

**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
QUARTERLY
ENVIRONMENTAL MONITORING REPORT
JULY - SEPTEMBER 2001**



US Department of Energy, Rocky Flats Field Office
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NOVEMBER 2001

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PREPARED BY SAFE SITES OF COLORADO, L.L.C.

*THE DATA IN THIS DOCUMENT MAY BE PRELIMINARY AND COULD CHANGE AFTER THE
DATA HAVE BEEN VERIFIED OR VALIDATED.*

NOVEMBER 2001

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HIGHLIGHTS FOR JULY - SEPTEMBER 2001

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 monitoring requirement. As discussed at a previous Exchange of Information Meeting, the Site is consolidating its reporting for selected media. In an effort to provide a more meaningful interpretation of the data presented and to save some natural resources, namely trees, the Site will be providing analytical data in the following formats.

Airborne effluent data are represented by a single graph providing cumulative plutonium emissions for 1999, 2000, and 2001. Ambient air data are represented by two graphs – a summary of estimated off-site dose as compared to a 10 Mrem per year standard, and air concentrations at perimeter sample locations expressed as a percentage of EPA's air concentration-based dose limit for members of the public. Meteorological data are represented by one windrose and a climatic summary for each month in the reporting period.

Compliance data in support of the Site National Pollutant Discharge Elimination System (NPDES) permit are presented for the reporting period. Analytical data collected in support of RFCA will include the following locations: GS01, GS03, GS08, GS10, GS11, GS31, GS43, SW022, SW027, SW091, and SW093. Data include the hydrograph, mean daily flow and available water quality measurements for each location during the reporting period. Additional surface water locations supporting the Industrial Area Interim Measures/Interim Remedial Action (IA IM/IRA) program are GS27, GS32, GS39 and GS40 and are presented in the same manner as RFCA locations. Other stations may appear or be deleted, as performance monitoring locations are added or dropped, as well as any new source detection locations that may be required. Some locations, like GS32, have no flow monitoring capabilities and only analytical data are provided. An additional section provides quarterly summary information for the Incidental Waters program.

Airborne Effluent

Complete isotopic analytical data through August 2001 are included in this report. All data are within the normally observed ranges of concentrations for their respective locations. Consistent with all other uses of these data, only positive values are included in the total release calculation (the negative values are treated as zeros). The uncertainty calculation reflects all data.

Effluent sampler calibrations were performed in April 2001.

During July 2001, velocity profiling was performed on all effluent locations. The coefficient of variation for these measurements, which compare the most recent flow rate measurement to previous measurements to confirm constant flow rate, was well within the acceptance range of ± 20 percent.

Ambient Air

Complete isotopic analytical data through August 2001 for coarse (>10 micrometers) and fine (≤10 micrometers) ambient air samples are included in this report. All data are within the normally observed ranges of concentrations for their respective locations.

During the quarterly sample flow verification in July, all ambient air samplers were observed to have acceptable sample flow of 40 cubic feet per minute (cfm) ± 4 cfm.

Meteorology and Climatology

Meteorological data are routinely measured from instruments on a 61-meter tower located in the west buffer zone at an elevation of 1,870 meters (6,140 feet) above sea level. All meteorological data are collected on a real-time basis and are transmitted as 15-minute averaged values to the Computer Assisted Protective Action Recommendations System (CAPARS) model for emergency response purposes. The same data are logged at the tower and downloaded for air quality and surface water modeling purposes.

Climatic summaries and wind roses for July, August and September 2001 are included in this report.

As a result of the protocols used to validate the meteorological data, each 15-minute averaged observation is validated, rather than the entire observation record for the same time period (which might contain 70 different observations -- i.e., temperature, wind speed, etc.). Missing data are reported with respect to the wind speed and wind direction values, for example, rather than recording all observations missing for the same 15 minute period. There were no missing wind speed and/or direction data during the quarter.

The semi-annual calibration of all meteorological instruments was performed in July and all instruments were found to be operating within acceptable tolerances.

Surface Water

Surface water analytical data collected during the fourth quarter of FY01 (July, August, and September) for NPDES permit compliance are presented in this report. Only one fecal coliform sample was collected for the week of September 10th. RFETS was closed after the attack on the World Trade Center began, and the sampling event scheduled for September 11th could not be taken due to security reasons. Extra security measures have been implemented at the Site, and routine NPDES sampling was reestablished by September 17th. All reported data were typical of historical measurements and within permit limitations.

Included in this report are two surface water locations that monitor the Mound Site area. These locations are SW061 and SW132 and are sampled quarterly for isotopic Pu/Am, selected total and dissolved metals, and EPA VOA Method 8260.

Hydrologic Monitoring and Rocky Flats Cleanup Agreement (RFCA) Monitoring

All available analytical data collected during the fourth quarter of FY01 (July, August, and September) from samples supporting RFCA and Hydrologic Monitoring programs are included in this report. Buffer Zone Hydrologic flow and water quality data, where collected, have been included with this report.

Incidental Water Monitoring

A summary of Incidental Waters dispositioned during the fourth quarter of FY01 (July, August, and September) are presented in this report.

1.0 AIR DATA

1.1 EFFLUENT AIR DATA

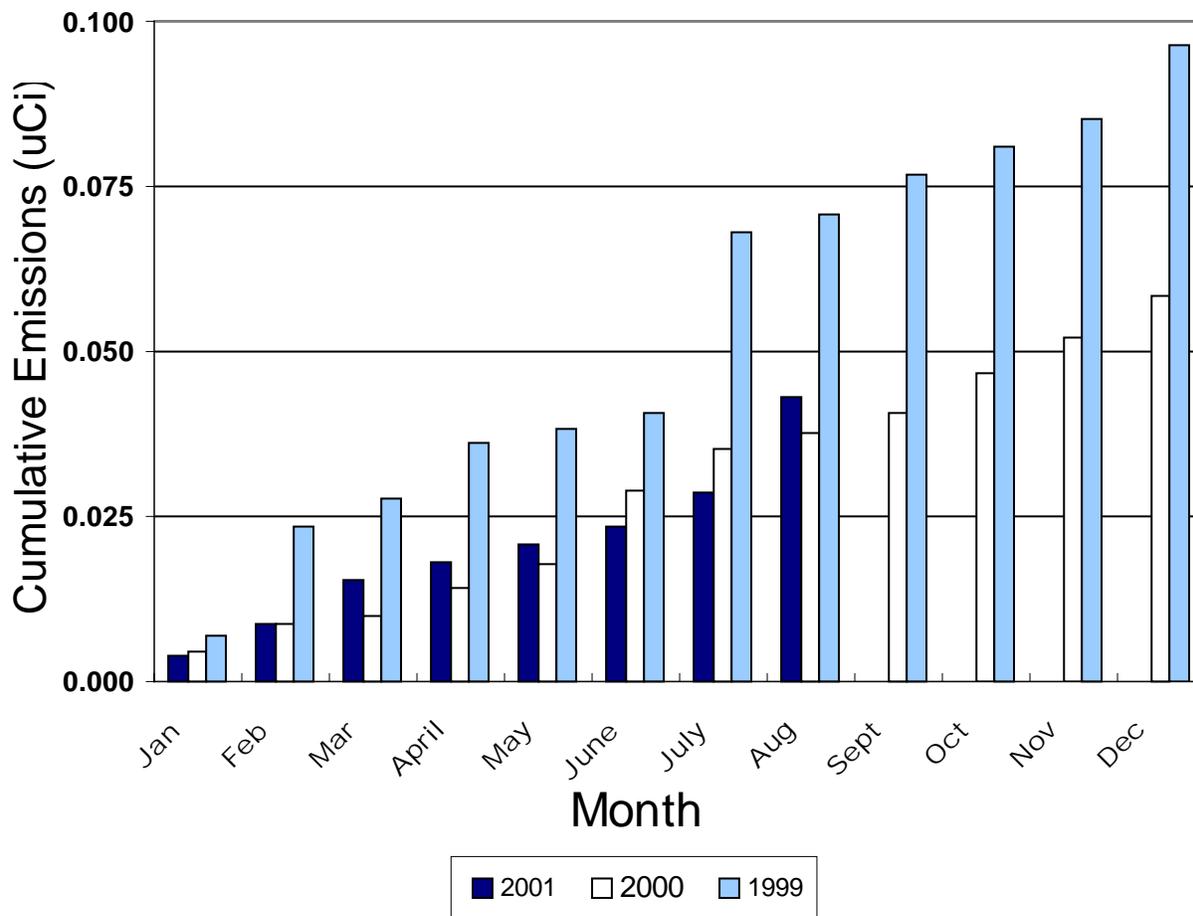
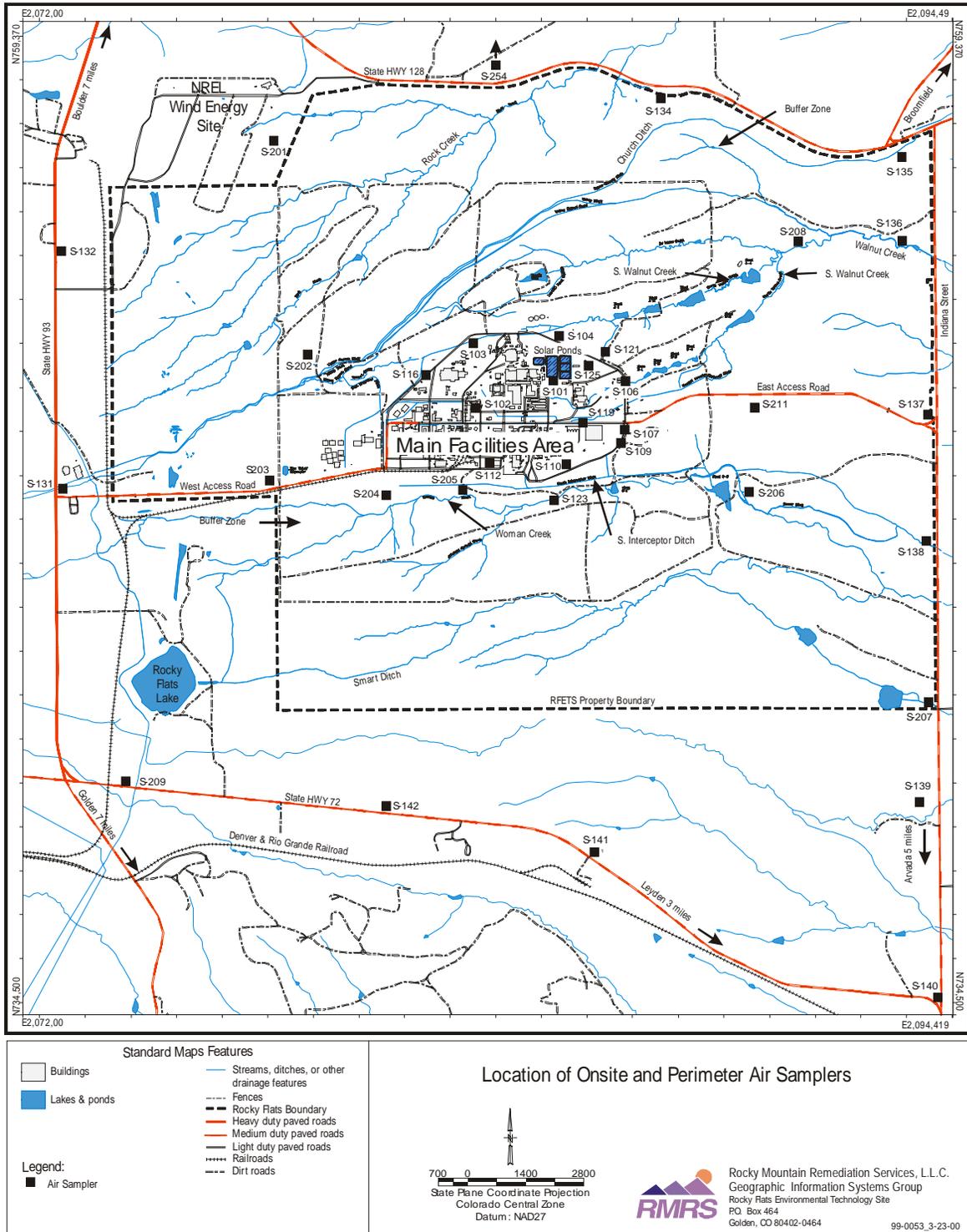


Figure 1-1 Cumulative Plutonium Airborne Effluent Emissions

The above graph shows the cumulative airborne effluent emissions of plutonium from the Site building stacks. Results from the most recently analyzed effluent stack samples (June, July and August 2001) were consistent with previously measured plutonium concentrations, with a cumulative, year-to-date (August 2001) plutonium emission of 0.043 micro curies (μCi).

Americium and uranium emissions for June, July and August 2001, while somewhat higher than respective 2000 data, were consistent with the levels seen in the past three years.

Map 1-1. Location of Onsite and Perimeter Air Samplers



2.0 AMBIENT AIR DATA

2.1.1 Perimeter Sampler Locations

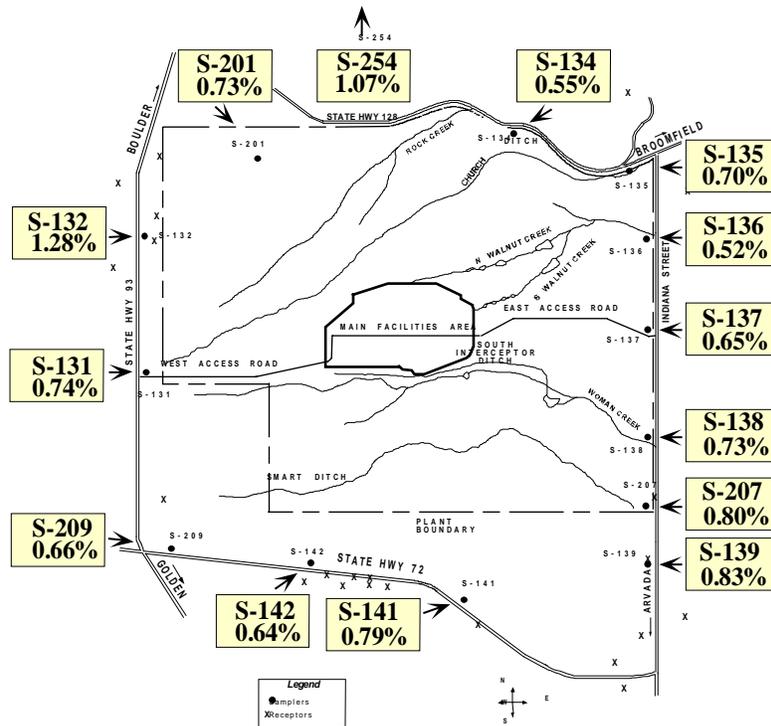


Figure 2-1. Perimeter Samplers Dose Map

The above map illustrates the perimeter Radioactive Ambient Air Monitoring Program (RAAMP) sampler locations and the twelve-month rolling-average maximum potential dose through August 2001, expressed as a percentage of EPA's air concentration-based dose limit for members of the public. The percentage values are based on the measured air concentrations, averaged over the year and converted as a percent of the Rad NESHAP concentration limits.

The percentages include the naturally occurring uranium isotopes as well as the isotopes from site contributions. The average concentration observed at location S-132 (northwest corner of Site) equates to the highest potential dose or 1.28% of the Rad NESHAP concentration limit. All perimeter samplers show percentages consistent with the previously reported results ranging from 0.52 % at S-136 (northeast corner of Site) to the high at S-132 stated previously.

2.1.2 Perimeter Sampler Locations – Dose Rate Graphs

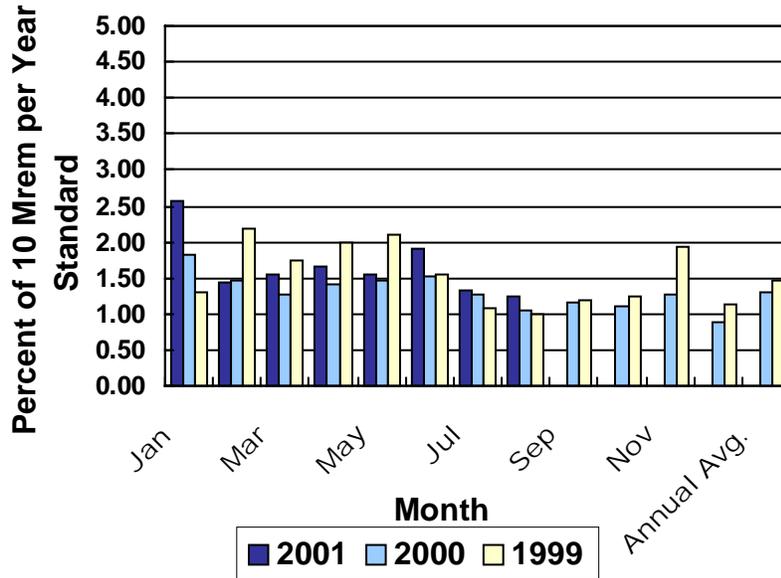


Figure 2-2. Offsite Dose Rate Summary

The above graph illustrates the monthly estimated maximum potential dose rates at the perimeter sampler showing the highest total radionuclide concentrations, including contributions from naturally occurring uranium isotopes. The highest dose rates for June, July, and August of 2001 were seen at locations S-132, S-142 and S-141, respectively. The maximum offsite dose rate remains well below 2.5 percent of the 10 mrem standard at all locations except S-254, where the dose rate was 2.6 percent. This reflects the elevated concentrations of naturally occurring uranium (U-234 and 238) due to a heavily loaded filter in January 2001, as mentioned in the May 2001 Quarterly Report.

2.2.2 Perimeter Sampler Locations – Dose Rate Graphs, continued

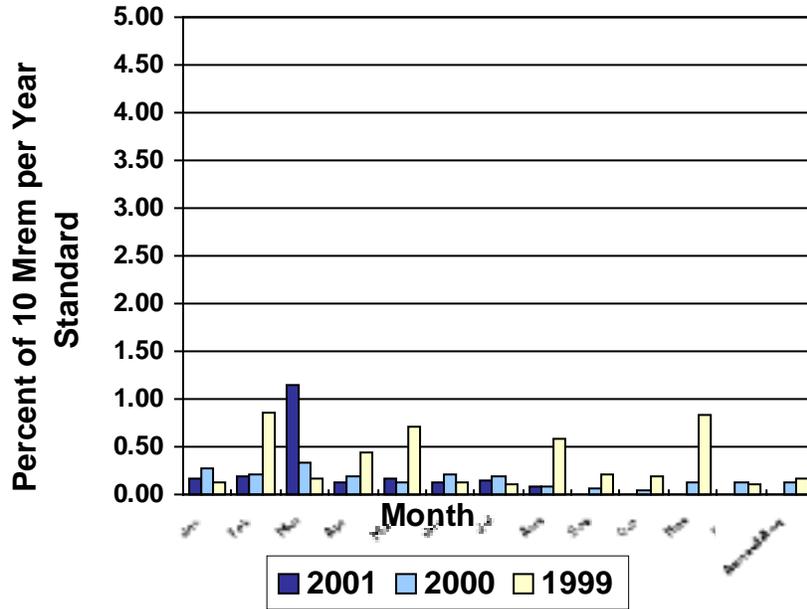


Figure 2-3. Offsite Dose Rate Summary Without U-234 and U-238

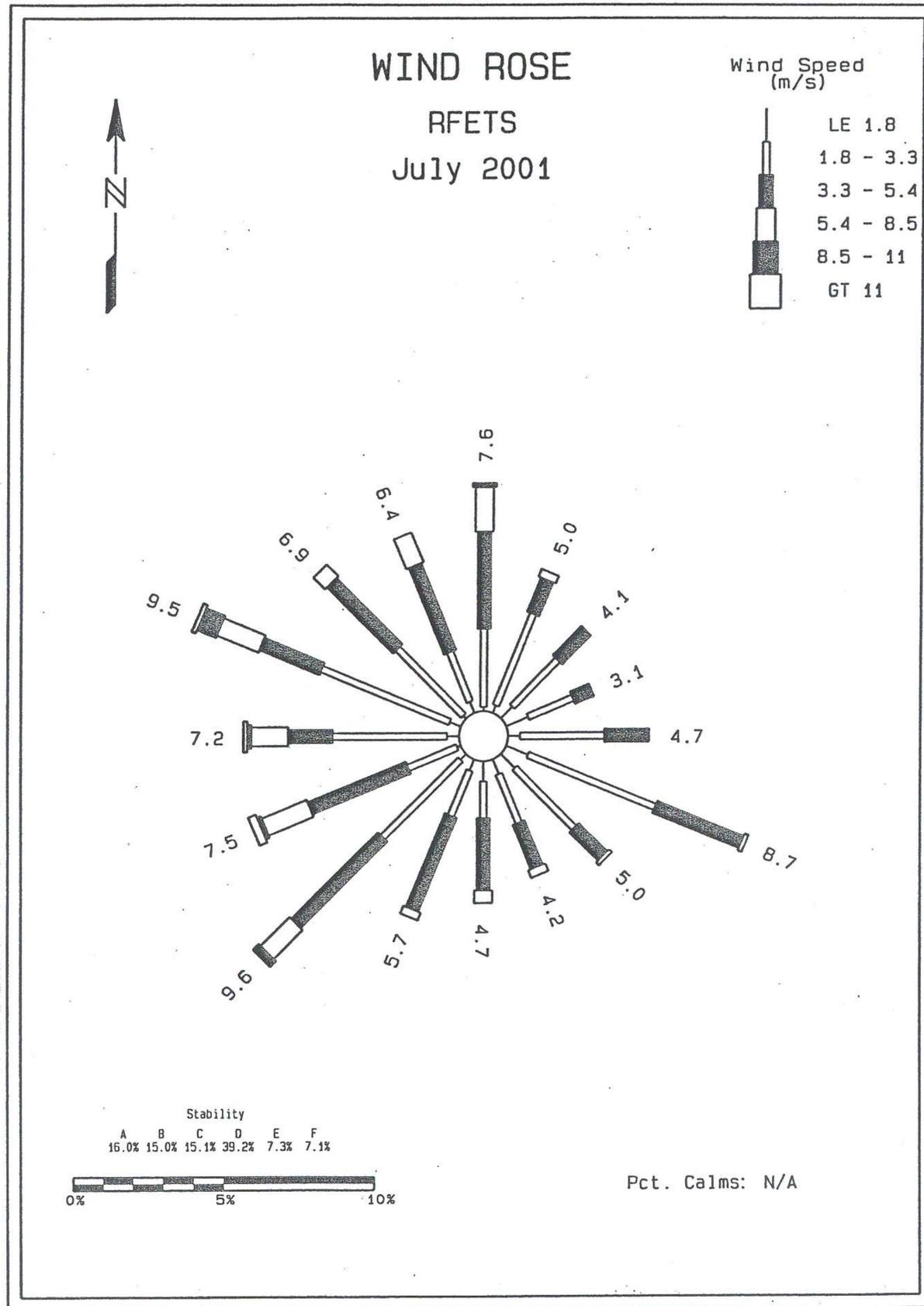
Omitting the dose contributions from uranium 234 and 238 may better reflect the contribution from Site operations at the same sampling location, since these two isotopes of uranium occur naturally in Colorado soils. This view displays the maximum offsite dose rate, resulting from Site activities, to be less than 1.2 percent of the 10 mrem standard. The highest dose rates during this period were at S-138, S-209 and S-141, respectively for June, July and August.

