

ER PROGRAM DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. 8909L819 Site Groundwater Monitoring
Laboratory Roy F. Weston - Lionville No. of Samples/Matrix 5/Water
SOW # 10/86 (Rev. 2/88) Reviewer Org. TechLaw, Inc.
Sample Numbers TB091889006, SW094006, SW094006D, SW094006FB, SW059006

Data Assessment Summary

	VOA	Comments
1. Holding Times	<u>A</u>	<u>Action Item 1; Comment 1</u>
2. GC/MS Tune/Instr. Perf.	<u>V</u>	<u></u>
3. Calibrations	<u>A</u>	<u>Action Items 2,3,4; Comments 2,3</u>
4. Blanks	<u>A</u>	<u>Action Items 5,6</u>
5. Surrogates	<u>A</u>	<u>Action Item 7</u>
6. Matrix Spike/Dup.	<u>X</u>	<u>Comment 4</u>
7. Other QC	<u>V</u>	<u></u>
8. Internal Standards	<u>V</u>	<u></u>
9. Compound Identification	<u>X</u>	<u>Comments 5,6,7</u>
10. System Performance	<u>X</u>	<u>Comment 8</u>
11. Overall Assessment	<u>A</u>	<u>Data acceptable with qualifications.</u>

V = Data had no problems.
A = Data acceptable but qualified due to problems.
R = Data rejected.
X = Problems, but do not affect data.

Data Quality: Data contained in this batch were reviewed and found to be acceptable with qualifications. Acceptable, qualified data may be used provided that individual values impacted by the "Action Items" listed below are appropriately flagged. (Refer to attached Results Summary Tables.)

REVIEWED FOR CLASSIFICATION/CONTROL

By [Signature]
Date 10/28/91

Action Items: 1) All non-detected results for aromatic compounds in the samples are estimated and undetected (UJ) because the holding time exceeded seven days.

2) 4-Methyl-2-pentanone's average RRF and RRF50s were less than 0.05 in all calibrations. Non-detected results for this compound are rejected (R) for all samples.

3) Acetone's %RSD exceeded 50% in the 9/10/89 initial calibration. The non-detected result in SW094006 is rejected (R) and the positive result in SW059006 is estimated (J). Other positive for results Acetone would have been estimated had blank contamination not been present. See Action Item 6.

4) 2-Hexanone had no RRF50 in the continuing calibration of 9/30/89, resulting in a %D of 100%. Non-detected results for 2-Hexanone are rejected (R) in all samples except SW059006.

5) Methylene Chloride's %D exceeded 25% in the 9/30/89 continuing calibration. The positive result for Methylene Chloride in TB091889006 would be estimated had blank criteria been met. See Action Item 6.

6) As a result of method blank contamination, positive results for Methylene Chloride in sample TB091889006, and Acetone in TB091889006, SW094006D, and SW094006FB are estimated and undetected according to the Functional Guidelines 10x rule.

7) Surrogate recovery was outside criteria in all samples except TB091889006, and their subsequent reanalyses. All results in these samples are estimated (J or UJ).

Comments: 1) Sample reanalysis grossly exceeded holding times and are therefore unusable.

2) Several other compounds did not meet %RSD or %D criteria in initial and continuing calibrations. None of these compounds were detected thus no action is necessary.

3) The RRF for 1,1-Dichloroethene was not listed on Form 7A for the 9/30/89 continuing calibration. The peak area was provided in the raw data, and the RRF was calculated and the %D adjusted accordingly.

4) No MS/MSD analysis was conducted with this data set. The Custody Transfer Record indicated that MS/MSD analysis was requested on sample SW094006. No action is necessary because results are not qualified solely on MS/MSD data.

5) Reference spectra provided for Acetone do not match the NBS standard.

Comments: (cont) 6) An apparent non-target compound appears in method blank 025 and several samples at retention time 14.5 minutes.

7) The mass spectra for Acetone and Carbon Disulfide in several samples indicated the presence of an unknown co-eluting compound.

8) Sample SW095006 was listed on the Custody Transfer Record for VOA analysis, however no data is present in this case.

Note: Data Summary Tables are attached.

Willis T Fee
Reviewer Signature

5/7/90
Date

SITE NAME: Groundwater Monitoring
CLP VOLATILE ORGANIC ANALYSIS: Low Water

ANALYTICAL RESULTS (ppb)

Sample Location	VBLK025	TS091888006	SW094006	SW094006D	SW094006FB	VBLK026	SW059006
Sample Number		9/18/89	9/18/89	9/18/89	9/18/89		9/18/89
Sampling Date		Trip Blank		Field Duplicate	Field Blank	Method Blank	
Remarks	Method Blank						
Volatiles							
Compound	CRQL ug/L (ppb)	DQ	DQ	DQ	DQ	DQ	DQ
Chloromethane	10	10 U V	10 U A	10 U A	10 U A	10 U A	10 U A
Bromomethane	10	10 U V	10 U A	10 U A	10 U A	10 U A	10 U A
Vinyl chloride	10	10 U V	10 U A	10 U A	10 U A	10 U A	10 U A
Chloroethane	10	10 U V	10 U A	10 U A	10 U A	10 U A	10 U A
Methylene chloride	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
Acetone	10	10 U A	10 U R	10 U A	10 U A	10 U A	21 J A
Carbon disulfide	5	1 J A	5 U A	2 J A	5 U A	5 U A	5 U A
1,1-Dichloroethene	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
1,1-Dichloroethane	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
1,2-Dichloroethene (Total)	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
Chloroform	5	5 U V	5 U A	5 U A	5 U A	5 U A	1 J A
1,2-Dichloroethane	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
2-Butanone	10	10 U V	10 U A	10 U A	10 U A	10 U A	10 U A
1,1,1-Trichloroethane	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
Carbon tetrachloride	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
Vinyl acetate	10	10 U V	10 U A	10 U A	10 U A	10 U A	10 U A
Bromodichloromethane	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
1,2-Dichloropropane	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
cis-1,3-Dichloropropene	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
Trichloroethene	5	5 U V	5 U A	5 U A	5 U A	5 U A	2 J A
Dibromochloromethane	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
1,1,2-Trichloroethane	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
Benzene	5	5 U A	5 U A	5 U A	5 U A	5 U A	5 U A
trans-1,3-Dichloropropene	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
Bromoform	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
4-Methyl-2-pentanone	10	10 U R	10 U R	10 U R	10 U R	10 U R	10 U R
2-Hexanone	10	10 U R	10 U R	10 U R	10 U R	10 U R	10 U R
Tetrachloroethene	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
1,1,2,2-Tetrachloroethane	5	5 U V	5 U A	5 U A	5 U A	5 U A	5 U A
Toluene	5	5 U A	5 U A	5 U A	5 U A	5 U A	5 U A
Chlorobenzene	5	5 U A	5 U A	5 U A	5 U A	5 U A	5 U A
Ethylbenzene	5	5 U A	5 U A	5 U A	5 U A	5 U A	5 U A
Styrene	5	5 U A	5 U A	5 U A	5 U A	5 U A	5 U A
Xylenes (Total)	5	5 U A	5 U A	5 U A	5 U A	5 U A	5 U A
Total Organic Concentration (ppb)		18	1	0	2	12	24

DQ Data Qualifier

V Valid
A Acceptable with qualifications
R Rejected

U Indicates the compound was not detected above the Required Quantitation Limit.

