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Rocky Flats Environmental Technology Site

Quarterly Environmental Monitoring Report

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July - September 1996

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

July - September Highlights

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

Airborne Effluent

Isotopic analytical data for third quarter 1996 are presented in this report. Several laboratory analyses performed in July and September failed quality control. Analyses are being rerun and results will be presented when available. A problem in the reporting of tritium data was encountered this period. Missing data is reported as analysis failures, and will be reported when available. All reported data are within typical and expected ranges.

Monthly isotopic analyses from Building 776, plenum 250 were re-started in August 1996 as a result of changes in building activities. This location is included in the monthly totals for August 1996 and September 1996.

Velocity profiling at selected locations was completed in September, and the revised effluent flow rates will be incorporated into the calculations for October 1996 data.

Ambient Air

The composite data for third quarter 1996 are included in this report, however one sample was incomplete at the time of reporting. Tables from the second quarterly report are repeated to include incomplete data. Second quarter data are complete. The ambient data tables have been changed to reflect seven digits to the right of the decimal point to provide better statiscal representation. All reported data are within typical and expected ranges.

Meteorology and Climatology

Meteorological data are routinely measured at the Rocky Flats Environmental Technology Site (Site) from instrumentation on a 61-meter (200 feet) tower located in the west buffer zone at an elevation of 1,870 meters (6,140 feet) above sea level. The frequency of wind direction, speed, and the Climatic Summary for July through September 1996, are shown. The compass points and windroses displaying the frequencies of wind direction and speed illustrate the large diurnal wind changes. A column recording the average daily relative humidity, in percent, has been added to the climactic summaries starting in July 1996.

Several time periods of missing meteorological data in this report are summarized as follows:

July 1996
July 10 from 0930 to 1015
July 14 from 0630 to 1715

August 1996
August 5 from 0630 to 0900
August 18 from 1415 to 1500
August 30 from 0700 to 1230

September 1996
September 27 from 2345 to 2400
September 28 from 0000 to 2400
September 29 from 0000 to 2400
September 30 from 0000 to 0845

The cause of these failures is unknown. The Site maintains a backup meteorological system for emergency preparedness purposes that is used to fill the data tables when there are no data from the 61-meter tower.

Surface Water

Surface water analytical data for third quarter 1996 are included in this report. All reported data are within typical and expected ranges. Transuranic isotopic and tritium data for Pond C-1 are included in this report. This location will not be sampled for radionuclides after October 1996, however flow measurement data will continue to be reported.

During September 1996, the construction project upgrading the outlet works at Pond A-4 was completed. Temporary permission to operate the pond for water storage had been granted on September 5, 1996 by the State Engineer's Office. During the final emptying of the new outlet works piping, approximately 500 gallons of water was released. As this was an insufficient volume to reach any other water source, the Environmental Protection Agency (EPA) waived the quarterly Whole Effluent Toxicity (WET) testing requirement for this discharge only. The WET testing is normally required quarterly for all discharging terminal ponds.

No notices of violation (NOV's) were issued by the permitting agency for the Site National Pollutant Elimination Discharge System (NPDES) permit during the reporting period. During a September 1996 discharge of Pond B-5, the WET test results showed toxicity for one organism, pimephales promelas, or fathead minnows. The failure is believed to be the result of un-ionized ammonia production caused by a higher than normal pH. This parameter is required to be reported only, as there is no effluent limitation for WET testing in the Site's permit.

Groundwater

All available third quarter 1996 boundary well data are included in this report. Data from second quarter 1996 are also included as much of the data was incomplete in the previous report.

The differences in the number of reported metals analyses as presented in this report represents an abbreviated analyte suite that was approved by the Colorado Department of Public Health and Environment (CDPHE) and the EPA in April 1996. This suite of metals was used for a portion of the year until it was found to be more cost effective to revert back to the full suite.

Negotiations were recently completed with CDPHE and EPA to finalize the fiscal year 1997 groundwater monitoring program for the Site. Changes to the program will involve the monitoring network, sampling frequency and sample suites. These changes are scheduled to be implemented in the fourth quarter 1996.

Section 1: Air Data

Table 1-1 Plutonium and Americium Airborne Effluent Data

Month	Plutonium-239 Release (µCi)	Plutonium-239 C Maximum (pCi/m³)	Americium-241 Release (µCi)	Americium-241 C Maximum (pCi/m³)
		CY 1995		
Jan – Dec	0.3395 ± 0.0186	0.0064 ± 0.006	0.1314 ± 0.0112	0.0004 ± 0.001
		CY 1996		
January	0.0058 ± 0.0015[a]	0.0001 ± 0.0000[a]	0.0004 ± 0.0007[a]	0.0000 ± 0.0000[a]
February	0.0210 ± 0.0043	0.0001 ± 0.0000	0.0116 ± 0.0021	0.0000 ± 0.0000
March (2/12 - 3/11)[b]	0.0038 ± 0.0011	0.0000 ± 0.0000	0.0026 ± 0.0021[c]	0.0000 ± 0.0000[c]
March (3/11 - 3/28)[b]	0.0027 ± 0.0011	0.0000 ± 0.0000	0.0009 ± 0.0013	0.0000 ± 0.0000
April	0.6043 ± 0.0861	0.0036 ± 0.0004	0.1205 ± 0.0217	0.0007 ± 0.0001
May	0.0203 ± 0.0035	0.0001 ± 0.0000	0.0052 ± 0.0017	0.0000 ± 0.0000
June	0.0073 ± 0.0015	0.0000 ± 0.0000	0.0019 ± 0.0015	0.0000 ± 0.0000
July	0.0051 ± 0.0011	0.0001 ± 0.000	0.0017 ± 0.0004[d]	0.0000 ± 0.0000[d]
August	0.0124 ± 0.0079	0.0006 ± 0.0002	0.0129 ± 0.0112	0.0003 ± 0.0002
September	0.0206 ± 0.0126	0.0001 ± 0.0001	-0.0032 ± 0.0087[e]	0.0000 ± 0.0000[e]
Year to Date	**0.7032 ± 0.0876**	**0.0036 ± 0.0004**	**0.1545 ± 0.0262**	**0.0007 ± 0.0001**

[a] Results from six locations are missing. No sample remains for repeat analysis. Results are final.
[b] Effluent sampling for Pu, Am, and U was changed from a mid month composite schedule to an end of month composite schedule.
[c] Results from five locations are missing. No sample remains for repeat analysis. Results are final.
[d] Results from seven locations are missing. Results will be reported when available.
[e] Results from eight locations are missing. Results will be reported when available.

Table 1-2 Uranium Airborne Effluent Data

Month	Uranium-233, -234 Release (µCi)	Uranium-233, -234 C Maximum (pCi/m³)	Uranium-238 Release (µCi)	Uranium-238 C Maximum (pCi/m³)
		CY 1995		
Jan – Dec	1.2703 ± 0.0428	0.0005 ± 0.0001	0.5026 ± 0.0446	0.0007 ± 0.0001
		CY 1996		
January	0.0013 ± 0.0050[a]	0.0000 ± 0.0000[a]	0.0048 ± 0.0052[a]	0.0000 ± 0.000[a]
February	0.0385 ± 0.0054	0.0001 ± 0.0000	0.0474 ± 0.0059	0.0001 ± 0.0000
March (2/12 - 3/11)[b]	-0.0160 ± 0.0032	0.0000 ± 0.0000	-0.0148 ± 0.0047	0.0001 ± 0.0000
March (3/11 - 3/28)[b]	0.0103 ± 0.0047	0.0001 ± 0.0000	0.0112 ± 0.0047	0.0001 ± 0.0000
April	0.0316 ± 0.0067	0.0004 ± 0.0001	0.0354 ± 0.0072	0.0004 ± 0.0001
May	0.0349 ± 0.0061	0.0001 ± 0.0000	0.0390 ± 0.0066	0.0001 ± 0.0000
June	0.0427 ± 0.0061	0.0001 ± 0.0000	0.0435 ± 0.0065	0.0001 ± 0.0000
July	0.0423 ± 0.0070	0.0001 ± 0.0000	0.0430 ± 0.0072	0.0001 ± 0.0000
August	-0.1291 ± 0.0583	0.0000 ± 0.0000	-0.1778 ± 0.0533	0.0000 ± 0.0001
September	0.0118 ± 0.0627	0.0001 ± 0.0003	0.0080 ± 0.0651	0.0002 ± 0.0003
Year to Date	**0.0682 ± 0.0870**	**0.0004 ± 0.0001**	**0.0398 ± 0.0857**	**0.0004 ± 0.0001**

[a] Results from six locations are missing. No sample remains for repeat analysis. Results are final.
[b] Effluent sampling for Pu, Am, and U was changed from a mid month composite schedule to an end of month composite schedule.

Table 1-3 Tritium and Beryllium Airborne Effluent Data

Month	Tritium Release (µCi)	Tritium C Maximum (pCi/m³)	Beryllium Release (g)	Beryllium C Maximum (µg/m³)
		CY 1995		
Jan – Dec	6.269	227 ± 27	2.4761[a]	0.0004[a]
		CY 1996		
January	1.352[b]	59 ± 9[b]	0.0152 ± 0.0013	0.0002 ± 0.0000
February	0.285[b]	74 ± 5[b]	0.0887 ± 0.0079	0.0003 ± 0.0000
March	0.767	218 ± 19	c	c
April	0.909	47 ± 13	c	c
May	0.489	51 ± 5	c	c
June	0.086[d]	44 ± 7[d]	c	c
July	0.399[e]	65 ± 14[e]	c	c
August	f	f	c	c
September	0.086[g]	67 ± 5[g]	c	c
Year to Date	**4.373**	**218 ± 19**	**N/A**	**N/A**

[a] Error terms unavailable.
[b] One sample is missing. No sample remains for repeat analysis. Results are final.
[c] No beryllium analyses will be performed in the future unless activities at the Site indicate potential beryllium release. However, samples will be maintained for 2 years in the event analyses are deemed necessary at a later date.
[d] Six samples are missing because of incomplete lab analysis. Data will be reported when it becomes available.
[e] Forty-eight samples are missing because of incomplete lab analysis. Data will be reported when it becomes available.
[f] No data is reported because of incomplete lab analysis. Data will be reported when it becomes available.
[g] Thirty-six samples are missing because of incomplete lab analysis. Data will be reported when it becomes available.

Note: No blank corrections are made to any beryllium data.

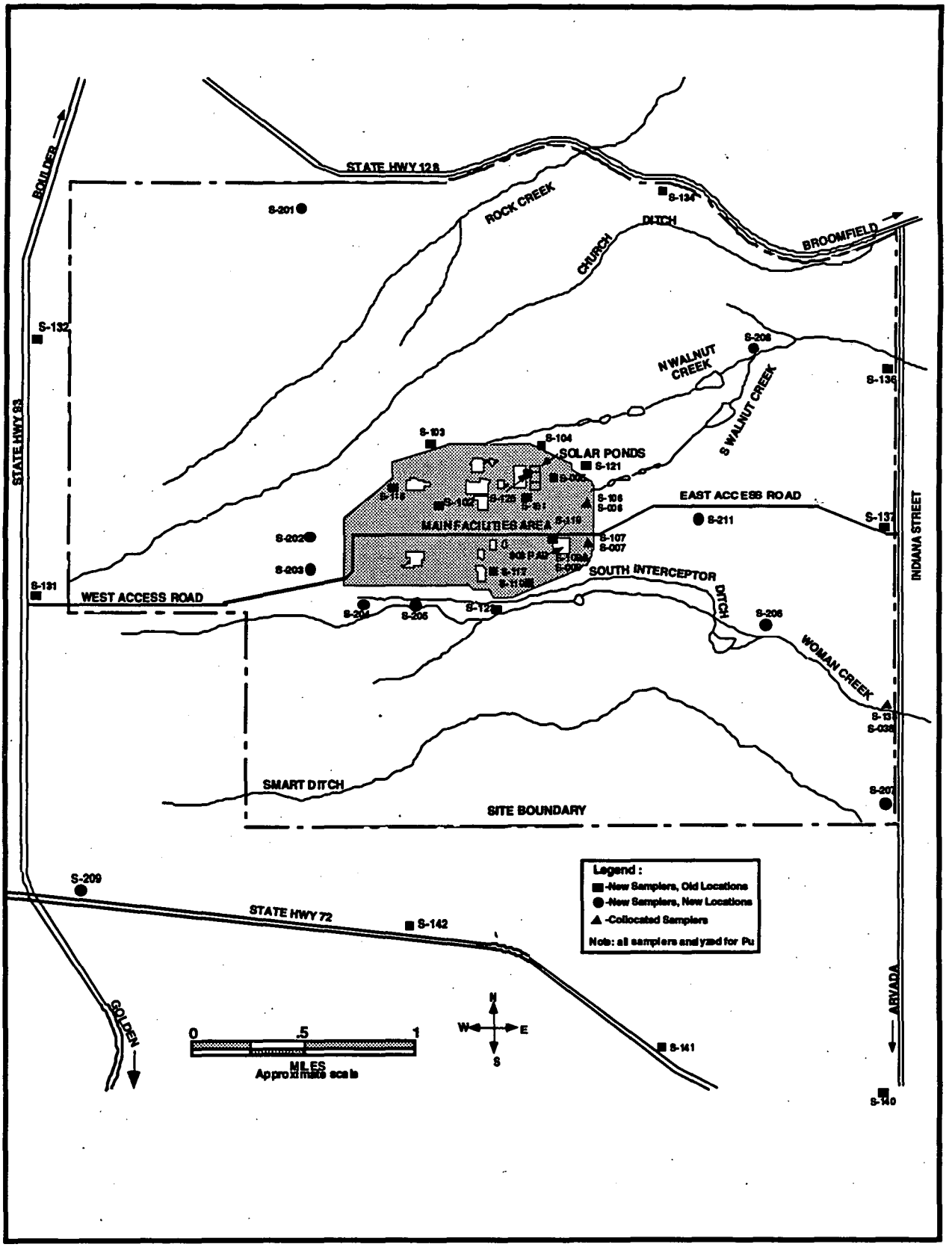

Figure 1-1 Location of Onsite and Perimeter Air Samplers

Table 1-4 Plutonium Concentrations in Ambient Air for Onsite Samplers[a]

