ROCKWELL INTERNATIONAL
NORTH AMERICAN SPACE OPERATIONS
ROCKY FLATS PLANT

Remedial Investigation Report for High Priority Sites

(881 Hillside Area)

Volume IX

U.S. DEPARTMENT OF ENERGY

Rocky Flats Plant
Golden, Colorado

1 MARCH 1988

REVIEWED FOR CLASSIFICATION/UCNI
By
Date 9/30/91

ADMIN RECORD

A-OU01-000012

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"REVIEWED FOR CLASSIFICATION
By R. B. Hoffman
Date 7-9-90

"REVIEWED FOR CLASSIFICATION
By
Date 6/11/90"

APPENDIX F-5

GROUND-WATER ANALYTICAL DATA
BEDROCK WELLS

VOLATILE ORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8710-017-0030	3-87	03
0587-881-005	3-87-06-16-87	
0387-881-026	3-87-07-08-87	
0687-881-011	3-87-10-05-87	
8711-063-0001	45-87	
0487-881-047	45-87-11-23-87	
8710-041-0020	5-87	02
0587-881-003	5-87-06-12-87	
0387-881-020	5-87-07-06-87	
0687-881-014	5-87-10-12-87	
0187-881-043	59-86-04-09-87	
0187-881-067	59-86-04-30-87	
0387-881-024	59-86-07-06-87	
0487-881-011	59-86-10-07-87	
0187-881-044	62-86-04-09-87	
0187-881-068	62-86-04-29-87	
0287-881-009	62-86-05-26-87	
0387-881-021	62-86-07-06-87	
0487-881-017	62-86-10-14-87	
0287-881-008	69-86-05-26-87	
0587-881-004	8-87-06-15-87	
0387-881-028	8-87-07-08-87	
0687-881-012	8-87-10-07-87	
8610-028-0210	G598610860	21
8610-044-0260	G628610860	26
8706-042-0100	GW0387	10
8706-037-0010	GW0587	01
8706-042-0090	GW0887	09

BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8710-017-0030	0587-881-005	0387-881-026	0687-881-011
Customer ID:	3-87	3-87-06-16-87	3-87-07-08-87	3-87-10-05-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1.0	1		

Surrogate Recovery

Toluene-d8:	102 %	%	%	%
Bromofluorobenzene:	100 %	%	%	%
1,2-Dichloroethane-d4:	102 %	%	%	%

Analytes

Chloromethane	10.00	U	NR		NR		NR	
Bromomethane	10.00	U	NR		NR		NR	
Vinyl Chloride	10.00	U	NR		NR		NR	
Chloroethane	10.00	U	NR		NR		NR	
Methylene Chloride	5.00	U	NR		NR		NR	
Acetone	3.00	JB	NR		NR		NR	
Carbon Disulfide	5.00	U	NR		NR		NR	
1,1-Dichloroethene	5.00	U	4	U	4	U	5	U
1,1-Dichloroethane	5.00	U	NR		NR		NR	
Trans-1,2-Dichloroethene	5.00	U	4	U	4	U	5	U
Chloroform	5.00	U	4	U	4	U	5	U
1,2-Dichloroethane	5.00	U	4	U	4	U	5	U
2-Butanone	10.00	U	NR		NR		NR	
1,1,1-Trichloroethane	5.00	U	4	U	4	U	5	U
Carbon Tetrachloride	5.00	U	4	U	4	U	5	U
Vinyl Acetate	10.00	U	NR		NR		NR	
Bromodichloromethane	5.00	U	NR		NR		NR	
1,2-Dichloropropane	5.00	U	NR		NR		NR	
Trans-1,3-Dichloropropene	5.00	U	NR		NR		NR	
Trichloroethene	5.00	U	4	U	4	U	5	U
Dibromochloromethane	5.00	U	NR		NR		NR	
1,1,2-Trichloroethane	5.00	U	4	U	4	U	5	U
Benzene	5.00	U	NR		NR		NR	
cis-1,3-Dichloropropene	5.00	U	NR		NR		NR	
2-Chloroethylvinylether	10.00	U	NR		NR		NR	
Bromoform	5.00	U	NR		NR		NR	
4-Methyl-2-pentanone	10.00	U	NR		NR		NR	
2-Hexanone	10.00	U	NR		NR		NR	
Tetrachloroethene	5.00	U	4	U	4	U	5	U
1,1,2,2-Tetrachloroethane	5.00	U	NR		NR		NR	
Toluene	5.00	U	NR		NR		NR	
Chlorobenzene	5.00	U	NR		NR		NR	
Ethylbenzene	5.00	U	NR		NR		NR	
Styrene	5.00	U	NR		NR		NR	
Total Xylenes	5.00	U	NR		NR		NR	

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8711-063-0001	0487-881-047	8710-041-0020	0587-881-003
Customer ID:	45-87	45-87-11-23-87	5-87	5-87-06-12-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	5	1.0	2.5	1

Surrogate Recovery

Toluene-d8:	102 %	84 %	95 %	%
Bromofluorobenzene:	108 %	98 %	94 %	%
1,2-Dichloroethane-d4:	106 %	84 %	94 %	%

Analytes

Chloromethane.....	50 U	10 U	30.00 U	NR
Bromomethane.....	50 U	10 U	30.00 U	NR
Vinyl Chloride.....	50 U	10 U	30.00 U	NR
Chloroethane.....	50 U	10 U	30.00 U	NR
Methylene Chloride.....	23 JB	5 U	9.00 JB	NR
Acetone.....	210 B	10 U	30.00 U	NR
Carbon Disulfide.....	25 U	5 U	15.00 U	NR
1,1-Dichloroethene.....	25 U	5 U	15.00 U	4 U
1,1-Dichloroethane.....	25 U	5 U	15.00 U	NR
Trans-1,2-Dichloroethene.....	25 U	5 U	15.00 U	4 U
Chloroform.....	37 B	18.00	15.00 U	4 U
1,2-Dichloroethane.....	25 U	5 U	15.00 U	6
2-Butanone.....	50 U	10 U	30.00 U	NR
1,1,1-Trichloroethane.....	25 U	5 U	15.00 U	4 U
Carbon Tetrachloride.....	25 U	5 U	15.00 U	4 U
Vinyl Acetate.....	50 U	10 U	30.00 U	NR
Bromodichloromethane.....	25 U	5 U	15.00 U	NR
1,2-Dichloropropane.....	25 U	5 U	15.00 U	NR
Trans-1,3-Dichloropropene.....	25 U	5 U	15.00 U	NR
Trichloroethene.....	25 U	5 U	15.00 U	4 U
Dibromochloromethane.....	25 U	5 U	15.00 U	NR
1,1,2-Trichloroethane.....	25 U	5 U	15.00 U	4 U
Benzene.....	25 U	5 U	15.00 U	NR
cis-1,3-Dichloropropene.....	25 U	5 U	15.00 U	NR
2-Chloroethylvinylether.....	50 U	NR	30.00 U	NR
Bromoform.....	25 U	5 U	15.00 U	NR
4-Methyl-2-pentanone.....	50 U	10 U	30.00 U	NR
2-Hexanone.....	50 U	10 U	30.00 U	NR
Tetrachloroethene.....	25 U	5 U	15.00 U	4 U
1,1,2,2-Tetrachloroethane.....	25 U	5 U	15.00 U	NR
Toluene.....	25 U	5 U	15.00 U	NR
Chlorobenzene.....	25 U	5 U	15.00 U	NR
Ethylbenzene.....	25 U	5 U	15.00 U	NR
Styrene.....	25 U	5 U	15.00 U	NR
Total Xylenes.....	25 U	5 U	15.00 U	NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-020	0687-881-014	0187-881-043	0187-881-067
Customer ID:	5-87-07-06-87	5-87-10-12-87	59-86-04-09-87	59-86-04-30-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:			1	1

Surrogate Recovery

Toluene-d8:	%	%	%	%
Bromofluorobenzene:	%	%	%	%
1,2-Dichloroethane-d4:	%	%	%	%

Analytes

Chloromethane.....	NR	NR	NR	NR
Bromomethane.....	NR	NR	NR	NR
Vinyl Chloride.....	NR	NR	NR	NR
Chloroethane.....	NR	NR	NR	NR
Methylene Chloride.....	NR	NR	NR	NR
Acetone.....	NR	NR	NR	NR
Carbon Disulfide.....	NR	NR	NR	NR
1,1-Dichloroethene.....	4 U	5 U	4 U	4 U
1,1-Dichloroethane.....	NR	NR	NR	NR
Trans-1,2-Dichloroethene.....	4 U	5 U	4 U	4 U
Chloroform.....	4 U	5 U	4 U	4 U
1,2-Dichloroethane.....	4 U	5 U	4 U	4 U
2-Butanone.....	NR	NR	NR	NR
1,1,1-Trichloroethane.....	4 U	5 U	4 U	4 U
Carbon Tetrachloride.....	4 U	5 U	4 U	4 U
Vinyl Acetate.....	NR	NR	NR	NR
Bromodichloromethane.....	NR	NR	NR	NR
1,2-Dichloropropane.....	NR	NR	NR	NR
Trans-1,3-Dichloropropene.....	NR	NR	NR	NR
Trichloroethene.....	4 U	5 U	4 U	4 U
Dibromochloromethane.....	NR	NR	NR	NR
1,1,2-Trichloroethane.....	4 U	5 U	4 U	4 U
Benzene.....	NR	NR	NR	NR
cis-1,3-Dichloropropene.....	NR	NR	NR	NR
2-Chloroethylvinylether.....	NR	NR	NR	NR
Bromoform.....	NR	NR	NR	NR
4-Methyl-2-pentanone.....	NR	NR	NR	NR
2-Hexanone.....	NR	NR	NR	NR
Tetrachloroethene.....	4 U	5 U	4 U	4 U
1,1,2,2-Tetrachloroethane.....	NR	NR	NR	NR
Toluene.....	NR	NR	NR	NR
Chlorobenzene.....	NR	NR	NR	NR
Ethylbenzene.....	NR	NR	NR	NR
Styrene.....	NR	NR	NR	NR
Total Xylenes.....	NR	NR	NR	NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-024	0487-881-011	0187-881-044	0187-881-068
Customer ID:	59-86-07-06-87	59-86-10-07-87	62-86-04-09-87	62-86-04-29-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	PPB	UG/L	UG/L
Dilution Factor:			1	1

Surrogate Recovery

Toluene-d8:	%	%	%	%
Bromofluorobenzene:	%	%	%	%
1,2-Dichloroethane-d4:	%	%	%	%

Analytes

Chloromethane	NR		NR	NR
Bromomethane	NR		NR	NR
Vinyl Chloride	NR		NR	NR
Chloroethane	NR		NR	NR
Methylene Chloride	NR		NR	NR
Acetone	NR		NR	NR
Carbon Disulfide	NR		NR	NR
1,1-Dichloroethene	4 U	5 U	4 U	4 U
1,1-Dichloroethane	NR		NR	NR
Trans-1,2-Dichloroethene	4 U	5 U	4 U	4 U
Chloroform	4 U	5 U	4 U	4 U
1,2-Dichloroethane	4 U	5 U	4 U	4 U
2-Butanone	NR		NR	NR
1,1,1-Trichloroethane	4 U	5 U	4 U	4 U
Carbon Tetrachloride	4 U	5 U	4 U	4 U
Vinyl Acetate	NR		NR	NR
Bromodichloromethane	NR		NR	NR
1,2-Dichloropropane	NR		NR	NR
Trans-1,3-Dichloropropene	NR		NR	NR
Trichloroethene	4 U	5 U	4 U	4 U
Dibromochloromethane	NR		NR	NR
1,1,2-Trichloroethane	4 U	5 U	4 U	4 U
Benzene	NR		NR	NR
cis-1,3-Dichloropropene	NR		NR	NR
2-Chloroethylvinylether	NR		NR	NR
Bromoform	NR		NR	NR
4-Methyl-2-pentanone	NR		NR	NR
2-Hexanone	NR		NR	NR
Tetrachloroethene	4 U	5 U	4 U	4 U
1,1,2,2-Tetrachloroethane	NR		NR	NR
Toluene	NR		NR	NR
Chlorobenzene	NR		NR	NR
Ethylbenzene	NR		NR	NR
Styrene	NR		NR	NR
Total Xylenes	NR		NR	NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0287-881-009	0387-881-021	0487-881-017	0287-881-008
Customer ID:	62-86-05-26-87	62-86-07-06-87	62-86-10-14-87	69-86-05-26-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	PPB	UG/L
Dilution Factor:	1			1

Surrogate Recovery

Toluene-d8:	%	%	%	%
Bromofluorobenzene:	%	%	%	%
1,2-Dichloroethane-d4:	%	%	%	%

Analytes

Chloromethane	NR	NR		NR
Bromomethane	NR	NR		NR
Vinyl Chloride	NR	NR		NR
Chloroethane	NR	NR		NR
Methylene Chloride	NR	NR		NR
Acetone	NR	NR		NR
Carbon Disulfide	NR	NR		NR
1,1-Dichloroethene	4 U	4 U	5 U	4 U
1,1-Dichloroethane	NR	NR		NR
Trans-1,2-Dichloroethene	4 U	4 U	5 U	4 U
Chloroform	4 U	4 U	5 U	4 U
1,2-Dichloroethane	4 U	4 U	5 U	4 U
2-Butanone	NR	NR		NR
1,1,1-Trichloroethane	4 U	4 U	5 U	4 U
Carbon Tetrachloride	4 U	4 U	5 U	4 U
Vinyl Acetate	NR	NR		NR
Bromodichloromethane	NR	NR		NR
1,2-Dichloropropane	NR	NR		NR
Trans-1,3-Dichloropropene	NR	NR		NR
Trichloroethene	4 U	4 U	5 U	4 U
Dibromochloromethane	NR	NR		NR
1,1,2-Trichloroethane	4 U	4 U	5 U	4 U
Benzene	NR	NR		NR
cis-1,3-Dichloropropene	NR	NR		NR
2-Chloroethylvinylether	NR	NR		NR
Bromoform	NR	NR		NR
4-Methyl-2-pentanone	NR	NR		NR
2-Hexanone	NR	NR		NR
Tetrachloroethene	4 U	4 U	5 U	4 U
1,1,2,2-Tetrachloroethane	NR	NR		NR
Toluene	NR	NR		NR
Chlorobenzene	NR	NR		NR
Ethylbenzene	NR	NR		NR
Styrene	NR	NR		NR
Total Xylenes	NR	NR		NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-004	0387-881-028	0687-881-012	8610-028-0210
Customer ID:	8-87-06-15-87	8-87-07-08-87	8-87-10-07-87	G598610860
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1			1

Surrogate Recovery

Toluene-d8:	%	%	%	102 %
Bromofluorobenzene:	%	%	%	102 %
1,2-Dichloroethane-d4:	%	%	%	76 %

Analytes

Chloromethane.....	NR	NR	NR	10 U
Bromomethane.....	NR	NR	NR	10 U
Vinyl Chloride.....	NR	NR	NR	10 U
Chloroethane.....	NR	NR	NR	10 U
Methylene Chloride.....	NR	NR	NR	5 U
Acetone.....	NR	NR	NR	2 BJ
Carbon Disulfide.....	NR	NR	NR	5 U
1,1-Dichloroethene.....	4 U	4 U	5 U	5 U
1,1-Dichloroethane.....	NR	NR	NR	5 U
Trans-1,2-Dichloroethene.....	4 U	4 U	5 U	5 U
Chloroform.....	4 U	4 U	5 U	5 U
1,2-Dichloroethane.....	4 U	4 U	5 U	5 U
2-Butanone.....	NR	NR	NR	10 U
1,1,1-Trichloroethane.....	4 U	4 U	5 U	5 U
Carbon Tetrachloride.....	4 U	4 U	5 U	5 U
Vinyl Acetate.....	NR	NR	NR	10 U
Bromodichloromethane.....	NR	NR	NR	5 U
1,2-Dichloropropane.....	NR	NR	NR	5 U
Trans-1,3-Dichloropropene.....	NR	NR	NR	5 U
Trichloroethene.....	4 U	4 U	5 U	5 U
Dibromochloromethane.....	NR	NR	NR	5 U
1,1,2-Trichloroethane.....	4 U	4 U	5 U	5 U
Benzene.....	NR	NR	NR	5 U
cis-1,3-Dichloropropene.....	NR	NR	NR	5 U
2-Chloroethylvinylether.....	NR	NR	NR	10 U
Bromoform.....	NR	NR	NR	5 U
4-Methyl-2-pentanone.....	NR	NR	NR	10 U
2-Hexanone.....	NR	NR	NR	10 U
Tetrachloroethene.....	4 U	4 U	5 U	5 U
1,1,2,2-Tetrachloroethane.....	NR	NR	NR	5 U
Toluene.....	NR	NR	NR	5 U
Chlorobenzene.....	NR	NR	NR	5 U
Ethylbenzene.....	NR	NR	NR	5 U
Styrene.....	NR	NR	NR	5 U
Total Xylenes.....	NR	NR	NR	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

BEDROCK WELLS
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8610-044-0260	8706-042-0100	8706-037-0010	8706-042-0090
Customer ID:	G628610860	GW0387	GW0587	GW0887
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1.0	1.0	1.0

Surrogate Recovery

Toluene-d8:	98 %	102 %	106 %	104 %
Bromofluorobenzene:	98 %	96 %	105 %	96 %
1,2-Dichloroethane-d4:	92 %	86 %	110 %	100 %

Analytes

Chloromethane	10	U	10.00	U	10.00	U	10.00	U
Bromomethane	10	U	10.00	U	10.00	U	10.00	U
Vinyl Chloride	10	U	10.00	U	10.00	U	10.00	U
Chloroethane	10	U	10.00	U	10.00	U	10.00	U
Methylene Chloride	5	U	2	J	3	JB	2	J
Acetone	10	U	33	B	14	B	11	B
Carbon Disulfide	5	U	5.00	U	5.00	U	5.00	U
1,1-Dichloroethene	5	U	5.00	U	5.00	U	2	J
1,1-Dichloroethane	5	U	5.00	U	5.00	U	5.00	U
Trans-1,2-Dichloroethene	5	U	5.00	U	5.00	U	5.00	U
Chloroform	5	U	5.00	U	4	J	5.00	U
1,2-Dichloroethane	5	U	5.00	U	5.00	U	5.00	U
2-Butanone	10	U	10.00	U	10.00	U	10.00	U
1,1,1-Trichloroethane	5	U	5.00	U	5.00	U	5.00	U
Carbon Tetrachloride	5	U	5.00	U	5.00	U	5.00	U
Vinyl Acetate	10	U	10.00	U	10.00	U	10.00	U
Bromodichloromethane	5	U	5.00	U	5.00	U	5.00	U
1,2-Dichloropropane	5	U	5.00	U	5.00	U	5.00	U
Trans-1,3-Dichloropropene	5	U	5.00	U	5.00	U	5.00	U
Trichloroethene	5	U	5.00	U	5.00	U	5.00	U
Dibromochloromethane	5	U	5.00	U	5.00	U	5.00	U
1,1,2-Trichloroethane	5	U	5.00	U	5.00	U	5.00	U
Benzene	5	U	5.00	U	5.00	U	5.00	U
cis-1,3-Dichloropropene	5	U	5.00	U	5.00	U	5.00	U
2-Chloroethylvinylether	10	U	10.00	U	10.00	U	10.00	U
Bromoform	5	U	5.00	U	5.00	U	5.00	U
4-Methyl-2-pentanone	10	U	10.00	U	10.00	U	10.00	U
2-Hexanone	10	U	10.00	U	10.00	U	10.00	U
Tetrachloroethene	5	U	5.00	U	5.00	U	5.00	U
1,1,2,2-Tetrachloroethane	5	U	5.00	U	5.00	U	5.00	U
Toluene	5	U	2	J	5.00	U	1	J
Chlorobenzene	5	U	5.00	U	5.00	U	5.00	U
Ethylbenzene	5	U	5.00	U	5.00	U	5.00	U
Styrene	5	U	5.00	U	5.00	U	5.00	U
Total Xylenes	5	U	5.00	U	5.00	U	5.00	U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

RADIONUCLIDES

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0587-881-005	3-87-06-16-87	
0387-881-009	3-87-07-09-87	
0687-881-010	3-87-10-06-87	
0487-881-011	45-87-11-24-87	
0587-881-003	5-87-06-12-87	
0387-881-109	5-87-07-07-87	
0687-881-014	5-87-10-13-87	
0187-881-046	59-86-04-09-87	
0187-881-071	59-86-04-30-87	
0287-881-010	59-86-05-26-87	
0387-881-112	59-86-07-07-87	
0187-881-047	62-86-04-09-87	
0187-881-069	62-86-04-29-87	
0287-881-009	62-86-05-26-87	
0387-881-113	62-86-07-07-87	
0487-881-009	62-86-10-16-87	
0587-881-004	8-87-06-15-87	
0387-881-012	8-87-07-13-87	

BEDROCK WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-005	0387-881-009	0687-881-010
Customer ID:	3-87-06-16-87	3-87-07-09-87	3-87-10-06-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	811 +/- 76	pci/l	0 +/- 21	pci/l	15 +/- 19	pci/l
Gross Beta.....	177 +/- 61	pci/l	53 +/- 44	pci/l	6 +/- 40	pci/l
Uranium 233, 234.....	11 +/- 2	pci/l	0.0 +/- 1.1	pci/l	1.6 +/- 0.2	pci/l
Uranium 235.....	.18 +/- .47	pci/l	0.0 +/- 0.5	pci/l	.09 +/- .05	pci/l
Uranium 238.....	11 +/- 2	pci/l	0.3 +/- 0.7	pci/l	.53 +/- .13	pci/l
Strontium 89, 90.....	1.4	pci/l	<1.0	pci/l	NR	
Plutonium 239, 240.....	0.2 +/- 1.1	pci/l	.15 +/- .98	pci/l	.05 +/- .11	pci/l
Americium 241.....	0.0 +/- 4.1	pci/l	.25 +/- .32	pci/l	0.00 +/- .08	pci/l
Cesium 137.....	2.2	pci/l			NR	
Tritium.....	<110	pci/l	<514	pci/l	<500	pci/l

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0487-881-011	0587-881-003	0387-881-109
Customer ID:	45-87-11-24-87	5-87-06-12-87	5-87-07-07-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	32 +/- 9	pci/l	64 +/- 9	pci/l	75 +/- 43	pci/l
Gross Beta.....	114 +/- 17	pci/l	80 +/- 41	pci/l	91 +/- 51	pci/l
Uranium 233, 234.....	2.7 +/- 0.4	pci/l	.14 +/- .03	pci/l	9.4 +/- 2.0	pci/l
Uranium 235.....	.08 +/- .05	pci/l	.58 +/- .66	pci/l	0.1 +/- 0.3	pci/l
Uranium 238.....	1.4 +/- 0.2	pci/l	9.1 +/- 2.2	pci/l	5.9 +/- 1.5	pci/l
Strontium 89, 90.....	<1.0	pci/l	3.4	pci/l	1.7	pci/l
Plutonium 239, 240.....	.00 +/- .12	pci/l	0.0 +/- .55	pci/l	0.6 (1.9) +/- 1.4	pci/l
Americium 241.....	0.0 +/- 1.4	pci/l	0.0 +/- 3.0	pci/l	-.04 (2.4) +/- 1.41	pci/l
Cesium 137.....			2.0	pci/l		
Tritium.....	<220	pci/l	<110	pci/l	<493	pci/l

BEDROCK WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0687-881-014	0187-881-046	0187-881-071
Customer ID:	5-87-10-13-87	59-86-04-09-87	59-86-04-30-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	99 +/- 48	pci/l	33 +/- 7	pc/l	45 +/- 17	pc/l
Gross Beta.....	61 +/- 50	pci/l	37 +/- 13	pc/l	58 +/- 14	pc/l
Uranium 233, 234.....	12 +/- 1	pci/l	.11 +/- .03	pc/l	15 +/- 2	pc/l
Uranium 235.....	.56 +/- .15	pci/l	0.5 +/- 1.3	pc/l	.74 +/- .64	pc/l
Uranium 238.....	8.0 +/- 0.8	pci/l	5.3 +/- 2.9	pc/l	11 +/- 2	pc/l
Strontium 89, 90.....	NR		0.6	pc/l	2.41	pc/l
Plutonium 239, 240.....	.06 +/- .12	pci/l	0.0 +/- .84	pc/l	0.9 +/- 1.1	pc/l
Americium 241.....	0.00 +/- .12	pci/l	0.0 +/- 1.6	pc/l	0.0 +/- 1.3	pc/l
Cesium 137.....	NR		NR		NR	
Tritium.....	<460	pci/l	450	pc/l	NR	

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0287-881-010	0387-881-112	0187-881-047
Customer ID:	59-86-05-26-87	59-86-07-07-87	62-86-04-09-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	27 +/- 27	pci/l	27 +/- 27	pci/l	36 +/- 27	pc/l
Gross Beta.....	54 +/- 12	pci/l	14 (74) +/- 40	pci/l	3 +/- 9	pc/l
Uranium 233, 234.....	0.15 +/- 0.02	pci/l	13.1 +/- 2.2	pci/l	0.9 +/- 1.6	pc/l
Uranium 235.....	0.0 +/- 0.36	pci/l	0.2 (0.5) +/- 0.4	pci/l	.11 +/- .65	pc/l
Uranium 238.....	10 +/- 2	pci/l	10.9 +/- 1.7	pci/l	1.8 +/- 1.6	pc/l
Strontium 89, 90.....	1.53	pci/l	<1.0	pci/l	0.6	pc/l
Plutonium 239, 240.....	0.0 +/- 0.63	pci/l	.07 (0.8) +/- .71	pci/l	0.0 +/- 1.1	pc/l
Americium 241.....	0.0 +/- 1.3	pci/l			0.0 +/- 1.3	pc/l
Cesium 137.....	NR				NR	
Tritium.....	2.1	pci/l	<493	pci/l	110	pc/l

