APPENDIX D
SUMMARY OF QUALITY ASSURANCE CROSS-CHECK ANALYSES

Table D-1.1
Comparison of Radiological Concentrations in Quality
Assurance Samples Between WVDP and EML for QAP 8803 Samples

Sample	Isotope	Actual	Reported	Ratio Rep/Act	Accept
air	Be-7	4.73E+03	4.54E+03	0.96	yes
air	Mn-54	3.63E+02	3.72E+02	1.02	yes
air	Co-57	1.62E+02	1.66E+02	1.02	yes
air	Co-60	2.82E+02	2.80E+02	0.99	yes
air	Sr-90	4.91E+00	4.94E+00	1.01	yes
air	Cs-134	3.81E+02	3.48E+02	0.91	yes
air	Cs-137	2.11E+02	2.32E+02	1.10	yes
air	Pu-239	2.52E+00	2.58E+00	1.02	yes
air	Am-241	3.02E+00	3.02E+00	1.00	yes
air	U-238	2.53E+00	2.72E+00	1.08	yes
air	U-ug	7.32E+00	8.13E+00	1.11	yes
soil	K-40	6.00E-01	8.25E-01	1.38	pass
soil	Sr-90	1.46E-01	1.52E-01	1.04	yes
soil	Cs-137	4.00E-01	3.83E-01	0.96	yes
soil	Pu-239	4.10E-02	7.66E-02	1.87	no
soil	Am-241	6.70E-03	7.35E-03	1.10	yes
soil	U-238	6.90E-01	5.66E-01	0.82	yes
soil	U-ug	1.97E+00	1.70E+00	0.86	yes
vegetn	K-40	3.60E+01	4.22E+01	1.17	yes
vegetn	Sr-90	1.09E+01	1.02E+01	0.94	yes
vegetn	Cs-137	4.62E+00	5.07E+00	1.10	yes
vegetn	Pu-239	4.50E-02	5.64E-02	1.25	pass
vegetn	Am-241	4.60E-02	3.77E-02	0.82	yes
vegetn	U-238	3.60E-02	3.80E-02	1.06	yes
vegetn	U-ug	1.04E-01	1.14E-01	1.10	yes
water	H-3	2.07E+01	2.63E+01	1.27	pass
water	Mn-54	6.80E+00	6.91E+00	1.02	yes
water	Co-57	2.50E+00	1.91E+00	0.76	pass
water	Co-60	2.03E+00	1.82E+00	0.90	yes
water	Sr-90	5.30E-01	5.70E-01	1.08	yes
water	Cs-134	3.56E+00	3.02E+00	0.85	yes
water	Cs-137	1.84E+00	1.73E+00	0.94	yes
water	Pu-239	2.43E-02	1.94E-02	0.80	yes
water	Am-241	4.10E-03	3.95E-03	0.96	yes
water	U-238	4.25E-03	4.47E-03	1.05	yes
water	U-ug	1.23E-02	1.34E-02	1.09	yes

Ratio: 1.2 - 0.8 acceptable; 1.5 - 0.5 pass

Table D-1.2

Comparison of Radiological Parameters in Quality Assurance Samples
Between WVDP and EMSL (USEPA) in 1988

