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ROCKY FLATS PLANT

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MONTHLY ENVIRONMENTAL MONITORING REPORT

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Executive Summary

The Rocky Flats Plant is part of a nationwide Department of Energy complex for the research, development, and production of nuclear weapons. The Plant is responsible for fabricating nuclear weapons components from plutonium, uranium, beryllium, and stainless steel. Primary production activities include metal fabrication and assembly, chemical recovery and purification of process-produced transuranic radionuclides, and related quality control functions.

Because radioactive and chemically hazardous materials are used or handled at the Rocky Flats Plant, the Plant maintains an extensive environmental protection program. Included in that program is regular monitoring for radioactive and hazardous constituents at onsite, Plant boundary, and offsite locations. This Environmental Monitoring Report provides a monthly summary of environmental monitoring data collected by the Rocky Flats Plant. Summarized below are highlights from the major data categories presented. Remaining data presented in this report are within the ranges historically measured for their respective parameters and locations.

The January 1991 Executive Summary of the Rocky Flats Plant Monthly Environmental Monitoring Report discussed a shutdown of the Plant's Radiological Health Laboratory that resulted from defects in liners to the process waste water transfer system valve vaults. The Radiological Health Laboratory performs the radioactivity analyses for which data are presented in this report. A proposal for temporary corrections to the valve vault problem that would allow limited operation of the system until permanent corrections are complete was submitted by Rocky Flats Plant to the Colorado Department of Health Hazardous Materials and Waste Management Division. Agreed-upon corrective actions that would allow use of the valve vaults servicing the Radiological Health Laboratory included: (1) repair of the current valve vault liners to pass a visual acceptance test; (2) provision of soft containment around ancillary equipment in the vaults for low pressure leak detection; (3) hourly visual inspection of the valve vaults. These corrective actions have been implemented for the Building 123 process waste water transfer lines. Building 123 houses the Radiological Health Laboratory.

However, leaks in process waste line connections and possible groundwater infiltration into the secondary containment provided for these connections within Building 123 were detected, and Laboratory operations were again shut down pending correction of these leaks. For this reason, no plutonium, uranium, americium, beryllium, or surface water tritium environmental monitoring data for the February sampling period are included in this report. Tables I and III-VIII, as described on page 1, are omitted from this month's monitoring report. Also omitted are the graphs and figures that normally accompany these tables.

Screening of building air effluent samples for total long-lived alpha radiation was performed on the February samples. The principal radiation of interest for plutonium, uranium, and americium is alpha radiation. No samples exceeded the Plant's internal guide value of 0.02 pCi/m^3. All air effluent total long-lived alpha values for February were 0.006 pCi/m^3 or less. Air effluent analyses for tritium also were performed on the February samples, and the results are given in the report (see Table II).

Gross alpha and gross beta radiation analyses were performed on the surface water effluent for the discharge of Pond A-4 between February 1, and February 28, 1991. Results of these analyses indicated gross alpha and beta concentrations that were within the Colorado Water Quality Control Commission (CWQCC) standards of 11 pCi/l and 19 pCi/l, respectively. Gross alpha and beta concentrations in samples collected at Walnut Creek at Indiana Street between February 2 and February 28, 1991, also were within the CWQCC standards for the Walnut Creek drainage.

All analytical results for samples impacted by the shut down will be reported when available.

February 1991

ENVIRONMENTAL MONITORING REPORT
Rocky Flats Plant

This report summarizes the effluent and environmental monitoring programs at the Rocky Flats Plant for the month of February 1991. The data presented herein reflect the best information available to the Rocky Flats Plant at this time. Should subsequent analyses indicate that any data presented herein are inaccurate or misleading, appropriate revisions will be issued promptly.

Tables I and II show monitoring results for radioactive and nonradioactive airborne effluents continuously sampled from Plant buildings. Tables III through V summarize environmental monitoring data from the Rocky Flats Plant ambient air sampling network. This network is comprised of continuously operating air samplers located on plantsite, around the Plant boundary, and in neighboring communities.

Water sampling results for radioactive constituents are given in Tables VI through VIII. Results are summarized for Plant surface water control ponds, for nearby drinking water reservoirs, and for tap water for neighboring communities. Nitrate monitoring for Great Western Reservoir and Standley Lake, the two drinking water reservoirs which can receive surface water discharges from the Plant, are summarized in Table IX.

The Environmental Protection Agency (EPA) has issued to the Plant a National Pollutant Discharge Elimination System (NPDES) permit for control of surface water discharges. Water sampling results associated with the NPDES permit, as well as applicable discharge limitations imposed by that permit, are reported in Table X. Analytical results for nonradioactive parameters in water at the Walnut Creek at Indiana Street location are summarized in Table XI. Daily flow data for surface water from the two Plant drainage systems (Walnut Creek and Woman Creek) are given in Tables XI, XII, and XIII. Meteorological data, including percent wind direction frequency by wind speed class and daily precipitation, are given in Tables XIV and XV.

Appendix C contains corrections and updates on previously reported information.

