Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and TLD Network Second Quarter CY2017

The CEMP air-sampling network is designed to monitor and collect radioactive airborne particles from NNSS and non-NNSS related activities, as well as background environmental sources. This report is compiled by the Desert Research Institute (DRI) and summarizes the results from the analysis of the air samples collected by CEMP station managers as part of the community environmental monitoring program.

In general, the CEMP air-sampling network is comprised of 24 continuously operating environmental sampling stations. A total of 23 stations are equipped with a low volume air sampler/totalizer configuration to collect particulate radionuclides on glass fiber filter paper. Prior to October 1, 2013 all air samples were collected on a bi-weekly basis with a target collection time of 336 hours (two weeks). After October 1, 2013 approximately half of the stations were converted to 'stand by' status in which only one two week sample is collected every quarter year. The samplers are calibrated on a monthly basis by DRI to maintain a collection rate of 1.75 cfm (@ STP). All relevant information such as collection times, variations in flow rate, actual flow volumes, power outages, and other information documenting the integrity of the sample are recorded by the station managers. This allows for the proper interpretation of the analytical results. The air filters are analyzed by a commercial laboratory for gross alpha/beta activity as well as by high-resolution gamma spectrometry. The filters are composited on a quarterly basis for gamma spectroscopy analysis after the gross alpha/beta analyses have been completed.

In the U.S., the principle reporting unit for the measurement of radioactivity in the atmospheric environment is pCi/m^3 (picocuries per cubic meter). DRI receives its data from the lab as picocuries per filter. DRI converts the laboratory data unit of measurement to pCi/m^3 for the ease in comparison of data.

A summary of the second quarter CY2017 analytical results for gross alpha and beta analyses are found in Tables 1 and 2. These tables document the minimum, maximum, and average values for each of the 23 air-sampling network stations. The last column shows the average annual value from the previous year (CY2016) for comparison purposes. Overall the gross alpha results for the second quarter of CY2017 reflect similar values to previous quarters. These data remain consistent with the average CY2016 analyses used for comparison, especially when analytical error is considered. The second quarter CY2017 beta results are also consistent with previous results.

The second quarter gamma results for CY2017 are shown in Table 3. All of the samples were gamma spectrum negligible (i.e. gamma emitting radionuclides were not detected) with the exception of beryllium (Be)-7 and lead (Pb)-210, naturally occurring elements of the atmospheric and geologic environment respectively. Overall, these data are consistent with previous analytical results.

The TLD results for the second quarter of CY2017 are shown in Table 4. Data for the environmental thermoluminescent dosimeter (TLD) is reported in milliroentgens (mR). Overall, the results display similar values to the previous quarters of the last calendar

year. The 2016 pressurized ion chamber, or PIC exposure rate and TLD data are also provided for comparison. As with historical data, TLD values are commonly lower than the PIC results. The overall estimated annual exposure based on the second quarter shows consistent agreement with CY2016.

DRI welcomes and encourages input from the station managers regarding the content of the CEMP quarterly reports. If there is anything you feel we could provide to help you interpret the data or enable you to explain the information to someone in your community not familiar with the program, please let us know.

Table 1. Gross Alpha Analytical Results for the Second Quarter of Calendar Year 2017
(Average analytical error, +/– 0.0007)

Station	Minimum (pCi/m^3)	Maximum (pCi/m^3)	Average (pCi/m^3)	2016 Average (pCi/m^3)
Alamo	0.0007	0.0039	0.0018	0.0018
Amargosa*	N.A.	N.A.	0.0036	0.0013
Beatty	0.0010	0.0025	0.0017	0.0012
Boulder City*	N.A.	N.A.	0.0009	0.0012
Caliente	0.0008	0.0025	0.0015	0.0014
Cedar City	0.0008	0.0015	0.0010	0.0009
Delta*	N.A.	N.A.	0.0006	0.0009
Duckwater*	N.A.	N.A.	0.0014	0.0010
Ely*	N.A.	N.A.	0.0014	0.0010
Goldfield	0.0005	0.0025	0.0012	0.0011
Henderson*	N.A.	N.A.	0.0009	0.0012
Indian Springs*	N.A.	N.A.	0.0007	0.0011
Las Vegas	0.0010	0.0016	0.0013	0.0013
Mesquite	0.0008	0.0017	0.0012	0.0014
Milford*	N.A.	N.A.	0.0010	0.0011
Overton*	N.A.	N.A.	0.0007	0.0017
Pahrump*	N.A.	N.A.	0.0010	0.0013
Pioche	0.0009	0.0034	0.0015	0.0013
Rachel	0.0007	0.0013	0.0011	0.0012
Sarcobatus	0.0006	0.0026	0.0014	0.0019

