



**On-screen Review of Tritium Sample Counts**

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# ***Appendix D***

*Summary of Quality Assurance Crosscheck Analyses*

**Table D - 1**  
**Comparison of Radiological Concentrations in Crosscheck Samples**  
*between the West Valley Demonstration Project*  
**and the Environmental Measurements Laboratory (EML)**  
**Quality Assessment Program (QAP) 34**

Isotope	Matrix	Actual	Reported	Ratio	Accept?	Analyzed By
BE-7	Air	5.30E+01	5.85E+01	1.10	Yes	TI
MN-54	Air	4.80E+00	5.81E+00	1.21	Pass	TI
CO-57	Air	5.82E+00	6.22E+00	1.07	Yes	TI
CO-60	Air	5.14E+00	6.07E+00	1.18	Yes	TI
SR-90	Air	7.89E-02	6.70E-02	.85	Yes	TI
CS-137	Air	4.53E+00	5.81E+00	1.28	Pass	TI
CE-144	Air	5.22E+01	5.70E+01	1.09	Yes	TI
PU-239	Air	1.54E-01	8.50E-02	.55	Pass	TI
AM-241	Air	1.01E-01	5.90E-02	.58	Pass	TI
K-40	Soil	3.74E+02	3.37E+02	.90	Yes	TI
CS-137	Soil	1.50E+02	1.87E+02	1.25	Pass	TI
PU-238	Soil	1.15E+01	7.03E+00	.61	Pass	TI
PU-239	Soil	3.40E+00	8.88E-01	.26	No	TI
U(BQ)	Soil	5.94E+01	7.62E+01	1.28	Pass	TI
K-40	Veg	1.15E+03	1.39E+03	1.21	Pass	TI
SR-90	Veg	1.86E+02	1.18E+02	.63	Pass	TI
CS-137	Veg	6.76E+01	8.73E+01	1.29	Pass	TI
H-3	Water	3.61E+02	3.37E+02	.93	Yes	EL
MN-54	Water	2.13E+02	2.26E+02	1.06	Yes	EL
CO-57	Water	2.30E+02	2.38E+02	1.03	Yes	EL
CO-60	Water	2.01E+02	2.01E+02	1.00	Yes	EL
SR-90	Water	8.63E+00	8.51E+00	.99	Yes	EL
CS-137	Water	1.69E+02	1.79E+02	1.06	Yes	EL
PU-239	Water	7.73E-01	6.30E-01	.82	Yes	TI
AM-241	Water	1.19E+00	8.10E-01	.68	Pass	TI
U( $\mu$ g)	Water	1.72E-02	3.80E-02	2.21	No	TI

*Units for air filters = pCi/filter; soil and vegetation = pCi/g; water = pCi/mL*

*Uranium units as listed in the table. Samples analyzed by the Environmental Laboratory (EL) or Teledyne Isotopes (TI).*

*Acceptance limits of reported to actual ratio: 0.8 to 1.2 within warning limits; 0.5 to 1.5 within control limits (pass).*

**Table D - 2**  
**Comparison of Radiological Concentrations in Crosscheck Samples**  
*between the West Valley Demonstration Project*  
*and the Environmental Measurements Laboratory (EML)*  
**Quality Assessment Program (QAP) 35**

Isotope	Matrix	Actual	Reported	Ratio	Accept?	Analyzed
						By
BE-7	Air	5.38E+01	4.70E+01	.87	Yes	TI
MN-54	Air	2.43E+01	2.23E+01	.92	Yes	TI
CO-57	Air	1.66E+01	1.61E+01	.97	Yes	TI
CO-60	Air	2.30E+01	2.01E+01	.87	Yes	TI
CS-137	Air	2.80E+01	2.55E+01	.91	Yes	TI
CE-144	Air	5.08E+01	4.40E+01	.87	Yes	TI
PU-239	Air	8.40E-02	8.20E-02	.98	Yes	TI
AM-241	Air	1.04E-01	1.10E-01	1.06	Yes	TI
U(BQ)	Air	7.83E-02	4.03E+00	51.47	No	TI
K-40	Soil	4.30E+02	4.60E+02	1.07	Yes	TI
SR-90	Soil	3.78E+00	3.70E+00	.98	Yes	TI
CS-137	Soil	3.12E+02	3.65E+02	1.17	Yes	TI
PU-239	Soil	7.35E+00	3.30E+00	.45	No	TI
U(μg)	Soil	2.28E+00	1.60E+01	7.02	No	TI
K-40	Veg	9.92E+02	1.47E+03	1.48	Pass	TI
SR-90	Veg	4.39E+02	4.07E+02	.93	Yes	TI
CS-137	Veg	2.71E+01	4.07E+01	1.50	Pass	TI
PU-239	Veg	3.65E-01	3.40E-01	.93	Yes	TI
H-3	Water	1.00E+02	9.99E+01	1.00	Yes	TI
MN-54	Water	1.03E+02	1.06E+02	1.03	Yes	TI
CO-57	Water	1.66E+02	1.78E+02	1.07	Yes	TI
CO-60	Water	2.91E+02	2.91E+02	1.00	Yes	TI
SR-90	Water	1.01E+01	8.95E+00	.89	Yes	EL
CS-137	Water	4.60E+01	4.63E+01	1.01	Yes	TI
CE-144	Water	2.26E+02	3.26E+02	1.44	Pass	TI
PU-239	Water	5.10E-01	4.80E-01	.94	Yes	TI
AM-241	Water	5.70E-01	1.40E-01	.25	No	TI
U(μg)	Water	3.70E-02	3.70E+01	1000.00	No	TI