BEDROCK WELLS
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0187-881-069	0287-881-009	0387-881-113
Customer ID:	62-86-04-29-87	62-86-05-26-87	62-86-07-07-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	30 +/- 12	pc/l	14 +/- 3	pci/l	22	(33) +/- 22	pci/l
Gross Beta	8 +/- 37	pc/l	35 +/- 13	pci/l	44	(76) +/- 45	pci/l
Uranium 233, 234	4.9 +/- 1.3	pc/l	3.4 +/- 1.2	pci/l		4.3 +/- 1.4	pci/l
Uranium 235	.75 +/- .54	pc/l	0.1 +/- 0.35	pci/l		0.5 +/- 0.4	pci/l
Uranium 238	3.6 +/- 1.1	pc/l	2.8 +/- 1.0	pci/l		3.2 +/- 1.0	pci/l
Strontium 89, 90	.44	pc/l	NR			<1.0	pci/l
Plutonium 239, 240	0.0 +/- 1.3	pc/l	0.04 +/- 0.76	pci/l	.06	(0.8) +/- .71	pci/l
Americium 241	0.0 +/- 1.4	pc/l	0.0 +/- 1.2	pci/l			
Cesium 137	NR		NR				
Tritium	NR		NR			<493	

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0487-881-009	0587-881-004	0387-881-012
Customer ID:	62-86-10-16-87	8-87-06-15-87	8-87-07-13-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	13 +/- 5	pci/l	87 +/- 86	pci/l	10 +/- 30	pci/l
Gross Beta	11 +/- 10	pci/l	117 +/- 4	pci/l	50 +/- 47	pci/l
Uranium 233, 234	4.0 +/- 0.5	pci/l	4.2 +/- 1.6	pci/l	-0.2 +/- 1.0	pci/l
Uranium 235	.15 +/- .07	pci/l	.40 +/- .54	pci/l	0.0 +/- 0.3	pci/l
Uranium 238	3.0 +/- 0.4	pci/l	4.7 +/- 1.5	pci/l	-0.3 +/- 0.5	pci/l
Strontium 89, 90	<1.0	pci/l	1.6	pci/l	<1.0	pci/l
Plutonium 239, 240	.04 +/- .09	pci/l	1.7 +/- 1.9	pci/l	.00 +/- .46	pci/l
Americium 241	0.00 +/- .03	pci/l	0.0 +/- 1.5	pci/l	-.04 +/- .18	pci/l
Cesium 137			0.3	pci/l		
Tritium	<520	pci/l	<110	pci/l	<514	pci/l

INORGANICS

BEDROCK WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-005	0387-881-037	0687-881-011
Customer ID:	3-87-06-16-87	3-87-07-09-87	3-87-10-06-87
Matrix:	Water	Water	Water

Inorganics

Chloride	93.9		mg/l	97		mg/l	100.1	mg/l
Cyanide, Total	1.0	U	mg/l	1	U	ug/l	NR	
Fluoride								
Nitrate-Nitrite-Nitrogen	0.32		mg/l	0.50		mg/l	0.20	U mg/l
Total Organic Carbon								
pH								
Sulfate	210		mg/l	81.0		mg/l	3.5	mg/l
Specific Conductance								
Turbidity								
Sulfide								
Oil and Grease	-95.0		mg/k					
Ignitability (Degrees)								
% Solids								
Total Dissolved Solids	470		mg/l	426		mg/l	388	mg/l
HCO3-	192		mg/l	196		mg/l	199	mg/l
CO3=								
Suspended Solids								
Hexavalent Chromium (Cr+6)	1.0	U	mg/l					

BEDROCK WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0487-881-085			0587-881-003			0387-881-029	
Customer ID:	45-87-11-23-87			5-87-06-12-87			5-87-07-07-87	
Matrix:	Water			Water			Water	

Inorganics

Chloride	6.38	mg/l		166		mg/l	205	mg/l
Cyanide, Total	NR			1.0	U	mg/l	1	U ug/l
Fluoride								
Nitrate-Nitrite-Nitrogen	<0.02	mg/l		9.50		mg/l	8.6	mg/l
Total Organic Carbon								
pH								
Sulfate	73.6	mg/l		345		mg/l	365	mg/l
Specific Conductance								
Turbidity								
Sulfide								
Oil and Grease				32.0		mg/k		
Ignitability (Degrees)								
% Solids								
Total Dissolved Solids	327	mg/l		1314		mg/l	1488	mg/l
HCO3-	111	mg/l		389		mg/l	443	mg/l
CO3=	NR							
Suspended Solids								
Hexavalent Chromium (Cr+6)				1.0	U	mg/l		

BEDROCK WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0687-881-015	0187-881-046	0187-881-071
Customer ID:	5-87-10-13-87	59-86-04-09-87	59-86-04-30-87
Matrix:	Water	Water	Water

Inorganics

Chloride	244	mg/l	66.7		mg/l	78.5		mg/l
Cyanide, Total	NR		1.0	U	mg/l	1.0	U	mg/l
Fluoride								
Nitrate-Nitrite-Nitrogen	9.62	mg/l	1.28		mg/l	1.40		mg/l
Total Organic Carbon								
pH								
Sulfate	490	mg/l	150		mg/l	175		mg/l
Specific Conductance								
Turbidity								
Sulfide								
Oil and Grease								
Ignitability (Degrees)								
% Solids								
Total Dissolved Solids	1712	mg/l	874		mg/l	812		mg/l
HCO3-	505	mg/l	329		mg/l	493		mg/l
CO3=								
Suspended Solids								
Hexavalent Chromium (Cr+6)								

BEDROCK WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0287-881-010			0387-881-030			0487-881-011	
Customer ID:	59-86-05-26-87			59-86-07-07-87			59-86-10-07-87	
Matrix:	Water			Water			Water	

Inorganics

Chloride	116	mg/l		24		mg/l	91.1	mg/l
Cyanide, Total	1.0	mg/l		1	U	ug/l	NR	
Fluoride								
Nitrate-Nitrite-Nitrogen	2.56	mg/l		1.98		mg/l	1.10	mg/l
Total Organic Carbon								
pH								
Sulfate	390	mg/l		140		mg/l	168	mg/l
Specific Conductance								
Turbidity								
Sulfide								
Oil and Grease								
Ignitability (Degrees)								
% Solids								
Total Dissolved Solids	1047	mg/l		997		mg/l	929	mg/l
HCO3-	514	mg/l		446		mg/l	459	mg/l
CO3=							NR	
Suspended Solids								
Hexavalent Chromium (Cr+6)								

BEDROCK WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0187-881-047			0187-881-069			0287-881-009		
Customer ID:	62-86-04-09-87			62-86-04-29-87			62-86-05-26-87		
Matrix:	Water			Water			Water		

Inorganics

Chloride	28.0		mg/l	26.9		mg/l	25.5		mg/l
Cyanide, Total	1.0	U	mg/l	1.0	U	mg/l	1.0	U	mg/l
Fluoride									
Nitrate-Nitrite-Nitrogen	2.30		mg/l	2.60		mg/l	3.4		mg/l
Total Organic Carbon									
pH									
Sulfate	60.0		mg/l	90.0		mg/l	48.0		mg/l
Specific Conductance									
Turbidity									
Sulfide									
Oil and Grease									
Ignitability (Degrees)									
% Solids									
Total Dissolved Solids	274		mg/l	286		mg/l	295		mg/l
HCO3-	67.5		mg/l	124		mg/l	164		mg/l
CO3=									
Suspended Solids									
Hexavalent Chromium (Cr+6)									

BEDROCK WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-031			0487-881-018			0587-881-004		
Customer ID:	62-86-07-07-87			62-86-10-14-87			8-87-06-15-87		
Matrix:	Water			Water			Water		

Inorganics

Chloride	102		mg/l	27.3		mg/l	40.1		mg/l
Cyanide, Total	1	U	ug/l	NR			1.0	U	mg/l
Fluoride									
Nitrate-Nitrite-Nitrogen	2.3		mg/l	2.70		mg/l	0.20	U	mg/l
Total Organic Carbon									
pH									
Sulfate	23.0		mg/l	48.0		mg/l	770		mg/l
Specific Conductance									
Turbidity									
Sulfide									
Oil and Grease							-55.0		mg/k
Ignitability (Degrees)									
% Solids									
Total Dissolved Solids	280		mg/l	303		mg/l	1232		mg/l
HCO3-	157		mg/l	178		mg/l	266		mg/l
CO3=				NR					
Suspended Solids									
Hexavalent Chromium (Cr+6)							1.0	U	mg/l

BEDROCK WELLS
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-039	8610-044-028
Customer ID:	8-87-07-09-87	G628610860
Matrix:	Water	Water

Inorganics

Chloride	41		mg/l	26		mg/l
Cyanide, Total	1	U	ug/l	0.01	U	mg/l
Fluoride						
Nitrate-Nitrite-Nitrogen	1	U	mg/l			
Total Organic Carbon						
pH						
Sulfate	433		mg/l	58		mg/l
Specific Conductance						
Turbidity						
Sulfide						
Oil and Grease						
Ignitability (Degrees)						
% Solids						
Total Dissolved Solids	1226		mg/l	350		mg/l
HCO3-	295		mg/l			
CO3=						
Suspended Solids				NR		
Hexavalent Chromium (Cr+6)						

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0587-881-005	3-87-06-16-87	
0387-881-037	3-87-07-09-87	
0687-881-011	3-87-10-06-87	
0487-881-085	45-87-11-23-87	
0587-881-003	5-87-06-12-87	
0387-881-029	5-87-07-07-87	
0687-881-015	5-87-10-13-87	
0187-881-046	59-86-04-09-87	
0187-881-071	59-86-04-30-87	
0287-881-010	59-86-05-26-87	
0387-881-030	59-86-07-07-87	
0487-881-011	59-86-10-07-87	
0187-881-047	62-86-04-09-87	
0187-881-069	62-86-04-29-87	
0287-881-009	62-86-05-26-87	
0387-881-031	62-86-07-07-87	
0487-881-018	62-86-10-14-87	
0587-881-004	8-87-06-15-87	
0387-881-039	8-87-07-09-87	
8610-044-028	G628610860	

METALS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0587-881-005	3-87-06-16-87	
0387-881-138	3-87-07-09-87	
0687-881-010	3-87-10-06-87	
0487-881-081	45-87-11-24-87	
0587-881-003	5-87-06-12-87	
0387-881-023	5-87-07-07-87	
0687-881-014	5-87-10-13-87	
0187-881-043	59-86-04-09-87	
0187-881-067	59-86-04-30-87	
0287-881-010	59-86-05-27-87	
0387-881-132	59-86-07-07-87	
0487-881-014	59-86-10-08-86	
0187-881-044	62-86-04-09-87	
0187-881-068	62-86-04-29-87	
0287-881-009	62-86-05-27-87	
0387-881-024	62-86-07-07-87	
0487-881-022	62-86-10-16-87	
0587-881-004	8-87-06-15-87	
0387-881-140	8-87-07-09-87	
8610-028-22	G598610860	
8610-044-27	G628610860	

BEDROCK WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-005	0387-881-138	0687-881-010	0487-881-081
Customer ID:	3-87-06-16-87	3-87-07-09-87	3-87-10-06-87	45-87-11-24-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....		0.0076 U	0.0076 U	0.0076 U
Aluminum (Al), total.....		0.0290 U	0.0290 U	0.1306
Arsenic (As), total.....	0.01 U	0.005 U		0.004 J
Barium (Ba), total.....		0.0663	0.0878	0.1658
Beryllium (Be), total.....		0.005 U	0.005 U	0.005 U
Calcium (Ca), total.....		15.5874	19.4722	19.7961
Cadmium (Cd), total.....	0.005 U	0.001 U	0.001 U	0.0058
Cobalt (Co), total.....		0.0220 U	0.0220 U	0.0220 U
Chromium (Cr), total.....		0.0100 U	0.0100 U	0.0100 U
Cesium (Cs), total.....	0.2 U	0.02 U	0.02 U	0.02 U
Copper (Cu), total.....		0.0083	0.0063 U	0.0133
Iron (Fe), total.....		0.0069 U	0.0069 U	0.0899
Mercury (Hg), total.....	0.0002 U	0.0002 U	0.0004	0.0002
Potassium (K), total.....	13	10.2		
Lithium (Li), total.....	0.06			
Magnesuim (Mg), total.....		6.0678	6.7842	2.3647
Manganese (Mn), total.....		0.0207	0.0303	0.0493
Molybdenum(Mo), total.....		0.0393	0.0222	0.0650
Sodium (Na), total.....		131.7184	124.5451	34.6104
Nickel (Ni), total.....		0.0370 U	0.0370 U	0.0370 U
Lead (Pb), total.....	0.008 U	0.005 U	0.005 U	0.005 U
Antimony (Sb), total.....	0.06 U	0.02 U		0.02 U
Selenium (Se), total.....	0.005 U	0.005 U	0.005 U	0.003 J
Strontium (Sr), total.....		0.4580	0.4220	0.2063
Thallium (Tl), total.....	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium (V), total.....		0.0240 U	0.0240 U	0.0240 U
Zinc (Zn), total.....	0.02 U	0.0220 U	0.0200 U	0.0229

BEDROCK WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-003	0387-881-023	0687-881-014	0187-881-043
Customer ID:	5-87-06-12-87	5-87-07-07-87	5-87-10-13-87	59-86-04-09-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....		0.0076 U	0.0076 U	0.0076 U
Aluminum (Al), total.....		0.0314	0.0451	0.1056
Arsenic (As), total.....	0.01 U	0.005 U	0.005 U	0.0100 U
Barium (Ba), total.....		0.0727	0.0628	0.926
Beryllium (Be), total.....		0.005 U	0.005 U	0.005 U
Calcium (Ca), total.....		251.4976	256.0985	130.7961
Cadmium (Cd), total.....	0.008 U	0.0003 J	0.0005 J	0.0050 U
Cobalt (Co), total.....		0.0220 U	0.0220 U	0.0220 U
Chromium (Cr), total.....		0.0100 U	0.0376	0.0100 U
Cesium (Cs), total.....	0.2 U	0.02 U	0.02 U	0.2 U
Copper (Cu), total.....		0.0140	0.0063 U	0.0063 U
Iron (Fe), total.....		0.0314	0.0120	0.0294
Mercury (Hg), total.....	0.0002 U	0.0002 U	0.0003	0.0002 U
Potassium (K), total.....	11	11.1	11.6	5.0 U
Lithium (Li), total.....	0.35			
Magnesuim (Mg), total.....		65.5484	75.6664	41.3597
Manganese (Mn), total.....		0.0863	0.0252	0.0362
Molybdenum(Mo), total.....		0.0220 U	0.0220 U	0.0220 U
Sodium (Na), total.....		194.8140	158.2419	145.5361
Nickel (Ni), total.....		0.0370 U	0.0370 U	0.0463
Lead (Pb), total.....	0.005 U	0.005 U	0.005 U	0.0050 U
Antimony (Sb), total.....	0.06 U	0.02 U	0.02 U	0.06 U
Selenium (Se), total.....	0.052	0.13	0.005 U	0.06
Strontium (Sr), total.....		2.9664	3.0625	1.2964
Thallium (Tl), total.....	0.01 U	0.01 U	0.01 U	0.0100 U
Vanadium (V), total.....		0.0240 U	0.0240 U	0.0240 U
Zinc (Zn), total.....	0.07	0.0638	0.0219	0.02 U

BEDROCK WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0187-881-067	0287-881-010	0387-881-132	0487-881-014
Customer ID:	59-86-04-30-87	59-86-05-27-87	59-86-07-07-87	59-86-10-08-86
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver	(Ag), total.....	0.0076	U	0.0076	U	0.0076	U	0.0076	U
Aluminum	(Al), total.....	0.0290	U	0.0290	U	0.0487		0.0649	
Arsenic	(As), total.....	0.0100	U	0.01	U	0.005	U	0.005	U
Barium	(Ba), total.....	0.1220		0.0881		0.0894		0.0786	
Beryllium	(Be), total.....	0.005	U	0.005	U	0.005	U	0.005	U
Calcium	(Ca), total.....	124.0025		152.3470		155.7762		126.5730	
Cadmium	(Cd), total.....	0.0050	U	0.005	U	0.0004	J	0.0007	J
Cobalt	(Co), total.....	0.0220	U	0.0220	U	0.0220	U	0.0220	U
Chromium	(Cr), total.....	0.0100	U	0.0100	U	0.0100	U	0.0256	
Cesium	(Cs), total.....	0.2	U	0.2	U	0.02	U	0.02	U
Copper	(Cu), total.....	0.0063	U	0.0063	U	0.0156		0.0118	
Iron	(Fe), total.....	0.0069	U	0.0069	U	0.0069	U	0.0518	
Mercury	(Hg), total.....	0.0002	U	0.0002	U	0.002		0.0004	
Potassium	(K), total.....	5.0	U	5.0	U	2.8		2.5	
Lithium	(Li), total.....							0.07	J
Magnesuim	(Mg), total.....	40.1383		42.7896		44.9796		43.0923	
Manganese	(Mn), total.....	0.0485		0.1833		0.0568		0.0051	U
Molybdenum	(Mo), total.....	0.0220	U	0.0220	U	0.0220	U	0.0220	U
Sodium	(Na), total.....	145.1149		190.4572		176.5974		136.9976	
Nickel	(Ni), total.....	0.1112		0.1494		0.1004		0.0737	
Lead	(Pb), total.....	0.0050	U	0.010		0.005	U	0.005	U
Antimony	(Sb), total.....	0.06	U	0.06	U	0.02	U	0.02	U
Selenium	(Se), total.....	0.04		0.15		0.15		0.068	
Strontium	(Sr), total.....	1.2411		1.2687		1.4948		1.3233	
Thallium	(Tl), total.....	0.0100	U	0.01	U	0.01	U	0.01	U
Vanadium	(V), total.....	0.0240	U	0.0240	U	0.0240	U	0.0240	U
Zinc	(Zn), total.....	0.02		0.0273		0.0241		0.0209	

BEDROCK WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0187-881-044	0187-881-068	0287-881-009	0387-881-024
Customer ID:	62-86-04-09-87	62-86-04-29-87	62-86-05-27-87	62-86-07-07-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.0076 U	0.0076 U	0.0076 U	0.0076 U
Aluminum (Al), total.....	0.1455	0.0839	0.0647	0.0600
Arsenic (As), total.....	0.01 U	0.01 U	0.01 U	0.005 U
Barium (Ba), total.....	0.0239	0.0191	0.0322	0.0356
Beryllium (Be), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Calcium (Ca), total.....	37.1320	32.5061	38.7927	35.4258
Cadmium (Cd), total.....	0.005 U	0.005 U	0.005 U	0.0003 J
Cobalt (Co), total.....	0.0220 U	0.0220 U	0.0220 U	0.0220 U
Chromium (Cr), total.....	0.0128	0.0100 U	0.0100 U	0.0189
Cesium (Cs), total.....	0.2 U	0.2 U	0.2 U	0.02 U
Copper (Cu), total.....	0.0063 U	0.0063 U	0.0103	0.0166
Iron (Fe), total.....	0.0069 U	0.0069 U	0.0225	0.0272
Mercury (Hg), total.....	0.0002 U	0.0002 U	0.0002 U	0.0008
Potassium (K), total.....	13.0	10.0	9.5 U	8.2
Lithium (Li), total.....				
Magnesuim (Mg), total.....	4.1261	4.3072	6.8863	8.1709
Manganese (Mn), total.....	0.0051 U	0.0051 U	0.0051 U	0.0051 U
Molybdenum(Mo), total.....	0.0220 U	0.0220 U	0.0220 U	0.0220 U
Sodium (Na), total.....	53.4960	58.5839	56.0170	60.8007
Nickel (Ni), total.....	0.0370 U	0.0370 U	0.0370 U	0.0370
Lead (Pb), total.....	0.005 U	0.005 U	0.021	0.005 U
Antimony (Sb), total.....	0.0600 U	0.0600 U	0.06 U	0.02 U
Selenium (Se), total.....	0.06	0.04	0.044	0.05
Strontium (Sr), total.....	0.4131	0.3812	0.3969	0.4878
Thallium (Tl), total.....	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium (V), total.....	0.0240 U	0.0240 U	0.0240 U	0.0240 U
Zinc (Zn), total.....	0.05	0.02 U	0.0200 U	0.0200 U

BEDROCK WELLS
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0487-881-022	0587-881-004	0387-881-140	8610-028-22
Customer ID:	62-86-10-16-87	8-87-06-15-87	8-87-07-09-87	G598610860
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.0076 U		0.0076 U	0.010 U
Aluminum (Al), total.....	0.0479		0.0337	0.230
Arsenic (As), total.....	0.005 U	0.01 U	0.005 U	0.002 U
Barium (Ba), total.....	0.0375		0.0433	0.100
Beryllium (Be), total.....	0.005 U		0.005 U	0.029
Calcium (Ca), total.....	27.7660		137.2682	112.000
Cadmium (Cd), total.....	0.001 U	0.005 U	0.001 U	0.005 U
Cobalt (Co), total.....	0.0220 U		0.0220 U	0.050 U
Chromium (Cr), total.....	0.0453		0.0100 U	0.010 U
Cesium (Cs), total.....	0.02 U	0.2 U	0.02 U	0.150 U
Copper (Cu), total.....	0.0087		0.0128	0.020 U
Iron (Fe), total.....	0.1330		0.0156	0.075 U
Mercury (Hg), total.....	0.0001 J	0.0003	0.0002 U	0.0012
Potassium (K), total.....	9.1	20	1.47	41.300
Lithium (Li), total.....	0.03 J	0.12		NA
Magnesuim (Mg), total.....	8.6855		42.0058	36.100
Manganese (Mn), total.....	0.0051 U		0.0531	0.107
Molybdenum(Mo), total.....	0.0220 U		0.0377	0.100 U
Sodium (Na), total.....	51.3986		289.5255	156.000
Nickel (Ni), total.....	0.1041		0.0402	0.040 U
Lead (Pb), total.....	0.005 U	0.005 U	0.005 U	0.024
Antimony (Sb), total.....	0.02 U	0.06 U	0.02 U	0.185
Selenium (Se), total.....	0.027	0.005 U	0.003 J	0.002 U
Strontium (Sr), total.....	0.3823		2.4734	1.110
Thallium (Tl), total.....	0.01 U	0.01 U	0.01 U	0.010 U
Vanadium (V), total.....	0.0240 U		0.0240 U	0.025 U
Zinc (Zn), total.....	0.0200 U	0.02 U	0.0200 U	0.012

APPENDIX F-6

SURFACE WATER ANALYTICAL DATA

VOLATILE ORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0487-881-087	F DRAIN-11-17-87	
0387-881-001	SW-27-07-22-87	
0387-881-002	SW-28-07-22-87	
0587-881-006	SW-29-05-26-87	
0487-881-088	SW-29-11-10-87	
0587-881-026	SW-30	
0587-881-007	SW-30-05-26-87	
0487-881-089	SW-30-11-10-87	
0587-881-027	SW-31	
0587-881-008	SW-31-05-26-87	
0587-881-028	SW-32	
0587-881-009	SW-32-05-26-87	
0487-881-090	SW-32-11-11-87	
0587-881-029	SW-35	
0587-881-010	SW-35-05-26-87	
0487-881-091	SW-35-11-11-87	
0587-881-030	SW-40	
0587-881-031	SW-41	
0487-881-092	SW-41-11-11-87	
0587-881-032	SW-42	
0587-881-011	SW-44-05-26-87	
0587-881-012	SW-45-05-26-87	
0587-881-013	SW-46-05-26-87	
0387-881-014	SW-62-07-22-87	
0387-881-016	SW-64-07-22-87	
0587-881-014	SW-881HS-05-28-87	
8608-052-0210	SW27088600	21
8608-052-0160	SW28088600	16
8608-044-0110	SW31088600	11
8608-044-0260	SW32088600	26
8608-052-0110	SW34088600	11
8608-044-0160	SW36088600	16
0000-000-0050	SW4208860	
8608-036-0490	SWC1088600	49
8608-036-0560	SWC2088600	56

SURFACE WATER
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0487-881-087	0387-881-001	0387-881-002	0587-881-006
Customer ID:	F DRAIN-11-17-87	SW-27-07-22-87	SW-28-07-22-87	SW-29-05-26-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1.0	1	1	1

Surrogate Recovery

Toluene-d8:	92 %	%	%	%
Bromofluorobenzene:	96 %	%	%	%
1,2-Dichloroethane-d4:	98 %	%	%	%

Analytes

Chloromethane.....	10 U	NR	NR	NR
Bromomethane.....	10 U	NR	NR	NR
Vinyl Chloride.....	10 U	NR	NR	NR
Chloroethane.....	10 U	NR	NR	NR
Methylene Chloride.....	21.00	NR	NR	NR
Acetone.....	10 U	NR	NR	NR
Carbon Disulfide.....	5 U	NR	NR	NR
1,1-Dichloroethene.....	5 U	5 U	5 U	4 U
1,1-Dichloroethane.....	5 U	NR	NR	NR
Trans-1,2-Dichloroethene.....	5 U	5 U	5 U	4 U
Chloroform.....	5 U	5 U	5 U	4 U
1,2-Dichloroethane.....	5 U	5 U	5 U	4 U
2-Butanone.....	10 U	NR	NR	NR
1,1,1-Trichloroethane.....	5 U	5 U	5 U	4 U
Carbon Tetrachloride.....	6.00	5 U	5 U	4 U
Vinyl Acetate.....	10 U	NR	NR	NR
Bromodichloromethane.....	5 U	NR	NR	NR
1,2-Dichloropropane.....	5 U	NR	NR	NR
Trans-1,3-Dichloropropene.....	5 U	NR	NR	NR
Trichloroethene.....	8.00	5 U	5 U	4 U
Dibromochloromethane.....	5 U	NR	NR	NR
1,1,2-Trichloroethane.....	5 U	5 U	5 U	4 U
Benzene.....	5 U	NR	NR	NR
cis-1,3-Dichloropropene.....	5 U	NR	NR	NR
2-Chloroethylvinylether.....	10 U	NR	NR	NR
Bromoform.....	5 U	NR	NR	NR
4-Methyl-2-pentanone.....	10 U	NR	NR	NR
2-Hexanone.....	10 U	NR	NR	NR
Tetrachloroethene.....	16.00	5 U	5 U	4 U
1,1,2,2-Tetrachloroethane.....	5 U	NR	NR	NR
Toluene.....	12.00	NR	NR	NR
Chlorobenzene.....	5 U	NR	NR	NR
Ethylbenzene.....	5 U	NR	NR	NR
Styrene.....	5 U	NR	NR	NR
Total Xylenes.....	5 U	NR	NR	NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0487-881-088	0587-881-026	0587-881-007	0487-881-089
Customer ID:	SW-29-11-10-87	SW-30	SW-30-05-26-87	SW-30-11-10-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1.0	1	1	1.0