Error terms in the form of "a ± b" are included with some of the data. For a single sample, "a" is the blank corrected value; for multiple samples it represents the arithmetic mean, the volume-weighted mean, or the annual total of multiple blank corrected samples, as indicated in the table. The error term "b" accounts for the propagated statistical counting uncertainty of the sample(s) and the associated reagent blanks at the 95 percent confidence level. These error terms represent a minimum estimate of error for the data.

The plutonium, uranium, americium, and beryllium measured concentrations in this report include values that are less than the corresponding calculated minimum detectable concentrations (MDCs). In some cases, the values are less than zero. This method of reporting began in January 1981. These negative values result when the measured value for the laboratory reagent blank is subtracted from an analytical result that was measured as a smaller value than the reagent blank. This may happen when measuring concentrations that are very close to zero.

The data provided in this report are provided as a matter of courtesy and should not be construed as an application for a permit or license, or in support of such an application. Approval of the Department of Energy should be obtained before publication of any data contained in this report.

Table II

1991 Tritium, Beryllium, and Americium Airborne Effluent Data

February 1991

	Tritium, H-3 (01/30/91 - 02/27/91)		Beryllium (01/21/91 - 02/19/91)		Americium-241 (12/17/90 - 01/22/91)	
Month	Release (mCi)	CMaximum (pCi/m^3)	Release (grams)	CMaximum ($\mu g/m^3$)	Release (μCi)	CMaximum (pCi/m^3)
December					**	**
CY 1990*	3.849***	88 ± 7	1.4734	0.00136	0.399	0.001 ± 0.0007
January	0.082	19 ± 8		**	**	**
February	0.147*	30 ± 18		**	**	**
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						
Year to Date	0.229	30 ± 18		**	**	**

NOTE: Beryllium measured at the remaining 44 locations was below the screening level of 0.1 gram per month.

The calibration methodology for the beryllium analyses was changed beginning with the September samples to improve quality assurance. The previous procedure used the single-point, "simple method of additions," one of the methods recommended by the manufacturer of the graphite furnace atomic absorption analytical equipment. The current method is based on EPA Contract Laboratory Program protocol. It uses multi-point calibration curves, periodic validation of the curve with EPA validation standards, and periodic blank and sample checks to assure absence of equipment contamination and matrix effects during the analysis.

* Effluent volume for one location is missing, a six month average was used to represent the missing effluent volume.
** Incomplete lab analysis. Please see Executive Summary for further information.
*** See Appendix C for corrections and updates on previously reported information.