*Units for air filters = pCi/filter; soil and vegetation = pCi/g; water = pCi/mL*

*Uranium units as listed in the table. Samples analyzed by the Environmental Laboratory (EL) or Teledyne Isotopes (TI).*

*Acceptance limits of reported to actual ratio: 0.8 to 1.2 within warning limits; 0.5 to 1.5 within control limits (pass).*

**Table D - 3**  
**Comparison of Radiological Concentrations in Crosscheck Samples**  
*between the West Valley Demonstration Project*  
*and the Environmental Protection Agency's*  
**Environmental Monitoring Systems Laboratory (EMSL)**

Sample	Analyte	Matrix	Actual	Reported	Accept?	Analyzed By
<b>PE-A</b> (April 1991)	Alpha	Water	54.0	35.33	Pass	EL
	Ra-226	Water	8.0	6.23	Pass	TI
	Ra-228	Water	15.2	10.00	Pass	TI
	U(Nat)	Water	29.8	32.00	Yes	TI
<b>PE-B</b> (April 1991)	Beta	Water	115.0	104.00	Yes	EL
	Sr-89	Water	28.0	22.33	Yes	TI
	Sr-90	Water	26.0	17.00	No	TI
	Cs-134	Water	24.0	23.67	Yes	EL
	Cs-137	Water	25.0	27.33	Yes	EL
<b>PE-A</b> (Oct 1991)	Alpha	Water	82.0	60.33	Yes	EL
	Ra-226	Water	22.0	18.33	Yes	TI
	Ra-228	Water	22.2	18.00	Yes	TI
	U(Nat)	Water	13.5	13.00	Yes	TI
<b>PE-B</b> (Oct 1991)	Beta	Water	65.0	54.33	Yes	EL
	Sr-89	Water	10.0	10.33	Yes	TI
	Sr-90	Water	10.0	7.33	Yes	TI
	Co-60	Water	20.0	31.67	No	EL
	Cs-134	Water	10.0	12.67	Yes	EL
	Cs-137	Water	11.0	23.00	No	EL
<b>GAM</b> (Feb 1991)	Co-60	Water	40.0	44.33	Yes	EL
	Zn-65	Water	149.0	154.00	Yes	EL
	Ru-106	Water	186.0	203.67	Yes	EL
	Cs-134	Water	8.0	12.33	Yes	EL
	Cs-137	Water	8.0	9.33	Yes	EL
	Ba-133	Water	75.0	76.67	Yes	EL
<b>GAM</b> (June 1991)	Co-60	Water	10.0	11.33	Yes	EL
	Zn-65	Water	108.0	104.33	Yes	EL
	Ru-106	Water	149.0	132.67	Yes	EL
	Cs-134	Water	15.0	15.00	Yes	EL
	Cs-137	Water	14.0	14.00	Yes	EL
	Ba-133	Water	62.0	58.33	Yes	EL
<b>TRW</b> (Feb 1991)	H-3	Water	4418.0	3745.33	Pass	EL
<b>TRW</b> (June 1991)	H-3	Water	12480.0	12030.00	Yes	EL

*continued on next page*

**Table D - 3 (concluded)**  
**Comparison of Radiological Concentrations in Crosscheck Samples**  
**between the West Valley Demonstration Project**  
**and the Environmental Protection Agency's**  
**Environmental Monitoring Systems Laboratory (EMSL)**

