



Oak Ridge  
Associated Universities  
Post Office Box 117  
Oak Ridge, Tennessee 37831-0117

Energy/  
Environment  
Systems Division

May 8, 1991

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

**SUBJECT: PRELIMINARY DATA FOR THE ROYERSFORD SLUDGE SAMPLES**

Dear Ms. Ullrich:

Enclosed are the gamma spectroscopy results of analyses performed on samples submitted by the Royersford Wastewater Treatment Plant. Sludge cake samples summarized in Table 1, are reported in units of activity per gram of dry solids. Liquid sludge samples results in Table 2 and filtrate liquid sludge samples results in Table 3 are reported in units of activity per volume of sample. Vegetation samples from the reed beds, summarized in Table 4, are reported in units of activity per gram of ashed sample. Strontium-90 analyses have not been performed and will be provided when evaluation is completed. In a previous discussion with J. Kinneman, it was decided that uranium and plutonium analyses will be performed if requested by the NRC on selected samples.

You may contact me at FTS 626-0065 if you have any questions regarding these data.

Sincerely,

Wade C. Adams  
Health Physicist/Project Leader  
Environmental Survey and  
Site Assessment Program

WCA:jls

Enclosures  
As Stated

cc: J. Kinneman, NRC/Region I  
D. Tiktinsky, NRC/NMSS 6A4  
T. Mo, NRC/NMSS 6H3  
C. Haughney, NRC/NMSS 6H3  
P. Cotten, ORAU  
Site File: ROY/127

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TABLE 1 (Cont'd)  
 RADIONUCLIDE CONCENTRATIONS MEASURED  
 IN SLUDGE SAMPLES (8.3% TO 20.7% SOLIDS) FROM  
 ROYERSFORD WASTEWATER TREATMENT PLANT

RADIONUCLIDE	RADIONUCLIDE CONCENTRATION (pCi/g)					
	DATES and TIMES (1990)					
	7/12-1815	7/13-1930	12/12-1530	12/12-1530	12/12-1530	
Cr-51	<2000	<2100	<13	<17.4	<50	
Mn-54	442 ± 20	438 ± 22	19.8 ± 1.4	27.4 ± 2.1	117.6 ± 5.5	
Co-58	96 ± 30	106 ± 43	1.1 ± 1.1	1.6 ± 1.5	8.2 ± 4.3	
Fe-59	<220	<220	<3.8	<5.5	<16	
Co-60	1042 ± 23	999 ± 24	60.6 ± 2.2	87.0 ± 3.0	427.7 ± 9.2	
Zn-65	570 ± 48	551 ± 47	21.3 ± 2.8	33.0 ± 4.3	129 ± 12	
Sr-90	---	---	---	---	---	
Nb-95	<170	<190	<1.9	<2.8	<7.8	
Zr-95	<80	<90	<2.6	<3.7	<10	
Ag-110m	11 ± 12	<17	<1.1	1.2 ± 1.3	<4.9	
Sb-125	<24	<27	<2.6	<3.5	<10	
Cs-134	18.9 ± 7.9	18 ± 10	0.9 ± 0.6	2.2 ± 0.9	5.0 ± 2.8	
Cs-137	183.8 ± 9.0	187 ± 10	10.5 ± 0.9	15.1 ± 1.3	61.9 ± 5.1	
U-234	---	---	---	---	---	
U-235	---	---	---	---	---	
U-238	---	---	---	---	---	
Pu-238	---	---	---	---	---	
Pu-239/240	---	---	---	---	---	

\*Nuclide not identified.

<sup>b</sup>Poor detection sensitivities for Cr-51, Fe-59, Nb-95, and Zr-95 are the result of small solids content and/or correction for decay between collection and analysis dates.

<sup>c</sup>Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10 have not been propagated into these data.

<sup>d</sup>Dash indicates analysis not yet completed.



**TABLE 2 (Cont'd)**  
**RADIONUCLIDE CONCENTRATIONS MEASURED**  
**IN LIQUID SLUDGE SAMPLES (3% to 6% SOLIDS) FROM**  
**ROYERSFORD WASTEWATER TREATMENT PLANT**

RADIONUCLIDE	RADIONUCLIDE CONCENTRATION (pCi/g)						
	DATES and TIMES (1990)						
	7/6-2130	7/7-1015	7/9-1700	7/10-1040	7/11-1330	7/12-1815	7/13-1930
Cr-51	<3200	<3600	<94000	<82000	<120000	<66000	<98000
Mn-54	7420 ± 550	9640 ± 630	9760 ± 610	13500 ± 600	13970 ± 940	8710 ± 490	13470 ± 890
Co-58	1730 ± 440	2090 ± 580	1900 ± 1300	2100 ± 1300	3500 ± 1800	2370 ± 830	2600 ± 1500
Fe-59	<1100	<1300	<9300	<10000	<12000	<8600	<11000
Co-60	15170 ± 740	21470 ± 890	22450 ± 850	29600 ± 890	31600 ± 1100	23800 ± 770	34500 ± 1000
Zn-65	8900 ± 1000	11500 ± 1100	11300 ± 1500	19000 ± 1900	17900 ± 2000	12400 ± 1400	15100 ± 2200
Sr-90	---	---	---	---	---	---	---
Nb-95	<510	<680	<7800	<7500	<9700	<6800	<8100
Zr-95	<780	<880	<3500	<3500	<4400	<3000	<4100
Ag-110m	<390	160 ± 330	<640	<610	<860	<560	600 ± 540
Sb-125	<830	<930	<1000	890 ± 700	<1300	450 ± 550	<1200
Cs-134	360 ± 260	320 ± 280	520 ± 340	660 ± 240	970 ± 390	420 ± 160	830 ± 310
Cs-137	2560 ± 320	2810 ± 350	4180 ± 460	5470 ± 360	5790 ± 460	3620 ± 440	5120 ± 400
U-234	---	---	---	---	---	---	---
U-235	---	---	---	---	---	---	---
U-238	---	---	---	---	---	---	---
Pu-238	---	---	---	---	---	---	---
Pu-239/240	---	---	---	---	---	---	---