Surrogate Recovery

Toluene-d8:	92 %	%	%	94 %
Bromofluorobenzene:	94 %	%	%	96 %
1,2-Dichloroethane-d4:	90 %	%	%	92 %

Analytes

Chloromethane.....	10 U	NR	NR	10 U
Bromomethane.....	10 U	NR	NR	10 U
Vinyl Chloride.....	10 U	NR	NR	10 U
Chloroethane.....	10 U	NR	NR	10 U
Methylene Chloride.....	19.00	NR	NR	21.00
Acetone.....	10 U	NR	NR	10 U
Carbon Disulfide.....	5 U	NR	NR	5 U
1,1-Dichloroethene.....	5 U	5 U	4 U	5 U
1,1-Dichloroethane.....	5 U	NR	NR	5 U
Trans-1,2-Dichloroethene.....	5 U	5 U	4 U	5 U
Chloroform.....	5 U	5 U	4 U	5 U
1,2-Dichloroethane.....	5 U	5 U	4 U	5 U
2-Butanone.....	10 U	NR	NR	10 U
1,1,1-Trichloroethane.....	5 U	5 U	4 U	5 U
Carbon Tetrachloride.....	7.00	5 U	4 U	7.00
Vinyl Acetate.....	10 U	NR	NR	10 U
Bromodichloromethane.....	5 U	NR	NR	5 U
1,2-Dichloropropane.....	5 U	NR	NR	5 U
Trans-1,3-Dichloropropene.....	5 U	NR	NR	5 U
Trichloroethene.....	42.00	5 U	4 U	5 U
Dibromochloromethane.....	5 U	NR	NR	5 U
1,1,2-Trichloroethane.....	5 U	5 U	4 U	5 U
Benzene.....	5 U	NR	NR	5 U
cis-1,3-Dichloropropene.....	5 U	NR	NR	5 U
2-Chloroethylvinylether.....	NR	NR	NR	NR
Bromoform.....	5 U	NR	NR	5 U
4-Methyl-2-pentanone.....	10 U	NR	NR	10 U
2-Hexanone.....	10 U	NR	NR	10 U
Tetrachloroethene.....	5 U	5 U	4 U	5 U
1,1,2,2-Tetrachloroethane.....	5 U	NR	NR	5 U
Toluene.....	11.00	NR	NR	12.00
Chlorobenzene.....	5 U	NR	NR	5 U
Ethylbenzene.....	5 U	NR	NR	5 U
Styrene.....	5 U	NR	NR	5 U
Total Xylenes.....	5 U	NR	NR	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-027	0587-881-008	0587-881-028	0587-881-009
Customer ID:	SW-31	SW-31-05-26-87	SW-32	SW-32-05-26-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1	1

Surrogate Recovery

Toluene-d8:	%	%	%	%
Bromofluorobenzene:	%	%	%	%
1,2-Dichloroethane-d4:	%	%	%	%

Analytes

Chloromethane.....	NR	NR	NR	NR
Bromomethane.....	NR	NR	NR	NR
Vinyl Chloride.....	NR	NR	NR	NR
Chloroethane.....	NR	NR	NR	NR
Methylene Chloride.....	NR	NR	NR	NR
Acetone.....	NR	NR	NR	NR
Carbon Disulfide.....	NR	NR	NR	NR
1,1-Dichloroethene.....	5 U	4 U	5 U	4 U
1,1-Dichloroethane.....	NR	NR	NR	NR
Trans-1,2-Dichloroethene.....	5 U	4 U	5 U	4 U
Chloroform.....	5 U	4 U	5 U	4 U
1,2-Dichloroethane.....	5 U	4 U	5 U	4 U
2-Butanone.....	NR	NR	NR	NR
1,1,1-Trichloroethane.....	5 U	4 U	5 U	4 U
Carbon Tetrachloride.....	5 U	4 U	5 U	4 U
Vinyl Acetate.....	NR	NR	NR	NR
Bromodichloromethane.....	NR	NR	NR	NR
1,2-Dichloropropane.....	NR	NR	NR	NR
Trans-1,3-Dichloropropene.....	NR	NR	NR	NR
Trichloroethene.....	5 U	4 U	5 U	4 U
Dibromochloromethane.....	NR	NR	NR	NR
1,1,2-Trichloroethane.....	5 U	4 U	5 U	4 U
Benzene.....	NR	NR	NR	NR
cis-1,3-Dichloropropene.....	NR	NR	NR	NR
2-Chloroethylvinylether.....	NR	NR	NR	NR
Bromoform.....	NR	NR	NR	NR
4-Methyl-2-pentanone.....	NR	NR	NR	NR
2-Hexanone.....	NR	NR	NR	NR
Tetrachloroethene.....	5 U	4 U	5 U	4 U
1,1,2,2-Tetrachloroethane.....	NR	NR	NR	NR
Toluene.....	NR	NR	NR	NR
Chlorobenzene.....	NR	NR	NR	NR
Ethylbenzene.....	NR	NR	NR	NR
Styrene.....	NR	NR	NR	NR
Total Xylenes.....	NR	NR	NR	NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0487-881-090	0587-881-029	0587-881-010	0487-881-091
Customer ID:	SW-32-11-11-87	SW-35	SW-35-05-26-87	SW-35-11-11-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1.0	1	1	1.0

Surrogate Recovery

Toluene-d8:	94 %	%	%	92 %
Bromofluorobenzene:	98 %	%	%	96 %
1,2-Dichloroethane-d4:	90 %	%	%	92 %

Analytes

Chloromethane	10 U	NR	NR	10 U
Bromomethane	10 U	NR	NR	10 U
Vinyl Chloride	10 U	NR	NR	10 U
Chloroethane	10 U	NR	NR	10 U
Methylene Chloride	20.00	NR	NR	18.00
Acetone	10 U	NR	NR	10 U
Carbon Disulfide	5 U	NR	NR	5 U
1,1-Dichloroethene	5 U	5 U	4 U	5 U
1,1-Dichloroethane	5 U	NR	NR	5 U
Trans-1,2-Dichloroethene	5 U	4 U	4 U	5 U
Chloroform	5 U	5 U	4 U	5 U
1,2-Dichloroethane	5 U	5 U	4 U	5 U
2-Butanone	10 U	NR	NR	10 U
1,1,1-Trichloroethane	5 U	5 U	6	5 U
Carbon Tetrachloride	6.00	5 U	4 U	6.00
Vinyl Acetate	10 U	NR	NR	10 U
Bromodichloromethane	5 U	NR	NR	5 U
1,2-Dichloropropane	5 U	NR	NR	5 U
Trans-1,3-Dichloropropene	5 U	NR	NR	5 U
Trichloroethene	26.00	5 U	4 U	5 U
Dibromochloromethane	5 U	NR	NR	5 U
1,1,2-Trichloroethane	5 U	5 U	4 U	5 U
Benzene	5 U	NR	NR	5 U
cis-1,3-Dichloropropene	5 U	NR	NR	5 U
2-Chloroethylvinylether	NR	NR	NR	NR
Bromoform	5 U	NR	NR	5 U
4-Methyl-2-pentanone	10 U	NR	NR	10 U
2-Hexanone	10 U	NR	NR	10 U
Tetrachloroethene	5 U	5 U	4 U	5 U
1,1,2,2-Tetrachloroethane	5 U	NR	NR	5 U
Toluene	12.00	NR	NR	12.00
Chlorobenzene	5 U	NR	NR	5 U
Ethylbenzene	5 U	NR	NR	5 U
Styrene	5 U	NR	NR	5 U
Total Xylenes	5 U	NR	NR	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-030	0587-881-031	0487-881-092	0587-881-032
Customer ID:	SW-40	SW-41	SW-41-11-11-87	SW-42
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1.0	1

Surrogate Recovery

Toluene-d8:	%	%	94 %	%
Bromofluorobenzene:	%	%	96 %	%
1,2-Dichloroethane-d4:	%	%	94 %	%

Analytes

Chloromethane.....	NR	NR	10 U	NR
Bromomethane.....	NR	NR	10 U	NR
Vinyl Chloride.....	NR	NR	10 U	NR
Chloroethane.....	NR	NR	10 U	NR
Methylene Chloride.....	NR	NR	21.00	NR
Acetone.....	NR	NR	10 U	NR
Carbon Disulfide.....	NR	NR	5 U	NR
1,1-Dichloroethene.....	5 U	5 U	5 U	5 U
1,1-Dichloroethane.....	NR	NR	5 U	NR
Trans-1,2-Dichloroethene.....	4 U	4 U	5 U	5 U
Chloroform.....	5 U	5 U	5 U	5 U
1,2-Dichloroethane.....	5 U	5 U	5 U	5 U
2-Butanone.....	NR	NR	10 U	NR
1,1,1-Trichloroethane.....	5 U	5 U	5 U	5 U
Carbon Tetrachloride.....	5 U	5 U	6.00	5 U
Vinyl Acetate.....	NR	NR	10 U	NR
Bromodichloromethane.....	NR	NR	5 U	NR
1,2-Dichloropropane.....	NR	NR	5 U	NR
Trans-1,3-Dichloropropene.....	NR	NR	5 U	NR
Trichloroethene.....	5 U	5 U	8.00	5 U
Dibromochloromethane.....	NR	NR	5 U	NR
1,1,2-Trichloroethane.....	5 U	5 U	5 U	5 U
Benzene.....	NR	NR	5 U	NR
cis-1,3-Dichloropropene.....	NR	NR	5 U	NR
2-Chloroethylvinylether.....	NR	NR	NR	NR
Bromoform.....	NR	NR	5 U	NR
4-Methyl-2-pentanone.....	NR	NR	10 U	NR
2-Hexanone.....	NR	NR	10 U	NR
Tetrachloroethene.....	5 U	10	5 U	5 U
1,1,2,2-Tetrachloroethane.....	NR	NR	5 U	NR
Toluene.....	NR	NR	12.00	NR
Chlorobenzene.....	NR	NR	5 U	NR
Ethylbenzene.....	NR	NR	5 U	NR
Styrene.....	NR	NR	5 U	NR
Total Xylenes.....	NR	NR	5 U	NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-011	0587-881-012	0587-881-013	0387-881-014
Customer ID:	SW-44-05-26-87	SW-45-05-26-87	SW-46-05-26-87	SW-62-07-22-87
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1	1

Surrogate Recovery

Toluene-d8:	%	%	%	%
Bromofluorobenzene:	%	%	%	%
1,2-Dichloroethane-d4:	%	%	%	%

Analytes

Chloromethane	NR	NR	NR	NR
Bromomethane	NR	NR	NR	NR
Vinyl Chloride	NR	NR	NR	NR
Chloroethane	NR	NR	NR	NR
Methylene Chloride	NR	NR	NR	NR
Acetone	NR	NR	NR	NR
Carbon Disulfide	NR	NR	NR	NR
1,1-Dichloroethene	4 U	4 U	4 U	5 U
1,1-Dichloroethane	NR	NR	NR	NR
Trans-1,2-Dichloroethene	4 U	4 U	4 U	5 U
Chloroform	4 U	4 U	4 U	5 U
1,2-Dichloroethane	4 U	4 U	4 U	5 U
2-Butanone	NR	NR	NR	NR
1,1,1-Trichloroethane	4 U	4 U	4 U	5 U
Carbon Tetrachloride	4 U	4 U	4 U	5 U
Vinyl Acetate	NR	NR	NR	NR
Bromodichloromethane	NR	NR	NR	NR
1,2-Dichloropropane	NR	NR	NR	NR
Trans-1,3-Dichloropropene	NR	NR	NR	NR
Trichloroethene	4 U	14	4 U	5 U
Dibromochloromethane	NR	NR	NR	NR
1,1,2-Trichloroethane	4 U	4 U	4 U	5 U
Benzene	NR	NR	NR	NR
cis-1,3-Dichloropropene	NR	NR	NR	NR
2-Chloroethylvinylether	NR	NR	NR	NR
Bromoform	NR	NR	NR	NR
4-Methyl-2-pentanone	NR	NR	NR	NR
2-Hexanone	NR	NR	NR	NR
Tetrachloroethene	4 U	128	4 U	5 U
1,1,2,2-Tetrachloroethane	NR	NR	NR	NR
Toluene	NR	NR	NR	NR
Chlorobenzene	NR	NR	NR	NR
Ethylbenzene	NR	NR	NR	NR
Styrene	NR	NR	NR	NR
Total Xylenes	NR	NR	NR	NR

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-016	0587-881-014	8608-052-0210	8608-052-0160
Customer ID:	SW-64-07-22-87	SW-881HS-05-28-87	SW27088600	SW28088600
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1	1

Surrogate Recovery

Toluene-d8:	%	%	96 %	96 %
Bromofluorobenzene:	%	%	98 %	96 %
1,2-Dichloroethane-d4:	%	%	90 %	90 %

Analytes

Chloromethane	NR	NR	10 U	10 U
Bromomethane	NR	NR	10 U	10 U
Vinyl Chloride	NR	NR	10 U	10 U
Chloroethane	NR	NR	10 U	10 U
Methylene Chloride	NR	NR	2 BJ	5 B
Acetone	NR	NR	8 BJ	7 BJ
Carbon Disulfide	NR	NR	5 U	5 U
1,1-Dichloroethene	5 U	4 U	5 U	5 U
1,1-Dichloroethane	NR	NR	5 U	5 U
Trans-1,2-Dichloroethene	5 U	4 U	5 U	5 U
Chloroform	5 U	4 U	5 U	5 U
1,2-Dichloroethane	5 U	4 U	5 U	5 U
2-Butanone	NR	NR	10 U	10 U
1,1,1-Trichloroethane	5 U	4 U	5 U	5 U
Carbon Tetrachloride	5 U	4 U	5 U	5 U
Vinyl Acetate	NR	NR	10 U	10 U
Bromodichloromethane	NR	NR	5 U	5 U
1,2-Dichloropropane	NR	NR	5 U	5 U
Trans-1,3-Dichloropropene	NR	NR	5 U	5 U
Trichloroethene	20	4 U	5 U	5 U
Dibromochloromethane	NR	NR	5 U	5 U
1,1,2-Trichloroethane	5 U	4 U	5 U	5 U
Benzene	NR	NR	5 U	5 U
cis-1,3-Dichloropropene	NR	NR	5 U	5 U
2-Chloroethylvinylether	NR	NR	10 U	10 U
Bromoform	NR	NR	5 U	5 U
4-Methyl-2-pentanone	NR	NR	10 U	10 U
2-Hexanone	NR	NR	10 U	10 U
Tetrachloroethene	5 U	4 U	5 U	5 U
1,1,2,2-Tetrachloroethane	NR	NR	5 U	5 U
Toluene	NR	NR	5 U	5 U
Chlorobenzene	NR	NR	5 U	5 U
Ethylbenzene	NR	NR	5 U	5 U
Styrene	NR	NR	5 U	5 U
Total Xylenes	NR	NR	5 U	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-044-0110	8608-044-0260	8608-052-0110	8608-044-0160
Customer ID:	SW31088600	SW32088600	SW34088600	SW36088600
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1	1

Surrogate Recovery

Toluene-d8:	97 %	98 %	96 %	98 %
Bromofluorobenzene:	97 %	100 %	98 %	99 %
1,2-Dichloroethane-d4:	91 %	90 %	92 %	89 %

Analytes

Chloromethane	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U
Methylene Chloride	5 U	5 U	5 U	5 U
Acetone	10 U	10 U	7 BJ	10 U
Carbon Disulfide	5 U	5 U	5 U	5 U
1,1-Dichloroethene	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U	5 U
Trans-1,2-Dichloroethene	5 U	5 U	5 U	5 U
Chloroform	5 U	5 U	5 U	5 U
1,2-Dichloroethane	5 U	5 U	5 U	5 U
2-Butanone	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U
Vinyl Acetate	10 U	10 U	10 U	10 U
Bromodichloromethane	5 U	5 U	5 U	5 U
1,2-Dichloropropane	5 U	5 U	5 U	5 U
Trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U
Trichloroethene	5 U	5 U	5 U	5 U
Dibromochloromethane	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U
Benzene	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene	5 U	5 U	5 U	5 U
2-Chloroethylvinylether	10 U	10 U	10 U	10 U
Bromoform	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U
Tetrachloroethene	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U	5 U
Toluene	5 U	5 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U	5 U
Styrene	5 U	5 U	5 U	5 U
Total Xylenes	5 U	5 U	5 U	5 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

Sample Information

RFW Batch ID:	0000-000-0050	8608-036-0490	8608-036-0560
Customer ID:	SW4208860	SWC1088600	SWC2088600
Matrix:	Water	Water	Water
Units:	UG/L	UG/L	UG/L
Dilution Factor:	1.0	1	1

Surrogate Recovery

Toluene-d8:	%	100 %	100 %
Bromofluorobenzene:	%	100 %	100 %
1,2-Dichloroethane-d4:	%	97 %	99 %

Analytes

Chloromethane	10.00	U	10	U	10	U
Bromomethane	10.00	U	10	U	10	U
Vinyl Chloride	10.00	U	10	U	10	U
Chloroethane	10.00	U	10	U	10	U
Methylene Chloride	1	J	5	U	5	U
Acetone	14	B	10	U	10	U
Carbon Disulfide	5.00	U	5	U	5	U
1,1-Dichloroethene	5.00	U	5	U	5	U
1,1-Dichloroethane	5.00	U	5	U	5	U
Trans-1,2-Dichloroethene	5.00	U	5	U	5	U
Chloroform	5.00	U	5	U	5	U
1,2-Dichloroethane	5.00	U	5	U	5	U
2-Butanone	10.00	U	10	U	10	U
1,1,1-Trichloroethane	5.00	U	5	U	5	U
Carbon Tetrachloride	5.00	U	5	U	5	U
Vinyl Acetate	10.00	U	10	U	10	U
Bromodichloromethane	5.00	U	5	U	5	U
1,2-Dichloropropane	5.00	U	5	U	5	U
Trans-1,3-Dichloropropene	5.00	U	5	U	5	U
Trichloroethene	5.00	U	5	U	5	U
Dibromochloromethane	5.00	U	5	U	5	U
1,1,2-Trichloroethane	5.00	U	5	U	5	U
Benzene	5.00	U	5	U	5	U
cis-1,3-Dichloropropene	5.00	U	5	U	5	U
2-Chloroethylvinylether	10.00	U	10	U	10	U
Bromoform	5.00	U	5	U	5	U
4-Methyl-2-pentanone	10.00	U	10	U	10	U
2-Hexanone	10.00	U	10	U	10	U
Tetrachloroethene	5.00	U	5	U	5	U
1,1,2,2-Tetrachloroethane	5.00	U	5	U	5	U
Toluene	5.00	U	5	U	5	U
Chlorobenzene	5.00	U	5	U	5	U
Ethylbenzene	5.00	U	5	U	5	U
Styrene	5.00	U	5	U	5	U
Total Xylenes	0.00	U	5	U	5	U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SEMI-VOLATILES

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-052-009	SW27088600	
8608-052-008	SW28088600	
8608-044-003	SW31088600	
8608-052-010	SW34088600	
8608-044-006	SW36088600	
8608-036-005	SWC1088600	
8608-036-004	SWC2088600	

SURFACE WATER
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-052-009	8608-052-008	8608-044-003	8608-052-010
Customer ID:	SW27088600	SW28088600	SW31088600	SW34088600
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1	1

Surrogate Recovery

2-Fluorophenol:	36 %	24 %	58 %	37 %
Phenol-d5:	28 %	20 %	42 %	19 %
2,4,6-Br3-Phenol:	66 %	38 %	113 %	66 %
Nitrobenzene-d5:	36 %	30 %	50 %	40 %
2-Fluorobiphenyl:	46 %	58 %	70 %	48 %
p-Terphenyl-d14:	46 %	54 %	78 %	44 %

Analytes

Phenol	13	10 U	10 U	10 U
bis(2-Chloroethyl)Ether	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
Benzyl Alcohol	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
2-Methylphenol	24	10 U	10 U	10 U
bis(2-Chloroisopropyl)Ether	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
Benzoic Acid	8 J	50 U	50 U	50 U
bis(2-Chloroethoxy)Methane	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U
Hexachlororbutadiene	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U
Dimethyl Phthalate	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
3-Nitroaniline	50 U	50 U	50 U	50 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-052-009	8608-052-008	8608-044-003	8608-052-010
Customer ID:	SW27088600	SW28088600	SW31088600	SW34088600
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1	1

Analytes

Acenaphthene	10	U	10	U	10	U	10	U
2,4-Dinitrophenol	50	U	50	U	50	U	50	U
4-Nitrophenol	50	U	50	U	50	U	50	U
Dibenzofuran	10	U	10	U	10	U	10	U
2,4-Dinitrotoluene	10	U	10	U	10	U	10	U
2,6-Dinitrotoluene	10	U	10	U	10	U	10	U
Diethylphthalate	10	U	10	U	10	U	10	U
4-Chlorophenyl-phenylether	10	U	10	U	10	U	10	U
Fluorene	10	U	10	U	10	U	10	U
4-Nitroaniline	50	U	50	U	50	U	50	U
4,6-Dinitro-2-methylphenol	50	U	50	U	50	U	50	U
N-Nitrosodiphenylamine	11	B	16	B	9	JB	9	JB
4-Bromophenyl-phenylether	10	U	10	U	10	U	10	U
Hexachlorobenzene	10	U	10	U	10	U	10	U
Pentachlorophenol	50	U	50	U	50	U	50	U
Phenanthrene	10	U	10	U	10	U	10	U
Anthracene	10	U	10	U	10	U	10	U
di-n-Butyl Phthalate	10	U	10	U	10	U	10	U
Fluoranthene	10	U	10	U	10	U	10	U
Pyrene	10	U	10	U	10	U	10	U
Butyl Benzyl Phthalate	10	U	10	U	10	U	10	U
3,3'-Dichlorobenzidine	20	U	20	U	20	U	20	U
Benzo(a)Anthracene	10	U	10	U	10	U	10	U
bis(2-Ethylhexyl)Phthalate	10	U	10	U	10	U	10	U
Chrysene	10	U	10	U	10	U	10	U
di-n-Octyl Phthalate	10	U	10	U	10	U	10	U
Benzo(b)Fluoranthene	10	U	10	U	10	U	10	U
Benzo(k)Fluoranthene	10	U	10	U	10	U	10	U
Benzo(a)Pyrene	10	U	10	U	10	U	10	U
Indeno(1,2,3-cd)Pyrene	10	U	10	U	10	U	10	U
Dibenz(a,h)Anthracene	10	U	10	U	10	U	10	U
Benzo(g,h,i)Perylene	10	U	10	U	10	U	10	U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-044-006	8608-036-005	8608-036-004
Customer ID:	SW36088600	SWC1088600	SWC2088600
Matrix:	Water	Water	Water
Units:	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1

Surrogate Recovery

2-Fluorophenol:	31 %	13 %	31 %
Phenol-d5:	25 %	15 %	23 %
2,4,6-Br3-Phenol:	56 %	13 %	50 %
Nitrobenzene-d5:	24 %	34 %	26 %
2-Fluorobiphenyl:	34 %	48 %	70 %
p-Terphenyl-d14:	50 %	48 %	56 %

Analytes

Phenol	10 U	10 U	10 U
bis(2-Chloroethyl)Ether	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U
Benzyl Alcohol	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U
bis(2-Chloroisopropyl)Ether	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	10 U	3 J	200
Hexachloroethane	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U
2-Nitrophenol	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U
Benzoic Acid	50 U	50 U	50 U
bis(2-Chloroethoxy)Methane	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U
Hexachlororbutadiene	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U	50 U
2-Chloronaphthalene	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U
Dimethyl Phthalate	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U
3-Nitroaniline	50 U	50 U	50 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATER
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-044-006	8608-036-005	8608-036-004
Customer ID:	SW36088600	SWC1088600	SWC2088600
Matrix:	Water	Water	Water
Units:	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1

Analytes

Acenaphthene	10	U	10	U	10	U
2,4-Dinitrophenol	50	U	50	U	50	U
4-Nitrophenol	50	U	50	U	50	U
Dibenzofuran	10	U	10	U	10	U
2,4-Dinitrotoluene	10	U	10	U	10	U
2,6-Dinitrotoluene	10	U	10	U	10	U
Diethylphthalate	10	U	10	U	10	U
4-Chlorophenyl-phenylether	10	U	10	U	10	U
Fluorene	10	U	10	U	10	U
4-Nitroaniline	50	U	50	U	50	U
4,6-Dinitro-2-methylphenol	50	U	50	U	50	U
N-Nitrosodiphenylamine	4	JB	10	U	10	U
4-Bromophenyl-phenylether	10	U	10	U	10	U
Hexachlorobenzene	10	U	10	U	10	U
Pentachlorophenol	50	U	50	U	50	U
Phenanthrene	10	U	10	U	10	U
Anthracene	10	U	10	U	10	U
di-n-Butyl Phthalate	10	U	10	U	5	J
Fluoranthene	10	U	10	U	10	U
Pyrene	10	U	10	U	10	U
Butyl Benzyl Phthalate	10	U	10	U	2	J
3,3'-Dichlorobenzidine	20	U	20	U	20	U
Benzo(a)Anthracene	10	U	10	U	2	J
bis(2-Ethylhexyl)Phthalate	10	U	10	U	2	J
Chrysene	10	U	10	U	2	J
di-n-Octyl Phthalate	10	U	10	U	2	J
Benzo(b)Fluoranthene	10	U	10	U	3	J
Benzo(k)Fluoranthene	10	U	10	U	4	J
Benzo(a)Pyrene	10	U	10	U	3	J
Indeno(1,2,3-cd)Pyrene	10	U	10	U	10	U
Dibenz(a,h)Anthracene	10	U	10	U	10	U
Benzo(g,h,i)Perylene	10	U	10	U	10	U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