Location	On Date	Off Date	Flow (m^3)	Fine Conc (pCi/m^3)	Fine Error (pCi/m^3)	Coarse Conc (pCi/m^3)	Coarse Error (pCi/m^3)	Total Conc (pCi/m^3)	Total Error (pCi/m^3)
S-107	07/01/96	10/07/96	119712	0.0000283	0.0000033	0.0000361	0.0000043	0.0000644	0.0000054
S-007	07/01/96	08/05/96	41840	N/A	N/A	N/A	N/A	0.0000801	0.0000092
	08/05/96	09/03/96	34674	N/A	N/A	N/A	N/A	0.0000424	0.0000055
	09/03/96	10/01/96	34499	N/A	N/A	N/A	N/A	b	b

[a] These data have not been corrected for temperature.
[b] Data is unavailable because of failed laboratory sample preparation. No sample remains for rerun. No data will be reported.
N/A = Not Applicable

Table 1-5 Plutonium Concentrations in Ambient Air for Perimeter Samplers[a]

Location	On Date	Off Date	Flow (m^3)	Fine Conc (pCi/m^3)	Fine Error (pCi/m^3)	Coarse Conc (pCi/m^3)	Coarse Error (pCi/m^3)	Total Conc (pCi/m^3)	Total Error (pCi/m^3)
S-138	07/02/96	10/01/96	119276	0.0000014	0.0000004	0.0000006	0.0000003	0.00000020	0.0000005
S-207	07/02/96	10/0196	119134	0.0000014	0.0000005	0.0000004	0.0000003	0.00000018	0.0000006
S-038	07/02/96	08/06/96	36513	N/A	N/A	N/A	N/A	0.0000025	0.0000010
	08/06/96	09/04/96	30250	N/A	N/A	N/A	N/A	0.0000029	0.0000012
	09/04/96	10/01/96	30245	N/A	N/A	N/A	N/A	0.0000003	0.0000006

[a] These data have not been corrected for temperature.

N/A = Not Applicable

Section 1: Ambient Air Data - Errata

Table 1-4 Plutonium Concentrations in Ambient Air for Onsite Samplers[a]

Location	On Date	Off Date	Flow (m³)	Fine Conc (pCi/m³)	Fine Error (pCi/m³)	Coarse Conc (pCi/m³)	Coarse Error (pCi/m³)	Total Conc (pCi/m³)	Total Error (pCi/m³)
S-107	01/01/96	04/01/96	117552	0.0000371	0.0000039	0.0000640	0.0000073	0.0001011	0.0000000
	04/01/96	07/01/96	117891	0.0000372	0.0000044	0.0000439	0.0000050	0.0000811	0.0000066
S-007	02/19/96	03/04/96	16991	N/A	N/A	N/A	N/A	0.0000713	0.0000096
	03/04/96	04/01/96	33280	N/A	N/A	N/A	N/A	0.0000961	0.0000104
	04/01/96	04/29/96	33091	N/A	N/A	N/A	N/A	0.0000694	0.0000095
	04/29/96	06/03/96	42560	N/A	N/A	N/A	N/A	0.0001038	0.0000110
	06/03/96	07/01/96	32873	N/A	N/A	N/A	N/A	0.0000665	0.0000077

[a] These data have not been corrected for temperature.

N/A = Not Applicable

Table 1-5 Plutonium Concentrations in Ambient Air for Perimeter Samplers[a]

Location	On Date	Off Date	Flow (m³)	Fine Conc (pCi/m³)	Fine Error (pCi/m³)	Coarse Conc (pCi/m³)	Coarse Error (pCi/m³)	Total Conc (pCi/m³)	Total Error (pCi/m³)
S-138	01/03/96	04/02/96	117989	0.0000003	0.0000002	0.0000004	0.0000002	0.0000007	0.0000000
	04/02/96	07/02/96	118883	0.0000003	0.0000002	0.0000007	0.0000003	0.0000009	0.0000003
S-207	01/03/96	04/02/96	117732	0.0000002	0.0000002	0.0000002	0.0000002	0.0000004	0.0000000
	04/02/96	07/02/96	119091	0.0000003	0.0000002	0.0000001	0.0000002	0.0000004	0.0000002
S-038	02/21/96	03/05/96	14732	N/A	N/A	N/A	N/A	0.0000002	0.0000010
	03/05/96	04/02/965	30158	N/A	N/A	N/A	N/A	0.0000004	0.0000005
	04/02/96	04/29/96	29049	N/A	N/A	N/A	N/A	0.0000009	0.0000008
	04/29/96	06/03/96	38103	N/A	N/A	N/A	N/A	0.0000003	0.0000004
	06/03/96	07/02/96	30637	N/A	N/A	N/A	N/A	0.0000080	0.0000020

[a] These data have not been corrected for temperature.
N/A = Not Applicable

Section 2: Meteorology and Climatology

Table 2-1 Wind Direction Frequency (Percent) by Four Wind Speed Classes at RFETS

July 1996 15-Minute Averages						
	Calm	1 – 2 m/s	2.5 – 4 m/s	4 – 8 m/s	>8 m/s	Total (m/s)
N	0	1.64	3.96	6.28	0.51	12.39
NNE	0	1.54	3.45	3.17	0.2	8.36
NE	0	1.3	3.14	2.01	0.1	6.55
ENE	0	1.13	2.63	0.82	0	4.58
E	0	1.57	2.05	0.61	0	4.23
ESE	0	1.74	1.77	0.68	0	4.19
SE	0	2.39	2.08	0.48	0	4.95
SSE	0	1.64	1.54	0.41	0	3.59
S	0	1.26	2.22	0.78	0	4.26
SSW	0	1.54	1.3	1.36	0.14	4.34
SW	0	1.67	1.81	1.57	0.07	5.12
WSW	0	1.16	3.07	4.16	0.38	8.77
W	0	1.67	3.17	1.5	0.31	6.65
WNW	0	1.94	2.25	2.97	0.31	7.47
NW	0	1.36	2.32	1.98	0.07	5.73
NNW	0	1.6	2.76	4.33	0.14	8.83
Total	0	25.15	39.52	33.11	2.23	100

Table 2-2 Climatic Summary for July 1996

	Temperature (°F)			Dew-Point (°F)	Rel. Hum. (%)	Wind Speed (mph)		Press (mb)	Solar (kW-h/m²)	Water-Equiv Precip (in.)	
Date	High	Low	Mean	Mean	Mean	Mean	Peak Gust (1 sec)	Mean	Total	Total	Peak (15 min)
7/1	89.29	57.11	75.04	39.11	28.84	7.83	20.72	817.92	7.53	0.00	0.00
7/2	93.87	54.84	78.32	37.24	25.99	7.06	22.29	817.17	8.69	0.00	0.00
7/3	92.86	63.00	79.12	39.26	24.81	9.47	26.30	815.55	6.65	0.00	0.00
7/4	93.56	56.64	76.42	43.19	32.09	8.84	47.13	814.48	7.24	0.00	0.00
7/5	92.21	56.44	76.42	47.79	41.30	10.18	42.60	815.11	7.17	0.08	0.03
7/6	85.50	57.65	73.09	50.90	47.40	8.37	26.70	816.96	7.57	0.00	0.00
7/7	87.58	50.85	70.75	51.37	52.94	7.72	19.33	815.27	8.77	0.00	0.00
7/8	72.10	53.04	62.68	51.16	67.27	9.51	26.81	817.07	4.80	0.00	0.00
7/9	69.19	49.62	59.77	57.94	94.08	7.54	33.44	816.86	2.09	0.38	0.20
7/10	82.47	51.21	67.00	51.93	65.07	6.83	23.45	816.39	7.14	0.00	0.00
7/11	87.12	58.62	75.65	47.42	40.39	8.91	29.46	816.85	8.62	0.00	0.00
7/12	74.68	52.48	65.18	58.06	78.95	8.38	24.08	818.31	5.61	0.00	0.00
7/13	77.67	51.82	65.01	57.15	77.30	9.10	44.60	815.38	7.22	0.00	0.00
7/14	76.66	48.43	59.44	50.04	76.18	6.78	22.49	817.41	0.68	0.01	0.01
7/15	82.60	52.34	70.60	48.34	47.55	9.43	47.02	814.64	5.60	0.03	0.02
7/16	87.17	61.02	75.39	46.79	37.98	11.54	31.45	812.66	5.81	0.00	0.00
7/17	91.62	56.89	73.03	48.24	45.95	9.66	41.13	814.20	5.26	0.00	0.00
7/18	86.07	55.15	69.17	52.82	58.01	7.21	24.82	817.30	3.21	0.02	0.01
7/19	89.64	51.75	73.26	49.95	48.69	7.33	21.35	817.67	8.16	0.00	0.00
7/20	91.44	57.42	76.67	42.38	35.62	7.22	20.72	816.24	8.45	0.00	0.00
7/21	91.27	59.31	76.38	36.25	25.18	8.28	25.24	817.37	8.61	0.00	0.00
7/22	83.16	56.43	71.34	42.78	39.53	7.72	24.82	819.76	8.11	0.00	0.00
7/23	82.00	52.02	67.73	48.96	55.81	9.24	33.87	818.84	6.72	0.00	0.00
7/24	77.14	52.25	64.95	50.54	61.34	8.53	24.60	820.43	7.08	0.00	0.00
7/25	83.01	51.40	65.42	52.57	67.94	7.70	29.55	818.20	5.02	0.02	0.01
7/26	79.83	51.35	64.87	50.44	66.25	7.92	37.86	819.09	6.82	0.01	0.01
7/27	88.52	47.25	70.22	45.10	46.22	7.67	26.70	819.57	7.85	0.00	0.00
7/28	85.10	51.66	67.21	52.08	61.85	10.25	58.82	820.25	6.29	0.19	0.13
7/29	70.32	54.75	62.09	56.80	83.94	6.08	25.45	820.86	2.77	0.32	0.05
7/30	80.01	50.85	66.64	54.40	67.93	6.61	26.81	818.29	7.62	0.00	0.00
7/31	84.78	50.27	68.69	53.97	64.69	7.53	32.28	817.87	7.30	0.00	0.00

Temperature (°F)			Humidity		Wind Speed		Press	Solar	Precipitation	
Mean High	Mean Low	Mean	Dew Point	Rel. Hum.	Mean (mph)	Monthly Max	Monthly Avg	Monthly Total	Total	Monthly Max
84.1	54.0	69.9	48.9	53.8	8.3	58.8	817.2	200.5	1.1	0.2

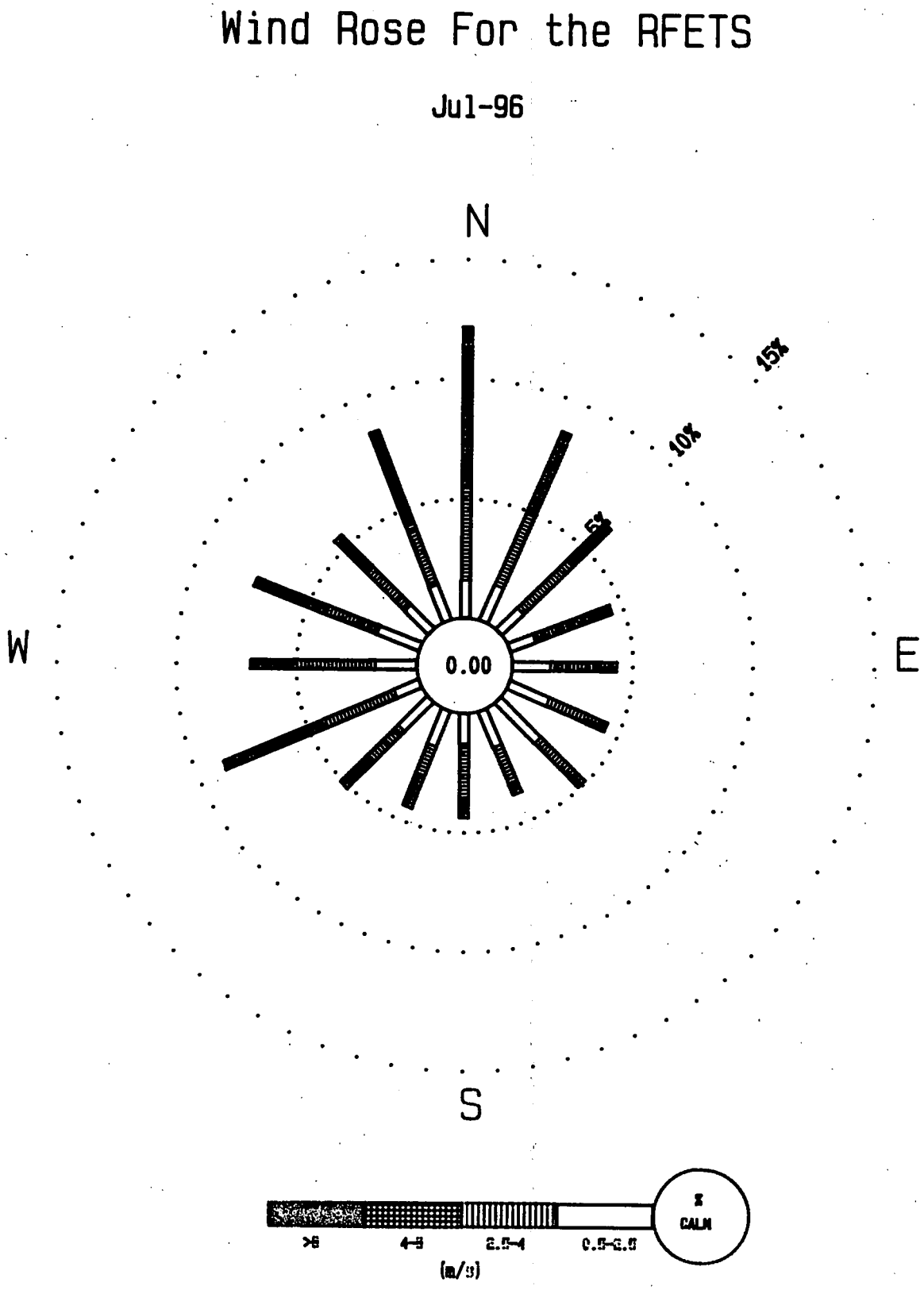

Figure 2-1 Windrose for the Rocky Flats Environmental Technology Site (July 1996)

