

Table 00-19. Activity Concentrations of Radionuclides Measured by Gamma Spectroscopy in Red Bluff Reservoir Sediment Samples Collected during 1998 - 2000

See CEMRC 2000 Report "Radiological and non-radiological constituents in surface water and sediments at selected reservoirs" for descriptions of locations and methods of data collection.

Isotope	Collection Date and Sampling Depth					
	March 3, 1998 (14.9 m depth)			March 10, 1998 (14.0 m depth)		
	Activity Concentration (mBq g ⁻¹)	^a SD (mBq g ⁻¹)	^b MDC (mBq g ⁻¹)	Activity Concentration (mBq g ⁻¹)	SD (mBq g ⁻¹)	MDC (mBq g ⁻¹)
²²⁸ Ac	3.14E+01	6.79E-01	1.66E+00	3.28E+01	7.28E-01	1.82E+00
²⁴¹ Am	<MDL		2.16E+00	<MDL		2.31E+00
⁷ Be	<MDL		3.73E+03	<MDL		5.36E+03
²¹² Bi	3.20E+01	2.24E+00	6.64E+00	3.70E+01	2.32E+00	6.67E+00
²¹³ Bi	<MDL		1.06E+00	<MDL		1.18E+00
²¹⁴ Bi	3.46E+01	5.39E-01	9.45E-01	3.25E+01	5.33E-01	1.01E+00
¹⁴⁴ Ce	<MDL		1.15E+01	<MDL		8.54E+00
²⁴⁹ Cf	<MDL		5.31E-01	<MDL		5.20E-01
⁶⁰ Co	<MDL		4.68E-01	<MDL		5.12E-01
¹³⁴ Cs	<MDL		3.96E+00	<MDL		4.95E+00
¹³⁷ Cs	1.07E+01	2.58E-01	3.30E-01	1.06E+01	2.70E-01	3.70E-01
¹⁵² Eu	<MDL		1.16E+00	<MDL		1.01E+00
¹⁵⁴ Eu	<MDL		1.38E+00	<MDL		1.65E+00
⁴⁰ K	4.52E+02	7.17E+00	4.89E+00	4.32E+02	7.07E+00	5.81E+00
²³³ Pa	<MDL		7.16E-01	<MDL		7.26E-01
^{234m} Pa	5.60E+01	1.60E+01	5.16E+01	5.99E+01	1.67E+01	5.38E+01
²¹² Pb	3.24E+01	5.19E-01	6.65E-01	3.21E+01	5.27E-01	6.93E-01
²¹⁴ Pb	3.57E+01	5.00E-01	8.75E-01	3.32E+01	4.83E-01	8.92E-01
¹⁰⁶ Rh	<MDL		8.35E+00	<MDL		1.29E+01
¹²⁵ Sb	<MDL		1.32E+00	<MDL		1.18E+00
²⁰⁸ Tl	1.03E+01	2.13E-01	4.95E-01	1.02E+01	2.22E-01	5.55E-01
Isotope	March 10, 1998 (14.0 m depth)			March 10, 1998 (11.9 m depth)		
	Activity Concentration (mBq g ⁻¹)	SD (mBq g ⁻¹)	MDC (mBq g ⁻¹)	Activity Concentration (mBq g ⁻¹)	SD (mBq g ⁻¹)	MDC (mBq g ⁻¹)
²²⁸ Ac	3.18E+01	7.03E-01	1.81E+00	2.33E+01	6.81E-01	1.26E+00
²⁴¹ Am	<MDL		2.21E+00	<MDL		2.24E+00
⁷ Be	<MDL		4.70E+03	<MDL		2.53E+03
²¹² Bi	3.59E+01	2.02E+00	5.65E+00	2.54E+01	1.66E+00	4.85E+00

