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Colorado Department of Health

Environmental Surveillance Report

on the

U.S. Department of Energy

Rocky Flats Plant

JULY 1990

Monthly Information Exchange Meeting

This is a numerical summary of data accumulated during

JULY 1990

pertaining to environmental surveillance activities of the Department Also included are additional data not previously reported for earlier periods

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ADMIN RECORD

COLORADO DEPARTMENT OF HEALTH

ENVIRONMENTAL SURVEILLANCE REPORT

ON THE U S DEPARTMENT OF ENERGY ROCKY FLATS PLANT

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COLORADO DEPARTMENT OF HEALTH

ENVIRONMENTAL SURVEILLANCE REPORT

ON THE U S DEPARTMENT OF ENERGY ROCKY FLATS PLANT

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COLORADO DEPARTMENT OF HEALTH
Radiation Control Division
Gross Alpha and Gross Beta Radioactivity in Suspended Airborne Particulate Material

Table A

JUL 1990

	Sampler Type	Number of Samples	**** Gross Alpha Radioactivity ***** Mean Concen. pCi/m^3	+/- 95%CI pCi/M^3	Max pCi/M^3	Min pCi/M^3	**** Gross Beta Radioactivity ***** Mean Concen. pCi/M^3	+/- 95%CI pCi/M^3	Max pCi/M^3	Min pCi/M^3	Total Volume M^3
	*******	*******	*******	*********	*******	*******	*******	*********	*******	*******	******
**** ROCKY FLATS ON-SITE (SECURITY) TSP ****											
RF-1 ON-SITE (Security)	TSP/C/4	8	<0.0007	0.0007	0.0015	<0.0003	0.003	0 002	0.004	0.001	23598
RF-2 ON-SITE (Security)	TSP/C/4	9	<0.0006	0.0007	0.0015	<0.0003	0.003	0.002	0.004	0 002	26133
RF-3 ON-SITE (Security)	TSP/C/4	5	<0.0006	0.0003	<0.0007	0.0004	<0.003	0.003	0.005	<0.001	21518
RF-4 ON-SITE (Security)	TSP/C/4	9	<0.0007	0.0008	0.0017	<0.0005	0.003	0.002	0.004	0.002	30585
JUL GROUP SUMMARY		31	<0.0007	0.0007	0.0017	<0.0003	<0.003	0.002	0.005	<0.001	101834
**** ROCKY FLATS ON-SITE (PERIMETER) TSP ****											
RF-5 ON-SITE (Perimeter)	TSP/C/4	8	<0.0010	0.0016	0.0029	0.0004	0.004	0.003	0.006	0.002	27937
RF-6 ON-SITE (Perimeter)	TSP/C/4	9	<0.0008	0.0007	0.0016	0.0004	0.004	0 002	0.005	0.002	34482
RF-7 ON-SITE (Perimeter)	TSP/C/4	9	<0.0005	0.0003	0.0008	0.0003	0.003	0.002	0.004	0.001	39315
RF-8 ON-SITE (Perimeter)	TSP/C/4	7	<0.0009	0.0010	0.0019	<0.0005	0.005	0.003	0.006	0 002	23075
JUL GROUP SUMMARY		33	<0 0008	0.0010	0.0029	0.0003	0.004	0.003	0.006	0 001	124809
**** OFF-SITE (ROCKY FLATS PLANT VICINITY) TSP ****											
ARVADA SH 72 & Indiana Street	TSP/C/7	5	<0.0005	<.0001	0.0006	0.0005	0.003	0.002	0.004	0.002	35073
BROOMFIELD 18 Garden Ofc. Ctr	TSP/C/7	5	0.0007	0 0008	0.0014	0.0004	0.003	<.001	0 004	0 003	37146
WESTMINSTER 10100 Garland Str	TSP/C/7	4	0 0010	0.0017	0.0023	0.0003	0 004	0 003	0.005	0.002	26917
JUL GROUP SUMMARY		14	<0.0007	0.0010	0.0023	0.0003	0.003	0.002	0.005	0.002	99136
**** OFF-SITE (METROPOLITAN DENVER) TSP ****											
ADAMS CITY 4201 E 72nd Ave	TSP/6	5	<0.0011	0 0002	<0.0012	<0.0010	0 005	0.002	0.005	0.003	8155
BOULDER 13th & Spruce	TSP/6	5	<0.0010	<.0001	<0.0010	<0.0010	0 004	0.003	0.006	0.002	8261
DENVER CAMP A 2105 Broadway	TSP/6	5	<0 0010	0 0002	0.0011	<0.0009	<0.003	0.003	0.005	<0.002	9083
DENVER GATES A 1050 S Broadwa	TSP/6	5	<0 0011	0.0003	0.0013	<0 0010	0.004	0 003	0.006	0 002	8181
JUL GROUP SUMMARY		20	<0 0011	0.0002	0.0013	<0.0009	<0.004	0.003	0 006	<0.002	33680
**** OFF-SITE (METROPOLITAN DENVER) PM-10 ****											
ADAMS CITY 4201 E 72nd Ave	PM10/6	5	<0.0012	< 0001	<0.0012	<0 0011	<0.003	<.001	<0.003	<0.003	6632
ARVADA 8101 Ralston Road	PM10/6	2	<0.0012	< 0001	<0.0012	<0.0012	0.004	<.001	0.004	0.004	2755
BOULDER 13th & Spruce	PM10/6	3	<0 0011	<.0001	<0.0011	<0.0011	<0.003	0 003	0 005	<0.002	4233
DENVER CAMP A 2105 Broadway	PM10/6	5	<0.0019	0.0033	0.0049	<0.0011	<0.003	< 001	0 003	<0 003	6775
DENVER GATES A 1050 S Broadwa	PM10/6	5	<0 0013	0 0004	0 0016	<0 0012	<0.003	< 001	<0 003	<0 003	6629
JUL GROUP SUMMARY		20	<0.0014	0.0016	0.0049	<0.0011	<0.003	0 001	0 005	<0 002	27024
**** OFF-SITE (REMOTE) TSP ****											
COLO SPGS 3730 N Meadowland	TSP/6	0									
DURANGO Court House	TSP/6	0									
LEADVILLE 510 Harrison Ave	TSP/6	5	<0 0010	< 0001	<0.0010	<0 0010	0 004	0 001	0 005	0 003	7779
COLORADO NATIONAL MONUMENT	TSP/6	3	<0 0012	0 0004	0 0014	<0 0010	<0 003	0 002	0.004	<0 002	4306
STERLING 3rd & Ash Street	TSP/6	0									
PLATTEVILLE City Hall	TSP/6	5	<0 0009	0.0001	<0 0010	<0.0009	<0 004	0 002	0 005	<0 002	8967
JUL GROUP SUMMARY		13	<0.0010	0 0003	0 0014	<0.0009	<0 004	0 002	0 005	<0 002	21052
**** OFF-SITE (REMOTE) PM-10 ****											
COLO SPGS 3730 N Meadowland	PM10/1	5	<0 0016	0.0018	0.0033	<0 0011	<0 003	0.003	0.006	<0.003	6488
JUL GROUP SUMMARY		5	<0 0016	0 0018	0.0033	<0.0011	<0 003	0 003	0 006	<0.003	6488

TABLE B-1
AIR SURVEILLANCE SUMMARY
MONTHLY COMPARISON DATA
ROCKY FLATS ON SITE (SECURITY) TSP
1989 and 1990

	NUMBER OF SAMPLES	Long-lived Gross Alpha (pCi/M^3) Mean	Std. Dev.	Max.	Min.	Long-lived Gross Beta (pCi/M^3) Mean	Std. Dev.	max.	min.	VOLUME M^3
1989										
July	30	<0.006	0.005	0.032	<0.003	<0.02	<0.01	0.03	0.00	127333
August	36	<0 004	0.001	0.008	<0.002	<0.02	<0.01	0.04	<0.01	167524
September	34	<0.005	0.004	0.023	<0.002	<0.03	0.01	0.05	<0.01	146757
October	32	<0 005	0.004	0.016	<0.002	<0.02	<0.01	0.04	0.01	138979
November	30	<0.003	0.001	0.008	<0.002	<0.03	<0.01	0.04	0.01	134941
December	33	<0.004	0.002	<0.013	<0.002	<0.03	0.02	0.11	<0.01	140470
1989 Annual Summary		<0.004	0.002	0.032	<0.002	<0.02	<0.01	0.11	0.00	