Ambient concentrations and dose rates for 2001 are consistent with data from 1998 through 2000 for each respective month.

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3.0 METEOROLOGY AND CLIMATOLOGY

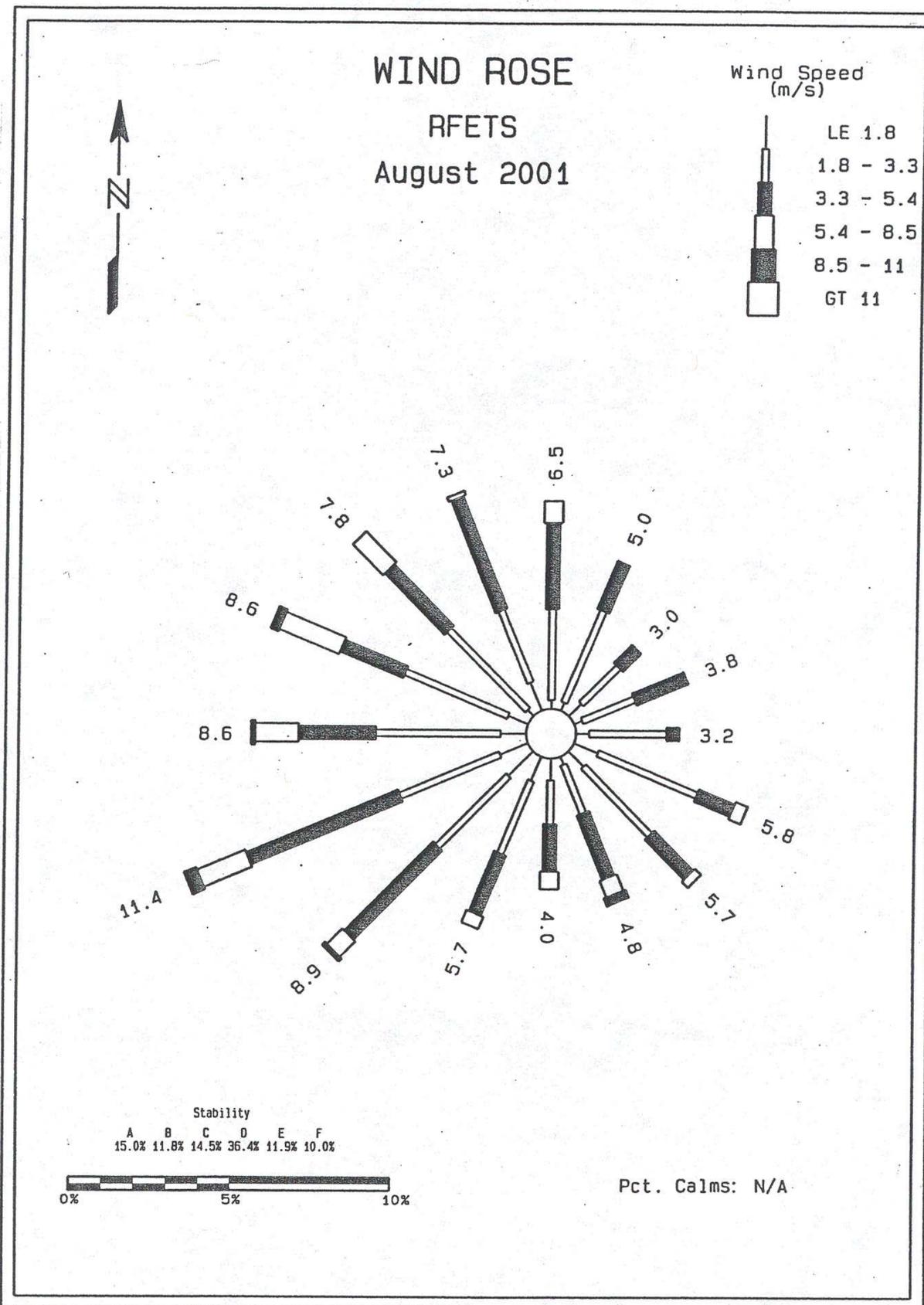
3.1 WIND ROSES FOR JULY, AUGUST, AND SEPTEMBER 2001



Monthly Climatic Summary

Month	Temperature (°F)			Mean Dew Point (°F)	Mean Relative Humidity (%)	Wind Speed (mph)		Pressure Mean (mb)	Solar Total (kW-h/m ²)	Precipitation (in)	
	Mean Daily High	Mean Daily Low	Daily Mean			Mean	Max			Total	Max
Jul-01	84.43	62.8	73.56	53.87	57.03	8.22	54.74	816.86	184.45	2.7	0.79

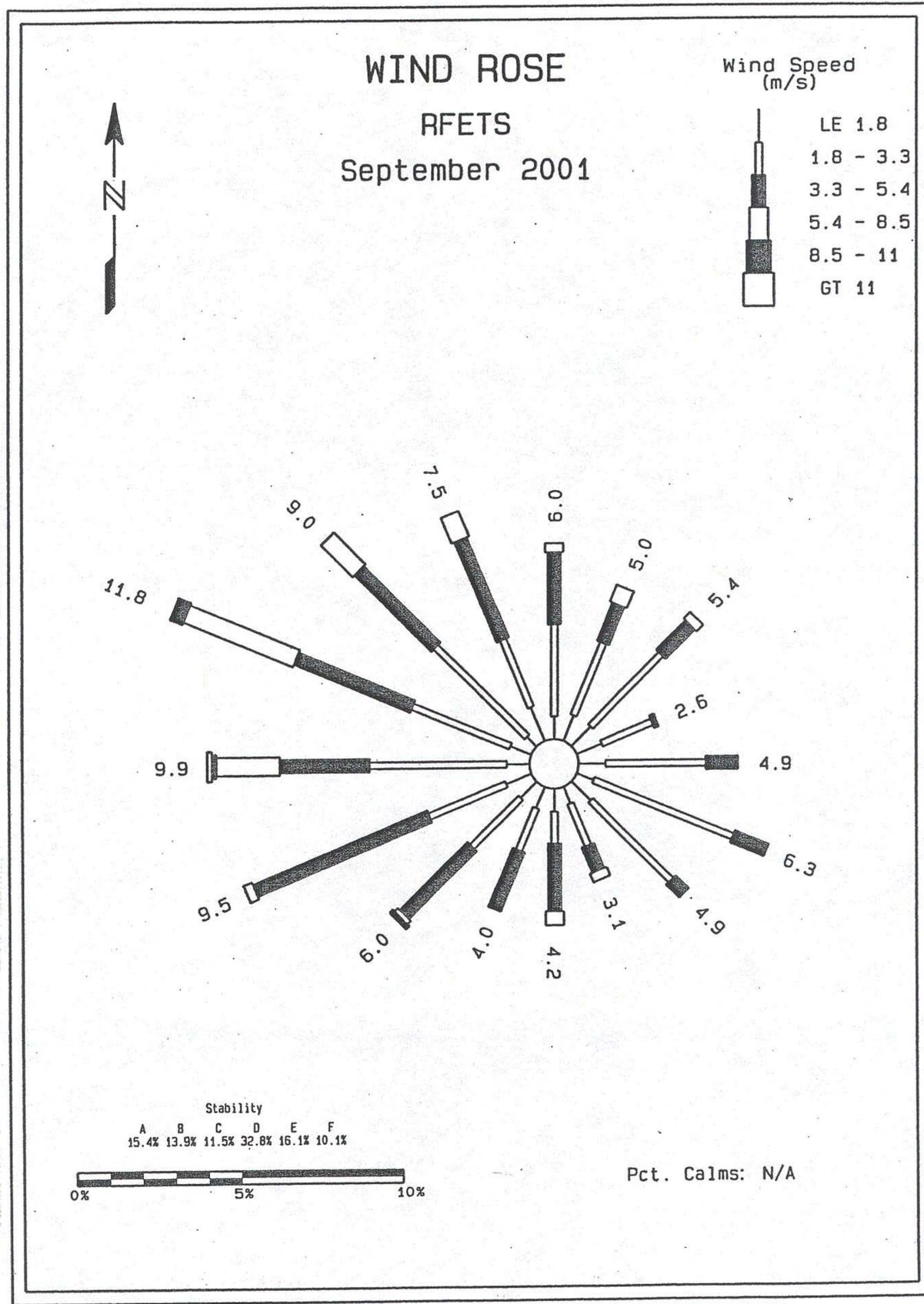
Figure 3-1. Wind Rose for Rocky Flats Environmental Technology Site for July 2001



Monthly Climatic Summary

Month	Temperature (°F)			Mean Dew Point (°F)	Mean Relative Humidity (%)	Wind Speed (mph)		Pressure (mb)	Solar Total (kW-h/m ²)	Precipitation (in)	
	Mean Daily High	Mean Daily Low	Daily Mean			Mean	Max			Total	Max
	Aug-01	80.29	60.57			70.57	52.42			59.87	7.86

Figure 3-2. Wind Rose for Rocky Flats Environmental Technology Site for August 2001



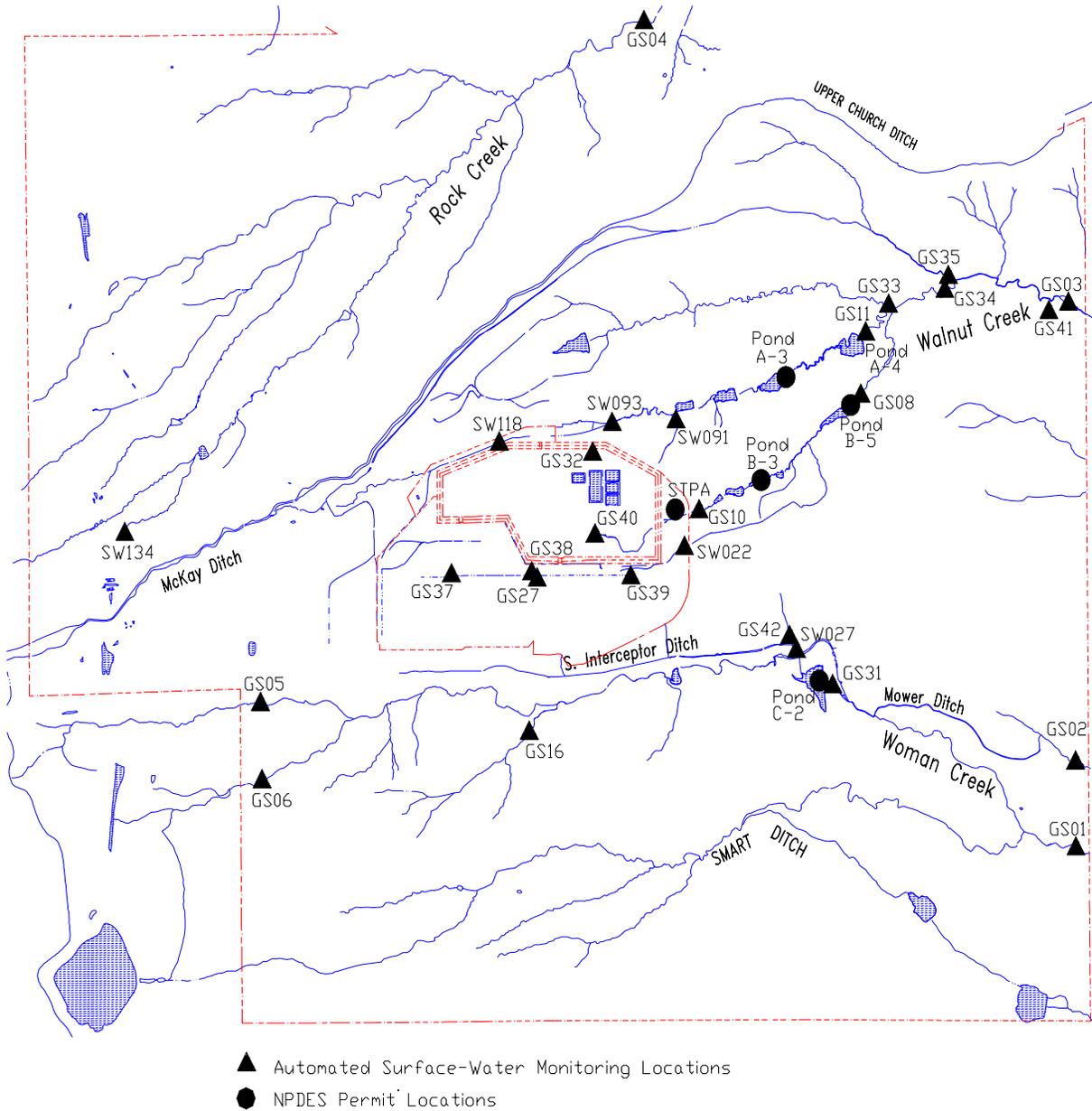
Monthly Climatic Summary											
Month	Temperature (°F)			Mean Dew Point (°F)	Mean Relative Humidity (%)	Wind Speed (mph)		Pressure (mb)	Solar Total (kW-h/m ²)	Precipitation (in)	
	Mean Daily High	Mean Daily Low	Daily Mean			Mean	Max			Total	Max
Sep-01	74.8	53.98	64.78	44.2	56.0	7.7	57.1	817.0	150.1	1.42	0.16

Figure 3-3. Wind Rose for Rocky Flats Environmental Technology Site for September 2001

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4.0 SURFACE WATER DATA

Map 4-1. Holding Ponds and Liquid Effluent Water Courses



4.1 NPDES SUMMARY DATA

Table 4-1. Sewage Treatment Plant (Outfall STP1)

Dates of discharge: 07/01/01 – 09/30/01

Parameter & Units	Measured 30-day Average	Limit 30-Day Average	Measured 7-Day Average	Limit 7-Day Average	Measured Daily Minimum	Limit Daily Minimum	Measured Daily Maximum	Limit Daily Maximum	Measured Result	% Removal (calc.)	% Removal Minimum
pH, SU	N/A	N/A	N/A	N/A	6.8 – 7.0	6.5	7.8 – 8.8	9.0	N/A	N/A	N/A
TSS, mg/l	<5	15	N/A	N/A	N/A	N/A	<5 - 8	25	N/A	N/A	N/A
TSS (Influent), mg/l	55 - 63	a	N/A	N/A	N/A	N/A	140 - 160	a	N/A	N/A	N/A
TSS, % removal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	90% - 92%	85%
Total Phos., mg/l	2 – 2.1	8	N/A	N/A	N/A	N/A	3 - 4	12	N/A	N/A	N/A
Total Cr., ug/l	N/A	N/A	N/A	N/A	N/A	N/A	<1	50	N/A	N/A	N/A
Potentially Dissolved Ag, ug/l	<0.3	0.6	N/A	N/A	N/A	N/A	<0.3	3.8	N/A	N/A	N/A
F. Coliform, #/100ml	<4	200b	<2 - 34	400b	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CBOD5, mg/l	<3	8	N/A	N/A	N/A	N/A	3 - 5	20	N/A	N/A	N/A
CBOD5 (Influent), mg/l	25 - 39	a	N/A	N/A	N/A	N/A	54 - 104	a	N/A	N/A	N/A
CBOD5, % removal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	92% - 95%	85%
Oil & Grease	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	c	N/A	N/A
NO3/NO2 as N, mg/l	N/A	N/A	N/A	N/A	N/A	N/A	4.6 - 10	a	N/A	N/A	N/A
NO2 as N, mg/l	N/A	N/A	N/A	N/A	N/A	N/A	0.4 – 3.0	4.5	N/A	N/A	N/A
Ammonia as N, mg/l	N/A	N/A	N/A	N/A	N/A	N/A	2.0 – 14.0	a	N/A	N/A	N/A
Alkalinity, mg/l	N/A	N/A	N/A	N/A	N/A	N/A	134 - 260	a	N/A	N/A	N/A

a Report Only CBOD5 Carbonaceous Biochemical Oxygen Demand, 5-Day Test

b Geometric Mean TSS Total Suspended Solids

c No Sheen Observed SU Standard Units

N/A Not Applicable

Note: Results are the range of value(s) measured during the reporting period.

Table 4-1. Sewage Treatment Plant (Outfall STP1), continued

Parameter & Units	Measured 30-day Average	Limit 30-Day Average	Measured 7-Day Average	Limit 7-Day Average	Measured Daily Minimum	Limit Daily Minimum	Measured Daily Maximum	Limit Daily Maximum	Measured Result	% Removal (calc.)	% Removal Minimum
Gross alpha, pCi/l	1 - 2	11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gross beta, pCi/l	5 - 6	19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ceriodaphnia Acute test	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100 pass	N/A	N/A
Fathead Minnows Acute test	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100 pass	N/A	N/A
Ceriodaphnia Chronic test	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fathead Minnows Chronic test	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Carbon tetrachloride, ug/l	<1	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2 dichloro-ethane, ug/l	<1	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzene, ug/l	<1	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,1 dichloro-ethylene, ug/l	<1	7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,1,1 trichloro-ethane, ug/l	<1	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2 dichloro-ethylene (transl), ug/l	<1	70	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trichloro-ethylene, ug/l	<1	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloro-ethylene, ug/l	<1	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A Not Applicable

NS Not sampled

4.2 MOUND PLUME SUMMARY DATA

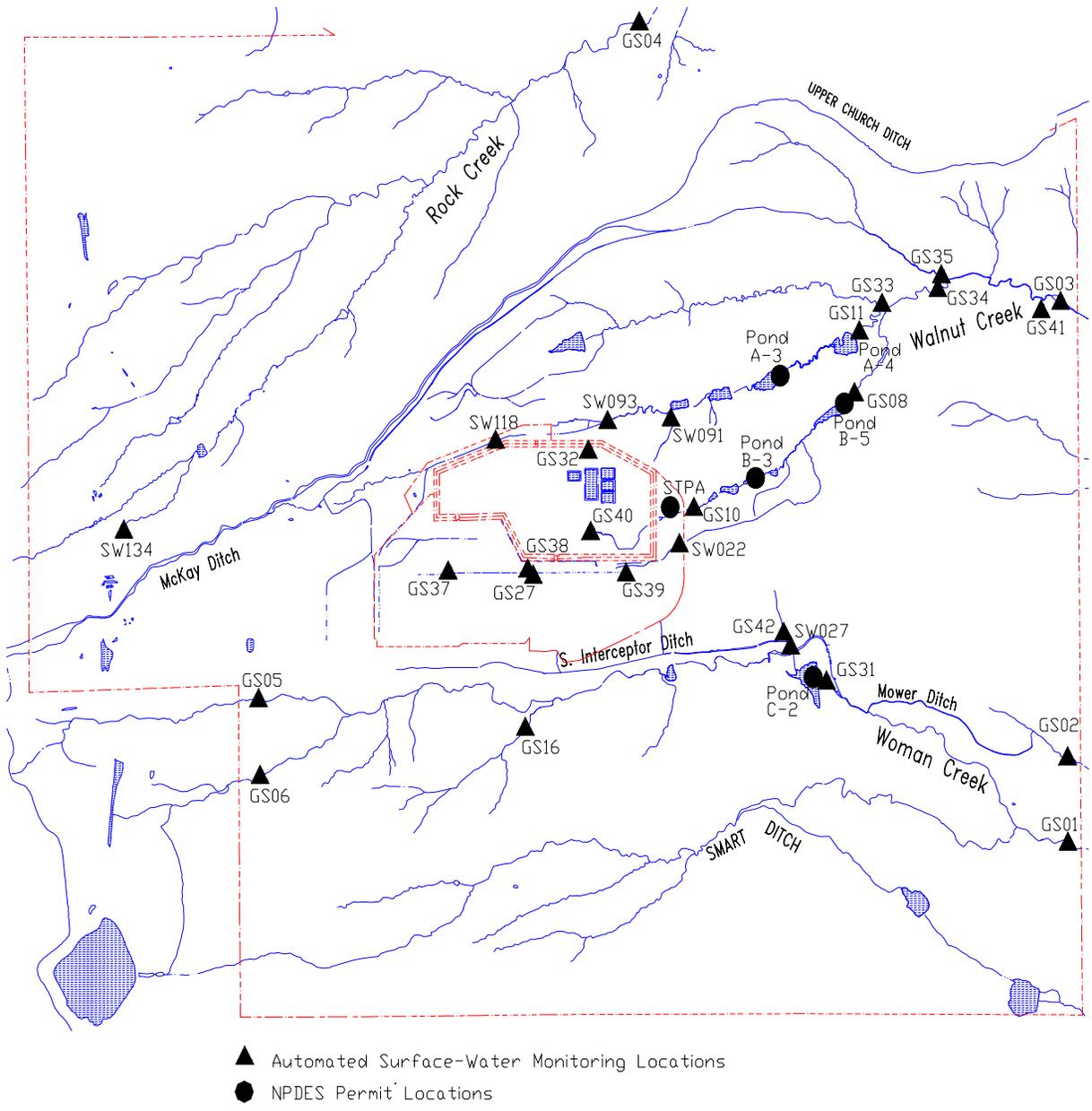
Table 4-2. Mound Plume Locations SW061 and SW132

Analyte	SW061	SW132
	09/05/01	09/05/01
Pu 239/240, pCi/l	0.003 +/- 0.010	0.007 +/- 0.015
Am 241, pCi/l	-0.003 +/- 0.002	0.010 +/- 0.018
Silver, dissolved, ug/l	<.32	<0.32
Aluminum, total, ug/l	19.0	634
Arsenic, total, ug/l	2.1	4.0
Barium, total, ug/l	322	303
Beryllium, total, ug/l	<0.18	<0.18
Cadmium, dissolved, ug/l	<0.15	<0.15
Copper, dissolved, ug/l	4.8	3.2
Iron, total, ug/l	148	3930
Mercury, total, ug/l	<0.026	<0.026
Manganese, total, ug/l	21.0	771
Nickel, dissolved, ug/l	<3.0	<3.0
Lead, dissolved, ug/l	<0.6	<0.6
Antimony, total, ug/l	1.3	3.2
Selenium, dissolved, ug/l	3.0	4.9
Zinc, dissolved, ug/l	9.0	17.8
EPA VOA Method 8260, compounds found >RFCA Seg 5 Action Level	None detected	None detected

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5.0 HYDROLOGIC AND ROCKY FLATS CLEAN-UP AGREEMENT (RFCA) DATA

Map 5-1. Gaging Station Locations



5.1 FLOW MONITORING

Table 5-1. Gaging Station GS01: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
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	0.010	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	0.000	0.000	NA
Monthly Average (cfs)	0.000	0.000	0.000

Monthly Discharge

Cubic Feet	0.001	0.000	0.000
Gallons	0.001	0.000	0.000
Acre-Feet	0.001	0.000	0.000

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

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.

