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ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

February 26, 2001

Ms. Elizabeth Ullrich
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

SUBJECT: REPORT FOR ANALYSIS OF SAMPLES COLLECTED FROM SEPTEMBER 21, 2000 THROUGH OCTOBER 4, 2000 FROM ROYERSFORD WASTEWATER TREATMENT FACILITY, ROYERSFORD, PENNSYLVANIA (DOCKET NO. 030-20934, RFTA NO. 99-042)

Dear Ms. Ullrich:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) performed strontium-90, gamma spectroscopy, and percent solid analyses on four effluent, five sludge, seven filtrate, and seven filter cake samples from the Royersford Wastewater Treatment Facility, Royersford, Pennsylvania. In addition, tritium analysis was performed on the effluent, sludge, and filtrate samples. The results are presented in pCi/L for the effluent, sludge, and filtrate samples, whereas the results for the filter cake samples are presented as pCi/g dry weight for strontium-90 and pCi/g wet weight for gamma spectroscopy. The results are presented in Tables 1 though 4, respectively.

ESSAP's Quality Control (QC) procedures were followed for these analyses. Analytical and instrumentation QC for these 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

RDC:ar

Enclosure

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TABLE 1

STRONTIUM-90 CONCENTRATIONS IN LIQUID AND SOLID SAMPLES ROYERSFORD WASTEWATER TREATMENT FACILITY ROYERSFORD, PENNSYLVANIA

ESSAP SAMPLE ID	NRC SAMPLE ID	Sr-90 Concentrations (pCi/L or pCi/g)[a]	MDC (pCi/L or pCi/g)
0761M001	Effluent to River, #1	1.3 ± 2.4[b]	4.0
0761M002	Effluent to River, #2	-0.7 ± 2.2	4.1
0761M003	Effluent to River, #3	0.4 ± 2.2	3.9
0761M004	Effluent to River, #4	0.7 ± 2.3	4.0
0761M005	Sludge #1	70.4 ± 9.4	9.3
0761M006	Sludge #2	171 ± 14	9.3
0761M007	Sludge #3	65.3 ± 9.4	9.7
0761M008	Sludge w/ Polymer #6	42.6 ± 6.3	6.7
0761M009	Sludge w/ Polymer #7	73 ± 14	17
0761M010	Filtrate #1	0.3 ± 4.0	7.1
0761M011	Filtrate #2	4.2 ± 4.4	7.2
0761M012	Filtrate #3	3.1 ± 4.9	8.3
0761M013	Filtrate #4	24.8 ± 4.0	4.4
0761M014	Filtrate #5	5.0 ± 4.6	7.5
0761M015	Filtrate #6	1.9 ± 4.3	7.4
0761M016	Filtrate #7	1.5 ± 4.0	7.0
0761M017	Filter Cake #1	2.85 ± 0.50	0.57
0761M018	Filter Cake #2	1.37 ± 0.35	0.46
0761M019	Filter Cake #3	1.82 ± 0.44	0.57
0761M020	Filter Cake #4	2.85 ± 0.50	0.56
0761M021	Filter Cake #5	2.25 ± 0.48	0.59
0761M022	Filter Cake #6	2.26 ± 0.50	0.62
0761M023	Filter Cake #7	12.4 ± 1.0	0.6

[a]Samples 0761M001-M016 are pCi/L and samples 0761M017-M023 are pCi/g dry material.
[b]Uncertainties represent the 95% confidence level, based on total propagated uncertainties.

TABLE 2

GAMMA EMITTING ISOTOPE CONCENTRATIONS IN LIQUID AND SOLID SAMPLES ROYERSFORD WASTEWATER TREATMENT FACILITY ROYERSFORD, PENNSYLVANIA