Sample	Analyte	Matrix	Actual	Reported	Accept?	Analyzed By
AF (March 1991)	Alpha	Filter	25.0	27.67	Yes	EL
	Beta	Filter	124.0	135.33	No	EL
	Sr-90	Filter	40.0	35.33	Yes	TI
	Cs-137	Filter	40.0	46.33	Pass	EL
AF (August 1991)	Alpha	Filter	25.0	28.33	Yes	EL
	Beta	Filter	92.0	100.33	Yes	EL
	Sr-90	Filter	30.0	30.67	Yes	TI
	Cs-137	Filter	30.0	26.67	Yes	EL
Milk (April 1991)	Sr-89	Milk	32.0	16.00	No	TI
	Sr-90	Milk	32.0	21.33	No	TI
	I-131	Milk	60.0	52.33	Pass	TI
	Cs-137	Milk	49.0	48.67	Yes	TI
	Total K	Milk	1650.0	1456.67	No	TI
Milk (Sept 1991)	Sr-89	Milk	25.0	17.00	Pass	TI
	Sr-90	Milk	25.0	19.33	Yes	TI
	I-131	Milk	108.0	116.67	Yes	TI
	Cs-137	Milk	30.0	28.67	Yes	TI
	Total K	Milk	1740.0	1499.67	No	TI
ABW (May 1991)	Alpha	Water	24.0	15.67	Pass	EL
	Beta	Water	46.0	44.67	Yes	EL
ABW (Sept 1991)	Alpha	Water	10.0	7.00	Yes	EL
	Beta	Water	20.0	20.33	Yes	EL
PUW (August 1991)	Pu-239	Water	19.4	20.00	Yes	TI

Units for water and milk = pCi/L; air = pCi/filter.

Samples analyzed by the Environmental Laboratory (EL) or Teledyne Isotopes (TI) as indicated.

Explanation of Codes:

PE-A : Performance Evaluation (Alpha)

PE-B: Performance Evaluation (Beta)

GAM: Gamma in water

TRW: Tritium in water

AF: Air filter

MILK: Milk sample

ABW: Alpha and beta in water

PUW: Plutonium in water

Acceptance limits are defined for individual analytes and matrices by EMSL and differ from cross-check to crosscheck. **Yes** indicates acceptable results. **Pass** indicates results between warning and control limits. **No** indicates results were outside control limits.

**Table D - 4**  
**Comparison of Water Quality Parameters in Crosscheck Samples**  
**between the West Valley Demonstration Project**  
**and the Environmental Protection Agency 1991 Discharge Monitoring Report (DMR)**  
**Quality Assurance Program #11 for the National Pollutant Discharge Elimination System**

Analyte	Units	Actual (EPA)	Reported (WVNS)	Accept?	Analyzed By
Aluminum	µg/L	3200	3620	Check	E&E
Arsenic	µg/L	200	185	Yes	E&E
Beryllium	µg/L	130	152	Yes	E&E
Cadmium	µg/L	190	236	No	E&E
Chromium	µg/L	410	470	Check	E&E
Cobalt	µg/L	180	220	No	E&E
Copper	µg/L	730	864	No	E&E
Iron	µg/L	1000	1070	Yes	A/PC
Lead	µg/L	47.9	50.5	Yes	E&E
Manganese	µg/L	920	1110	No	E&E
Mercury	µg/L	3.4	3.32	Yes	E&E
Nitrate	µg/L	430	519	No	E&E
Selenium	µg/L	86	71.6	Yes	E&E
Vanadium	µg/L	4600	5540	No	E&E
Zinc	µg/L	110	135	No	E&E
pH	µg/L	5.52	5.53	Yes	EL
Tot.Suspended Solids	mg/L	23.9	18.8	Yes	EL
Oil and Grease	mg/L	17	14.8	Yes	E&E
Ammonia-N	mg/L	4.2	4.3	Yes	EL
Nitrate-N	mg/L	10	8.58	Yes	E&E
Tot.OrganicCarbons	mg/L	25.9	24.6	Yes	EL
BOD-5	mg/L	41.4	42.7	Yes	EL
Cyanide	mg/L	.53	.569	Yes	E&E
Phenolics	mg/L	.0146	.023	Yes	E&E

Samples were analyzed by Ecology & Environment, Inc. (E&E), the Analytical and Physical Chemistry Laboratory (A/PC), or the Environmental Laboratory (EL) as indicated in the table. **Check** indicates a result within control limits but outside warning limits. **No** indicates a result outside control limits. All **Check** or **No** results were metals analyses conducted by E&E. The problem was addressed by WVNS Quality Assurance and was traced to a problem with matrix matching. A duplicate sample was submitted for reanalysis and results were then acceptable.