J Quantitation is approximate due to limitations identified during the quality control review.

E Exceeds calibration range, dilute & reanalyze.

CRQL Contract Required Quantitation Limit in Micrograms per Liter (ug/L), Parts per billion (ppb).

← COMMUNIT
Stockton
89094006

Custody Transfer Record/Lab Work Request

Client: Rockwell (Rocky Flats)
2029 33 04
Work Order: 2029 33 04
Date Rec'd: 9/21/89
Pete Bue 10/19/89
RFB Contact: James Bue
Client Contact/Phone: (303) 980-6800

WESTON Analytics Use Only

1 Samples Were: Skipped or Hand-Delivered
NOTES: Ambient or chilled

2 Received Broken/Leaking (Improperly Sealed) (N)
NOTES: Properly Preserved

3 Received Within Storing Times (N)
NOTES: Properly Preserved

4 Present on Outer Package (Y)
5 Unbroken on Outer Package (Y)
6 Present on Sample (Y)
7 Unbroken on Sample (Y)
NOTES: Present on Outer Package (Y), Unbroken on Outer Package (Y), Present on Sample (Y), Unbroken on Sample (Y)

8 Present Upon Receipt of Samples (Y)
9 Discrepancies Between Sample Labels and COC Record? (Y)
NOTES: Present Upon Receipt of Samples (Y), Discrepancies Between Sample Labels and COC Record? (Y)

Refrigerator#	#Type Container	Volume	Preservative	ANALYSES REQUESTED	Matrix	Date Collected	Item/Reason	Relinquished by	Received by	Date	Time
1	3	3									
2	4	4									
3	1-L	1-L									
4	1-L	1-L									
5	1-L	1-L									
6	1-L	1-L									
7	1-L	1-L									
8	1-L	1-L									
9	1-L	1-L									
10	1-L	1-L									
11	1-L	1-L									
12	1-L	1-L									
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98	1-L	1-L									
99	1-L	1-L									
100	1-L	1-L									

Special Instructions:
 1 - vos 2 - bna 3 - pest/pcb 4 - cyanide
 5 - filtered tcl metals Mo, Sr, Cs, Li, Sn
 6 - unfiltered tcl metals Mo, Sr, Cs, Li, Sn

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
100	James Bue	Francie MacDonald	9-17-89	1217					
101	James Bue	Francie MacDonald	9-17-89	1600					
102	James Bue	Francie MacDonald	9-20-89	9:30 AM					
103	James Bue	Francie MacDonald	9-20-89	1715					
104	James Bue	Francie MacDonald	10/1/89	1800					

SW094006 < 300 pCi/L } Per Francie MacDonald
 SW095006 < 400 pCi/L } on 9/20/89 JB

ER PROGRAM DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. 8909L819 Site Site Background Characterization
 Laboratory Roy F. Weston - Lionville No. of Samples/Matrix 8/Water
 SOW # 7/87 Reviewer Org. TechLaw, Inc.

Sample Numbers SW094006 (total), SW094006D (total), SW094006FB (total), SW095006 (total),
 SW094006 (soluble), SW094006D (soluble), SW094006FB (soluble), SW094006 (soluble)

Data Assessment Summary

	ICP	AA	Hg	CN	Comments
1. Holding Times	<u>V</u>	<u>V</u>	<u>A</u>	<u>A</u>	<u>Action Items 1-2</u>
2. Calibrations	<u>A</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>Action Items 3-9</u>
3. Blanks	<u>A</u>	<u>A</u>	<u>V</u>	<u>V</u>	<u>Action Items 10-17</u>
4. ICP Interference Check Sample	<u>A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>Action Items 18-22</u>
5. Lab Control Sample Results	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	
6. Duplicate Sample Results	<u>V</u>	<u>A</u>	<u>V</u>	<u>V</u>	<u>Action Item 25</u>
7. Matrix Spike Sample Results	<u>A</u>	<u>A</u>	<u>V</u>	<u>V</u>	<u>Action Items 23-24</u>
8. Method of Standard Addition	<u>N/A</u>	<u>V</u>	<u>N/A</u>	<u>N/A</u>	
9. Serial Dilution	<u>V</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	
10. Sample Verification	<u>V</u>	<u>X</u>	<u>V</u>	<u>V</u>	<u>Comments 1-3</u>
11. Other QC	<u>X</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>Comment 4</u> <u>Data valid, or</u> <u>acceptable</u> <u>with qualifications</u>
12. Overall Assessment	<u>A</u>	<u>A</u>	<u>A</u>	<u>A</u>	

V = Data had no problems.
 A = Data acceptable but qualified due to problems.
 R = Data rejected.
 X = Problems, but do not affect data.

N/A = Not applicable.

Data Quality: Data contained in this batch were reviewed and found to be valid, or acceptable with qualifications. Acceptable, qualified data may be used provided that individual values impacted by the "Action Items" listed below are appropriately flagged.

(Refer to attached Results Summary Tables).