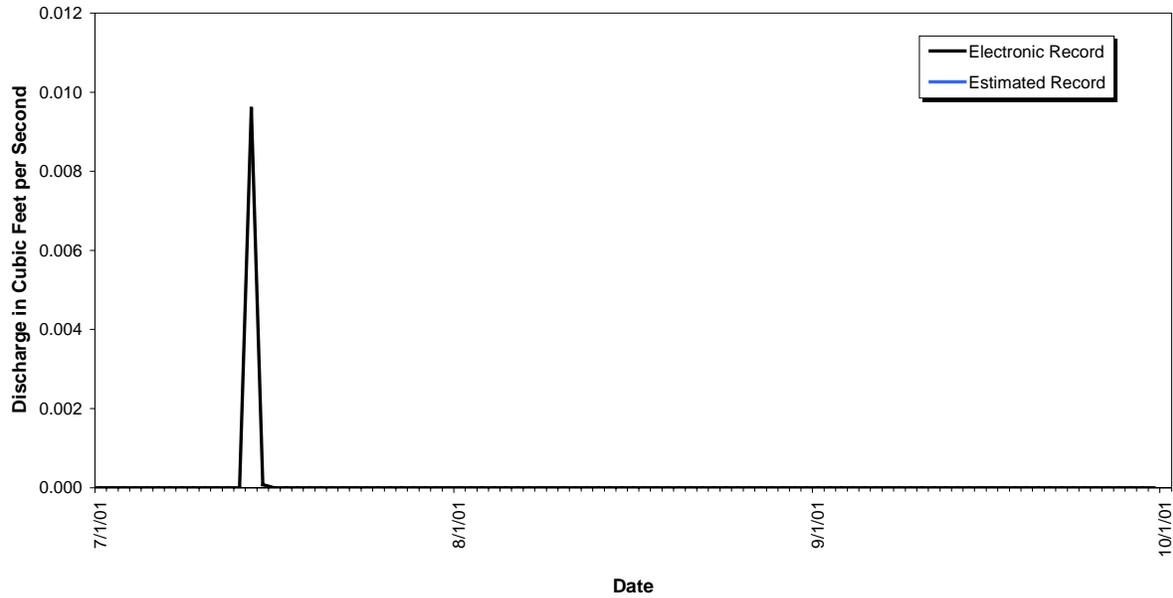


Figure 5-1. Mean Daily Discharge at GS01, Water Year 2001 (July, August, and September)

Table 5-2. Gaging Station GS02: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
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	0.000	0.000	NA
Monthly Average (cfs)	0.000	0.000	0.000

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.

Buffer Zone Hydrologic monitoring location GS02 is located at state plane 2093817, 746302 on Mower Ditch 200 feet west of Indiana Street. This station monitors runoff from an area north of Mower Ditch between Pond C-2 and Indiana Street. The GS02 drainage area is approximately 157.7 acres. This station collects samples for sediment/sand, Ca, Mg, Na, K, Cl, F, SO₄, HCO₃, and TSS using storm-event, rising-limb, flow-paced composite sampling.

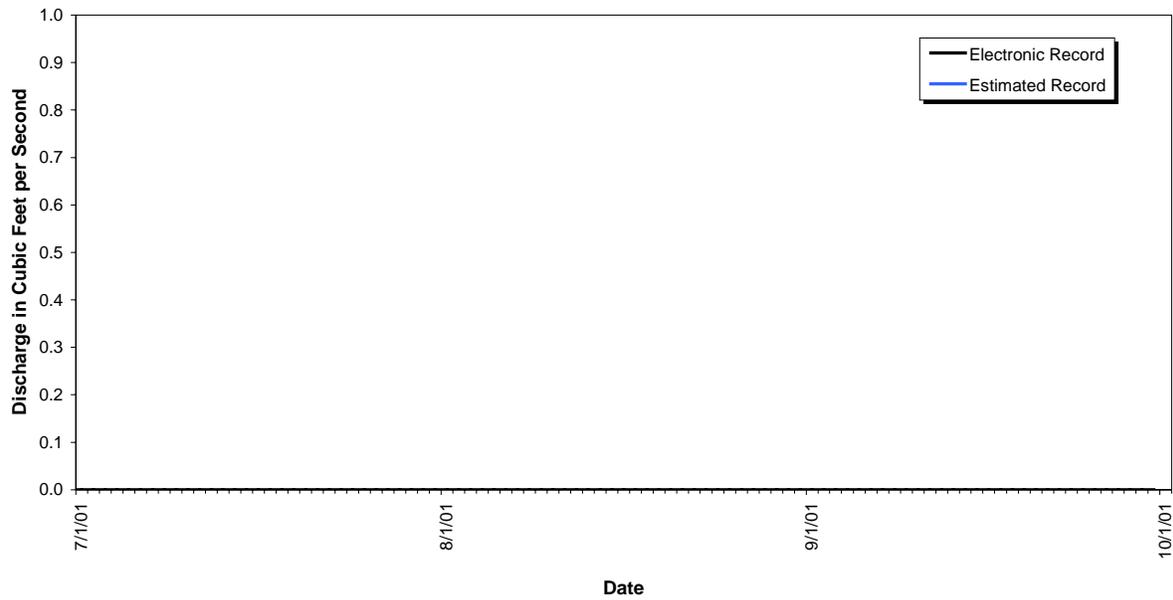


Figure 5-2. Mean Daily Discharge at GS02, Water Year 2001 (July, August, and September)

Table 5-3. Gaging Station GS03: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	1.548	0.000	0.002
2	1.564	0.381	0.000
3	1.536	1.081	0.000
4	1.731	0.938	0.000
5	0.898	0.871	0.000
6	0.654	0.962	0.000
7	0.536	1.101	0.000
8	0.498	1.093	0.004
9	0.284	0.850	0.000
10	0.048	0.812	0.000
11	0.051	1.508	0.000
12	0.021	1.308	0.000
13	0.028	1.348	0.000
14	0.100	1.353	0.000
15	0.056	1.446	0.000
16	0.014	1.847	0.000
17	0.011	2.304	0.000
18	0.009	2.090	0.000
19	0.008	1.892	0.000
20	0.007	1.825	0.000
21	0.006	1.840	0.000
22	0.004	1.907	0.000
23	0.004	1.674	0.000
24	0.005	1.366	0.000
25	0.004	1.107	0.000
26	0.004	0.614	0.000
27	0.003	0.118	0.000
28	0.001	0.007	0.000
29	0.000	0.003	0.000
30	0.000	0.002	0.000
31	0.000	0.002	NA
Monthly Average (cfs)	0.311	1.085	0.000

Monthly Discharge

Cubic Feet	832295	2907323	581
Gallons	6226000	21748291	4349
Acre-Feet	19.11	66.74	0.01

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

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.

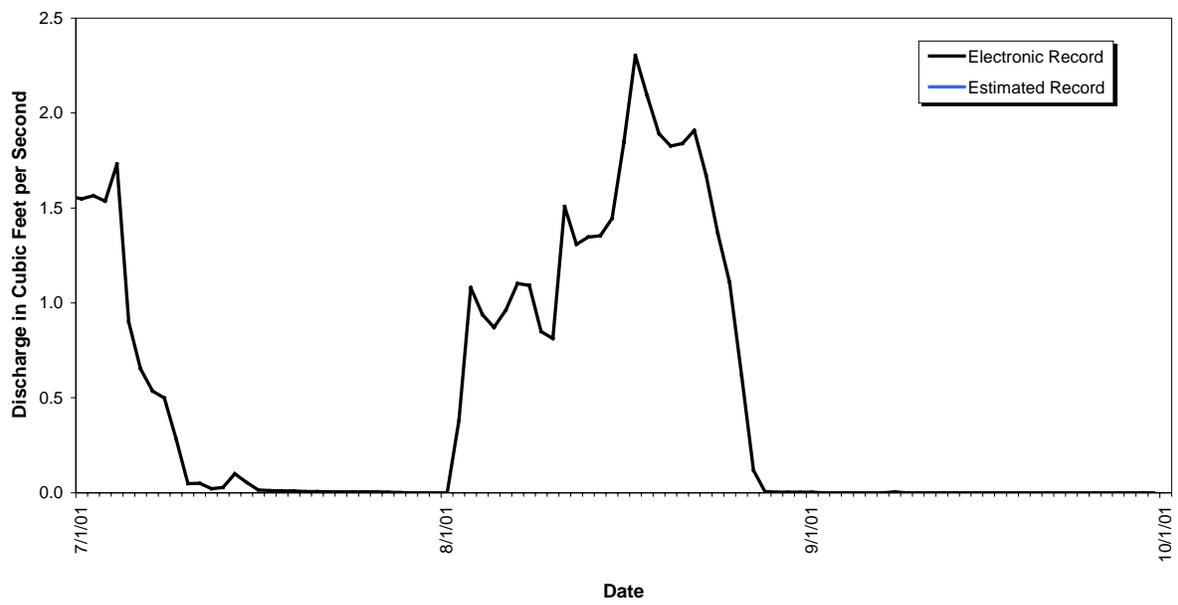


Figure 5-3. Mean Daily Discharge at GS03, Water Year 2001 (July, August, and September)

Table 5-4. Gaging Station GS04: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
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	0.154	0.000	0.000
15	0.015	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	0.000	0.000	NA
Monthly Average (cfs)	0.005	0.000	0.000

Monthly Discharge

Cubic Feet	14660	0	0
Gallons	109662	0	0
Acre-Feet	0.34	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.

Buffer Zone Hydrologic monitoring location GS04 is located at state plane 2085568, 758145 on Rock Creek 300 feet upstream of the box culvert under Hwy. 128. This station monitors runoff from the Rock Creek drainage in the northwest BufferZone. The GS04 drainage area is approximately 1500 acres. This station collects samples for sediment/sand, Ca, Mg, Na, K, Cl, F, SO4, HCO3, and TSS using storm-event, rising-limb, flow-paced composite sampling.

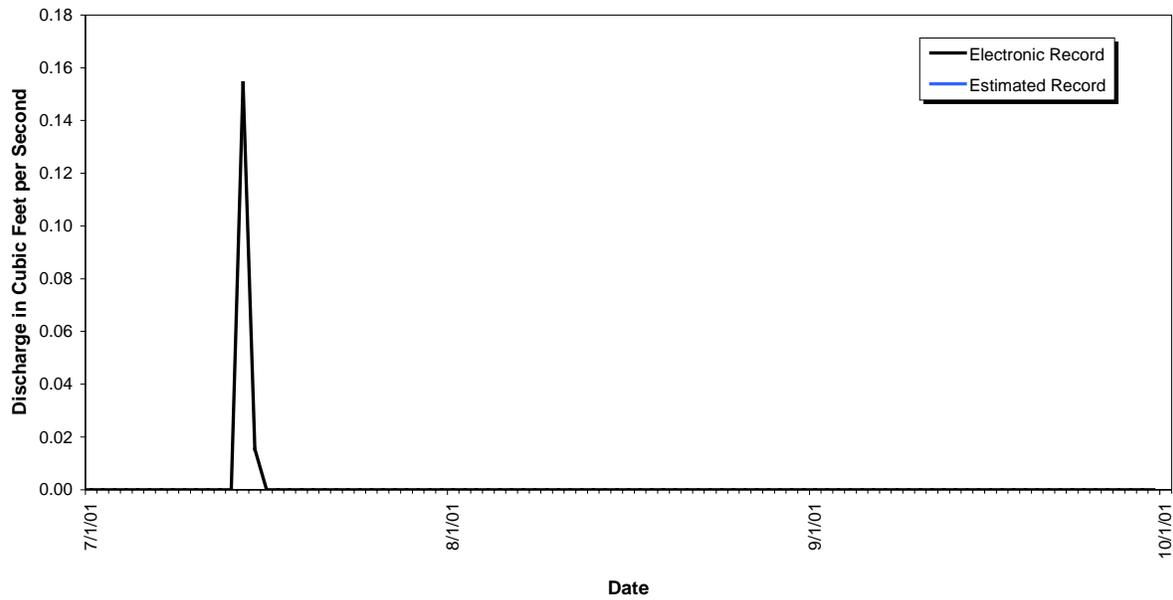


Figure 5-4. Mean Daily Discharge at GS04, Water Year 2001 (July, August, and September)

Table 5-5. Gaging Station GS05: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	BD	0.000a	0.000
2	BD	0.000	0.000
3	BD	0.000	0.000
4	BD	0.000	0.000
5	BD	0.000	0.000
6	BD	0.000	0.000
7	BD	0.000	0.000
8	BD	0.000	0.022
9	BD	0.089a	0.014
10	BD	0.014a	0.014
11	BD	0.013	0.013
12	BD	0.012	0.012
13	BD	0.011	0.013
14	BD	0.010	0.016
15	BD	0.019	0.013
16	BD	0.013	0.012
17	BD	0.012	0.011
18	BD	0.011	0.010
19	BD	0.010	0.010
20	BD	0.010	0.009
21	BD	0.009	0.008
22	BD	0.008	0.007
23	BD	0.007	0.006
24	BD	0.006	0.005
25	BD	0.005	0.004
26	BD	0.004	0.004
27	BD	0.003	0.003
28	BD	0.002	0.002
29	BD	0.001	0.002
30	BD	0.000	0.001
31	BD	0.000	NA
Monthly Average (cfs)	No Data	0.009	0.007

Monthly Discharge

Cubic Feet	No Data	23144	18278
Gallons	No Data	173132	136729
Acre-Feet	No Data	0.53	0.42

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

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

BD – Bad data due to equipment failure.

Buffer Zone Hydrologic monitoring location GS05 is located at state plane 2078428, 747260 on Woman Creek 320 feet east of the west Buffer Zone fence. This station monitors runoff from the Woman Creek drainage southwest of the Site including areas west of Hwy. 93. This station collects samples for sediment/sand, Ca, Mg, Na, K, Cl, F, SO₄, HCO₃, and TSS using storm-event, rising-limb, flow-paced composite sampling.

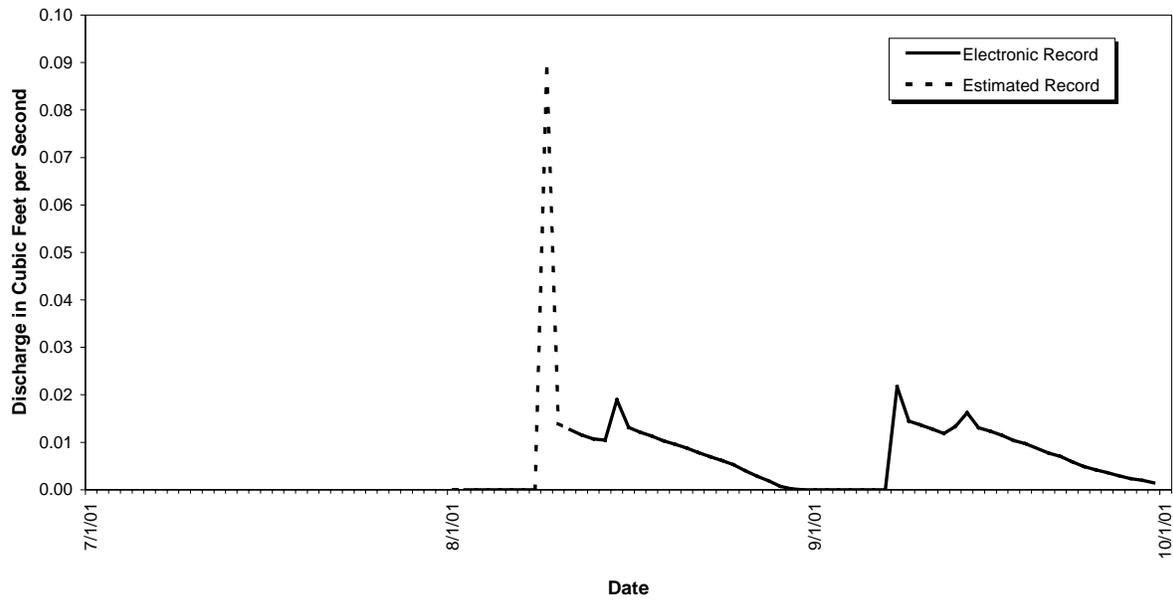


Figure 5-5. Mean Daily Discharge at GS05, Water Year 2001 (July, August, and September)

Table 5-6. Gaging Station GS06: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
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	0.005
9	0.000	0.026	0.000
10	0.000	0.011	0.000
11	0.000	0.005	0.000
12	0.007	0.003	0.000
13	0.010	0.003	0.000
14	0.097	0.007	0.000
15	0.049	0.013	0.000
16	0.011	0.009	0.000
17	0.008	0.005	0.000
18	0.007	0.003	0.000
19	0.006	0.000	0.000
20	0.006	0.000	0.000
21	0.006	0.000	0.000
22	0.004	0.000	0.000
23	0.004	0.000	0.000
24	0.005	0.000	0.000
25	0.003	0.000	0.000
26	0.004	0.000	0.000
27	0.002	0.000	0.000
28	0.001	0.000	0.000
29	0.000	0.000	0.000
30	0.000	0.000	0.000
31	0.000	0.000	NA
Monthly Average (cfs)	0.007	0.003	0.000

Monthly Discharge

Cubic Feet	19798	7418	470
Gallons	148101	55493	3518
Acre-Feet	0.45	0.17	0.01

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

Buffer Zone Hydrologic monitoring location GS06 is located at state plane 2078449, 745968 on the Owl Branch to Woman Creek 330 feet east of the west Buffer Zone fence. This station monitors runoff from the area northeast of Rocky Flats Lake. This station collects samples for sediment/sand, Ca, Mg, Na, K, Cl, F, SO₄, HCO₃, and TSS using storm-event, rising-limb, flow-paced composite sampling.