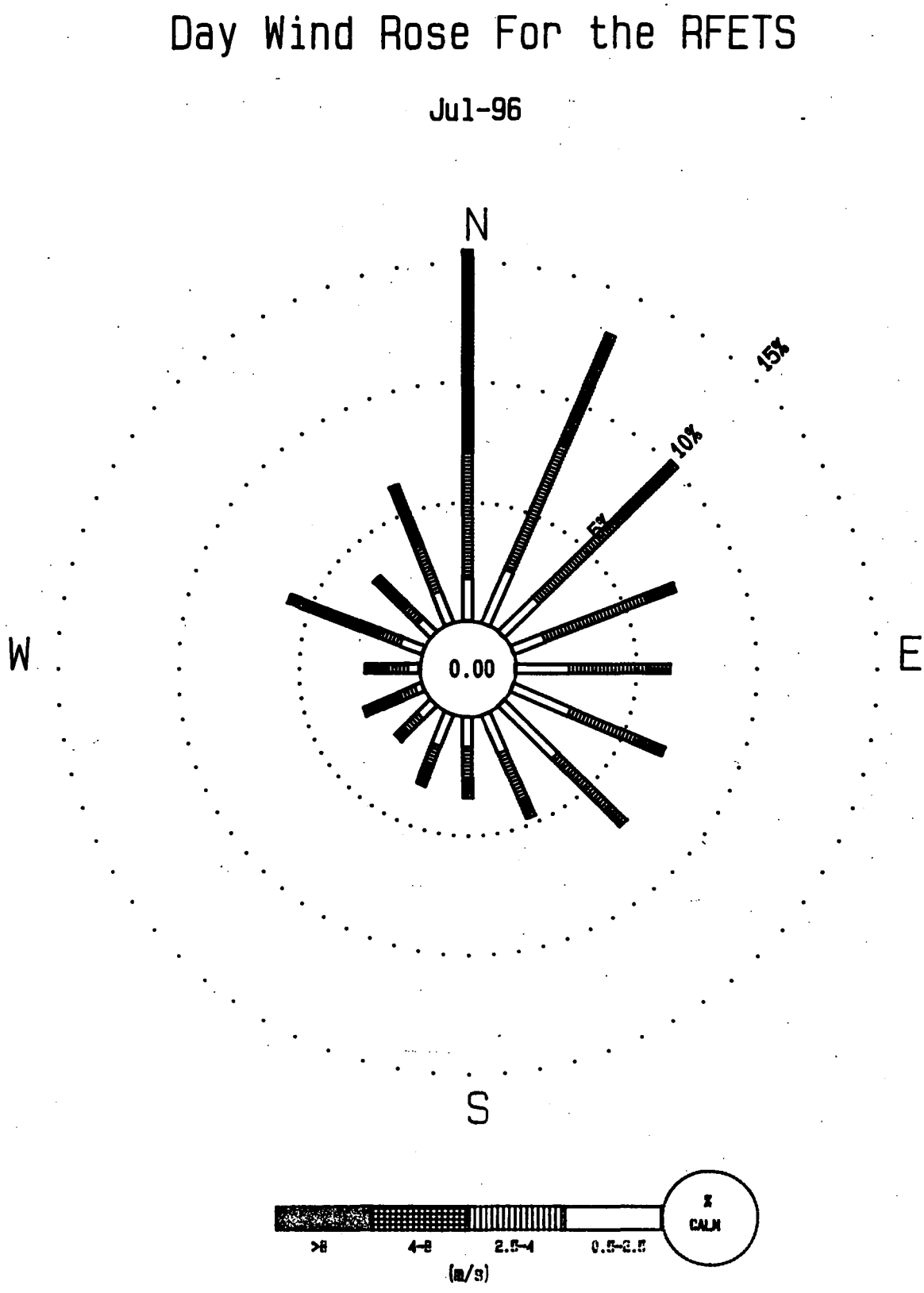

Figure 2-2 Day Windrose for the Rocky Flats Environmental Technology Site (July 1996)

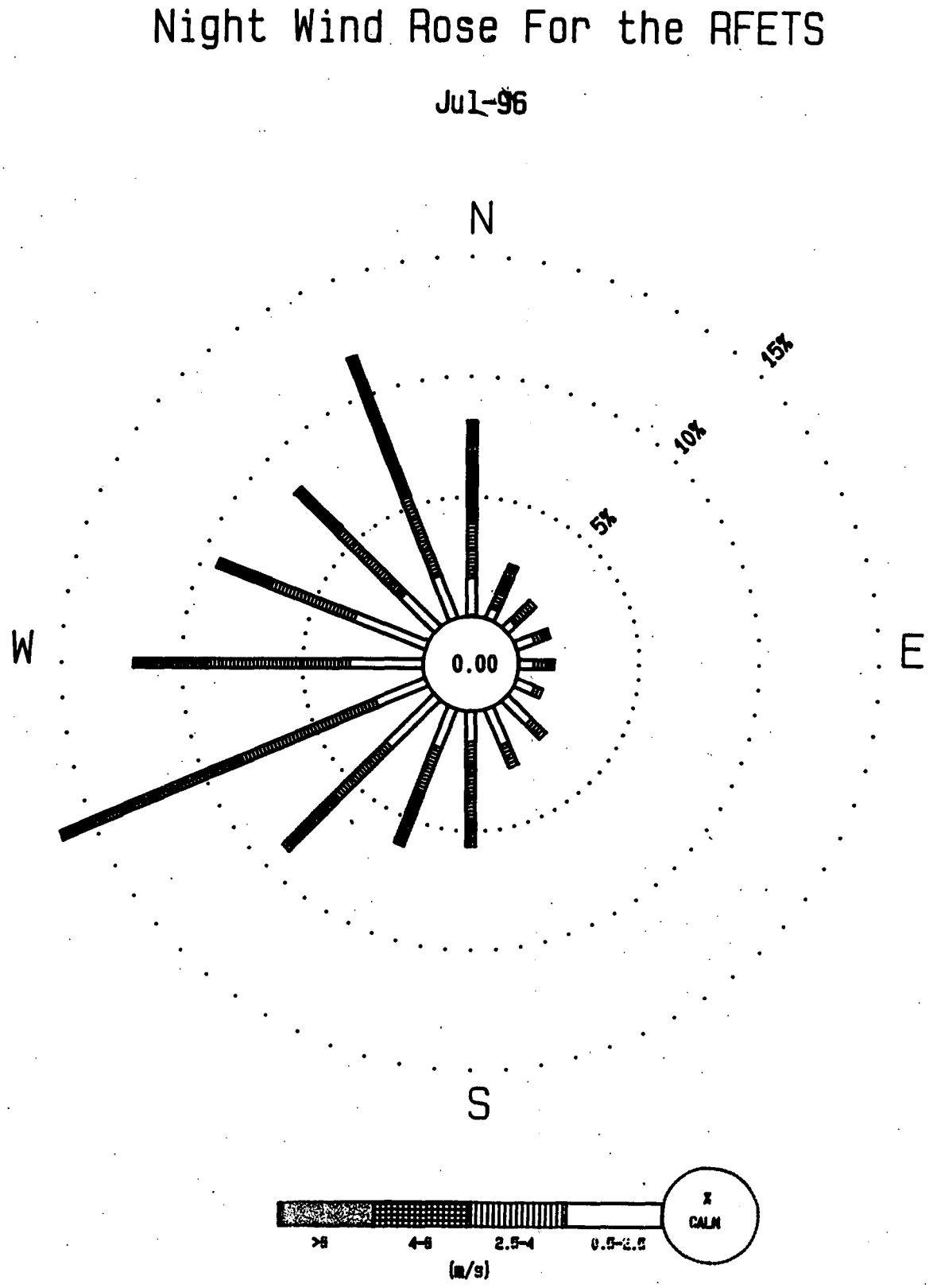

Figure 2-3 Night Windrose for the Rocky Flats Environmental Technology Site (July 1996)

Table 2-3 Wind Direction Frequency (Percent) by Four Wind Speed Classes at RFETS

August 1996 15-Minute Averages						
	Calm	1 – 2 m/s	2.5 – 4 m/s	4 – 8 m/s	>8 m/s	Total (m/s)
N	0	1.43	3.16	3.33	0.68	8.6
NNE	0.03	2	2.68	2	0.1	6.81
NE	0	1.83	2.62	1.7	0.03	6.18
ENE	0	1.7	2.07	1.02	0	4.79
E	0	1.87	3.19	0.71	0	5.77
ESE	0	2.31	2.28	0.58	0	5.17
SE	0	2.17	1.6	0.24	0.03	4.04
SSE	0	2.21	1.56	1.12	0	4.89
S	0	1.6	1.83	2.07	0.24	5.74
SSW	0	2.07	2.24	2.41	0.24	6.96
SW	0	1.39	2	3.4	0.07	6.86
WSW	0	1.66	3.09	2.85	0.1	7.7
W	0	2.24	3.33	0.51	0.17	6.25
WNW	0	2.21	2.75	1.09	0.37	6.42
NW	0.03	1.6	2.65	1.77	0.17	6.22
NNW	0	1.7	2.75	2.96	0.17	7.58
Total	**0.06**	**29.99**	**39.8**	**27.76**	**2.37**	**100**

Table 2-4 Climatic Summary for August 1996

	Temperature (°F)			Dew-Point (°F)	Rel. Hum. (%)	Wind Speed (mph)		Press (mb)	Solar (kW-h/m²)	Water-Equiv Precip (in.)	
Date	High	Low	Mean	Mean	Mean	Mean	Peak Gust (1 sec)	Mean	Total	Total	Peak (15 min)
8/1	86.58	51.24	71.95	47.93	49.04	7.49	33.44	816.86	8.29	0.00	0.00
8/2	92.59	58.03	74.93	46.11	38.72	7.22	37.65	814.31	6.16	0.02	0.01
8/3	85.55	53.31	69.30	48.11	49.81	8.79	52.19	811.71	4.00	0.00	0.00
8/4	85.41	52.39	68.39	45.52	48.13	8.17	35.77	810.01	5.22	0.12	0.11
8/5	88.52	52.88	71.60	32.95	27.48	9.16	23.88	812.03	7.35	0.00	0.00
8/6	91.65	53.20	73.49	33.61	28.81	11.23	37.97	813.69	6.50	0.04	0.03
8/7	74.75	43.79	61.36	41.16	51.02	6.85	30.17	821.45	5.74	0.00	0.00
8/8	80.56	46.44	65.81	44.22	48.09	6.97	27.01	822.23	6.72	0.00	0.00
8/9	83.91	50.29	67.25	42.22	43.88	9.04	37.86	818.94	6.74	0.00	0.00
8/10	87.31	49.35	68.32	40.11	44.44	7.73	48.29	818.46	7.15	0.00	0.00
8/11	89.33	50.27	71.71	34.22	28.37	6.93	23.34	819.18	8.23	0.00	0.00
8/12	95.58	52.38	77.83	21.68	16.71	6.92	25.56	818.55	7.68	0.00	0.00
8/13	93.09	59.52	77.26	33.27	22.00	9.06	30.08	820.11	6.19	0.00	0.00
8/14	81.75	54.50	68.07	51.33	57.48	8.31	34.92	820.56	4.84	0.02	0.01
8/15	84.00	51.66	68.21	50.24	55.38	7.40	26.50	818.72	5.44	0.04	0.02
8/16	80.65	53.26	67.60	46.18	50.97	9.47	31.88	820.14	7.84	0.31	0.22
8/17	87.80	47.34	71.47	40.30	35.53	7.81	25.02	815.98	7.61	0.00	0.00
8/18	81.43	55.42	67.44	48.95	53.45	7.99	42.18	813.46	4.33	0.16	0.07
8/19	71.82	49.41	62.29	49.89	64.90	7.76	38.51	819.22	3.94	0.01	0.01
8/20	85.78	48.67	67.18	47.01	53.25	6.08	31.56	817.68	6.32	0.00	0.00
8/21	86.16	54.12	69.34	48.19	49.08	7.24	37.45	817.13	4.30	0.07	0.05
8/22	75.42	53.91	63.26	51.21	65.51	8.70	27.98	821.22	4.62	0.01	0.01
8/23	79.43	50.23	62.91	50.85	68.01	8.17	35.77	821.82	5.36	0.00	0.00
8/24	82.04	48.54	66.18	46.68	52.49	6.36	25.33	819.39	7.45	0.00	0.00
8/25	82.92	51.75	68.73	44.28	45.70	9.20	28.72	817.61	7.44	0.04	0.01
8/26	80.92	52.38	67.02	47.62	54.36	8.53	32.28	817.39	6.57	0.05	0.01
8/27	74.88	48.81	61.46	52.80	74.60	5.73	15.13	816.46	4.16	0.02	0.02
8/28	82.36	48.56	64.77	51.42	64.50	7.47	28.40	817.93	4.33	0.01	0.01
8/29	77.34	51.04	63.96	49.68	62.09	8.64	39.65	818.80	5.78	0.00	0.00
8/30	72.86	46.26	58.65	50.21	76.80	5.86	14.82	817.41	3.32	0.00	0.00