- Action Items:** 1) All Mercury non-detects are estimated and undetected (UJ) because holding times were exceeded.
- 2) All Cyanide non-detects are estimated and undetected (UJ) because holding times were exceeded.
- 3) All Molybdenum, Lithium, Strontium, and Tin non-detects are estimated and undetected (UJ) because the CRDL check sample recovery criteria were not met.
- 4) The Copper values for SW094006 (total and soluble), SW094006D (total), SW095006 (total and soluble), and SW094006D (soluble) are estimated (J) because the CRDL check sample recovery criteria were not met.
- 5) The Beryllium values for SW094006 (total and soluble), SW094006D (total), SW095006 (total and soluble), and SW094006D (soluble) are estimated (J) because the CRDL check sample recovery criteria were not met.
- 6) The Cobalt values for SW094006 (total and soluble), SW094006D (total), and SW095006 (total and soluble) are estimated (J) because the CRDL check sample recovery criteria were not met.
- 7) The Manganese values for SW094006 (total and soluble), SW094006D (total and soluble), and SW095006 (total and soluble) are estimated (J) because the CRDL check sample recovery criteria were not met.
- 8) The Nickel values for SW094006D (total and soluble), SW095006 (total and soluble), and SW094006 (soluble) are estimated (J) because the CRDL check sample recovery criteria were not met.
- 9) All Zinc values except SW094006D (total) are estimated (J) because the CRDL check sample criteria were not met.
- 10) All Arsenic, Silver, and Thallium values are rejected (R) because of negative bias indicated in the blanks.
- 11) The Aluminum value for SW094006FB (soluble) is estimated and undetected (UJ) because Aluminum values >IDL were found in the blanks.
- 12) The Sodium non-detect for SW094006FB (total) is rejected (R) because of negative bias indicated in the blanks.
- 13) The Sodium value for SW094006FB (soluble) is estimated and undetected (UJ) because Sodium values >IDL were found in the blanks.
- 14) The Lead values for SW094006 (total), SW094006FB (total), and SW095006 (soluble) are estimated and undetected (UJ) because Lead values >IDL were found in the blanks.

- Action Items: (cont)**
- 15) All Lead values except SW094006 (total), SW094006FB (total), and SW095006 (soluble) are rejected (R) because of negative bias indicated in the blanks.
 - 16) The Selenium values for SW094006FB (total and soluble) are rejected (R) because of negative bias indicated in the blanks.
 - 17) The Selenium values for SW095006 (total and soluble), SW094006 (soluble), and SW095006 (soluble) are estimated and undetected (UJ) because Selenium values >IDL were found in the blanks.
 - 18) The Potassium non-detects for SW094006FB (total and soluble) are rejected (R) because of possible Calcium interference indicated in the ICP interference check sample.
 - 19) All Potassium values except SW094006FB (total and soluble) are estimated (J) because of possible Calcium interference indicated in the ICP interference check sample.
 - 20) All Sodium values except SW094006FB (total and soluble) are estimated (J) because of possible Calcium interference indicated in the ICP interference check sample.
 - 21) The Antimony values for SW094006 (total and soluble), SW094006D (total and soluble), and SW095006 (total) are estimated (J) because of possible Calcium interference indicated in the ICP interference check sample.
 - 22) The Zinc value for SW094006D (total) is estimated (J) because of possible Calcium interference indicated in the ICP interference check sample.
 - 23) All Strontium and Lithium values except SW094006FB (total and soluble) are estimated (J) because the pre-digestion matrix spike recovery criteria were not met.
 - 24) The Tin values for SW094006 (total) and SW094006D (total) are estimated (J) because the pre-digestion matrix spike recovery criteria were not met.
 - 25) The Selenium values for SW094006 (total) and SW094006D (total) are estimated (J) because the duplicate precision criteria were not met.

Comments: 1) The Selenium values for SW094006D (total and soluble), SW095006 (total), and SW094006 (soluble) were calculated incorrectly; the correct values appear in the Summary Table.

2) The Lead value for SW094006 (total) was calculated incorrectly; the correct value appears in the Summary Table.

3) The Lead values for SW094006D (total and soluble), SW095006 (total), SW094006 (soluble), and SW094006FB (soluble) were reported at the wrong IDL. The correct values appear in the Summary Table.

4) The IDL for Cesium is greater than the CRDL.

Note: Data Summary Tables are attached.


Reviewer Signature

3/21/90
Date

SITE NAME: Site Background Characterization

CLP WATER INORGANIC ANALYSIS: Low Water

ANALYTICAL RESULTS (ug/L)

Sample Location	SW094006	SW094006D	SW094006FB	SW094006	SW094006D	SW094006FB	SW094006	SW094006D	SW094006FB	SW095006
Sample Number	09/18/89	09/18/89	09/18/89	09/18/89	09/18/89	09/18/89	09/18/89	09/18/89	09/18/89	09/18/89
Sample Date										
Remarks	Total	Total	Total	Total	Total	Total	Total	Total	Total	Soluble
Inorganic Analyte	DL ug/L	DQ	DQ	DQ	DQ	DQ	DQ	DQ	DQ	DQ
Aluminum	200	278	V 184	V 16.9 U	V 183	V 165	V 176	V 34.6 UJ	A 160	V
Antimony	60	32.7 J	A 50.1 J	A 26.5 U	V 50.1 J	A 30.5 J	A 28.3 J	A 26.5 U	V 28.5 U	V
Arsenic	10	1.1 U	R 1.1 U	R 1.1 U	R 1.1 U	R 1.1 U	R 1.1 U	R 1.1 U	R 1.1 U	R
Barium	200	145	V 151	V 5.8 U	V 144	V 145	V 145	V 5.6 U	V 147	V
Beryllium	5	1.3 J	A 0.70 J	A 0.60 U	V 0.70 J	A 0.70 J	A 0.70 J	A 0.50 U	V 0.70 J	A
Cadmium	5	4.5 U	V 4.5 U	V 4.5 U	V 4.5 U	V 4.5 U	V 4.5 U	V 4.5 U	V 4.5 U	V
Calcium	6000	284000	V 278000	V 31.1 U	V 266000	V 267000	V 267000	V 91.1	V 271000	V
Cesium	1000	2600 U	V 2600 U	V 2600 U	V 2600 U	V 2600 U	V 2600 U	V 2600 U	V 2500 U	V
Chromium	Cr 10	5.9 U	V 5.3 U	V 5.3 U	V 5.3 U	V 5.3 U	V 5.3 U	V 5.3 U	V 5.3 U	V
Cobalt	Co 50	5.0 J	A 6.5 J	A 4.2 U	V 5.4 J	A 5.0 J	A 4.2 U	V 4.2 U	V 5.4 J	A
Copper	Cu 25	21.7 J	A 13.5 J	A 9.9 U	V 13.2 J	A 15.3 J	A 12.7 J	A 5.9 U	V 14.0 J	A
Iron	Fe 100	96.2	V 98.6	V 75.9	V 85.8	V 67.5	V 83.2	V 28.5	V 71.5	V
Lead	Pb 5	6.0 UJ	A 0.60 U	R 1.8 UJ	A 0.50 U	R 0.50 U	R 0.50 U	R 0.50 U	R 0.70 UJ	A
Lithium	Li 100	320 J	A 336 J	A 100 UJ	A 323 J	A 328 J	A 322 J	A 100 UJ	A 342 J	A
Magnesium	Mg 5000	69300	V 71500	V 29.5 U	V 68100	V 69500	V 69500	V 29.5 U	V 69900	V
Manganese	Mn 15	16.8 J	A 13.7 J	A 1.2 U	V 13.2 J	A 11.9 J	A 12.4 J	A 1.2 U	V 11.9 J	A
Mercury	Hg 0.2	0.20 UJ	A 0.20 UJ	A 0.20 UJ	A 0.20 UJ	A 0.20 UJ	A 0.20 UJ	A 0.20 UJ	A 0.20 UJ	A
Molybdenum	Mo 200	100 UJ	A 100 UJ	A 100 UJ	A 100 UJ	A 100 UJ	A 100 UJ	A 100 UJ	A 100 UJ	A
Nickel	Ni 40	9.0 U	V 18.9 J	A 9.0 U	V 9.9 J	A 12.3 J	A 10.9 J	A 9.0 U	V 19.4 J	A
Potassium	K 5000	74100 J	A 75800 J	A 540 U	R 71400 J	A 72500 J	A 72100 J	R 540 U	R 73800 J	A
Selenium	Se 5	16.0 J	A 9.69 J	A 1.3 U	R 8.53 UJ	A 9.03 UJ	A 6.62 UJ	A 1.3 U	R 3.9 UJ	A
Silver	Ag 10	6.2 U	R 6.2 U	R 6.2 U	R 6.2 U	R 6.2 U	R 6.2 U	R 6.2 U	R 6.2 U	R
Sodium	Na 5000	387000 J	A 408000 J	A 32.9 U	R 388000 J	A 393000 J	A 393000 J	A 134 UJ	A 399000 J	A
Strontium	Sr 200	2080 J	A 2170 J	A 100 UJ	A 2080 J	A 2080 J	A 2080 J	A 100 UJ	A 2110 J	A
Thallium	Tl 10	1.9 U	R 1.9 U	R 1.9 U	R 1.9 U	R 1.9 U	R 1.9 U	R 1.9 U	R 1.9 U	R
Tin	Sn 200	112 J	A 100 J	A 100 UJ	A 100 UJ	A 100 UJ	A 100 UJ	A 100 UJ	A 100 UJ	A
Vanadium	V 50	8.1 U	V 8.1 U	V 8.1 U	V 8.1 U	V 8.1 U	V 8.1 U	V 8.1 U	V 8.1 U	V
Zinc	Zn 20	35.7 J	A 62.6 J	A 23.0 J	A 44.1 J	A 34.5 J	A 51.8 J	A 12.7 J	A 35.7 J	A
Cyanide	10	10.0 UJ	A 10.0 UJ	A 10.0 UJ	A 10.0 UJ	A 10.0 UJ	A 10.0 UJ	A 10.0 UJ	A 10.0 UJ	A