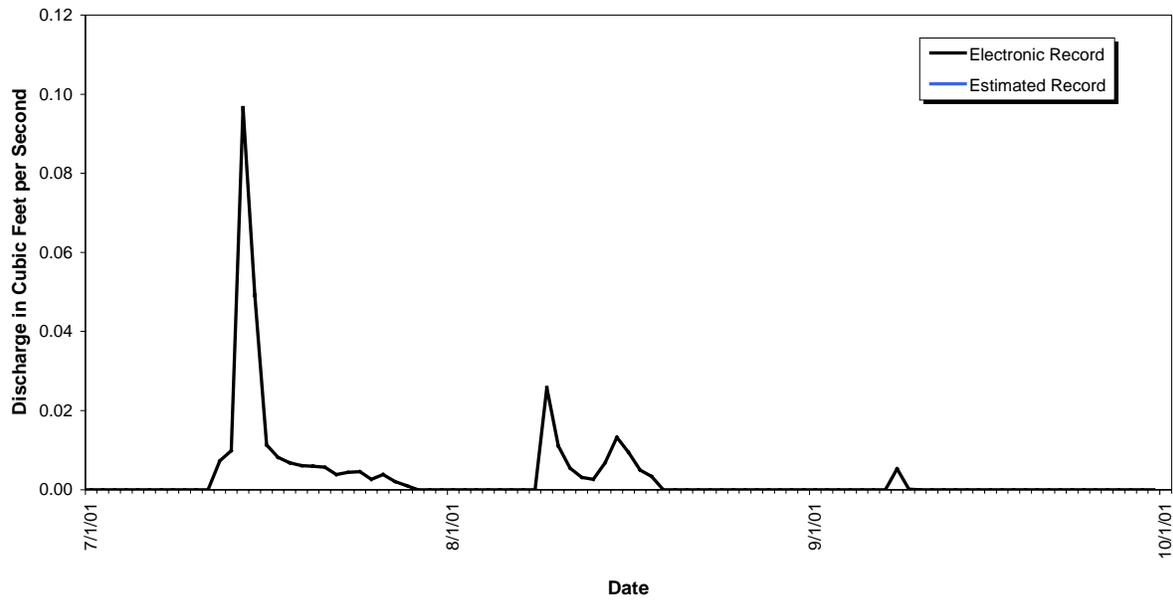


Figure 5-6. Mean Daily Discharge at GS06, Water Year 2001 (July, August, and September)

Table 5-7. Gaging Station GS08: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	2.091	0.000	0.000
2	1.957	1.255	0.000
3	2.018	1.662	0.000
4	2.234	1.371	0.000
5	1.187	1.260	0.000
6	0.891	1.404	0.000
7	0.659	1.563	0.000
8	0.587	1.584	0.000
9	0.187	0.828	0.000
10	0.000	1.298	0.000
11	0.000	1.900	0.000
12	0.000	1.620	0.000
13	0.000	1.679	0.000
14	0.000	1.623	0.000
15	0.000	1.748	0.000
16	0.000	0.443	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	0.000	0.000	NA
Monthly Average (cfs)	0.381	0.685	0.000

Monthly Discharge

Cubic Feet	1020526	1834957	0
Gallons	7634066	13726431	0
Acre-Feet	23.43	42.12	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.

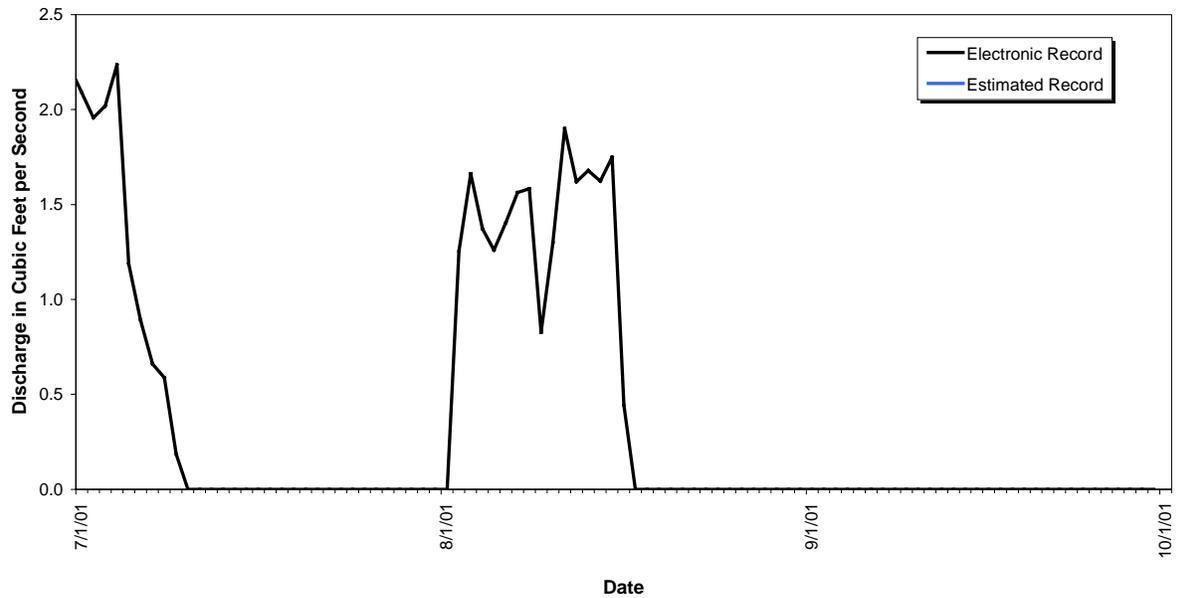


Figure 5-7. Mean Daily Discharge at GS08, Water Year 2001 (July, August, and September)

Table 5-8. Gaging Station GS10: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.031	0.097	0.036
2	0.030	0.084	0.034
3	0.031	0.075	0.035
4	0.032	0.075	0.035
5	0.044	0.074	0.037
6	0.101	0.078	0.041
7	0.035	0.069	0.079
8	0.112	0.068	1.753
9	0.039	2.695a	0.040
10	0.646a	0.095	0.034
11	0.222	0.065	0.032
12	0.060	0.063	0.032
13	0.935a	0.074	0.242
14	3.896a	0.090	0.151
15	0.110	0.704	0.043
16	0.052	0.061	0.039
17	0.047	0.054	0.051
18	0.049	0.051	0.042
19	0.050	0.049	0.054
20	0.054	0.059	0.051
21	0.057	0.042	0.047
22	0.061	0.044	0.043
23	0.066	0.045	0.044
24	0.072	0.038	0.044
25	0.075	0.036	0.045
26	0.088	0.036	0.077
27	0.076	0.035	0.050
28	0.071	0.035	0.050
29	0.072	0.033	0.053
30	0.076	0.034	0.058
31	0.080	0.036	NA
Monthly Average (cfs)	0.238	0.164	0.112

Monthly Discharge

Cubic Feet	636952	440171	291242
Gallons	4764730	3292705	2178640
Acre-Feet	14.62	10.10	6.69

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

^a 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.

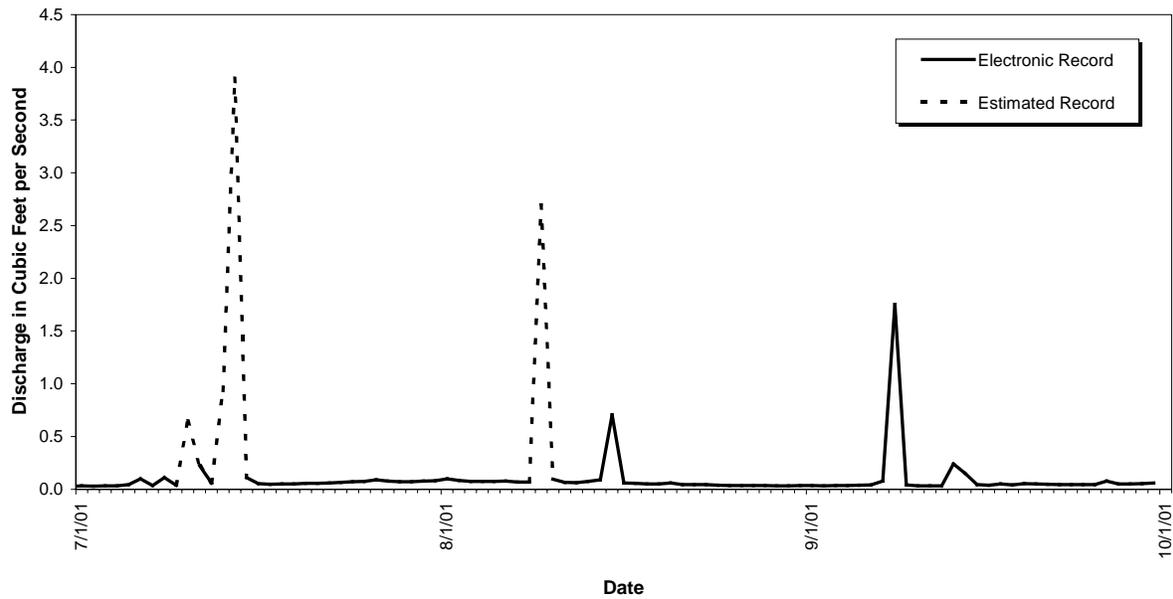


Figure 5-8. Mean Daily Discharge at GS10, Water Year 2001 (July, August, and September)

Table 5-9. Gaging Station GS11: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
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	1.687a	0.000
17	0.000	2.508	0.000
18	0.000	2.314	0.000
19	0.000	2.147	0.000
20	0.000	2.074	0.000
21	0.000	2.102	0.000
22	0.000	2.143	0.000
23	0.000	1.886	0.000
24	0.000	1.562	0.000
25	0.000	1.229	0.000
26	0.000	0.629	0.000
27	0.000	0.076	0.000
28	0.000	0.000	0.000
29	0.000	0.000	0.000
30	0.000	0.000	0.000
31	0.000	0.000	NA
Monthly Average (cfs)	0.000	0.657	0.000

Monthly Discharge

Cubic Feet	0	1758782	0
Gallons	0	13156601	0
Acre-Feet	0.00	40.38	0.00

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

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS11 is located 39° 54' 3"N, 105° 10' 47"W, at the Pond A-4 Outfall on North Walnut Creek (See Section 4 Map). This station is a RFCA Point of Compliance and monitors water discharged from Pond A-4 to North Walnut Creek. This station collects samples for selected radionuclides using continuous flow-paced sampling.

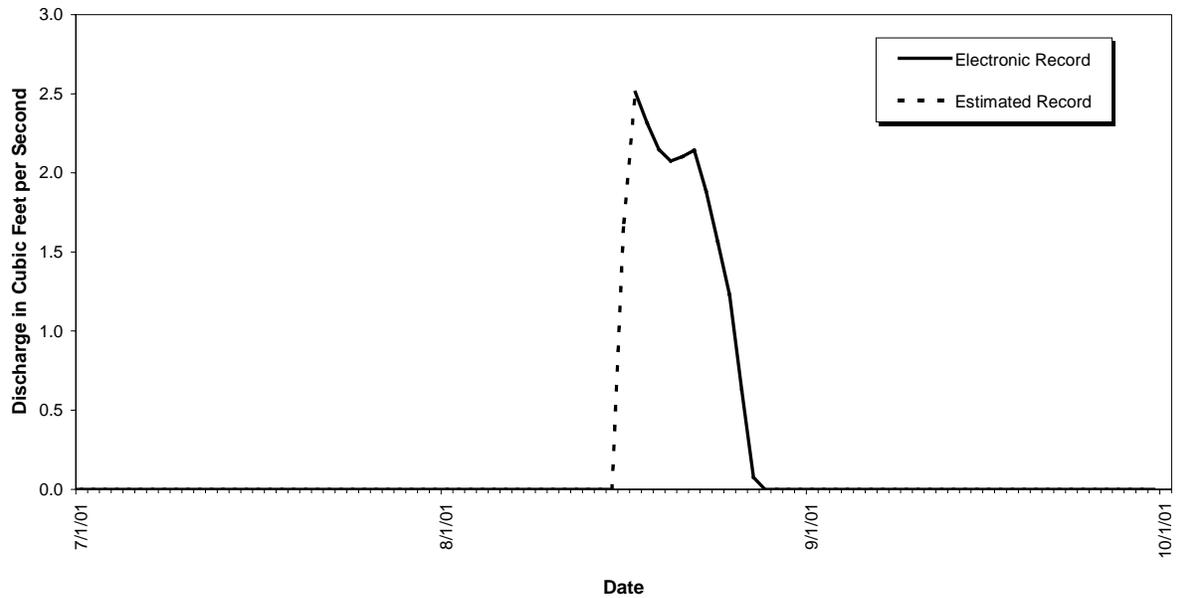


Figure 5-9. Mean Daily Discharge at GS11 Water Year 2001 (July, August, and September)

Table 5-10. Gaging Station GS16: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.039	0.049	0.050
2	0.038	0.051	0.044
3	0.038	0.044	0.045
4	0.042	0.044	0.046
5	0.043	0.042	0.048
6	0.046	0.043	0.048
7	0.045	0.042	0.059
8	0.055	0.042	0.202
9	0.050	0.129	0.070
10	0.074	0.065	0.058
11	0.069	0.058	0.054
12	0.063	0.049	0.053
13	0.096	0.054	0.076
14	0.181	0.066	0.078
15	0.078	0.144	0.073
16	0.053	0.071	0.070
17	0.049	0.060	0.078
18	0.048	0.051	0.069
19	0.047	0.048	0.061
20	0.047	0.052	0.058
21	0.046	0.052	0.053
22	0.045	0.053	0.047
23	0.051	0.055	0.049
24	0.051	0.047	0.052
25	0.048	0.049	0.050
26	0.053	0.048	0.048
27	0.049	0.043	0.046
28	0.044	0.043	0.051
29	0.044	0.045	0.053
30	0.041	0.048	0.055
31	0.044	0.052	NA
Monthly Average (cfs)	0.055	0.056	0.062

Monthly Discharge

Cubic Feet	148384	150217	159603
Gallons	1109987	1123705	1193915
Acre-Feet	3.41	3.45	3.66

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

Buffer Zone Hydrologic monitoring location GS16 is located at state plane 2083406, 746659 on Antelope Springs Creek 970 feet upstream of Woman Creek. This station monitors discharge from Antelope Springs and runoff from the surrounding area. The GS16 drainage area is approximately 105 acres. This station collects flow data only.

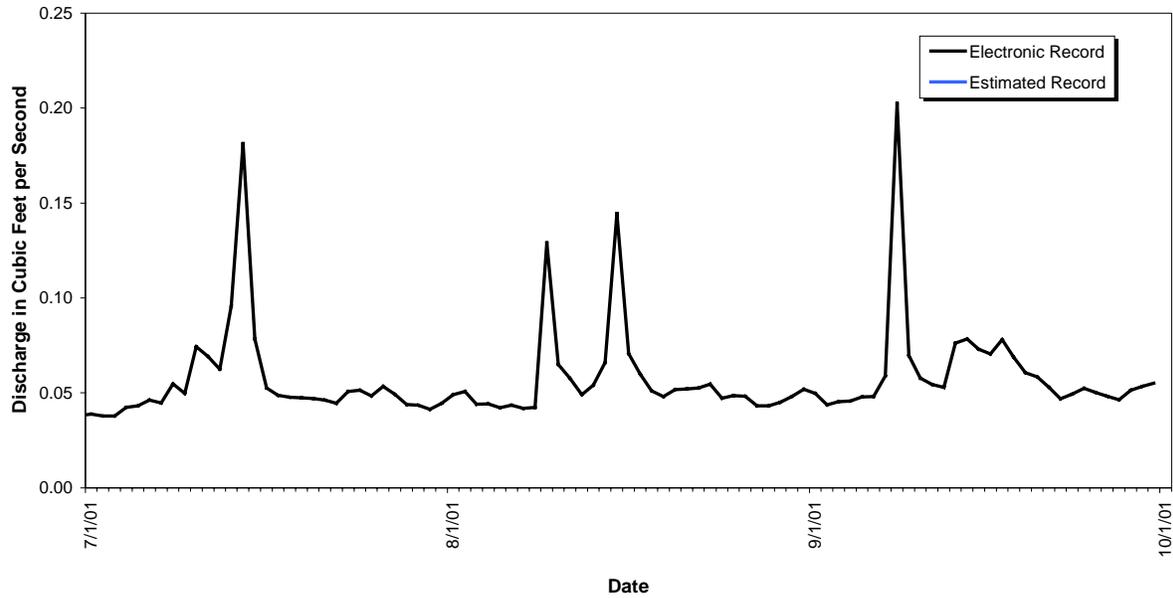


Figure 5-10. Mean Daily Discharge at GS16, Water Year 2001 (July, August, and September)

Table 5-11. Gaging Station GS27: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0036
9	0.0000	0.0077	0.0000
10	0.0020	0.0000	0.0000
11	0.0001	0.0000	0.0000
12	0.0000	0.0000	0.0000
13	0.0021	0.0000	0.0001
14	0.0070a	0.0000	0.0000
15	0.0000	0.0010	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	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000
27	0.0000	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	0.0000	0.0000	NA
Monthly Average (cfs)	0.000	0.000	0.000

Monthly Discharge

Cubic Feet	963	756	323
Gallons	7206	5652	2416
Acre-Feet	0.02	0.02	0.01

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

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

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. This station collects samples for selected radionuclides using continuous, flow-paced sampling.

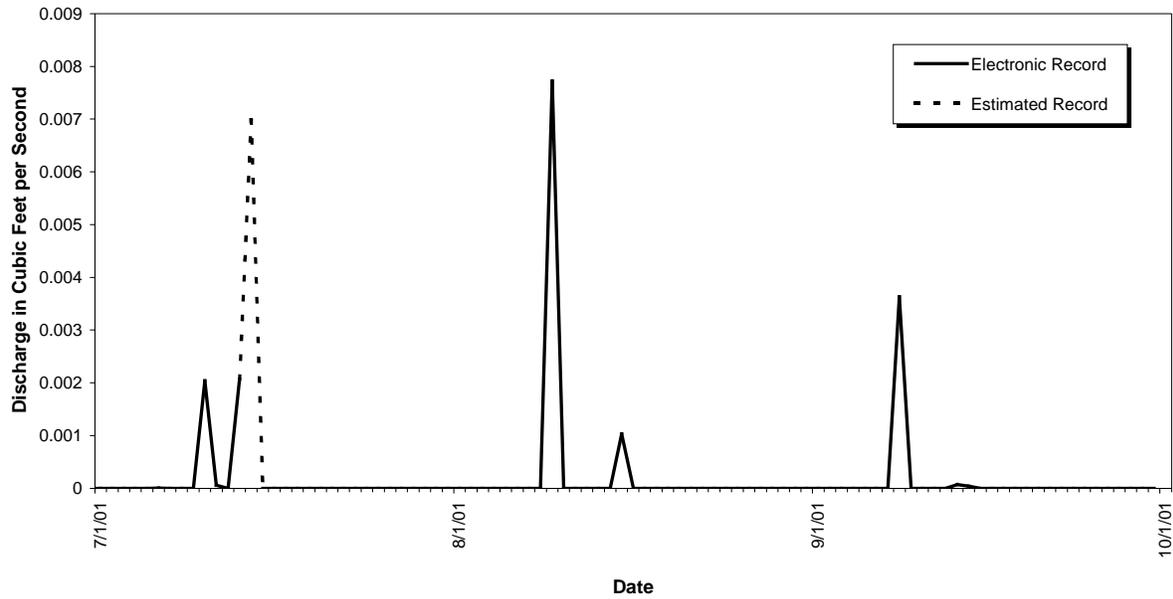


Figure 5-11. Mean Daily Discharge at GS27 Water Year 2001 (July, August, and September)

Table 5-12. Gaging Station GS31: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
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	0.000	0.000	NA
Monthly Average (cfs)	0.000	0.000	0.000

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.

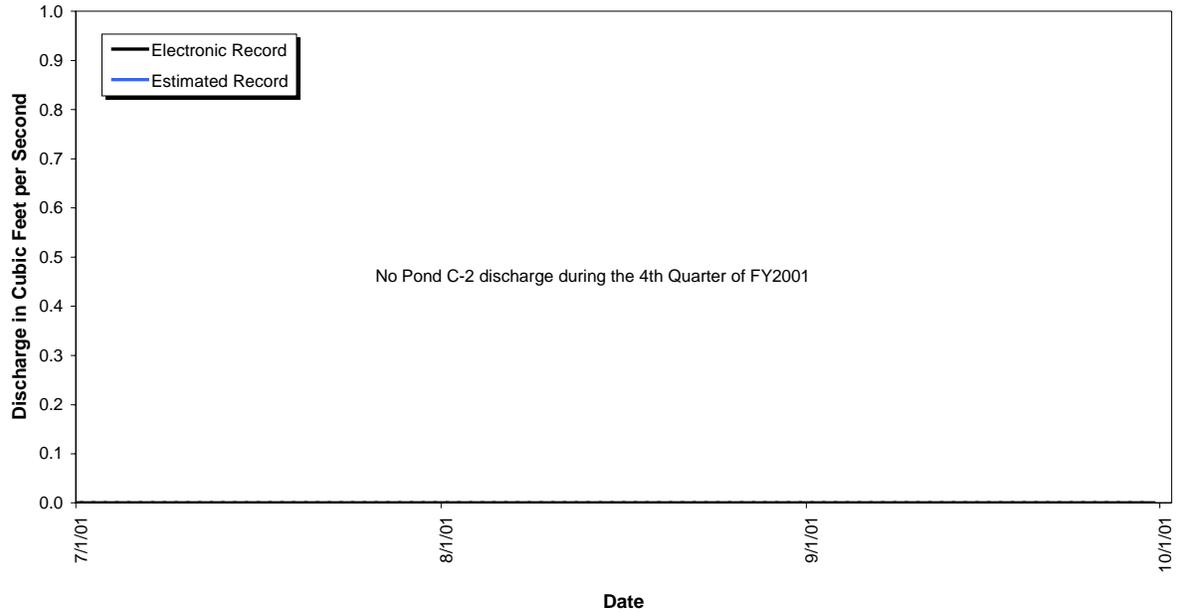


Figure 5-12. Mean Daily Discharge at GS31 Water Year 2001 (July, August, and September)

Table 5-13. Gaging Station GS39: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.0000a	0.0000	0.0000
2	0.0000a	0.0000	0.0000
3	0.0000a	0.0000	0.0000
4	0.0000a	0.0000	0.0000
5	0.0002a	0.0000	0.0000
6	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000
8	0.0002	0.0000	0.0804
9	0.0000	0.1188	0.0000
10	0.0335	0.0001	0.0000
11	0.0063	0.0000	0.0000
12	0.0000	0.0000	0.0000
13	0.0525	0.0000	0.0054
14	0.1129a	0.0000	0.0024
15	0.0000	0.0314	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	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000
27	0.0000	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	0.0000	0.0000	NA
Monthly Average (cfs)	0.007	0.005	0.003

Monthly Discharge

Cubic Feet	17766	12992	7621
Gallons	132899	97189	57009
Acre-Feet	0.41	0.30	0.17

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

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS39 is located in the drainage ditch northwest of the 904 Pad. This location is a RFCA Source Location station monitoring water flowing from the area of the 903 Pad as well as part of the 904 Pad and contractor yard to South Walnut Creek. This station collects samples for selected radionuclides using continuous, flow-paced sampling.