	NUMBER OF SAMPLES	Long-lived Gross Alpha (pCi/M^3) Mean	95% CI	Max.	Min.	Long-lived Gross Beta (pCi/M^3) Mean	95% CI	max.	min.	VOLUME M^3
1990										
January	36	<0.0008	0.0005	0.0017	<0.0004	<0.003	0.003	0.005	<0.001	148373
February	30	<0.0008	0.0006	0.0020	<0.0004	0.004	0.003	0.007	0.001	116944
March	29	<0.0006	0.0004	0.0011	<0.0003	0.003	0.003	0.009	0.001	119877
April	25	<0.0007	0.0005	0.0016	<0.0004	<0.002	0.001	0.004	0.001	75752
May	32	<0.0007	0.0003	0.0010	<0.0004	<0.003	0.002	0.005	<0.001	106901
June	34	<0.0007	0.0005	0 0016	0.0003	<0.003	0.002	0.006	<0.001	110758
July	31	<0.0007	0.0007	<0.0017	<0.0003	<0.003	0.002	0.005	<0.001	101834

max. = maximum individual sample concentration observed in period reported
min. = minimum individual sample concentration observed in period reported

SI Unit Equivalent: 1 pCi/M^3 = .037 Bq/M^3
20 pCi/M^3 = 0.74 Bq/M^3

TABLE B-2
AIR SURVEILLANCE SUMMARY
MONTHLY COMPARISON DATA
ROCKY FLATS ON SITE (PERIMETER) TSP
1989 and 1990

	NUMBER OF SAMPLES	Long-lived Gross Alpha (pCi/M^3) Mean	Std. Dev.	Max.	Min.	Long-lived Gross Beta (pCi/M^3) Mean	Std. Dev.	max.	min.	VOLUME M^3
1989										
July	32	<0.004	0.001	0.008	0.003	0.03	<0.01	0.04	0.01	145575
August	32	<0.003	0.001	0.006	<0.002	<0.02	<0.01	0.04	<0.01	156582
September	35	<0.003	0.001	0.008	<0.001	<0.03	0.01	0.06	<0.01	163488
October	36	<0.004	0.002	0.012	0.001	<0.02	<0.01	<0.06	<0.01	160928
November	33	<0.003	<0.001	<0.006	<0.002	0.03	<0.01	0.05	<0.01	157493
December	31	<0.003	0.002	<0.011	<0.002	<0.03	0.02	0.11	0.01	144356
1989 Annual Summary		<0.003	0.001	0.012	0.001	<0.02	<0.01	0.11	<0.01	

	NUMBER OF SAMPLES	Long-lived Gross Alpha (pCi/M^3) Mean	95% CI	Max.	Min.	Long-lived Gross Beta (pCi/M^3) Mean	95% CI	max.	min.	VOLUME M^3
1990										
January	36	<0.0009	0.0025	<0.0072	0.0003	<0.003	0.004	<0.010	0.001	154266
February	32	<0.0007	0.0004	0.0014	<0.0004	<0.004	0.003	0.007	0.001	145378
March	30	<0.0005	0.0006	0.0014	<0.0003	0.002	0.002	0.005	0.001	135991
April	30	<0.0006	0.0004	0.0012	<0.0003	<0.003	0.001	0.004	0.001	111235
May	33	<0.0007	0.0007	0.0017	<0.0002	<0.002	0.002	0.005	0.001	127999
June	27	<0 0008	0.0005	0.0018	<0.0006	<0.004	0.003	<0.007	0.001	102491
July	33	<0.0008	0.0010	0.0029	0.0003	0.004	0.003	0.006	0.001	124809

max. = maximum individual sample concentration observed in period reported
min. = minimum individual sample concentration observed in period reported

SI Unit Equivalent: 1 pCi/M^3 = .037 Bq/M^3
20 pCi/M^3 = 0.74 Bq/M^3

TABLE B-3
AIR SURVEILLANCE SUMMARY
MONTHLY COMPARISON DATA
OFF-SITE (ROCKY FLATS PLANT VICINITY) TSP
1989 and 1990

	NUMBER OF SAMPLES	Long-lived Gross Alpha (pCi/M^3) Mean	Std. Dev.	Max.	Min.	Long-lived Gross Beta (pCi/M^3) Mean	Std. Dev.	max.	min.	VOLUME M^3
1989										
July	12	<0.005	0.002	0.010	<0.002	0.02	<0.01	0.03	0.01	88755
August	14	<0.003	0.001	0.007	<0.002	0.02	<0.01	0.03	0.01	101904
September	11	0.004	0.001	0.005	0.002	0.02	<0.01	0.03	0.01	76866
October	15	<0.004	0.002	0.007	0.001	<0.02	<0.01	0.04	<0.01	105545
November	11	<0.003	<0.001	0.005	0.002	0.02	<0.01	0.03	0.01	87901
December	10	<0.004	0.001	<0.006	<0.002	<0.03	0.01	0.04	<0.01	60030
1989 Annual Summary		<0 003	0.001	0.010	0.001	<0.02	<0.01	0.05	<0.01	

	NUMBER OF SAMPLES	Long-lived Gross Alpha (pCi/M^3) Mean	95% CI	Max.	Min.	Long-lived Gross Beta (pCi/M^3) Mean	95% CI	max.	min.	VOLUME M^3
1990										
January	15	<0.0011	0.0015	0.0028	<0.0002	<0.003	0.005	0.012	<0.001	102940
February	12	0.0012	0.0011	0.0022	0.0005	0.004	0.002	0.005	0.001	79198
March	12	<0.0009	0.0006	0.0014	<0.0005	0.003	0.002	0.005	0.002	77264
April	12	<0.0008	0.0006	0.0013	<0.0002	0.003	0.002	0.006	0.000	80242
May	14	<0.0007	0.0006	0.0012	<0.0002	0.003	0.002	0.004	0.001	100007
June	12	<0.0010	0.0008	<0.0018	<0.0004	0.004	0.002	0.005	0.002	76103
July	14	<0.0007	0.0010	0.0023	0.0003	0.003	0.002	0.005	0.002	99136

max. = maximum individual sample concentration observed in period reported
min. = minimum individual sample concentration observed in period reported

SI Unit Equivalent: 1 pCi/M^3 = .037 Bq/M^3
20 pCi/M^3 = 0.74 Bq/M^3

TABLE C
ALPHA SPECTROMETRIC ANALYSIS AND LONG-LIVED GROSS ALPHA RADIOACTIVITY CONCENTRATIONS IN SUSPENDED AIRBORNE PARTICULATE MATERIAL
July 1990

Sampling Location	Period	Pu^{239} pCi/M^3	Long-lived Gross Alpha pCi/M^3	U^{234}/U^{238} Ratio
903 Pad Area	20-Mar-90	Pu-239	186.5 ± 0.5 pCi/gm	
		Am-241	22.9 ± 0.6 pCi/gm	
		Am-241/Pu-239	.123 ± .003	
		Cs-137	<10 pCi/gm	
		U-nat	1.8* pCi/gm	
		U-234/U-238	1.38 ± .04	

* Corrected information

PLEASE NOTE: Reported values for Pu^{239} may include a contribution from Pu^{240}. When apparent positive values for $Pu^{239+240}$ do exist, results are reported as Pu^{239}.