<sup>a</sup>Nuclide not identified.

<sup>b</sup>Poor detection sensitivities for Cr-51, Fe-59, Nb-95, and Zr-95 are the result of small solids content and/or correction for decay between collection and analysis dates.

<sup>c</sup>Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10 have not been propagated into these data.

<sup>d</sup>Dash indicates analysis not yet completed.



**TABLE 3 (Cont'd)  
RADIONUCLIDE CONCENTRATIONS MEASURED  
IN FILTRATE SLUDGE SAMPLES (<3% SOLIDS) FROM  
ROYERSFORD WASTEWATER TREATMENT PLANT**

RADIONUCLIDE	RADIONUCLIDE CONCENTRATION (pCi/g)					
	DATES and TIMES (1990)					
	7/7-1015	7/9-1700	7/10-1040	7/11-1330	7/12-1815	7/13-1930
Cr-51	<730	<17000	<13000	<18000	<12000	<16000
Mn-54	<99	<100	<140	<140	<100	<110
Co-58	<130	<300	<440	<380	<300	<390
Fe-59	<250	<1400	<1500	<1500	<890	<1400
Co-60	260 ± 100	230 ± 120	220 ± 110	280 ± 140	170 ± 110	120 ± 100
Zn-65	<250	<400	140 ± 190	<350	<310	<240
Sr-90	---	---	---	---	---	---
Nb-95	<70	<1300	<760	<1100	<1100	<1600
Zr-95	<120	<400	<500	<740	<540	<750
Ag-110m	<95	<100	<100	<140	<110	<110
Sb-125	<170	<200	<190	<200	<190	<220
Cs-134	31 ± 40	<100	<8.3	<100	<81	<120
Cs-137	53 ± 72	199 ± 92	131 ± 67	140 ± 84	141 ± 67	191 ± 83
U-234	---	---	---	---	---	---
U-235	---	---	---	---	---	---
U-238	---	---	---	---	---	---
Pu-238	---	---	---	---	---	---
Pu-239/240	---	---	---	---	---	---

\*Nuclide not identified.

<sup>b</sup>Poor detection sensitivities for Cr-51, Fe-59, Nb-95, and Zr-95 are the result of small solids content and/or correction for decay between collection and analysis dates.

<sup>c</sup>Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10 have not been propagated into these data.

<sup>d</sup>Dash indicates analysis not yet completed.



**TABLE 4**  
**RADIONUCLIDE CONCENTRATIONS**  
**MEASURED IN REED STALK SAMPLES FROM**  
**ROYERSFORD WASTEWATER TREATMENT PLANT**

RADIONUCLIDE	RADIONUCLIDE CONCENTRATION (pCi/g)			
	7/30-0920	12/12-1530	12/12-1530	12/12-1530
Cr-51	<21 <sup>a</sup>	<35	<18	<23
Mn-54	6.1 ± 1.2 <sup>b</sup>	4.1 ± 1.7	3.0 ± 1.9	2.9 ± 1.8
Co-58	<1.2	<3.0	<3.4	<2.3
Fe-59	<3.3	<6.5	<1.7	<5.2
Co-60	0.9 ± 0.8	<3.1	1.0 ± 0.8	1.5 ± 1.2
Zn-65	9.0 ± 2.1	1.7 ± 1.9	<3.0	4.3 ± 3.0
Sr-90	---	---	---	---
Nb-95	<2.0	<3.2	<3.9	<2.4
Zr-95	<2.3	<4.7	<4.2	<3.2
Ag-110m	<1.3	<2.2	<1.7	<1.7
Sb-125	<2.8	<4.7	<5.2	<4.7
Cs-134	1.8 ± 0.7	<1.7	<2.1	<1.6
Cs-137	15.1 ± 1.6	<2.6	1.2 ± 1.3	2.0 ± 1.1
U-234	---	---	---	---
U-235	---	---	---	---
U-238	---	---	---	---
Pu-238	---	---	---	---
Pu-239/240	---	---	---	---

<sup>a</sup>Poor detection sensitivities for Cr-51, Fe-59, Nb-95, and Zr-95 are the result of small solids content and/or correction for decay between collection and analysis dates.

<sup>b</sup>Uncertainties represent the 95% confidence levels, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10 have not been propagated into these data.

<sup>c</sup>Dash indicates analysis not yet completed.