¹⁵⁴ Eu	<MDL		1.65E+00	<MDL		1.36E+00
⁴⁰ K	4.43E+02	7.12E+00	5.66E+00	4.29E+02	6.57E+00	4.22E+00
²³³ Pa	<MDL		6.42E-01	<MDL		5.13E-01
^{234m} Pa	7.07E+01	1.76E+01	5.65E+01	<MDL		3.12E+01
²¹² Pb	3.15E+01	5.11E-01	6.50E-01	1.99E+01	2.39E+00	4.91E-01
²¹⁴ Pb	3.19E+01	4.62E-01	8.55E-01	2.56E+01	3.93E-01	6.67E-01
¹⁰⁶ Rh	<MDL		8.79E+00	<MDL		7.38E+00
¹²⁵ Sb	<MDL		1.42E+00	<MDL		1.31E+00
²⁰⁸ Tl	1.01E+01	2.14E-01	5.16E-01	6.96E+00	1.49E-01	3.61E-01
Isotope	October 14, 1998 (10.4 m depth)			October 14, 1998 (10.4 m depth)		
	Activity Concentration (mBq g⁻¹)	SD (mBq g⁻¹)	MDC (mBq g⁻¹)	Activity Concentration (mBq g⁻¹)	SD (mBq g⁻¹)	MDC (mBq g⁻¹)
²²⁸ Ac	2.85E+01	7.18E-01	2.16E+00	3.20E+01	6.58E-01	1.45E+00
²⁴¹ Am	<MDL		2.43E+00	<MDL		2.45E+00
⁷ Be	<MDL		2.28E+02	<MDL		1.97E+02
²¹² Bi	3.15E+01	2.60E+00	7.83E+00	3.50E+01	1.97E+00	5.59E+00
²¹³ Bi	<MDL		1.39E+00	<MDL		1.24E+00
²¹⁴ Bi	2.92E+01	5.56E-01	1.27E+00	3.21E+01	4.93E-01	7.90E-01
¹⁴⁴ Ce	<MDL		4.90E+00	<MDL		5.43E+00
²⁴⁹ Cf	<MDL		4.67E-01	<MDL		4.89E-01
⁶⁰ Co	<MDL		5.26E-01	<MDL		5.02E-01
¹³⁴ Cs	<MDL		4.53E+00	<MDL		3.26E+00
¹³⁷ Cs	8.52E+00	2.49E-01	3.69E-01	1.04E+01	2.43E-01	2.94E-01
¹⁵² Eu	<MDL		1.10E+00	<MDL		8.66E-01
¹⁵⁴ Eu	<MDL		1.23E+00	<MDL		1.59E+00
⁴⁰ K	4.08E+02	7.01E+00	7.13E+00	4.27E+02	6.76E+00	5.00E+00
²³³ Pa	<MDL		1.05E+00	<MDL		7.77E-01
^{234m} Pa	5.04E+01	1.41E+01	4.50E+01	<MDL		5.13E+01
²¹² Pb	2.75E+01	4.65E-01	5.93E-01	3.24E+01	5.22E-01	5.50E-01
²¹⁴ Pb	3.06E+01	4.80E-01	1.13E+00	3.27E+01	4.92E-01	7.85E-01
¹⁰⁶ Rh	<MDL		6.30E+00	<MDL		5.68E+00
¹²⁵ Sb	<MDL		1.14E+00	<MDL		9.98E-01
²⁰⁸ Tl	9.01E+00	2.29E-01	6.56E-01	1.02E+01	2.01E-01	4.47E-01
Isotope	October 14, 1998 (10.4 m depth)			October 14, 1998 (10.1 m depth)		
	Activity Concentration (mBq g⁻¹)	SD (mBq g⁻¹)	MDC (mBq g⁻¹)	Activity Concentration (mBq g⁻¹)	SD (mBq g⁻¹)	MDC (mBq g⁻¹)
²²⁸ Ac	3.38E+01	7.64E-01	2.14E+00	3.28E+01	7.57E-01	2.15E+00