TABLE D
LONG-LIVED GROSS ALPHA AND GROSS BETA RADIOACTIVITY
IN TOTAL SOLIDS CONTAINED IN WATER AND
TRITIUM IN DISTILLED WATER
MONTHLY SURVEILLANCE SUMMARY
July 1990

Sampling Location	Date	GROSS ALPHA pCi/L	GROSS BETA pCi/L	TRITIUM pCi/L
A-3 Pond	No sample			
A-4 Pond	07/17/90	6 ± 4	9 ± 3	<120
B-3 Pond	07/17/90	<5	10 ± 3	<120
B-5 Pond	07/03/90	<6	10 ± 4	<120
	07/10/90	<6	12 ± 4	<120
	07/17/90	<5	9 ± 3	<120
	07/24/90	<6	9 ± 3	<120
	07/31/90	<6	<5	<120
July Average		<6	<9	<120
Walnut Creek (continuous)	07/03/90*			
	07/10/90*			
	07/17/90*			
	07/24/90*			
	07/31/90*			
Walnut Creek East of Indiana Street	07/03/90*			
	07/06/90*			
	07/10/90*			
	07/13/90*			
	07/17/90*			
	07/24/90*			
	07/27/90*			
	07/31/90*			
Broomfield (raw)	07/03/90	<4	<5	<120
	07/10/90	<4	<5	<120
	07/17/90	<4	<5	<120
	07/24/90	<4	<5	<120
	07/31/90	<4	<5	<120
July Average		<4	<5	<120

* Not Running/Dry/Frozen
No Sample/No analysis

SI unit equivalent: 1 pCi/L = .037 Bq/L
20 pCi/l = 0.74 Bq/L

TABLE D
LONG-LIVED GROSS ALPHA AND GROSS BETA RADIOACTIVITY
IN TOTAL SOLIDS CONTAINED IN WATER AND
TRITIUM IN DISTILLED WATER
MONTHLY SURVEILLANCE SUMMARY
July 1990

Sampling Location	Date	GROSS ALPHA pCi/L	GROSS BETA pCi/L	TRITIUM pCi/L
Broomfield (finshed)	07/03/90	<4	<4	<120
	07/10/90	<4	<5	<120
	07/17/90	<4	<5	<120
	07/24/90	<5	<5	<120
	07/31/90	<4	<5	<120
July Average		<4	<5	<120
C-1 Pond	No sample			
C-2 Pond	No sample			
Woman Creek	07/03/90*			
	07/06/90*			
	07/10/90*			
	07/13/90*			
	07/17/90*			
	07/24/90*			
	07/27/90*			
	07/31/90*			
Westminster raw	07/03/90	5 ± 3	<5	<120
	07/17/90	<5	7 ± 3	<120
	07/31/90	<4	<5	<120
July Average		<5	<6	<120
Westminster finished	07/03/90	<4	<5	<120
	07/17/90	<5	<5	<120
	07/31/90	<4	<5	<120
July Average		<4	<5	<120
CDH PPT	07/09/90			<120
	07/16/90			<120
RF-4 PPT	07/10/90			<120
	07/17/90			<120
	07/24/90			<120

* Not Running/Dry/Frozen/
No Sample/No analysis

SI unit equivalent: 1 pCi/L = .037 Bq/L
20 pCi/l = 0.74 Bq/L

TABLE E-1
WATER SURVEILLANCE SUMMARY
MONTHLY COMPARISON DATA
A-4 POND (grab)
1989 - 1990

Date	NUMBER OF SAMPLES	GROSS ALPHA (pCi/L)	GROSS BETA (pCi/L)	TRITIUM (pCi/L)
1989				
July	1	9	10	<200
August	1	8	12	<200
September	1	<9	10	<200
October	1	<8	10	299
November	1	10	12	<200
December*	0	-	-	-
1988 Annual Summary		<11	<12	<208
1990				
January*	0	-	-	-
February*	0	-	-	-
March	1	11	9	<140
April	1	<7	9	<120
May*	0	-	-	-
June*	0	-	-	-
July	1	6	9	<120

* = No sample collected/no discharges

SI unit equivalent: 1 pCi/L = .037 Bq/L
20 pCi/L = 0.74 Bq/L

TABLE E-2
WATER SURVEILLANCE SUMMARY
MONTHLY COMPARISON DATA
B-5 POND (grab)
1989 - 1990

Date	NUMBER OF SAMPLES	Gross Alpha (pCi/L) Mean	max.	min.	Gross Beta (pCi/L) Mean	max.	min.	Tritium (pCi/L) Mean	max.	min.
1989										
July	4	<5	<5	<5	<6	6	<5	<200	<200	<200
August	5	<5	5	<5	<5	6	<5	<200	<200	<200
September	4	<7	9	6	8	9	8	<241	289	<200
October	6	<8	8	<8	<7	8	<5	<200	<200	<200
November	4	<9	11	<8	<7	9	<5	<227	309	<200
December	2	<11	13	<9	7	8	6	<200	<200	<200
1989 Annual Summary		<7	13	<4	<7	12	<5	<207	309	<200
1990										
January	2	<9	<9	<9	<6	6	<5	<140	<140	<140
February	1	9	9	9	8	8	8	<140	<140	<140
March	3	<8	12	4	12	11	12	<140	<140	<140
April	4	<8	<9	<8	11	13	9	<120	<120	<120
May	4	<8	9	<7	10	11	8	<120	<120	<120
June	4	<6	<7	<5	13	10	11	<120	<120	<120
July	5	<6	<6	<5	<9	12	<5	<120	<120	<120

max. = maximum individual sample concentration observed
min. = minimum individual sample concentration observed

SI Unit Equivalent: 1 pCi/L = .037 Bq/L
20 pCi/L = 0.74 Bq/L

TABLE E-3
WATER SURVEILLANCE SUMMARY
MONTHLY COMPARISON DATA
WALNUT CREEK EAST OF INDIANA STREET (grab)
1989 - 1990

Date	NUMBER OF SAMPLES	Gross Alpha (pCi/L) Mean	max.	min.	Gross Beta (pCi/L) Mean	max.	min.	Tritium (pCi/L) Mean	max.	min.
1989										
July *	0									
August	4	<6	6	<6	6	8	7	<200	<200	<200
September	10	<9	11	<6	7	8	5	<200	<200	<200
October	5	<9	10	<8	8	10	6	<215	240	<200
November	1	<8	<8	<8	5	5	5	<200	<200	<200
December*	0									
1989 Annual Summary		<8	11	4	<7	12	<5	<203	240	<200
1990										
January*	0									
February*	0									
March	4	<7	8	<6	8	11	7	<140	<140	140
April	7	<8	10	6	8	10	5	<120	<120	<120
May	8	<8	10	<7	8	9	6	<120	<120	<120
June	1	15	15	15	7	7	7	<120	<120	<120
July*	0									

max. = maximum individual sample concentration observed
min. = minimum individual sample concentration observed

* = No sample collected/creek dry/not running/frozen

SI Unit Equivalent: 1 pCi/L = .037 Bq/L
20 pCi/L = 0.74 Bq/L

TABLE E-4
WATER SURVEILLANCE SUMMARY
MONTHLY COMPARISON DATA
BROOMFIELD-FINISHED (weekly composite)
1989 - 1990

Date	NUMBER OF SAMPLES	Gross Alpha (pCi/L) Mean	max.	min.	Gross Beta (pCi/L) Mean	max.	min.	Tritium (pCi/L) Mean	max.	min.
1989										
July	4	<4	<4	<3	<5	<5	<5	<200	<200	<200
August	5	<3	<4	<3	<5	<5	<5	<200	<200	<200
September	4	<5	<5	<3	<4	<5	<4	<202	208	<200
October	5	<5	<5	<5	<4	4	<4	<200	<200	<200
November	4	<5	<5	<5	<5	<5	<4	<200	<200	<200
December	4	<5	<5	<5	<5	<5	<5	<200	<200	<200
1989 Annual Summary		<4	<5	<3	<5	9	<4	<200	208	<200
1990										
January	5	<5	<5	<5	<5	5	<5	<140	<140	<140
February	4	<5	<5	<5	<4	4	<4	<140	<140	<140
March	2	<5	<5	<5	5	5	4	<140	<140	<140
April	2	<5	<5	<5	<5	5	<5	<120	<120	<120
May	5	<5	<5	<5	<5	5	<5	<120	<120	<120
June	4	<5	<5	<4	<5	<5	<5	<120	<120	<120
July	5	<4	<5	<4	<5	<5	<4	<120	<120	<120

max. = maximum individual sample concentration observed
min. = minimum individual sample concentration observed

