ORISE

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

June 27, 2002

Mr. Jon Peckenpaugh
Mail Stop: T-7J8
U.S. Nuclear Regulatory Commission
NMSS/DWM/EPAB
11555 Rockville Pike
Rockville, MD 20852

SUBJECT: ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED APRIL 1 AND 2, 2002 FROM SAXTON NUCLEAR EXPERIMENTAL CORPORATION (SNEC), SAXTON, PENNSYLVANIA (DOCKET #50-146) [RFTA NO. 02-005]

Dear Mr. Peckenpaugh:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) received seven water samples on April 3, 2002, that were collected on April 1 and 2, 2002 by SNEC staff and received 15 water samples April 4, 2002 that were collected on April 2, 2002 by SNEC staff. Eleven of the 22 samples that were received had been acidified in the field and these samples were filtered upon receipt and then analyzed. The other eleven samples were not acidified and were analyzed as received. The samples were analyzed by gamma spectroscopy (procedure CP1, Revision 11); alpha spectroscopy for isotopic uranium, isotopic plutonium, and americium-241 (procedure AP3, Revision 16); strontium-90 (procedure AP4, Revision 11), and by liquid scintillation counting for plutonium-241 (non-routine procedure AP10, Revision 0). The 11 unacidified samples were analyzed for tritium (procedure AP2, Revision 12) and for C-14 (non-routine procedure AP9, Revision 0). The data are presented in Tables 1, 2, 3, 4, 5, 6, and 7.

ESSAP's Quality Control (QC) procedures were followed for these analyses. The daily QC and detector background for the counting instrumentation used in the analyses were within acceptable limits. The QC files are available for your review upon request.

Please contact me at (865) 241-3242 or Wade Ivey at (865) 576-9184 with any questions or comments.

Sincerely,

Dale Condra

Dale Condra
Laboratory Manager
Environmental Survey and Site Assessment Program

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ORISE TABLE 1

CONCENTRATIONS OF IODINE-129, COBALT-60, AND CESIUM-137 IN WATER SAMPLES BY GAMMA SPECTROSCOPY CP1, REV 11 SAXTON NUCLEAR SAXTON, PENNSYLVANIA

ESSAP Sample ID	NRC Region I Sample ID	Radionuclide Concentrations[a] (pCi/L)		
		I-129	Co-60	Cs-137
815W001	OW7R-X	0[b] ± 17[c]	0 ± 2	0 ± 2
815W002	OW5R-X	7 ± 38	-1 ± 3	0 ± 3
815W003	OW5R	8 ± 39	1 ± 3	0 ± 3
815W004	OW4R-X	18 ± 25	2 ± 2	-1 ± 2
815W005	OW4R	-5 ± 18	1 ± 2	-1 ± 2
815W006	GEO8-X	-13 ± 40	1 ± 3	-4 ± 3
815W007	GEO8	7 ± 42	-2 ± 3	1 ± 3
815W008	OW-3-X	6 ± 16	0 ± 2	1 ± 2
815W009	OW-3	4 ± 17	1 ± 2	2 ± 2
815W010	OW-10-X	-9 ± 38	2 ± 3	-2 ± 3
815W011	OW-10	24 ± 25	0 ± 2	1 ± 2
815W012	MW-4-X	-4 ± 16	0 ± 2	1 ± 2
815W013	MW-4	-15 ± 26	-1 ± 2	-2 ± 2
815W014	GEO-5-X	32 ± 39	-2 ± 3	-2 ± 3
815W015	GEO-5	4 ± 17	1 ± 2	1 ± 2
815W016	OW-R7	17 ± 27	0 ± 2	-1 ± 2
815W017	NRC Angle well-X	-9 ± 16	1 ± 2	3 ± 2
815W018	NRC Angle well	-11 ± 38	0 ± 3	-1 ± 3
815W019	OW-6-X	16 ± 38	0 ± 3	0 ± 2
815W020	OW-6	10 ± 16	1 ± 2	0 ± 2
815W021	OW-3R-X	-11 ± 23	1 ± 2	0 ± 2
815W022	OW-3R	-4 ± 25	1 ± 2	0 ± 2

[a]The average MDC for a sixteen hour count of water in a 1.0 L Marinelli for I-129 is 40 pCi/L, for Co-60 is 4 4 pCi/L, and for Cs-137 is 3.8 pCi/L.