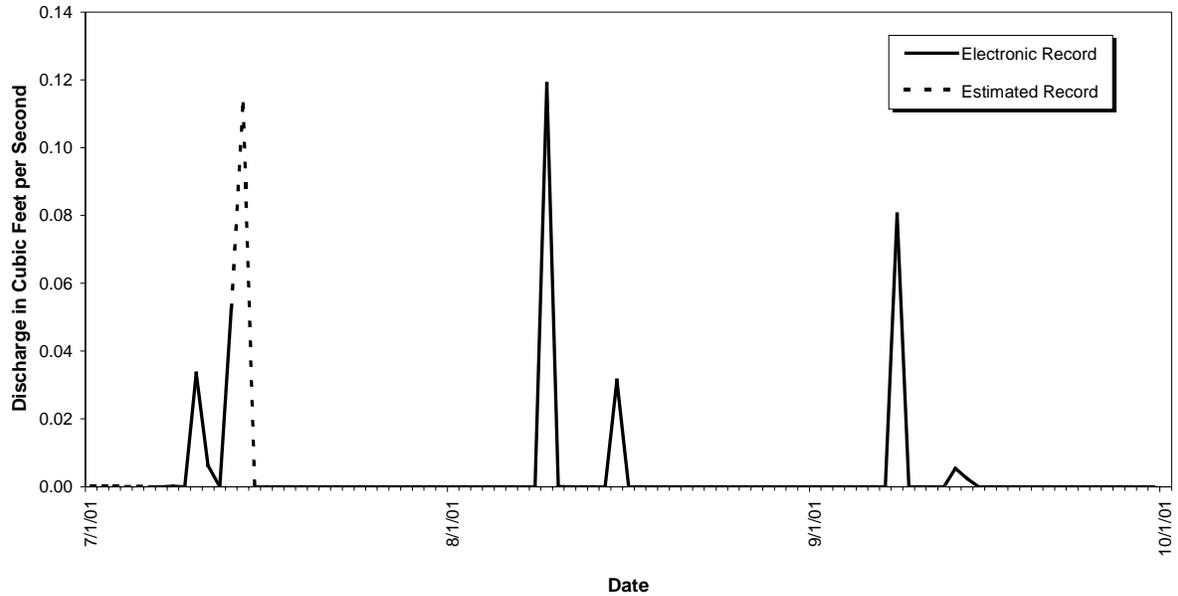


Figure 5-13. Mean Daily Discharge at GS39 Water Year 2001 (July, August, and September)

Table 5-14. Gaging Station GS40: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.037	0.075	0.040
2	0.035	0.049	0.030
3	0.037	0.038	0.026
4	0.038	0.047	0.025
5	0.051	0.046	0.026
6	0.087	0.038	0.027
7	0.029	0.031	0.072
8	0.084	0.032	0.572
9	0.031	0.790a	0.037
10	0.232	0.052	0.037
11	0.127	0.048	0.040
12	0.046	0.047	0.043a
13	0.293	0.058	0.144a
14	0.721a	0.065	0.088a
15	0.038	0.212	0.051a
16	0.034	0.025	0.058a
17	0.045	0.026	0.066a
18	0.050	0.024	0.044a
19	0.055	0.025	0.046a
20	0.058	0.046	0.050a
21	0.046	0.022	0.051a
22	0.045	0.028	0.047
23	0.044	0.023	0.049
24	0.049	0.023	0.051
25	0.059	0.028	0.050
26	0.080	0.032	0.050
27	0.057	0.035	0.046
28	0.065	0.038	0.043
29	0.061	0.038	0.040
30	0.064	0.038	0.038
31	0.065	0.041	NA
Monthly Average (cfs)	0.089	0.068	0.066

Monthly Discharge

Cubic Feet	238773	183231	171507
Gallons	1786144	1370661	1282959
Acre-Feet	5.48	4.21	3.94

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

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station GS40 is located on the concrete spillway east of Tenth Street, south of Building 997. This location is a RFCA Performance Monitoring Location monitoring water flowing from the 700 area to South Walnut Creek. This station samples for selected radionuclides using continuous, flow-paced sampling.

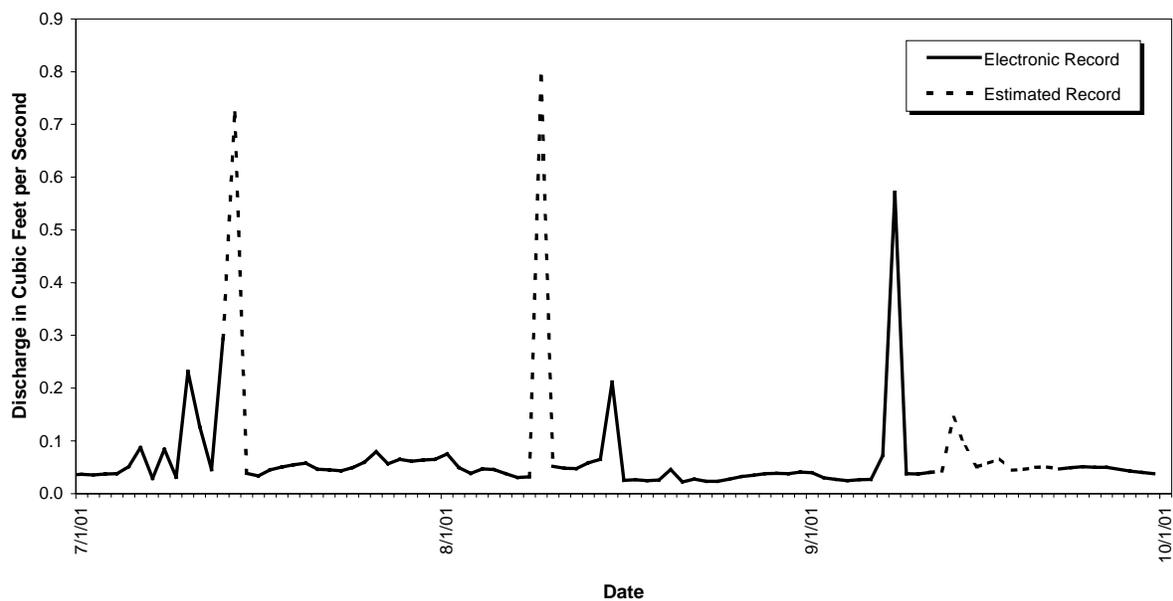


Figure 5-14. Mean Daily discharge at GS40 Water Year 2001 (July, August, and September)

Table 5-15. Gaging Station GS43: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000
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	0.0013	0.0000
12	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000
14	0.0087	0.0000	0.0000
15	0.0027	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	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000
27	0.0000	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	0.0000	0.0000	NA
Monthly Average (cfs)	0.000	0.000	0.000

Monthly Discharge

Cubic Feet	987	118	5
Gallons	7385	881	34
Acre-Feet	0.02	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 GS43 is located in the ditch at the northeast corner of T886A. This location is a RFCA Performance Monitoring Location monitoring runoff from the eastern portion of the 800 area including Building 875, T886A, and the eastern half of Building 886. Water passing this monitoring location continues to South Walnut Creek. This station samples for selected radionuclides and metals using continuous, flow-paced sampling.

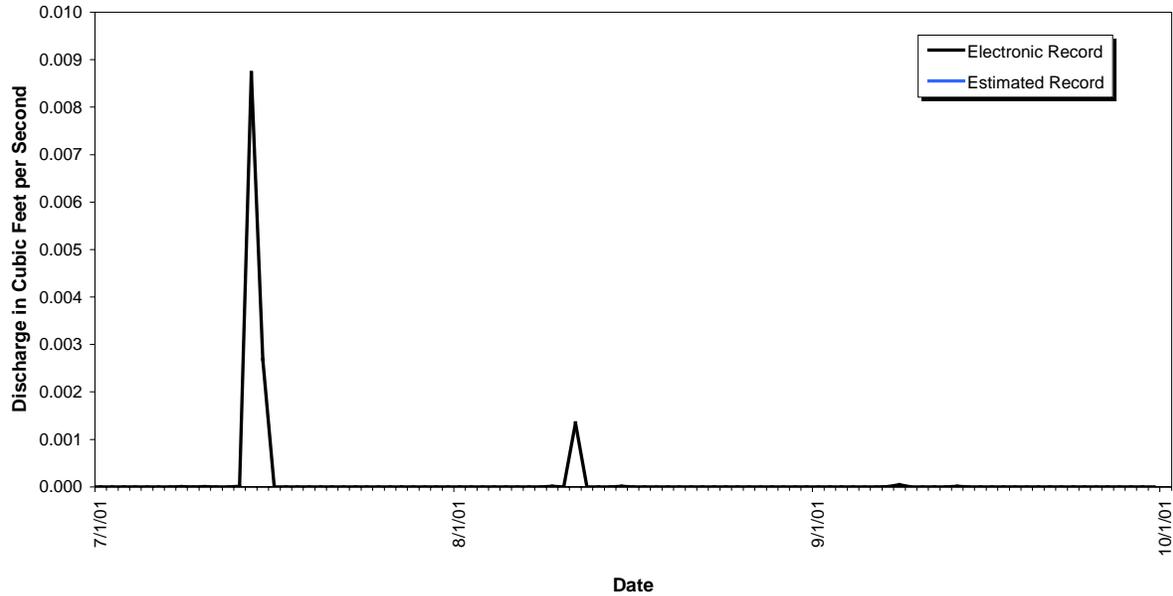


Figure 5-15. Mean Daily Discharge at GS43, Water Year 2001 (July, August, and September)

Table 5-16. Gaging Station GS44 Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.0020	0.0068	0.0008
2	0.0018	0.0030a	0.0000
3	0.0018	0.0019a	0.0000
4	0.0017	0.0016a	0.0000
5	0.0019	0.0014a	0.0000
6	0.0037	0.0013a	0.0000
7	0.0018	0.0012	0.0009
8	0.0035	0.0010	0.0367
9	0.0021	0.0797a	0.0018
10	0.0116	0.0037	0.0011
11	0.0136	0.0023	0.0005
12	0.0030	0.0019	0.0000
13	0.0307	0.0018	0.0042
14	0.0781a	0.0026	0.0041
15	0.0071	0.0136	0.0010
16	0.0032	0.0024	0.0007
17	0.0035	0.0023	0.0005
18	0.0052a	0.0024	0.0001
19	0.0043	0.0026	0.0000
20	0.0051	0.0029	0.0000
21	0.0055	0.0020	0.0000
22	0.0063	0.0020	0.0000
23	0.0063	0.0020	0.0000
24	0.0065	0.0024	0.0000
25	0.0069	0.0020	0.0000
26	0.0084	0.0016	0.0000
27	0.0081	0.0013	0.0000
28	0.0070	0.0013	0.0000
29	0.0070	0.0013	0.0000
30	0.0072	0.0014	0.0000
31	0.0064	0.0013	NA
Monthly Average (cfs)	0.008	0.005	0.002

Monthly Discharge

Cubic Feet	22584	13374	4536
Gallons	168944	100042	33935
Acre-Feet	0.52	0.31	0.10

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

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging station GS44 is located at state plane 2083411, 751100 on a drainage ditch between T771F and T771L. This station is a Performance Monitoring Location and monitors runoff from the west side of B771 and includes B771 footing drain water. This station collects samples for selected radionuclides and water quality parameters using continuous flow-paced composite sampling.

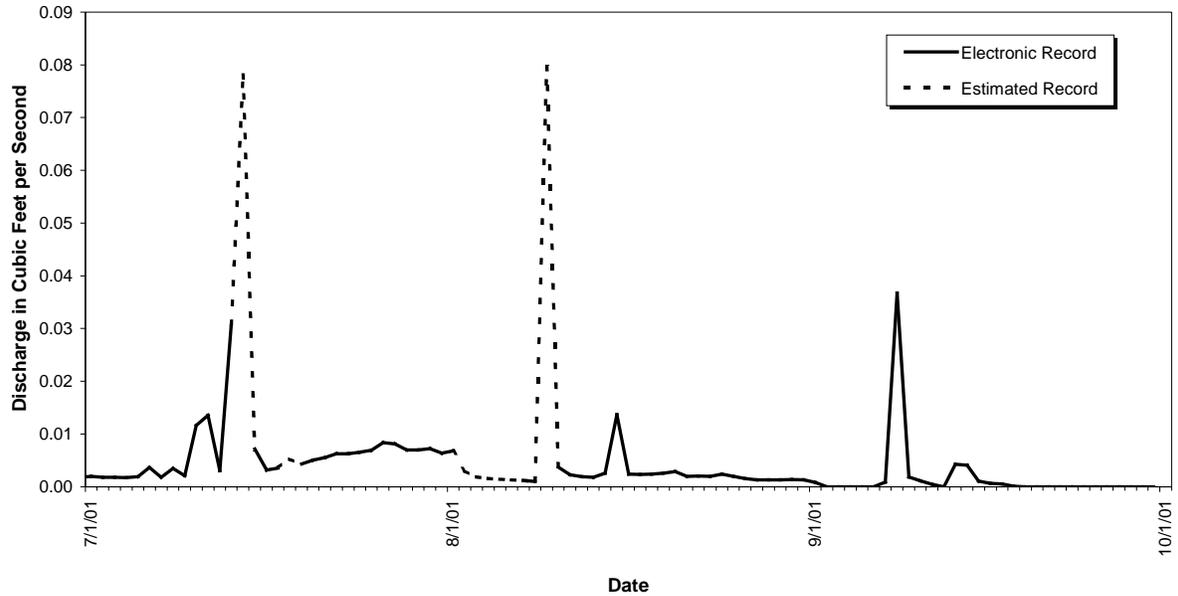


Figure 5-16. Mean Daily Discharge at GS44 Water Year 2001 (July, August, and September)

Table 5-17. Gaging Station GS49 Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.0000	0.0010	0.0000
2	0.0000	0.0004	0.0000
3	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000
5	0.0003	0.0000	0.0000
6	0.0014	0.0001	0.0000
7	0.0000	0.0000	0.0012
8	0.0026	0.0000	0.0213
9	0.0000	0.0340	0.0001
10	0.0067	0.0012	0.0000
11	0.0055	0.0001	0.0000
12	0.0007	0.0000	0.0000
13	0.0106	0.0011	0.0036
14	0.0373	0.0011	0.0018
15	0.0001	0.0070	0.0000
16	0.0000	0.0002	0.0000
17	0.0000	0.0000	0.0005
18	0.0000	0.0000	0.0002
19	0.0000	0.0000	0.0000
20	0.0000	0.0003	0.0000
21	0.0000	0.0000	0.0000
22	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000
24	0.0000	0.0000	0.0000
25	0.0005	0.0000	0.0000
26	0.0006	0.0000	0.0000
27	0.0002	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	0.0000	0.0000	NA
Monthly Average (cfs)	0.002	0.001	0.001

Monthly Discharge

Cubic Feet	5752	4005	2484
Gallons	43026	29960	18584
Acre-Feet	0.13	0.09	0.06

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

Gaging station GS49 is located at state plane 2083292, 750652 on a drainage ditch northwest of B566. This station is a Performance Monitoring location and has been installed in support of D&D activities for Building 776/777. This station monitors runoff from the west side of the B776/777 complex. The GS49 drainage area is approximately 3.3 acres. This station collects samples for selected isotopes, metals, tritium, and TSS using continuous flow-paced composite sampling.

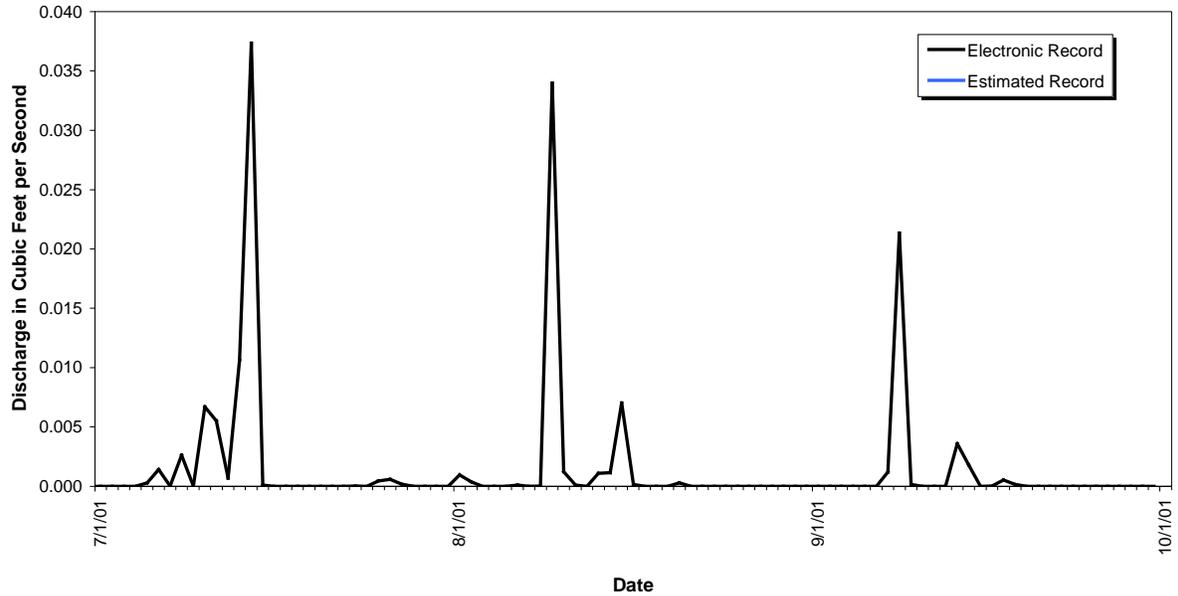


Figure 5-17. Mean Daily Discharge at GS49 Water Year 2001 (July, August, and September)

Table 5-18. Gaging Station GS50 Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000
9	0.0000	0.0095	0.0000
10	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000
14	0.0466	0.0000	0.0000
15	0.0021	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	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000
27	0.0000	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	0.0000	0.0000	NA
Monthly Average (cfs)	0.002	0.000	0.000

Monthly Discharge

Cubic Feet	4210	824	0
Gallons	31493	6161	0
Acre-Feet	0.10	0.02	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 GS50 is located at state plane 2085760, 750441 on a drainage ditch northeast of B990. This station is a performance monitoring location that was installed in support of remediation activities for the Solar Ponds and the ongoing GS10 Source Evaluation effort.. This station monitors runoff from the south side of the Solar Ponds and Triangle Area. The GS50 drainage area is approximately 4.1 acres. This station collects samples for Pu, Am, uranium isotopes, CLP metals, and TSS using continuous flow-paced composite sampling.

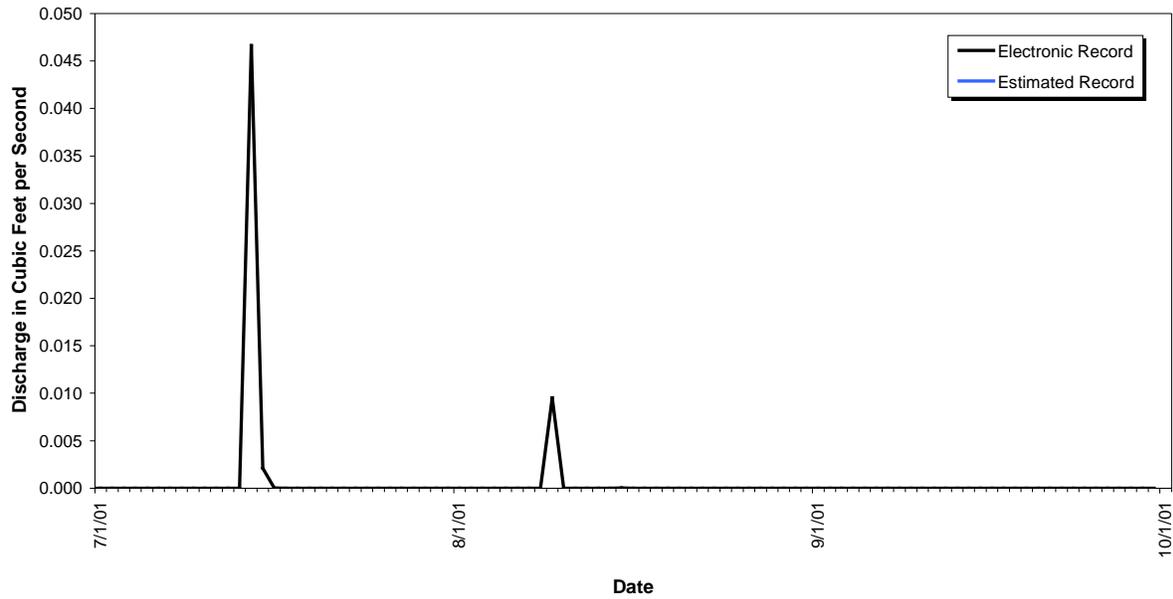


Figure 5-18. Mean Daily Discharge at GS50 Water Year 2001 (July, August, and September)

Table 5-19. Gaging Station 995 POE Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.221	0.224	0.170
2	0.213	0.223	0.188
3	0.150	0.197	0.216
4	0.146	0.195	0.272
5	0.314	0.198	0.258
6	0.265	0.284	0.194
7	0.309	0.320	0.157
8	0.307	0.256	0.374
9	0.310	0.309	0.261
10	0.158	0.335	0.291
11	0.274	0.231	0.206
12	0.285	0.302	0.242
13	0.231	0.280	0.195
14	0.344	0.286	0.232
15	0.492	0.286	0.288
16	0.314	0.154	0.273
17	0.299	0.187	0.321
18	0.289	0.220	0.292
19	0.251	0.198	0.314
20	0.296	0.304	0.315
21	0.220	0.256	0.216
22	0.173	0.262	0.227
23	0.312	0.333	0.198
24	0.341	0.164	0.187
25	0.296	0.261	0.271
26	0.179	0.259	0.302
27	0.108	0.284	0.187
28	0.263	0.274	0.177
29	0.292	0.197	0.233
30	0.384	0.140	0.237
31	0.265	0.147	NA
Monthly Average (cfs)	0.268	0.244	0.243

Monthly Discharge

Cubic Feet	717183	653537	630170
Gallons	5364900	4888800	4714000
Acre-Feet	16.46	15.00	14.47

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

Gaging station 995POE is located on the Building 995 (WWTP) effluent flow stream at the V-notch weir immediately below the UV disinfection equipment. This station is a RFCA Action Level Framework Point of Evaluation and monitors effluent from the Site wastewater treatment plant. This station collects samples for selected radionuclides using continuous flow-paced composite sampling.