PESTICIDES/PCBs

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-052-009	SW27088600	
8608-052-008	SW28088600	
8608-044-003	SW31088600	
8608-044-005	SW32088600	
8608-052-011	SW34088600	
8608-044-006	SW36088600	
8608-036-005	SWC1088600	
8608-036-004	SWC2088600	

SURFACE WATERS
PESTICIDES/PCB
CLP LIST

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-052-011	8608-044-006	8608-036-005	8608-036-004
Customer ID:	SW34088600	SW36088600	SWC1088600	SWC2088600
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1	1

Surrogate Recovery

Di-n-butylchlorendate:	89 %	98 %	90 %	91 %

Analytes

Alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U
Beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U
Delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U
Gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor Epoxide	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDE	0.1 U	0.1 U	0.1 U	0.1 U
Endrin	0.1 U	0.1 U	0.1 U	0.1 U
Endosulfan II	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDD	0.1 U	0.1 U	0.1 U	0.1 U
Endosulfan Sulfate	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDT	0.1 U	0.1 U	0.1 U	0.1 U
Methoxychlor	0.5 U	0.5 U	0.5 U	0.5 U
Endrin Ketone	0.1 U	0.1 U	0.1 U	0.1 U
Chlordane	0.5 U	0.5 U	0.5 U	0.5 U
Toxaphene	1 U	1 U	1 U	1 U
Aroclor-1016	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1221	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1232	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1242	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1248	0.5 U	0.5 U	0.5 U	0.5 U
Aroclor-1254	1 U	1 U	1 U	1 U
Aroclor-1260	1 U	1 U	1 U	1 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SURFACE WATERS
PESTICIDES/PCB
CLP LIST

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-052-009	8608-052-008	8608-044-003	8608-044-005
Customer ID:	SW27088600	SW28088600	SW31088600	SW32088600
Matrix:	Water	Water	Water	Water
Units:	UG/L	UG/L	UG/L	UG/L
Dilution Factor:	1	1	1	1

Surrogate Recovery

Di-n-butylchlorendate:	49 %	94 %	95 %	97 %

Analytes

Alpha-BHC	0.05	U	0.05	U	0.05	U	0.05	U
Beta-BHC	0.05	U	0.05	U	0.05	U	0.05	U
Delta-BHC	0.05	U	0.05	U	0.05	U	0.05	U
Gamma-BHC (Lindane)	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor	0.05	U	0.05	U	0.05	U	0.05	U
Aldrin	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor Epoxide	0.05	U	0.05	U	0.05	U	0.05	U
Endosulfan I	0.05	U	0.05	U	0.05	U	0.05	U
Dieldrin	0.1	U	0.1	U	0.1	U	0.1	U
4,4'-DDE	0.1	U	0.1	U	0.1	U	0.1	U
Endrin	0.1	U	0.1	U	0.1	U	0.1	U
Endosulfan II	0.1	U	0.1	U	0.1	U	0.1	U
4,4'-DDD	0.1	U	0.1	U	0.1	U	0.1	U
Endosulfan Sulfate	0.1	U	0.1	U	0.1	U	0.1	U
4,4'-DDT	0.1	U	0.1	U	0.1	U	0.1	U
Methoxychlor	0.5	U	0.5	U	0.5	U	0.5	U
Endrin Ketone	0.1	U	0.1	U	0.1	U	0.1	U
Chlordane	0.5	U	0.5	U	0.5	U	0.5	U
Toxaphene	1	U	1	U	1	U	1	U
Aroclor-1016	0.5	U	0.5	U	0.5	U	0.5	U
Aroclor-1221	0.5	U	0.5	U	0.5	U	0.5	U
Aroclor-1232	0.5	U	0.5	U	0.5	U	0.5	U
Aroclor-1242	0.5	U	0.5	U	0.5	U	0.5	U
Aroclor-1248	0.5	U	0.5	U	0.5	U	0.5	U
Aroclor-1254	1	U	1	U	1	U	1	U
Aroclor-1260	1	U	1	U	1	U	1	U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

RADIONUCLIDES

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0387-881-116	SW-27-07-22-87	
0387-881-117	SW-28-07-22-87	
0587-881-006	SW-29-05-26-87	
0587-881-007	SW-30-05-26-87	
0587-881-008	SW-31-05-26-87	
0587-881-009	SW-32-05-26-87	
0587-881-010	SW-35-05-26-87	
0587-881-011	SW-44-05-26-87	
0587-881-012	SW-45-05-26-87	
0387-881-129	SW-62-07-22-87	
0387-881-130	SW-64-07-22-87	
0587-881-014	SW-881HS-05-28-87	
1000-000-380	SW27088600	22570-5-5
1000-000-381	SW28088600	22570-5-4
1000-000-382	SW31088600	22548-8-3
1000-000-384	SW32088600	22548-8-8
1000-000-386	SW34088600	22570-5-3
1000-000-387	SW36088600	22548-8-4
1000-000-389	SW42088600	22509-14-11
1000-000-403	SWC1088600	22528-5-4
1000-000-404	SWC2088600	22528-5-5

SURFACE WATER
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-116	0387-881-117	0587-881-006
Customer ID:	SW-27-07-22-87	SW-28-07-22-87	SW-29-05-26-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	10 +/- 0	pci/l	2 +/- 17	pci/l	0 +/- 0	pci/l
Gross Beta	61 +/- 3	pci/l	80 +/- 19	pci/l	33 +/- 11	pci/l
Uranium 233, 234	.79 +/- .92	pci/l	.13 +/- .79	pci/l	.62 +/- .94	pci/l
Uranium 235	.17 +/- .52	pci/l	0.0 +/- .57	pci/l	.15 +/- .48	pci/l
Uranium 238	5.8 +/- 1.7	pci/l	1.6 +/- 1.3	pci/l	1.1 +/- 1.0	pci/l
Strontium 89, 90	<1.0	pci/l	1.4	pci/l	1.80	pci/l
Plutonium 239, 240	0.0 +/- 1.0	pci/l	0.1 +/- 1.2	pci/l	0.0 +/- .74	pci/l
Americium 241	0.0 +/- 1.6	pci/l	0.0 +/- 4.1	pci/l	0.0 +/- 1.3	pci/l
Cesium 137	<1.0	pci/l	<1	pci/l	0.3	pci/l
Tritium	<110	pci/l	<110	pci/l	<110	pci/l

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-007	0587-881-008	0587-881-009
Customer ID:	SW-30-05-26-87	SW-31-05-26-87	SW-32-05-26-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	18 +/- 14	pci/l	77 +/- 24	pci/l	8 +/- 4	pci/l
Gross Beta	13 +/- 14	pci/l	59 +/- 2	pci/l	10 +/- 5	pci/l
Uranium 233, 234	2.5 +/- 1.2	pci/l	5.5 +/- 1.3	pci/l	2.9 +/- 1.9	pci/l
Uranium 235	.84 +/- .62	pci/l	.46 +/- .45	pci/l	.07 +/- .50	pci/l
Uranium 238	13 +/- 2	pci/l	14 +/- 2	pci/l	1.2 +/- 1.3	pci/l
Strontium 89, 90	2.03	pci/l	3.43	pci/l	3.15	pci/l
Plutonium 239, 240	.04 +/- .68	pci/l	.39 +/- .84	pci/l	.26 +/- .82	pci/l
Americium 241	0.0 +/- 1.9	pci/l	0.0 +/- 1.3	pci/l	0.0 +/- 1.2	pci/l
Cesium 137	<0.3	pci/l	<0.3	pci/l	<0.3	pci/l
Tritium	<110	pci/l	<110	pci/l	<110	pci/l

SURFACE WATER
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-010	0587-881-011	0587-881-012
Customer ID:	SW-35-05-26-87	SW-44-05-26-87	SW-45-05-26-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	20 +/- 10	pci/l	21 +/- 7	pci/l	13 +/- 18	pci/l
Gross Beta.....	11 +/- 11	pci/l	59 +/- 5	pci/l	14 +/- 31	pci/l
Uranium 233, 234.....	3.5 +/- 1.1	pci/l	7.1 +/- 1.8	pci/l	5.5 +/- 1.9	pci/l
Uranium 235.....	.49 +/- .48	pci/l	.27 +/- .50	pci/l	0.0 +/- .37	pci/l
Uranium 238.....	14 +/- 2	pci/l	8.5 +/- 1.9	pci/l	4.7 +/- 1.7	pci/l
Strontium 89, 90.....	2.95	pci/l	<0.6	pci/l	1.78	pci/l
Plutonium 239, 240.....	.16 +/- .69	pci/l	0.0 +/- .71	pci/l	0.0 +/- .55	pci/l
Americium 241.....	0.0 +/- 1.2	pci/l	0.0 +/- 1.2	pci/l	0.0 +/- 1.2	pci/l
Cesium 137.....	0.8	pci/l	<0.3	pci/l	<0.3	pci/l
Tritium.....	<110	pci/l	<110	pci/l	<110	pci/l

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-129	0387-881-130	0587-881-014
Customer ID:	SW-62-07-22-87	SW-64-07-22-87	SW-881HS-05-28-87
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	100 +/- 20	pci/l	34 +/- 7	pci/l	32 +/- 9	pci/l
Gross Beta.....	100 +/- 13	pci/l	93 +/- 16	pci/l	61 +/- 12	pci/l
Uranium 233, 234.....	3.2 +/- 2.9	pci/l	6.3 +/- 1.6	pci/l	2.2 +/- 1.9	pci/l
Uranium 235.....	0.0 +/- 2.1	pci/l	0.0 +/- .38	pci/l	0.0 +/- .26	pci/l
Uranium 238.....	5.1 +/- 3.0	pci/l	4.9 +/- 1.3	pci/l	2.7 +/- 1.9	pci/l
Strontium 89, 90.....	<1.0	pci/l	1.5	pci/l	0.88	pci/l
Plutonium 239, 240.....	1.3 +/- 0.9	pci/l	0.1 +/- 1.2	pci/l	0.0 +/- .67	pci/l
Americium 241.....	0.0 +/- 1.3	pci/l	0.01 +/- 1.3	pci/l	0.0 +/- 1.2	pci/l
Cesium 137.....	1.9	pci/l	<1.0	pci/l	<0.3	pci/l
Tritium.....	<110	pci/l	<110	pci/l	320	pci/l

SURFACE WATER
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	1000-000-380	1000-000-381	1000-000-382
Customer ID:	SW27088600	SW28088600	SW31088600
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	33 +/- 12	pci/l	6 +/- 4	pci/l	17 +/- 7	pci/l
Gross Beta.....	37 +/- 8	pci/l	4 +/- 3	pci/l	15 +/- 4	pci/l
Uranium 233, 234.....	4.1 +/- 0.7	pci/l	1.2 +/- 0.3	pci/l	3.1 +/- 0.4	pci/l
Uranium 235.....	NR		NR		NR	
Uranium 238.....	6.1 +/- 0.9	pci/l	0.87 +/- 0.27	pci/l	10 +/- 1	pci/l
Strontium 89, 90.....	NR		NR		NR	
Plutonium 239, 240.....	0.10 +/- 0.20	pci/l	-0.04 +/- 0.08	pci/l	-0.01 +/- 0.28	pci/l
Americium 241.....	0.10 +/- 0.12	pci/l	0.00 +/- 0.04	pci/l	-0.02 +/- 0.06	pci/l
Cesium 137.....	NR		NR		NR	
Tritium.....	-0.03 +/- 0.21	pci/l	0.19 +/- 0.21	pci/l	0.18 +/- 0.24	pci/l

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	1000-000-384	1000-000-386	1000-000-387
Customer ID:	SW32088600	SW34088600	SW36088600
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	4 +/- 3	pci/l	2 +/- 2	pci/l	24 +/- 8	pci/l
Gross Beta.....	18 +/- 3	pci/l	1 +/- 2	pci/l	17 +/- 4	pci/l
Uranium 233, 234.....	0.03 +/- 0.13	pci/l	-0.06 +/- 0.16	pci/l	3.9 +/- 0.5	pci/l
Uranium 235.....	NR		NR		NR	
Uranium 238.....	0.04 +/- 0.11	pci/l	-0.05 +/- 0.32	pci/l	17 +/- 1	pci/l
Strontium 89, 90.....	NR		NR		NR	
Plutonium 239, 240.....	0.23 +/- 0.87	pci/l	0.02 +/- 0.06	pci/l	-0.04 +/- 0.07	pci/l
Americium 241.....	0.01 +/- 0.03	pci/l	-0.01 +/- 0.05	pci/l	0.04 +/- 0.04	pci/l
Cesium 137.....	NR		NR		NR	
Tritium.....	-0.05 +/- 0.22	pci/l	0.10 +/- 0.21	pci/l	0.09 +/- 0.24	pci/l

SURFACE WATER
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	1000-000-389	1000-000-403	1000-000-404
Customer ID:	SW42088600	SWC1088600	SWC2088600
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha	0 +/- 1	pci/l	6 +/- 4	pci/l	7 +/- 4	pci/l
Gross Beta	3 +/- 2	pci/l	5 +/- 3	pci/l	3 +/- 3	pci/l
Uranium 233, 234	0.13 +/- 0.09	pci/l	1.8 +/- 0.3	pci/l	1.5 +/- 0.4	pci/l
Uranium 235	NR		NR		NR	
Uranium 238	0.06 +/- 0.06	pci/l	1.5 +/- 0.3	pci/l	2.6 +/- 0.6	pci/l
Strontium 89, 90	NR		NR		NR	
Plutonium 239, 240	-0.02 +/- 0.04	pci/l	0.08 +/- 0.06	pci/l	0.01 +/- 0.04	pci/l
Americium 241	0.02 +/- 0.03	pci/l	0.03 +/- 0.05	pci/l	0.01 +/- 0.04	pci/l
Cesium 137	NR		NR		NR	
Tritium	0.08 +/- 0.22	pci/l	-0.09 +/- 0.22	pci/l	-0.02 +/- 0.22	pci/l

INORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0387-881-001	SW-27-07-22-87	
0387-881-002	SW-28-07-22-87	
0587-881-006	SW-29-05-26-87	
0587-881-026	SW-30	
0587-881-007	SW-30-05-26-87	
0587-881-027	SW-31	
0587-881-028	SW-32	
0587-881-029	SW-35	
0587-881-030	SW-40	
0587-881-031	SW-41	
0587-881-032	SW-42	
0587-881-011	SW-44-05-26-87	
0587-881-012	SW-45-05-26-87	
0587-881-013	SW-46-05-26-87	
0387-881-014	SW-62-07-22-87	
0387-881-016	SW-64-07-22-87	
0587-881-014	SW-88HS-05-28-87	
8608-052-023	SW27088600	
8608-052-018	SW28088600	
8608-044-013	SW31088600	
8608-044-028	SW32088600	
8608-052-013	SW34088600	
8608-044-018	SW36088600	
8608-012-009	SW42088600	
8608-036-052	SWC1088600	
8608-036-058	SWC2088600	

SURFACE WATER
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-001	0387-881-002	0587-881-006
Customer ID:	SW-27-07-22-87	SW-28-07-22-87	SW-29-05-26-87
Matrix:	Water	Water	Water

Inorganics

Chloride	34.0		mg/l	35.0		mg/l	11.9		mg/l
Cyanide, Total	1.0	U	ug/l	1.0	U	ug/l	1.0	U	mg/l
Fluoride									
Nitrate-Nitrite-Nitrogen	3.2		mg/l	0.20	U	mg/l	0. 20	U	mg/l
Total Organic Carbon									
pH									
Sulfate	69.3		mg/l	60.0		mg/l	8.0		mg/l
Specific Conductance									
Turbidity									
Sulfide									
Oil and Grease	5.0	U	mg/k	5.0	U	mg/k	5.0	U	mg/k
Ignitability (Degrees)									
% Solids									
Total Dissolved Solids	426		mg/l	402		mg/l	232		mg/l
HCO3-	237		mg/l	237		mg/l	160		mg/l
CO3=									
Suspended Solids	1.0	U	mg/l	8		mg/l	10		mg/l
Hexavalent Chromium (Cr+6)	1.0	U	mg/l	1.0	U	mg/l	1.0	U	mg/l

SURFACE WATER
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-026			0587-881-007			0587-881-027		
Customer ID:	SW-30			SW-30-05-26-87			SW-31		
Matrix:	Water			Water			Water		
Inorganics									
Chloride	49.9		mg/l	33.8		mg/l	32.9		mg/l
Cyanide, Total	1.0	U	mg/l	1.0	U	mg/l	1.0	U	mg/l
Fluoride									
Nitrate-Nitrite-Nitrogen	0.20	U	mg/l	1.29		mg/l	1.5		mg/l
Total Organic Carbon									
pH									
Sulfate	60.0		mg/l	68.0		mg/l	83.5		mg/l
Specific Conductance									
Turbidity									
Sulfide									
Oil and Grease	5.0	U	mg/k	5.2		mg/k	5.0	U	mg/k
Ignitability (Degrees)									
% Solids									
Total Dissolved Solids	192		mg/l	310		mg/l	303		mg/l
HCO3-	142		mg/l	165		mg/l	127		mg/l
CO3=									
Suspended Solids	7		mg/l	22		mg/l	25		mg/l
Hexavalent Chromium (Cr+6)	1.0	U	mg/l	1.0	U	mg/l			

SURFACE WATER
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-028	0587-881-029	0587-881-030
Customer ID:	SW-32	SW-35	SW-40
Matrix:	Water	Water	Water

Inorganics

Chloride	11.2		mg/l	33.6		mg/l	23.9		mg/l
Cyanide, Total	1.0	U	mg/l	1.0	U	mg/l	1.0	U	mg/l
Fluoride									
Nitrate-Nitrite-Nitrogen	0.20	U	mg/l	1.8		mg/l	3.6		mg/l
Total Organic Carbon									
pH									
Sulfate	1.0	U	mg/l	74.0		mg/l	65.0		mg/l
Specific Conductance									
Turbidity									
Sulfide									
Oil and Grease	5.0	U	mg/k	12.1		mg/k	21.6		mg/k
Ignitability (Degrees)									
% Solids									
Total Dissolved Solids	256		mg/l	307		mg/l	289		mg/l
HCO3-	110		mg/l	162		mg/l	131		mg/l
CO3=									
Suspended Solids	14		mg/l	13		mg/l	7		mg/l
Hexavalent Chromium (Cr+6)	1.0	U	mg/l	1.0	U	mg/l			

SURFACE WATER
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-031	0587-881-032	0587-881-011
Customer ID:	SW-41	SW-42	SW-44-05-26-87
Matrix:	Water	Water	Water

Inorganics

Chloride	82.5		mg/l	20.2		mg/l	47.8		mg/l
Cyanide, Total	1.0	U	mg/l	1.0	U	mg/l	1.0	U	mg/l
Fluoride									
Nitrate-Nitrite-Nitrogen	7.3		mg/l	0.20	U	mg/l	3.80		mg/l
Total Organic Carbon									
pH									
Sulfate	54.5		mg/l	21.0		mg/l	64.0		mg/l
Specific Conductance									
Turbidity									
Sulfide									
Oil and Grease							5.0	U	mg/k
Ignitability (Degrees)									
% Solids									
Total Dissolved Solids	498		mg/l	180		mg/l	239		mg/l
HCO3-	236		mg/l	140		mg/l	168		mg/l
CO3=									
Suspended Solids	11		mg/l	13		mg/l	115		mg/l
Hexavalent Chromium (Cr+6)	1.0	U	mg/l	1.0	U	mg/l	1.0	U	mg/l

SURFACE WATER
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-012	0587-881-013	0387-881-014
Customer ID:	SW-45-05-26-87	SW-46-05-26-87	SW-62-07-22-87
Matrix:	Water	Water	Water

Inorganics

Chloride	74.1		mg/l	10.8		mg/l	44.0		mg/l
Cyanide, Total	1.0	U	mg/l	1.0	U	mg/l	1.0	U	mg/l
Fluoride									
Nitrate-Nitrite-Nitrogen	8.50		mg/l	0.20	U	mg/l	0.20	U	mg/l
Total Organic Carbon									
pH									
Sulfate	44.0		mg/l	27.0		mg/l	132		mg/l
Specific Conductance									
Turbidity									
Sulfide									
Oil and Grease	9.6		mg/k	9.8		mg/k	5.0	U	mg/k
Ignitability (Degrees)									
% Solids									
Total Dissolved Solids	456		mg/l	160		mg/l	625		mg/l
HCO3-	216		mg/l	86.9		mg/l	346		mg/l
CO3=									
Suspended Solids	11		mg/l	37		mg/l	7		mg/l
Hexavalent Chromium (Cr+6)	1.0	U	mg/l	1.0	U	mg/l	1.0	U	mg/l

SURFACE WATER
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0387-881-016	0587-881-014	8608-052-023
Customer ID:	SW-64-07-22-87	SW-88HS-05-28-87	SW27088600
Matrix:	Water	Water	Water

Inorganics

Chloride	46.5		mg/l	16.3		mg/l	47		mg/l
Cyanide, Total	1.0	U	mg/l	1.0	U	mg/l	0.005	U	mg/l
Fluoride									
Nitrate-Nitrite-Nitrogen	0.20	U	mg/l	0.20	U	mg/l			
Total Organic Carbon									
pH									
Sulfate	83.0		mg/l	95.0		mg/l	83		mg/l
Specific Conductance									
Turbidity									
Sulfide									
Oil and Grease	5.0	U	mg/k	52.0		mg/k			
Ignitability (Degrees)									
% Solids									
Total Dissolved Solids	716		mg/l	629		mg/l	700		mg/l
HCO3-	404		mg/l	318		mg/l			
CO3=									
Suspended Solids	13		mg/l	896		mg/l			
Hexavalent Chromium (Cr+6)	1.0	U	mg/l	1.0	U	mg/l			

SURFACE WATER
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-052-018	8608-044-013	8608-044-028
Customer ID:	SW28088600	SW31088600	SW32088600
Matrix:	Water	Water	Water

Inorganics

Chloride	39		mg/l	40		mg/l	12		mg/l
Cyanide, Total	0.005	U	mg/l	0.005	U	mg/l	0.005	U	mg/l
Fluoride									
Nitrate-Nitrite-Nitrogen									
Total Organic Carbon									
pH									
Sulfate	89		mg/l	53		mg/l	16		mg/l
Specific Conductance									
Turbidity									
Sulfide									
Oil and Grease									
Ignitability (Degrees)									
% Solids									
Total Dissolved Solids	370		mg/l	320		mg/l	185		mg/l
HCO3-									
CO3=									
Suspended Solids									
Hexavalent Chromium (Cr+6)									

SURFACE WATER
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-052-013			8608-044-018			8608-012-009	
Customer ID:	SW34088600			SW36088600			SW42088600	
Matrix:	Water			Water			Water	
Inorganics								
Chloride	16		mg/l	29		mg/l	2.0	mg/l
Cyanide, Total	0.005	U	mg/l	0.005	U	mg/l	0.0016	mg/l
Fluoride								
Nitrate-Nitrite-Nitrogen								
Total Organic Carbon								
pH								
Sulfate	15		mg/l	64		mg/l	3	mg/l
Specific Conductance								
Turbidity								
Sulfide								
Oil and Grease								
Ignitability (Degrees)								
% Solids								
Total Dissolved Solids	170		mg/l	320		mg/l	31	mg/l
HCO3-								
CO3=								
Suspended Solids								
Hexavalent Chromium (Cr+6)								

SURFACE WATER
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-036-052	8608-036-058
Customer ID:	SWC1088600	SWC2088600
Matrix:	Water	Water

Inorganics

Chloride	22		mg/l	31		mg/l
Cyanide, Total	0.005	U	mg/l	0.005	U	mg/l
Fluoride						
Nitrate-Nitrite-Nitrogen						
Total Organic Carbon						
pH						
Sulfate	38		mg/l	67		mg/l
Specific Conductance						
Turbidity						
Sulfide						
Oil and Grease						
Ignitability (Degrees)						
% Solids						
Total Dissolved Solids	190		mg/l	240		mg/l
HCO3-						
CO3=						
Suspended Solids						
Hexavalent Chromium (Cr+6)						

METALS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
0487-881-042	FDRAIN-11-17-87	
0387-881-001	SW-27-07-22-87	
0387-881-002	SW-28-07-22-87	
0587-881-006	SW-29-05-26-87	
0587-881-026	SW-30	
0587-881-007	SW-30-05-26-87	
0587-881-027	SW-31	
0587-881-008	SW-31-05-26-87	
0587-881-028	SW-32	
0587-881-009	SW-32-05-26-87	
0587-881-029	SW-35	
0587-881-010	SW-35-05-26-87	
0587-881-030	SW-40	
0587-881-031	SW-41	
0587-881-032	SW-42	
0587-881-011	SW-44-05-26-87	
0587-881-012	SW-45-05-26-87	
0587-881-013	SW-46-05-26-87	
0387-881-014	SW-62-07-22-87	
0387-881-016	SW-64-07-22-87	
0587-881-014	SW-881HS-05-28-87	
8608-052-022	SW27088600	
8608-052-017	SW28088600	
8608-044-012	SW31088600	
8608-044-027	SW32088600	
8608-052-012	SW34088600	
8608-044-017	SW36088600	
8608-012-010	SW42088600	
8608-036-051	SWC1088600	
8608-036-057	SWC2088600	