Sample	Analyte	Actual	Reported	Ratio Rep/Act	Accept
Gamma(water)	Cs-137	9.40E+01	1.12E+02	1.20	no
Feb 88	Cs-134	6.40E+01	5.43E+01	0.85	no
	Ru-106	1.05E+02	< DETECT	0.00	NA
	Zn-65	9.40E+01	1.37E+02	1.45	no
	Co-60	6.90E+01	7.93E+01	1.15	no
Gamma(water)	Cs-137	2.50E+01	3.27E+01	1.31	yes
Jun 88	Cs-134	2.00E+01	2.13E+01	1.07	yes
	Ru-106	1.95E+02	1.88E+02	0.96	yes
	Zn-65	1.01E+02	1.01E+02	1.00	yes
	Co-60	1.50E+01	1.83E+01	1.22	yes
HTO Feb 88	H-3	3.33E+03	3.13E+03	0.94	yes
HTO Jun 88	H-3	5.57E+03	4.89E+03	0.88	yes
A/B (water)	Beta	1.30E+01	1.40E+01	1.08	yes
Mar 88	Alpha	6.00E+00	3.00E+00	0.50	yes
A/B (water)	Beta	1.00E+01	1.40E+01	1.40	yes
Sep 88	Alpha	8.00E+00	5.33E+00	0.67	yes
Air Filter	Cs-137	1.60E+01	2.33E+01	1.46	yes
Mar 88	Sr-90	1.70E+01	1.57E+01	0.92	yes
	Beta	5.00E+01	5.77E+01	1.15	yes
	Alpha	2.00E+01	2.17E+01	1.08	yes
Air Filter	Cs-137	1.20E+01	1.30E+01	1.08	yes
Aug 88	Sr-90	8.00E+00	7.00E+00	0.88	yes
	Beta	2.90E+01	3.10E+01	1.07	yes
	Alpha	8.00E+00	8.33E+00	1.04	yes
Milk	Potassium	1.60E+03	1.67E+03	1.05	yes
Jun 88	Cs-137	5.10E+01	5.63E+01	1.10	yes
	I-131	9.40E+01	1.03E+02	1.09	yes
	Sr-89	4.00E+01	5.20E+01	1.30	no
	Sr-90	6.00E+01	7.83E+01	1.31	no
Milk	Potassium	1.60E+03	1.80E+03	1.13	no
Oct 88	Cs-137	5.00E+01	5.17E+01	1.03	yes
	I-131	9.10E+01	9.57E+01	1.05	yes
	Sr-89	4.00E+01	2.73E+01	0.68	no
	Sr-90	6.00E+01	5.47E+01	0.91	no
Perf. Eval.	Cs-137	7.00E+00	8.67E+00	1.24	yes
Apr 88	Cs-134	7.00E+00	1.07E+01	1.52	yes
	Co-60	5.00E+01	4.90E+01	0.98	yes
	Sr-90	5.00E+00	5.00E+00	1.00	yes
	Sr-89	5.00E+00	6.00E+00	1.20	yes
	Beta	5.70E+01	5.13E+01	0.90	yes
	U(nat)	6.00E+00	6.33E+00	1.06	yes
	Ra-228	5.60E+00	3.70E+00	0.66	no
	Ra-226	6.40E+00	4.00E+00	0.63	no
	Alpha	4.60E+01	3.47E+01	0.75	yes

Table D-1.2
Comparison of Radiological Parameters in Quality Assurance Samples
Between WVDP and EMSL (USEPA) in 1988 (contd)

Sample	Analyte	Actual	Reported	Ratio Rep/Act	Accept
Perf. Eval.	Cs-137	1.50E+01	1.20E+01	0.80	yes
Oct 88	Cs-134	1.50E+01	1.30E+01	0.87	yes
	Sr-90	1.00E+01	9.67E+00	0.97	yes
	Sr-89	1.10E+01	9.67E+00	0.88	yes
	Beta	5.40E+01	5.40E+01	1.00	yes
	U(nat)	5.00E+00	5.00E+00	1.00	yes
	Ra-228	5.20E+00	5.17E+00	0.99	yes
	Ra-226	5.00E+00	5.50E+00	1.10	yes
	Alpha	4.10E+01	3.10E+01	0.76	yes
Plut.(water)	Pu-239	1.02E+01	9.83E+00	0.96	yes

Note: Acceptable range determined by EPA-EMSL

Table D-1.3

Comparison of Radiological Concentrations in Quality Assurance Samples
Between WVDP and NBS for 1988 INEL QA Samples

Sample	INEL QA 23 Isotope	Gamma in Water NBS Measured	WV Reported	Ratio WV/NBS	Accept
water	Ce-144	1.73E-02	2.26E-02	1.31	no
water	Ce-141	2.02E-02	2.48E-02	1.23	no
water	Cr-51	1.15E-01	9.35E-02	0.81	no
water	Cs-134	2.53E-02	2.08E-02	0.82	no
water	Cs-137	2.07E-02	2.08E-02	1.00	yes
water	Co-58	1.29E-02	1.21E-02	0.94	no
water	Mn-54	6.05E-03	5.72E-03	0.95	yes
water	Fe-59	2.48E-02	2.50E-02	1.01	yes
water	Zn-65	3.25E-02	3.23E-02	0.99	yes
water	Co-60	1.07E-02	1.10E-02	1.03	yes

Note: Acceptable range is 1.00 ± 0.05 ratio.

