Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and TLD Network First Quarter CY2018

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 was collected and analyzed every quarter year. Beginning October 1, 2017 all CEMP stations are again operating full time with samples being collected every two weeks. Now the procedure is to submit one sample set per quarter year for analysis. The remaining samples will be archived to be accessed if needed. This protocol will be followed unless an important event were to occur on or off the NNSS (major fires, transportation incident or an unusual result are a few examples). Archived samples would be used to assess conditions before and after an event. The samplers are calibrated on a quarterly 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.

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 for this report.

A summary of the first quarter CY2018 analytical results for gross alpha and beta analyses are found in Table 1. This table documents the results of the quarterly analyses for each of the 23 air-sampling network stations. The average annual value from the previous year (CY2017) is provided for comparison purposes. Overall the gross alpha results for the first quarter of CY2018 reflect similar values to previous quarters. These data remain consistent with the average CY2017 analyses used for comparison, especially when analytical error is considered. The first quarter CY2018 beta results are also consistent with previous results.

The first quarter gamma results for CY2018 are shown in Table 2. 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 first quarter of CY2018 are shown in Table 3. 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 2017 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 first quarter shows consistent agreement with CY2017.

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/Beta Analytical Results for the First Quarter of Calendar Year. 2018. (Data represents one analysis per quarter).

Station	Gross Alpha (pCi/m^3)	2017 Average	Gross Beta (pCi/m^3)	2017 Average
Alamo	0.0027	0.0017	0.016	0.017
Amargosa	0.0009	0.0018	0.011	0.021
Beatty	0.0010	0.0014	0.013	0.017
Boulder City	0.0007	0.0013	0.013	0.020
Caliente	0.0013	0.0013	0.014	0.019
Cedar City	0.0011	0.0011	0.012	0.016
Delta	0.0009	0.0010	0.015	0.022
Duckwater	0.0008	0.0016	0.013	0.021
Ely	0.0011	0.0012	0.011	0.017
Goldfield	0.0010	0.0012	0.011	0.016
Henderson	0.0010	0.0013	0.014	0.019
Indian Springs	0.0012	0.0011	0.015	0.018
Las Vegas	0.0008	0.0013	0.013	0.018
Mesquite	0.0010	0.0015	0.015	0.018
Milford	0.0028	0.0011	0.016	0.019
Overton	0.0012	0.0020	0.015	0.020
Pahrump	0.0006	0.0013	0.012	0.018
Pioche	0.0011	0.0012	0.013	0.016

Rachel	0.0007	0.0013	0.015	0.018
Sarcobatus	0.0007	0.0018	0.013	0.017
St. George/ Blooming Hills	0.0012	0.0012	0.016	0.022
Tecopa	0.0005	0.0012	0.013	0.020
Tonopah	0.0031	0.0011	0.012	0.015

Average analytical error gross alpha +/- 0.0007
Average analytical error gross beta +/-0.005

Table 2. Gamma Spectroscopy Results for the First Quarter of Calendar Year 2018. (Data represents one analysis per quarter).

Station	Cs-137 (pCi/sample)	Cs-137 (MDC)	Be-7 (pCi/m^3)	Pb-210 (pCi/m^3)
Alamo	-5.4	12.2	0.013	N.D.
Amargosa	4.0	12.4	0.012	N.D.
Beatty	0.0	8.3	0.011	N.D.
Boulder City	-0.8	10.3	0.012	N.D.
Caliente	0.1	10.4	N.D.	N.D.
Cedar City	2.6	11.2	N.D.	N.D.
Delta	2.6	13.6	0.010	N.D.
Duckwater	0.4	9.6	N.D.	N.D.
Ely	-6.5	18.4	N.D.	N.D.
Goldfield	-1.8	12.0	N.D.	N.D.
Henderson	-4.6	16.7	N.D.	N.D.
Indian Springs	-6.5	13.7	N.D.	N.D.
Las Vegas	6.1	18.4	N.D.	N.D.
Mesquite	0.4	14.0	N.D.	N.D.
Milford	-2.3	13.3	N.D.	N.D.
Overton	-5.8	16.7	0.013	N.D.
Pahrump	0.0	2.8	0.009	N.D.
Pioche	-3.1	19.8	N.D.	N.D.

Rachel	-4.3	16.3	N.D.	N.D.
Sarcobatus	0.2	11.1	N.D.	N.D.
St.George/ Bloomington Hills	-5.2	17.9	N.D.	N.D.
Tecopa	-6.0	18.5	0.011	N.D.
Tonopah	3.6	10.4	0.009	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

Table 3. TLD Analytical Results for the First Quarter of Calendar Year 2018

Station	First Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2017 TLD Exposure (mR/yr)	2017 PIC Exposure (mR/yr)
Alamo	33	123	114	116
Amargosa	30	132	102	101
Beatty	38	142	129	148
Boulder City	27	120	106	139
Caliente	34	128	114	141
Cedar City	29	108	97	107
Delta	28	104	95	109
Duckwater	35	132	114	127
Ely	38	113	101	106
Goldfield	35	130	120	132
Henderson	30	134	112	116
Indian Springs	26	114	92	99
Las Vegas	30	132	94	92
Mesquite	31	116	101	103
Milford	41	153	139	176
Overton	27	120	93	110
Pahrump	23	101	80	73
Pioche	37	139	118	127

Rachel	35	130	122	134
Sarcobatus	39	145	133	146
St. George/ Bloomington Hills	34	127	123	119
Tecopa	28	123	104	116
Tonopah	39	145	128	142