TRITIUM MEASURED IN EFFLUENT AIR

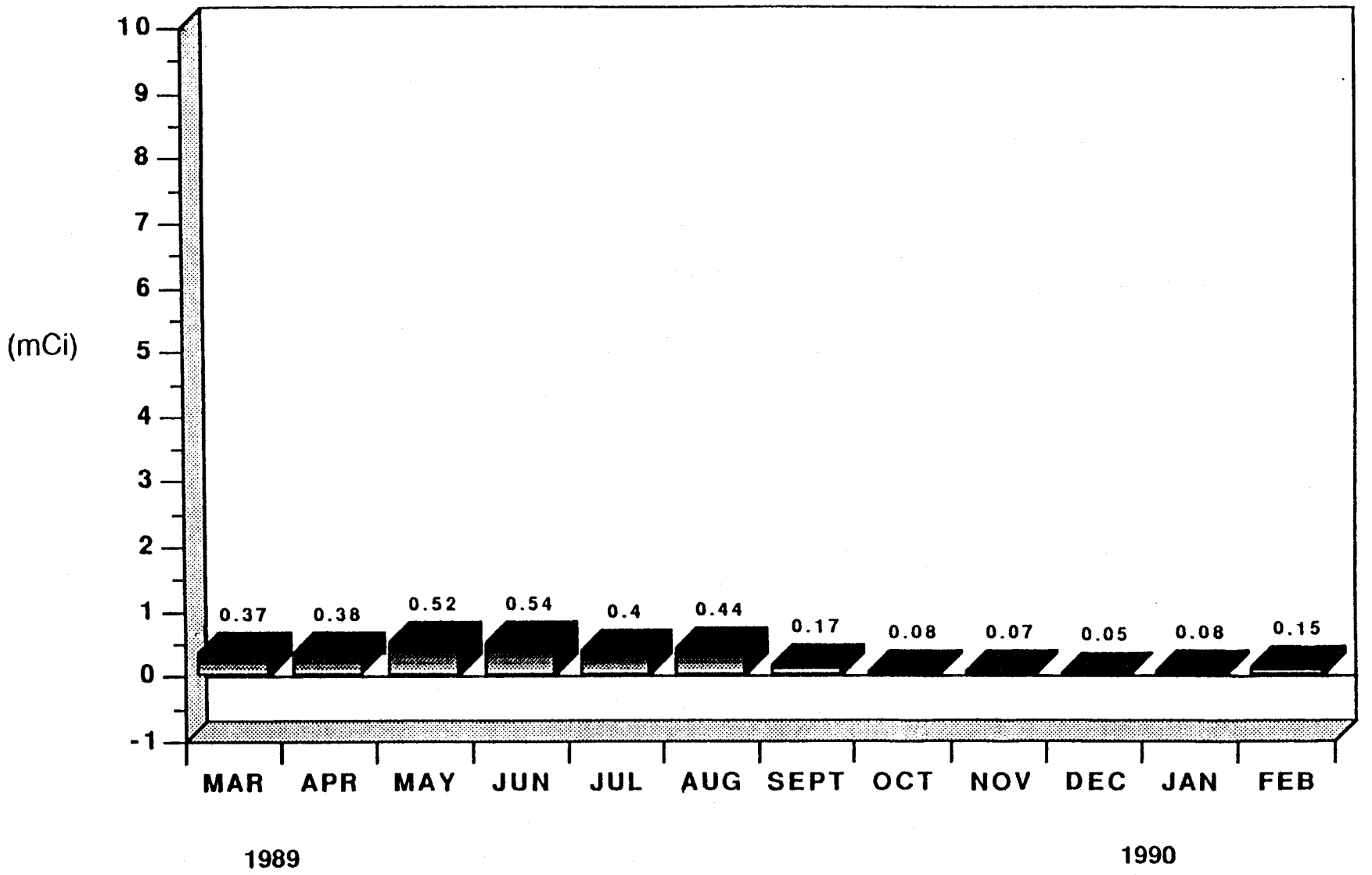
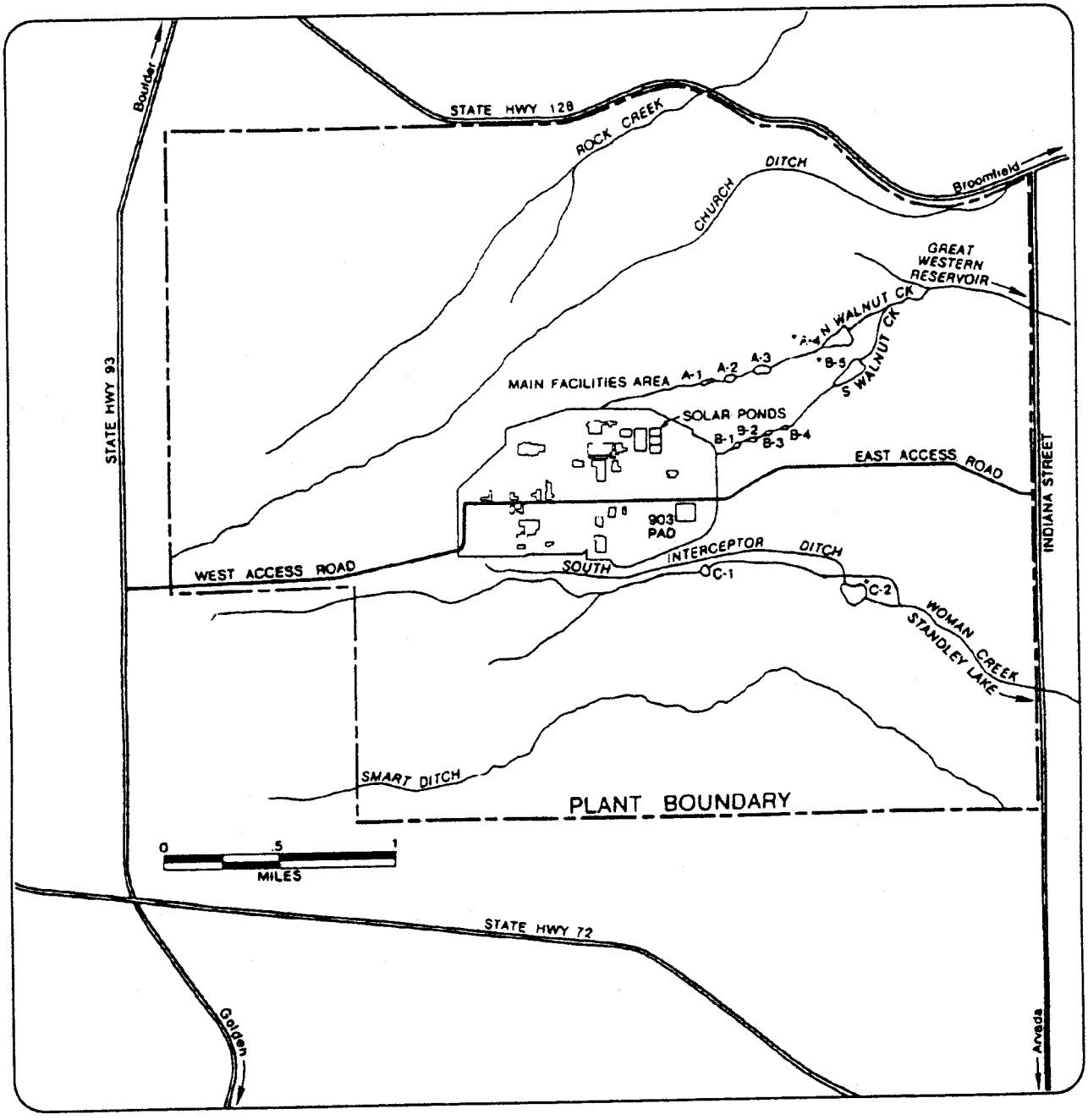


FIGURE 3

Holding Ponds and Liquid Effluent Watercourses



* Diversion capabilities exist for indicated locations.