SI Unit Equivalent: 1 pCi/L = .037 Bq/L
20 pCi/L = 0.74 Bq/L

TABLE E-5
WATER SURVEILLANCE SUMMARY
MONTHLY COMPARISON DATA
WOMAN CREEK EAST OF INDIANA STREET (grab)
1989 - 1990

	NUMBER OF SAMPLES	GROSS ALPHA (pCi/L)	GROSS BETA (pCi/L)	TRITIUM (pCi/L)
1989				
July *	0			
August*	0			
September*	0			
October	6	<8	8	<204
November	4	<9	<8	<200
December*	0			
1989 Annual Summary		<6	<6	<212
1990				
January*	0			
February	1	<7	6	<140
March	5	<6	<7	<140
April	8	<7	6	<120
May	7	<7	<5	<120
June	1	<9	7	<120
July*	0			

* = No sample collected (dry/not running)

SI unit equivalent: 1 pCi/l = .037 Bq/L
20 pCi/l = 0.74 Bq/L

TABLE E-6
WATER SURVEILLANCE SUMMARY
MONTHLY COMPARISON DATA
WESTMINSTER-FINISHED (biweekly composite)
1989 - 1990

Date	NUMBER OF SAMPLES	Gross Alpha (pCi/L) Mean	max.	min.	Gross Beta (pCi/L) Mean	max.	min	Tritium (pCi/L) Mean	max.	min.
1989										
July	2	<4	<4	<4	<5	<5	<5	<200	<200	<200
August	2	<4	<4	<3	<5	<5	<5	<200	<200	<200
September	2	<5	<5	<4	<5	<5	<4	<200	<200	<200
October	3	<5	<5	<5	<5	6	<4	<200	<200	<200
November	2	<5	<5	<5	<5	<5	<5	<200	<200	<200
December	2	<5	<5	<5	<5	<5	<5	<200	<200	<200
1989 Annual Summary		<4	<5	<3	<5	6	<4	<200	<200	<200
1990										
January	2	<5	<5	<5	<6	7	<5	<140	<140	<140
February	3	<5	<5	<5	4	5	3	<140	<140	<140
March	2	<5	<5	<5	<5	6	<5	<140	<140	<140
April	2	<5	<5	<5	<5	5	<5	<120	<120	<120
May	1	<5	<5	<5	<5	<5	<5	<120	<120	<120
June	2	<5	<4	<5	<5	<5	<5	<120	<120	<120
July	3	<4	<5	<4	<5	<5	<5	<120	<120	<120

max. = maximum individual sample concentration observed
min. = minimum individual sample concentration observed

SI unit equivalent: 1 pCi/l = .037 Bq/L
20 pCi/l = 0.74 Bq/L

TABLE F
ALPHA SPECTROMETRIC AND LONG-LIVED GROSS ALPHA RADIOACTIVITY CONCENTRATIONS IN TOTAL SOLIDS CONTAINED IN WATER
July 1990

Sample Location	Period	Pu^{239} (pCi/L)	Gross Alpha (pCi/L)	U^{234}/U^{238} Ratio

No analysis results to report this month.

PLEASE NOTE: Reported values for Pu^{239} may include a contribution from Pu^{240}. When apparent positive values for $Pu^{239+240}$ do exist, results are reported as Pu^{239}.

TABLE G
URANIUM BY FLOUROMETRIC ANALYSIS
AND LONG-LIVED GROSS ALPHA RADIOACTIVITY IN
TOTAL SOLIDS CONTAINED IN WATER
July 1990

Sample Location	Period	NATURAL URANIUM (pCi/L)	GROSS ALPHA (pCi/L)
A-4 Pond	2nd Qtr 1990 Cmpst	12	<8
B-3 Pond	2nd Qtr 1990 Cmpst	<2	31
B-5 Pond	May 1990 Cmpst	4	<8
	Jun 1990 Cmpst	<2	<6
	Jul 1990 Cmpst	<2	<6
Walnut Creek (continuous)	May 1990 Cmpst	4	<8
	Jun 1990 Cmpst	3	<6
Walnut Creek at Indiana Street	May 1990 Cmpst	5	<8
	Jun 1990 Cmpst	2	15
Broomfield (raw)	May 1990 Cmpst	3	<5
	Jun 1990 Cmpst	<2	<4
	Jul 1990 Cmpst	<2	<4
Broomfield (finished)	May 1990 Cmpst	<2	<5
	Jun 1990 Cmpst	<2	<5
	Jul 1990 Cmpst	<2	<4
Woman Creek at Indiana Street	2nd Qtr 1990 Cmpst	<2	<7
Westminster (raw)	May 1990 Cmpst	<2	<5
	Jun 1990 Cmpst	<2	<5
	Jul 1990 Cmpst	<2	<6
Westminster (finished)	May 1990 Cmpst	<2	<5
	Jun 1990 Cmpst	<2	<5
	Jul 1990 Cmpst	<2	<4

TABLE H

VOLATILE ORGANIC COMPOUNDS IN WATER

JULY 1990

		Trihalomethanes	Regulated VOCs	Standard Unregulated VOCs	Vulnerable Systems Parameters	State's Discretion Parameters
Pond A-4	07/10/90	None	None	None	None	None
Pond A-4 (carbon filter effluent)	07/10/90	None	None	None	None	None
Pond B-5	07/10/90	None	None	None	None	None
Pond B-5 (carbon filter effluent)	07/10/90	None	None	None	None	None
Broomfield raw water	07/27/90	None	None	None	None	None
Broomfield finished water	07/27/90	Total THMs 59 36 ppb	None	None	None	None
Northglenn raw water	07/27/90	None	None	None	None	None
Northglenn finished water	07/27/90	Total THMs 42 18 ppb	None	None	None	None
Thornton raw water	07/27/90	None	None	None	None	None
Thornton finished water	07/27/90	Trace chloroform	None	None	None	None
Westminster raw water	07/27/90	None	None	None	None	None
Westminster finished water	07/27/90	Total THMs 18 65 ppb	None	None	None	None

TABLE I

BASE/NEUTRAL AND ACID EXTRACTABLE ORGANIC COMPOUNDS, PHENOXY ACID AND TRIAZINE HERBICIDES, ORGANOCHLORINE PESTICIDES AND ORGANOPHOSPHOROUS PESTICIDES IN WATER

JULY 1990

		COMPOUND	ASSAY
A-4 Pond	07/10/90	Herbicides & pesticides	Trace atrazine
A-4 Pond (carbon filter effluent)	07/10/90	Herbicides & pesticides	None
B-5 Pond	07/10/90	Herbicides & pesticides	None
B-5 Pond (carbon filter effluent)	07/10/90	Herbicides & pesticides	None