Temperature (°F)			Humidity		Wind Speed		Press	Solar	Precipitation	
Mean High	Mean Low	Mean	Dew Point	Rel. Hum.	Mean (mph)	Monthly Max	Monthly Avg	Monthly Total	Total	Monthly Max
83.5	51.1	67.9	44.5	49.3	7.8	52.2	817.5	186.7	0.9	0.2

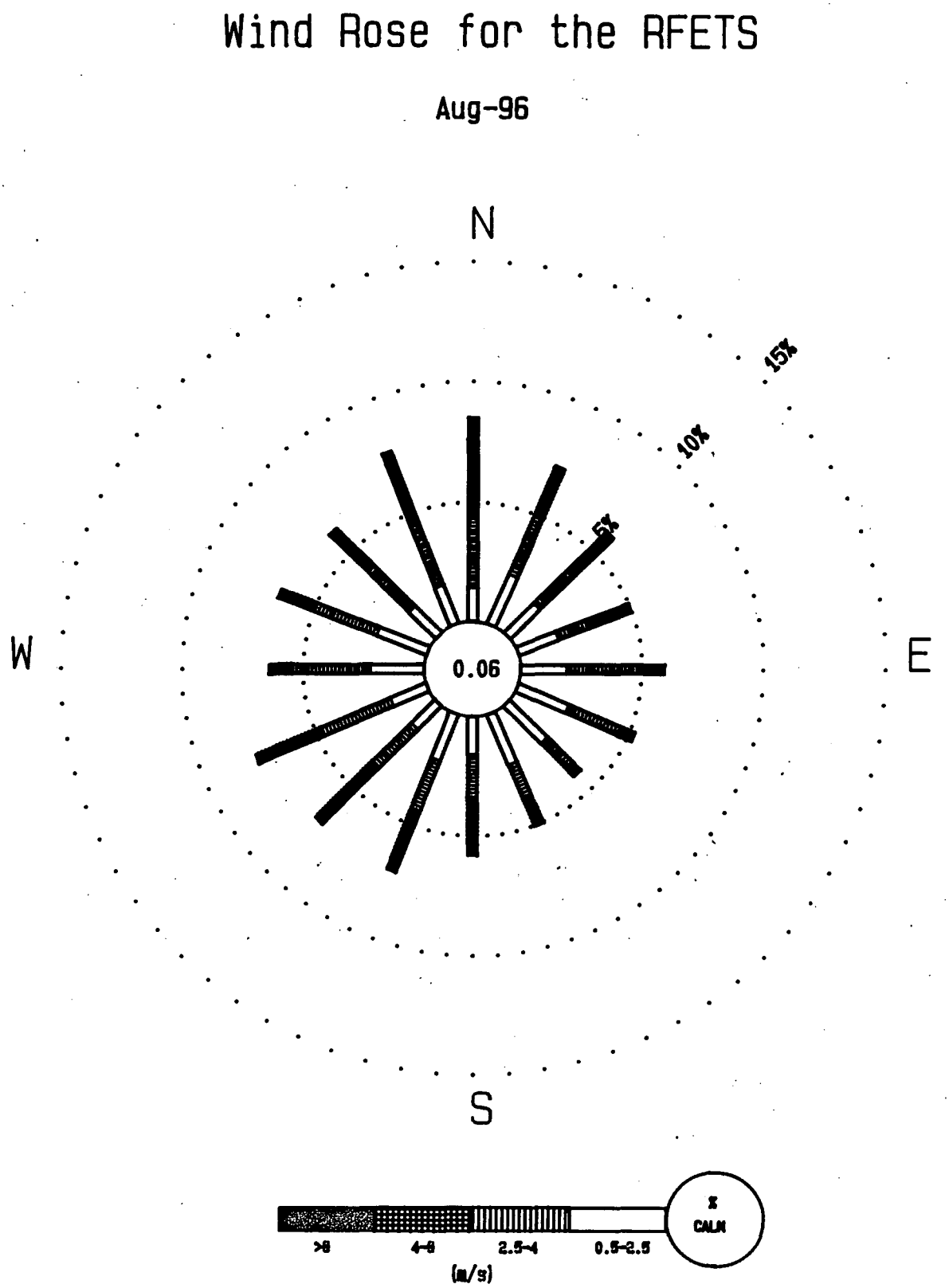

Figure 2-4 Windrose for the Rocky Flats Environmental Technology Site (August 1996)

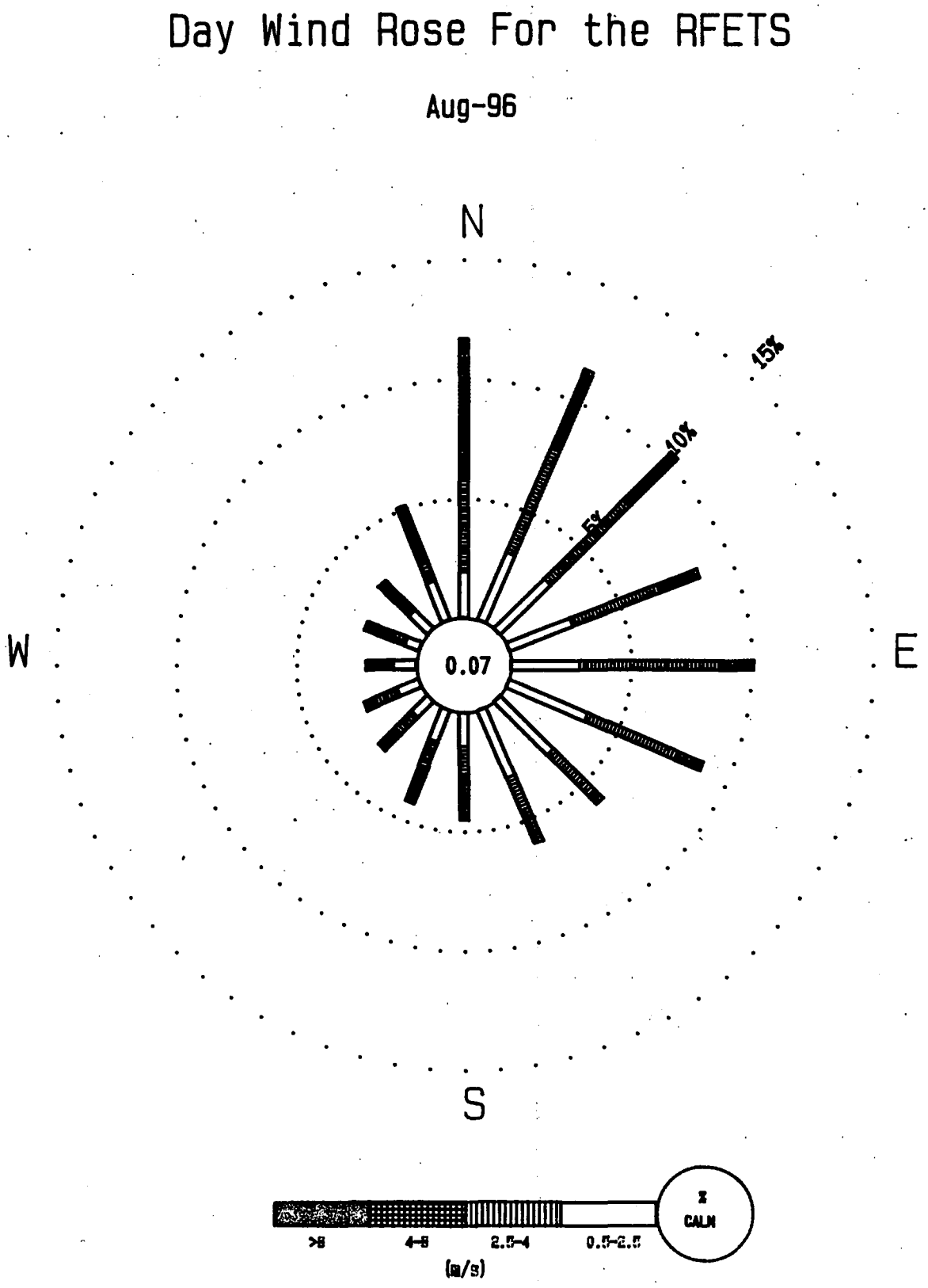

Figure 2-5 Day Windrose for the Rocky Flats Environmental Technology Site (August 1996)

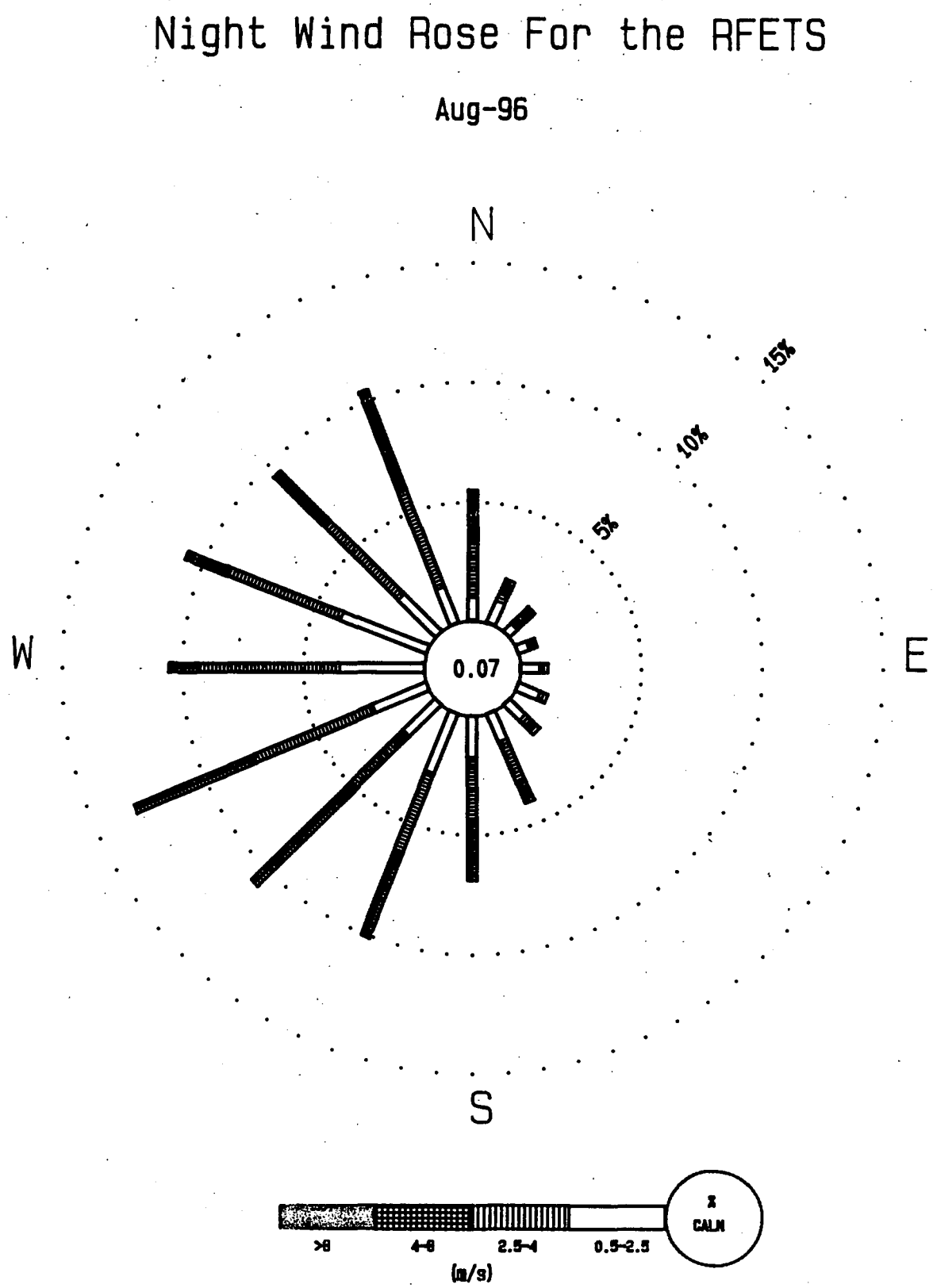

Figure 2-6 Night Windrose for the Rocky Flats Environmental Technology Site (August 1996)

Table 2-5 Wind Direction Frequency (Percent) by Four Wind Speed Classes at RFETS

September 1996 15-Minute Averages						
	Calm	1 – 2 m/s	2.5 – 4 m/s	4 – 8 m/s	>8 m/s	Total (m/s)
N	0.04	1.92	2.19	1.66	0.3	6.11
NNE	0	2.34	2.6	1.28	0.04	6.26
NE	0	1.92	2.41	0.98	0	5.31
ENE	0	1.7	1.51	0.49	0.04	3.74
E	0	2.26	2.19	0.45	0.08	4.98
ESE	0.04	0.83	2.56	0.64	0	4.07
SE	0	1.51	1.73	1.36	0	4.6
SSE	0.04	1.81	1.81	0.94	0.15	4.75
S	0	1.66	1.47	1.09	0.11	4.33
SSW	0	1.85	2.26	1.36	0.15	5.62
SW	0	1.58	2.71	1.51	0.04	5.84
WSW	0	1.73	2.98	2.98	0.45	8.14
W	0	2.45	2.71	4.22	0.75	10.13
WNW	0	3.2	1.92	4.37	2.26	11.75
NW	0.04	2.19	2.71	2.19	0.34	7.47
NNW	0.04	2.11	2.22	2.37	0.15	6.89
Total	0.2	31.06	35.98	27.89	4.86	100