Table IX

Offsite Water Sample Results - Nitrate as Nitrogen

February 1991

Nitrate (as N) at Great Western Reservoir

Sample Date	Nitrate (as N) (mg/l)
02-07-91	0.02
02-14-91	0.05
02-21-91	<0.02
02-28-91	0.02

Nitrate (as N) at Standley Lake

Sample Date	Nitrate (as N) (mg/l)
02-07-91	0.28
02-14-91	0.10
02-21-91	0.17
02-28-91	0.07

NOTE: For some nonradioactive parameters, the concentrations that are measured at or below the minimum detectable concentration (MDC) are assigned to MDC. The less than symbol (<) indicates MDC values and calculated values that include one or more MDCs.

Table X

NPDES Permit Water Sample Results

February 1991

Discharge 001 (Pond B-3)

Continuous discharge from 02-01-91 through 02-28-91

Parameters		Measured 30-Day Average	Limits 30-Day* Average	Measured Daily Maximum	Limits Daily Maximum
Biochem. oxygen demand, 5 day	mg/l	6.9	10	11.0	25
Total suspended solids	mg/l	4	30	8	NA
Nitrates as N	mg/l	1.73	10	2.40	NA
Total chromium	mg/l	<0.006	0.05	<0.006	0.1
Total phosphorus	mg/l	0.41	8	0.54	NA
Oil and grease, visual	No visual	No visual	NA	No visual	NA
Total residual chlorine	mg/l	0.04	NA	0.30	0.5
Fecal coliforms (geometric mean)	#/100 ml	<10	200	<10	NA

Parameter		Measured Daily Minimum	Limits Daily Minimum	Measured Daily Maximum	Limits Daily Maximum
pH	SU	6.78	6.0	7.90	9.0

Discharge 002 (Pond A-3)

No discharge

Parameters		Measured 30-Day Average	Limits 30-Day* Daily Average	Measured Daily Maximum	Limits Daily Maximum
Nitrates as N	mg/l	No discharge	10	No discharge	20

		Measured Daily Minimum	Limits Daily Minimum	Measured Daily Maximum	Limits Daily Maximum
pH	SU	8.3	6.0	8.6	9.0

Discharge 003 (RO Pilot Plant)

No discharge

Parameter		Measured Daily Minimum	Limits Daily Minimum	Measured Daily Maximum	Limits Daily Maximum
pH	SU	No discharge	6.0	No discharge	9.0

* This limitation applies when a minimum of three consecutive samples are taken during separate weeks.

Table X

NPDES Permit Water Sample Results (Continued)

February 1991

Discharge 004 (RO Plant)
No discharge

Parameters		Measured 30-Day Average	Limits 30-Day* Average	Measured Daily Maximum	Limits Daily Maximum
Total suspended solids	mg/l	No discharge	15	No discharge	25
Total organic compounds	mg/l		22		30
Total phosphorus	mg/l		8		12
Nitrates as N	mg/l		10		20
Total chromium	mg/l		0.05		0.1
Total residual chlorine	mg/l		NA		0.5
		7-Day Average	7-Day Average	30-Day Average	30-Day Average
Fecal coliform	#/100 ml	No discharge	400	No discharge	200
		Daily Minimum	Daily Minimum	Daily Maximum	Daily Maximum
pH	SU	No discharge	6.0	No discharge	9.0

Discharge 005 (Pond A-4)

Discharge occurred 02-01-91 through 02-28-91

Parameters		No. of Samples	CMinimum	CMaximum	CAverage
pH	SU	5	7.51	8.15	N/A
Nitrates as N	mg/l	4	3.70	3.86	3.78
Nonvolatile	mg/l	4	0	0	0

Discharge 006 (Pond B-5)

No discharge

Parameters		No. of Samples	CMinimum	CMaximum	CAverage
pH	SU	No discharge			
Nitrates as N	mg/l				
Nonvolatile suspended solids	mg/l				

Discharge 007 (Pond C-2)

No discharge

Parameters		No. of Samples	CMinimum	CMaximum	CAverage
pH	SU	No discharge			
Nitrates as N	mg/l				
Nonvolatile suspended solids	mg/l				

Table XI

Water Sample Results, Nonradioactive Parameters

February 1991

Walnut Creek at Indiana Street

Parameters		Number of Samples	CMinimum	CMaximum	CAverage
pH	SU	28	7.17	8.28	7.87
Nitrates as N	mg/l	19	3.97	4.91	4.61

Total Volume (gallons) = 13,334,282

Table XII

Daily Flow Data Recorded at the Walnut Creek at Indiana Gaging Station Ponds A-4 and B-5