[b]Zero values are due to rounding

[c]Uncertainties represent the 95% confidence level, based on total propagated uncertainties.

ORISE TABLE 2

CONCENTRATIONS OF AMERCIUM-241 IN WATER SAMPLES BY ALPHA SPECTROSCOPY AP3, REV 16 SAXTON NUCLEAR SAXTON, PENNSYLVANIA

ESSAP Sample ID	NRC Region I Sample ID	Americium-241 Concentrations[a] (pCi/L)
815W001	OW7R-X	-0.05 ± 0.15[b]
815W002	OW5R-X	0.11 ± 0.08
815W003	OW5R	0.10 ± 0.15
815W004	OW4R-X	0.14 ± 0.11
815W005	OW4R	0.04 ± 0.12
815W006	GEO8-X	0.12 ± 0.08
815W007	GEO8	0.19 ± 0.08
815W008	OW-3-X	0.02 ± 0.11
815W009	OW-3	0.05 ± 0.08
815W010	OW-10-X	0.03 ± 0.08
815W011	OW-10	0.21 ± 0.19
815W012	MW-4-X	0.05 ± 0.05
815W013	MW-4	0.08 ± 0.08
815W014	GEO-5-X	0.11 ± 0.11
815W015	GEO-5	0.26 ± 0.14
815W016	OW-R7	0.01 ± 0.09
815W017	NRC Angle well-X	0.03 ± 0.07
815W018	NRC Angle well	-0.04 ± 0.06
815W019	OW-6-X	0.09 ± 0.09
815W020	OW-6	0.02 ± 0.04
815W021	OW-3R-X	0.07 ± 0.06
815W022	OW-3R	0.02 ± 0.09

[a]The average MDC for a sixteen hour count of a 0 25 L sample for Am-241 is 0.14 pCi/L.
[b]Uncertainties represent the 95% confidence level, based on total propagated uncertainties

ORISE TABLE 3

CONCENTRATIONS OF PLUTONIUM ISOTOPES IN WATER SAMPLES BY ALPHA SPECTROSCOPY AP3, REV 16 AND LIQUID SCINTILLATION ANALYSIS NON-ROUTINE AP10, REV 0 SAXTON NUCLEAR SAXTON, PENNSYLVANIA

ESSAP Sample ID	NRC Region I Sample ID	Radionuclide Concentrations (pCi/L)		
		Pu-238[a]	Pu-239	Pu-241[b]
815W001	OW7R-X	-0.01 ± 0.06[c]	-0.01 ± 0.02	6 ± 15
815W002	OW5R-X	0.02 ± 0.07	-0.02 ± 0.04	3 ± 15
815W003	OW5R	-0.08 ± 0.09	-0.02 ± 0.05	10 ± 16
815W004	OW4R-X	-0.03 ± 0.07	-0.04 ± 0.04	4 ± 14
815W005	OW4R	-0.03 ± 0.07	0.03 ± 0.04	11 ± 15
815W006	GEO8-X	0.05 ± 0.08	-0.02 ± 0.02	-7 ± 14
815W007	GEO8	-0.02 ± 0.08	0.01 ± 0.02	1 ± 15
815W008	OW-3-X	-0.05 ± 0.08	-0.01 ± 0.02	9 ± 17
815W009	OW-3	0.03 ± 0.07	-0.02 ± 0.06	7 ± 17
815W010	OW-10-X	-0.03 ± 0.06	-0.02 ± 0.05	14 ± 16
815W011	OW-10	0.06 ± 0.08	-0.03 ± 0.07	6 ± 19
815W012	MW-4-X	0.01 ± 0.05	0.00[d] ± 0.02	-3 ± 16
815W013	MW-4	0.02 ± 0.05	0.02 ± 0.04	20 ± 17
815W014	GEO-5-X	-0.04 ± 0.06	0.01 ± 0.07	13 ± 17
815W015	GEO-5	0.03 ± 0.05	0.01 ± 0.07	18 ± 25
815W016	OW-R7	-0.01 ± 0.04	0.01 ± 0.04	6 ± 15
815W017	NRC Angle well-X	0.01 ± 0.05	0.03 ± 0.04	2 ± 14
815W018	NRC Angle well	0.04 ± 0.08	-0.01 ± 0.05	13 ± 15
815W019	OW-6-X	-0.03 ± 0.11	0.02 ± 0.06	15 ± 17
815W020	OW-6	-0.03 ± 0.06	0.04 ± 0.04	5 ± 15
815W021	OW-3R-X	-0.03 ± 0.08	0.03 ± 0.05	15 ± 15
815W022	OW-3R	-0.04 ± 0.08	-0.02 ± 0.05	9 ± 15