SURFACE WATER
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS) Page: 1

Sample Information

RFW Batch ID:	0487-881-042	0387-881-001	0387-881-002	0587-881-006
Customer ID:	FDRAIN-11-17-87	SW-27-07-22-87	SW-28-07-22-87	SW-29-05-26-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.0076 U	0.01 U	0.01 U	
Aluminum (Al), total.....	0.0436	0.2 U	0.2 U	
Arsenic (As), total.....	0.005 U			0.01 U
Barium (Ba), total.....	0.1547	0.2 U	0.2 U	
Beryllium (Be), total.....	0.005 U			
Calcium (Ca), total.....	85.3425	78.6	66.3	
Cadmium (Cd), total.....	0.0017			0.005 U
Cobalt (Co), total.....	0.0220 U	0.05 U	0.05 U	
Chromium (Cr), total.....	0.0100 U	0.01 U	0.03	
Cesium (Cs), total.....	0.02 U			0.2 U
Copper (Cu), total.....	0.0111	0.025 U	0.027	
Iron (Fe), total.....	0.0279	0.1 U	0.23	
Mercury (Hg), total.....	0.0002 U			0.0002 U
Potassium (K), total.....				5.0 U
Lithium (Li), total.....				0.01 U
Magnesuim (Mg), total.....	19.0212	16.1	15.7	
Manganese (Mn), total.....	0.0060	0.153	0.144	
Molybdenum(Mo), total.....	0.0220 U	0.04 U	0.04 U	
Sodium (Na), total.....	41.7614	49.8	55.0	
Nickel (Ni), total.....	0.0370 U	0.04 U	0.82	
Lead (Pb), total.....	0.005 U			0.005 U
Antimony (Sb), total.....	0.02 U			0.06 U
Selenium (Se), total.....	0.018			0.005 U
Strontium (Sr), total.....	0.6411	0.52	0.43	
Thallium (Tl), total.....	0.01 U			0.01 U
Vanadium (V), total.....	0.240 U	0.05 U	0.05 U	
Zinc (Zn), total.....	0.0426	0.04	0.02 U	0.02 U

SURFACE WATER
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-026	0587-881-007	0587-881-027	0587-881-008
Customer ID:	SW-30	SW-30-05-26-87	SW-31	SW-31-05-26-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.01 U		0.01 U	
Aluminum (Al), total.....	0.2 U		0.2 U	
Arsenic (As), total.....		0.01 U		0.01 U
Barium (Ba), total.....	0.2 U		0.2 U	
Beryllium (Be), total.....				
Calcium (Ca), total.....	36.1		56.5	
Cadmium (Cd), total.....		0.005 U		0.006
Cobalt (Co), total.....	0.05 U		0.05 U	
Chromium (Cr), total.....	0.01 U		0.01 U	
Cesium (Cs), total.....		0.2 U		0.2 U
Copper (Cu), total.....	0.025 U		0.025 U	
Iron (Fe), total.....	0.1 U		0.1 U	
Mercury (Hg), total.....		0.0002 U		0.0002 U
Potassium (K), total.....		5.0 U		5.0 U
Lithium (Li), total.....		0.01 U		0.01 U
Magnesuim (Mg), total.....	14.4		12.3	
Manganese (Mn), total.....	0.015 U		0.037	
Molybdenum(Mo), total.....	0.04 U		0.04 U	
Sodium (Na), total.....	36.9		24.0	
Nickel (Ni), total.....	0.04 U		0.04 U	
Lead (Pb), total.....		0.005 U		0.005 U
Antimony (Sb), total.....		0.06 U		0.06 U
Selenium (Se), total.....		0.005 U		0.005 U
Strontium (Sr), total.....	0.3		0.4	
Thallium (Tl), total.....		0.01 U		0.01 U
Vanadium (V), total.....	0.05 U		0.05 U	
Zinc (Zn), total.....	0.02 U	0.02 U	0.02 U	0.02 U

SURFACE WATER
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-028	0587-881-009	0587-881-029	0587-881-010
Customer ID:	SW-32	SW-32-05-26-87	SW-35	SW-35-05-26-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.01 U		0.01 U	
Aluminum (Al), total.....	0.2 U		0.2 U	
Arsenic (As), total.....		0.01 U		0.01 U
Barium (Ba), total.....	0.2 U		0.2 U	
Beryllium (Be), total.....				
Calcium (Ca), total.....	49.2		65.0	
Cadmium (Cd), total.....		0.005 U		0.005 U
Cobalt (Co), total.....	0.05 U		0.05 U	
Chromium (Cr), total.....	0.01 U		0.01 U	
Cesium (Cs), total.....		0.2 U		0.2 U
Copper (Cu), total.....	0.025 U		0.025 U	
Iron (Fe), total.....	0.1 U		2.0	
Mercury (Hg), total.....		0.0002 U		0.0002 U
Potassium (K), total.....		5.0 U		5.0 U
Lithium (Li), total.....		0.01 U		0.01 U
Magnesuim (Mg), total.....	6.1		15.9	
Manganese (Mn), total.....	0.015 U		0.196	
Molybdenum(Mo), total.....	0.04 U		0.04 U	
Sodium (Na), total.....	14.5		26.9	
Nickel (Ni), total.....	0.04 U		0.04 U	
Lead (Pb), total.....		0.005 U		0.005 U
Antimony (Sb), total.....		0.06 U		0.06 U
Selenium (Se), total.....		0.005 U		0.005 U
Strontium (Sr), total.....	0.2 U		0.4	
Thallium (Tl), total.....		0.01 U		0.01 U
Vanadium (V), total.....	0.05 U		0.05 U	
Zinc (Zn), total.....	0.02 U	0.02 U	0.02 U	0.02 U

SURFACE WATER
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-030	0587-881-031	0587-881-032	0587-881-011
Customer ID:	SW-40	SW-41	SW-42	SW-44-05-26-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L
Metals				
Silver (Ag), total	0.01 U	0.01 U	0.01 U	
Aluminum (Al), total	2.5	0.2 U	0.2 U	
Arsenic (As), total				0.01 U
Barium (Ba), total	0.2 U	0.2 U	0.2 U	
Beryllium (Be), total				
Calcium (Ca), total	68.1	98.3	23.9	
Cadmium (Cd), total				0.005 U
Cobalt (Co), total	0.05 U	0.05 U	0.05 U	
Chromium (Cr), total	0.01 U	0.01 U	0.01 U	
Cesium (Cs), total				0.2 U
Copper (Cu), total	0.025 U	0.025 U	0.025 U	
Iron (Fe), total	2.0	0.1 U	0.5	
Mercury (Hg), total				0.0002 U
Potassium (K), total				5.0 U
Lithium (Li), total				0.01 U
Magnesuim (Mg), total	13.4	20.8	5.0 U	
Manganese (Mn), total	0.096	0.015 U	0.029	
Molybdenum(Mo), total	0.04 U	0.04 U	0.04 U	
Sodium (Na), total	25.0	45.8	19.7	
Nickel (Ni), total	0.04 U	0.04 U	0.04 U	
Lead (Pb), total				0.005 U
Antimony (Sb), total				0.06 U
Selenium (Se), total				0.005 U
Strontium (Sr), total	0.4	0.6	0.02 U	
Thallium (Tl), total				0.01 U
Vanadium (V), total	0.05 U	0.05 U	0.05 U	
Zinc (Zn), total	0.06	0.03	0.14	0.02 U

SURFACE WATER
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-012	0587-881-013	0387-881-014	0387-881-016
Customer ID:	SW-45-05-26-87	SW-46-05-26-87	SW-62-07-22-87	SW-64-07-22-87
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....			0.01 U	0.01 U
Aluminum (Al), total.....			0.2 U	0.2 U
Arsenic (As), total.....	0.01 U	0.01 U		
Barium (Ba), total.....			0.2 U	0.2 U
Beryllium (Be), total.....				
Calcium (Ca), total.....			67.9	45.8
Cadmium (Cd), total.....	0.005 U	0.005 U		
Cobalt (Co), total.....			0.05 U	0.05 U
Chromium (Cr), total.....			0.01 U	0.01 U
Cesium (Cs), total.....	0.2 U	0.2 U		
Copper (Cu), total.....			0.025 U	0.025 U
Iron (Fe), total.....			0.1 U	0.1 U
Mercury (Hg), total.....	0.0002 U	0.0002 U		
Potassium (K), total.....	5.0 U	5.0 U		
Lithium (Li), total.....	0.01 U	0.01 U		
Magnesuim (Mg), total.....			29.6	54.2
Manganese (Mn), total.....			0.016	0.015 U
Molybdenum(Mo), total.....			0.04 U	0.04 U
Sodium (Na), total.....			99.4	103
Nickel (Ni), total.....			0.04 U	0.04 U
Lead (Pb), total.....	0.005 U	0.005 U		
Antimony (Sb), total.....	0.06 U	0.06 U		
Selenium (Se), total.....	0.005 U	0.005 U		
Strontium (Sr), total.....			0.97	1.10
Thallium (Tl), total.....	0.01 U	0.01 U		
Vanadium (V), total.....			0.05 U	0.05 U
Zinc (Zn), total.....	0.05 U	0.02 U	0.02 U	0.02 U

SURFACE WATER
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0587-881-014	8608-052-022	8608-052-017	8608-044-012
Customer ID:	SW-881HS-05-28-87	SW27088600	SW28088600	SW31088600
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....		0.010 U	0.010 U	0.010 U
Aluminum (Al), total.....		0.100 U	0.100 U	3.47
Arsenic (As), total.....	0.01 U	0.002 U	0.002 U	0.002 U
Barium (Ba), total.....		0.100 U	0.100 U	0.100 U
Beryllium (Be), total.....		0.005 U	0.005 U	0.090
Calcium (Ca), total.....		57.5	90	103
Cadmium (Cd), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Cobalt (Co), total.....		0.050 U	0.050 U	0.050 U
Chromium (Cr), total.....		0.010 U	0.010 U	0.010 U
Cesium (Cs), total.....	0.2 U	0.100 U	0.100 U	0.100 U
Copper (Cu), total.....		0.020 U	0.020 U	0.040
Iron (Fe), total.....		0.030 U	0.050	0.200
Mercury (Hg), total.....	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Potassium (K), total.....	5.0 U	3.95	8.25	0.100 U
Lithium (Li), total.....	0.01 U			
Magnesuim (Mg), total.....		19	17	10
Manganese (Mn), total.....		0.010 U	0.054	0.070
Molybdenum(Mo), total.....		0.100 U	0.100 U	0.100 U
Sodium (Na), total.....		45	42	18.7
Nickel (Ni), total.....		0.040 U	0.040 U	0.040 U
Lead (Pb), total.....	0.005 U	0.005 U	0.005 U	0.010 U
Antimony (Sb), total.....	0.06 U	0.050 U	0.050 U	0.050 U
Selenium (Se), total.....	0.005 U	0.002 U	0.002 U	0.002 U
Strontium (Sr), total.....		0.420	0.460	0.380
Thallium (Tl), total.....	0.01 U	0.010 U	0.010 U	0.010 U
Vanadium (V), total.....		0.050 U	0.050 U	0.050 U
Zinc (Zn), total.....	0.02 U	0.020 U	0.022	0.589

SURFACE WATER
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-044-027	8608-052-012	8608-044-017	8608-012-010
Customer ID:	SW32088600	SW34088600	SW36088600	SW42088600
Matrix:	Water	Water	Water	Water
Units:	MG/L	MG/L	MG/L	MG/L

Metals

Silver (Ag), total.....	0.010 U	0.010 U	0.010 U	0.022
Aluminum (Al), total.....	0.100 U	0.100 U	0.210	0.540
Arsenic (As), total.....	0.002 U	0.002 U	0.002 U	0.001 U
Barium (Ba), total.....	0.100 U	0.100 U	0.100 U	0.100 U
Beryllium (Be), total.....	0.090	0.005 U	0.090	0.005 U
Calcium (Ca), total.....	67.1	65	123	6.6
Cadmium (Cd), total.....	0.005 U	0.005 U	0.005 U	0.005 U
Cobalt (Co), total.....	0.050 U	0.050 U	0.050	0.050 U
Chromium (Cr), total.....	0.010 U	0.010 U	0.010 U	0.002 U
Cesium (Cs), total.....	0.100 U	0.100 U	0.100 U	0.170
Copper (Cu), total.....	0.040	0.020 U	0.020 U	0.020 U
Iron (Fe), total.....	0.075 U	0.030 U	0.075 U	0.130
Mercury (Hg), total.....	0.0002 U	0.0002 U	0.00465 U	0.0005
Potassium (K), total.....	0.100 U	0.750	0.100 U	0.390
Lithium (Li), total.....				
Magnesuim (Mg), total.....	2	7.2	10	1.1
Manganese (Mn), total.....	0.010 U	0.010 U	0.120	0.010 U
Molybdenum(Mo), total.....	0.300	0.100 U	0.300	0.680
Sodium (Na), total.....	8	3.3	14.9	4
Nickel (Ni), total.....	0.040 U	0.040 U	0.040 U	0.082
Lead (Pb), total.....	0.010 U	0.005 U	0.010 U	0.005 U
Antimony (Sb), total.....	0.050 U	0.050 U	0.050 U	0.037
Selenium (Se), total.....	0.002 U	0.002 U	0.002 U	0.0088
Strontium (Sr), total.....	0.230	0.170	0.420	0.020 U
Thallium (Tl), total.....	0.010 U	0.010 U	0.010 U	0.002 U
Vanadium (V), total.....	0.020	0.050 U	0.050 U	0.450
Zinc (Zn), total.....	0.020 U	0.020 U	1	0.016

SURFACE WATER
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-036-051	8608-036-057
Customer ID:	SWC1088600	SWC2088600
Matrix:	Water	Water
Units:	MG/L	MG/L

Metals

Silver (Ag), total.....	0.010 U	0.010 U
Aluminum (Al), total.....	0.100 U	0.100 U
Arsenic (As), total.....	0.002 U	0.002 U
Barium (Ba), total.....	0.250	0.240
Beryllium (Be), total.....	0.110	0.020
Calcium (Ca), total.....	49.3	20.6
Cadmium (Cd), total.....	0.005 U	0.005 U
Cobalt (Co), total.....	0.050 U	0.050 U
Chromium (Cr), total.....	0.017	0.021
Cesium (Cs), total.....	0.100 U	0.100 U
Copper (Cu), total.....	0.020 U	0.020 U
Iron (Fe), total.....	0.140	0.075 U
Mercury (Hg), total.....	0.0002 U	0.0002 U
Potassium (K), total.....	0.010 U	0.010 U
Lithium (Li), total.....		
Magnesuim (Mg), total.....	5.6	10.3
Manganese (Mn), total.....	0.010 U	0.010 U
Molybdenum(Mo), total.....	0.200	0.100
Sodium (Na), total.....	20.9	33.9
Nickel (Ni), total.....	0.040 U	0.040 U
Lead (Pb), total.....	0.010 U	0.010 U
Antimony (Sb), total.....	0.010 U	0.010 U
Selenium (Se), total.....	0.002 U	0.002 U
Strontium (Sr), total.....	0.170	0.230
Thallium (Tl), total.....	0.010 U	0.010 U
Vanadium (V), total.....	0.050 U	0.050 U
Zinc (Zn), total.....	0.005 U	0.005 U

APPENDIX F-7

SEDIMENT ANALYTICAL DATA

VOLATILES

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-027-0190	SED0108860	19
8608-027-0130	SED0208860	13
0000-000-0070	SED1508860	

SEDIMENT SAMPLES
GC/MS DATA SUMMARY
Volatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-027-0190	8608-027-0130	0000-000-0070
Customer ID:	SED0108860	SED0208860	SED1508860
Matrix:	Soil	Soil	Water
Units:	UG/KG	UG/KG	UG/L
Dilution Factor:	0.96	1	1.0

Surrogate Recovery

Toluene-d8:	104 %	105 %	%
Bromofluorobenzene:	97 %	85 %	%
1,2-Dichloroethane-d4:	102 %	91 %	%

Analytes

Chloromethane	10 U	10 U	10.00 U
Bromomethane	10 U	10 U	10.00 U
Vinyl Chloride	10 U	10 U	10.00 U
Chloroethane	10 U	10 U	10.00 U
Methylene Chloride	5 U	5 U	3 J
Acetone	85	9 B	50 B
Carbon Disulfide	5 U	5 U	5.00 U
1,1-Dichloroethene	5 U	5 U	5.00 U
1,1-Dichloroethane	5 U	5 U	5.00 U
Trans-1,2-Dichloroethene	5 U	5 U	5.00 U
Chloroform	5 U	5 U	5.00 U
1,2-Dichloroethane	5 U	5 U	5.00 U
2-Butanone	10 U	10 U	10.00 U
1,1,1-Trichloroethane	5 U	5 U	5.00 U
Carbon Tetrachloride	5 U	5 U	5.00 U
Vinyl Acetate	10 U	10 U	10.00 U
Bromodichloromethane	5 U	5 U	5.00 U
1,2-Dichloropropane	5 U	5 U	5.00 U
Trans-1,3-Dichloropropene	5 U	5 U	5.00 U
Trichloroethene	5 U	5 U	5.00 U
Dibromochloromethane	5 U	5 U	5.00 U
1,1,2-Trichloroethane	5 U	5 U	5.00 U
Benzene	5 U	5 U	5.00 U
cis-1,3-Dichloropropene	5 U	5 U	5.00 U
2-Chloroethylvinylether	10 U	10 U	10.00 U
Bromoform	5 U	5 U	5.00 U
4-Methyl-2-pentanone	10 U	10 U	10.00 U
2-Hexanone	10 U	10 U	10.00 U
Tetrachloroethene	5 U	5 U	5.00 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5.00 U
Toluene	5 U	5 U	5.00 U
Chlorobenzene	5 U	5 U	5.00 U
Ethylbenzene	5 U	5 U	5.00 U
Styrene	5 U	5 U	5.00 U
Total Xylenes	5 U	5 U	0.00 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SEMIVOLATILES

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-027-018	SED0108860	
8608-027-005	SED0208860	

SEDIMENT SAMPLES
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-027-018	8608-027-005
Customer ID:	SED0108860	SED0208860
Matrix:	Soil	Soil
Units:	UG/KG	UG/KG
Dilution Factor:	37	20

Surrogate Recovery

2-Fluorophenol:	71 %	116 %
Phenol-d5:	62 %	101 %
2,4,6-Br3-Phenol:	79 %	149 %
Nitrobenzene-d5:	66 %	52 %
2-Fluorobiphenyl:	86 %	66 %
p-Terphenyl-d14:	76 %	54 %

Analytes

Phenol.....	370 U	200 U
bis(2-Chloroethyl)Ether.....	370 U	200 U
2-Chlorophenol.....	370 U	200 U
1,3-Dichlorobenzene.....	370 U	200 U
1,4-Dichlorobenzene.....	370 U	200 U
Benzyl Alcohol.....	370 U	200 U
1,2-Dichlorobenzene.....	370 U	200 U
2-Methylphenol.....	370 U	200 U
bis(2-Chloroisopropyl)Ether.....	370 U	200 U
4-Methylphenol.....	370 U	200 U
N-Nitroso-di-n-propylamine.....	370 U	200 U
Hexachloroethane.....	370 U	200 U
Nitrobenzene.....	370 U	200 U
Isophorone.....	370 U	200 U
2-Nitrophenol.....	370 U	200 U
2,4-Dimethylphenol.....	370 U	200 U
Benzoic Acid.....	1800 U	1000 U
bis(2-Chloroethoxy)Methane.....	370 U	200 U
2,4-Dichlorophenol.....	370 U	200 U
1,2,4-Trichlorobenzene.....	370 U	200 U
Naphthalene.....	370 U	200 U
4-Chloroaniline.....	370 U	200 U
Hexachlororbutadiene.....	370 U	200 U
4-Chloro-3-methylphenol.....	370 U	200 U
2-Methylnaphthalene.....	370 U	200 U
Hexachlorocyclopentadiene.....	370 U	200 U
2,4,6-Trichlorophenol.....	370 U	200 U
2,4,5-Trichlorophenol.....	1800 U	1000 U
2-Chloronaphthalene.....	370 U	200 U
2-Nitroaniline.....	1800 U	1000 U
Dimethyl Phthalate.....	370 U	200 U
Acenaphthylene.....	370 U	200 U
3-Nitroaniline.....	1800 U	1000 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

SEDIMENT SAMPLES
GC/MS DATA SUMMARY
Semivolatile HAZARDOUS SUBSTANCE LIST COMPOUNDS

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-027-018	8608-027-005
Customer ID:	SED0108860	SED0208860
Matrix:	Soil	Soil
Units:	UG/KG	UG/KG
Dilution Factor:	37	20

Analytes

Acenaphthene	370	U	200	U
2,4-Dinitrophenol	1800	U	1000	U
4-Nitrophenol	1800	U	1000	U
Dibenzofuran	370	U	200	U
2,4-Dinitrotoluene	370	U	200	U
2,6-Dinitrotoluene	370	U	200	U
Diethylphthalate	370	U	200	U
4-Chlorophenyl-phenylether	370	U	200	U
Fluorene	370	U	200	U
4-Nitroaniline	1800	U	1000	U
4,6-Dinitro-2-methylphenol	1800	U	1000	U
N-Nitrosodiphenylamine	260	JB	180	JB
4-Bromophenyl-phenylether	370	U	200	U
Hexachlorobenzene	370	U	200	U
Pentachlorophenol	1800	U	1000	U
Phenanthrene	370	U	200	U
Anthracene	370	U	200	U
di-n-Butyl Phthalate	370	U	200	U
Fluoranthene	370	U	200	U
Pyrene	370	U	200	U
Butyl Benzyl Phthalate	370	U	200	U
3,3'-Dichlorobenzidine	740	U	400	U
Benzo(a)Anthracene	370	U	200	U
bis(2-Ethylhexyl)Phthalate	370	U	200	U
Chrysene	370	U	200	U
di-n-Octyl Phthalate	370	U	200	U
Benzo(b)Fluoranthene	370	U	200	U
Benzo(k)Fluoranthene	370	U	200	U
Benzo(a)Pyrene	370	U	200	U
Indeno(1,2,3-cd)Pyrene	370	U	200	U
Dibenz(a,h)Anthracene	370	U	200	U
Benzo(g,h,i)Perylene	370	U	200	U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

PESTICIDE/PCBs

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-027-005	SED0108860	
8608-027-004	SED0208860	

SEDIMENT SAMPLES
PESTICIDES/PCB
CLP LIST

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-027-005	8608-027-004
Customer ID:	SED0108860	SED0208860
Matrix:	Soil	Soil
Units:	UG/KG	UG/KG
Dilution Factor:		

Surrogate Recovery

Di-n-butylchlorendate:	85 %	59 %

Analytes

Alpha-BHC	1.5 U	1.5 U
Beta-BHC	1.5 U	1.5
Delta-BHC	1.5 U	1.5 U
Gamma-BHC (Lindane)	1.5 U	1.5 U
Heptachlor	1.5 U	1.5 U
Aldrin	1.5 U	1.5 U
Heptachlor Epoxide	1.5 U	1.5 U
Endosulfan I	1.5 U	1.5 U
Dieldrin	3 U	3 U
4,4'-DDE	3 U	3 U
Endrin	3 U	3 U
Endosulfan II	3 U	3 U
4,4'-DDD	3 U	3 U
Endosulfan Sulfate	3 U	3 U
4,4'-DDT	3 U	3 U
Methoxychlor	15 U	15 U
Endrin Ketone	3 U	3 U
Chlordane	15 U	15 U
Toxaphene	30 U	30 U
Aroclor-1016	15 U	15 U
Aroclor-1221	15 U	15 U
Aroclor-1232	15 U	15 U
Aroclor-1242	15 U	15 U
Aroclor-1248	15 U	15 U
Aroclor-1254	30 U	30 U
Aroclor-1260	30 U	30 U

Modifiers: U=Analyzed, not detected. J=Present below detection limit. B=Present in blank. NS=Not spiked. %=Percent recovery.

RADIONUCLIDES

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
1000-000-350	SED0108860	22510-10-4
1000-000-352	SED0208860	22510-10-6
1000-000-368	SED1508860	22509-14-8

SEDIMENT SAMPLES
RADIOCHEMISTRY
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	1000-000-350	1000-000-352	1000-000-368
Customer ID:	SED0108860	SED0208860	SED1508860
Matrix:	Soil	Soil	Soil

Radio Chemistry

Gross Alpha.....	12 +/- 8	pci/g	37 +/- 11	pci/g	25 +/- 10	pci/g
Gross Beta.....	11 +/- 6	pci/g	32 +/- 6	pci/g	39 +/- 7	pci/g
Uranium 233, 234.....	0.47 +/- 0.23	pci/g	0.79 +/- 0.23	pci/g	0.38 +/- 0.23	pci/g
Uranium 235.....	NR		NR		NR	
Uranium 238.....	0.26 +/- 0.17	pci/g	0.52 +/- 0.18	pci/g	0.36 +/- 0.22	pci/g
Strontium 89, 90.....	NR		NR		NR	
Plutonium 239, 240.....	0.06 +/- 0.02	pci/g	0.80 +/- 0.09	pci/g	-0.05 +/- 0.08	pci/g
Americium 241.....	0.01 +/- 0.01	pci/g	0.04 +/- 0.03	pci/g	0.02 +/- 0.07	pci/g
Cesium 137.....	NR		NR		NR	
Tritium.....	0.30 +/- 0.26	pci/ml	0.0 +/- 0.25	pci/ml	0.21 +/- 0.26	pci/ml

INORGANICS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-027-021	SED0108860	
8608-027-015	SED0208860	

SEDIMENT SAMPLES
INORGANIC
DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-027-021	8608-027-015
Customer ID:	SED0108860	SED0208860
Matrix:	Soil	Soil

Inorganics

Chloride	26		mg/kg	43		mg/kg
Cyanide, Total	0.12	U	mg/kg	0.12	U	mg/kg
Fluoride						
Nitrate-Nitrite-Nitrogen						
Total Organic Carbon						
pH						
Sulfate	244		mg/kg	74		mg/kg
Specific Conductance						
Turbidity						
Sulfide						
Oil and Grease						
Ignitability (Degrees)						
% Solids						
Total Dissolved Solids						
HCO3-						
CO3=						
Suspended Solids						
Hexavalent Chromium (Cr+6)						

Appendix G

METALS

List: Customer ID's: All

RFW Batch ID	Customer ID	Laboratory ID
8608-027-020	SED0108860	
8608-027-014	SED0208860	

SEDIMENT SAMPLES
METALS
INORGANICS DATA SUMMARY REPORT

RFW Batch Number: Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	8608-027-020	8608-027-014
Customer ID:	SED0108860	SED0208860
Matrix:	Soil	Soil
Units:	MG/KG	MG/KG

Metals

Silver (Ag), total.....	0.83 U	0.61 U
Aluminum (Al), total.....	4840	17600
Arsenic (As), total.....	0.16	1.1
Barium (Ba), total.....	56	132
Beryllium (Be), total.....	0.42 U	0.30 U
Calcium (Ca), total.....	1740	8350
Cadmium (Cd), total.....	0.42 U	0.30 U
Cobalt (Co), total.....	4.2 U	5.5
Chromium (Cr), total.....	4.2	15
Cesium (Cs), total.....	10 U	9.0 U
Copper (Cu), total.....	5.8	13
Iron (Fe), total.....	13300	16300
Mercury (Hg), total.....	0.39	0.17
Potassium (K), total.....	18600	67000
Lithium (Li), total.....		
Magnesuim (Mg), total.....	1080	3580
Manganese (Mn), total.....	269	198
Molybdenum(Mo), total.....	8.3 U	6.1 U
Sodium (Na), total.....	143	301
Nickel (Ni), total.....	3.3 U	10
Lead (Pb), total.....	9.2	19
Antimony (Sb), total.....	1.7 U	1.2 U
Selenium (Se), total.....	0.22	0.24 U
Strontium (Sr), total.....	25	67
Thallium (Tl), total.....	3.4	13
Vanadium (V), total.....	19	40
Zinc (Zn), total.....	32	

DRILLING AUDIT

Well Number: 2-87 (BH-3)

Date: 5/19/87, 5/20/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

Date drilling started: 5/19/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Rocky Flats Alluvium

Type of sampling device being used: Split core barrel, hollow auger

What type of recovery is being obtained? 75%

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Yes

If an alluvial well, did they drill one to three feet into bedrock? Yes

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? N/A

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? N/A

Was the grout allowed to set for 24 hours? N/A

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different?

