ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

January 27, 2004

Mr. James Shepherd
U.S. Nuclear Regulatory Commission
NMSS/DWM/DCB
Mail Stop: T7F27
11545 Rockville Pike
Rockville, Maryland 20852

SUBJECT: ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED DECEMBER 2, 2003 AT BIG ROCK POINT NUCLEAR PLANT, CHARLEVOIX, MICHIGAN (INSPECTION REPORT NUMBER 050-00155/2003-07) [RFTA 04-001]

Dear Mr. Shepherd:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) received six water samples on December 3, 2003 that were collected on December 2, 2003 at the Big Rock Point Nuclear Plant in Charlevoix, Michigan. The following analyses were performed on the samples per the sampling plan received by e-mail on November 18, 2003:

1. Gamma spectrometry (Procedure CP1, Revision 13)
2. Gross alpha and gross beta (Procedure AP1, Revision 14; Procedure CP3, Revision 2)
3. H-3 (Procedure AP2, Revision 14; Procedure CP4, Revision 2)
4. C-14 (Non-routine Procedure AP9, Revision 2; Procedure CP4, Revision 2)
5. Sr-90 as Total Radiostrontium by low background beta counting (Procedure AP4, Revision 11; Procedure CP3, Revision 2)
6. Pu-241 (Non-routine Procedure AP10, Revision 2; Procedure CP4, Revision 3)
7. Ni-63 (Non-routine Procedure AP12, Revision 3; Procedure CP4, Revision 3)
8. Fe-55 (Non-routine Procedure AP13, Revision 3; Procedure CP4, Revision 3)
9. Alpha isotopic (Procedure AP11, Revision 2; Procedure CP2, Revision 11)

The data for these analyses are presented in Tables 1 through 7, respectively.

Ni-59 was one of the requested radionuclides. ESSAP does not have the capability to analyze samples for Ni-59 due to the extremely low energies of the x-rays associated with this radionuclide. This fact should have been pointed out before beginning the analytical work and we apologize for this oversight.

ESSAP's Quality Control (QC) requirements were met for these analyses. 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

RDC:WPI:ar

Enclosure

cc: T. McLaughlin, NRC/NMSS/TWFN/7F27
E. Knox-Davin, NRC/NMSS/TWFN/8A23
J. Peckenpaugh, NMSS/DWM/EPAB
M. LaFranzo, Region III
G. Purdy, NRC/NMSS/TWFN/7F27
W. Snell, Region III
E. Abelquist, ORISE/ESSAP
T. Vitkus, ORISE/ESSAP
File/895

Distribution approval and concurrence:	Initials	Date
Technical Management Team Member	TJV	1/27/2004
Quality Manager	QTP	1/27/2004

ORISE TABLE 1

CONCENTRATIONS OF SELECTED GAMMA EMITTING RADIONUCLIDES IN WATER SAMPLES BY GAMMA SPECTROMETRY CP1, REVISION 13 BIG ROCK POINT NUCLEAR PLANT CHARLEVOIX, MICHIGAN

ESSAP Sample ID	NRC Region III Sample ID	Radionuclide Concentrations[a] (pCi/L)				
		Mn-54	Co-60	Zn-65	Ag-110m	I-129
895W001	MW-9	0.1 ± 1.6[b]	0.1 ± 1.8	3.5 ± 4.2	0.9 ± 1.5	23 ± 24
895W002	PZ-3MB	0.3 ± 2.1	2.7 ± 2.3	0.7 ± 5.1	-3.0 ± 2.1	2 ± 25
895W003	PZ-5S	0.8 ± 2.0	-0.9 ± 2.1	-2.7 ± 4.7	0.4 ± 1.9	-11 ± 18
895W004	PZ-3D	0.3 ± 2.0	0.6 ± 2.2	1.8 ± 4.4	0.3 ± 2.0	12 ± 24
895W005	PZ-3MA	0.4 ± 2.0	0.9 ± 2.0	-2.0 ± 4.7	-0.2 ± 1.9	14 ± 18
895W006	MW-6	0.0[c] ± 1.6	-0.7 ± 1.7	-6.4 ± 3.7	1.2 ± 1.5	-3 ± 24
ESSAP Sample ID	NRC Region III Sample ID	Radionuclide Concentrations[a] (pCi/L)				
		Cs-134	Cs-137	Eu-152	Eu-154	Eu-155
895W001	MW-9	0.2 ± 1.8	-0.7 ± 1.7	-1.6 ± 4.4	-3.8 ± 7.6	1.1 ± 3.6
895W002	PZ-3MB	-1.5 ± 2.5	-3.9 ± 4.2	-2.9 ± 5.5	-8 ± 10	-0.9 ± 4.9
895W003	PZ-5S	1.9 ± 2.2	0.5 ± 2.2	-3.0 ± 4.9	-5.8 ± 9.6	3.0 ± 4.8
895W004	PZ-3D	0.4 ± 2.2	0.0 ± 4.4	1.9 ± 5.5	-10.7 ± 9.7	0.1 ± 4.6
895W005	PZ-3MA	-0.9 ± 2.4	-0.8 ± 2.1	-2.0 ± 5.0	8.5 ± 9.3	-3.4 ± 4.6
895W006	MW-6	1.2 ± 1.9	-1.3 ± 1.7	2.2 ± 4.3	-6.0 ± 7.9	-1.7 ± 3.5