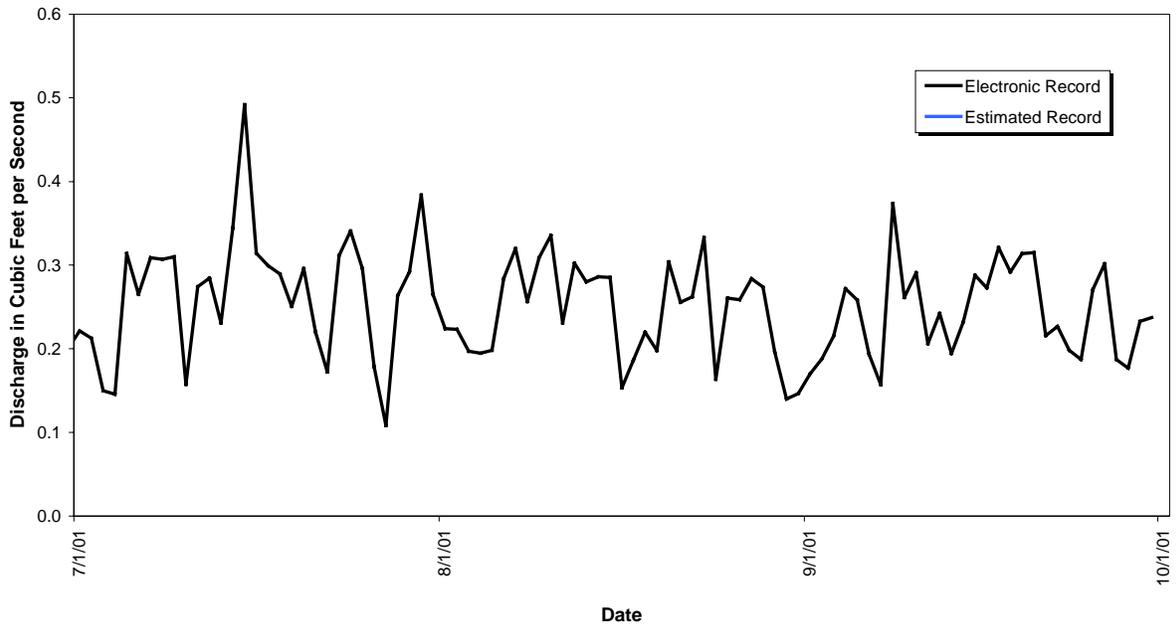


Figure 5-19. Mean Daily Discharge at 995 POE Water Year 2001 (July, August, and September)

Table 5-20. Gaging Station SW022: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
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	0.012	0.000	0.000
7	0.000	0.000	0.000
8	0.029	0.000	0.853
9	0.001	0.752	0.007
10	0.273	0.016	0.000
11	0.078	0.005	0.000
12	0.007	0.000	0.000
13	0.397	0.000	0.086
14	0.621	0.003	0.058
15	0.031	0.344	0.001
16	0.003	0.003	0.000
17	0.000	0.000	0.001
18	0.000	0.000	0.000
19	0.000	0.000	0.019
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	0.000	0.000	NA
Monthly Average (cfs)	0.047	0.036	0.034

Monthly Discharge

Cubic Feet	0.073	0.066	0.068
Gallons	0.075	0.068	0.071
Acre-Feet	0.078	0.071	0.074

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

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.

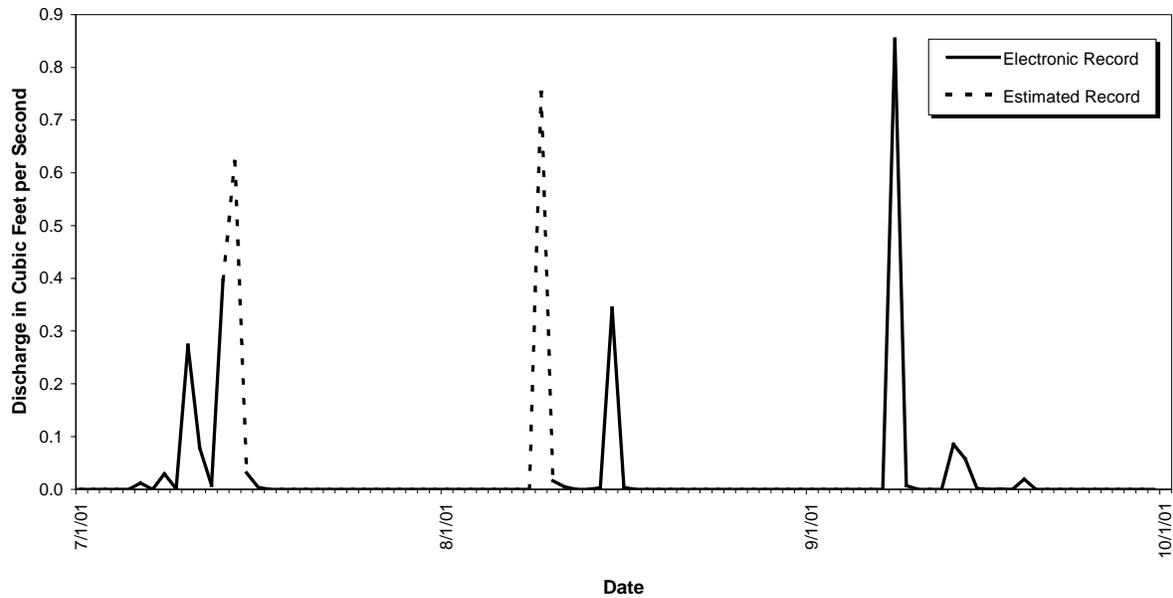


Figure 5-20. Mean Daily Discharge at SW022, Water Year 2001 (July, August, and September)

Table 5-21. Gaging Station SW027: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
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	0.251
9	0.000	0.340	0.026
10	0.000	0.024	0.007
11	0.000	0.004	0.002
12	0.000	0.000	0.000
13	0.000	0.000	0.000
14	0.819	0.000	0.000
15	0.236	0.050	0.000
16	0.013	0.046	0.000
17	0.005	0.005	0.000
18	0.004	0.001	0.000
19	0.016	0.000	0.000
20	0.004	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	0.000	0.000	NA
Monthly Average (cfs)	0.035	0.015	0.010

Monthly Discharge

Cubic Feet	94801	40603	24782
Gallons	709159	303733	185382
Acre-Feet	2.18	0.93	0.57

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.

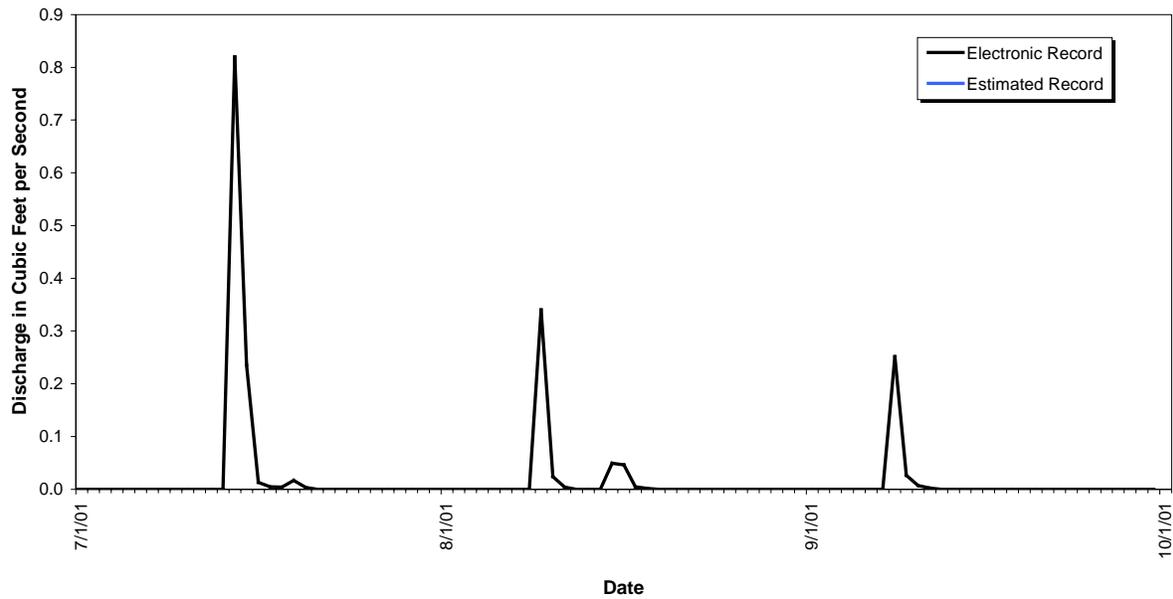


Figure 5-21. Mean Daily Discharge at SW027, Water Year 2001 (July, August, and September)

Table 5-22. Gaging Station SW055: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0001a
9	0.0000	0.0001	0.0000
10	0.0000	0.0000	0.0000
11	0.0001	0.0000	0.0000
12	0.0001	0.0000	0.0000
13	0.0000	0.0000	0.0000
14	0.0008	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	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000
27	0.0000	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	0.0000	0.0000	NA
Monthly Average (cfs)	0.000	0.000	0.000

Monthly Discharge

Cubic Feet	89	9	10
Gallons	668	65	77
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.

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

A new Performance monitoring location was installed in support of remediation activities for the 903 Pad and Lip Area. Gaging station SW055 is located at state plane 2086059, 748501 on a drainage ditch southeast of the 903 Pad just inside of the inner security fence. This station monitors runoff from the southeast side of the 903 Pad area. The SW055 drainage area is approximately 17.3 acres. This station collects samples for Pu, Am, and TSS using continuous flow-paced composite sampling.

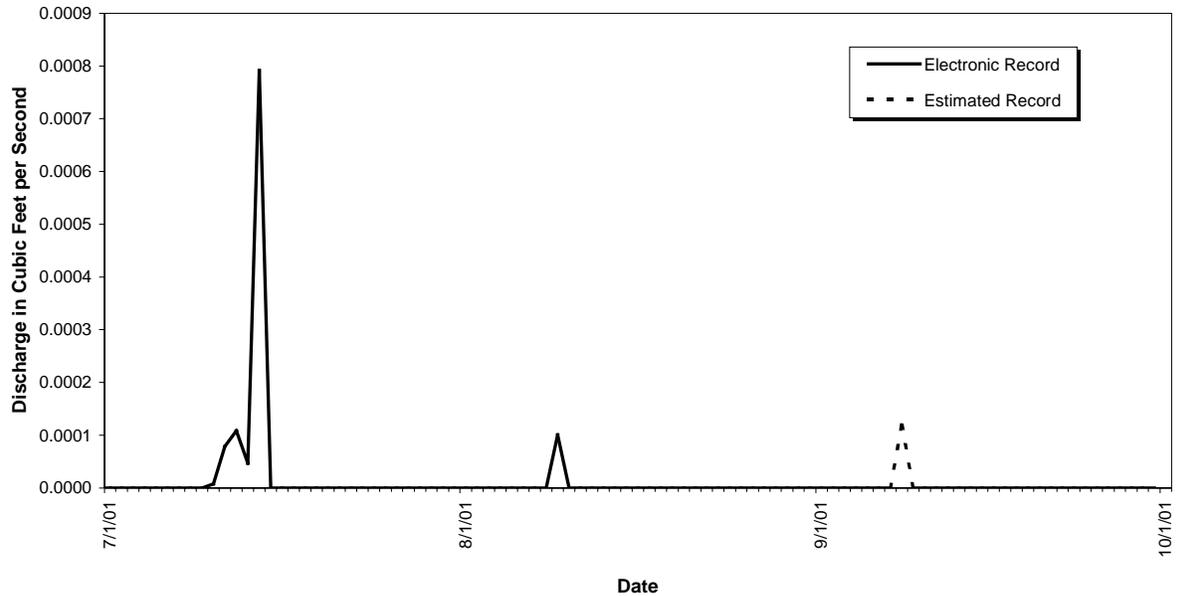


Figure 5-22. Mean Daily Discharge at SW055, Water Year 2001 (July, August, and September)

Table 5-23. Gaging Station SW091: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000
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	0.0001	0.0000	0.0000
14	0.0034	0.0000	0.0000
15	0.0001	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	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000
27	0.0000	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	0.0000	0.0000	NA
Monthly Average (cfs)	0.000	0.000	0.000

Monthly Discharge

Cubic Feet	306	3	1
Gallons	2288	21	6
Acre-Feet	0.01	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 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.

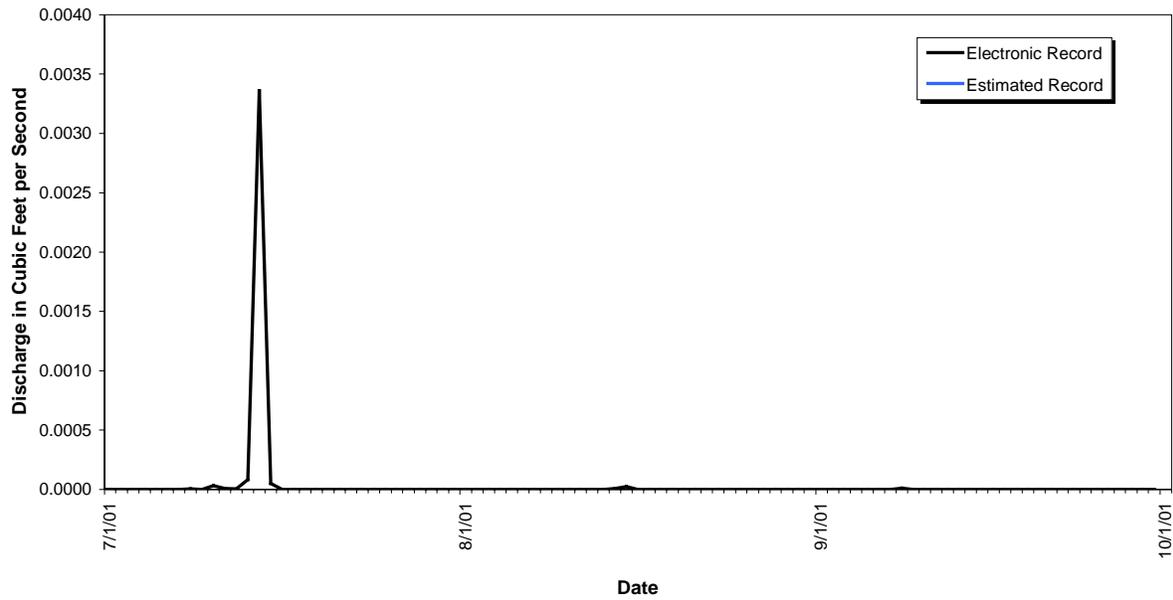


Figure 5-23. Mean Daily Discharge at SW091, Water Year 2001 (July, August, and September)

Table 5-24. Gaging Station SW093: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.185	0.105	0.068a
2	0.196	0.099	0.066a
3	0.219	0.088	0.067a
4	0.298	0.089	0.067a
5	0.344	0.090	0.067a
6	0.411	0.090	0.059a
7	0.292	0.091	0.095a
8	0.291	0.092	1.372a
9	0.135	3.030a	0.101a
10	0.257	0.236	0.078a
11	0.305	0.142	0.066a
12	0.150	0.111	0.079a
13	0.844a	0.118	0.228a
14	6.097a	0.140	0.213a
15	0.358	0.548	0.112a
16	0.145	0.156	0.093a
17	0.121	0.118	0.095a
18	0.132	0.103	0.091a
19	0.119a	0.098	0.084a
20	0.109	0.102	0.083a
21	0.106	0.100	0.088a
22	0.103	0.098	0.091a
23	0.104a	0.099	0.090a
24	0.124	0.100	0.090a
25	0.209	0.099	0.088a
26	0.181	0.097a	0.090a
27	0.171	0.088a	0.089a
28	0.150	0.083a	0.095a
29	0.135	0.081a	0.096a
30	0.124	0.070a	0.101a
31	0.097	0.066a	NA
Monthly Average (cfs)	0.404	0.214	0.137

Monthly Discharge

Cubic Feet	1081014	572657	354555
Gallons	8086548	4283773	2652255
Acre-Feet	24.82	13.15	8.14

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

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

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.

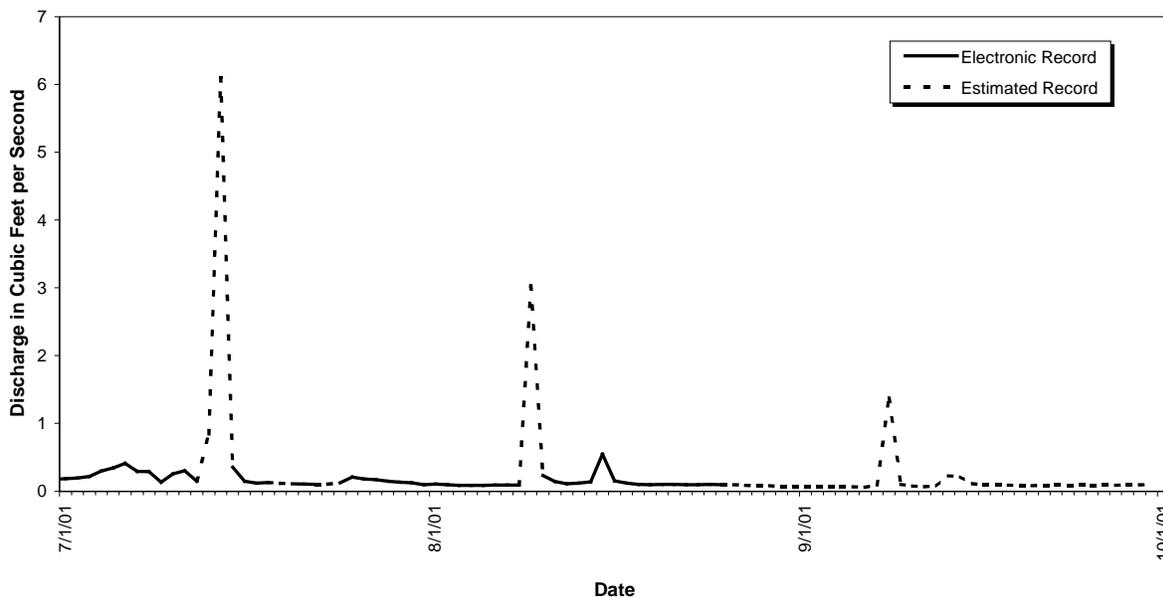


Figure 5-24. Mean Daily Discharge at SW093, Water Year 2001 (July, August, and September)

Table 5-25. Gaging Station SW118: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.071	0.000	0.000
2	0.070	0.000	0.000
3	0.070	0.000	0.000
4	0.073	0.000	0.000
5	0.069	0.000	0.000
6	0.051	0.000	0.000
7	0.050	0.000	0.000
8	0.060	0.000	0.114
9	0.061	0.184	0.020
10	0.067	0.011	0.004
11	0.084	0.011	0.000
12	0.052	0.006	0.000
13	0.154	0.002	0.003
14	0.476a	0.003	0.009
15	0.129	0.020	0.010
16	0.078	0.018	0.005
17	0.054	0.010	0.003
18	0.044	0.005	0.003
19	0.035	0.001	0.001
20	0.028	0.001	0.000
21	0.024	0.002	0.000
22	0.010	0.000	0.000
23	0.029	0.001	0.000
24	0.034	0.000	0.000
25	0.027	0.000	0.000
26	0.029	0.000	0.000
27	0.024	0.000	0.000
28	0.009	0.000	0.000
29	0.000	0.000	0.000
30	0.000	0.000	0.000
31	0.000	0.000	NA
Monthly Average (cfs)	0.063	0.009	0.006

Monthly Discharge

Cubic Feet	169548	23918	14832
Gallons	1268307	178917	110950
Acre-Feet	3.89	0.55	0.34

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

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Buffer Zone Hydrologic monitoring location SW118 is located at state plane 2082961, 751417 on North Walnut Creek northeast of B371 along the IA Perimeter Road. This station monitors runoff from the area northwest of the former PA. The SW118 drainage area is approximately 50 acres. This station collects flow data only.