February 1991

Date	Walnut Creek At Indiana (Gallons)	Pond A-4 (Gallons)	Pond B-5 (Gallons)
02/01/91	No flow	142,395	No discharge
02/02/91	457,087	407,115	
02/03/91	495,646	416,803	
02/04/91	442,300	467,234	
02/05/91	488,978	375,271	
02/06/91	472,641	367,854	
02/07/91	447,462	450,918	
02/08/91	469,566	292,968	
02/09/91	521,846	410,869	
02/10/91	504,647	506,300	
02/11/91	392,258	430,152	
02/12/91	555,345	378,237	
02/13/91	529,098	477,617	
02/14/91	535,597	461,301	
02/15/91	494,704	375,271	
02/16/91	583,094	480,584	
02/17/91	560,214	378,237	
02/18/91	449,520	422,736	
02/19/91	486,437	400,487	
02/20/91	519,764	447,952	
02/21/91	551,303	427,186	
02/22/91	506,748	485,034	
02/23/91	536,480	396,037	
02/24/91	413,668	404,937	
02/25/91	360,397	462,784	
02/26/91	435,886	397,520	
02/27/91	559,944	427,186	
02/28/91	563,652	424,219	
Total	13,334,282	11,515,204	No discharge

Table XIII

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

February 1991

Date	Pond C-1 (Gallons)	Pond C-2 (Gallons)
02/01/91	286,000	No discharge
02/02/91	*	
02/03/91	*	
02/04/91	890,000	
02/05/91	580,000	
02/06/91	680,000	
02/07/91	470,000	
02/08/91	512,000	
02/09/91	*	
02/10/91	*	
02/11/91	1,998,000	
02/12/91	870,000	
02/13/91	680,000	
02/14/91	300,000	
02/15/91	230,000	
02/16/91	*	
02/17/91	*	
02/18/91	720,000	
02/19/91	130,464	
02/20/91	162,000	
02/21/91	149,616	
02/22/91	201,600	
02/23/91	*	
02/24/91	*	
02/25/91	379,872	
02/26/91	182,160	
02/27/91	172,800	
02/28/91	172,656	
Total	9,767,168	No discharge

* Flow readings are not taken on weekends or holidays at Pond C-1. The flow reading for the following Monday or day after holiday(s) reflects the cumulative flow over the period.

SITE METEOROLOGY AND CLIMATOLOGY

Meteorological data were collected on the plantsite from instrumentation installed on a 61-meter (200-foot) tower located in the west buffer zone during February 1991. Meteorological information in this report represents 99 percent data recovery (data loss was a result of instrument maintenance, instrument failure and data validation/ quality assurance procedures). Table XIV is the February 1991 summary of the percent frequency of wind directions (16 compass points) divided into four wind speed categories. The compass point designations indicate the true bearing when facing against the wind. These frequency values are represented graphically in the accompaning wind rose. The wind rose vectors also represent the bearing the wind (i.e., wind along each vector blows toward the center).

The predominance of northwesterly winds is typical of Rocky Flats. The low frequency of winds greater than 7 meters per second (m/s) (15.6 mph) with easterly components is normal.

The mean wind speed for February 1991 was 4.2 m/s (9.4 mph). The highest wind speed for February 1991 was 31.3 m/s (70 mph) on February 21, 1991, at 6:30 p.m.

The mean temperature recorded for February 1991 was 4.7°C (40.5°F). The maximum temperature recorded was 14.6°C (58.3°F) on February 22, 1991, at 3:15 p.m. The minimum temperature recorded was -10.1°C (13.8°F) on February 25, 1991, at 12:15 a.m.

In February 1991, the Rocky Flats Plant recorded 0.10 centimeters (0.04 inches) of precipitation. The maximum precipitation for a 15-minute period was .03 centimeters (0.01 inches). Table XV presents the daily total precipitation for the month of February 1991.

Table XIV

Rocky Flats Plant
Wind Direction Frequency (Percent) by Four Wind-Speed Classes

(Fifteen-Minute Averages - February 1991)

	Calm	1-3 (m/s)	3-7 (m/s)	7-15 (m/s)	>15 (m/s)	TOTAL
-	1.39	-	-	-	-	1.39
N	-	1.46	1.61	0.11	0.00	3.18
NNE	-	2.33	2.48	0.45	0.00	5.26
NE	-	2.14	1.31	0.04	0.00	3.49
ENE	-	1.20	0.64	0.00	0.00	1.84
E	-	1.24	0.23	0.04	0.00	1.51
ESE	-	1.61	0.38	0.00	0.00	1.99
SE	-	2.18	0.53	0.00	0.00	2.71
SSE	-	2.70	3.12	0.00	0.00	5.82
S	-	3.08	2.89	0.00	0.00	5.97
SSW	-	2.33	1.95	0.00	0.00	4.28
SW	-	2.59	2.89	0.00	0.00	5.48
WSW	-	2.82	6.65	0.00	0.00	9.47
W	-	2.93	4.54	1.58	0.00	9.05
WNW	-	4.54	5.22	7.55	0.45	17.76
NW	-	3.72	5.78	4.39	0.00	13.89
NNW	-	2.48	3.94	0.49	0.00	6.91
TOTALS	1.39	39.35	44.16	14.65	0.45	100.00