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: 3-87BR

Date: 5/15/87, 6/1/87, 6/2/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway; Janell Bergman

Date drilling started: 5/15/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Arapahoe ss or bearing member

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? 90 - 100%

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Yes

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? Yes

What type of grout was used to set the casing? Portland

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? Yes

Was the grout allowed to set for 24 hours? Yes

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? Yes

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? Yes

Note any drilling problems:

DRILLING AUDIT

Well Number: 5-87 BR

Date: 6/23/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard/Janell Bergman

Date drilling started: 5/21/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Bedrock - Arapahoe water bearing member

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? ~90%

Were augers and sampling devices decontaminated? Yes

Are they kept clean? On racks

If an alluvial well, did they drill one to three feet into bedrock? NA

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? No

What type of grout was used to set the casing? Portland Type I

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? Yes

Was the grout allowed to set for 24 hours? Yes

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered?

Explain reasons for choosing the total depth if it is different? This well was completed in weathered bedrock to monitor the upper flow zone.

Was a packer test conducted? Yes

Note any drilling problems: Please note that no samples for field screening were taken.

DRILLING AUDIT

Well Number: 6-87

Date: 5/14/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

Date drilling started: 5/14/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Alluvium

Type of sampling device being used: Split core barrel, hollow stem auger

What type of recovery is being obtained? 95%

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Yes, off ground

If an alluvial well, did they drill one to three feet into bedrock? Yes

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? Portland Type I

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? Yes

Was the grout allowed to set for 24 hours? Yes

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: 6-87A

Date: 5/13/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

Date drilling started: 5/13/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Alluvium

Type of sampling device being used: Split core barrel, hollow stem auger

What type of recovery is being obtained? 20%, Consol. 80%, Consol. 100%

Were augers and sampling devices decontaminated? Sampler decontaminated with alconox prior to resampling; scrubbed couplings tube

Are they kept clean? Off ground

If an alluvial well, did they drill one to three feet into bedrock? Yes

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? Portland Type I

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? Yes

Was the grout allowed to set for 24 hours? Plugged and abandoned

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? Seeking wet or damp interval indicative of ground water flow.

Was a packer test conducted? N/A

Note any drilling problems: Vertical deviation - how determined? 7 1/2" hole auger drilled; 3 1/4" hollow stem; 2" core

DRILLING AUDIT

Well Number: 7-87 BRA

Date: 6/4/76 - 6/8/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway/Janell Bergman

Date drilling started: 6/4/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Arapahoe - below alluvium and above 5-87 zone of completion

Type of sampling device being used: Hollow stem auger/core barrel

What type of recovery is being obtained? Variable, some lost core zones; 75% to 100%

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Yes - racks

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No, on 0-35' Yes, with rig change to TD

If a bedrock well, was the surface casing set into unweathered bedrock? N/A (not set)

What type of grout was used to set the casing? N/A

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? N/A

Was the grout allowed to set for 24 hours? N/A

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? No - not in target interval

Explain reasons for choosing the total depth if it is different? (goal was to construct well between alluvium and fractured zone (5-87 BR). Abandoned because no moisture of flow was intercepted

Was a packer test conducted? No

Note any drilling problems: Core barrel stuck in augers; broken wireline. Please note that no field screening was performed because no sampling was planned for this well. The Health and Safety organic and radioactive screening was performed during drilling, as required.

DRILLING AUDIT

Well Number: 8-87BR

Date: 5/14 - 5/15/87

Audit Performed by: C. Sundblad

Geologist's Name: Janell Bergman

Date drilling started: 5/13/87

Type of drill rig being used: Failing rotary

Proposed formation of completion: Bedrock Arapahoe SS

Type of sampling device being used: NX core barrel

What type of recovery is being obtained? 75-100% 4' core rounds

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Yes/off ground

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? Yes, water

If a bedrock well, was the surface casing set into unweathered bedrock? 40' (slightly weathered 43-46')

What type of grout was used to set the casing? Portland Type I (redrilled)

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? Yes

Was the grout allowed to set for 24 hours? Yes

What size is the core? 2" (NX, NDX)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? 3 1/2' of lignite-wet interstitially

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? Yes

Note any drilling problems: Sluff/bridge on packer test installation-reamed hole

Geologist noted "water coming up outside the casing; bubbling up in the gd and the 2 adjacent wells". Needs to be clarified.

DRILLING AUDIT

Well Number: BH5-87

Date: 5/20/87

Audit Performed by: C. Sundblad

Geologist's Name: M. Gard

Date drilling started: 5/19/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: No completion - soil boring

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? 100%

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Off ground - Yes

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? N/A

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? N/A

Was the grout allowed to set for 24 hours? N/A

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? Soil boring - exploratory organics/radiometric

Was a packer test conducted? N/A

Note any drilling problems: No - backfill w/Portland Type I Concrete.

DRILLING AUDIT

Well Number: BH 6-87

Date: 6/23/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard

Date drilling started: 5/20/87

Type of drill rig being used: BH57

Proposed formation of completion: Alluvium - exploratory borehole

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? 67%

Were augers and sampling devices decontaminated? Not noted

Are they kept clean? Off ground and on racks

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? N/A

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? N/A

Was the grout allowed to set for 24 hours? N/A

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: BH8-87

Date: 6/22/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

Date drilling started: 6/3/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Alluvium borehole

Type of sampling device being used: Split core barrel

What type of recovery is being obtained?

Were augers and sampling devices decontaminated? Not noted

Are they kept clean? On racks

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? N/A

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? N/A

Was the grout allowed to set for 24 hours? N/A

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different?

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: BH 9-87

Date: 5/29/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

Date drilling started: 5/28/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Alluvium; concrete backfill

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? ~ 80%

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Yes

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? N/A

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? N/A

Was the grout allowed to set for 24 hours? N/A

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? No

Note any drilling problems: None noted

DRILLING AUDIT

Well Number: BH 10-87

Date: 6/1/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

Date drilling started: 6/1/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Borehole to be backfilled with concrete

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? 40-70% above bedrock contact; below ~95%

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Yes

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? Backfill borehole 6 gal/94lbs.

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? Yes

Was the grout allowed to set for 24 hours? Yes

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: BH11-87

Date: 6/22/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

Date drilling started: 6/2/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Alluvium - exploratory borehole

Type of sampling device being used: Split core barrel

What type of recovery is being obtained?

Were augers and sampling devices decontaminated? Not noted

Are they kept clean? On rack

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? N/A

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? N/A

Was the grout allowed to set for 24 hours? N/A

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? Alluvial borehole

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: BH 12-87

Date: 6/29/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard

Date drilling started: 5/27/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Borehole-surface to bedrock, concrete backfill

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? 20% to 95%

Were augers and sampling devices decontaminated? Not recorded in logbook

Are they kept clean? Yes - On racks

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? Backfill borehole, Portland Type I

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? Yes

Was the grout allowed to set for 24 hours? Yes

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? No

Note any drilling problems: Poor recovery - moved and started new borehole

DRILLING AUDIT

Well Number: BH 13-87

Date: 5/29/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway/Suzanne Paschke

Date drilling started: 5/29/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Alluvium/colluvium; concrete backfill

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? ~85 - 90%

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Yes

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? N/A

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? BH 6 gal/94 lb. bay

Was the grout allowed to set for 24 hours? Yes

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: BH 13-87

Date: 6/22/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

Date drilling started: 5/29/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Alluvium

Type of sampling device being used: Split core barrel

What type of recovery is being obtained?

Were augers and sampling devices decontaminated? Not noted in logbook

Are they kept clean? Yes - On racks

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? N/A

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? N/A

Was the grout allowed to set for 24 hours? N/A

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? Borehole drilled to define extent of waste contamination in alluvium.

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: BH 14-87

Date: 6/29/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard

Date drilling started: 5/28/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Borehole to bedrock backfill with concrete

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? 20% to 95%

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Yes, off ground

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? Portland Type I for borehole backfill

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? Yes

Was the grout allowed to set for 24 hours? Yes

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: BH 15-87

Date: 6/29/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard

Date drilling started: 6/3/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Borehole to bedrock backfill with concrete

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? 0-100% - Abandonned 1st hole D 17'; 2nd hole lost core at same interval

Were augers and sampling devices decontaminated? Yes

Are they kept clean? Yes, off ground

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? Portland type I - Borehole backfill

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? Yes

Was the grout allowed to set for 24 hours? Yes

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: BH 16-87

Date: 6/29/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard

Date drilling started: 6/2/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Borehole to bedrock, concrete backfill

Type of sampling device being used: Split core barrel

What type of recovery is being obtained? 50% - 100%

Were augers and sampling devices decontaminated? Not noted in logbook

Are they kept clean? Yes, off ground

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? Portland Type I - Borehole backfill

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? Yes

Was the grout allowed to set for 24 hours? Yes

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? No

Note any drilling problems:

DRILLING AUDIT

Well Number: BH17-87

Date: 6/22/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

Date drilling started: 6/3/87

Type of drill rig being used: Mobile B-57

Proposed formation of completion: Alluvium borehole

Type of sampling device being used: Split core barrel

What type of recovery is being obtained?

Were augers and sampling devices decontaminated? Yes, previous day

Are they kept clean? Yes, On racks

If an alluvial well, did they drill one to three feet into bedrock? N/A

Was any fluid used while drilling? No

If a bedrock well, was the surface casing set into unweathered bedrock? N/A

What type of grout was used to set the casing? N/A

Was the mixture 6 to 9 gallons of water per 94 lbs. of grout? N/A

Was the grout allowed to set for 24 hours? N/A

What size is the core? 2" (xix) (xlc)

Were at least three feet of saturated sandstone found in a ten-foot interval of bedrock or was 100' of claystone encountered? N/A

Explain reasons for choosing the total depth if it is different? N/A

Was a packer test conducted? No

Note any drilling problems:

APPENDIX G

QUALITY ASSURANCE

APPENDIX G
QUALITY ASSURANCE

1.0 INTRODUCTION

The Comprehensive Environmental Assessment and Response Program (CEARP) Quality Assurance/Quality Control (QA/QC) Plan consists of policies, objectives, principles, and general procedures to be followed in producing quality environmental data. The QA/QC Plan for remedial investigations at Rocky Flats Plant is contained in the CEARP Installation Generic Monitoring Plan (IGMP). The primary quality assurance objective for quantitative analysis is to obtain reproducible measurements to a degree of accuracy consistent with their intended use and to document measurement procedures. Quality assurance responsibilities are to monitor and review the procedures used in all aspects of the remedial investigation. This includes, but is not limited to, drilling, sampling, well installation, laboratory analysis, data analysis, and report preparation. Required procedures for drilling, sampling, and related field activities are described in detail in Appendix A of the IGMP Sampling Plan. A complete description of remedial investigation field activities that differ from the IGMP can be found in Appendix D of this report. Required analytical procedures and programs are described in the IGMP QA/QC Plan. This appendix discusses the field and laboratory QA/QC programs implemented during the RI and compares them to those outlined in the CEARP IGMP QA/QC Plan.

2.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control (QA/QC) documentation was maintained for field activities (drilling, materials description, sampling, packer testing, well installation, and decontamination procedures). QA/QC policies are designed to maintain uniformity, to identify nonconformance with project procedures, and to implement corrective actions to remedy the identified nonconformances. Audits were performed to document compliance with specified procedures.

2.1 DRILLING AND WELL INSTALLATION

2.1.1 Documentation

QA/QC procedures involved close supervision of field personnel by the Site Manager. Activities were documented in field notebooks assigned to each individual by the Site Manager. Entries in the notebooks included core descriptions, well designs, packer tests, health and safety requirements, and other direct field activities, as well as conversations/interactions with other field personnel. A summary of the day's activities was presented at daily health and safety meetings, and two copies of the week's field notebooks were collected each Friday. These notebooks were reviewed by the Site Manager and the Quality Assurance Officer. This enabled ongoing QA to be performed on all field notebooks without actually taking possession of the documents and interfering with field activities.

In addition to daily reviews and submission of weekly field notes, site management approval of each well design was required prior to well installation. Field personnel were also required to contact the Site Manager on noncompliance or

difficulties before continuing field activities whenever questions arose. These steps were all designed to minimize variation between areas and between personnel and to ensure coordination at the site manager level.

Formal well designs and geologic logs included in Appendix E have been cross-checked against the field notebook by a geologist other than the originator to document proper descriptions and footages. Each log was dated and initialed by the reviewer prior to typing. The typed logs were reviewed again before being signed by the Site Manager and the CEARP Manager.

2.1.2 Audits

QA/QC was also maintained through the use of unannounced field audits and review of geologists' field notebooks by the Quality Assurance Officer. Five function-related checklists have been developed for the different field tasks and were used for the audits (Appendix G-1). A generic audit form was used as an overall audit of the RI activities. This generic audit form is provided in Table G-1.

Drilling audits (Attachment 1) were performed on five of nineteen wells (26%); all five audits were based on field observation (Table G-2). In addition, drilling field audits were performed on thirteen boreholes and two abandoned holes. These audits document conformance with drilling procedures. Specifically, the audits confirm that alluvial wells were drilled one to three feet into bedrock, surface casing was set into unweathered bedrock for bedrock wells, and that augers and sampling devices were decontaminated and kept clean between holes.

Borehole logging field audits (Attachment 2) were performed on five of the nineteen wells (26%) (Table G-2). In addition, borehole logging field audits were

TABLE G-1

FIELD AUDIT

Project_____ Site Manager_____

Site Location_____ Field Team Leader_____

Auditor_____ Date_____

Audit Question	Yes	No	Comment/Documentation
1. Was a site-specific sampling and analytical plan followed?			
2. Was a field team leader appointed?			
3. Was the site health and safety coordinator present?			
4. Were field team members familiar with the sampling plan?			
5. Was a briefing held offsite, before any site work was begun, to acquaint personnel with sampling equipment and assign field responsibilities?			
6. Was the daily briefing and safety check conducted?			
7. Was a completed "Site Personnel Protection and Safety Evaluation Form" read and signed by all visitors and personnel entering the site?			
8. Was a field notebook assigned to the field team leader?			
9. Were entries made in the field notebook?			
10. Were sampling stations located correctly?			
11. Did the number and location of samples collected follow the site-specific sampling plan?			

TABLE G-1
(CONTINUED)
FIELD AUDIT

Project _____ Site Manager _____

Site Location _____ Field Team Leader _____

Auditor _____ Date _____

Audit Question	Yes	No	Comment/Documentation
12. Were samples identified as described in the site-specific sampling plan?			
13. Were samples collected following procedures specified in the site-specific plan?			
14. Was a chain-of-custody form filled out for all samples collected? Were all sample transfers documented?			
15. Were samples preserved as specified in the site-specific sampling plan?			
16. Were the number, frequency, and type of samples (including blanks and duplicates) collected as described in the site-specific sampling plan?			
17. Were the number, frequency, and type of measurements and observations taken as specified in the site-specific sampling plan?			
18. Were blank and duplicate samples properly identified?			
19. Was a record maintained of calibration of field equipment?			
20. Was field equipment calibrated as required?			

TABLE G-1
(CONTINUED)
FIELD AUDIT

Project _____ Site Manager _____

Site Location _____ Field Team Leader _____

Auditor _____ Date _____

Audit Question	Yes	No	Comment/Documentation
21. Have any procedures been revised?			
22. Are revisions to procedures adequately documented?			
23. Was the document log for chain-of-custody records and other sample traffic control forms maintained?			
24. Have any accountable documents been lost?			
25. Did drilling and well construction follow procedures outlined in the sampling plan?			
26. Were the activities being conducted compatible with the environmental conditions?			

performed on thirteen boreholes and two abandoned holes. These audits confirm proper material descriptions and documentation as required in DOE (1987a).

Packer test audits (Attachment 3) were performed on three of the four bedrock wells packer tested (75%), all were field audits (Table G-2). These audits confirm compliance with the procedures presented in DOE (1987a).

Ten of the nineteen well installations were audited (53%) (Attachment 4). Seven audits were based on field observations, and three audits were from field notebooks (Table G-2). These audits document adherence to well installation procedures including materials, screened and blank depths, decontamination procedures, and careful well constructions (DOE, 1987a).

Field screening and sampling audits (Attachment 5) were performed on all thirteen boreholes; all were field audits (Table G-2). These audits confirm compliance with sampling and field screening procedures outlined in Appendix D.

2.1.3 Deviations

A discussion of each deviation from the RI Work Plan is presented below.

1) The borehole sampling technique was modified. A discussion of the technique used is located in Appendix D.

2) Field screening techniques were also modified (Appendix D).

3) Completion of Well 5-87BR was modified to better define the vertical extent of contamination in the weathered bedrock. A description can be found on pages 4 and 5 of Appendix D.

4) Completion of Well 8-87 was in a three-foot thick, water-bearing lignite bed. A discussion of this completion can be found on pages 5 and 6 of Appendix D.

TABLE G-2
QA/QC AUDITS

WELL/BOREHOLE	DRILLING	BOREHOLE LOGGING	PACKER TEST	WELL INSTALLATION	FIELD SCREENING & SAMPLING
BH1-87			NA	NA	
BH2-87			NA	NA	
BH4-87			NA	NA	
BH5-87	F	F	NA	NA	F
BH6-87	F	F	NA	NA	F
BH7-87			NA	NA	
BH8-87	F	F	NA	NA	F
BH9-87	F	F	NA	NA	F
BH10-87	F	F	NA	NA	F
BH11-87	F	F	NA	NA	F
BH12-87	F	F	NA	NA	F
BH13-87	F	F	NA	NA	F
BH14-87	F	F	NA	NA	F
BH15-87	F	F	NA	NA	F
BH16-87	F	F	NA	NA	F
BH17-87	F	F	NA	NA	F
BH61-87					
1-87					
2-87/BH3-87	F	F	NA	F	F
3-87BR*	F	F	F	F	
4-87			NA	F	
5-87BR*	F	F	F	F	F
6-87	F	F	NA	F	F
6-87A	F	F	NA	NA	F
7-87BRA	F	F	NA	NA	F
8-87BR*	F	F	F	F	
43-87/BH57-87			NA		
44-87/BH58-87			NA	LB	
45-87BR*/BH59-87					
47-87			NA	LB	

TABLE G-2
(continued)
QA/QC AUDITS

WELL/BOREHOLE	DRILLING	BOREHOLE LOGGING	PACKER TEST	WELL INSTALLATION	FIELD SCREENING & SAMPLING
48-87			NA	LB	
49-87			NA		
50-87			NA		
51-87/BH62-87			NA		
52-87/BH63-87			NA		
53-87			NA		
54-87			NA		
55-87			NA		

* = Bedrock Well Packer Tested
NA = Not Applicable
LB = Log Book Audit
F = Unannounced Field Audit

5) Deviation from the Soil Gas Method: The two principal methods employed to sample soil gas are real time and time integrated.

Real time measurements are extracted by inserting a hollow conduit into the soil to a given depth and evacuating a predesignated volume of gas. After the system has been purged of any atmospheric air, a sample is extracted and analyzed, either on-site or in a remote laboratory. The advantages of this procedure are that the data are, in general, available more quickly than time integrated methods. The disadvantages are cost, and the added equipment required to do the sampling and analysis reduces the mobility of the sampling vehicle. In addition, real time methods provide a lower detection limit.

Time integrated methods employ activated adsorbants to collect the contaminants for a period of time specifically determined for the site to concentrate the contaminant to a level that might otherwise be undetectable. Rather than mass per unit volume measurements that are the result of real time gas chromatographic analysis, time integrated results are measured in terms of molecular counts. Both methods can only be used as a reconnaissance tool as they merely give a qualitative indication of subsurface concentrations. Time integration also reduces any variations in the contaminant concentrations due to transient situations that might not reflect representative conditions. In addition, all equipment required to perform the sampling can be carried into the target area by two individuals, thus reducing traffic in areas where heavy traffic might permit re-suspension of soil possibly contaminated with radioactive contaminants.

Considerations of increased mobility, lower detection limits, reduction of heavy traffic, and cost influenced our decision to re-evaluate the method to be used and substitute Petrex's time integrated method.

Grid Spacing: The grid spacing for the soil gas stations was determined to be inconsistent with Petrex's recommended alignment. In areas of suspected plume migration, Petrex urges the employment of a random or offset grid opposed to an orthogonal grid. An offset grid is designed so that adjacent grid lines are sampled at non-aligned stations, thus disrupting the orthogonal pattern of the uniform grid.

2.2 SOIL GAS QA

Duplicate and field blank Quality Assurance (QA) samples were taken during the soil gas sampling operation. Duplicate samples were taken by placing two wires into the same tube. Results of both wires are presented in Table G-3. Any

TABLE G-3

SOIL GAS QUALITY ASSURANCE

SAMPLE LOCATION	DUPLICATE	BLANK
14	-----	0
17	-----	0
32	0:0	-----
50	PCE 965:209	-----
65	0:0	-----
93	0:0	-----
98	0:0	-----
101	0:0	-----
104	0:0	-----
107	0:0	-----
110	PCE 155:455 PCE	-----
114	0:0	-----
115	PCE 1,006:0	-----
116	PCE 968:1,271 0:352 TCE	-----

contaminants, if found, are also shown. Field blanks were taken by installing sealed tubes next to an open tube. The field blank results are also presented in Table G-3.

2.2 WATER SAMPLING

Water samples were collected using the procedure presented in Attachment 1 of Appendix D. This procedure is more detailed than, and is generally consistent with, procedures presented in the IGMP. Minor modifications to the procedures were made at the end of each quarter. For example, the order in which bottles were filled was changed, and the time allowed for recharge before sampling varied over the course of the program. Another modification involved filtration of samples for radiometric analyses. Ground-water radiochemistry samples were not filtered during the first (March 9, 1987, through May 20, 1987) and second (May 21, 1987, through June 30, 1987) quarters, but they were filtered during the third (July 1, 1987, through September 30, 1987) and fourth (October 1, 1987, through January 31, 1988) quarters. Surface water radiochemistry samples were not filtered during the second and third quarters but were filtered during the fourth quarter. Surface water samples were not collected in the first quarter of 1987. The revised sampling procedure is presented and discussed in Appendix D. An audit of ground-water sampling was performed during the fourth quarter. The audit shows satisfactory adherence to the sampling plan.

3.0 LABORATORY QA/QC

3.1 Radiochemistry

3.1.1 Rockwell International Laboratory

The Rocky Flats Plant Building 881 Laboratory analyzed water samples for gross alpha, gross beta, uranium-233+234, -235, and -238, plutonium -239 and -240, cesium-137, americium-241, strontium-90, and tritium. Field duplicates and field, equipment, and trip blanks were collected during sampling and submitted to the laboratory for analysis. These samples constituted approximately 17% of the total samples analyzed.

Samples analyzed prior to the start of the third quarter of 1987 were analyzed under a QA program that consisted of measurement control samples for gross alpha, gross beta, and tritium analyzed monthly and control samples analyzed with every ten samples for all other radionuclides of interest. Also, internal spikes were included in each sample to determine chemical recovery. Samples analyzed after the start of the third quarter of 1987 were analyzed with a QA program of one method blank analyzed with each batch of ten samples; one control sample analyzed with each batch of ten samples for all isotope specific analyses; one control sample analyzed weekly for gross alpha and beta; and a laboratory duplicate analyzed with every tenth sample for gross alpha, gross beta and tritium. Internal matrix spikes were included in each sample, and all isotopic standards used for spiking of control and individual samples are either directly or indirectly National Bureau of Standards (NBS) traceable. In addition, internal QA/QC audits are routinely performed of the 881 Laboratory as part of a Plant-wide QA/QC program.

Radionuclide analyses differed slightly from the QA/QC Plan specified analytical procedures during the first three quarters of 1987. The QA/QC Plan specified a one liter sample volume; however, the laboratory had inadequate capacity to process the large number of one liter samples. Smaller sample volumes were thus used for radiochemical analyses prior to fourth quarter, 1987. Specifically, gross alpha and gross beta results were based on a 25 milliliter (ml) sample; tritium results were based on a 5 ml sample; and all other isotopic analyses were based on a 100 ml sample. All analyses starting in fourth quarter 1987 are based on one liter sample volumes. Typically, smaller sample volumes resulted in larger counting errors.

The detection limits for the various radiochemical analyses conform to the suggested limits in the QA/QC Plan. Prior to the start of the third quarter of 1987, detection limits were determined as the minimum detectable activity (MDA) under optimum conditions. The detection limits were: uranium isotopes, 0.23 pCi/l; Am-241, 0.36 pCi/l; Pu-239, 0.23 pCi/l; Sr-90, 8 pCi/l; Cs-137, 1 pCi/l; and tritium, 110 pCi/l. After the start of the third quarter, the detection limits were calculated on the basis of individual samples to reflect the variability in sample analysis. Both methods of determining detection limits are acceptable and meet the detection requirements; the latter method is considered to more accurately represent these limits.