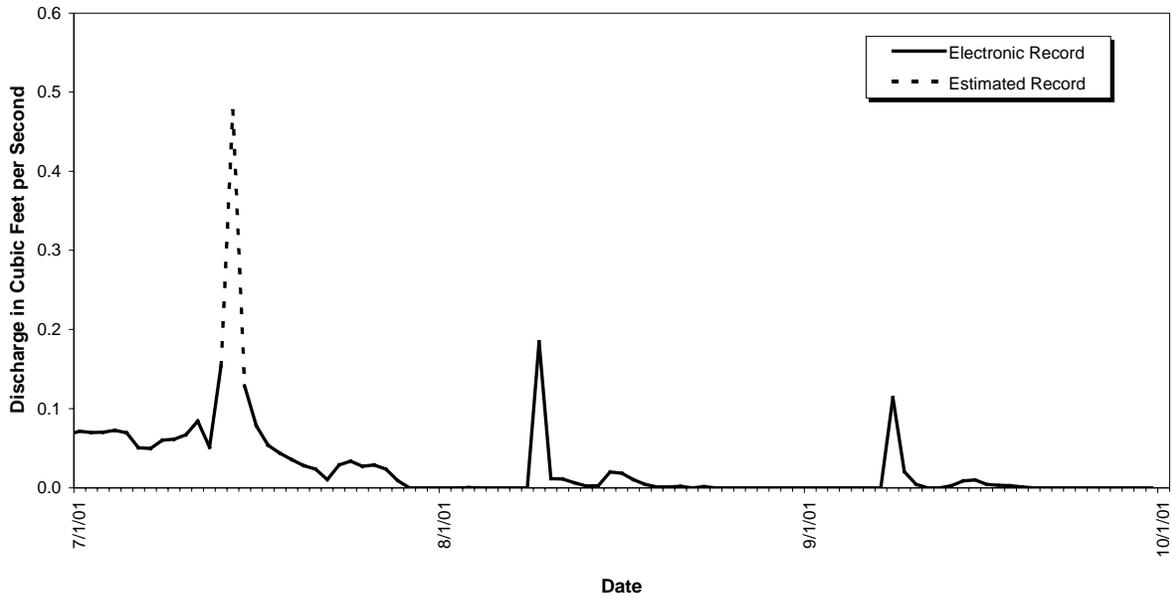


Figure 5-25. Mean Daily Discharge at SW118, Water Year 2001 (July, August, and September)

Table 5-26. Gaging Station SW119: Mean Daily Discharge (cubic feet per second)

Day	Apr-01	May-01	Jun-01
1	No Data	0.0000a	0.0000
2	No Data	0.0068a	0.0000
3	No Data	0.0261a	0.0000
4	No Data	0.0539a	0.0000
5	0.0000a	0.1040a	0.0000
6	0.0000a	0.0057a	0.0000
7	0.0000a	0.0004a	0.0000
8	0.0000a	0.0000a	0.0000
9	0.0000a	0.0000a	0.0000
10	0.0000a	0.0000a	0.0000
11	0.0414a	0.0000a	0.0000
12	0.0316a	0.0000a	0.0000
13	0.0105a	0.0000a	0.0000
14	0.0009a	0.0000a	0.0000
15	0.0000a	0.0000a	0.0000
16	0.0000a	0.0000a	0.0000
17	0.0000a	0.0000a	0.0000
18	0.0000a	0.0000a	0.0000
19	0.0000a	0.0063a	0.0000
20	0.0000a	0.0076a	0.0000
21	0.0016a	0.0152a	0.0000
22	0.0479a	0.0011a	0.0000
23	0.0226a	0.0000a	0.0000
24	0.0035a	0.0000a	0.0000
25	0.0003a	0.0000a	0.0000
26	0.0000a	0.0000a	0.0000
27	0.0000a	0.0000a	0.0000
28	0.0000a	0.0000a	0.0000
29	0.0000a	0.0000a	0.0000
30	0.0000a	0.0000a	0.0000
31	NA	0.0000a	NA
Monthly Average (cfs)	0.006	0.007	0.000

Monthly Discharge

Cubic Feet	13851	19627	0
Gallons	103610	146822	0
Acre-Feet	0.32	0.45	0.00

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

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging station SW119 is located at state plane 2084723, 751268 on a drainage ditch north of Solar Pond 207A along the PA perimeter road and was installed in support of remediation activities for the Solar Ponds. This performance monitoring station monitors runoff from the east and north sides of the Solar Ponds and Triangle Area. The SW119 drainage area is approximately 7.6 acres. This station collects samples for Pu, Am, uranium isotopes, CLP metals, and TSS using continuous flow-paced composite sampling.

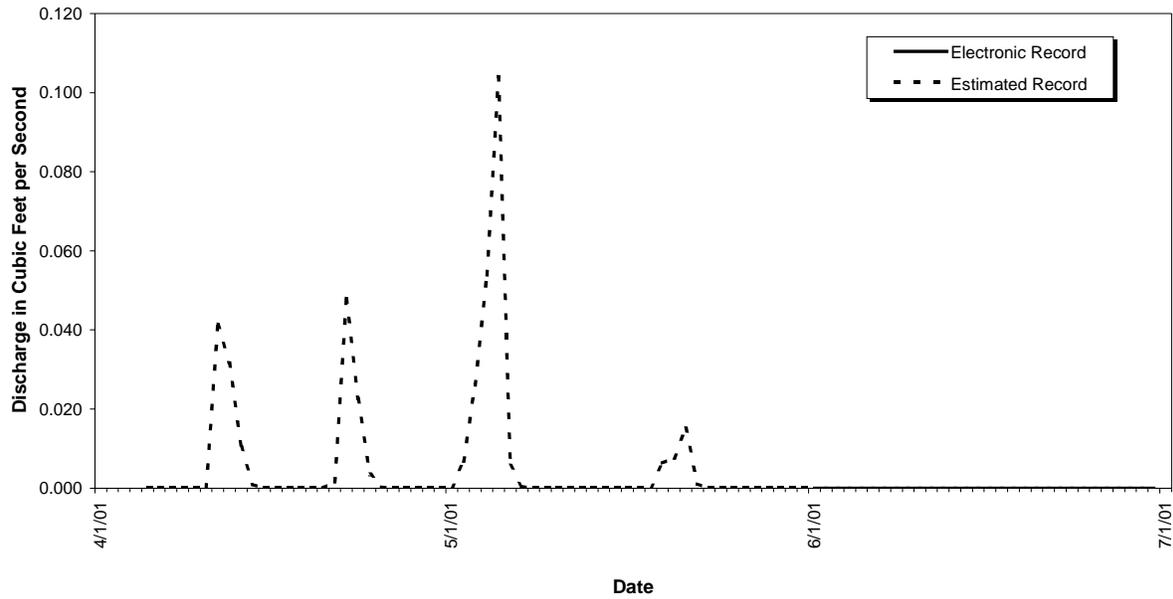


Figure 5-26. Mean Daily Discharge at SW119, Water Year 2001 (July, August, and September)

Table 5-27. Gaging Station SW120: Mean Daily Discharge (cubic feet per second)

Day	Apr-01	May-01	Jun-01
1	0.0000	0.0000	0.0000
2	0.0000	0.0124	0.0000
3	0.0000	0.0587	0.0000
4	0.0000a	0.1059	0.0000
5	0.0000	0.2314	0.0000
6	0.0000	0.0164	0.0000
7	0.0000	0.0077	0.0000
8	0.0000	0.0045	0.0000
9	0.0000	0.0028	0.0000
10	0.0000	0.0016	0.0000
11	0.0837	0.0003	0.0000
12	0.0846	0.0000	0.0000
13	0.0291	0.0000	0.0006
14	0.0098	0.0000	0.0003
15	0.0042	0.0000	0.0000
16	0.0008	0.0000	0.0000
17	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000
19	0.0000	0.0095	0.0000
20	0.0000	0.0069	0.0000
21	0.0034	0.0270	0.0000
22	0.0867	0.0012	0.0000
23	0.0736	0.0000	0.0000
24	0.0105	0.0000	0.0000
25	0.0027	0.0000	0.0000
26	0.0005	0.0000	0.0000
27	0.0000	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
Monthly Average (cfs)	0.013	0.016	0.000

Monthly Discharge

Cubic Feet	33662	42021	73
Gallons	251809	314339	545
Acre-Feet	0.77	0.96	0.00

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

^a Contains data estimated from field observations and electronic record at adjacent or comparable gages.

Gaging Station SW120 is located at state plane 2084681.6 E 751269 N, in the drainage ditch north of the Solar Ponds along the south side of the PA Perimeter Road. This location is a Performance monitoring location in support of D&D activities for the B771/774 area. SW120 also serves as a Source Location monitoring point in support of Source Evaluation efforts for POE SW093. This location collects continuous flow-paced samples that are analyzed for Pu, U, Am, CLP metals, and TSS.

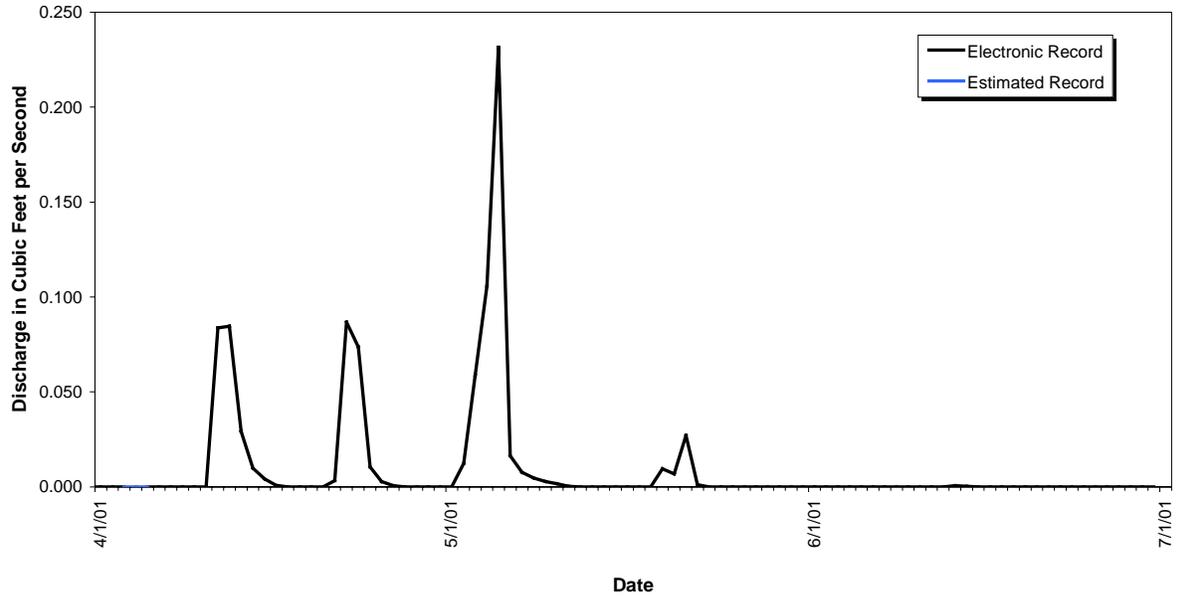


Figure 5-27. Mean Daily Discharge at SW120, Water Year 2001 (July, August, and September)

Table 5-28. Gaging Station SW134: Mean Daily Discharge (cubic feet per second)

Day	Jul-01	Aug-01	Sep-01
1	0.000	0.088	0.000
2	0.068	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	0.062	0.004
9	0.000	0.030	0.000
10	0.078	0.176	0.000
11	BD	0.000	0.119
12	0.000	0.000	0.000
13	0.000	0.000	0.000
14	0.055	0.049	0.000
15	0.000	0.001	0.000
16	0.450	0.000	0.000
17	0.000	0.000	0.000
18	0.000	0.000	0.000
19	0.000	0.000	0.113
20	0.000	0.000	0.000
21	0.000	0.000	0.000
22	0.000	0.000	0.000
23	0.094	0.000	0.000
24	0.044	0.000	0.000
25	0.000	0.000	0.000
26	0.000	0.000	0.000
27	0.000	0.129	0.000
28	0.000	0.000	0.000
29	0.000	0.000	0.000
30	0.000	0.000	0.000
31	0.000	0.000	NA
Monthly Average (cfs)	0.026	0.017	0.008

Monthly Discharge

Cubic Feet	68145	46216	20377
Gallons	509760	345722	152431
Acre-Feet	1.56	1.06	0.47

Note: Mean flow values are reported to the nearest 0.001 cfs, values less than 0.0005 cfs are reported as zero.
 BD – Bad data due to equipment failure.

Buffer Zone Hydrologic monitoring location SW134 is located at state plane 2075942, 750049 on a tributary to Rock Creek at the northeast corner of the gravel pits north of the West Access Road. This station monitors runoff and pumped discharges from the gravel pits. This station collects samples for sediment/sand, Ca, Mg, Na, K, Cl, F, SO₄, HCO₃, and TSS using rising-limb, flow-paced composite sampling.

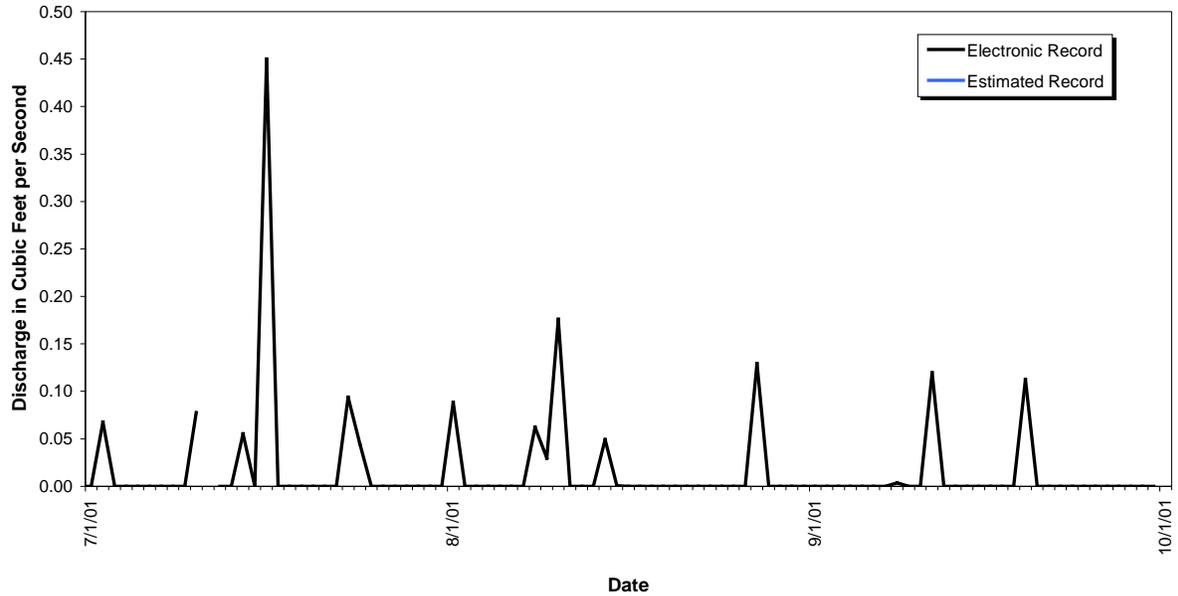


Figure 5-28. Mean Daily Discharge at SW134, Water Year 2001 (July, August, and September)

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5.2 WATER QUALITY DATA

Table 5-29. Radionuclides, Water Year 2001 (July, August, and September)

Location	Sample Dates	Result Pu-239, -240 [pCi/l]	Result Am-241 [pCi/l]	Result Total Uranium [pCi/l]	Result Tritium [pCi/l]
GS01	6/26/2001 -	c	c	a	c
GS03	7/2 - 7/10/01	0.010	0.002	a	-205
GS03	7/10 - 7/12/01	0.009	-0.003	a	-67
GS03	7/12 - 7/15/01	0.004	-0.003	a	-39
GS03	7/15 - 8/2/01	0.009	0.000	a	130
GS03	8/2 - 8/7/01	0.000	0.008	a	25
GS03	8/7 - 8/16/01	0.007	0.007	a	-156
GS03	8/16 - 8/19/01	-0.001	0.001	a	-131
GS03	8/19 - 8/22/01	0.007	-0.005	a	-20
GS03	8/22 - 8/28/01	0.004	0.007	a	-30
GS03	8/28 - 10/3/01	b	b	a	b
GS08	7/2 - 7/9/01	-0.001	0.001	1.449	a
GS08	8/2 - 8/7/01	-0.003	0.011	1.204	a
GS08	8/7 - 8/16/01	0.004	0.008	0.916	a
GS10	7/2 - 7/12/01	0.190	0.192	1.974	a
GS10	7/12 - 7/15/01	0.085	0.084	0.843	a
GS10	7/15 - 8/1/01	0.008	0.011	5.332	a
GS10	8/1 - 8/9/01	0.089	0.052	1.925	a
GS10	8/9 - 8/20/01	0.050	0.032	1.837	a
GS10	8/20 - 9/8/01	0.198	0.073	1.759	a
GS10	9/8 - 9/18/01	0.019	0.027	2.930	a
GS10	9/18 - 10/1/01	0.033	0.021	4.812	a
GS11	8/16 - 8/19/01	-0.002	-0.003	1.879	a
GS11	8/19 - 8/22/01	0.003	-0.005	1.903	a
GS11	8/22 - 8/27/01	0.009	-0.003	1.693	a
GS27	7/10/01	0.581	0.172	0.324	a
GS27	7/13/01	0.981	0.232	0.311	a
GS27	8/9/01	0.662	0.198	0.167	a
GS27	9/8/01	0.227	0.103	0.074	a
GS32	7/6/01	1.860	0.689	2.442	-203

- a Not applicable
- b Non-sufficient quantity
- c Composite sample in progress

Table 5-29. Radionuclides, Water Year 2001 (July, August, and September), continued

Location	Sample Dates	Result Pu-239, -240 [pCi/l]	Result Am-241 [pCi/l]	Result Total Uranium [pCi/l]	Result Tritium [pCi/l]
GS32	8/9/01	3.200	2.250	2.521	80
GS32	9/7/01	0.479	0.469	0.950	1
GS39	5/21 - 7/11/01	0.130	0.018	a	a
GS39	7/11 - 8/9/01	0.087	0.020	a	a
GS39	8/9 - 8/10/01	0.068	0.003	a	a
GS39	8/10/01 - *	0.046	0.029	a	a
GS40	6/28 - 7/16/01	0.017	0.043	1.910	-2
GS40	7/16 - 8/9/01	0.047	0.045	3.348	-20
GS40	8/9 - 9/8/01	0.058	0.032	2.676	10
GS40	9/8 - 10/1/01	0.013	0.001	3.119	-200
GS43	5/21 - 7/15/01	0.003	0.011	6.086	a
GS43	7/15/01 -	b	b	b	a
GS44	6/28 - 7/16/01	0.055	0.026	1.699	28
GS44	7/16 - 8/6/01	0.029	0.014	5.075	100
GS44	8/6 - 8/27/01	0.031	0.012	1.850	100
GS44	8/27 - 10/4/01	0.009	0.019	1.240	-230
GS49	5/5 - 7/25/01	0.079	0.050	1.169	49
GS49	7/25/01 -	b	b	b	e
GS50	5/5 - 8/9/01	0.225	0.442	0.438	a
GS50	8/9/01 -	b	b	b	a
SW022	5/21 - 7/11/01	0.100	0.039	0.609	a
SW022	7/11-7/15/01	0.147	0.043	0.950	a
SW022	7/15 - 8/14/01	0.120	0.033	0.467	a
SW022	8/14 - 9/13/01	0.036	0.014	0.469	a
SW022	9/13/2001 -	b	b	b	a
SW027	5/5 - 8/9/01	0.015	-0.003	0.992	a
SW027	8/9/01 - *	0.009	-0.003	0.428	a
SW055	5/28/01 - *	3.160	0.557	2.908	a
SW091	7/13/01	0.051	0.186	0.507	a
SW093	7/2 - 7/9/01	0.025	-0.003	1.148	a
SW093	7/9 - 7/15/01	0.019	0.018	0.961	a
SW093	7/15 - 7/23/01	0.008	0.003	3.576	a
SW093	7/23 - 8/1/01	-0.001	-0.005	2.854	a
SW093	8/1 - 8/9/01	0.099	0.030	1.679	a
SW093	8/9 - 8/16/01	0.023	0.019	1.784	a

a Not applicable

b Composite sample in progress

Table 5-29. Radionuclides, Water Year 2001 (July, August, and September), continued

Location	Sample Dates	Result Pu-239, -240 [pCi/l]	Result Am-241 [pCi/l]	Result Total Uranium [pCi/l]	Result Tritium [pCi/l]
SW093	8/16 - 8/27/01	-0.013	0.003	3.689	a
SW093	8/27 - 9/8/01	0.010	0.013	1.759	a
SW093	9/8 - 9/20/01	-0.001	0.008	2.470	a
SW093	9/20 - 10/1/01	0.010	0.000	3.582	a
SW119	5/5 - 8/9/01	0.300	0.384	2.701	a
SW119	8/9/01 -	c	c	c	a
SW120	5/5 - 8/9/01	1.160	0.336	2.082	49
SW120	8/9 - 9/13/01	0.136	0.050	1.066	70
SW120	9/13/2001 -	c	c	c	e
995POE	6/21 - 7/23/01	-0.002	-0.003	0.978	94
995POE	7/23 - 8/23/01	0.000	0.003	0.793	-30
995POE	8/23 - 9/24/01	-0.006	0.001	0.578	-200
995POE	9/24 - 10/25/01	b	b	b	-136

- a Not applicable
- b Incomplete analysis
- c Composite sample in progress

Table 5-30. POE Metals, Water Year 2001 (July, August, and September)