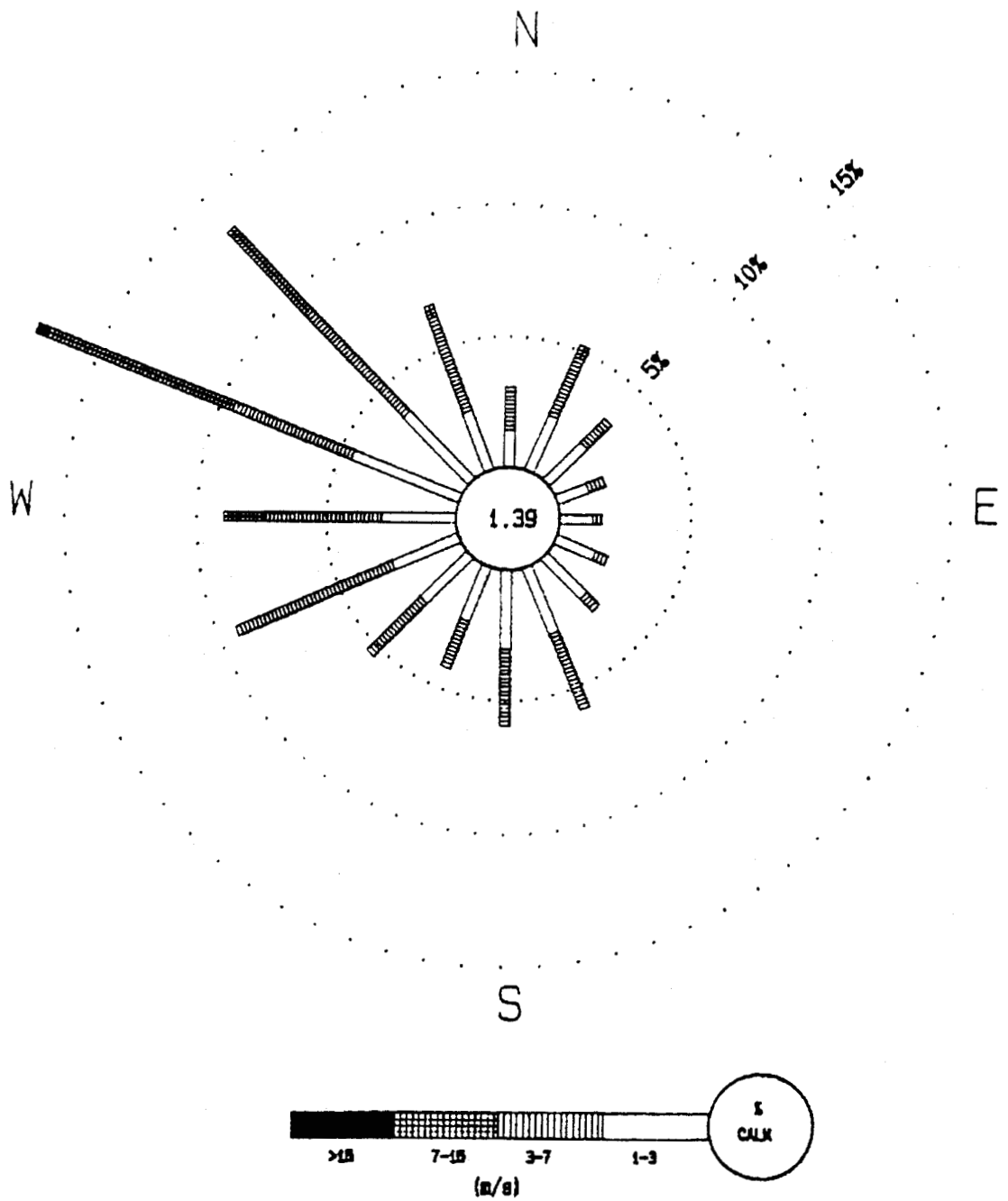
Table XV

Precipitation Report, February 1991

Date	Daily Total
02-24-91	.04 inches
Total Precipitation	.04 inches

Wind Rose for the Rocky Flats Plant

February 1991



Abbreviations

CAverage	Average concentration
CMaximum	Maximum concentration
CMinimum	Minimum concentration
m^3	Cubic meter
m/s	Meters per second
mCi	Millicurie
mg/l	Milligrams per liter
mrem	Millirem
pCi/l	Picocuries per liter
pCi/m^3	Picocuries per cubic meter
pH	Hydrogen ion concentration
SU	Standard Unit
$\mu g/m^3$	Micrograms per cubic meter
#/100 ml	Number per 100 milliliter
µCi	Microcurie

Appendix A

RADIATION STANDARDS FOR PROTECTION OF THE PUBLIC

Calculation of Potential Plant Contribution to Public Radiation Dose

The primary standards for protection of the public from radiation are based on radiation dose. Radiation dose is a means of quantifying the biological damage or risk of ionizing radiation. The unit of radiation dose is the rem or the millirem (1 rem = 1,000 mrem). Radiation protection standards for the public are annual standards, based on the projected radiation dose from a year's exposure to or intake of radioactive materials.