E Estimated by the Laboratory
 U Indicates the compound was not detected above the instrument Quantitation Limit
 J Quantitation is approximate due to limitations identified during the quality control review
 DL Detection Limit in Micrograms per Liter (ug/L)
 N/R Not reported

DQ Data Qualifier
 V Valid
 A Acceptable with qualifications
 R Rejected

L819L/eg04j

ER PROGRAM DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. 8909S051 Site Site Background Characterization
 Laboratory Accu-Labs Research No. of Samples/Matrix 7/Water, 15/Soil
 Method Standard Methods Reviewer Org. TechLaw, Inc.

Sample Numbers GSEP29890989001, G20890989002, SW094006, SW094006D, SW094006FB, SW095006, SW059006, PZ61890003, PZ61890307, PZ61890710, PZ61891014, PZ61891619, PZ61891922, PZ61892226, PZ61892630, PZ61893032, PZ61890307D, PZ62890003, PZ62890306, PZ62890610, PZ62891012, PZ62891012D

Data Assessment Summary

	Oil/ Grease	Alkalinity	Chloride	Nitrate/ Nitrite	Sulfide/ Sulfate	Gravimetric	Comments
1. Holding Times	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>A</u>	<u>Action Item 1</u>
2. Calibrations	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	
3. Blanks	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>A</u>	<u>V</u>	<u>Action Item 2</u>
4. Lab Control Sample Results	<u>N/A</u>	<u>V</u>	<u>N/A</u>	<u>X</u>	<u>N/A</u>	<u>V</u>	<u>Comment 1</u>
5. Duplicate Sample Results	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	
6. Matrix Spike Sample Results	<u>V</u>	<u>N/A</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>N/A</u>	
7. Sample Verification	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	
8. Other QC	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	
9. Overall Assessment	<u>V</u>	<u>V</u>	<u>V</u>	<u>V</u>	<u>A</u>	<u>A</u>	<u>Data valid, or acceptable with qualifications</u>

V = Data had no problems.

A = Data acceptable but qualified due to problems.

R = Data rejected.

X = Problems, but do not affect data.

N/A = Not applicable.

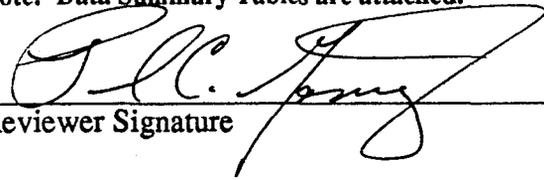
Data Quality: Data contained in this batch were reviewed and found to be valid, or acceptable with qualifications. Acceptable, qualified data may be used provided that individual values impacted by the "Action Items" listed below are appropriately flagged. (Refer to attached Results Summary Tables).

Action Items: 1) All TDS and TSS values are estimated (J) and non-detects are estimated and undetected (UJ) because holding times were exceeded.

2) The aqueous Sulfate values for SW094006, SW094006D, and SW059006 are estimated (J) because there was no evidence of a blank analyzed after the run.

Comments: 1) Laboratory control samples were not included in the soil Nitrate/Nitrite analysis.

Note: Data Summary Tables are attached.