Table D-1.4

Comparison of Water Quality Parameters in Quality Assurance Samples Between WVDP and NYSDOH, JAN 1988

Sample	Analyte	Actual	Reported	Ratio Rep/Act	Accept
water	Ag	74.7	80.0	1.07	yes
water	Ag	360.0	355.0	0.99	yes
water	Al	123.5	120.0	0.97	yes
water	Al	308.0	311.0	1.01	yes
water	As	97.1	102.0	1.05	yes
water	As	390.1	407.0	1.04	yes
water	BOD-5	87.2	99.0	1.14	yes
water	BOD-5	24.8	26.8	1.08	yes
water	CN	1.0	0.9	0.92	yes
water	CN	2.0	1.7	0.85	yes
water	Cd	19.9	22.0	1.11	yes
water	Cd	75.2	77.0	1.02	yes
water	Cr	79.4	83.0	1.05	yes
water	Cr	347.0	357.0	1.03	yes
water	Cu	60.3	61.0	1.01	yes
water	Cu	251.3	249.0	0.99	yes
water	Fe	162.6	159.0	0.98	yes
water	Fe	443.4	443.0	1.00	yes
water	NH-3(as N)	3.4	3.4	1.00	yes
water	NH-3(as N)	2.0	1.9	0.97	yes
water	Ni	125.1	128.0	1.02	yes
water	Ni	344.2	348.0	1.01	yes
water	Pb	132.8	133.0	1.00	yes
water	Pb	439.2	456.0	1.04	yes
water	pH	7.4	7.4	1.00	yes
water	pH	5.1	5.1	1.00	yes
water	Sus Solids	43.1	43.7	1.01	yes
water	Sus Solids	14.1	12.7	0.90	yes
water	Se	90.9	101.0	1.11	yes
water	Se	181.3	209.0	1.15	yes
water	Zn	593.3	592.0	1.00	yes
water	Zn	3999.8	3921.0	0.98	yes

Table D-1.5
Comparison of Water Quality Parameters in Quality Assurance Samples
Between WVDP and NYSDOH, JUN 1988

Sample	Analyte	Actual	Reported	Ratio Rep/Act	Accept
water	Ag	59.0	53.7	0.91	yes
water	Ag	392.7	400.0	1.02	yes
water	Al	408.3	396.0	0.97	yes
water	Al	111.5	105.0	9.94	yes
water	As	81.6	75.3	0.92	yes
water	As	367.1	367.0	1.00	yes
water	Cd	33.5	33.2	0.99	yes
water	Cd	60.0	57.2	0.95	yes
water	BOD-5	25.4	23.1	0.91	yes
water	BOD-5	77.2	72.6	0.94	yes
water	CN	0.9	87.7	97.44	no
water	CN	1.9	186.0	97.89	no
water	Cr	417.4	408.0	0.98	yes
water	Cr	71.6	67.9	0.95	yes
water	Cu	57.4	56.7	0.99	yes
water	Cu	375.4	373.0	0.99	yes
water	Fe	60.9	58.0	0.95	yes
water	Fe	299.7	299.0	1.00	yes
water	NH-3(as N)	4.7	4.7	1.00	yes
water	NH-3(as N)	2.2	2.2	1.00	yes
water	Ni	170.5	175.0	1.03	yes
water	Ni	481.0	487.0	1.01	yes
water	Oil&Grease	133.4	144.0	1.08	yes
water	Oil&Grease	61.8	67.3	1.09	yes
water	Pb	217.9	218.0	1.00	yes
water	Pb	125.7	124.0	0.99	yes
water	pH	5.5	5.5	1.00	yes
water	pH	7.3	7.4	1.01	yes
water	Sus Solids	20.9	20.5	0.98	yes
water	Sus Solids	58.0	58.0	1.00	yes
water	Se	84.9	84.4	0.99	yes
water	Se	138.9	136.0	0.98	yes
water	Zn	3278.0	3275.0	1.00	yes
water	Zn	767.4	776.0	1.01	yes