Radiation dose is a calculated value. It is calculated by multiplying radioactivity concentrations in air and water or on contaminated surfaces by assumed intake rates (for internal exposures) or exposure times (for external exposure to penetrating radiation), then by the appropriate radiation dose conversion factors. That is:

Radiation Dose =
Radioactivity Concentration X
Intake Rate/Exposure Time X
Dose Conversion Factor

Radioactivity concentrations can be determined either by measurements in the environment or by calculations using computer models. These computer models perform airborne dispersion/dose modeling of measured building radioactivity effluents and estimated diffuse source term emissions (e.g., from resuspension from contaminated soil areas).

Assumed intake rates and dose conversion factors used are based on recommendations of national and international radiation protection advisory organizations, such as the National Council on Radiation Protection and Measurements (NCRP) and the International Commission on Radiological Protection (ICRP).

Radioactive materials of importance in calculating radiation dose to the public from Rocky Flats Plant activities include plutonium, uranium, americium, and tritium. Alpha radiation emissions from plutonium, uranium, and americium are primary contributors to the projected radiation dose.

DOE Radiation Protection Standards for the Public

ICRP- RECOMMENDED STANDARDS FOR ALL PATHWAYS:

Temporary Increase -	500 mrem/year Effective Dose Equivalent* (with prior approval of DOE EH-2)
Normal Operations -	100 mrem/year Effective Dose Equivalent

EPA CLEAN AIR ACT STANDARDS FOR THE AIR PATHWAY ONLY:

10 mrem/year Effective Dose Equivalent

Potential public radiation dose commitments, which could have resulted from plant operations and from background (i.e., non-Plant) contributions, are calculated from average radionuclide concentrations measured at the Department of Energy (DOE) property boundary and in surrounding communities. Inhalation and water ingestion are the principal potential pathways of human exposure.

On February 8, 1990, DOE adopted DOE Order 5400.5, "Radiation Protection of the Public and the Environment," a radiation protection standard for DOE environmental activities (US 90). This standard incorporates guidance from the International Commission on Radiological Protection (ICRP), as well as from the Environmental Protection Agency Clean Air Act air emission standards (as implemented in 40 CFR 61, Subpart H). Included in DOE Order 5400.5 is a revision of the dose limits for members of the public. Tables of radiation dose conversion factors currently used for calculating dose from intakes of radioactive materials were issued in July 1988 (US88a, US88b). The dose factors are based on the ICRP Publications 30 and 48 methodology and biological models for radiation dosimetry. The DOE Order 5400.5 and the dose conversion factor tables are used for assessment of any potential Rocky Flats Plant contribution to public radiation dose. On December 15, 1989, EPA published revised Clean Air Act air emission standards for DOE facilities (US89). DOE radiation standards for protection of the public are given in this Appendix and include the December 15, 1989, EPA Clean Air Act air pathway standards.

DOE Derived Concentration Guides

Secondary radioactivity concentration guides can be calculated from the primary radiation dose standards and used as comparison values for measured radioactivity concentrations. DOE provides tables of these "Derived Concentration Guides" - in 5400.5. Derived Concentration Guides (DCGs) are the concentrations that would result in an effective dose equivalent of 100 mrem from one year's chronic exposure or intake. In calculating air inhalation DCGs, DOE assumes that the exposed individual inhales 8,400 cubic meters of air at the calculated DCG during the year. Ingestion DCGs assume a water intake of 730 liters at the calculated DCG for the year. The accompanying table lists the most restrictive air and water DCGs for the principal radionuclides of interest at the Rocky Flats Plant.

DOE DERIVED CONCENTRATION GUIDES FOR RADIONUCLIDES OF INTEREST AT THE ROCKY FLATS PLANT

AIR INHALATION:

Radionuclide	DCG (pCi/m3)
Plutonium-239, -240	0.02

WATER INGESTION:

Radionuclide	DCG (pCi/l)
Plutonium-239, -240	30
Americium-241	30
Uranium-233, -234, -238	500
Hydrogen-3 (Tritium)	2,000,000

Compliance with EPA Clean Air Act Standards

To determine compliance with the EPA air emissions standards, measured airborne effluent radioactivity emissions and estimated radioactivity resuspension from soil are entered into the EPA-approved atmospheric dispersion/dose calculation computer model, AIRDOS-PC, for calculation of the maximum radiation dose that an individual in the public could receive from the air pathway only.

For comparison with the annual radiation dose standards for protection of the public, the maximum annual effective dose equivalent that a member of the public could receive as a result of Rocky Flats Plant activities is typically less than 1 mrem, or less than 1 percent of the recommended annual standard for all pathways.

References

US88a DOE/EH-0070, "External Dose-Rate Conversion Factors for Calculation of Dose to the Public," U.S. Dept. of Energy, Asst. Secretary for Environment, Safety and Health, July 1988.

US88b DOE/EH-0071, "Internal Dose Conversion Factors for Calculation of Dose to the Public," U.S. Dept. of Energy, Asst. Secretary of Environment, Safety and Health, July 1988.

US89 U.S. Environmental Protection Agency, Code of Federal Regulations 40 CFR 61, Subpart H, "National Emission Standards of Emissions of Radionuclides other than Radon from Department of Energy Facilities," Washington D.C., December 15, 1989.