Reviewer Signature

03/02/90
Date

WWW.P091889003

ACCULARS

Custody Transfer Record/Lab Work Request



WESTON Analyticals Use Only

Client Rockwell (Rocky Flato)
 2029 33 04
 Work Order _____
 Date Rec'd. Jan 11 2008
 RFW Contact 1000 000 0000
 Client Contact/Phone _____

WA Use Only Lab ID	Client ID/Description	Matrix	Date Collected	Refrigerator #	#/Type Container	Volume	Preservative	ANALYSES REQUESTED
3	SW0944006	W	7/18/09	1081	1-L	250	H2O2	2-7
4	SW0944006 D	W						
5	SW0944006 FB	W						
6	SW0950006	W						
7	SW0590006	W						

Special Instructions:

- 1 - pH
- 2 - HCO3
- 3 - SO4
- 4 - TOC
- 5 - COD
- 6 - Cl
- 7 - TSS
- 8 - NO3 as N
- 9 - Oil and Grease
- 10 - sulfide

Matrix: W - Water DS - Drum Solids X - Other
 O - Oil DL - Drum Liquids
 S - Soil A - Air F - Fish
 SE - Sediment WI - Wipe L - EP/TCLP Leachate
 SO - Solid

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
	<u>F. M. ...</u>	<u>F. M. ...</u>	<u>9-18-08</u>	<u>12:15</u>					
	<u>F. M. ...</u>	<u>F. M. ...</u>	<u>9-18-08</u>	<u>12:05</u>					

WESTON Analyticals Use Only

Samples Were: 1 Shipped or Hand-Delivered (Delivered) NOTES:

2 Ambient or Chilled NOTES:

3 Received Broken/Leaking (Improperly Sealed) Y (N) NOTES:

4 Properly Preserved Y (N) NOTES:

5 Received Within Holding Times Y (N) NOTES:

COC Tape Was: 1 Present on Outer Package Y (N) 2 Unbroken on Outer Package Y (N) 3 Present on Sample Y (N) 4 Unbroken on Sample Y (N) NOTES:

COC Record Was: 1 Present Upon Receipt of Samples Y (N) Discrepancies Between Sample Labels and COC Record? Y (N) NOTES:

ER PROGRAM DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. 8909S019 Site Groundwater Monitoring
 Laboratory TMA/Norcal No. of Samples/Matrix 23/Water
 Reviewer Org. TechLaw, Inc.

Sample Numbers SW006006, SW006006D, SW006006FB, SW005006, SW087006, SW088006, SW105006, SW085006, SW101006, SW056006, SW084006, SW086006, SW094006, SW094006D, SW094006FB, SW095006, SW059006, SW026006, SW027006, SW062006, SW028006, G32890989002, GSEP08890989001

Data Assessment Summary

Radiometric Analysis
by Gas Proportional Counters
Includes: Total Sr, Total Cs, Ra²²⁸

	Sr	Cs	Ra ²²⁸	Comments
1. Holding Times	<u>V</u>	<u>V</u>	<u>N/A</u>	
2. Initial Calibrations	<u>V</u>	<u>V</u>	<u>N/A</u>	<u>See Comment 1</u>
3. Continuing Calibrations	<u>R</u>	<u>R</u>	<u>N/A</u>	<u>See Action Item 1</u>
4. Blanks	<u>R</u>	<u>V</u>	<u>N/A</u>	<u>See Action Item 2</u>
5. Lab Replicates	<u>X</u>	<u>X</u>	<u>N/A</u>	<u>See Action Item 3</u>
6. Lab Control Samples	<u>V</u>	<u>V</u>	<u>N/A</u>	
7. Self Absorption-Recovery Factors	<u>V</u>	<u>V</u>	<u>N/A</u>	<u>See Action Item 4</u>
8. Sample Calculations	<u>V</u>	<u>V</u>	<u>N/A</u>	
9. Overall Assessment	<u>R</u>	<u>R</u>	<u>N/A</u>	

V = Data had no problems. N/A = Not Applied.
 A = Data acceptable but qualified due to problems.
 R = Data rejected.
 X = Problems, but do not affect data.

Data Quality: Data contained in this batch were reviewed and found to be rejected. See Action Items and Comments listed below for discussion. (Refer to attached Results Summary Tables.)

Action Items: 1) Continuing Calibrations: The Low Beta Geiger-Mueller (LBG) counters used to count the total strontium and total cesium samples were last calibrated in 1965 and 1966. No self-absorption curves have been generated for these systems since the initial calibrations were performed. The results were flagged R (rejected).

2) Blanks: The chemical recovery for the strontium blank was 50%. The results of the strontium batch were flagged R (rejected).

3) Lab Replicates: Lab replicates were not run with this batch. The results were flagged X (problems, but do not affect data.)

4) Self Absorption-Recovery Factors: The chemical recovery for five total strontium samples was less than 50%. The samples affected with respective percent chemical recovery were: SW094006FB, 27%; SW027006, 21%; SW062006, 42%, SW028006, 23%; G32890989002, 37%. The results for these samples were flagged R (rejected). The chemical recovery for three total strontium samples was 50%. The samples affected were SW006006, SW105006, and SW095006. The results for these samples were flagged A (acceptable). The chemical recovery for one total cesium sample was 29%. The result for this sample was flagged R (rejected). The chemical recovery for five total cesium samples was between 50 - 60 percent. The samples affected were SW094006, SW006006, SW00600FB, SW087006, and SW062006. The results for these samples were flagged A (acceptable).

Comments: 1) Initial Calibrations: Initial Calibrations were performed for Sr⁹⁰ and Cs¹³⁷ in 1965 and 1966 respectively. A written document was submitted describing the calibration procedure with the results of the calibration. A Cl³⁶ beta standard in the sample counting geometry is used to calculate a "Standard Factor", which is the ratio of the original count rate to the daily count rate. All sample data is corrected back to the original efficiency.

Note: Data Summary Tables are attached.

Marilyn Ayers
Reviewer Signature

May 11, 1990
Date

**RADIOCHEMICAL ANALYSIS
ANALYTICAL RESULTS (pCi/L)**

TABLE #: 8909S019
SITE NAME: Groundwater Monitoring

Sample Location	SW056006		SW084006		SW086006		SW094006		SW094006D		SW095006		SW099006		SW026006											
	Sample Number	Sample Date	Matrix	Val.	DQ	Val.	DQ	Val.	DQ	Val.	DQ	Val.	DQ	Val.	DQ	Val.	DQ									
Parameter																										
Gross Alpha	DL																									
Gross Beta	pCi/L																									
Total Strontium	2																									
Total Cesium	4																									
Radium 228	1	.1U	.1	R	0U	.2	R	0U	.1	R	0U	.1	R	.4U	.4	R	.1U	.1	R	.1U	.2	R	.5	2	R	
Tritium	1	2U	.1	R	.1U	.1	R	.1U	.1	R	.1U	.1	R	.1U	.1	R	.1U	.1	R	.1U	.1	R	.1U	.1	R	
Uranium 234 & 233	400																									
Uranium 235	0.6																									
Uranium 238	0.6																									
Plutonium 239 & 240	0.01																									
Americium 241 & 242	0.01																									
Radium 226	0.05																									
Gamma scan																										
Other Isotopes																										