Location	Sample Dates	Analyte Be ug/L	Analyte Dissolved Cd ug/L	Analyte Cr ug/L	Analyte Dissolved Ag ug/L
GS10	7/2 - 7/12/01	0.22	0.12	5.50	undetect
GS10	7/12 - 7/15/01	0.93	undetect	23.20	undetect
GS10	7/15 - 8/1/01	undetect	undetect	undetect	undetect
GS10	8/1 - 8/9/01	0.32	undetect	8.00	undetect
GS10	8/9 - 8/20/01	0.21	0.21	5.10	undetect
GS10	8/20 - 9/8/01	0.68	undetect	10.70	undetect
GS10	9/8 - 9/18/01	a	a	a	a
GS10	9/18 - 10/1/01	undetect	undetect	1.40	undetect
SW027	5/5 - 8/9/01	0.11	0.16	1.70	undetect
SW027	8/9/01 - *	0.40	undetect	5.60	undetect
SW093	7/2 - 7/9/01	0.23	undetect	2.80	undetect
SW093	7/9 - 7/15/01	1.50	undetect	34.50	undetect
SW093	7/15 - 7/23/01	0.06	0.09	0.60	undetect
SW093	7/23 - 8/1/01	0.10	undetect	2.30	undetect
SW093	8/1 - 8/9/01	0.40	undetect	9.80	undetect
SW093	8/9 - 8/16/01	0.20	undetect	5.00	undetect
SW093	8/16 - 8/27/01	undetect	undetect	0.52	undetect
SW093	8/27 - 9/8/01	0.68	undetect	10.70	undetect
SW093	9/8 - 9/20/01	a	a	a	a
SW093	9/20 - 10/1/01	undetect	undetect	2.90	undetect

a Incomplete analysis

Table 5-31. Other Metals, Water Year 2001 (July, August, and September)

Analyte ug/l	Result GS32, 7/6/01	Result GS32, 8/9/01	Result GS32, 9/7/01	Result GS40, 7/16/01 – 8/9/01	Result GS40, 8/9/01 – 9/8/01
Aluminum	14100	30200	3550	6130	5550
Antimony	15.7	31.5	6.8	21.5	14.3
Arsenic	7.1	12.6	2.4	6.4	9.1
Barium	175	289	97.9	326	335
Beryllium	0.86	1.4	0.27	0.29	0.33
Cadmium	1.8	2.8	0.9	1.9	1.5
Calcium	59800	76600	37500	101000	90000
Chromium	22.3	48.8	7.1	8.2	7
Cobalt	5.5	12.3	2.2	2.6	2.8
Copper	51.4	100	27.4	20.8	16.5
Iron	15500	35500	4040	12800	20100
Lead	51.3	91.8	12.5	11.4	10.7
Lithium	27	33.1	11.1	18.5	15.3
Magnesium	7070	10500	3860	30100	22900
Manganese	419	767	189	595	850
Mercury	undetect	0.12	undetect	undetect	undetect
Molybdenum	4.8	3.7	2.8	1.9	1.7
Nickel	16.6	32.2	7.1	6.6	6
Potassium	20300	13600	11300	7620	8110
Selenium	1.7	2	1.3	1.4	undetect
Silver	undetect	0.41	undetect	undetect	undetect
Sodium	116000	28000	72300	145000	139000
Strontium	253	205	179	859	704
Thallium	undetect	undetect	undetect	undetect	undetect
Tin	1.5	3.5	undetect	undetect	undetect
Vanadium	37.7	79.4	11.7	17.3	18.4
Zinc	1240	1710	847	604	622

Table 5-31. Other Metals, Water Year 2001 (July, August, and September) continued

Analyte ug/l	Result GS40, 9/8/01 – 10/1/01	Result GS43, 7/15/01 -	Result GS44, 7/16/01 – 8/6/01	Result GS44, 8/6/01 – 8/27/01	Result GS44, 8/27/01 – 10/4/01
Aluminum	120	a	61.5	7540	2810
Antimony	1.9	a	0.95	0.67	undetect
Arsenic	1.9	a	undetect	3.4	1.3
Barium	159	a	169	91.8	54.1
Beryllium	undetect	a	undetect	0.35	0.12
Cadmium	undetect	a	undetect	0.09	undetect
Calcium	90300	a	89700	32600	21900
Chromium	1.1	a	undetect	8	3.3
Cobalt	undetect	a	undetect	1.8	0.55
Copper	4.7	a	1.9	12.5	8
Iron	433	a	52	6060	2300
Lead	0.98	a	undetect	6.9	3.7
Lithium	14.3	a	77.6	31	18.1
Magnesium	23400	a	17700	6630	4480
Manganese	39.2	a	1.5	74.5	26.1
Mercury	undetect	a	undetect	undetect	undetect
Molybdenum	2.2	a	2.1	1.5	0.84
Nickel	1.4	a	1.2	6.3	2.5
Potassium	5820	a	14600	8040	5770
Selenium	1.6	a	3.4	1.8	undetect
Silver	undetect	a	undetect	undetect	undetect
Sodium	84800	a	45700	21000	19900
Strontium	670	a	547	183	126
Thallium	undetect	a	undetect	undetect	undetect
Tin	undetect	a	undetect	undetect	undetect
Vanadium	1.8	a	1.8	16.5	6.9
Zinc	29.4	a	80.5	101	57.8

a Composite sample in progress

Table 5-31. Other Metals, Water Year 2001 (July, August, and September) continued

Analyte ug/l	Result GS49, 7/25/01 -	Result GS50, 5/5/01 – 8/9/01	Result GS50, 8/9/01 -	Result SW119, 5/5/01 – 8/9/01	Result SW119, 8/9/01 -
Aluminum	a	8025	a	7110	a
Antimony	a	1.65	a	1.40	a
Arsenic	a	4.8	a	3.1	a
Barium	a	77.1	a	89.5	a
Beryllium	a	0.31	a	0.33	a
Cadmium	a	0.72	a	1.20	a
Calcium	a	16750	a	23050	a
Chromium	a	8.35	a	8.10	a
Cobalt	a	2.25	a	2.05	a
Copper	a	17.5	a	11.2	a
Iron	a	6565.0	a	5420.0	a
Lead	a	17.0	a	6.0	a
Lithium	a	7.0	a	21.5	a
Magnesium	a	2475	a	6175	a
Manganese	a	106.0	a	76.4	a
Mercury	a	undetect	a	undetect	a
Molybdenum	a	0.86	a	0.84	a
Nickel	a	6.65	a	6.40	a
Potassium	a	7305	a	8650	a
Selenium	a	1.13	a	1.61	a
Silver	a	0.24	a	undetect	a
Sodium	a	5895	a	64750	a
Strontium	a	61.0	a	170.5	a
Thallium	a	undetect	a	undetect	a
Tin	a	0.92	a	undetect	a
Vanadium	a	19.45	a	16.80	a
Zinc	a	89.60	a	80.05	a

a Composite sample in progress

Table 5-31. Other Metals, Water Year 2001 (July, August, and September) continued

Analyte ug/l	Result SW120, 5/5/01 – 8/9/01	Result SW120, 8/9/01 – 9/13/01	Result SW120, 9/13/01 -
Aluminum	9750	3610	a
Antimony	2.50	3.1	a
Arsenic	5.8	4.4	a
Barium	106.0	56.7	a
Beryllium	0.40	0.21	a
Cadmium	0.34	0.14	a
Calcium	32100	23500	a
Chromium	10.60	5.1	a
Cobalt	2.70	0.85	a
Copper	17.8	9.7	a
Iron	8530.0	2730	a
Lead	8.7	3.4	a
Lithium	18.4	11.9	a
Magnesium	7540	4880	a
Manganese	151.0	58.1	a
Mercury	5.50	undetected	a
Molybdenum	1.10	1.5	a
Nickel	8.90	4	a
Potassium	9100	7770	a
Selenium	1.60	1.3	a
Silver	undetected	undetected	a
Sodium	51100	43800	a
Strontium	190.0	135	a
Thallium	undetected	undetected	a
Tin	undetected	undetected	a
Vanadium	23.40	8.2	a
Zinc	112.00	73.3	a

a Composite sample in progress

Table 5-32. Water Quality Parameters, Water Year 2001 (July, August, and September)

Location	Sample Dates	Analyte Hardness mg/L
GS10	7/2 - 7/12/01	160
GS10	7/12 - 7/15/01	92
GS10	7/15 - 8/1/01	386
GS10	8/1 - 8/9/01	147
GS10	8/9 - 8/20/01	150
GS10	8/20 - 9/8/01	140
GS10	9/8 - 9/18/01	226
GS10	9/18 - 10/1/01	470
SW027	5/5 - 8/9/01	90
SW027	8/9 - 9/12/01	73
SW093	7/2 - 7/9/01	160
SW093	7/9 - 7/15/01	130
SW093	7/15 - 7/23/01	328
SW093	7/23 - 8/1/01	278
SW093	8/1 - 8/9/01	174
SW093	8/9 - 8/16/01	184
SW093	8/16 - 8/27/01	350
SW093	8/27 - 9/8/01	180
SW093	9/8 - 9/20/01	280
SW093	9/20 - 10/1/01	393

Table 5-33. Buffer Zone/Hydrologic Water Quality Parameters, Water Year 2001 (July, August, and September)

Analyte mg/l	Result GS04, 7/14/01	Result GS06, 8/9/01	Result SW134, 7/10/01
TSS	220	2310	57
Calcium	23	15.9	28.1
Magnesium	6.61	8.14	5.97
Sodium	12.6	2.27	13.9
Potassium	8.2	9.5	1.66
Chloride	13	5.8	13
Fluoride	0.33	0.27	0.48
SO ₄	21	3.9	37
HCO ₃	68	9.1	230

6.0 INCIDENTAL WATERS

6.1 INCIDENTAL WATERS DEFINITION AND ROUTING MATRIX

An incidental water is defined as precipitation, surface water, groundwater, utility water, process water, or waste water collecting in one or more of several types of containments. These containments can include excavation sites, foundation drains, secondary containment berms, electrical vaults, utility pits and manholes, or other natural or manmade depressions, which must be dewatered.

Water collected in this manner has the potential to become contaminated via contact with the surrounding containment material. Sampling and disposition of incidental waters is conducted per Site Procedure 1-C91-EPR-SW.01, *Control and Disposition of Incidental Waters*. Incidental waters are typically sampled for pH, nitrates, conductivity, and gross alpha and gross beta (when radionuclides are suspected). Additional testing for volatile organic compounds and metals is performed when a specific potential contaminant source is known to exist. Disposition depends on the analytical results. Routing options for incidental waters are outlined in the following table.

Table 6-1. Incidental Waters Routing Matrix

Incidental Water Routing	Routing Criteria	Treatment Processes
Ground/Storm Drain	<ul style="list-style-type: none"> Water meets discharge limits per Incidental Waters procedure 	N/A
Building 995 Waste Water Treatment Plant (WWTP)	<ul style="list-style-type: none"> Water above discharge to ground limits Water meets Internal Waste Streams Program review criteria 	Activated Sludge w/ tertiary clarifiers Dual media filtration UV disinfection
Building 891 Consolidated Water Treatment Facility (CWTF)	<ul style="list-style-type: none"> Water above discharge to ground limits Water not accepted by WWTP Water meets CWTF acceptance criteria and has both radionuclide and organic constituents 	Chemical precipitation Microfiltration UV/ peroxide oxidation Granular activated carbon Ion exchange
Building 374	<ul style="list-style-type: none"> Water above discharge to ground limits Water not accepted by WWTP Water has radionuclides, but no organic constituents 	Flash evaporation (Steam-heated reactor with spray evaporation)

6.2 QUARTERLY INCIDENTAL WATER DISPOSITIONS

Forty three (43) incidental waters were sampled/dispositioned during the fourth quarter of FY01. The following table summarizes the location and route of disposal.

Table 6-2. Quarterly Incidental Water Dispositions FY2001 (July, August, and September)

Location/Building	Location Type	Location Description	# of Incidental Waters	Route of Disposal
N/A	Manhole	Manhole 5	1	To B891
124	Water Treatment System	Spill of 200 gallons of raw water	1	To Ground or Storm Drain
302	Drum	6" water in 40 gal drum containing deicer	1	To Ground or Storm Drain
371	Condensate Water	Air Intake Condensate	1	To B995
371	Condensate Water	Condensate from intake air to 371	1	To B891
373	Cooling Tower Sump	This tower is being dismantled. Need to sample water	1	To Ground or Storm Drain
462	Cooling Tower	Periodic draining of cooling tower.	1	To Ground or Storm Drain
551	New System	Pump water thru new plastic tubing in new system	1	To Ground or Storm Drain
664	Excavation	While digging for new culvert they hit old culvert - 2 gallons	1	To Ground or Storm Drain
664	Steam Condensate Tank	Main steam condensate receiving tank	1	To Ground or Storm Drain
703	Makeup/Process System	Sample point No. 2	1	To B995
703	Makeup/Process Water	Sample point No. 1	1	To B995
703	Makeup/process water	Sample point No. 3	1	To B995
703	Makeup/Process Water	Sample point No. 4	1	To B995
703	Valve Vault	Valve vault for 703	1	To Ground or Storm Drain

Table 6-2. Quarterly Incidental Waters Disposition FY01 (July, August, and September), con't.

Location/Building	Location Type	Location Description	# of Incidental Waters	Route of Disposal
707	Chiller condensate	Discharge from chiller condensate	1	To B995
707	Chiller condensate	Resample: Discharge from chiller condensate	1	To B891
709	Manhole	Just west of 709	1	To B374
709	Manhole	Re-analysis of IW01063	1	To Ground or Storm Drain
711	Cooling Tower	Cooling Tower 711	1	To Ground or Storm Drain
711	Cooling Tower	Re-sampling of cooling tower water	1	To Ground or Storm Drain
711	Cooling Tower	Resampling of 711 cooling tower	1	To Ground or Storm Drain
711	Cooling Tower	Water in cooling tower	1	To B995
713	Cooling Tower	re-sampling of 713 cooling tower	1	To B995
761	Excavation	Excavation where PA fence was located	1	Solar Pond Plumes Trmt System
776	Building Pit	Sump previously sampled under IW01114	1	To B995
776	Chiller condensate	Temporary discharge to ground of condensate water normally routed to sanitary for convenience.	1	To Ground or Storm Drain
776	Dock	Water from a sprinkler head break, mixed with rain water	1	To Ground or Storm Drain
776	Drum	Drummed water from oil/water separator	2	To B995
776	New Chiller	Need to flush a new chiller with potable water	1	To Ground or Storm Drain

Table 6-2. Quarterly Incidental Waters Disposition FY01 (July, August, and September), con't.

Location/Building	Location Type	Location Description	# of Incidental Waters	Route of Disposal
776	Process Cooling Water (PCW)	CA Room 430	1	Cancelled
776	Process Cooling Water (PCW)	RBA Room 208	1	To B995
776	Trench	Oil/water separator trench. Sample 2 points in trench	1	To B995
778	Steam Condensate Line	Condensate line at 778	1	To Ground or Storm Drain
865	Excavation/Pipe Break	Potable water line break west of 865	1	To Ground or Storm Drain
881	Drum	drum of water collected from sanitary waste dumpster	1	To Ground or Storm Drain
886	Building Pit	Room 828	1	To B374
886	Building Pit	Room 828	1	To B891
904	Tank	High density polyethylene tank	1	To Ground or Storm Drain
928	Fire Suppression System	Fire suppression system	1	To Ground or Storm Drain
980	Bermed Area	SE corner of pad	1	To B374
NE IA(B761)	Excavation	Fence removal produced excavations with ground water	1	To Ground or Storm Drain

The 20 incidental waters requiring treatment were routed to the following Site treatment facilities:

- Building 995 – WWTP 13
- Building 891 – CWTF 4
- Building 374 3

7.0 FINAL 2000 PUBLIC RADIATION DOSE ASSESSMENT FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Introduction

A public radiation dose assessment was performed for calendar year (CY) 2000 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 (RFETS) 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 CY 2000, the MEI was located at Mower Lake. The radiation dose received by this MEI was 0.38 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 RFETS, a number of steps need to be followed. These steps are identified as:

1. The radiation sources at RFETS 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 RFETS 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 from RFETS activities needs to be calculated and 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 such an approach.

Sources of Radioactive Material

The radioactive material released to the environment at RFETS includes isotopes of americium, plutonium, uranium and tritium. For CY 2000, these radioactive materials were released from RFETS through air emissions and through surface water emissions. There have also been past releases from RFETS that have deposited americium and plutonium on surface soils east of RFETS. These surface soils were investigated as Operable Unit #3 at RFETS. Annual 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 CY 2000.

The radioactive material released in air from RFETS is quantified in the Radionuclide Air Emissions Annual Report, Calendar Year 2000. 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 RFETS are assessed in this report with their associated air emissions. Air emissions are measured at the boundary of RFETS through a system of air monitors. The air monitor closest to a resident was used to assess radiation dose. Air concentrations of radioactive material from this report are used to quantify the amount of radioactive material inhaled by members of the public. Tritium concentrations in air were not assessed in this report due to their low concentrations. Therefore, radiation dose from tritium in air was not included in the public radiation dose assessment. The deposition rate of radioactive material onto surface soils is also assessed 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 RFETS is quantified through routine surface water monitoring activities. In 2000, Ponds A-4 and B-5 released water offsite in a batch manner while Pond C-2 did not release any water. Pond discharge water was analyzed for radioactive material. 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.

As a result of past releases of radioactive material at RFETS, there are elevated levels of radioactive material in surface soils east of RFETS. 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), June 1996. 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 RFETS

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 RFETS. 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, eight locations surrounding RFETS were investigated. The nearest member of the public were assessed at the Sawmill, McCaslin, Rocky Flats Lake, South, Northeast Resident, East of Great Western Reservoir, Mower Reservoir and 96th & Indiana. All of these locations are private residents.

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 due to the high dilution during tilling of radioactive material deposited on surface soil.

All of these exposure pathways may not be applicable to each of the seven locations being examined and/or may not be significant to each of these seven locations at the boundary of RFETS. This is because surface water is preferentially released to the east of RFETS and because the surface soils east of RFETS contain elevated concentrations of radioactive material. Therefore, the ingestion of radioactive material in surface water will only be applicable to those locations east of RFETS. 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 RFETS.

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) exposure parameters for a resident will be used. Exposure parameters were taken from EPA's OSWER Directive 9285.6-03, "Human Health Evaluation Manual, Supplemental Guidance: 'Standard Default Exposure Factors'." The RME exposure parameters represent the maximum exposure reasonably expected by an individual.

For the ingestion of surface water exposure pathway, it is not reasonable to assume that a resident would use the surface water released from RFETS for household use. Surface water from RFETS is released

intermittently in both Walnut Creek and Woman Creek and is not a reliable water supply. In Walnut Creek, surface water is released to a waterway that is not used as a drinking water supply. Surface water released from RFETS into Walnut Creek 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. In Woman Creek, surface water is discharged to the creek where water flows to any one of three cells in the Woman Creek Reservoir, located just east of Indiana Avenue. The surface water within these cells is pumped to Walnut Creek just east of Great Western Reservoir. The water then follows the same path as the waters released into Walnut Creek. Due to these circumstances, it is not reasonable to assume that a resident would use the surface water released from RFETS for household use. It is reasonable to assume though that the residents near the eastern boundary of RFETS may come into contact with surface waters released from RFETS in a recreational capacity. It is therefore assumed that residents might wade in surface waters periodically and incidentally ingest surface water at these times. Exposure parameters for this recreational exposure were taken from the open space exposure scenario, which is defined in Appendix N, "Programmatic Preliminary Remediation Goals Tables," of the Implementation Guidance Document within the Rocky Flats Cleanup Agreement (RFCA).

Radiation Dose Assessment

In order to develop the radiation dose to the MEI member of the public, the location of the MEI must be determined. From the Radionuclide Air Emissions Annual Report, Calendar Year 2000, the residents receiving the highest radiation dose through the air inhalation pathway were located at the Sawmill, McCaslin Avenue, Northeast Resident and 96th & Indiana. These residents correspond to air monitors S-132, S-134, S-135, S-136 and S-207. For the resident at McCaslin, the highest air concentration from air monitors S-134 and S-135 were used to assess radiation dose. For the Northeast Resident, the highest air concentration from air monitors S-135 and S-136 were used to assess radiation dose. Since surface water is preferentially released to the east of RFETS and the surface soils east of RFETS contain elevated concentrations of radioactive material, the four locations east of RFETS (Northeast Resident, East of Great Western Reservoir, Mower Lake and 96th & Indiana) were investigated along with the locations at the Sawmill northwest of RFETS and at McCaslin Avenue northeast of RFETS to determine the MEI individual. After assessing the radiation dose to an individual at all six locations, the MEI individual for CY 2000 was located at Mower Lake.

To calculate radiation dose due to 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 due to 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.

From the aforementioned analyses, the radiation dose received by the MEI individual is 0.38 mrem. 11% of this 0.38 mrem is due to air and surface water emissions in CY 2000. 89% of this 0.38 mrem is due air emissions in years prior to CY 2000, which are deposited on offsite soils. The radiation dose of 0.38 mrem is well within the radiation dose limit of 100 mrem in DOE Order 5400.5.

The following table gives the breakdown of radiation dose by radionuclide and by exposure pathway for the MEI:

Table 7-1. Radiation Dose by Radionuclide and Exposure Pathway

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	5.59E-04	5.84E-02	5.54E-03	1.26E-03	6.57E-02
Pu-239/240	1.68E-03	2.70E-01	1.29E-04	8.31E-04	2.73E-01
U-234	1.85E-02	3.38E-05	3.62E-07	1.74E-03	2.03E-02
U-235	1.12E-03	2.06E-06	2.21E-05	7.05E-05	1.21E-03
U-238	1.66E-02	3.04E-05	1.58E-07	1.49E-03	1.81E-02
H-3	0.00E+00	0.00E+00	0.00E+00	2.53E-05	2.53E-05
TOTAL	3.8E-02	3.3E-01	5.7E-03	5.4E-03	3.8E-01

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 CY 2000 collective population dose to the public from RFETS, 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 Radionuclide Air Emissions Annual Report, Calendar Year 2000 using the computer model CAP88-PC. The population surrounding RFETS was based on 2000 data adjusted for regional growth. The collective dose was calculated to be 0.28 person-rem for CY 2000.