E-01
U-234	2.28E-02	3.15E-10	3.37E-12	1.15E-04	2.29E-02
U-235	1.41E-03	1.90E-11	2.03E-10	5.71E-06	1.42E-03
U-238	2.88E-02	3.89E-10	2.03E-12	1.22E-04	2.89E-02
H-3	2.87E-05	0.00E+00	0.00E+00	0.00E+00	2.87E-05
<b>Total</b>	<b>8.2E-02</b>	<b>3.3E-01</b>	<b>5.7E-03</b>	<b>3.0E-04</b>	<b>4.2E-01</b>

90/90