TABLE J

INORGANIC ANALYSIS OF WATER

JULY 1990

		A-4 Pond Untreated 07/10/90	A-4 Pond Treated 07/10/90	B-5 Pond Untreated 07/10/90	B-5 Pond Treated 07/10/90	C-2 Pond 06/05/90
Gross alpha	pCi/L					<3
Gross beta	pCi/L					6
Plutonium-239+240	pCi/L					
Uranium (U-nat)	pCi/L	3 5	2 5	<2	<2	
Americium-241	pCi/L					
Alkalinity	mg/L					
Ammonia	mg/L	1 8	1 4	3 3	3 8	
Antimony						
Arsenic	ug/L	<10	<10	<10	<10	
Barium						
Beryllium	ug/L	<50	<50	<50	<50	
Boron	ug/L	67	<50	120	160	
Cadmium	ug/L	<0 3	<0 3	<0 3	<0 3	
Chloride	mg/L	56	57	45	44	
Chromium	ug/L	<5	<5	<5	<5	
Copper	ug/L	<5	<5	5	<5	
Cyanide, dist	mg/L	<0 01	<0 01	<0 01	<0 01	
Dissolved oxygen	mg/L	7 4	6 4	6 5	5 5	
Hardness	mg/L	170	160	130	130	
Iron (dissolved)	ug/L	120	<100	220	190	
(total)	ug/L	290	<100	440	180	
Lead	ug/L	<5	<5	<5	<5	
Manganese (dissolved)	ug/L	<50	<50	110	52	280
(total)	ug/L	<50	<50	100	500	
Mercury	ug/L	<0 2	<0 2	<0 2	<0 25	
Nickel	ug/L	<100	<100	<100	<100	
Nitrogen (Nitrate+ Nitrite)	mg/L	1 5	2 1	2 4	1 5	
Nitrogen (Nitrite)	mg/L	0 36	0 23	0 94	0 36	
Selenium	ug/L	<2	<2	<2	<2	
Silver	ug/L	<0 2	<0 2	<0 2	<0 2	
Solids (dissolved)	mg/L	390	340	280	280	
Solids (total)	mg/L					440
Sp conductivity	umhos	500	500	430	430	
Sulfate	mg/L	61	61	67	63	
Sulfide	mg/L					<0 01
Zinc	ug/L	<10	20	40	42	

APPENDIX I

ROCKY FLATS PLANT SUSPENDED AIR PARTICULATE MATERIAL
AND WET/DRY DEPOSITION SAMPLING SITE LOCATIONS

On-site (Security)	Location
RF-1 (formerly D-1)	Inside security fence, east side of plant, approximately 100 yds north of Central Avenue
RF-2 (formerly D-2)	Inside security fence, east side of plant, approximately 30 yds north of Central Avenue
RF-3 (formerly D-3)	Inside security fence, east side of plant, approximately 30 yds south of Central Avenue
RF-4 (formerly D-4)	Inside security fence, east side of plant, approximately 100 yds south of Central Avenue

On-site (Perimeter)	Location
RF-5 (formerly D-5)	Perimeter, east side of plant on Indiana Street, approximately 1 5 mi south of east access road
RF-6 (formerly D-6)	Perimeter, east side of plant on Indiana Street, approximately 1 mi north of east access road
RF-7 (formerly D-7)	Perimeter, north side of plant on SH 128 approximately 1 5 mi west of Indiana Street
RF-8 (formerly D-8)	Perimeter, west side of plant on Jefferson County Road 93, approximately 0 75 mi north of west access road

Off-site (Metro)	Location
Arvada	SH 72 at Indiana Street
Broomfield	Roof, 18 Carden Office Center
Westminster	Fire Department, 10100 Garland Street

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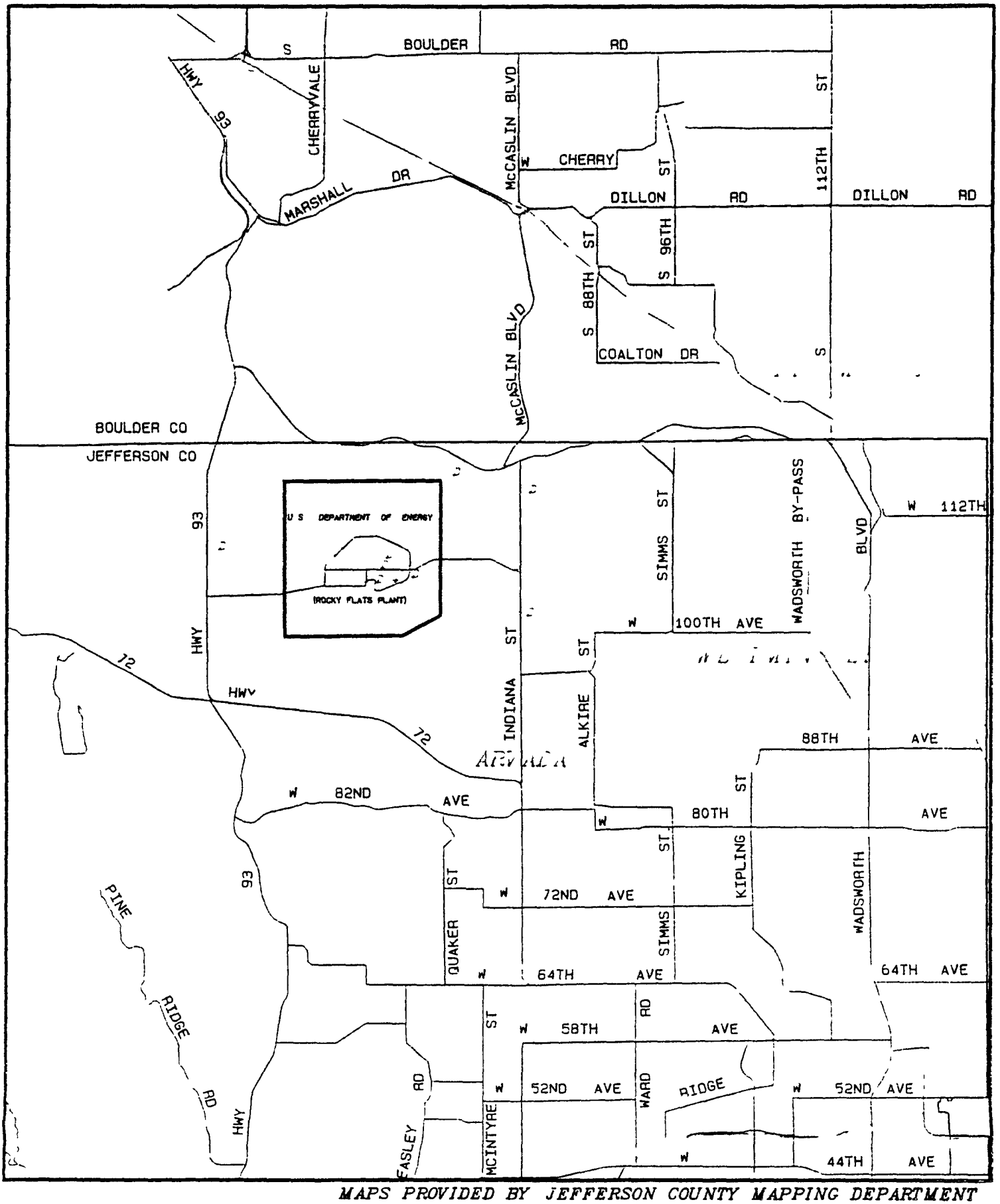
ROCKY FLATS PLANT AREA – AIR SAMPLING LOCATIONS



MAPS PROVIDED BY JEFFERSON COUNTY MAPPING DEPARTMENT

APPENDIX IIa

DERIVED CONCENTRATION GUIDES FOR CONCENTRATIONS OF RADIONUCLIDES IN AIR AND WATER ABOVE BACKGROUND IN UNCONTROLLED AREAS AT POINTS OF MAXIMUM PROBABLE EXPOSURE

The derived concentration guides (DCGs) listed below are based on the recommendations of the International Commission on Radiological Protection, as stated in Publication 30 (ICRP 30) and applied to the recommendations of Publication 26 (ICRP 26) These DCGs are incorporated into the Memorandum of Understanding between the Colorado Department of Health and the United States Department of Energy