[a]The average MDCs for a sixteen hour count of water in a 1.0 L Marinelli range from a low of 3.0 pCi/L for Ag-110m to a high of 37 pCi/L for I-129.

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

[c]Zero values are due to rounding.

ORISE TABLE 2

CONCENTRATIONS OF GROSS ALPHA AND BETA IN WATER SAMPLES BY LOW BACKGROUND ALPHA AND BETA COUNTING AP1, REVISION 14; CP3 REVISION 2 BIG ROCK POINT NUCLEAR PLANT CHARLEVOIX, MICHIGAN

ESSAP ID	NRC Region III Sample ID	Concentrations (pCi/L)	
		Gross Alpha[a]	Gross Beta[b]
895W001	MW-9	0.5 ± 1.8[c]	8.6 ± 2.8
895W002	PZ-3MB	2.4 ± 3.6	13.1 ± 3.1
895W003	PZ-5S	3.4 ± 4.3	17.1 ± 5.6
895W004	PZ-3D	3.8 ± 2.6	9.3 ± 2.9
895W005	PZ-3MA	3.3 ± 2.8	6.5 ± 2.7
895W006	MW-6	4 ± 20	39 ± 26

[a]The average MDC for gross alpha for a 200 minute count using sample quantities ranging from 0.01 L to 0.1 L is 10 pCi/L.
[b]The average MDC for gross beta for a 200 minute count using sample quantities ranging from 0.01 L to 0.1 L is 11 pCi/L.
[c]Uncertainties represent the 95% confidence level, based on total propagated uncertainties.

ORISE TABLE 3

CONCENTRATIONS OF AMERCIUM-241 and CURIUM 243/244 IN WATER SAMPLES BY ALPHA SPECTROSCOPY AP11, REVISION 2; CP2 REVISION 11 BIG ROCK POINT NUCLEAR PLANT CHARLEVOIX, MICHIGAN

ESSAP Sample ID	NRC Region III Sample ID	Radionuclide Concentrations (pCi/L)	
		Am-241[a]	Cm-243/244[b]
895W001	MW-9	-0.06 ± 0.21[c]	0.04 ± 0.22
895W002	PZ-3MB	-0.02 ± 0.23	-0.26 ± 0.23
895W003	PZ-5S	0.32 ± 0.32	-0.11 ± 0.23
895W004	PZ-3D	0.15 ± 0.17	0.04 ± 0.16
895W005	PZ-3MA	0.15 ± 0.21	-0.13 ± 0.18
895W006	MW-6	0.14 ± 0.21	-0.11 ± 0.21

[a]The average MDC for a sixteen hour count of a 0.1 L sample for Am-241 is 0.40 pCi/L.

[b]The average MDC for a sixteen hour count of a 0.1 L sample for Cm-243/244 is 0.42 pCi/L.