U Indicates the parameter was not detected above the Instrument Quantitation Limit
 J Quantitation is approximate due to limitations identified during the quality control review
 * Value is rejected due to other contractual criteria examined during the quality control review
 ** Value is rejected due to blank contamination identified during the quality control review
 DL Detection Limit in PicoCuries per Liter (pCi/L)

DQ Data Qualifier
 V Valid
 A Acceptable with qualifications
 R Rejected

trf019L/rtk49

**RADIOCHEMICAL ANALYSIS
ANALYTICAL RESULTS (pCi/L)**

TABLE #: 8909S019
SITE NAME: Groundwater Monitoring

Sample Location	SW027006	SW062006	SW028006	G32890989002	GSEF08890989001	Reagent Blank				
Sample Number	9/15/89	9/15/89	9/15/89	9/15/89	9/15/89					
Sample Date	Water	Water	Water	Water	Water					
Matrix										
Parameter	DL	Val.	+/-	DQ	Val.	+/-	DQ	Val.	+/-	DQ
Gross Alpha	2									
Gross Beta	4									
Total Strontium	1	.1U	.5	R	.2U	.5	R	.1U	.2	R
Total Cesium	1	.2U	.2	R	-.1U	.1	R	.6U	.3	R
Radium 228	1									
Tritium	400									
Uranium 234 & 233	0.6									
Uranium 235	0.6									
Uranium 238	0.6									
Plutonium 239 & 240	0.01									
Americium 241 & 242	0.01									
Radium 226	0.05									
Gamma scan										
Other Isotopes										

U Indicates the parameter was not detected above the Instrument Quantitation Limit
 J Quantitation is approximate due to limitations identified during the quality control review
 * Value is rejected due to other contractual criteria examined during the quality control review
 ** Value is rejected due to blank contamination identified during the quality control review
 DL Detection Limit in PicoCuries per Liter (pCi/L)

DQ Data Qualifier
 V Valid
 A Acceptable with qualifications
 R Rejected
 tr019/rk49

**Radiochemical Data Completeness
Checklist for Radiometric Analyses
of Total Sr, Total Cs and Ra²²⁸
of Soil and Water**

- A. Yes Case Narrative
Yes Abnormalities explained
Yes Matrix Problems explained
Yes Instrument problems explained
Yes Improper collection, storage, preservation, container explained
Yes Hold times were met, explained if not met
- B. Yes Initial and Continuing Calibration Data Package
Yes ID of each detector
No Dates of last self-absorption curve for Sr, Cs and/or Actinium²²⁸
(or comparable beta energy nuclide like Sr⁸⁹) including: counter
printouts, reference material certificates, DPMs and carrier weights
added to the planchet, count duration, and calculations used to
determine the efficiency
No Dates of the last calibration using a check source including:
counter printouts, reference material certificates, DPMs
and count durations
Yes Dates of last background measurements including:
counter printouts, count durations, counts obtained
- C. Yes Blanks Data Package
Yes ID number of each detector blank is counted in
Yes Analyst initials
Yes Date, Times of counts
Yes Number and ID of samples included with the blank
Yes Type of method blank used, MDA of method
- D. Yes Replicate Sample Data Package
Yes Detector ID
Yes Analyst Initials
Yes Date, Time Analyzed
Yes Value obtained for sample, replicates, mean values
Yes Count Durations of samples and backgrounds
Yes Statistical Analysis of Range, Control Limits
- E. Yes Lab Control Samples Data Package
Yes Sample ID, Detector ID
Yes Analyst initials
Yes Values obtained, true value of sample
Yes Statistical Analysis of Results

- F. Yes Minimum Detectable Activity
Yes Background Measurements
Yes Detector ID
Yes Date and time of count, counting duration
Yes Mean background CPM over long period
Yes Calculated MDA for isotope of interest
- G. Yes Recovery Factors
Yes Amount of standardized Sr and Cs carrier added to each sample
N/A Information to monitor the chemical yield of Ac²²⁸
- H. Yes Sample Data Package
Yes Printed report of results for sample and reruns
Yes Computer calculations sheet including: Sample IDs, isotopes of interest, counts obtained for samples, background counts obtained, amount of carrier added, sample aliquot, weight counted, collection date, precipitation date for Sr, count date, count duration, background CPMs, detector efficiency, chemical recovery, Y-90 ingrowth factor for Sr, Ac²²⁸ ingrowth factors, and activities obtained for samples, uncertainties, and MDAs

ER PROGRAM DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. 8909S019 Site Groundwater Monitoring
 Laboratory TMA/Norcal No. of Samples/Matrix 23/Waters
 Reviewer Org. TechLaw, Inc.

Sample Numbers SW006006, SW006006D, SW006006FB, SW005006, SW087006, SW088006, SW105006, SW085006, SW101006, SW056006, SW084006, SW086006, SW094006, SW094006D, SW094006FB, SW095006, SW059006, SW026006, SW027006, SW062006, SW028006, G32890989002, GSEP08890989001

Data Assessment Summary

Gross $\alpha + \beta$ Analysis by Gas Proportional Counters		Comments
1. Holding Times	<u>V</u>	
2. Initial Calibrations	<u>R</u>	<u>See Action Item 1; Comment 1</u>
3. Continuing Calibrations	<u>V</u>	
4. Blanks	<u>A</u>	<u>See Action Item 2</u>
5. Lab Replicates	<u>X</u>	<u>See Action Item 3</u>
6. Lab Control Samples	<u>V</u>	
7. Size of Aliquot	<u>R</u>	<u>See Action Item 4</u>
8. Self Absorption-Recovery Factors	<u>V</u>	<u>See Comment 2</u>
9. Sample Calculations	<u>V</u>	<u>See Comments 4,5</u>
10. Overall Assessment	<u>R</u>	

V = Data had no problems.
 A = Data acceptable but qualified due to problems.
 R = Data rejected.
 X = Problems, but do not affect data.

Data Quality: Data contained in this batch were reviewed and found to be rejected. Refer to attached Action Items and Comment section for discussion.

Action Items: 1) Initial Calibrations: The data that has been submitted shows that the latest self-absorption curve was performed 4/14/82 for the Gross Alpha Counters (GAs) at Norcal. The samples for which the curve was intended to apply were analyzed approximately 8 years after the calibration was performed. Therefore the data was flagged R (rejected).

2) Blanks: The gross beta activities for SW006006FB and SW094006FB exceeded their respective Minimum Detectable Activities (MDAs); thus the results were flagged JA (estimated).

3) Lab Replicates: No lab replicates were run with this batch, however this does not affect the overall quality of the data; thus the results were flagged X.