¹³⁷ Cs	1.11E+01	2.81E-01	3.97E-01	1.10E+01	2.81E-01	4.00E-01
¹⁵² Eu	<MDL		1.83E+00	<MDL		1.49E+00
¹⁵⁴ Eu	<MDL		1.42E+00	<MDL		1.48E+00
⁴⁰ K	4.55E+02	7.34E+00	5.44E+00	4.41E+02	7.18E+00	5.40E+00
²³³ Pa	<MDL		8.50E-01	<MDL		6.69E-01
^{234m} Pa	1.00E+02	2.10E+01	6.72E+01	<MDL		5.01E+01
²¹² Pb	3.50E+01	5.73E-01	7.39E-01	3.34E+01	5.51E-01	7.22E-01
²¹⁴ Pb	3.59E+01	5.39E-01	1.17E+00	3.26E+01	5.06E-01	1.18E+00
¹⁰⁶ Rh	<MDL		1.03E+01	<MDL		7.74E+00
¹²⁵ Sb	<MDL		1.65E+00	<MDL		2.01E+00
²⁰⁸ Tl	1.07E+01	2.30E-01	5.66E-01	1.04E+01	2.34E-01	5.73E-01
Isotope	July 27, 1999 (9.4 m depth)			July 27, 1999 (13.4 m depth)		
	Activity Concentration (mBq g⁻¹)	SD (mBq g⁻¹)	MDC (mBq g⁻¹)	Activity Concentration (mBq g⁻¹)	SD (mBq g⁻¹)	MDC (mBq g⁻¹)
²²⁸ Ac	2.69E+01	6.17E-01	1.73E+00	2.92E+01	7.14E-01	2.20E+00
²⁴¹ Am	<MDL		1.87E+00	<MDL		2.41E+00
⁷ Be	<MDL		7.29E+00	<MDL		8.36E+00
²¹² Bi	2.69E+01	1.86E+00	5.43E+00	3.21E+01	2.60E+00	7.86E+00
²¹³ Bi	<MDL		9.73E-01	<MDL		1.85E+00
²¹⁴ Bi	2.77E+01	4.66E-01	8.41E-01	2.74E+01	5.11E-01	1.13E+00
¹⁴⁴ Ce	<MDL		2.32E+00	<MDL		4.50E+00
²⁴⁹ Cf	<MDL		4.81E-01	<MDL		6.84E-01
⁶⁰ Co	<MDL		3.81E-01	<MDL		4.01E-01
¹³⁴ Cs	<MDL		2.70E+00	<MDL		3.24E+00
¹³⁷ Cs	8.08E+00	2.12E-01	2.95E-01	8.83E+00	2.46E-01	3.71E-01
¹⁵² Eu	<MDL		8.22E-01	<MDL		1.03E+00
¹⁵⁴ Eu	<MDL		8.86E-01	<MDL		1.34E+00
⁴⁰ K	4.73E+02	7.37E+00	4.75E+00	4.22E+02	6.93E+00	5.71E+00
²³³ Pa	<MDL		5.55E-01	<MDL		1.10E+00
^{234m} Pa	4.41E+01	1.36E+01	4.38E+01	7.21E+01	2.22E+01	7.20E+01
²¹² Pb	2.73E+01	4.47E-01	6.27E-01	3.06E+01	5.06E-01	6.55E-01
²¹⁴ Pb	2.89E+01	4.21E-01	7.98E-01	2.79E+01	4.54E-01	1.16E+00
¹⁰⁶ Rh	<MDL		4.09E+00	<MDL		3.19E+00
¹²⁵ Sb	<MDL		1.16E+00	<MDL		1.45E+00
²⁰⁸ Tl	8.70E+00	1.89E-01	4.66E-01	9.90E+00	2.26E-01	5.92E-01
Isotope	July 27, 1999 (13.7 m depth)			July 27, 1999 (12.8 m depth)		
	Activity Concentration	SD (mBq g⁻¹)	MDC (mBq g⁻¹)	Activity Concentration	SD (mBq g⁻¹)	MDC (mBq g⁻¹)