Table 2-6 Climatic Summary for September 1996

	Temperature (°F)			Dew-Point (°F)	Rel. Hum. (%)	Wind Speed (mph)		Press (mb)	Solar (kW-h/m²)	Water-Equiv Precip (in.)	
Date	High	Low	Mean	Mean	Mean	Mean	Peak Gust (1 sec)	Mean	Total	Total	Peak (15 min)
9/1	87.85	56.68	73.82	28.17	19.89	8.99	36.18	810.29	5.08	0.00	0.00
9/2	88.11	53.51	71.90	33.44	25.84	8.96	33.98	811.86	5.69	0.00	0.00
9/3	88.47	52.02	72.04	29.17	23.23	7.02	23.03	813.74	6.64	0.00	0.00
9/4	93.34	49.91	70.96	34.95	28.14	7.53	61.44	813.01	4.55	0.00	0.00
9/5	88.02	52.57	71.03	41.29	36.41	9.09	37.97	809.85	5.73	0.06	0.03
9/6	61.83	46.71	53.42	52.06	95.49	4.91	14.39	815.53	0.95	0.44	0.04
9/7	74.86	42.42	60.36	40.23	55.37	7.31	21.97	815.78	6.90	0.00	0.00
9/8	82.69	53.46	67.50	33.23	29.65	9.11	26.39	815.69	5.13	0.00	0.00
9/9	84.63	53.26	70.60	34.18	27.44	7.91	31.02	816.40	6.02	0.00	0.00
9/10	85.95	53.92	69.28	35.32	31.41	7.04	16.71	818.17	5.70	0.00	0.00
9/11	73.99	50.56	60.07	48.80	67.98	9.79	36.92	819.45	5.45	0.34	0.06
9/12	64.87	46.09	55.88	52.38	88.89	6.12	15.45	816.21	2.85	0.07	0.04
9/13	68.18	42.42	55.84	51.17	84.99	5.49	16.28	810.29	3.62	0.04	0.02
9/14	66.02	40.87	55.41	48.80	79.37	7.03	29.12	807.06	3.75	0.15	0.04
9/15	68.16	43.68	55.96	48.57	78.89	5.68	19.67	808.03	4.77	0.04	0.01
9/16	69.24	39.47	55.92	47.80	76.27	5.47	26.50	807.34	6.31	0.00	0.00
9/17	59.52	36.05	50.60	43.90	79.81	7.51	25.65	811.36	2.03	0.38	0.04
9/18	59.25	31.17	45.67	39.77	81.92	7.97	32.39	813.28	4.30	1.10	0.18
9/19	58.33	31.06	48.01	28.15	48.98	15.89	47.24	812.34	4.92	0.00	0.00
9/20	62.28	42.20	52.57	28.87	41.28	12.46	42.18	812.74	5.77	0.00	0.00
9/21	75.18	46.36	61.35	32.25	34.78	11.54	40.30	811.43	5.16	0.00	0.00
9/22	81.28	38.98	60.02	39.18	52.31	7.77	30.40	810.84	4.81	0.00	0.00
9/23	62.28	37.23	48.76	41.51	77.73	6.75	25.56	817.44	2.74	0.04	0.02
9/24	74.34	39.74	55.62	44.10	70.76	8.45	46.93	814.39	4.19	0.01	0.01
9/25	69.94	24.90	46.00	39.39	81.40	11.49	49.12	810.42	3.28	0.12	0.05
9/26	43.58	22.80	32.59	30.22	92.09	5.51	29.46	810.78	2.99	0.38	0.18
9/27	54.30	15.67	39.33	22.82	56.56	11.54	40.39	814.13	6.18	0.35	0.05
9/28											
9/29											
9/30	78.04	51.82	67.00	32.64	28.77	6.58	18.39	812.65	4.50	0.00	0.00

Temperature (°F)			Humidity		Wind Speed		Press	Solar	Precipitation	
Mean High	Mean Low	Mean	Dew Point	Rel. Hum.	Mean (mph)	Monthly Max	Monthly Avg	Monthly Total	Total	Monthly Max
72.3	42.7	58.1	38.7	57.0	8.2	61.4	812.9	130.0	3.5	0.2

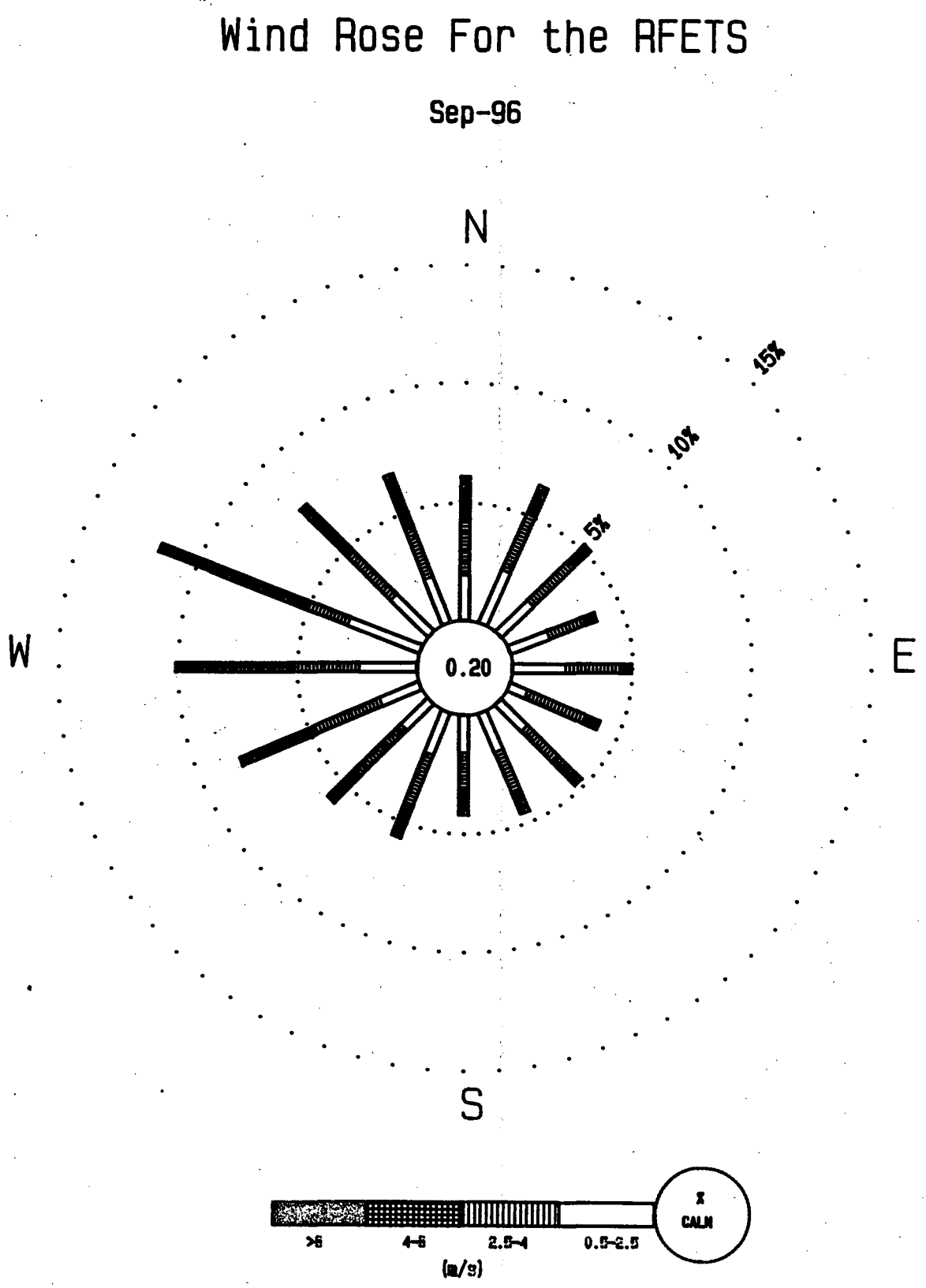

Figure 2-7 Windrose for the Rocky Flats Environmental Technology Site (September 1996)

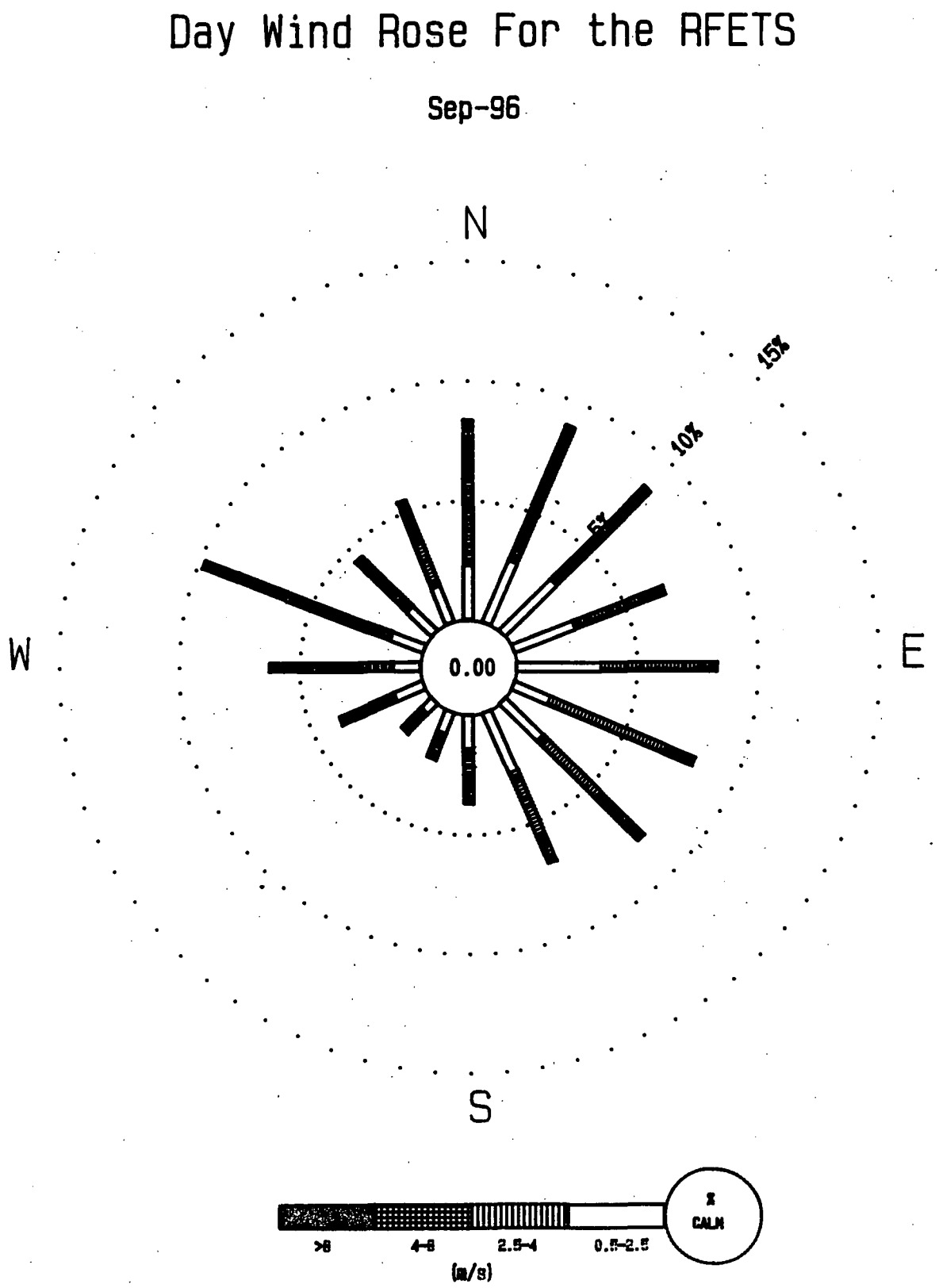

Figure 2-8 Day Windrose for the Rocky Flats Environmental Technology Site (September 1996)

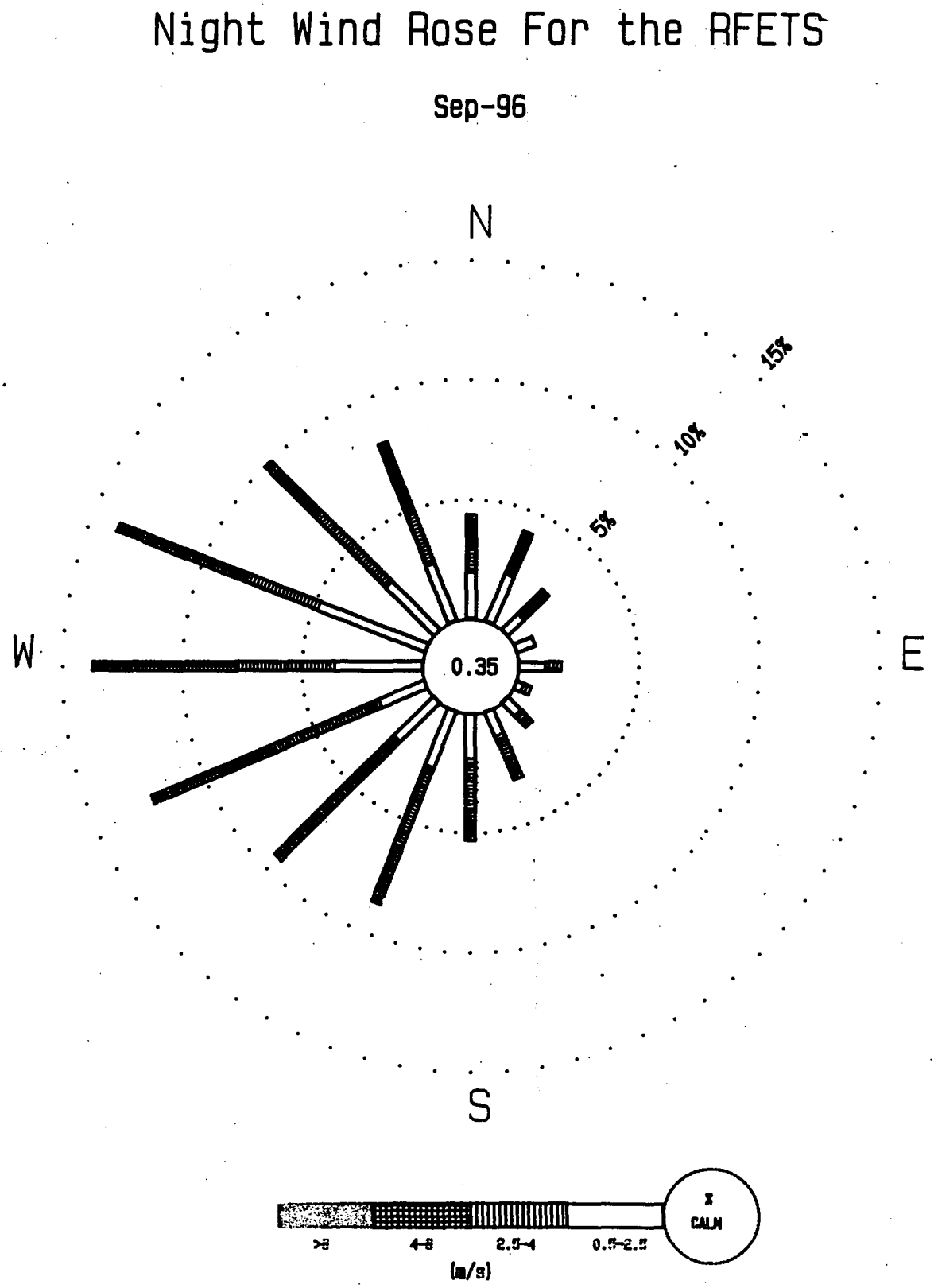

Figure 2-9 Night Windrose for the Rocky Flats Environmental Technology Site (September 1996)