The small sample volume and method of determining detection limits used prior to the start of the fourth quarter of 1987 add to the difficulty of data interpretation. The majority of samples analyzed appear to contain either very low-levels or background amounts of radioactive material. The small volume of these low-level samples has the effect of raising the detection limits and relative uncertainty due to the low sample count rate. Because the detection limits were not sample specific, it is difficult to distinguish between a sample with low-levels of radioactive material and

one with background levels. In fact, the sample activity is indistinguishable from background if the error is about twice the concentration. Since fourth quarter 1987, a a one-liter sample volume has been collected for radiochemical analyses in order to reduce detection limits (MDA) and counting error. This also allows remedial investigation data to be compared to data collected as part of the Plant routine environmental monitoring program.

All analytical data, including QA data, are entered into a technical data base. This data base is designed to include all pertinent QA data in such a form as to be retrievable with the appropriate sample lots. Detection limits are also retrievable with the data.

3.1.2 Accu-Labs Research, Inc. Laboratory

Accu-Labs Research, Inc., (Arvada, Colorado) analyzed soil samples for gross alpha and beta, plutonium-239 and -240, americium-241, uranium-233+234, uranium-238, strontium-90, cesium-137, and tritium. Field duplicates were collected during sampling and submitted to the laboratory for analysis. Field QA samples constituted approximately 6% of the total soil samples analyzed.

Field and trip blanks for soils were not collected because of the difficulty in obtaining blank samples of soils. Special bottling and sample handling procedures were implemented to reduce the need for field and trip blanks. Soil sample containers were obtained from I-CHEM Research. I-CHEM sample containers are precleaned and quality control analyzed to exact EPA protocols and meet EPA standards for use of glass containers in sampling. In addition, primary and secondary container ship-

ping packages are labeled with chain of custody seals to indicate potential tampering of sample containers.

Laboratory QA samples comprised 10% of the samples, consisting of method blanks, duplicate samples, and method spikes. On average, every batch of ten samples is accompanied by one of each of these QA samples. All isotopic standards used for the spiking of control and individual samples are either directly or indirectly NBS traceable. In addition, internal QA/QC checks have been performed at the laboratory on a routine basis since the start of the project.

The soil analyses were done according to QA/QC Plan specified analytical procedures. Sample mass requirements for sample analysis were met. The detection limits for the soils radiochemistry conform to those suggested in the QA/QC Plan and are calculated on the individual sample basis to reflect the variability in individual sample analysis. The detection limits under optimum conditions are approximately 1 pCi/g for Sr and Cs and approach 0.1 pCi/g for the remaining isotopic analysis.

Data generated by the Accu-Labs Laboratory contain sample and duplicate results. These values are accompanied by two sigma (95%) confidence intervals. Accu-Labs' QA/QC program and QA data have been reviewed and were found to be acceptable. The analytical program at the laboratory has remained unchanged throughout the project. Therefore, no written notification of changes has been required.

3.2 Chemical Analysis

Ground-water, surface water, and soil samples were analyzed for non-radioactive chemistry. The water samples were analyzed for volatile organics, metals, and inorganic parameters by the Rockwell 881 Laboratory. Field splits of ground-water

samples were also analyzed for volatile organics by Weston Analytics Laboratory (Stockton, California). However, samples identified as field splits were in fact field samples. Some of these "splits" were collected on different days. Additional soil samples were analyzed by WESTON Analytics for volatile organics, semi-volatile organics, metals, and inorganic parameters.

3.2.1 Water Samples

Water samples were analyzed by the 881 Laboratory for the first and second quarter using gas chromatography. Method spikes were not included in the routine analysis nor were lot control numbers assigned to samples. Use of the GC/MS procedure began in the third quarter of 1987. Third and fourth quarter analytical reports do not contain information on QA samples. Since no QA data are available to verify that calibrations remained valid throughout analyses, volatile organic data from the 881 Laboratory are considered qualitative screening-level data, i.e., indicating the probable presence or absence, and relative concentrations, of analyzed VOCs.

Ground-water volatile organic analyses performed by Weston Analytics followed the procedures outlined in the QA/QC Plan. Analytical reports for ground-water splits present required QA results (surrogate recoveries, matrix spikes, and lab blanks), and these results are within acceptable ranges. No matrix interference is indicated by QA results.

3.2.2 Soil Samples

Analytical methods used for soils analyses by both Weston Analytics and Envirodyne Engineers Laboratories are consistent with those specified in the QA/QC Plan. Soil boring analytical reports from both laboratories show lab QA results (surrogate recoveries, matrix spikes, and lab blanks) as well as tentative identified compounds in the semi-volatile fractions. Laboratory QA results are within acceptable ranges and do not indicate matrix interference. Results reported by Weston Analytics were reported on an as received basis and not corrected for moisture content.

4.0 CONCLUSIONS

In general, field and laboratory methods have followed the procedures specified in the QA/QC Plan. In particular:

1. The QA/QC of field activities documents compliance with field procedures. Twelve of nineteen (63%) wells installed during this phase of the remedial investigation have been audited to some degree, and seven wells (37%) have undergone at least three different audits each. During field activities, minor modifications were made to procedures.

2. Radiochemistry analyses have generally been performed according to procedures; however, 100 ml rather than one liter water sample volumes resulted in low count rates and higher uncertainties. Radiometric analysis of soil samples followed the project procedures.

3. Analysis of chemical parameters also generally followed procedures. However, gas chromatography was used instead of GC/MS for analysis of VOCs in water during the first two quarters. In addition, complete QA documentation is not available for water samples analyzed by the Rocky Flats Laboratory. Therefore, those analytical results are regarded as qualitative screening-level data indicating the probable presence or absence and relative concentrations of VOCs. Ground-water volatile organic analyses performed by Weston Analytics Laboratory followed procedures set forth in the QA/QC Plan and are accompanied

by appropriate QA documentation. These data are thus considered quantitative. Analysis of soil samples followed the project procedures.

The overall QA/QC goals have been met of documenting project methodologies and of developing data of sufficient accuracy for their intended use.

APPENDIX G-1

DETAILED AUDIT FORMS

APPENDIX G-1

ATTACHMENT 1
DRILLING AUDITS

APPENDIX G-1

ATTACHMENT 2
BOREHOLE LOGGING AUDITS

BOREHOLE LOGGING

Well Number: 2-87 (BH-3)

Date: 5/19/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: BH-3

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Colluvium

Color: Yes

Structural Characteristics: Contact

Grain Sizes: Descriptive

Degree of Sorting: None recorded

Grain Shapes: None recorded

Moisture Content: Descriptive

Nature of Contacts: Alluvium/weathered B.R.

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: 3-87BR

Date: 5/15/87

Audit Performed by: C. L. Sundblad

Geologist's Name: Karen Holliway

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: 3-87BR

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: Contacts noted

Grain Sizes: Descriptive

Degree of Sorting: Poor to well sorted noted

Grain Shapes: Yes

Moisture Content: Descriptive only

Nature of Contacts: Alluvium/weathered BR/unweathered BR

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: 5-87 BR

Date: 6/23/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard/Janell Bergman

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: 5-87 BR

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: Fractures, mottles

Grain Sizes: Descriptive

Degree of Sorting: Yes

Grain Shapes: Fine to very fine grained sands

Moisture Content: Descriptive

Nature of Contacts: Alluvium/bedrock

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: 6-87

Date: 5/14/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: 6-87

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: Some disturbed at 2'

Grain Sizes: Yes

Degree of Sorting: No comments on sorting

Grain Shapes: No comments on shapes of grains

Moisture Content: Yes, damp to moist

Nature of Contacts: Alluvium/bedrock

Organic and radioactive field screening results: Yes - logged

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: 6-87A

Date: 5/13/87

Audit Performed by: C. Sundblad

Geologist's name: Karen Holliway

The field notebook and log of borings from should be filled out in detail. The following items should be found in both.

Borehole number? 6-87 A

Time/date? AM 5/13/87

Footage? TD = 32 ft.

Recent Recovery? 78%

Material type? alluvium, claystone, sandstone

Color? Yellow orange, brown weathered claystones & sandstones

Structural characteristics? Same disturbed laminations

Grain sizes? clays, sands, cobbles

Degree of sorting? Poorly sorted sandy claystones to coarse sand-well sorted

Grain shapes? Subrounded

Moisture content? dry

Nature of contacts? alluvium/weathered bedrock

Organic and radioactive field screening results? HNU @ background, alphas @ 0.0

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: 7-87 BRA

Date: 6/22/87

Audit Performed by: C. Sundblad

Geologist's name: Karen Holliway/Janell Bergman

The field notebook and log of borings from should be filled out in detail. The following items should be found in both.

Borehole number? 7-87 BR; 7-87 BRA (cemented and abandoned)

Time/date? Yes

Footage? Yes

Recent Recovery? Yes

Material type? Yes - Descriptions

Color? Yes - Weathered/Unweathered

Structural characteristics? Some

Grain sizes? Yes - descriptive

Degree of sorting? Some description

Grain shapes? Yes

Moisture content? Descriptive

Nature of contacts? Alluvium/weathered bedrock/no log of unweathered contact

Organic and radioactive field screening results? Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: 8-87BR

Date: 5/20/87

Audit Performed by: C. Sundblad

Geologist's name: Janell Bergman

The field notebook and log of borings from should be filled out in detail. The following items should be found in both.

Borehole number? 8-87BR Fieldbook

Time/date? Fieldbook

Footage? Fieldbook

Recent Recovery? Fieldbook

Material type? Fieldbook

Color? Fieldbook

Structural characteristics? Fieldbook

Grain sizes? Fieldbook

Degree of sorting?

Grain shapes? Fieldbook

Moisture content? Fieldbook (Descriptive)

Nature of contacts? Fieldbook

Organic and radioactive field screening results? Fieldbook

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: BH5-87

Date: 5/20/87

Audit Performed by: C. Sundblad

Geologist's Name: Mike Gard

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: Yes

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: N/A

Grain Sizes: Descriptive

Degree of Sorting: Not recorded

Grain Shapes: Descriptive

Moisture Content: Descriptive

Nature of Contacts: Alluvium/bedrock recorded

Organic and radioactive field screening results: Not recorded

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes - standby not noted

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: BH 6-87

Date: 6/23/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: BH 6-87

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Some

Structural Characteristics: N/A

Grain Sizes: Yes - diameter estimates on gravel zone

Degree of Sorting: Not recorded

Grain Shapes: Not recorded

Moisture Content: Descriptive

Nature of Contacts: Alluvium/bedrock recorded

Organic and radioactive field screening results: Not recorded

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: BH8-87

Date: 6/22/87

Audit Performed by: C. Sundblad

Geologist's Name: K. D. Holliway

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: Yes

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Some

Structural Characteristics: N/A

Grain Sizes: None recorded

Degree of Sorting: None recorded

Grain Shapes: None recorded

Moisture Content: Dry to damp

Nature of Contacts: Yes Alluvium/weathered bedrock

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: BH 9-87

Date: 5/29/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: Yes

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: N/A

Grain Sizes: Descriptive & size range - diameter estimates

Degree of Sorting: None noted

Grain Shapes: None noted

Moisture Content: Descriptive

Nature of Contacts: Yes Alluvium/bedrock

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: BH 10-87

Date: 6/1/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: Yes

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: Yes

Grain Sizes: Yes - diameter sizes estimated

Degree of Sorting: None noted

Grain Shapes: Yes

Moisture Content: Yes, Descriptive

Nature of Contacts: Yes

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: BH11-87

Date: 6/22/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: BH11-87

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: N/A

Grain Sizes: Some - Descriptive

Degree of Sorting: Some

Grain Shapes: Descriptive

Moisture Content: Descriptive

Nature of Contacts: Yes, Alluvium/weathered bedrock

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: BH 12-87

Date: 6/29/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: Yes

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: Fractures

Grain Sizes: Yes - diameters estimated

Degree of Sorting: Not noted

Grain Shapes: Not noted

Moisture Content: Yes Descriptive

Nature of Contacts: Yes Alluvium/bedrock

Organic and radioactive field screening results: Not recorded in logbook

Are the cores wrapped in plastic and placed in boxes? Yes, as required

Are the intervals properly identified? Yes, as required

Are the boxes properly identified? Yes, as required

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes, no standby recorded

BOREHOLE LOGGING

Well Number: BH 13-87

Date: 5/29/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway/ Suzanne Paschke

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: Yes

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: Yes - bedding characteristics

Grain Sizes: Yes - diameters estimated

Degree of Sorting: None noted

Grain Shapes: Yes subrounded to subangular

Moisture Content: Yes - Descriptive

Nature of Contacts: Yes - Alluvium/bedrock

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: BH 13-87

Date: 6/22/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: BH 13-87

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Some

Structural Characteristics: N/A

Grain Sizes: Descriptive

Degree of Sorting: None noted

Grain Shapes: None noted

Moisture Content: Descriptive

Nature of Contacts: Alluvium/weathered bedrock

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: BH 14-87

Date: 6/24/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: Yes - corrected; initially labelled BH 7-87

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: Yes - bedding characteristics

Grain Sizes: Large cobbles

Degree of Sorting: Not noted

Grain Shapes: Not noted

Moisture Content: Descriptive

Nature of Contacts: Alluvium/bedrock

Organic and radioactive field screening results: Not noted in logbook

Are the cores wrapped in plastic and placed in boxes? Yes, as required

Are the intervals properly identified? Yes, as required

Are the boxes properly identified? Yes, as required

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? No standby recorded, No concrete volume recorded

BOREHOLE LOGGING

Well Number: BH 15-87

Date: 6-29-87

Audit Performed by: C. Sunblad

Geologist's name: Michael Gard

The field notebook and log of borings from should be filled out in detail. The following items should be found in both.

Borehole number? Yes

Time/date? Yes

Footage? Yes

Recent Recovery? Yes

Material type? Yes

Color? Yes

Structural characteristics? None noted

Grain sizes? Descriptive

Degree of sorting? None noted

Grain shapes? None noted

Moisture content? Descriptive

Nature of contacts? None noted

Organic and radioactive field screening results? Not noted

Are the cores wrapped in plastic and placed in boxes? Yes as required

Are the intervals properly identified? Yes as required

Are the boxes properly identified? Yes as required

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? No standby recorded

BOREHOLE LOGGING

Well Number: BH 16-87

Date: 6/29/87

Audit Performed by: C. Sundblad

Geologist's Name: Michael Gard

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: Yes

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: Not noted

Grain Sizes: Some cobbles noted

Degree of Sorting: Not noted

Grain Shapes: Not noted

Moisture Content: Descriptive

Nature of Contacts: Bedrock noted

Organic and radioactive field screening results: Not recorded in logbook

Are the cores wrapped in plastic and placed in boxes? Yes, as required

Are the intervals properly identified? Yes, as required

Are the boxes properly identified? Yes, as required

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Concrete, volume not recorded

BOREHOLE LOGGING

Well Number: BH17-87

Date: 6/22/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: BH17-87

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: N/A

Grain Sizes: Descriptive (Cobbles)

Degree of Sorting: No - not recorded

Grain Shapes: Yes

Moisture Content: Dry

Nature of Contacts: Yes, Alluvium

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

BOREHOLE LOGGING

Well Number: BH17-87

Date: 6/22/87

Audit Performed by: C. Sundblad

Geologist's Name: Karen Holliway

The field notebook and log of borings form should be filled out in detail. The following items should be found in both.

Borehole number: BH17-87

Time/date: Yes

Footage: Yes

Recent Recovery: Yes

Material Type: Yes

Color: Yes

Structural Characteristics: N/A

Grain Sizes: Descriptive (Cobbles)

Degree of Sorting: No - not recorded

Grain Shapes: Yes

Moisture Content: Dry

Nature of Contacts: Yes, Alluvium

Organic and radioactive field screening results: Yes

Are the cores wrapped in plastic and placed in boxes? Yes

Are the intervals properly identified? Yes

Are the boxes properly identified? Yes

Is the driller keeping a daily log detailing footage drilled, material used, and stand-by time? Yes

Is the geologist (Field Team Leader) doing the same? Yes

APPENDIX G-1

ATTACHMENT 3
PACKER TEST AUDITS

PACKER TEST AUDIT

Well Number: 3-87BR

Date: 6/2/87

Audit performed by: C. L. Sundblad

Geologist's name: Janell Bergman

Date drill was completed: 6/2/87

Was packer test equipment decontaminated? Yes

When? _____

Was it kept clean? _____

Any problems with caving? _____

Were the packers inflated to at least 70 ps: above hydrostatic pressure? 80 psi

psi reading? 80 psi Hydrostatic reading? 42.32

Was the overburden pressure calculated? Yes Estimate was 42.08 psi

What was the water source? rig - raw water from plantsite

Was the combined static plus gauge pressure approximately:

one-third of the overburden pressure for the first test? X Reading 47.40

two-thirds of the overburden pressure for the second test? X Reading 43.89

one-third of the overburden pressure for the third test? X Reading

Were any leaks observed? Yes - packer assembly adjusted/test unvalid

Was the flow rate record in gpm at equal time intervals? Yes

What were the time intervals? 1 min

How long did each test last?
1. 15 min
2. 15 min
3. 15 min

Was the borehole reamed to a minimum four inch diameter for well installation? No

PACKER TEST AUDIT

Well Number: 5-87 BR

Date: 5/28/87

Audit performed by: C. Sunblad

Geologist's name: Janell Bergman

Date drill was completed: 5/27/87

Was packer test equipment decontaminated? Not noted in Field Book

When? _____

Was it kept clean? Yes - on racks

Any problems with caving? None noted

Were the packers inflated to at least 70 ps: above hydrostatic pressure? Yes

psi reading? 80 psi Hydrostatic reading? 19.69 psi

Was the overburden pressure calculated? Yes Estimate was 19.69 psi

What was the water source? Rig - rawwater from plantsite

Was the combined static plus gauge pressure approximately:

one-third of the overburden pressure for the first test? X Reading 15.26 psi

two-thirds of the overburden pressure for the second test? X Reading 30.52 psi

one-third of the overburden pressure for the third test? X Reading

Were any leaks observed? Yes, several tests aborted due to waterloss

Was the flow rate record in gpm at equal time intervals? Yes/Watercolumn

What were the time intervals? 1 minute

How long did each test last?
1. 15 minutes
2. 15 minutes
3. 15 minutes

Was the borehole reamed to a minimum four inch diameter for well installation? Yes

PACKER TEST AUDIT

Well Number: 8-87BR

Date: 5/18/87

Audit performed by: C. Sundblad

Geologist's name: Janell Bergman

Date drill was completed: 5/15/87

Was packer test equipment decontaminated? Yes

When? 5/15/87 Friday P.M. (afternoon)

Was it kept clean? Yes off ground

Any problems with caving? 77' (bridge?), reamed

Were the packers inflated to at least 70 psi above hydrostatic pressure? 80 psi

psi reading? 80 psi Hydrostatic reading? 83.43 ft

Was the overburden pressure calculated? Yes Estimate was 27.81

What was the water source? rig tank filled at Plant Site

Was the combined static plus gauge pressure approximately:

one-third of the overburden pressure for the first test? _____ Reading 0 psi

two-thirds of the overburden pressure for the second test? ___ Reading 17.56

one-third of the overburden pressure for the third test? _____ Reading

Were any leaks observed? No packer leaks or seal problems

Was the flow rate record in gpm at equal time intervals? Yes - 1 min/15 min

What were the time intervals? 1 min/15 min

How long did each test last? 1. 15 min Total tests
2. 15 min (3 good)
3. 15 min 12 15 min test

Was the borehole reamed to a minimum four inch diameter for well installation? No - 4" hole (OD coring bit = 4")

APPENDIX G-1

ATTACHMENT 4
WELL INSTALLATION AUDITS

WELL INSTALLATION AUDIT

Well Number: 1-87
Date: 5/8/87
Audit Performed by: B.R. Lewis

Geologist's Name: Suzanne Paschke

How far into the bedrock does the borehole extend? 3'

What was used to backfill any excess depth? Bentonite

How long was the bentonite allowed to swell? N/A

Was water added? N/A How much? N/A

How long was it allowed to swell or set? N/A

What was the source of water? N/A

If grout was used, how long was it allowed to set? N/A

Was the borehole remeasured to determine the new depth? Yes

Was the well design approved by the site manager? Yes

Is the completion depth greater than one foot into bedrock? No

Does the screened interval extend 2 to 5 feet above the water table? See comments in problems section

Is the screened bedrock interval in a saturated sandstone? N/A

Is it at least five feet long? N/A

Does the sand pack design extend no more than 2 feet above the screen? Yes

Is 10-slot screen being used? Yes

Is 32-42 sand being used? Yes

Was the casing strip (cap included) measured to the nearest 1/100th ft. before being placed into the borehole? Yes

When was the well construction material decontaminated? Yes

How was it decontaminated? Steam cleaned, alconox wash, DI rinse

Is care taken to keep this material clean? Yes

Once the casing is in the borehole, was the amount of stick-up determined?
Yes

Does the casing's position agree with the well design? Yes

Were total volumes of construction material calculated? Yes

Is care taken to prevent materials from bridging? Yes

Is the filter pack evenly distributed by shaking the casing? Yes

Are frequent depth measurements taken to assure the location of pack material? Yes

Is the bentonite seal greater than one foot? 1.0 F+ from 3' - 2' below surface

Was water added to the bentonite? Yes

How much? 1.0 gal How long was it allowed to swell? 5 min for top seal 10 min for bottom seal

What was the source of water? N/A

Were the total volume of construction material used recorded? Yes

Were the internal depths recorded? Yes

Was the well construction summary sheet adequately filled out? Only in log book

Is the grout mixture 6 to 9 gallons of water per 94-lb bag of Type I or II Portland cement? Yes

Was the grout pumped or poured? Poured

Was stick-up remeasured once well was completed? Yes

Does the protective casing have an identification number? No

Is there a seven-inch clearance between the inner casing and the locking device? Yes, too much clearance

Note any problems encountered: During drilling the Qrf seemed damp, but the highly weathered bedrock was more moist. Another well may be put in here at a later date to see if ground water could be flowing thru the weathered bedrock. No static water level was found.

WELL INSTALLATION AUDIT

Well Number: 2-87 (BH3)

Date: 5/20/87

Audit Performed by: C. Sundblad

Geologist's name: Karen Holliway

When was the well construction material decontaminated? Yes

How was it decontaminated? Alconox wash, steam rinse

Is care taken to keep this material clean? Yes - on racks

How far into bedrock does the borehole extend? 16' TD

What was used to backfill any excess depth? Bentonite

If grout was used how long was it allowed to set? N/A

Was the borehole remeasured to determine the new depth? Yes

Was the well design approved by the site manager? Yes

It the completion depth greater than one foot into bedrock? Yes, Contact = 8.5'

Does the screened interval extend two to five feet above the water table? Yes

Does the sand pack design extend no more than two feet above the screen? Yes 2'

Is 10-slot screen being used? Yes

Is 32-42 sand being used? Yes

Was the casing string (cap included) measured to the nearest 1/100th ft. before being placed into the borehole? Yes

Once the casing is in the borehole, was the amount of stick up determined? Yes

Does the casing's position agree with the well design? Yes

Were total volumes of construction material calculated? Yes

Is care taken to prevent materials from bridging? Yes- slowly added sand

Is the filter pack evenly distributed by shaking the casing? Yes

Does the casing's position agree with the well design? Within 0,22'

Were total volumes of construction material calculated? Yes

Is care taken to prevent materials from bridging? Yes, measurements taken

Is the filter pack evenly distributed by shaking the casing? Yes

Are frequent depth measurements taken to assure the location of pack material? Yes

Is the bentonite seal greater than one foot? No 0.5'

Was water added to the bentonite? Not recorded

How much? N/A How long was it allowed to swell? N/A

What was the source of water? N/A

Were the total volume of construction material used recorded? Yes

Were the internal depths recorded? Yes

Was the well construction summary sheet adequately filled out? Log books

Is the grout mixture 6 to 9 gallons of water per 94-lb bag of Type I or II Portland cement? Yes

Was the grout pumped or poured? Poured

Was stick-up remeasured once well was completed? Yes

Does the protective casing have an identification number? Not recorded

Is there a seven inch clearance between the inner casing and the locking device? Not recorded

Note any problems encountered: _____

WELL INSTALLATION AUDIT

Well Number: 3-87 (BR)
Date: 6/14/87
Audit Performed by: C. Sundblad

Geologist's name: J. Bergman

How far into bedrock does the borehole extend? 117.'0

What was used to backfill any excess depth? 3/8" Bentonite pellets

How long was the bentonite allowed to swell? Overnight

Was water added? No How much? N/A

How long was it allowed to swell or set? Overnight

What was the source of water? rig (raw water from plantsite)

If grout was used how long was it allowed to set? N/A

Was the borehole remeasured to determine the new depth? Yes - 108'

Was the well design approved by the site manager? Yes

Is the completion depth greater than one foot into bedrock? N/A

Does the screened alluvial interval extend two to five feet above the water table? N/A

Is the screened bedrock interval in a saturated sandstone? Yes (Wet)

Is it at least five feet long? Yes - 6'

Does the sand pack design extend no more than two feet above the screen? 0.5'

Is 10-slot screen being used? Yes

Is 32-42 sand being used? Yes

Was the casing string (cap included) measured to the nearest 1/100th ft. before being placed into the borehole? Yes

When was the well construction material decontaminated? Prior to installation

How was it decontaminated? Alconox and rinse

Is care taken to keep this material clean? on racks, off ground

Once the casing is in the borehole, was the amount of stick up determined? Yes

Does the casing's position agree with the well design? Yes

Were total volumes of construction material calculated? Yes

Is care taken to prevent materials from bridging? Yes

Is the filter pack evenly distributed by shaking the casing? Yes

Are frequent depth measurements taken to assure the location of pack material? Yes

Is the bentonite seal greater than one foot? 3'

Was water added to the bentonite? Not noted

How much? N/A How long was it allowed to swell? N/A

What was the source of water? N/A

Were the total volume of construction material used recorded? Yes

Were the internal depths recorded? Yes

Was the well construction summary sheet adequately filled out? Yes

Is the grout mixture 6 to 9 gallons of water per 94-lb bag of Type I or II Portland cement? 7:1 Type I

Was the grout pumped or poured? Poured

Was stick-up remeasured once well was completed? Yes

Does the protective casing have an identification number? _____

Is there a seven inch clearance between the inner casing and the locking device? Yes

Note any problems encountered: _____

WELL INSTALLATION AUDIT

Well Number: 4-87

Date: 5-12-87

Audit Performed by: Brent Lewis

Geologist's name: Karen Holliway

How far into bedrock does the borehole extend? 23.4=TD 21.91=TD after sluff

What was used to backfill any excess depth? stuffed some to 21'

How long was the bentonite allowed to swell? _____

Was water added? None How much? water table is high

How long was it allowed to swell or set? 15 - 20 min.