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

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CONCENTRATIONS OF PLUTONIUM RADIONUCLIDES IN WATER SAMPLES BY ALPHA SPECTROSCOPY AP11, REVISION 2; CP2, REVISION 11 AND LIQUID SCINTILLATION ANALYSIS NON-ROUTINE AP10, REVISION 2; CP4, REVISION 3 BIG ROCK POINT NUCLEAR PLANT CHARLEVOIX, MICHIGAN

ESSAP Sample ID	NRC Region III Sample ID	Radionuclide Concentrations (pCi/L)		
		Pu-238[a]	Pu-239/240[a]	Pu-241[b]
895W001	MW-9	0.04 ± 0.15[c]	0.06 ± 0.09	7 ± 20
895W002	PZ-3MB	0.00[d] ± 0.17	0.07 ± 0.10	5 ± 18
895W003	PZ-5S	-0.18 ± 0.14	0.02 ± 0.09	-1 ± 19
895W004	PZ-3D	-0.08 ± 0.14	0.06 ± 0.07	-2 ± 18
895W005	PZ-3MA	-0.23 ± 0.15	0.02 ± 0.07	11 ± 19
895W006	MW-6	-0.02 ± 0.15	-0.06 ± 0.09	1 ± 17

[a]The average MDC for Pu-238 and Pu-239/240 for a sixteen hour count using a 0.1 L sample is 0.25 pCi/L.

[b]The average MDC for Pu-241 for a one hour count using a 0.1 L sample is 31 pCi/L.

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

[d]Zero values are due to rounding.

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CONCENTRATIONS OF TRITIUM AND CARBON-14 IN WATER SAMPLES BY LIQUID SCINTILLATION ANALYSIS AP2, REVISION 14; NON-ROUTINE AP9, REVISION 2; CP4, REVISION 3 BIG ROCK POINT NUCLEAR PLANT CHARLEVOIX, MICHIGAN

ESSAP Sample ID	NRC Region III Sample ID	Tritium Concentrations[a] (pCi/L)	C-14 Concentrations[b] (pCi/L)
895W001	MW-9	190 ± 230[c]	13 ± 22
895W002	PZ-3MB	290 ± 230	37 ± 22
895W003	PZ-5S	310 ± 240	41 ± 22
895W004	PZ-3D	770 ± 250	15 ± 22
895W005	PZ-3MA	2900 ± 310	28 ± 22
895W006	MW-6	2050 ± 290	32 ± 22

[a]The average MDC for a one hour count of a 0.01 L sample for tritium is 390 pCi/L.
[b]The average MDC for a six hour count of a 0.05 L sample for C-14 is 37 pCi/L.
[c]Uncertainties represent the 95% confidence level, based on total propagated uncertainties.

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CONCENTRATIONS OF IRON-55 AND NICKEL-63 IN WATER SAMPLES BY LIQUID SCINTILLATION ANALYSIS NON-ROUTINE AP12, REVISION 3; NON-ROUTINE AP13, REVISION 3; CP4, REVISION 3 BIG ROCK POINT NUCLEAR PLANT CHARLEVOIX, MICHIGAN

ESSAP Sample ID	NRC Region III Sample ID	Fe-55 Concentrations[a] (pCi/L)	Ni-63 Concentrations[b] (pCi/L)
895W001	MW-9	52 ± 28[c]	24 ± 13
895W002	PZ-3MB	46 ± 27	23 ± 13
895W003	PZ-5S	31 ± 26	20 ± 13
895W004	PZ-3D	25 ± 26	21 ± 13
895W005	PZ-3MA	41 ± 27	-14 ± 12
895W006	MW-6	35 ± 26	11 ± 13

[a]The average MDC for a one hour count of a 0.1 L sample for Fe-55 is 42 pCi/L.

[b]The average MDC for a one hour count of a 0.1 L sample for Ni-63 is 21 pCi/L.

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

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CONCENTRATIONS OF STRONTIUM-90 AS TOTAL STRONTIUM IN WATER SAMPLES BY LOW BACKGROUND BETA COUNTING AP4, REVISION 12; CP3, REVISION 2 BIG ROCK POINT NUCLEAR PLANT CHARLEVOIX, MICHIGAN

ESSAP Sample ID	NRC Region III Sample ID	Sr-90 Concentrations[a] (pCi/L)
895W001	MW-9	0.9 ± 1.7[b]
895W002	PZ-3MB	1.5 ± 1.7
895W003	PZ-5S	0.0[c] ± 1.7
895W004	PZ-3D	0.2 ± 1.4
895W005	PZ-3MA	1.1 ± 2.2
895W006	MW-6	0.5 ± 1.7

[a]The average MDC for a one hour count of a 0.25 L sample for Sr-90 is 2.9 pCi/L.
[b]Uncertainties represent the 95% confidence level, based on total propagated uncertainties.
[c]Zero values are due to rounding.