⁶⁰ Co	<MDL		5.00E-01	<MDL		4.57E-01
¹³⁴ Cs	<MDL		3.05E+00	<MDL		2.87E+00
¹³⁷ Cs	9.78E+00	2.61E-01	3.73E-01	9.44E+00	2.36E-01	3.15E-01
¹⁵² Eu	<MDL		1.20E+00	<MDL		9.02E-01
¹⁵⁴ Eu	<MDL		1.25E+00	<MDL		1.04E+00
⁴⁰ K	4.31E+02	7.02E+00	5.00E+00	4.25E+02	6.81E+00	4.78E+00
²³³ Pa	<MDL		9.83E-01	<MDL		8.24E-01
^{234m} Pa	6.91E+01	1.72E+01	5.53E+01	6.50E+01	1.41E+01	4.48E+01
²¹² Pb	3.33E+01	5.48E-01	7.04E-01	3.20E+01	5.09E-01	6.53E-01
²¹⁴ Pb	2.91E+01	4.61E-01	1.02E+00	2.88E+01	4.25E-01	8.30E-01
¹⁰⁶ Rh	<MDL		3.85E+00	<MDL		4.40E+00
¹²⁵ Sb	<MDL		1.46E+00	<MDL		8.43E-01
²⁰⁸ Tl	1.04E+01	2.18E-01	5.03E-01	1.01E+01	2.10E-01	4.93E-01
Isotope	May 22, 2000 (12.6 m depth)			May 22, 2000 (12.3 m depth)		
	Activity Concentration (mBq g⁻¹)	SD (mBq g⁻¹)	MDC (mBq g⁻¹)	Activity Concentration (mBq g⁻¹)	SD (mBq g⁻¹)	MDC (mBq g⁻¹)
²²⁸ Ac	3.18E+01	7.32E-01	1.85E+00	3.33E+01	7.69E-01	1.88E+00
²⁴¹ Am	<MDC		3.42E+00	<MDC		2.69E+00
⁷ Be	<MDC		7.07E+00	<MDC		1.24E+01
²¹² Bi	3.57E+01	2.04E+00	5.60E+00	3.54E+01	2.15E+00	5.88E+00
²¹³ Bi	<MDC		1.24E+00	<MDC		1.43E+00
²¹⁴ Bi	3.28E+01	5.59E-01	1.10E+00	3.48E+01	6.01E-01	1.07E+00
¹⁴⁴ Ce	<MDC		2.25E+00	<MDC		2.81E+00
²⁴⁹ Cf	<MDC		5.96E-01	<MDC		6.16E-01
⁶⁰ Co	<MDC		4.26E-01	<MDC		5.09E-01
¹³⁴ Cs	<MDC		3.85E+00	<MDC		3.21E+00
¹³⁷ Cs	9.35E+00	1.78E-01	3.48E-01	8.58E+00	1.89E-01	3.56E-01
¹⁵² Eu	<MDC		1.12E+00	<MDC		1.16E+00
¹⁵⁴ Eu	<MDC		1.59E+00	<MDC		1.26E+00
⁴⁰ K	4.39E+02	7.79E+00	6.28E+00	4.76E+02	8.74E+00	6.10E+00
²³³ Pa	<MDC		6.89E-01	<MDC		7.04E-01
^{234m} Pa	<MDC		5.66E+01	4.97E+01	1.53E+01	4.93E+01
²¹² Pb	3.27E+01	4.92E-01	5.97E-01	3.31E+01	5.56E-01	6.54E-01
²¹⁴ Pb	3.31E+01	4.94E-01	1.02E+00	3.55E+01	5.38E-01	1.11E+00
¹⁰⁶ Rh	<MDC		5.10E+00	<MDC		5.56E+00
¹²⁵ Sb	<MDC		1.08E+00	<MDC		9.40E-01
²⁰⁸ Tl	1.04E+01	2.55E-01	5.51E-01	1.12E+01	2.81E-01	5.52E-01
	May 22, 2000 (12.6 m depth)			May 22, 2000 (12.4 m depth)		

¹⁴⁴ Ce	<MDC		2.43E+00	<MDC		2.69E+00
²⁴⁹ Cf	<MDC		4.76E-01	<MDC		6.10E-01
⁶⁰ Co	<MDC		4.34E-01	<MDC		4.60E-01
¹³⁴ Cs	<MDC		2.95E+00	<MDC		3.26E+00
¹³⁷ Cs	9.07E+00	1.79E-01	3.40E-01	9.59E+00	2.02E-01	3.62E-01
¹⁵² Eu	<MDC		1.16E+00	<MDC		1.31E+00
¹⁵⁴ Eu	<MDC		1.62E+00	<MDC		1.04E+00
⁴⁰ K	4.42E+02	7.86E+00	6.47E+00	4.38E+02	8.13E+00	5.77E+00
²³³ Pa	<MDC		7.57E-01	<MDC		6.97E-01
^{234m} Pa	6.31E+01	1.90E+01	6.15E+01	<MDC		5.17E+01
²¹² Pb	3.38E+01	5.03E-01	6.02E-01	3.28E+01	5.55E-01	6.45E-01
²¹⁴ Pb	3.50E+01	5.13E-01	1.04E+00	3.36E+01	5.18E-01	1.10E+00
¹⁰⁶ Rh	<MDC		4.13E+00	<MDC		4.64E+00
¹²⁵ Sb	<MDC		1.23E+00	<MDC		1.09E+00
²⁰⁸ Tl	1.08E+01	2.57E-01	5.39E-01	1.06E+01	2.58E-01	4.59E-01

^aSD = One standard deviation of the radioanalytical uncertainty

^bMDC = Minimum Detectable Concentration