What was the source of water? 664 fire hydrant

If grout was used how long was it allowed to set? _____

Was the borehole remeasured to determine the new depth? Yes

Was the well design approved by the site manager? Yes

Is the completion depth greater than one foot into bedrock? No

Does the screened alluvial interval extend two to five feet above the water table? Due to high WT season, 1.5' screen above WT is sufficient

Is the screened bedrock interval in a saturated sandstone? N/A

Is it at least five feet long? N/A

Does the sand pack design extend no more than two feet above the screen? Yes

Is 10-slot screen being used? Yes

Is 32-42 sand being used? Yes

Was the casing string (cap included) measured to the nearest 1/100th ft. before being placed into the borehole? Yes

When was the well construction material decontaminated? Prior to installation

How was it decontaminated? Steam clean, Alconox scrub & steam clean

Is care taken to keep this material clean? Yes

Once the casing is in the borehole, was the amount of stick up determined? Yes

Does the casing's position agree with the well design? Yes

Were total volumes of construction material calculated? Yes

Is care taken to prevent materials from bridging? Yes

Is the filter pack evenly distributed by shaking the casing? Yes

Are frequent depth measurements taken to assure the location of pack material? Yes

Is the bentonite seal greater than one foot? 1.1'

Was water added to the bentonite? Yes

How much? 1¼ gal How long was it allowed to swell? 10 min

What was the source of water? 664

Were the total volume of construction material used recorded? Yes

Were the internal depths recorded? Yes

Was the well construction summary sheet adequately filled out? None used

Is the grout mixture 6 to 9 gallons of water per 94-lb bag of Type I or II Portland cement? 6 gal/2 bags - 47 lbs/bag

Was the grout pumped or poured? Poured

Was stick-up remeasured once well was completed?

Does the protective casing have an identification number? ID# done later when pad is poured

Is there a seven inch clearance between the inner casing and the locking device?

Note any problems encountered: Driller (Alan) has grease on tyvex. He is careful with gloves, changed gloves but not tyvek. Was asked to change tyvek. Decontamination of stainless steel casing occurred again after the casing string was pulled, to wash off the bentonite mud.

WELL INSTALLATION AUDIT

Well Number: 5-87 BR

Date: 5/29/87

Audit Performed by: C. Sunblad

Geologist's name: Janell Bergman

When was the well construction material decontaminated? Yes

How was it decontaminated? Alconox wash, steam rinse

Is care taken to keep this material clean? Yes

How far into bedrock does the borehole extend? 61.7' T.D

What was used to backfill any excess depth? Yes 4.5'

If grout was used how long was it allowed to set? NA

Was the borehole remeasured to determine the new depth? Yes

Was the well design approved by the site manager? Yes

It the completion depth greater than one foot into bedrock? Yes

Does the screened interval extend two to five feet above the water table? NA

Does the sand pack design extend no more than two feet above the screen? Yes

Is 10-slot screen being used? Yes

Is 32-42 sand being used? Yes

Was the casing string (cap included) measured to the nearest 1/100th ft. before being placed into the borehole? Yes

Once the casing is in the borehole, was the amount of stick up determined? Yes

Does the casing's position agree with the well design? Yes

Were total volumes of construction material calculated? Yes

Is care taken to prevent materials from bridging? Yes

Is the filter pack evenly distributed by shaking the casing? Yes

Are frequent depth measurements taken to assure the location of pack material? Yes

Is the bentonite seal grater than one foot? Yes

Was the volume used recorded? Yes

Were the depths recorded? Yes

Was water added to the bentonite? No - not recorded

How much? _____ How long was it allowed to swell? _____

What was the source of water? NA

Was the well construction summary sheet adequately filled out? Yes

Is the grout mixture 6 to 9 gallons of water per 94-lb bag of Type I or II Portland cement? Yes

Was the grout pumped or poured? Pumped

Was stick-up remeasured once well was completed? Yes

Does the protective casing have an identification number? Yes

Is there a seven inch clearance between the inner casing and the locking device? Yes

Note any problems encountered: _____

WELL INSTALLATION AUDIT

Well Number: 6-87 (6-87A was abandoned)

Date: 5/14/87

Audit Performed by: C. Sundblad

Geologist's name: Karen Holliway

How far into bedrock does the borehole extend? 15½' (BH) Well TD = 7'

What was used to backfill any excess depth? Bentonite (3 3/4 buckets)

How long was the bentonite allowed to swell? 20 minutes

Was water added? Yes How much? 7 gal

How long was it allowed to swell or set? _____

What was the source of water? Drill rig tank filled on plantsite at fire hydrant

If grout was used how long was it allowed to set? _____

Was the borehole remeasured to determine the new depth? Yes

Was the well design approved by the site manager? Yes

Is the completion depth greater than one foot into bedrock? No (X 1/2')

Does the screened alluvial interval extend two to five feet above the water table? Yes

Is the screened bedrock interval in a saturated sandstone? N/A

Is it at least five feet long? N/A

Does the sand pack design extend no more than two feet above the screen? Yes

Is 10-slot screen being used? Yes

Is 32-42 sand being used? Yes

Was the casing string (cap included) measured to the nearest 1/100th ft. before being placed into the borehole? Yes

When was the well construction material decontaminated? Prior to installation

How was it decontaminated? Steam clean and Alconox (detergent)

Is care taken to keep this material clean? Yes - off ground

Once the casing is in the borehole, was the amount of stick up determined? Yes

Does the casing's position agree with the well design? Yes

Were total volumes of construction material calculated? Bentonite + H20 Yes

Is care taken to prevent materials from bridging? Yes

Is the filter pack evenly distributed by shaking the casing? Yes

Are frequent depth measurements taken to assure the location of pack material? Yes

Is the bentonite seal greater than one foot? Yes 13'

Was water added to the bentonite? Yes

How much? 1 gal How long was it allowed to swell? 20 min

What was the source of water? drill tank

Were the total volume of construction material used recorded? yes

Were the internal depths recorded?

Was the well construction summary sheet adequately filled out? N/A

Is the grout mixture 6 to 9 gallons of water per 94-lb bag of Type I or II Portland cement? 6 gal to 94 lb = good cement/used 1 bag + 3 gal H20

Was the grout pumped or poured? Poured

Was stick-up remeasured once well was completed? Yes

Does the protective casing have an identification number?

Is there a seven inch clearance between the inner casing and the locking device? Yes

Note any problems encountered: Oil leak from bearings on soil around borehole.

Kept drill cuttings shoveled away from borehole. Covered ss casing with plastic sheet to prevent contamination as rig was moved away from borehole.

WELL INSTALLATION AUDIT

Well Number: 8-87 BR

Date: 6/5/87

Audit Performed by: C. Sunblad

Geologist's name: Janell Bergman

When was the well construction material decontaminated? Prior to installation

How was it decontaminated? Alconox wash and steam rinse

Is care taken to keep this material clean? Yes - on rack

How far into bedrock does the borehole extend? 95.53 T.D.

What was used to backfill any excess depth? Yes ≈ 6' to 89.34'

If grout was used how long was it allowed to set? NA

Was the borehole remeasured to determine the new depth? Yes

Was the well design approved by the site manager? Yes

It the completion depth greater than one foot into bedrock? Yes

Does the screened interval extend two to five feet above the water table? NA

Does the sand pack design extend no more than two feet above the screen? Yes

Is 10-slot screen being used? Yes

Is 32-42 sand being used? Yes

Was the casing string (cap included) measured to the nearest 1/100th ft. before being placed into the borehole? Yes

Once the casing is in the borehole, was the amount of stick up determined? Yes

Does the casing's position agree with the well design? Yes

Were total volumes of construction material calculated? Yes

Is care taken to prevent materials from bridging? Yes

Is the filter pack evenly distributed by shaking the casing? Yes

Are frequent depth measurements taken to assure the location of pack material? Yes

Is the bentonite seal grater than one foot? Yes - 3 Ft.

Was the volume used recorded? Yes

Were the depths recorded? Yes

Was water added to the bentonite? Yes

How much? 1 Gal How long was it allowed to swell? Overnight

What was the source of water? Rig

Was the well construction summary sheet adequately filled out? Yes

Is the grout mixture 6 to 9 gallons of water per 94-lb bag of Type I or II Portland cement? Yes

Was the grout pumped or poured? Poured

Was stick-up remeasured once well was completed? Yes

Does the protective casing have an identification number? Yes

Is there a seven inch clearance between the inner casing and the locking device? Yes

Note any problems encountered:

WELL INSTALLATION AUDIT

Well Number: 44-87
Date: October 9,1987 Field Audit (Assumed from date)
Audit Performed by: C. Sundblad (Rockwell)

Geologist's Name: J. Bannon (WESTON)

How far into the bedrock does the borehole extend? TD=7'

What was used to backfill any excess depth? 3/8" volclay bentonite pellets

How long was the bentonite allowed to swell? 15 min

Was water added? Yes How much?

How long was it allowed to swell or set?

What was the source of water? Plant site - water

If grout was used, how long was it allowed to set? NA

Was the borehole remeasured to determine the new depth? Yes

Was the well design approved by the site manager? Yes

Is the completion depth greater than one foot into bedrock? No

Does the screened interval extend 2 to 5 feet above the water table? Dry well screened 1.25' - 3.95'

Is the screened bedrock interval in a saturated sandstone? No

Is it at least five feet long? No

Does the sand pack design extend no more than 2 feet above the screen? Yes

Is 10-slot screen being used? Yes

Is 32-42 sand being used? Yes

Was the casing strip (cap included) measured to the nearest 1/100th ft. before being placed into the borehole? Yes

When was the well construction material decontaminated? Prior to installation

How was it decontaminated? Steam rinse

Is care taken to keep this material clean? Yes

Once the casing is in the borehole, was the amount of stick-up determined? Yes

Does the casing's position agree with the well design? Yes

Were total volumes of construction material calculated? Yes

Is care taken to prevent materials from bridging? Yes

Is the filter pack evenly distributed by shaking the casing? Yes

Are frequent depth measurements taken to assure the location of pack material?
Yes

Is the bentonite seal greater than one foot? No- 0.25' of bentonite

Was water added to the bentonite? Yes

How much? 1/4 gal How long was it allowed to swell? 15 min

What was the source of water? Plant site - Raw water

Were the total volume of construction material used recorded? Yes

Were the internal depths recorded? Yes

Was the well construction summary sheet adequately filled out? Yes

Is the grout mixture 6 to 9 gallons of water per 94-lb bag of Type I or II Portland cement? Yes

Was the grout pumped or poured? Poured

Was stick-up remeasured once well was completed? Yes

Does the protective casing have an identification number? Yes

Is there a seven-inch clearance between the inner casing and the locking device? Yes
Yes

Note any problems encountered: Very shallow well. Bentonite from 3.95' to 7.0'; sand from 3.95' to 1.25'; screen w/cap from 1.5' to 3.7'; 0.25' bentonite and ~1' concrete to surface for surface seal. No waste hits encountered.

WELL INSTALLATION AUDIT

Well Number: 47-87
Date: October 1,1987 Field Audit (Assumed from date)
Audit Performed by: C. Sundblad (Rockwell)

Geologist's Name: J. Bannon (WESTON)

How far into the bedrock does the borehole extend? 15'

What was used to backfill any excess depth? 3/8" volclay bentonite pellets

How long was the bentonite allowed to swell? periodically ~every 5' for 10 min

Was water added? Yes How much? 2-3 gallons every 5'

How long was it allowed to swell or set? 10-15 min each time water added

What was the source of water? Plant site - raw water

If grout was used, how long was it allowed to set? NA

Was the borehole remeasured to determine the new depth? Yes

Was the well design approved by the site manager? Yes

Is the completion depth greater than one foot into bedrock? No -.25'

Does the screened interval extend 2 to 5 feet above the water table? NA dry well 3.5' - 7.5' screened

Is the screened bedrock interval in a saturated sandstone? NA

Is it at least five feet long? NA

Does the sand pack design extend no more than 2 feet above the screen? Yes

Is 10-slot screen being used? Yes

Is 32-42 sand being used? Yes

Was the casing strip (cap included) measured to the nearest 1/100th ft. before being placed into the borehole? Yes

When was the well construction material decontaminated? Prior to installation

How was it decontaminated? Steam rinse

Is care taken to keep this material clean? Yes

Once the casing is in the borehole, was the amount of stick-up determined? Yes

Does the casing's position agree with the well design? Yes

Were total volumes of construction material calculated? Yes

Is care taken to prevent materials from bridging? Yes

Is the filter pack evenly distributed by shaking the casing? Yes

Are frequent depth measurements taken to assure the location of pack material?
Yes

Is the bentonite seal greater than one foot? No

Was water added to the bentonite? Yes

How much? 1/2 gal How long was it allowed to swell? 10 min

What was the source of water? Plant site - raw water

Were the total volume of construction material used recorded? Yes

Were the internal depths recorded? Yes

Was the well construction summary sheet adequately filled out? Yes

Is the grout mixture 6 to 9 gallons of water per 94-lb bag of Type I or II Portland cement? Yes

Was the grout pumped or poured? Poured

Was stick-up remeasured once well was completed? Yes

Does the protective casing have an identification number? Yes

Is there a seven-inch clearance between the inner casing and the locking device? Yes
Yes

Note any problems encountered:

WELL INSTALLATION AUDIT

Well Number: 48-87
Date: October 5,1987 Field Audit (Assumed from date)
Audit Performed by: C. Sundblad (Rockwell)

Geologist's Name: R. Treat (Chen)

How far into the bedrock does the borehole extend? 4.9'

What was used to backfill any excess depth? 3/8" volclay bentonite pellets

How long was the bentonite allowed to swell? 15 minutes ~every 5' for 10 min

Was water added? Yes How much?

How long was it allowed to swell or set?

What was the source of water? Plant site - raw water

If grout was used, how long was it allowed to set? NA

Was the borehole remeasured to determine the new depth? Yes

Was the well design approved by the site manager? Yes

Is the completion depth greater than one foot into bedrock? No

Does the screened interval extend 2 to 5 feet above the water table? NA dry well

Is the screened bedrock interval in a saturated sandstone? NA

Is it at least five feet long? NA

Does the sand pack design extend no more than 2 feet above the screen? Yes

Is 10-slot screen being used? Yes

Is 32-42 sand being used? Yes

Was the casing strip (cap included) measured to the nearest 1/100th ft. before being placed into the borehole? Yes

When was the well construction material decontaminated? Prior to installation

How was it decontaminated? Steam rinse

Is care taken to keep this material clean? Yes

Once the casing is in the borehole, was the amount of stick-up determined? Yes

Does the casing's position agree with the well design? Yes

Were total volumes of construction material calculated? Yes

Is care taken to prevent materials from bridging? Yes

Is the filter pack evenly distributed by shaking the casing? Yes

Are frequent depth measurements taken to assure the location of pack material? Yes

Is the bentonite seal greater than one foot? No - 1'

Was water added to the bentonite? Yes

How much? 1/2 gal How long was it allowed to swell? 10 min

What was the source of water? Plant site - raw water

Were the total volume of construction material used recorded? Yes

Were the internal depths recorded? Yes

Was the well construction summary sheet adequately filled out? _____

Is the grout mixture 6 to 9 gallons of water per 94-lb bag of Type I or II Portland cement? Yes

Was the grout pumped or poured? Poured

Was stick-up remeasured once well was completed? Yes

Does the protective casing have an identification number? Yes

Is there a seven-inch clearance between the inner casing and the locking device? Yes Yes

Note any problems encountered: _____

APPENDIX G-1

ATTACHMENT 5
FIELD SCREENING AND SAMPLING AUDITS

FIELD SCREENING & SAMPLING

2-87/BH3-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? No - clear glass jars were used (see Appendix C)

Is the jar capped, shaken and allowed to stand for 30 minutes? Yes

Is each jar labeled with date, time, borehole number, interval? Yes

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings?
Yes

Are designated samples placed in labeled jars and then place on ice in a cooler?
Yes

Is the chain of custody form properly filled out? Yes

FIELD SCREENING & SAMPLING

5-87BR

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? ___See note on drilling audit note___

Is the jar capped, shaken and allowed to stand for 30 minutes? _____

Is each jar labeled with date, time, borehole number, interval? _____

Are the screening instruments calibrated to a specific compound? _____

Are all readings recorded in the field notebook and the log of the borings?

_____

Are designated samples placed in labeled jars and then place on ice in a cooler?

_____

Is the chain of custody form properly filled out? _____

FIELD SCREENING & SAMPLING

6-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? None taken

Is the jar capped, shaken and allowed to stand for 30 minutes? N/A

Is each jar labeled with date, time, borehole number, interval? N/A

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings? Yes

Are designated samples placed in labeled jars and then place on ice in a cooler? N/A

Is the chain of custody form properly filled out? N/A

FIELD SCREENING & SAMPLING

6-87A

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? None taken

Is the jar capped, shaken and allowed to stand for 30 minutes? N/A

Is each jar labeled with date, time, borehole number, interval? N/A

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings? Yes

Are designated samples placed in labeled jars and then place on ice in a cooler? N/A

Is the chain of custody form properly filled out? _____

FIELD SCREENING & SAMPLING
7-87BRA

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? See note on drilling audit note area.

Is the jar capped, shaken and allowed to stand for 30 minutes? _____

Is each jar labeled with date, time, borehole number, interval? _____

Are the screening instruments calibrated to a specific compound? _____

Are all readings recorded in the field notebook and the log of the borings?

_____

Are designated samples placed in labeled jars and then place on ice in a cooler?

_____

Is the chain of custody form properly filled out? _____

FIELD SCREENING & SAMPLING

BH 5-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? Not _____

Is the jar capped, shaken and allowed to stand for 30 minutes? _____

Is each jar labeled with date, time, borehole number, interval? _____

Are the screening instruments calibrated to a specific compound? _____

Are all readings recorded in the field notebook and the log of the borings?

_____

Are designated samples placed in labeled jars and then place on ice in a cooler?

_____

Is the chain of custody form properly filled out? _____

FIELD SCREENING AND SAMPLING
BH6-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? Not recorded

Is the jar capped, shaken and allowed to stand for 30 minutes?

Is each jar labeled with date, time, borehole number, interval?

Are the screening instruments calibrated to a specific compound?

Are all readings recorded in the field notebook and the log of the borings?

Are designated samples placed in labeled jars and then placed on ice in a cooler?

Is the chain of custody form properly filled out?

FIELD SCREENING & SAMPLING

BH8-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? No - clear glass jars were used (see Appendix C)

Is the jar capped, shaken and allowed to stand for 30 minutes? Yes

Is each jar labeled with date, time, borehole number, interval? Yes

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings?
Yes

Are designated samples placed in labeled jars and then place on ice in a cooler?
Yes

Is the chain of custody form properly filled out? Yes

FIELD SCREENING & SAMPLING

BH 9-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? No- clear glass jars were used. See Appendix C.

Is the jar capped, shaken and allowed to stand for 30 minutes? Yes

Is each jar labeled with date, time, borehole number, interval? Yes

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings?
Yes

Are designated samples placed in labeled jars and then place on ice in a cooler?
Yes

Is the chain of custody form properly filled out? Yes

FIELD SCREENING AND SAMPLING
BH 10-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? No- clear glass jars were used. See Appendix C

Is the jar capped, shaken and allowed to stand for 30 minutes? Yes

Is each jar labeled with date, time, borehole number, interval? Yes

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings? Yes

Are designated samples placed in labeled jars and then placed on ice in a cooler? Yes

Is the chain of custody form properly filled out? Yes

FIELD SCREENING & SAMPLING

BH11-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? No - clear glass jars were used -(see Appendix C)

Is the jar capped, shaken and allowed to stand for 30 minutes? Yes

Is each jar labeled with date, time, borehole number, interval? Yes

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings? Yes

Are designated samples placed in labeled jars and then place on ice in a cooler? Yes

Is the chain of custody form properly filled out? Yes

FIELD SCREENING & SAMPLING

BH 12-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? Not noted in logbook

Is the jar capped, shaken and allowed to stand for 30 minutes? NA

Is each jar labeled with date, time, borehole number, interval? NA

Are the screening instruments calibrated to a specific compound? Not recorded

Are all readings recorded in the field notebook and the log of the borings? Not recorded

Are designated samples placed in labeled jars and then place on ice in a cooler? Yes

Is the chain of custody form properly filled out? Yes

FIELD SCREENING & SAMPLING

BH 13-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? No- clear glass jars were used. See Appendix C.

Is the jar capped, shaken and allowed to stand for 30 minutes? Yes

Is each jar labeled with date, time, borehole number, interval? Yes

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings?
Yes

Are designated samples placed in labeled jars and then place on ice in a cooler?
Yes

Is the chain of custody form properly filled out? Yes

FIELD SCREENING & SAMPLING

BH 13-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? No- clear glass jars were used. See Appendix C.

Is the jar capped, shaken and allowed to stand for 30 minutes? _____

Is each jar labeled with date, time, borehole number, interval? _____

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings?

_____

Are designated samples placed in labeled jars and then place on ice in a cooler?

_____

Is the chain of custody form properly filled out? _____

FIELD SCREENING & SAMPLING

BH 14-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? No- clear glass jars were used. See Appendix C.

Is the jar capped, shaken and allowed to stand for 30 minutes? _____

Is each jar labeled with date, time, borehole number, interval? _____

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings?

No

Are designated samples placed in labeled jars and then place on ice in a cooler?

As required

Is the chain of custody form properly filled out? As required

FIELD SCREENING & SAMPLING

BH 15-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? ~~No- clear glass jars were used. See Appendix C.~~

Is the jar capped, shaken and allowed to stand for 30 minutes? _____

Is each jar labeled with date, time, borehole number, interval? _____

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings? No

Are designated samples placed in labeled jars and then place on ice in a cooler? As required

Is the chain of custody form properly filled out? As required

FIELD SCREENING & SAMPLING

BH 16-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? No- clear glass jars were used. See Appendix C.

Is the jar capped, shaken and allowed to stand for 30 minutes? _____

Is each jar labeled with date, time, borehole number, interval? _____

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings?
No

Are designated samples placed in labeled jars and then place on ice in a cooler?
As required

Is the chain of custody form properly filled out? As required

FIELD SCREENING AND SAMPLING
BH17-87

Is 50 to 100 ml of soil being placed in 500 ml amber glass jars with equal amounts of deionized water? No - clear glass jars were used (see Appendix C)

Is the jar capped, shaken and allowed to stand for 30 minutes? Yes

Is each jar labeled with date, time, borehole number, interval? Yes

Are the screening instruments calibrated to a specific compound? Yes

Are all readings recorded in the field notebook and the log of the borings? Yes

Are designated samples placed in labeled jars and then placed on ice in a cooler? Yes

Is the chain of custody form properly filled out? Yes

APPENDIX G-2

GENERIC AUDIT FORMS

Field Audit

Project 881 Hillside

Site Manager

Site Location

Field Team Leader

Auditor C. Sunblad

Date 5/14/87

Audit Question	Yes	No	Comment/Documentation
1. Was a site-specific sampling and analytical plan followed?	X		
2. Was a field team leader appointed?	X		
3. Was the site health and safety coordinator present?	X		
4. Were field team members familiar with the sampling plan?	X		
5. Was a briefing held offsite, before any site work was begun, to acquaint personnel with sampling equipment and assign field responsibilities?	X		Improvements needed in coordination and communication
6. Was the daily briefing and safety check conducted?	X		
7. Was a completed "Site Personnel Protection and Safety Evaluation Form" read and signed by all visitors and personnel entering the site?		X	
8. Was a field notebook assigned to the field team leader?	X		
9. Were entries made in the field notebook?	X		
10. Were sampling stations located correctly?	X		Determined by soil-gas results and field survey.
11. Did the number and location of samples collected follow the site-specific sampling plan?	X		

Project _____ Site Manager _____

Site Location _____ Field Team Leader _____

Auditor C. Sunblad Date _____

Audit Question	Yes	No	Comment/Documentation
12. Were samples identified as described in the site-specific sampling plan?		X	Approved deviation
13. Were samples collected following procedures specified in the site-specific plan?		X	See # 12
14. Was a chain-of-custody form filled out for all samples collected? Were all sample transfers documented?	X		
15. Were samples preserved as specified in the site-specific sampling plan?	X		Where needed
16. Were the number, frequency, and type of samples (including blanks and duplicates) collected as described in the site-specific sampling plan?	X		
17. Were the number, frequency, and type of measurements and observations taken as specified in the site-specific sampling plan?	X		
18. Were blank and duplicate samples properly identified?	X		
19. Was a record maintained of calibration of field equipment?	X		
20. Was field equipment calibrated as required?	X		

Project _____ Site Manager _____

Site Location _____ Field Team Leader _____

Auditor C. Sunblad Date _____

Audit Question	Yes	No	Comment/Documentation
21. Have any procedures been revised?	X		See # 12
22. Are revisions to procedures adequately documented?	X		
23. Was the document log for chain-of-custody records and other sample traffic control forms maintained?			Uncertain at this point
24. Have any accountable documents been lost?		X	
25. Did drilling and well construction follow procedures outlined in the sampling plan?	X		
26. Were the activities being conducted compatible with the environmental conditions?	X		