Section 3: Surface Water Data

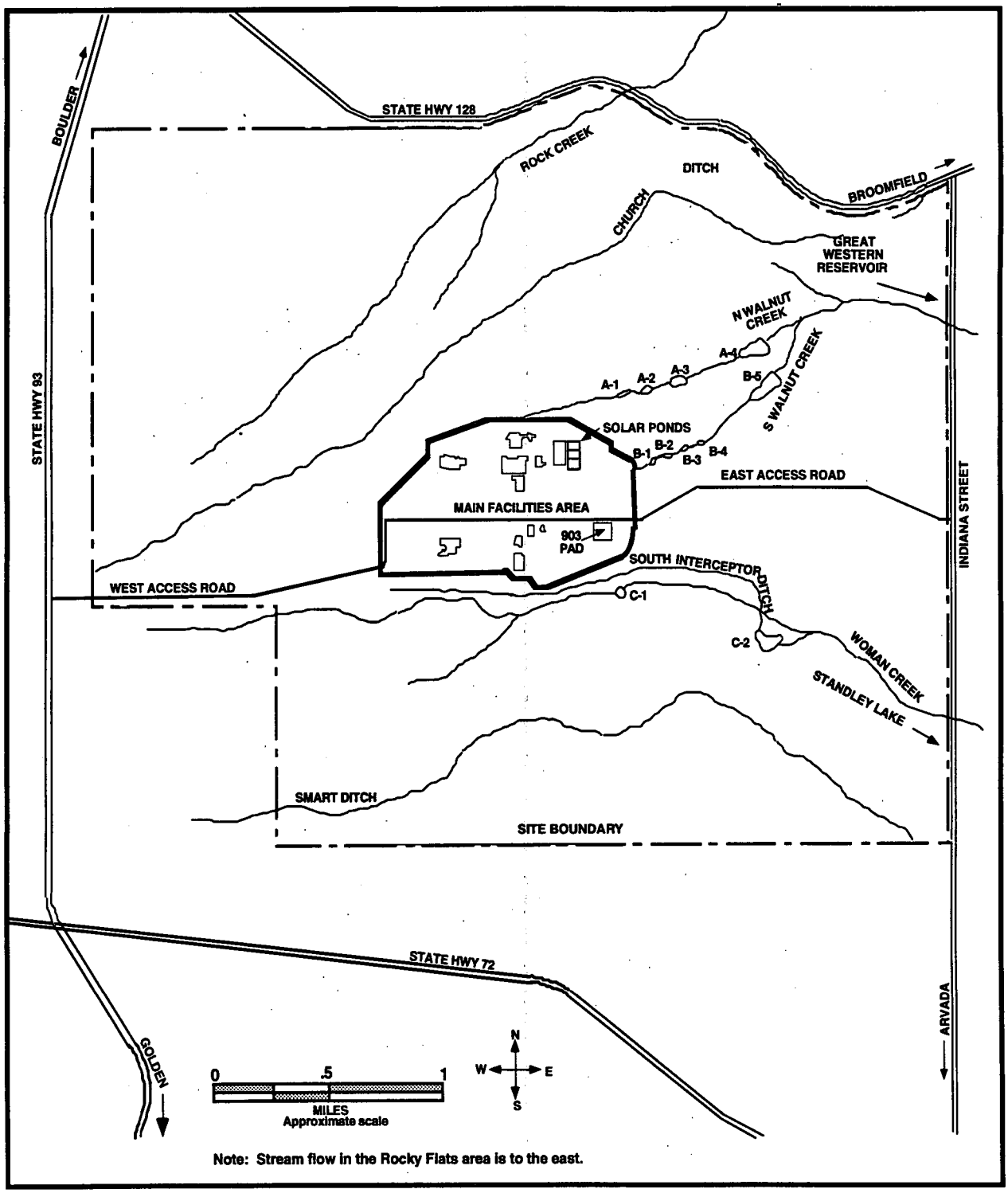

Figure 3-1 Holding Ponds and Liquid Effluent Water Courses

Table 3-1 Onsite Surface Water Sampling Results – Plutonium and Americium

Holding Pond Outfall (pCi/L)			
Concentration	**Date**	**Plutonium-239, -240**	**Americium-241**
		Pond A-4	
Volume Weighted Average	No Discharge		
		Pond B-5	
Volume Weighted Average	07/17/96 - 07/31/96	a a	a a
		Pond C-1	
	06/28/96 - 07/05/96	0.003 ± 0.004	-0.003 ± 0.008
	07/06/96 - 07/12/96	0.011 ± 0.005	0.012 ± 0.008
	07/13/96 - 07/19/96	0.004 ± 0.005	-0.001 ± 0.005
Average		**0.006 ± 0.004**	**0.003 ± 0.008**
	09/18/96 - 09/20/96	0.016 ± 0.013	0.000 ± 0.003
	09/21/96 - 09/27/96	-0.001 ± 0.004	0.001 ± 0.006
Average		**0.008 ± 0.012**	**0.001 ± 0.001**
		Pond C-2	
Volume Weighted Average	No Discharge		

[a] Weekly grab samples collected by CDPHE during discharge. Site did not collect or analyze discharge.

Table 3-2 Onsite Surface Water Sampling Results – Uranium

Holding Pond Outfall (pCi/L)			
Concentration	**Date**	**Uranium-233, -234**	**Uranium-238**
Pond A-4			
Volume Weighted Average	No Discharge		
Pond B-5			
	07/17/96 - 07/31/96	a	a
Volume Weighted Average		a	a
Pond C-1			
	06/28/96 - 07/05/96	0.89 ± 0.14	0.67 ± 0.11
	07/06/96 - 07/12/96	1.15 ± 0.15	0.84 ± 0.11
	07/13/96 - 07/19/96	1.10 ± 0.15	0.82 ± 0.12
Average		**1.05 ± 0.14**	**0.78 ± 0.09**
	09/18/96 - 09/20/96	0.85 ± 0.13	0.62 ± 0.10
	09/21/96 - 09/27/96	1.24 ± 0.21	0.79 ± 0.14
Average		**1.05 ± 0.28**	**0.70 ± 0.12**
Pond C-2			
Volume Weighted Average	No Discharge		

[a] Weekly grab samples collected by CDPHE during discharge. Site did not collect or analyze discharge.

Table 3-3 Onsite Surface Water Sampling Results – Tritium

Month	Number of Samples	Tritium (pCi/L) C Minimum	C Maximum	C Average
		Pond C-1		
July	3	-80 ± 170	-50 ± 171	-70 ± 20
August	No Flow			
September	2	-10 ± 160	-10 ± 160	-10 ± 10

Table 3-4 Pond B-3 (Outfall 001A)

Dates of Discharge: 07/01/96 – 09/30/96

Parameter & Units	Measured 30-Day Average	Limit 30-Day Average	Measured 7-Day Average	Limit 7-Day Average	Measured Daily Maximum	Limit Daily Maximum
NO_3/NO_2 mg/l	2 - 5	10	3 - 7	20	N/A	N/A
TRC mg/l	N/A	N/A	N/A	N/A	0.06 - 0.08	0.5
BOD_5 mg/l	3.9 - 7.6	[a]	N/A	N/A	5.1 - 13.0	[a]
$CBOD_5$ mg/l	1.3 – 2.6	[a]	N/A	N/A	1.6 - 6.3	[a]
TSS mg/l	<4	[a]	N/A	N/A	<4 - 5	[a]

[a] Report only

N/A = Not Applicable
TRC = Total Residual Chlorine
TSS = Total Suspended Solids
BOD_5 = Biochemical Oxygen Demand, 5-Day Test
$CBOD_5$ = Carbonaceous Biochemical Oxygen Demand, 5-Day Test

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

Table 3-5 Sewage Treatment Plant (Outfall STP A)

Dates of Discharge: 07/01/96 – 09/30/96

Parameter and Units	Measured 30-Day Avg	Limit 30-Day Avg	Measured 7-Day Avg	Limit 7-Day Avg	Measured Daily Min	Limit Daily Min	Measured Daily Max	Limit Daily Max	Observed Sheen	Measured Result
pH, SU	N/A	N/A	N/A	N/A	6.6 - 6.7	6.0	7.1 – 7.4	9.0	N/A	N/A
TSS, mg/l	<4	30	<5	45	N/A	N/A	N/A	N/A	N/A	N/A
Total Phosphorous, mg/l	2.9 – 3.3	8	N/A	N/A	N/A	N/A	4.4 - 5.3	12	N/A	N/A
TRC, mg/l	0.01	[a]	0.01 – 0.03	[a]	N/A	N/A	N/A	N/A	N/A	N/A
Total Chromium, mg/l	<10.5	50	N/A	N/A	N/A	N/A	<10	100	N/A	N/A
Fecal Coliform #/100 ml	<2[b]	200[b]	4[b]	400[b]	N/A	N/A	N/A	N/A	N/A	N/A
$CBOD_5$ mg/l	1.7 - 3.4	10	N/A	N/A	N/A	N/A	2.7 - 12.4	25	N/A	N/A
Oil & Grease	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	[c]	N/A
WET										
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100

Samples Collected: 07/02/96, 08/06/96, 09/03/96, and 09/17/96

Antimony, µg/l	<30 - 60	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic, µg/l	<1 - 5.3	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium, µg/l	<1 - <5	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium, µg/l	<0.2 - <5	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper, µg/l	<4 – <25	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Iron, µg/l	36.9 – <100	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead, µg/l	<1 - <3	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese, µg/l	<15 - 21.4	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury, µg/l	<0.2	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel, µg/ll	<20 - <40	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Silver, µg/l	<0.2 – <10	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc, µg/l	<20 - 34.8	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VOCs, µg/l	7[d]	[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[a] Report Only
[b] Geometric
[c] No Sheen Observed
[d] Chloroform

N/A = Not Applicable
SU = Standard Units
TSS = Total Suspended Solids
TRC = Total Residual Chlorine
$CBOD_5$ = Carbonaceous Biochemical Oxygen Demand, 5-Day Test
PQL = Practical quantitation limit is equal to 10 times the method detection limit and represents the quantity at which 70% of laboratories can be reported in the 95% upper confidence limit.
WET = (Whole Effluent Toxicity) Results for WET are given in percentage of effluent sample that will cause mortality to half the test result organisms within the time frame of the test. For example, >100% indicates that 100% pure effluent did not cause acute toxicity to at least half of the organisms. A lower percentage LC_{50} (lethal concentration to 50% of test organisms) indicates a greater toxic effect because less of the sample is required to observe a sufficiently extensive adverse effect.

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

Table 3-6 Ponds – Interior and Terminal

Location, Parameter, and Units	Measured 30-Day Avg	Limit 30-Day Avg	Measured 7-Day Avg	Limit 7-Day Avg	Measured Daily Min	Limit Daily Min	Measured Daily Max	Limit Daily Max	Measured Result
No Discharge									
Pond A-3 (Outfall 002)									
pH, SU	N/A	N/A	N/A	N/A	N/A	6.0	N/A	9.0	N/A
NO_3/NO_2, mg/l	N/A	10	N/A	N/A	N/A	N/A	N/A	20	N/A
Discharged: 09/17/96 only									
Pond A-4. (Outfall 005A)									
Total Chromium, mg/l	N/A	N/A	N/A	N/A	N/A	N/A	<6.0	50	N/A
WET									
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	waived
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	waived
Discharged: 07/217/96 - 07/31/96, 09/18/96 - 09/19/96, 09/30/96, 09/23/96 - 09/30/96									
Pond B-5 (Outfall 006A)									
Total Chromium, mg/l	N/A	N/A	N/A	N/A	N/A	N/A	<5.0	50	N/A
WET									
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	>100
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	97.6 (Fail)
NO_3/NO_2, mg/l*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRC, mg/l*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
No Discharge									
Pond C-2 (Outfall 007A)									
Total Chromium, mg/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WET									
Ceriodaphnia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fathead Minnows	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Sample and analysis required only if Pond B-3 is bypassed.

N/A = Not Applicable
SU = Standard Units
TRC = Total Residual Chlorine
WET = (Whole Effluent Toxicity) Results for WET are given in percentage of effluent sample that will cause mortality to half the test result organisms within the time frame of the test. For example, >100% indicates that 100% pure effluent did not cause acute toxicity to at least half of the organisms. A lower percentage LC_{50} (lethal concentration to 50% of test organisms) indicates a greater toxic effect because less of the sample is required to observe a sufficiently extensive adverse effect.