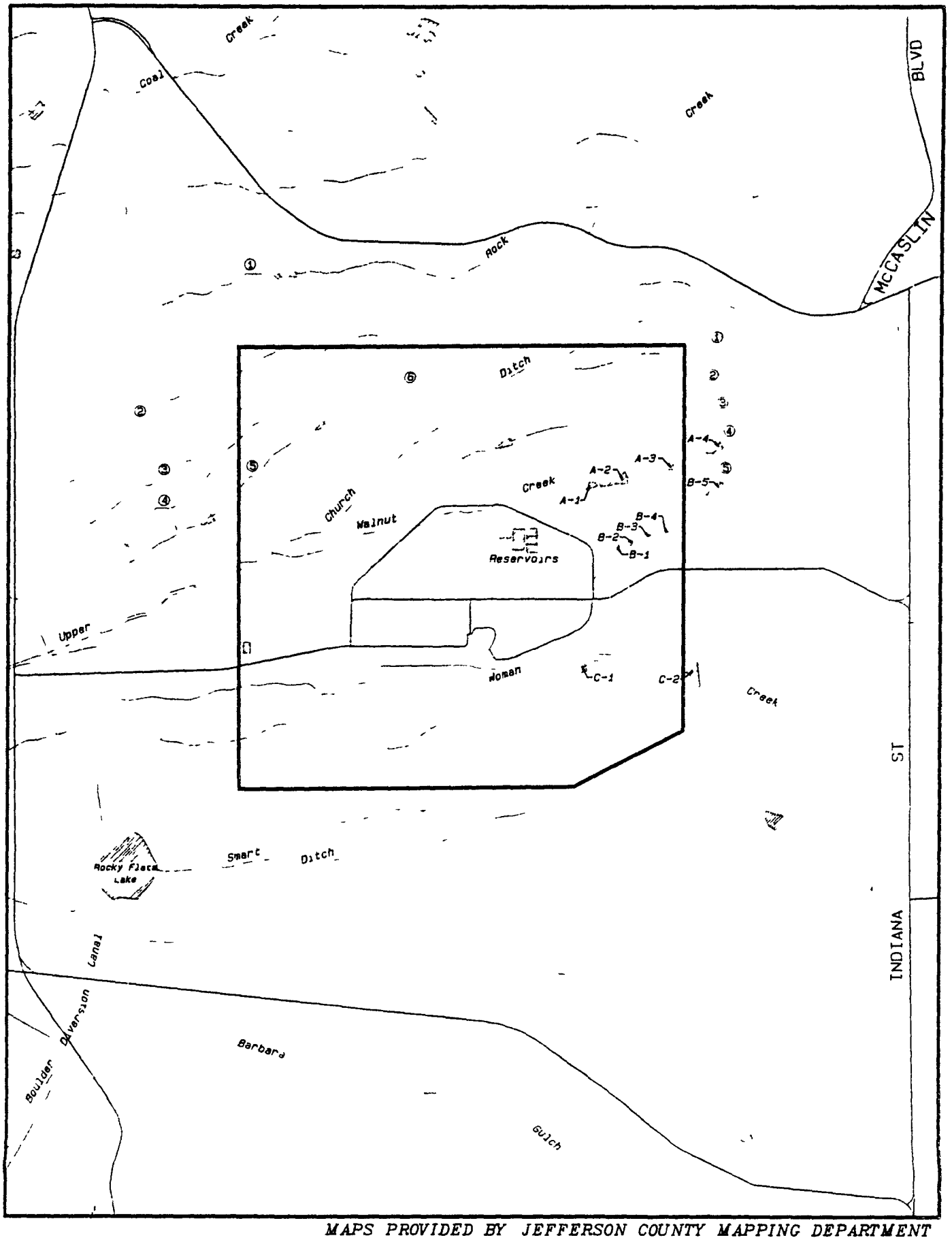
The concentrations listed in the table below are those concentrations which, if sustained over a period of one year, in air which is breathed by humans or in water which is used for human consumption, would result in an effective absorbed radiation dose equivalent of 100 millirem per year to humans Readers should consult the Colorado Department of Health for specific criteria which apply to the usage of these derived concentration guides

The radionuclides listed below are those which are of particular interest in the environment around Rocky Flats A more detailed list of radionuclides used at Rocky Flats can be found in the Rocky Flats Plant's *Health Physics Report Radioactive Materials Associated with Rocky Flats*, also widely known as the List of Materials

For all radionuclides listed below, the DCG for the chemical form (either soluble or insoluble) which is most stringent is shown

Nuclide	DCG water pCi/L	DCG air pCi/M^3
Americium-241	30	02
Curium-244	60	04
Hydrogen-3 (tritium)	2,000,000	100,000
Neptunium-237	30	02
Plutonium-238	30	02
Plutonium-239	30	02
Plutonium-240	30	02
Plutonium-241	1,000	1
Plutonium-242	30	02
Uranium-233	500	09
Uranium-234	500	09
Uranium-235	600	1
Uranium-238	600	1

ROCKY FLATS PLANT AREA - SURFACE HYDROLOGY



MAPS PROVIDED BY JEFFERSON COUNTY MAPPING DEPARTMENT

APPENDIX IIb

COLORADO COMMUNITY WATER SYSTEM STANDARDS

MAXIMUM CONTAMINANT LEVELS FOR GROSS ALPHA PARTICLE RADIOACTIVITY AND RADIUM

a	Gross alpha particle radioactivity (all radionuclides including radium but not including radon or uranium)	15 pCi/L
b	Radium-226 and radium-228 (combined)	5 pCi/L

MAXIMUM CONTAMINANT LEVELS FOR GROSS BETA PARTICLE AND PHOTON RADIOACTIVITY FROM MAN-MADE RADIONUCLIDES

The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water provided by community water systems shall not produce an annual absorbed dose equivalent to the total body or to any internal organ greater than 4 millirem per year

Except for the radionuclides listed below, the concentration of man-made radionuclides causing 4 millirem total body or organ dose equivalents shall be calculated on the basis of a 2 liter per day drinking water intake using 168 hour data listed in the publication of the U S Department of Commerce, NBS Handbook No 69, "Maximum Permissible Body Burden and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure " If two or more radionuclides are present, the sum of their contributions to the annual absorbed dose equivalent to the total body or to any organ shall not exceed 4 millirem per year

AVERAGE ANNUAL CONCENTRATIONS OF RADIONUCLIDES ASSUMED TO PRODUCE A DOSE TO THE TOTAL BODY OR TO A SPECIFIC ORGAN OF 4 MILLIREM PER YEAR

Radionuclide	Critical Organ	pCi/L
Hydrogen-3 (tritium)	Total body	20,000
Strontium-90	Bone marrow	8

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APPENDIX IIc

COLORADO WATER QUALITY CONTROL COMMISSION STANDARDS FOR RADIOACTIVE MATERIALS IN SURFACE WATER NEAR THE ROCKY FLATS PLANT SITE

The Water Quality Control Commission adopted site-specific standards for the following radionuclides for Walnut Creek and Woman Creek, effective March 30, 1990 In addition to the standards listed below, the Basic Standards and Methodologies for Surface Water (3 1 11) also apply

The radionuclides listed below shall be maintained at the lowest practical level and in no case shall they be increased by any cause attributable to municipal, industrial or agricultural practices to exceed the site specific numeric standards

	Segment 2 Standley Lake pCi/L	Segment 3 Great Western Reservoir pCi/L	Segment 4 Segment 5 Woman Creek pCi/L	Segment 4 Segment 5 Walnut Creek pCi/L
A Ambient based site-specific standards·				
Gross alpha radioactivity	6	5	7	11
Gross beta radioactivity	9	12	5	19
Plutonium^{239}	0 03	0 03	0 05	0 05
Americium^{241}	0 03	0 03	0 05	0 05
Tritium	500	500	500	500
Uranium	3	4	5	10
B Other site-specific standards				
Curium^{244}	60	60	60	60
Neptunium^{237}	30	30	30	30

For parameters other than radioactivity, additional standards apply, based on

1 The Classifications and Numeric Standards for the South Platte River Basin (3 8 0) - Big Dry Creek Sub-Basin, and

2 The Basic Standards and Methodologies for Surface Water (3 1 0)

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APPENDIX IIIa

LIMITS OF SENSITIVITY -- LOWER LIMITS OF DETECTION

Many of the measurements performed by the Radiation Counting Facility yield extremely low or even negative results In order to provide the maximum confidence in the analytical result, data is subjected to statistical tests to confirm the presence or absence of radioactivity in the sample By convention, the sensitivity of a measurement system is determined by calculation of lower limits of detection

Lower limits of detection (LLDs) are determined using the formula described in the United States Atomic Energy Commission Health and Safety Laboratory Procedures Manual (HASL-300, 1972)