[a]The average MDC for Pu-238 and Pu-239 for a sixteen hour count using a 0.25 L sample is 0 12 pCi/L.

[b]The average MDC for Pu-241 for a one hour count using a 0 25 L sample is 25 pCi/L.

[c]Uncertainties represent the 95% confidence level, based on total propagated uncertainties

[d]Zero values are due to rounding

ORISE TABLE 4

CONCENTRATIONS OF URANIUM ISOTOPES IN WATER SAMPLES BY ALPHA SPECTROSCOPY AP3, REV 16 SAXTON NUCLEAR SAXTON, PENNSYLVANIA

ESSAP Sample ID	NRC Region I Sample ID	Radionuclide Concentrations[a] (pCi/L)			
		U-234	U-235	U-238	U Total
815W001	OW7R-X	3.46 ± 0.54[b]	0.27 ± 0.24	1.02 ± 0.28	4.75 ± 0.66
815W002	OW5R-X	2.11 ± 0.35	0.11 ± 0.09	1.34 ± 0.26	3.55 ± 0.44
815W003	OW5R	0.95 ± 0.29	0.00[c] ± 0.13	0.66 ± 0.21	1.62 ± 0.38
815W004	OW4R-X	2.67 ± 0.46	0.08 ± 0.17	1.49 ± 0.30	4.23 ± 0.58
815W005	OW4R	2.22 ± 0.38	0.18 ± 0.08	1.57 ± 0.29	3.97 ± 0.49
815W006	GEO8-X	0.61 ± 0.29	0.09 ± 0.13	0.24 ± 0.15	0.94 ± 0.35
815W007	GEO8	0.38 ± 0.15	0.03 ± 0.03	0.11 ± 0.06	0.51 ± 0.16
815W008	OW-3-X	0.63 ± 0.31	0.26 ± 0.17	0.23 ± 0.15	1.11 ± 0.38
815W009	OW-3	0.10 ± 0.07	0.01 ± 0.06	0.03 ± 0.04	0.14 ± 0.10
815W010	OW-10-X	1.45 ± 0.28	0.06 ± 0.05	1.27 ± 0.25	2.78 ± 0.38
815W011	OW-10	1.13 ± 0.25	0.07 ± 0.06	1.18 ± 0.25	2.38 ± 0.36
815W012	MW-4-X	1.65 ± 0.31	0.06 ± 0.07	0.79 ± 0.19	2.50 ± 0.37
815W013	MW-4	1.42 ± 0.28	0.06 ± 0.06	0.90 ± 0.21	2.38 ± 0.35
815W014	GEO-5-X	1.98 ± 0.36	0.22 ± 0.10	1.59 ± 0.30	3.78 ± 0.48
815W015	GEO-5	1.88 ± 0.35	0.16 ± 0.09	1.53 ± 0.30	3.57 ± 0.47
815W016	OW-R7	0.29 ± 0.11	0.10 ± 0.07	0.22 ± 0.10	0.61 ± 0.16
815W017	NRC Angle well-X	1.26 ± 0.25	0.08 ± 0.07	1.00 ± 0.22	2.34 ± 0.34
815W018	NRC Angle well	1.44 ± 0.27	0.08 ± 0.07	1.08 ± 0.22	2.61 ± 0.36
815W019	OW-6-X	0.06 ± 0.09	0.05 ± 0.10	0.11 ± 0.09	0.22 ± 0.16
815W020	OW-6	0.04 ± 0.06	0.03 ± 0.03	0.06 ± 0.04	0.13 ± 0.08
815W021	OW-3R-X	0.31 ± 0.14	0.02 ± 0.04	0.30 ± 0.12	0.63 ± 0.19
815W022	OW-3R	0.24 ± 0.09	0.05 ± 0.05	0.29 ± 0.10	0.57 ± 0.15

[a]The average MDC for individual uranium isotopes for a sixteen hour count using 0 25 L of sample is 0.1 pCi/L.
[b]Uncertainties represent the 95% confidence level, based on total propagated uncertainties.
[c]Zero values are due to rounding.