ESSAP Sample ID	NRC Sample ID	Radionuclide Concentrations (pCi/L or pCi/g)[a]				
		I-125	I-129	Sb-125	Ag-110M	Cs-137
0761M001	Effluent to River, #1	<142	<37	< 8.3	< 4.1	35.7 ± 1.6[b]
0761M002	Effluent to River, #2	<97	<29	< 8.1	< 3.4	39.2 ± 4.1
0761M003	Effluent to River, #3	<118	<31	< 8.6	< 4.0	60.4 ± 5.0
0761M004	Effluent to River, #4	<111	<36	< 11.1	< 5.0	57.4 ± 7.3
0761M005	Sludge #1	2,050 ± 450	<170	470 ± 70	440 ± 40	2,950 ± 140
0761M006	Sludge #2	1,550 ± 470	<240	520 ± 100	570 ± 50	3,540 ± 170
0761M007	Sludge #3	9,200 ± 2200	<580	550 ± 90	670 ± 50	3,950 ± 70
0761M008	Sludge w/ Polymer #6	1,190 ± 470	<260	370 ± 80	470 ± 40	2,230 ± 110
0761M009	Sludge w/ Polymer #7	1,300 ± 630	<250	370 ± 80	450 ± 40	2,120 ± 100
0761M010	Filtrate #1	<116	<30	< 13	< 6.6	100 ± 8
0761M011	Filtrate #2	<195	<43	< 14	< 8.0	170 ± 10
0761M012	Filtrate #3	<180	<53	< 27	< 15	330 ± 10
0761M013	Filtrate #4	<1,670	<320	< 98	240 ± 30	1,420 ± 40
0761M014	Filtrate #5	<170	<40	< 13	< 6.9	150 ± 10
0761M015	Filtrate #6	<110	<32	< 14	< 6.9	130 ± 10
0761M016	Filtrate #7	<145	<36	< 12	<5.4	130 ± 10
0761M017	Filter Cake #1	<20	<4.0	< 1.5	< 0.8	14.2 ± 0.8
0761M018	Filter Cake #2	<19	<3.9	< 1.4	< 0.8	13.0 ± 0.8
0761M019	Filter Cake #3	28 ± 18	<4.3	< 1.5	< 0.8	15.1 ± 0.9
0761M020	Filter Cake #4	15 ± 13	<4.1	< 1.5	< 0.8	15.5 ± 0.9
0761M021	Filter Cake #5	<19	<4.1	< 1.4	< 0.8	14.2 ±0.9
0761M022	Filter Cake #6	<20	<4.6	< 1.6	< 0.9	14.8 ± 0.9
0761M023	Filter Cake #7	<18	<4.4	< 1.6	< 0.9	15.7 ± 0.9

TABLE 2 (Continued)

GAMMA EMITTING ISOTOPES CONCENTRATIONS IN LIQUID AND SOLID SAMPLES ROYERSFORD WASTEWATER TREATMENT FACILITY ROYERSFORD, PENNSYLVANIA

ESSAP Sample ID	NRC Sample ID	Radionuclide Concentrations (pCi/L or pCi/g)				
		Cs-134	Co-58	Mn-54	Zn-65	Co-60
0761M001	Effluent to River, #1	11.3 ± 1.7	< 6.8	6.4 ± 1.5	< 8.7	29.5 ± 2.1
0761M002	Effluent to River, #2	11.5 ± 3.9	20.9 ± 5.1	< 3.7	< 8.7	25.7 ± 3.8
0761M003	Effluent to River, #3	15.5 ± 4.0	20.6 ± 6.7	4.0 ± 3.0	< 9.5	68.9 ± 5.8
0761M004	Effluent to River, #4	17.3 ± 4.5	20.5 ± 8.0	< 5.0	< 12	26.6 ± 6.8
0761M005	Sludge #1	360 ± 40	3,060 ± 190	17,700 ± 960	6,180 ± 220	43,000 ± 580
0761M006	Sludge #2	400 ± 50	3,780 ± 240	21,700 ± 1200	7,300 ± 260	54,140 ± 750
0761M007	Sludge #3	510 ± 70	4,060 ± 180	23,970 ± 640	9,780 ± 390	61,800 ± 2,000
0761M008	Sludge w/ Polymer #6	190 ± 40	2,500 ± 160	15,400 ± 850	4,140 ± 200	38,900 ± 560
0761M009	Sludge w/ Polymer #7	210 ± 50	2,870 ± 190	13,810 ± 760	4,490 ± 200	37,350 ± 530
0761M010	Filtrate #1	13.2 ± 4.9	45 ±17	210 ± 10	52 ± 16	510 ± 20
0761M011	Filtrate #2	21.3 ± 6.1	70 ± 16	400 ± 30	110 ± 20	940 ± 20
0761M012	Filtrate #3	56 ± 12	210 ± 30	1,670 ± 50	380 ± 40	3,630 ± 120
0761M013	Filtrate #4	140 ± 30	1,560 ± 90	8,100 ± 230	2,130 ± 150	19,800 ± 640
0761M014	Filtrate #5	24.9 ± 6.8	73 ± 14	280 ± 20	96 ± 16	830 ± 20
0761M015	Filtrate #6	18.2 ± 7.0	67 ±13	230 ± 10	34 ± 15	490± 20
0761M016	Filtrate #7	16.8 ± 5.6	26.3 ± 9.9	54.2 ± 7.4	< 15	220 ± 10
0761M017	Filter Cake #1	1.7 ± 0.7	16.2 ± 2.0	94.2 ± 5.4	38.4 ± 3.1	240 ± 4
0761M018	Filter Cake #2	1.3 ± 0.7	13.7 ± 1.7	90.1 ± 5.2	39.5 ± 3.1	210 ± 4
0761M019	Filter Cake #3	2.0 ± 0.8	16.6 ± 1.9	100 ± 10	35.7 ± 3.3	240 ± 4
0761M020	Filter Cake #4	1.7 ± 0.7	16.8 ± 2.1	100 ± 10	32.8 ± 2.6	240 ± 4
0761M021	Filter Cake #5	1.8 ± 0.8	14.6 ± 2.0	91.7 ± 5.3	28.2 ± 2.5	233 ± 4
0761M022	Filter Cake #6	1.2 ± 0.7	24.4 ± 2.4	120 ± 10	39.5 ± 3.4	270 ± 4
0761M023	Filter Cake #7	1.3 ± 0.7	21.5 ± 2.0	100 ± 10	49.5 ± 3.0	260 ± 4