The reported LLD is usually calculated according to specific variables affecting each sample measurement The notable exception to this practice is tritium analysis, for which a nominal average LLD is always reported Following are nominal average lower limits of detection

WATER ANALYSIS

Gross alpha activity	4	pCi/L
Gross beta activity	6	pCi/L
Hydrogen-3 (tritium)	200	pCi/L
Plutonium-239	0 02	pCi/L

The Department's Laboratory Division reports a "lower detection limit" for uranium analysis by the fluorometric method which is analogous, but not identical, to LLDs reported radiometric measurements

Natural uranium (assumes secular isotopic equilibrium)	3	mg/L
	or 2	pCi/L

AIR (PARTICULATE) ANALYSIS

Gross alpha activity (corrected for density thickness)	004	pCi/M^3
Gross beta activity (corrected for density thickness)	01	pCi/M^3
Plutonium-239		
Individual samples (using 1/4 sample - as required)	00009	pCi/M^3
Monthly composites (using 1 $inch^2$ per sample - 8 samples)	00001	pCi/M^3

SOIL ANALYSIS

Plutonium-239	0 02	pCi/gm
	or 0 01	dpm/gm

The Radiation Counting Facility calculates all lower limits of detection at the 95% confidence level The lower limits of detection for gross alpha, gross beta and tritium analysis are propagated from Poisson standard deviations of the background (blank) measurement, together with sample-specific parameters such as sample volume, density thickness, date of sample collection or other information which may be relevant The calculation of lower limits of detection for plutonium-239 analysis is more complex and relies on spectrometric software to perform equivalent calculations

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APPENDIX IIIb

DETERMINATION OF PRECISION -- CONFIDENCE INTERVALS

All radiometric measurements which exceed the lower limit of detection are reported as positive values (x) plus or minus a confidence interval (y), as follows

$$x \pm y$$

The Radiation Counting Facility calculates all confidence intervals at the 95% confidence level. The confidence intervals for gross alpha, gross beta and tritium analysis are propagated from Poisson standard deviations of the sample measurement and the background (blank) measurement The confidence interval for plutonium-239 analysis is more complex and relies on spectrometric software to perform equivalent calculations

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APPENDIX IV

VOLATILE ORGANIC COMPOUNDS (EPA Method 502 2)

Compound	MCL	MDL	PQL
Trihalomethanes			
Chloroform	Total for all	0 5 ppb	1 0 ppb
Bromodichloromethane	compounds must	0 5 ppb	1 0 ppb
Chlorodibromomethane	not exceed	0 5 ppb	1 0 ppb
Bromoform	100 ppb	0 5 ppb	1 0 ppb
Regulated VOCs			
Vinyl chloride	2 ppb	0 5 ppb	1 0 ppb
1,1 Dichloroethylene	7 ppb	0 5 ppb	1 0 ppb
1,2 Dichloroethane	5 ppb	0 5 ppb	1 0 ppb
1,1,1 Trichloroethane	200 ppb	0 5 ppb	1 0 ppb
Carbon tetrachloride	5 ppb	0 5 ppb	1 0 ppb
Trichloroethylene	5 ppb	0 5 ppb	1 0 ppb
1,4 dichlorobenzene	75 ppb	0 5 ppb	1 0 ppb
Benzene	5 ppb	0 5 ppb	1 0 ppb
Vulnerable systems parameters*			
Ethylene dibromide (EDB)		0 5 ppb	1 0 ppb
1,2 Dibromo-3-chloropropane (DBCP)		0 5 ppb	1 0 ppb
State's Discretion Parameters			
Bromochloromethane		0 5 ppb	1 0 ppb
p-Isopropyltoluene		0 5 ppb	1 0 ppb
Dichlorodifluoromethane		0 5 ppb	1 0 ppb
Fluorotrichloromethane		0 5 ppb	1 0 ppb
Hexachlorobutadiene		0 5 ppb	1 0 ppb
Napthalene		0 5 ppb	1 0 ppb
1 2,3 Trichlorobenzene		0 5 ppb	1 0 ppb
1 2 4 Trichlorobenzene		0 5 ppb	1 0 ppb
1 2,4 Trimethylbenzene		0 5 ppb	1 0 ppb
1,3 5 Trimethylbenzene		0 5 ppb	1 0 ppb
Isopropylbenzene		0 5 ppb	1 0 ppb
n-Propylbenzene		0 5 ppb	1 0 ppb
n-Butylbenzene		0 5 ppb	1 0 ppb
sec-Butylbenzene		0 5 ppb	1 0 ppb
tert-Butylbenzene		0 5 ppb	1 0 ppb

Compound	MCL	MDL	PQL
Standard unregulated volatile organics			
Bromobenzene	No MCL	0 5 ppb	1 0 ppb
Bromomethane	No MCL	0 5 ppb	1 0 ppb
Chlorobenzene	No MCL	0 5 ppb	1 0 ppb
Chloroethane	No MCL	0 5 ppb	1 0 ppb
Chloromethane	No MCL	0 5 ppb	1 0 ppb
o-Chlorotoluene	No MCL	0 5 ppb	1 0 ppb
p-Chlorotoluene	No MCL	0 5 ppb	1 0 ppb
Dibromomethane	No MCL	0 5 ppb	1 0 ppb
o-Dichlorobenzene	No MCL	0 5 ppb	1 0 ppb
m-Dichlorobenzene	No MCL	0 5 ppb	1 0 ppb
1 3 Dichloropropene	No MCL	0 5 ppb	1 0 ppb
1,1 Dichloroethane	No MCL	0 5 ppb	1 0 ppb
cis-1,2 Dichloroethylene	No MCL	0 5 ppb	1 0 ppb
trans-1,2 Dichloroethylene	No MCL	0 5 ppb	1 0 ppb
1,2 Dichloropropane	No MCL	0 5 ppb	1 0 ppb
1,3 Dichloropropane	No MCL	0 5 ppb	1 0 ppb
2,2 Dichloropropane	No MCL	0 5 ppb	1 0 ppb
1,1 Dichloropropene	No MCL	0 5 ppb	1 0 ppb
Dichloromethane	No MCL	0 5 ppb	1 0 ppb
1,1,1,2 Tetrachloroethane	No MCL	0 5 ppb	1 0 ppb
1,1,2,2 Tetrachloroethane	No MCL	0 5 ppb	1 0 ppb
Tetrachloroethene	No MCL	0 5 ppb	1 0 ppb
1,1,2 Trichloroethane	No MCL	0 5 ppb	1 0 ppb
Trichlorofluoromethane	No MCL	0 5 ppb	1 0 ppb
1,2 3 Trichloropropane	No MCL	0 5 ppb	1 0 ppb
Ethyl benzene	No MCL	0 5 ppb	1 0 ppb
Styrene	No MCL	0 5 ppb	1 0 ppb
Toluene	No MCL	0 5 ppb	1 0 ppb
o-Xylene	No MCL	0 5 ppb	1 0 ppb
m-Xylene	No MCL	0 5 ppb	1 0 ppb
p-Xylene	No MCL	0 5 ppb	1 0 ppb

MCL = Maximum Contaminant Level
MDL = Method Detection Limit
PQL = Practical Quantitation Limit

* = EPA Method 504 may be substituted for EPA Method 502 2 for vulnerable systems parameters

Revised 5/90

APPENDIX V

BASE/NEUTRAL AND ACID EXTRACTABLE SEMIVOLATILE ORGANIC COMPOUNDS — BNAs (EPA Methods 3650 and 624-625)