ORISE TABLE 5

CONCENTRATIONS OF STRONTIUM-90
IN WATER SAMPLES
BY PROPORTIONAL COUNTING
AP4, REV 11
SAXTON NUCLEAR
SAXTON, PENNSYLVANIA

ESSAP Sample ID	NRC Region I Sample ID	Strontium-90 Concentrations[a] (pCi/L)
815W001	OW7R-X	0.21 ± 0.29[b]
815W002	OW5R-X	0.04 ± 0.28
815W003	OW5R	0.29 ± 0.28
815W004	OW4R-X	0.09 ± 0.29
815W005	OW4R	0.23 ± 0.30
815W006	GEO8-X	0.61 ± 0.31
815W007	GEO8	0.43 ± 0.31
815W008	OW-3-X	0.28 ± 0.30
815W009	OW-3	0.19 ± 0.30
815W010	OW-10-X	0.38 ± 0.31
815W011	OW-10	0.42 ± 0.30
815W012	MW-4-X	0.37 ± 0.29
815W013	MW-4	1.00 ± 0.34
815W014	GEO-5-X	0.58 ± 0.30
815W015	GEO-5	0.45 ± 0.32
815W016	OW-R7	0.17 ± 0.30
815W017	NRC Angle well-X	0.20 ± 0.29
815W018	NRC Angle well	-0.04 ± 0.30
815W019	OW-6-X	0.14 ± 0.30
815W020	OW-6	-0.05 ± 0.33
815W021	OW-3R-X	0.09 ± 0.32
815W022	OW-3R	0.13 ± 0.34

[a]The average MDC for a two hour count of a 0 5 L sample for Sr-90 is 0.5 pCi/L.
[b]Uncertainties represent the 95% confidence level, based on total propagated uncertainties

ORISE TABLE 6

CONCENTRATIONS OF TRITIUM IN WATER SAMPLES BY LIQUID SCINTILLATION ANALYSIS AP2, REV 12 SAXTON NUCLEAR SAXTON, PENNSYLVANIA

ESSAP Sample ID	NRC Region I Sample ID	Tritium Concentrations[a] (pCi/L)
815W003	OW-5R	30 ± 200[b]
815W005	OW-4R	-60 ± 190
815W007	GEO-8	-20 ± 200
815W009	OW-3	-80 ± 190
815W011	OW-10	-50 ± 190
815W013	MW-4	-90 ± 190
815W015	GEO-5	50 ± 200
815W016	OW-R7	10 ± 200
815W018	NRC Angle Well	-10 ± 200
815W020	OW-6	-40 ± 200
815W022	OW-3R	80 ± 200

[a]The average MDC for a one hour count of a 0 01 L sample for tritium is 330 pCi/L.
[b]Uncertainties represent the 95% confidence level, based on total propagated uncertainties

ORISE TABLE 7

CONCENTRATIONS OF CARBON-14
IN WATER SAMPLES
BY LIQUID SCINTILLATION ANALYSIS
NON-ROUTINE AP9, REV 0
SAXTON NUCLEAR
SAXTON, PENNSYLVAINIA

ESSAP Sample ID	NRC Region I Sample ID	C-14 Concentrations[a] (pCi/L)
815W003	OW-5R	1 ± 10[b]
815W005	OW-4R	-3 ± 10
815W007	GEO-8	6 ± 10
815W009	OW-3	1 ± 10
815W011	OW-10	4 ± 10
815W013	MW-4	-2 ± 10
815W015	GEO-5	-1 ± 10
815W016	OW-R7	1 ± 10
815W018	NRC Angle Well	-6 ± 10
815W020	OW-6	-3 ± 10
815W022	OW-3R	-1 ± 10

[a]The average MDC for a one hour count of a 0 01 L sample for C-14 is 17 pCi/L.
[b]Uncertainties represent the 95% confidence level, based on total propagated uncertainties