Note: Aceptable range determined by NYSDOH

Table D-1.6

Comparison of Water Quality Parameters in Quality Assurance Samples
Between WVDP and USEPA, JULY 1988

Sample	Analyte	Actual	Reported	Ratio Rep/Act	Accept
water	Al	626	620	0.99	yes
water	As	111	109	0.98	yes
water	Cd	270	270	1.00	yes
water	Cr	89.2	95	1.07	yes
water	Co	382	417	1.09	yes
water	Cu	100	102	1.02	yes
water	Fe	763	763	1.00	yes
water	Pb	914	963	1.05	yes
water	Mn	860	850	0.99	yes
water	Ni	171	178	1.04	yes
water	Se	82.1	82	1.00	yes
water	Zn	1270	1307	1.03	yes
water	pH	6.30	6.29	1.00	yes
water	Sus Solids	34.8	32.1	0.92	yes
water	Oil & Grease	21.0	21.5	1.02	yes
water	NH-3(as N)	10.3	10.0	0.97	yes
water	BOD-5	66.4	73.0	1.10	yes

Note: Acceptable range determined by USEPA

Table D-1.7

Comparison of WVDP to NRC Co-located Environmental TLD Dosimeters in WVDP Environs

FIRST QTR TLD 1988

NRC TLD #	WVDP TLD #	μR/hr NRC	μR/hr WVDP	WV/NRC	Accept
2	22	7.8	8.3	1.06	yes
3	5	8.0	7.9	0.99	yes
4	7	6.9	7.4	1.07	yes
5	9	8.5	7.9	0.93	yes
7	14	9.0	8.8	0.98	yes
8	15	8.5	8.8	1.04	yes
9	25	16.8	17.6	1.05	yes
11	24	674.0	911.0	1.35	pass

SECOND QTR TLD 1988

NRC TLD #	WVDP TLD #	μR/hr NRC	μR/hr WVDP	WV/NRC	Accept
2	22	9.0	9.7	1.08	yes
3	5	10.5	10.2	0.97	yes
4	7	7.7	9.3	1.21	pass
5	9	10.7	9.3	0.87	yes
7	14	8.8	10.2	1.16	yes
8	15	8.5	9.7	1.14	yes
9	25	19.6	16.7	0.85	yes
11	24	626.0	753.0	1.20	yes

THIRD QTR TLD 1988

NRC TLD #	WVDP TLD #	μR/hr NRC	μR/hr WVDP	WV/NRC	Accept
2	22	7.9	10.2	1.29	pass
3	5	8.9	11.1	1.25	pass
4	7	7.5	10.2	1.36	pass
5	9	8.9	9.9	1.11	yes
7	14	8.8	11.6	1.32	pass
8	15	9.0	10.6	1.18	yes
9	25	16.9	18.1	1.07	yes
11	24	611.0	733.0	1.20	yes

FOURTH QTR TLD 1988

NRC TLD #	WVDP TLD #	μR/hr NRC	μR/hr WVDP	WV/NRC	Accept
2	22	8.6	9.7	1.13	yes
3	5	14.0	11.6	0.83	yes
4	7	8.3	11.1	1.34	pass
5	9	10.4	9.7	0.93	yes
7	14	8.9	11.6	1.30	pass
8	15	8.5	10.6	1.25	pass
9	25	18.5	17.6	0.95	yes
11	24	724.0	756.0	1.04	yes

Ratio: 1.2 - 0.8 acceptable; 1.5 - 0.5 pass