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

Table 3-7 Daily Flow Data Recorded at the Walnut Creek and Indiana Street Gaging Station, Ponds A-4 and B-5

Date	Walnut Creek at Indiana (gal)	Pond A-4 (gal)	Pond B-5 (gal)
07/01/96	Low Flow	No Disc	No Disc
07/02/96			
07/03/96			
07/04/96			
07/05/96			
07/06/96			
07/07/96			
07/08/96			
07/09/96			
07/10/96			
07/11/96			
07/12/96			
07/13/96			
07/14/96			
07/15/96			
07/16/96			
07/17/96	10,000		497,000
07/18/96	876,000		1,452,000
07/19/96	967,000		1,439,000
07/20/96	985,000		1,411,000
07/21/96	957,000		1,390,000
07/22/96	787,000		1,126,000
07/23/96	685,000		992,000
07/24/96	657,000		939,000
07/25/96	478,000		685,000
07/26/96	497,000		715,000
07/27/96	239,000		311,000
07/28/96	112,000		200,000
07/29/96	550,000		853,000
07/30/96	1,148,000		1,481,000
07/31/96	822,000	No Disc	951,000
Total	9,770,000	No Disc	14,442,000

Date	Walnut Creek at Indiana (gal)	Pond A-4 (gal)	Pond B-5 (gal)
08/01/96	No Flow	No Disc	No Disc
08/02/96			
08/03/96			
08/04/96			
08/5/965			
08/06/96			
08/07/96			
08/08/96			
08/09/96			
08/10/96			
08/11/96			
08/12/96			
08/13/96			
08/14/96			
08/15/96			
08/16/96			
08/17/96			
08/18/96			
08/19/96			
08/20/96			
08/21/96			
08/22/96			
08/23/96			
08/24/96			
08/25/96			
08/26/96			
08/27/96			
08/28/96			
08/29/96			
08/30/96			
08/31/96			
Total	No Flow	No Disc	No Disc

Date	Walnut Creek at Indiana (gal)	Pond A-4 (gal)	Pond B-5 (gal)
09/01/96	No Flow	No Disc	No Disc
09/02/96			
09/03/96			
09/04/96			
09/05/96			
09/06/96			
09/07/96			
09/08/96			
09/09/96			
09/10/96			
09/11/96			
09/12/96			
09/13/96			
09/14/96			
09/15/96			
09/16/96			

Date	Walnut Creek at Indiana (gal)	Pond A-4 (gal)	Pond B-5 (gal)
09/17/96	No Flow	500[a]	No Disc
09/18/96	119,000	No Disc	834,000
09/19/96	917,000		729,000
09/20/96	147,000		251,000
09/2/196	12,000		No Disc
09/22/96	12,000		No Disc
09/23/96	319,000		756,000
09/24/96	871,000		1,188,000
09/25/96	802,000		1,118,000
09/26/96	828,000		1,126,000
09/27/96	834,000		1,120,000
09/28/96	805,000		997,000
09/29/96	724,000		960,000
09/30/96	694,000	No Disc	923,000
Total	7,084,000	8,511,000	10,002,000

[a] Flow from new outletworks pipe. Volume is estimated.

Table 3-8 Daily Flow Data Recorded at Ponds C-1 and C-2 (Woman Creek)

Date	Pond C-1 (gal)	Pond C-2 (gal)
07/01/96	Low Flow	No Discharge
07/02/96		
07/03/96		
07/04/96		
07/05/96		
07/06/96		
07/07/96		
07/08/96		
07/09/96		
07/10/96		
07/11/96		
07/12/96		
07/13/96		
07/14/96		
07/15/96		
07/16/96		
07/17/96		
07/18/96		
07/19/96	Low Flow	
07/20/96	No Flow	
07/21/96		
07/22/96		
07/23/96		
07/24/96		
07/25/96		
07/26/96		
07/27/96		
07/28/96		
07/29/96		
07/30/96		
07/31/96	a	
Total	No Flow	No Discharge

Date	Pond C-1 (gal)	Pond C-2 (gal)
08/01/96	No Flow	No Discharge
08/02/96		
08/03/96		
08/04/96		
08/05/96		
08/06/96		
08/07/96		
08/08/96		
08/09/96		
08/10/96		
08/11/96		
08/12/96		
08/13/96		
08/14/96		
08/15/96		
08/16/96		
08/17/96		
08/18/96		
08/19/96		
08/20/96		
08/21/96		
08/22/96		
08/23/96		
08/24/96		
08/25/96		
08/26/96		
08/27/96		
08/28/96		
08/29/96		
08/30/96		
08/31/96		
Total	No Flow	No Discharge

Date	Pond C-1 (gal)	Pond C-2 (gal)
09/01/96	No Flow	No Discharge
09/02/96		
09/03/96		
09/04/96		
09/05/96		
09/06/96		
09/07/96		
09/08/96		
090/9/96		
09/10/96		
09/11/96		
09/12/96		
09/13/96		
09/14/96		
09/15/96		
09/16/96		
09/17/96	No Flow	
09/18/96	63,000	
09/19/96	410,000	
09/20/96	80,000	
09/21/96	44,000	
09/22/96	34,000	
09/23/96	31,000	
09/24/96	38,000	
09/25/96	44,000	
09/26/96	104,000	
09/27/96	267,000	
09/28/96	235,000	
09/29/96	108,000	
09/30/96	76,000	
Total	1,534,000	No Discharge

a Low flow conditions. Unabile to quantify volumes.

Table 3-9 Daily Transfer Flow Data Recorded for Pond B-5 and Pond A-4

Date	Pond B-5 to Pond A-4 (gal)	Date	Pond B-5 to Pond A-4 (gal)	Date	Pond B-5 to Pond A-4 (gal)
07/01/96	No Transfer	08/01/96	No Transfer	09/01/96	No Transfer
07/02/96		08/02/96		09/02/96	
07/03/96		08/03/96		09/03/96	
07/04/96		08/04/96		09/04/96	
07/05/96		08/05/96		09/05/96	
07/06/96		08/06/96		09/06/96	
07/07/96		08/07/96		09/07/96	
07/08/96		08/08/96		09/08/96	
07/09/96		08/09/96		090/9/96	
07/10/96		08/10/96		09/10/96	
07/11/96		08/11/96		09/11/96	
07/12/96		08/12/96		09/12/96	
07/13/96		08/13/96		09/13/96	
07/14/96		08/14/96		09/14/96	
07/15/96		08/15/96		09/15/96	
07/16/96		08/16/96		09/16/96	
07/17/96		08/17/96		09/17/96	
07/18/96		08/18/96		09/18/96	
07/19/96		08/19/96		09/19/96	
07/20/96		08/20/96		09/20/96	
07/21/96		08/21/96		09/21/96	
07/22/96		08/22/96		09/22/96	
07/23/96		08/23/96		09/23/96	
07/24/96		08/24/96		09/24/96	
07/25/96		08/25/96		09/25/96	
07/26/96		08/26/96		09/26/96	
07/27/96		08/27/96		09/27/96	
07/28/96		0828/96		09/28/96	
07/29/96		08/29/96		09/29/96	
07/30/96		08/30/96		09/30/96	
07/31/96		08/31/96			
Total	No Transfer	Total	No Transfer	Total	No Transfer

Section 4: Groundwater Data

Table 4-1 Dissolved Metals Detected in Boundary Wells (2nd and 3rd Quarters 1996)

Loc	Geology	Sample Number	Sample Date	Analyte	Result[a] (µg/L)	Detection Limit[b]
06491	Bedrock	GW05002TE	04/08/966	Barium	20.4	200
				Calcium	24400	5000
				Chromium	5.2	10
				Lithium	178.00	100
				Magnesium	8110	5000
				Nickel	6.5	40
				Potassium	3320	5000
				Selenium	31.9	5
				Sodium	278000	5000
10394	Alluvium	GW05007TE	04/08/96	Barium	108	200
				Calcium	71400	5000
				Chromium	5.2	10
				Lithium	15.2	100
				Magnesium	20700	5000
				Nickel	6.5	40
				Potassium	1800	5000
				Selenium	15.7	5
				Sodium	59600	5000
41591	Alluvium	GW05018TE	05/09/96	Barium	144	200
				Calcium	43400	5000
				Chromium	3.3	10
				Lithium	106	100
				Magensium	82900	5000
				Nickel	7.8	40
				Potassium	364	5000
				Sodium	141000	5000
				Selenium	30.3	5
0386	Bedrock	GW05131TE	06/12/96	Barium	215	200
				Calcium	88900	5000
				Chromium	3.3	10
				Lithium	84.1	100
				Magensium	33200	5000
				Nickel	7.8	40
				Potassium	2530	5000
				Sodium	59900	5000
				Selenium	79.6	5
1591	Alluvium	GW05018TE	05/09/96	Alumium	25.4	25.4
				Antimony	28.4	28.4
				Arsenic	3.3	10
				Barium	138	39.5
				Beryllium	1	1
				Cadmium	4.2	4.2
				Calcium	36600	103
				Cesium	200	1000
				Chromium	6.1	6.1
				Cobalt	4.4	4.4
				Copper	3.5	3.5
				Iron	35	35
				Lead	3	5
				Lithium	114	100
				Magensium	71800	44.1
				Mangannese	5.2	5.2
				Mercury	0.2	0.2
				Molybdenum	10.2	200
				Nickel	10.2	10.2
				Potassium	394	96.1
				Selenium	8	5

Table 4-1 Dissolved Metals Detected in Boundary Wells (2nd and 3rd Quarters 1996) (continued)

Loc	Geology	Sample Number	Sample Date	Analyte	Result[a] (µg/L)	Detection Limit[b]
1591	*(Continued)*			Silicon	5050	100
				Silver	3.7	3.7
				Sodium	128000	975
				Strontium	1700	200
				Thallium	10.8	10
				Tin	28	200
				Vanadium	3.2	3.2
				Zinc	4	4
06491	Bedrock	GW05183TE	08/19/96	Alumium	25.4	25.4
				Antimony	28.4	28.4
				Arsenic	3.3	10
				Barium	30.1	4
				Beryllium	1	1
				Cadmium	4.2	4.2
				Calcium	33100	103
				Cesium	200	1000
				Chromium	6.1	6.1
				Cobalt	4.4	4.4
				Copper	3.5	3.5
				Iron	35	35
				Lead	3	5
				Lithium	202	100
				Magensium	10900	44.1
				Mangannese	5.2	5.2
				Mercury	0.2	0.2
				Molybdenum	13.5	200
				Nickel	10.2	10.2
				Potassium	4300	96.1
				Selenium	4.1	5
				Silicon	7090	100
				Silver	3.7	3.7
				Sodium	327000	975
				Strontium	543	200
				Thallium	6	10
				Tin	63.5	200
				Vanadium	48	3.2
				Zinc	4	4

[a] Where there are no results listed, the following codes indicate the reason:

NN = Analysis Not Required
NR = Analysis Not Received from Laboratory
NS = Not Sampled
NSD = No Sample Remained for Analysis

[b] Detection Limits are based on the contract required detection limit (CRDL) specified in General Radiochemistry and Routine Analytical Services Protocol (GRRASP) Version 2.1.

Table 4-2 Water Quality Parameters Detected in Boundary Wells (2nd and 3rd Quarters 1996)

Loc	Geology	Sample Number	Sample Date	Analyte	Result[a] (mg/L)	Detection Limit[b]
06491	Bedrock	GW05002TE	04/08/96	Bicarbonate as $CaCO_3$	453	10
				Carbonate as $CaCO_3$	0.22	10
				Chloride	39.4	5
				Nitrate/Nitrite	0.73	0.05
				Sulfate	246	50
				Total Dissolved Solids	981	10
10394	Alluvium	GW05007TE	04/08/96	Bicarbonate as $CaCO_3$	217	10
				Carbonate as $CaCO_3$	0.22	10
				Chloride	43.5	5
				Nitrate/Nitrite	0.041	0.05
				Sulfate	93.2	10
				Total Dissolved Solids	459	10
41691	Alluvium	GW05019TE	05/02/96	Bicarbonate as $CaCO_3$	179	10
				Carbonate as $CaCO_3$	0.22	10
				Chloride	99.4	5
				Nitrate/Nitrite	0.010	0.05
				Sulfate	61.1	10
				Total Dissolved Solids	480	10
41591	Alluvium	GW05018TE	05/09/96	Bicarbonate as $CaCO_3$	363	10
				Carbonate as $CaCO_3$	0.22	10
				Chloride	147	25
				Nitrate/Nitrite	1	0.1
				Sulfate	125	25
				Total Dissolved Solids	779	10
B202589	Alluvium	GW05091TE	05/09/96	Bicarbonate as $CaCO_3$	156	10
				Carbonate as $CaCO_3$	0.22	10
				Chloride	11.5	5
				Nitrate/Nitrite	0.01	0.05
				Sulfate	37.9	5
				Total Dissolved Solids	243	10
0386	Bedrock	GW05131TE	06/12/96	Bicarbonate as $CaCO_3$	286	10
				Carbonate as $CaCO_3$	0.22	10
				Chloride	42.2	5
				Nitrate/Nitrite	3.3	0.25
				Sulfate	100	10
				Total Dissolved Solids	533	10
41591	Alluvium	GW05205TE	07/30/96	Bicarbonate as $CaCO_3$	338	10
				Carbonate as $CaCO_3$	0.83	10
				Chloride	135	25
				Nitrate/Nitrite	0.32	0.05
				Sulfate	73.3	10
				Total Dissolved Solids	664	10
10394	Alluvium	GW05189TE	08/26/96	Nitrate/Nitrite	0.01	0.05
10294	Alluvium	GW05260TE	09/17/96	Bicarbonate as $CaCO_3$	613	10
				Carbonate as $CaCO_3$	0.83	10
				Chloride	117	25
				Nitrate/Nitrite	0.01	0.05
				Sulfate	606	100
				Total Dissolved Solids	1800	10
41691	Alluvium	GW05206TE	09/19/96	Bicarbonate as $CaCO_3$	207	10
				Carbonate as $CaCO_3$	0.83	10
				Chloride	70.2	10
				Nitrate/Nitrite	0.22	0.05
				Sulfate	54.1	10
				Total Dissolved Solids	459	10

Table 4-2 Water Quality Parameters Detected in Boundary Wells (2nd and 3rd Quarters 1996) (continued)

Loc	Geology	Sample Number	Sample Date	Analyte	Result[a] (mg/L)	Detection Limit[b]
0386	Bedrock	GW05180TE	09/24/96	Bicarbonate as $CaCO_3$	300	10
				Carbonate as $CaCO_3$	0.83	10
				Chloride	40	5
				Nitrate/Nitrite	3.4	0.25
				Sulfate	98.4	10
				Total Dissolved Solids	520	10

[a] Where there are no results listed, the following codes indicate the reason:

NN = Analysis Not Required
NR = Analysis Not Received from Laboratory
NS = Not Sampled
NSD = No Sample Remained for Analysis

[b] Detection limits are based on the contract required detection limit (CRDL) specified in General Radiochemistry and Routine Analytical Services Protocol (GRRASP) Version 2.1.