US90 U.S. Department of Energy, DOE Order 5400.5, "Radiation Protection of the Public and the Environment," Washington, D.C., February 8, 1990.

***NOTE:** "Dose equivalent" is a calculated value used to quantify radiation dose; it reflects the degree of biological effect from ionizing radiation. Differences in the biological effect of different types of ionizing radiation (e.g., alpha, beta, gamma, or x-rays) are accounted for in the calculation of dose equivalent.*

"Effective dose equivalent" is a calculated value used to allow comparisons of total health risk (based primarily on the risk of cancer mortality) from exposures of different types of ionizing radiation to different body organs. It is calculated by first calculating the dose equivalent to those organs receiving significant exposures, multiplying each organ dose equivalent by a health risk weighting factor, and then summing those products. One millirem effective dose equivalent from natural background radiation would have the same health risk as one millirem effective dose equivalent from an artificially produced source of radiation.

Appendix B

COLORADO WATER QUALITY CONTROL COMMISSION STANDARDS

The Colorado Water Quality Control commission has promulgated new standards for the Walnut and Woman Creek drainages downstream from the Rocky Flats Plant. EPA has not yet written a new NPDES permit that reflects these standards; however, in the spirit of the Agreement in Principle completed between DOE and the State of Colorado, the plant is attempting to meet the standards at this time.

Appendix C

CORRECTIONS AND UPDATES FOR PREVIOUSLY REPORTED INFORMATION

Table II

1990 Tritium, Beryllium, and Americium Airborne Effluent Data

December 1990

	Tritium, H-3 (11/30/90 - 12/31/90)		Beryllium (11/20/90 - 12/18/90)		Americium-241 (10/15/90 - 11/20/90)	
Month	Release (mCi)	CMaximum (pCi/m^3)	Release (grams)	CMaximum ($\mu g/m^3$)	Release (μCi)	CMaximum (pCi/m^3)
CY 1989	175.585	14000 ± 320	0.6442	0.00106	1.17	0.003 ± 0.0046
January	0.375	35 ± 6	0.0503*	0.00080	0.11	0.000 ± 0.0001
February	0.451	88 ± 7	0.0634*	0.00051	0.01	0.000 ± 0.0000
March	0.370	72 ± 13	0.0782*	0.00032	0.01	0.000 ± 0.0001
April	0.382	68 ± 19	0.0535*	0.00038	0.20	0.001 ± 0.0002
May	0.518	64 ± 5	0.1048*	0.00136	0.00	0.000 ± 0.0000
June	0.538	37 ± 7	0.1470*	0.00048	0.03	0.000 ± 0.0002
July	0.402	33 ± 2	0.2148*	0.00082	0.00	0.000 ± 0.0000
August	0.433	44 ± 4	0.0764*	0.00036	0.02[a]	0.001 ± 0.0007
September	0.172	6 ± 8	0.1976*	0.00081	0.011	0.0001 ± 0.0003
October	0.081[d]	5 ± 5	0.2094*	0.00107	0.007	0.0001 ± 0.0000
November	0.069[d]	13 ± 6	0.1838*	0.00050	0.007[b,c]	0.0000 ± 0.0000
December	0.052[d]	29 ± 4	0.0941*	0.00043		
Year to Date	3.849	88 ± 7	1.4734*	0.00136	0.399	0.001 ± 0.0007

NOTE: Beryllium measured at the remaining 44 locations was below the screening level of 0.1 gram per month.

The calibration methodology for the beryllium analyses was changed beginning with the September samples to improve quality assurance. The previous procedure used the single-point, "simple method of additions," one of the methods recommended by the manufacturer of the graphite furnace atomic absorption analytical equipment. The current method is based on EPA Contract Laboratory Program protocol. It uses multi-point calibration curves, periodic validation of the curve with EPA validation standards, and periodic blank and sample checks to assure absence of equipment contamination and matrix effects during the analysis.

* No blank correction

[a] One sample was accidentally destroyed. An average of six previous months' data was used to represent its activity.

[b] The particulate filters for one sample location could not be collected due to a temporary inaccessibility of the sampler. The data will be included in the December americium data.

[c] The data for one americium location are missing due to a bad planchet. The sample is being rerun.

[d] Corrected tritium results for 1990. The last three months (Oct. - Dec.) were reported using incorrect effluent volume data.

Table VIII

Onsite and Offsite Water Sample Results - Tritium

January 1991

Tritium (pCi/l)

Location	Number of Samples	CMinimum	CMaximum	CAverage
Pond A-4	4	-20 ± 150	80 ± 150	15 ± 50
Pond C-1	2	-170 ± 150	-70 ± 150	-120 ± 70
Boulder	2	-70 ± 150	-20 ± 150	-40 ± 40
Broomfield	1	-100 ± 150	-100 ± 150	-100 ± 150
Great Western	2	0 ± 150	140 ± 170	70 ± 90
Standley	2	90 ± 160	130 ± 170	110 ± 20
Westminster	1	-90 ± 150	-90 ± 150	-90 ± 150
Walnut and Indiana**	*			

*Incomplete lab analysis. Please see Executive Summary for further information.

** Volume weighted average concentration