[a]Samples 0761M001-M016 are pCi/L and samples 0761M017-M023 are pCi/g wet material.
[b]Uncertainties represent the 95% confidence level, based on total propagated uncertainties.

TABLE 3

TRITIUM CONCENTRATIONS IN LIQUID SAMPLES ROYERSFORD WASTEWATER TREATMENT FACILITY ROYERSFORD, PENNSYLVANIA

ESSAP SAMPLE ID	NRC SAMPLE ID	H-3 Concentrations (pCi/L)	MDC (pCi/L)
0761M001	Effluent to River, #1	820 ± 500[a]	820
0761M002	Effluent to River, #2	1,300 ± 530	820
0761M003	Effluent to River, #3	4,050 ± 670	820
0761M004	Effluent to River, #4	4,500 ± 700	820
0761M005	Sludge #1	-70 ± 470	820
0761M006	Sludge #2	170 ± 480	820
0761M007	Sludge #3	250 ± 480	820
0761M008	Sludge w/ Polymer #6	310 ± 480	820
0761M009	Sludge w/ Polymer #7	1,000 ± 510	820
0761M010	Filtrate #1	290 ± 480	820
0761M011	Filtrate #2	-60 ± 470	820
0761M012	Filtrate #3	-330 ± 460	820
0761M013	Filtrate #4	-200 ± 470	820
0761M014	Filtrate #5	290 ± 480	820
0761M015	Filtrate #6	520 ± 490	820
0761M016	Filtrate #7	2,040 ± 560	820

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

TABLE 4

PERCENT SOLIDS
IN LIQUID AND SOLID SAMPLES
ROYERSFORD WASTEWATER TREATMENT FACILITY
ROYERSFORD, PENNSYLVANIA

ESSAP SAMPLE ID	NRC SAMPLE ID	Percent Solids[a]
0761M001	Effluent to River, #1	0.05
0761M002	Effluent to River, #2	0.04
0761M003	Effluent to River, #3	0.06
0761M004	Effluent to River, #4	0.06
0761M005	Sludge #1	2.70
0761M006	Sludge #2	2.78
0761M007	Sludge #3	2.77
0761M008	Sludge w/ Polymer #6	3.18
0761M009	Sludge w/ Polymer #7	6.23
0761M010	Filtrate #1	0.08
0761M011	Filtrate #2	0.11
0761M012	Filtrate #3	0.22
0761M013	Filtrate #4	0.72
0761M014	Filtrate #5	0.09
0761M015	Filtrate #6	0.08
0761M016	Filtrate #7	0.09
0761M017	Filter Cake #1	14.96
0761M018	Filter Cake #2	17.25
0761M019	Filter Cake #3	14.95
0761M020	Filter Cake #4	15.24
0761M021	Filter Cake #5	14.00
0761M022	Filter Cake #6	15.25
0761M023	Filter Cake #7	15.48

[a]Percent solids was calculated by:

$$Percent\ Solids = \left(\frac{dry\ weight}{wet\ weight}\right) x\ 100$$