Compound	MDL	PQL	Compound	MDL	PQL
Acenaphthene	5 ppb	10 ppb	Diphenylamine	5 ppb	10 ppb
Acenaphthylene	5 ppb	10 ppb	1,2-Diphenylhydrazine	5 ppb	10 ppb
Acetophenone	5 ppb	10 ppb	Di-n-octylphthalate	5 ppb	10 ppb
Aniline	5 ppb	10 ppb	Ethyl methanesulfonate	5 ppb	10 ppb
Anthracene	5 ppb	10 ppb	Fluoranthene	5 ppb	10 ppb
4-Aminobiphenyl	5 ppb	10 ppb	Fluorene	5 ppb	10 ppb
Benzidine	10 ppb	10 ppb	Hexachlorobenzene	5 ppb	10 ppb
Benzoic acid	25 ppb	50 ppb	Hexachlorobutadiene	5 ppb	10 ppb
Benzo(a)anthracene	5 ppb	10 ppb	Hexachlorocyclopentadiene	5 ppb	10 ppb
Benzo(b)fluoranthene	5 ppb	10 ppb	Hexachloroethane	5 ppb	10 ppb
Benzo(k)fluoranthene	5 ppb	10 ppb	Indeno(1,2,3-cd)pyrene	5 ppb	10 ppb
Benzo(g h,i)perylene	5 ppb	10 ppb	Isophorone	5 ppb	10 ppb
Benzo(a)pyrene	5 ppb	10 ppb	3-Methylcholanthrene	5 ppb	10 ppb
Benzyl alcohol	10 ppb	20 ppb	Methyl methanesulfonate	5 ppb	10 ppb
Bis(2-chloroethoxy)methane	5 ppb	10 ppb	2-Methylnaphthalene	5 ppb	10 ppb
Bis(2-chloroethyl)ether	6 ppb	10 ppb	2-Methylphenol	5 ppb	10 ppb
Bis(2-chloroisopropyl)ether	5 ppb	10 ppb	4-Methylphenol	5 ppb	10 ppb
Bis(2-ethylhexyl)phthalate	5 ppb	10 ppb	Naphthalene	5 ppb	10 ppb
4-Bromophenyl phenyl ether	5 ppb	10 ppb	1-Naphthylamine	5 ppb	10 ppb
Butyl benzyl phthalate	5 ppb	10 ppb	2-Naphthylamine	5 ppb	10 ppb
4-Chloroaniline	10 ppb	20 ppb	2-Nitroaniline	25 ppb	50 ppb
1-Chloronaphthalene	5 ppb	10 ppb	3-Nitroaniline	25 ppb	50 ppb
2-Chloronaphthalene	5 ppb	10 ppb	4-Nitroaniline	25 ppb	50 ppb
4-Chloro-3-methylphenol	10 ppb	20 ppb	Nitrobenzene	5 ppb	10 ppb
2-Chlorophenol	5 ppb	10 ppb	2-Nitrophenol	25 ppb	50 ppb
4-Chlorophenyl phenyl ether	5 ppb	10 ppb	4-Nitrophenol	25 ppb	50 ppb
Chrysene	5 ppb	10 ppb	N-Nitroso-di-n-butylamine	5 ppb	10 ppb
Dibenz(a j)acridine	5 ppb	10 ppb	N-Nitrosodimethylamine	5 ppb	10 ppb
Dibenz(a,h)anthracene	5 ppb	10 ppb	N-nitrosodiphenylamine	5 ppb	10 ppb
Dibenzofuran	5 ppb	10 ppb	N-Nitrosodipropylamine	5 ppb	10 ppb
Di-n-butylphthalate	5 ppb	10 ppb	N-Nitrosopiperidine	5 ppb	10 ppb
1,2-Dichlorobenzene	5 ppb	10 ppb	Pentachlorobenzene	5 ppb	10 ppb
1 3-Dichlorobenzene	5 ppb	10 ppb	Pentachloronitrobenzene	5 ppb	10 ppb
1,4-Dichlorobenzene	5 ppb	10 ppb	Pentachlorophenol	25 ppb	50 ppb
3,3'-Dichlorobenzidine	10 ppb	10 ppb	Phenacetin	5 ppb	10 ppb
2,4-Dichlorophenol	5 ppb	10 ppb	Phenanthrene	5 ppb	10 ppb
2,6-Dichlorophenol	5 ppb	10 ppb	Phenol	5 ppb	10 ppb
Diethylphthalate	5 ppb	10 ppb	2-Picoline	5 ppb	10 ppb
p-Dimethylaminoazobenzene	5 ppb	10 ppb	Pronamide	5 ppb	10 ppb
7,12-Dimethylbenz(a)anthracene	5 ppb	10 ppb	Pyrene	5 ppb	10 ppb
Dimethylphenethylamine	5 ppb	10 ppb	1,2,4,5-Tetrachlorobenzene	5 ppb	10 ppb
2 4-Dimethylphenol	5 ppb	10 ppb	2 3,4 6-Tetrachlorophenol	5 ppb	10 ppb
Dimethylphthalate	5 ppb	10 ppb	1,2,4-Trichlorobenzene	5 ppb	10 ppb
4,6-Dinitro-2-methylphenol	25 ppb	50 ppb	2,4,5-Trichlorophenol	5 ppb	10 ppb
2,4-Dinitrophenol	25 ppb	50 ppb	2 4,6-Trichlorophenol	5 ppb	10 ppb
2 4-Dinitrotoluene	5 ppb	10 ppb			

MDL = Method Detection Limit

PQL = Practical Quantitation Limit

Trace = Greater than MDL but less than PQL

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APPENDIX VI

ORGANOPHOSPHOROUS PESTICIDES (EPA Methods 608 and 507), ORGANOCHLORINE PESTICIDES (EPA Method 508) CHLOROPHENOXY ACID HERBICIDES (EPA Method 615 or 515.1) AND TRIZAINE HERBICIDES (EPA Methods 608 and 507)

Compound	MDL	PQL
Organochlorine pesticides		
Aldrin	004 ppb	04 ppb
A-BHC	003 ppb	03 ppb
B-BHC	006 ppb	06 ppb
C-BHC	009 ppb	09 ppb
Lindane	004 ppb	04 ppb
Chlordane	014 ppb	14 ppb
DDD	011 ppb	11 ppb
DDE	004 ppb	04 ppb
DDT	012 ppb	12 ppb
Dieldrin	002 ppb	02 ppb
Endosulfan I	014 ppb	14 ppb
Endosulfan II	004 ppb	04 ppb
Endosulfan sulfate	066 ppb	66 ppb
Endrin	006 ppb	06 ppb
Endrin aldehyde	023 ppb	23 ppb
Heptachlor	003 ppb	03 ppb
Heptachlor epoxide	083 ppb	83 ppb
Methoxychlor	176 ppb	1 76 ppb
Toxaphene	24 ppb	2 4 ppb
Organophosphorous pesticides		
Azinphos methyl	1 5 ppb	15 ppb
Chlorpyrifos	3 ppb	3 ppb
Coumaphos	1 5 ppb	15 ppb
Diazinon	6 ppb	6 ppb
Dichlorvos	1 ppb	1 ppb
Disulfoton	2 ppb	2 ppb
Ethoprop	25 ppb	2 5 ppb
Merphos	25 ppb	2 5 ppb
Mevinphos	3 ppb	3 ppb
Naled	1 ppb	1 ppb
Parathion methyl	03 ppb	3 ppb
Ronnel	3 ppb	3 ppb

Compound	MDL	PQL
Chlorophenoxy acid herbicides		
Bentazon		
2,4-D	0 2 ppb	2 ppb
Dalapon		
2,4-DB		
Dicamba		
Dichloroprop		
Dinoseb		
4-Nitrophenol		
Pentachlorophenol (PCP		
Picloram		
2,4,5-T	0 08 ppb	0 8 ppb
2,4,5-TP (Silvex)	0 075 ppb	0 75 ppb
Triazine herbicides		
Ametryn	1 ppb	2 ppb
Atrazine	1 ppb	2 ppb
Prometon	1 ppb	2 ppb
Prometryn	1 ppb	2 ppb
Propazine	1 ppb	2 ppb
Simazine	1 ppb	2 ppb
Simetryn	1 ppb	2 ppb
Terbutryn	1 ppb	2 ppb

MDL = Method Detection Limit

PQL = Practical Quantitation Limit

Trace = Greater than MDL but less than PQL

Revised 5/90