St. George	0.0005	0.0014	0.0010	0.0013
Tecopa*	N.A.	N.A.	0.0011	0.0015
Tonopah	0.0008	0.0014	0.0011	0.0010

*quarterly air sampling station (represents only one sample)

Table 2. Gross Beta Analytical Results for the Second Quarter of Calendar Year 2017.
(Average analytical error, +/– 0.005)

Station	Minimum (pCi/m^3)	Maximum (pCi/m^3)	Average (pCi/m^3)	2016 Average (pCi/m^3)
Alamo	0.011	0.025	0.016	0.020
Amargosa*	N.A.	N.A.	0.023	0.020
Beatty	0.01	0.018	0.014	0.018
Boulder City*	N.A.	N.A.	0.018	0.020
Caliente	0.014	0.020	0.017	0.020
Cedar City	0.010	0.018	0.015	0.015
Delta*	N.A.	N.A.	0.016	0.019
Duckwater*	N.A.	N.A.	0.022	0.018
Ely*	N.A.	N.A.	0.019	0.012
Goldfield	0.011	0.016	0.014	0.017
Henderson*	N.A.	N.A.	0.016	0.018
Indian Springs*	N.A.	N.A.	0.015	0.018
Las Vegas	0.012	0.018	0.016	0.020
Mesquite	0.011	0.018	0.016	0.021
Milford*	N.A.	N.A.	0.017	0.019
Overton*	N.A.	N.A.	0.016	0.021
Pahrump*	N.A.	N.A.	0.019	0.019
Pioche	0.011	0.018	0.015	0.016
Rachel	0.011	0.028	0.015	0.020
Sarcobatus	0.013	0.017	0.015	0.020

St. George	0.011	0.020	0.017	0.022
Tecopa*	N.A.	N.A.	0.016	0.023
Tonopah	0.010	0.018	0.013	0.016

*quarterly air sampling station (represents only sample)

Table 3. Gamma Spectroscopy Results for the Second Quarter of Calendar Year 2017.

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m^3)	Pb-210 (pCi/m^3)
Alamo	0.3	13.5	0.029	0.018
Amargosa*	-4.6	13.6	0.084	N.D.
Beatty	3.8	14.2	0.025	N.D
Boulder City*	0.0	13.4	N.D.	N.D.
Caliente	-4.2	18.1	0.026	0.023
Cedar City	2.5	18.9	0.031	N.D.
Delta*	-2.1	16.0	0.111	N.D.
Duckwater*	2.8	6.2	N.D.	N.D.
Ely*	0.0	16.5	N.D.	N.D.
Goldfield	0.3	10.7	0.033	N.D.
Henderson*	-3.6	15.4	N.D.	N.D.
Indian Springs*	-6.0	16.5	N.D.	N.D.
Las Vegas	-0.8	17.6	0.028	N.D.
Mesquite	2.4	9.4	0.024	N.D.
Milford*	4.8	8.5	N.D.	N.D.
Overton*	0.4	13.0	0.061	N.D.
Pahrump*	-3.6	18.5	N.D.	N.D.
Pioche	-5.1	15.0	0.026	N.D.
Rachel	-6.7	18.1	0.026	0.020
Sarcobatus	-4.3	12.9	0.027	0.016

St.George	0.0	16.6	N.D.	N.D.
Tecopa*	-6.4	17.6	N.D.	N.D.
Tonopah	3.7	16.2	N.D.	N.D.

MDC (minimum detectable concentration)
MDC Be-7 = 0.022 pCi/m^3 Pb-210 = 0.006 pCi/m^3 N.D. = not detected
*quarterly air sample station (represents only one sample)

Table 4. TLD Analytical Results for the Second Quarter of Calendar Year 2017

Station	Second Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2016 TLD Exposure (mR/yr)	2016 PIC Exposure (mR/yr)
Alamo	29	108	116	117
Amargosa	26	95	110	102
Beatty	30	112	145	148
Boulder City	29	109	107	143
Caliente	28	104	112	141
Cedar City	25	93	96	92
Delta	23	86	99	109
Duckwater	30	112	117	128
Ely	25	93	106	106
Goldfield	31	116	130	136
Henderson	29	109	122	120
Indian Springs	24	88	98	99
Las Vegas	25	92	100	91
Mesquite	26	97	106	103
Milford	34	127	145	176
Overton	stolen	--	102	106
Pahrump	20	73	85	72
Pioche	29	108	124	134
Rachel	32	119	126	130
Sarcobatus	35	130	138	145

St. George	22	82	87	89
Tecopa	25	91	112	115
Tonopah	34	127	136	139