4) Size of Aliquot: For all samples a 300 ml aliquot was taken. For samples SW087006, SW088006, SW105006, SW085006, SW056006, SW094006, SW094006D, SW095006, SW059006, and GSEP08890989001 this yielded total solid weights of 1034, 952.9, 4213, 308.6, 306.4, 1286, 1246, 1171, 280.3, and 613.5 mgs respectively. The weight in milligrams deposited on the planchet for these samples was 240.4, 226, 176.4, 96.39, 233.5, 249.2, 215.1, 272.7, 182.9, and 172.7 respectively. Thus, the aliquot in milliliters reported by the laboratory and used in the sample calculations were 69.7, 71.2, 12.6, 93.7, 229, 58, 52, 70, 196, and 84.4. These volumes were calculated by taking the ratio of sample weight counted to the total solid weight and multiplying by the 300 ml aliquot taken. Therefore, all results were flagged R (rejected).

Comments: 1) Initial Calibrations: Initial Calibrations were performed 4/14/82 for the Gross Alpha counters (GAs). Initial efficiencies versus weight data were supplied, however calibration count versus DPM data were not supplied. There was good agreement between the polynomial generated curve fit and the manual curve fit.

2) Self Absorption Factors: The Standard Factors used to calculate the efficiencies for the gross alpha analysis were determined from a daily count of Np^{237} standard plated on a 1" planchet. The Standard Factors are used to correct the counting efficiencies obtained today to 1982 counting efficiencies.

3) Minimum Detectable Activities (MDAs): The MDAs for SW087006, SW088006, SW105006, SW085006, SW056006, SW094006, SW094006D and SW095006 exceeded the Required Detection Limit (RDL) for the gross alpha analysis due to heavy dissolved solids in the sample matrices. The MDAs for SW087006, SW088006, SW105006, SW085006, SW094006, SW094006D SW095006, and GSEP08890989001 exceeded the RDL for the gross beta analysis due to heavy dissolved solids in the sample matrices.

Comments: (cont) 4) Sample Calculations: The MDAs, activities, and counting uncertainty calculations for the gross alpha and gross beta analyses include the use of Standard Factors.

5) The reported gross alpha activity and counting uncertainty values for samples SW087006, SW088006, SW105006, SW085006, SW094006D, SW094006FB, and SW095006 are weighted averages of repeated analyses of these samples.

Note: Data Summary Tables are attached.

David W. Moody
Reviewer Signature

5 / 21 / 90
Date

**RADIOCHEMICAL ANALYSIS
ANALYTICAL RESULTS (pCi/L)**

TABLE #: 8909S019

SITE NAME: Groundwater Monitoring

Sample Location	SW006006	SW006006D	SW006006FB	SW005006	SW067006	SW088006	SW105006	SW085006	SW101006	
Sample Number	9/5/89	9/5/89	9/5/89	9/5/89	9/13/89	9/13/89	9/13/89	9/13/89	9/14/89	
Sample Date	Water	Water	Water	Water	Water	Water	Water	Water	Water	
Matrix	DL	Val.	+/-	DQ	Val.	+/-	DQ	Val.	+/-	DQ
Gross Alpha	2	0 U	0 R	0 R	0 U	1 R	0 R	0 U	0 R	
Gross Beta	4	2 U	2 R	3 R	0 U	1 R	0 U	13 R	5 R	
Total Strontium	1							57 R	8 R	
Total Cesium	1									
Radium 228	1									
Tritium	400									
Uranium 234 & 233	0.6									
Uranium 235	0.6									
Uranium 238	0.6									
Plutonium 239 & 240	0.01									
Americium 241 & 242	0.01									
Radium 226	0.05									
Gamma scan										
Other Isotopes										

DQ Data Qualifier
V Valid
A Acceptable with qualifications
R Rejected
s018L/rk49

U Indicates the parameter was not detected above the Instrument Quantization Limit
J Quantitation is approximate due to limitations identified during the quality control review
• Value is rejected due to other contractual criteria examined during the quality control review
•• Value is rejected due to blank contamination identified during the quality control review
DL Detection Limit in PicoCuries per Liter (pCi/L)

**RADIOCHEMICAL ANALYSIS
ANALYTICAL RESULTS (pCi/L)**

TABLE #: 8909S019
SITE NAME: Groundwater Monitoring

Sample Location	SW056006		SW084006		SW086006		SW094006		SW094006D		SW095006		SW095006		SW026006	
	9/14/89	9/14/89	9/14/89	9/14/89	9/14/89	9/18/89	9/18/89	9/18/89	9/18/89	9/18/89	9/18/89	9/18/89	9/18/89	9/15/89	9/15/89	9/15/89
Matrix	Water		Water		Water		Water		Water		Water		Water		Water	
Parameter	DL	Val.	+/-	DQ	Val.	+/-	DQ	Val.	+/-	DQ	Val.	+/-	DQ	Val.	+/-	DQ
Gross Alpha	2	0 U	3	R	4	2	R	5	3	R	8	8	R	14	4	R
Gross Beta	4	10	3	R	19	3	R	18	3	R	133	17	R	134	16	R
Total Strontium	1															
Total Cesium	1															
Radium 228	1															
Tritium	400															
Uranium 234 & 233	0.6															
Uranium 235	0.6															
Uranium 238	0.6															
Plutonium 239 & 240	0.01															
Americium 241 & 242	0.01															
Radium 226	0.05															
Gamma scan																
Other isotopes																

U Indicates the parameter was not detected above the Instrument Quantitation Limit
 J Quantitation is approximate due to limitations identified during the quality control review
 . Value is rejected due to other contractual criteria examined during the quality control review
 .. Value is rejected due to blank contamination identified during the quality control review
 DL Detection Limit in PicoCuries per Liter (pCi/L)

DQ Data Qualifier
 V Valid
 A Acceptable with qualifications
 R Rejected
 s019L/rk49

**Radiochemical Data Completeness
Checklist for Radiometric and Gross α & β Analyses
of Soil and Water by Gas Proportional Counters**