Table 4-3 Radionuclides Detected in Boundary Wells (2nd and 3rd Quarters 1996)

Loc	Geology	Sample Number	Sample Date	Analyte	Result[a] (pCi/L)	Error	Detection Limit[b]
06491	Alluvium	GW05002TE	04/08/96	Americium-241	0.007	0.007	0.009
				Gross Alpha	22.14	5.19	1.95
				Gross Beta	10.39	3.49	5.83
				Plutonium-238	0.001	0.003	0.007
				Plutonium-239/240	0.002	0.004	0.009
				Radium-226	0.082	0.077	0.123
				Radium-228	0.509	0.239	0.318
				Tritium	169.6	211	310
				Uranium-233, -234	15.32	2.8	0.193
				Uranium-235	0.419	0.274	0.170
				Uranium-238	9.877	1.96	0.170
41691	Alluvium	GW05019TE	04/09/96	Americium-241	0.034	0.012	0.007
				Gross Alpha	1.494	0.785	0.861
				Gross Beta	3.215	1.69	3.14
				Plutonium-238	0.002	0.003	0.006
				Plutonium-239/240	0.063	0.018	0.009
				Radium-226	0.187	0.056	0.033
				Radium-228	0.679	0.328	0.510
				Tritium	-66.1	192	302
				Uranium-233, -234	1.881	0.710	0.355
				Uranium-235	-0.004	0.009	0.214
				Uranium-238	1.179	0.547	0.377
41591	Alluvium	GW05018TE	05/09/96	Americium-241	0.003	0.005	0.007
				Gross Alpha	14.73	3.56	1.96
				Gross Beta	8.676	2.4	3.67
				Plutonium-238	0	0.003	0.003
				Plutonium-239/240	0.001	0.004	0.008
				Radium-226	0.248	0.097	0.120
				Radium-228	0.803	0.311	0.450
				Tritium	74.91	201	307
				Uranium-233, -234	10.26	2.07	0.305
				Uranium-235	0.385	0.273	0.237
				Uranium-238	7.883	1.69	0.237
0386	Bedrock	GW05131TE	06/12/96	Americium-241	0.001	0.002	0.006
				Gross Alpha	5.181	2.060	1.680
				Gross Beta	10.870	2.180	2.980
				Plutonium-238	0.004	0.005	0.008
				Plutonium-239/240	-0.001	0.002	0.009
				Radium-226	0.231	0.074	0.050
				Radium-228	0.596	0.324	0.521
				Tritium	37.990	194	294
				Uranium-233, -234	11.230	2.290	0.220
				Uranium-235	0.241	0.219	0.131
				Uranium-238	7.474	1.670	0.194
41591	Alluvium	GW05205TE	07/30/96	Americium-241	0.001	0.004	0.009
				Gross Alpha	6.373	2.51	2.53
				Gross Beta	6.875	2.54	4.28
				Plutonium-238	0.002	0.004	0.008
				Plutonium-239/240	0.003	0.005	0.011
				Radium-226	0.298	0.079	0.064
				Radium-228	0.299	0.298	0.556
				Tritium	144.9	208	307
				Uranium-233, -234	7.849	1.78	0.274
				Uranium-235	0.356	0.278	0.207
				Uranium-238	5.758	1.42	0.139

Table 4-3 Radionuclides Detected in Boundary Wells (2nd and 3rd Quarters 1996) (continued)

Loc	Geology	Sample Number	Sample Date	Analyte	Result[a] (pCi/L)	Error	Detection Limit[b]
10394	Alluvium	GW05189TE	08/26/96	Tritium	-51	110	260
10294	Alluvium	GW05260TE	09/17/96	Tritium	74	100	240
41691	Alluvium	GW05206TE	09/19/96	Tritium	25	100	240

[a] Where there are no results listed, the following codes indicate the reason:

NN = Analysis Not Required
NR = Analysis Not Received from Laboratory
NS = Not Sampled
NSD = No Sample Remained for Analysis

[b] Detection limits are based on the contract required detection limit (CRDL) specified in General Radiochemistry and Routine Analytical Services Protocol (GRRASP) Version 2.1.

Note: Pu-239, -240, Pu-238, and Am-241 are reported as total radionuclides. All U isotopes, radium isotopes, Tritium, Gross Alpha, and Gross Beta are reported as total dissovled radionuclides.

Table 4-4 Organics Detected in Boundary Wells (2nd and 3rd Quarters 1996)

Loc	Geology	Sample Number	Sample Date	Analyte	Result[a] (µg/L)	Detection Limit[b]
06491	Alluvium	GW05002TE	04/08/96	1,1,1,2-Tetrachloroethane	1	1
				1,1,1-Trichloroethane	1	1
				1,1,2,2-Tetrachloroethane	1	1
				1,1,2-Trichloroethane	1	1
				1,1-Dichloroethene	1	1
				1,1-Dichloropropene	1	1
				1,2,3-Trichlorobenzene	1	1
				1,2,3-Trichloropropane	1	1
				1,2,4-Trichlorobenzene	1	1
				1,2-Dibromoethane	1	1
				1,2-Dichlorobenzene	1	1
				1,2-Dichloroethane	1	1
				1,2-Dichloropropane	1	1
				1,3-Dichlorobenzene	1	1
				1,3-Dichloropropane	1	1
				1,4-Dichlorobenzene	1	1
				Benzene	1	1
				Benzene, 1,2,4-Trimethyl-	1	1
				Benzene, 1,3,5-Trimethyl-	1	1
				Bromobenzene	1	1
				Bromochloromethane	1	1
				Bromodichloromethane	1	1
				Bromoform	1	1
				Bromomethane	1	1
				Carbon Tetrachloride	1	1
				Chlorobenzene	1	1
				Chloroethane	1	1
				Chloroform	1	1
				Chloromethane	1	1
				Cis, 1,2-Dichloroethene-	1	1
				Cis, 1,3-Dichloropropene-	1	1
				Cumene	1	1
				Dibromochloromethane	1	1
				Dibromomethane	1	1
				Dichlorodifluoromethane	1	1
				Ethylbenzene	1	1
				Hexachlorobutadiene	1	1
				Methylene Chloride	1	1
				N-Butylbenzene	1	1
				N-Propylbenzene	1	1
				Naphthalene	1	1
				O-Chlorotoluene	1	1
				P-Chlorotoluene	1	1
				P-Cymene	1	1
				Propane, 1,2-Dibromo-3-Chloro-	1	1
				Sec-Butylbenzene	1	1
				Sec-Dichloropropane	1	1
				Styrene	1	1
				Tert-Butylbenzene	1	1
				Tetrachloroethene	1	1
				Toluene	1	1
				Total Xylenes	1	1
				Trans-1,2-Dichloroethene	1	1
				Trans-1,3-Dichloropropene	1	1
				Trichloroethene	1	1
				Trichlorofluoromethane	1	1
				Vinyl Chloride	1	1

Table 4-4 Organics Detected in Boundary Wells (2nd and 3rd Quarters 1996) (continued)

Loc	Geology	Sample Number	Sample Date	Analyte	Result[a] (µg/L)	Detection Limit[b]
41691	Alluvium	GW05019TE	05/02/96	1,1,1,2-Tetrachloroethane	1	1
				1,1,1-Trichloroethane	1	1
				1,1,2,2-Tetrachloroethane	1	1
				1,1,2-Trichloroethane	1	1
				1,1-Dichloroethene	1	1
				1,1-Dichloropropene	1	1
				1,2,3-Trichlorobenzene	1	1
				1,2,3-Trichloropropane	1	1
				1,2,4-Trichlorobenzene	1	1
				1,2-Dibromoethane	1	1
				1,2-Dichlorobenzene	1	1
				1,2-Dichloroethane	1	1
				1,2-Dichloropropane	1	1
				1,3-Dichlorobenzene	1	1
				1,3-Dichloropropane	1	1
				1,4-Dichlorobenzene	1	1
				Benzene	1	1
				Benzene, 1,2,4-Trimethyl-	1	1
				Benzene, 1,3,5-Trimethyl-	1	1
				Bromobenzene	1	1
				Bromochloromethane	1	1
				Bromodichloromethane	1	1
				Bromoform	1	1
				Bromomethane	1	1
				Carbon Tetrachloride	1	1
				Chlorobenzene	1	1
				Chloroethane	1	1
				Chloroform	1	1
				Chloromethane	1	1
				Cis, 1,2-Dichloroethene-	1	1
				Cis, 1,3-Dichloropropene-	1	1
				Cumene	1	1
				Dibromochloromethane	1	1
				Dibromomethane	1	1
				Dichlorodifluoromethane	1	1
				Ethylbenzene	1	1
				Hexachlorobutadiene	1	1
				Methylene Chloride	1	1
				N-Butylbenzene	1	1
				N-Propylbenzene	1	1
				Naphthalene	1	1
				O-Chlorotoluene	1	1
				P-Chlorotoluene	1	1
				P-Cymene	1	1
				Propane, 1,2-Dibromo-3-Chloro-	1	1
				Sec-Butylbenzene	1	1
				Sec-Dichloropropane	1	1
				Styrene	1	1
				Tert-Butylbenzene	1	1
				Tetrachloroethene	1	1
				Toluene	1	1
				Total Xylenes	1	1
				Trans-1,2-Dichloroethene	1	1
				Trans-1,3-Dichloropropene	1	1
				Trichloroethene	1	1
				Trichlorofluoromethane	1	1
				Vinyl Chloride	1	1

Table 4-4 Organics Detected in Boundary Wells (2nd and 3rd Quarters 1996) (continued)

Loc	Geology	Sample Number	Sample Date	Analyte	Result[a] (µg/L)	Detection Limit[b]
41591	Alluvium	GW05205TE	007/30/96	1,1,1,2-Tetrachloroethane	1	1
				1,1,1-Trichloroethane	1	1
				1,1,2,2-Tetrachloroethane	1	1
				1,1,2-Trichloroethane	1	1
				1,1-Dichloroethene	1	1
				1,1-Dichloropropene	1	1
				1,2,3-Trichlorobenzene	1	1
				1,2,3-Trichloropropane	1	1
				1,2,4-Trichlorobenzene	1	1
				1,2-Dibromoethane	1	1
				1,2-Dichlorobenzene	1	1
				1,2-Dichloroethane	1	1
				1,2-Dichloropropane	1	1
				1,3-Dichlorobenzene	1	1
				1,3-Dichloropropane	1	1
				1,4-Dichlorobenzene	1	1
				Benzene	1	1
				Benzene, 1,2,4-Trimethyl-	1	1
				Benzene, 1,3,5-Trimethyl-	1	1
				Bromobenzene	1	1
				Bromochloromethane	1	1
				Bromodichloromethane	1	1
				Bromoform	1	1
				Bromomethane	1	1
				Carbon Tetrachloride	1	1
				Chlorobenzene	1	1
				Chloroethane	1	1
				Chloroform	1	1
				Chloromethane	1	1
				Cis, 1,2-Dichloroethene-	1	1
				Cis, 1,3-Dichloropropene-	1	1
				Cumene	1	1
				Dibromochloromethane	1	1
				Dibromomethane	1	1
				Dichlorodifluoromethane	1	1
				Ethylbenzene	1	1
				Hexachlorobutadiene	1	1
				Methylene Chloride	1	1
				N-Butylbenzene	1	1
				N-Propylbenzene	1	1
				Naphthalene	1	1
				O-Chlorotoluene	1	1
				P-Chlorotoluene	1	1
				P-Cymene	1	1
				Propane, 1,2-Dibromo-3-Chloro-	1	1
				Sec-Butylbenzene	1	1
				Sec-Dichloropropane	1	1
				Styrene	1	1
				Tert-Butylbenzene	1	1
				Tetrachloroethene	1	1
				Toluene	1	1
				Total Xylenes	1	1
				Trans-1,2-Dichloroethene	1	1
				Trans-1,3-Dichloropropene	1	1
				Trichloroethene	1	1
				Trichlorofluoromethane	1	1
				Vinyl Chloride	1	1

Table 4-4 Organics Detected in Boundary Wells (2nd and 3rd Quarters 1996) (continued)

Loc	Geology	Sample Number	Sample Date	Analyte	Result[a] (mg/L)	Detection Limit[b]

[a] Where there are no results listed, the following codes indicate the reason:

NN = Analysis Not Required
NR = Analysis Not Received from Laboratory
NS = Not Sampled
NSD = No Sample Remained for Analysis

[b] Detection limits are based on the contract required detection limit (CRDL) specified in General Radiochemistry and Routine Analytical Services Protocol (GRRASP) Version 2.1.