**Table D - 5**  
**Comparison of Water Quality Parameters in Crosscheck Samples**  
*between the West Valley Demonstration Project*  
*and the New York State Department of Health (NYSDOH)*

Analyte:	Units	Actual (NYSDOH)	Reported (WVNS)	Accept?	Analyzed By
<b>BOD-5</b>	mg/L	29.5	28.9	Yes	EL
		67.7	73.1	Yes	EL
		52.8	41.7	Yes	EL
		20.2	15.1	Yes	EL
<b>Total Suspended Solids</b>	mg/L	87.0	88.7	Yes	EL
		28.4	28.4	Yes	EL
		38.1	38.2	Yes	EL
		57.3	57.0	Yes	EL
<b>pH</b>		2.53	2.43	Yes	EL
		7.00	7.06	Yes	EL
		2.54	2.42	Pass	EL
		8.41	8.51	Yes	EL
<b>NH-3</b>	mg/L	1.49	1.41	Yes	EL
		2.57	2.61	Yes	EL
		2.23	NR	No	EL
		4.64	NR	No	EL

*Acceptable range determined by NYSDOH. **Pass** indicates results within control limits but outside of warning limits. The first two results for each analyte were part of the January crosscheck. The second two results were part of the July crosscheck. The results for ammonia-nitrogen were transmitted on the wrong line of the form and were recorded as a **No Response** by NYSDOH.*



**Table D - 6**  
**Comparison of the West Valley Demonstration Project's**  
**Thermoluminescent Dosimeters (TLDs) to the**  
**Co-located Nuclear Regulatory Commission (NRC) TLDs in 1991**

1st Quarter						
NRC TLD#	WVDP TLD#	NRC mR/90days	WVDP mR/Qtr	WVDP/NRC Ratio	Accept ?	
2	22	16.9	20.4	1.21	Pass	
3	5	17.7	21.0	1.19	Yes	
4	7	17.4	19.4	1.11	Yes	
5	9	19.4	19.3	.99	Yes	
7	14	18.3	21.1	1.15	Yes	
8	15	17.7	19.7	1.11	Yes	
9	25	34.3	33.9	.99	Yes	
11	24	1180.0	1345.3	1.14	Yes	
2nd Quarter						
NRC TLD#	WVDP TLD#	NRC mR/93days	WVDP mR/Qtr	WVDP/NRC Ratio	Accept ?	
2	22	Missing	17.0	NA	NA	
3	5	16.6	18.6	1.12	Yes	
4	7	18.6	16.5	.89	Yes	
5	9	20.9	16.8	.80	Yes	
7	14	17.4	19.0	1.09	Yes	
8	15	18.0	16.8	.93	Yes	
9	25	36.3	31.7	.87	Yes	
11	24	910.0	1259.1	1.38	Pass	
3rd Quarter						
NRC TLD#	WVDP TLD#	NRC mR/90days	WVDP mR/Qtr	WVDP/NRC Ratio	Accept ?	
2	22	17.8	18.6	1.04	Yes	
3	5	19.5	21.1	1.08	Yes	
4	7	18.9	18.0	.95	Yes	
5	9	20.7	17.0	.82	Yes	
7	14	20.2	18.7	.93	Yes	
8	15	18.4	17.5	.95	Yes	
9	25	35.0	33.1	.95	Yes	
11	24	977.0	1135.2	1.16	Yes	
4th Quarter						
NRC TLD#	WVDP TLD#	NRCmR/90days	WVDPmR/Qtr	WVDP/NRC Ratio	Accept ?	
2	22	NA	21.3	NA	NA	
3	5	NA	23.9	NA	NA	
4	7	NA	21.1	NA	NA	
5	9	NA	21.0	NA	NA	
7	14	NA	24.2	NA	NA	
8	15	NA	22.1	NA	NA	
9	25	NA	36.0	NA	NA	
11	24	NA	1292.8	NA	NA	

Acceptable range of WVDP/NRC = 0.8 to 1.2. Pass = 0.5 to 1.5. N/A - not available. Fourth quarter TLD information for the NRC had not yet been processed at the time of report preparation.