- A. Yes Case Narrative
Yes Abnormalities explained
No Matrix Problems explained
Yes Instrument problems explained
Yes Improper collection, storage, preservation, container explained
Yes Hold times met, explained if not met
- B. Yes Initial and Continuing Calibration Data Package
Yes Detector ID
Yes Date and Time calibrated, calibration check, Analyst initials
Yes Radionuclide Standard Name or reliability check source ID, NIST certification and expiration dates, and DPM value
No Sample and Background counts and count duration observed at time of calibration
N/A Data supporting net standard CPMs versus gain setting ratio at optimum voltage setting (crosstalk ratio)
Yes Data supporting efficiency versus sample weight curve (Absorption curve)
- C. Yes Reagent Blanks Data Package
Yes ID of each detector used
Yes Analyst initials
Yes Date reagent blanks were analyzed
Yes ID of samples analyzed with the reagent blanks
Yes Type of method blank used, MDA of method
Yes Volume of aliquot for reagent blanks
- D. No Replicate Sample Data Package
No ID of each detector used
No Analyst Initials
No Date sample and replicates were analyzed
No Sample IDs, values obtained for sample and replicates
No Count Duration of sample and replicates
No Volume of aliquot for sample and replicates
No Calculated uncertainties and MDAs
- E. Yes Lab Control Samples (LCSs) Data Package
Yes ID of each detector used
Yes Analyst initials
Yes Date LCSs were analyzed
Yes ID of LCS
Yes Values obtained for LCSs with uncertainty and MDA
Yes True value of LCSs with uncertainty
Yes ID of samples analyzed with the LCSs

- F. Yes Minimum Detectable Activity
No Background measurements including: counts and count durations of samples and backgrounds taken during the same weekly time period
Yes Date of analysis
Yes Background CPM
Yes MDA calculated for both gross alpha and gross beta analysis of the sample
- G. Yes Size of Aliquot in Gross α & β Determination Data Package
Yes Sample ID
No Calculated volume of sample to deliver 150mgs solids
Yes Raw data supporting efficiency factor and efficiency factor used
- H. Yes Sample Data Package
Yes Printed report of results for sample, reruns
Yes Raw Data from counter, copies of notebook pages
Yes Manual/Computer calculations
No Sample ID, Detector ID, obtained sample and background counts and count durations observed, aliquot of sample, weight of solids counted, detector efficiency, activities, uncertainties, and MDAs

WESTON ANALYTICS
TOTAL RADIOCHEMISTRY
DATA SUMMARY REPORT

Client: ROCKWELL (ROCKY FLATS)

Page: 3

Sample Information

RFW Batch ID:	0091-501-13	0091-501-14	0091-501-15
Customer ID:	SW094006	SW094006D	SW094006FB
Collection Date:	09/18/89	09/18/89	09/18/89
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	9 ± 7 ¹⁶ pci/l 11	50 ± 20 ^{ok} pci/l 35	-0.8 ± 0.3 pci/l 2
Gross Beta.....	140 ± 20 pci/l 15	140 ± 20 pci/l 16	11 ± 2 pci/l 2
Uranium 233, 234.....	58 ± 8 [?] pci/l 0.09 ✓	54 ± 7 ✓ pci/l 0.4 ✓	0.2 ± 0.2 ✓ pci/l 0.1 ✓
Uranium 235.....	2.2 ± 0.7 ✓ pci/l 0.1 ✓	3.1 ± 0.8 ✓ pci/l 0.04 ✓	0.05 ± 0.09 ✓ pci/l 0.05 ✓
Uranium 238.....	38 ± 5 ✓ pci/l 0.1 ✓	34 ± 4 ✓ pci/l 0.4 ✓	0.3 ± 0.2 ✓ pci/l 0.04 ✓
Strontium 89, 90.....	-0.01 ± 0.1 pci/l 0.2	0.004 ± 0.1 pci/l 0.2	0.4 ± 0.6 pci/l 0.6
Plutonium 239, 240.....	0.02 ± 0.03 pci/l 0.04 ✓	0.015 ± 0.005 pci/l 0.004 ✓	0.001 ± 0.002 pci/l 0.004 ✓
Americium 241.....	0.009 ± 0.011 pci/l 0.01 ✓	0.009 ± 0.009 pci/l 0.007 ✓	-0.001 ± 0.004 pci/l 0.007 ✓
Cesium 137.....	-0.005 ± 0.12 pci/l 0.3	0.04 ± 0.12 pci/l 0.3	0.01 ± 0.11 pci/l 0.3
Tritium.....	1900 ± 300 pci/l 500	1900 ± 300 pci/l 500	-300 ± 300 pci/l 400
Radium 226.....	0.3 ± 0.5 pci/l 0.7	0.6 ± 0.6 pci/l 0.7	NR
Radium 228.....	NR	NR	NR

Client: ROCKWELL (ROCKY FLATS)

Sample Information

RFW Batch ID:	0091-501-16	0091-501-17	0091-501-18
Customer ID:	SW095006	SW059006	SW026006
Collection Date:	09/18/89	09/18/89	09/15/89
Matrix:	Water	Water	Water

Radio Chemistry

Gross Alpha.....	48 ± 14 [?] pci/l 16	0.7 ± 2.0 ^{ok} pci/l 0.8	2.0 ± 0.6 ^{ok} pci/l 0.7
Gross Beta.....	130 ± 20 pci/l 13	4 ± 3 pci/l 4	5 ± 2 pci/l 3
Uranium 233, 234.....	60 ± 7 ✓ pci/l 0.5 ✓	3.4 ± 0.8 ✓ pci/l 0.2 ✓	2.4 ± 0.7 ✓ pci/l 0.1 ✓
Uranium 235.....	3 ± 0.8 ✓ pci/l 0.2 ✓	0.2 ± 0.2 ✓ pci/l 0.1 ✓	0.05 ± 0.08 ✓ pci/l 0.08 ✓
Uranium 238.....	37 ± 5 ✓ pci/l 0.5 ✓	3.2 ± 0.8 ✓ pci/l 0.2 ✓	1.5 ± 0.5 ✓ pci/l 0.05 ✓
Strontium 89, 90.....	0.1 ± 0.2 pci/l 0.8	0.1 ± 0.2 pci/l 0.3	0.5 ± 0.2 pci/l 0.2
Plutonium 239, 240.....	0.009 ± 0.004 pci/l 0.003 ✓	0.021 ± 0.007 pci/l 0.006 ✓	0.015 ± 0.013 ✓ pci/l 0.01 ✓
Americium 241.....	0.02 ± 0.01 ✓ pci/l 0.009 ✓	-0.001 ± 0.004 pci/l 0.007 ✓	-0.001 ± 0.007 ✓ pci/l 0.009 ✓
Cesium 137.....	-0.06 ± 0.12 pci/l 0.3	0.08 ± 0.14 pci/l 0.3	-0.009 ± 0.12 pci/l 0.3
Tritium.....	1700 ± 300 pci/l 400	-200 ± 300 pci/l 400	-600 ± 300 pci/l 400
Radium 226.....	1.0 ± 0.6 pci/l 0.7	NR	NR
Radium 228.....	NR	NR	NR

