Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and TLD Network Third Quarter CY2019

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 are 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 third quarter CY2019 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 (CY2018) is provided for comparison purposes. Overall the gross alpha results for the third quarter of CY2019 reflect similar values to previous quarters. These data remain consistent with the average CY2018 analyses used for comparison, especially when analytical error is considered. The third quarter CY2019 beta results are also consistent with previous results.

The third quarter gamma results for CY2019 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) a naturally-occurring element of atmospheric origin. Overall, these data are consistent with previous analytical results.

The TLD results for the third quarter of CY2019 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 2018 pressurized ion chamber (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 third quarter shows consistent agreement with CY2018.

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 Third Quarter of Calendar Year 2019. (Data represents one analysis per quarter)

Station	Gross Alpha (pCi/m^3)	2018 Average	Gross Beta (pCi/m^3)	2018 Average
Alamo	0.0017	0.0016	0.024	0.017
Amargosa	0.0021	0.0014	0.021	0.018
Beatty	0.0015	0.0019	0.026	0.018
Boulder City	0.0027	0.0017	0.025	0.019
Caliente	0.0023	0.0015	0.027	0.017
Cedar City	0.0022	0.0016	0.024	0.016
Delta	0.0023	0.0014	0.025	0.018
Duckwater	0.0010	0.0013	0.017	0.019
Ely	0.0025	0.0018	0.018	0.016
Goldfield	0.0018	0.0014	0.018	0.015
Henderson	0.0026	0.0016	0.021	0.019
Indian Springs	0.0020	0.0019	0.019	0.020
Las Vegas	0.0021	0.0012	0.023	0.020
Mesquite	0.0026	0.0014	0.022	0.019
Milford	0.0013	0.0015	0.019	0.016
Overton	0.0014	0.0020	0.024	0.020
Pahrump	0.0022	0.0020	0.020	0.020
Pioche	0.0016	0.0013	0.019	0.016
Rachel	0.0024	0.0012	0.016	0.015
Sarcobatus	0.0021	0.0012	0.019	0.018
St. George	0.0020	0.0014	0.022	0.019

Tecopa	0.0020	0.0016	0.025	0.020
Tonopah	0.0026	0.0019	0.022	0.015

Average analytical error gross alpha +/- 0.00052 (pCi/m^3)
Average analytical error gross beta +/- 0.0026 (pCi/m^3)

Table 2. Gamma Spectroscopy Results for the Third Quarter of Calendar Year 2019.

Station	Cs-137 (pCi/sample)	Cs-137 MDC, (pCi/sample)	Be-7 (pCi/m^3)	Be-7 MDC, (pCi/m^3)	Pb-210 (pCi/m^3)
Alamo	0.2	15.2	0.115	0.034	N.D.
Amargosa	5.1	17.50	0.168	0.039	N.D.
Beatty	3.2	15.30	0.151	0.030	N.D.
Boulder City	-0.3	12.40	0.144	0.041	N.D.
Caliente	-5.1	13.90	0.134	0.077	N.D.
Cedar City	3.3	12.00	N.D.	N/A	N.D.
Delta	5.9	19.50	0.150	0.038	N.D.
Duckwater	-0.1	12.90	0.152	0.028	N.D.
Ely	-2.5	11.70	0.160	0.028	N.D.
Goldfield	3.3	12.00	0.119	0.046	N.D.
Henderson	-0.1	14.90	0.193	0.038	N.D.
Indian Springs	3.3	11.20	0.173	0.019	N.D.
Las Vegas	-0.7	16.00	0.136	0.040	N.D.
Mesquite	-7.7	17.70	0.194	0.040	N.D.
Milford	-2.6	15.20	0.161	0.031	N.D.
Overton	0.3	12.10	0.142	0.034	N.D.
Pahrump	4.1	13.50	0.161	0.032	N.D.
Pioche	-2.9	16.40	0.180	0.071	N.D.
Rachel	2.8	11.60	0.163	0.034	N.D.
Sarcobatus	-0.2	11.10	0.083	0.028	N.D.

St. George	-6.2	18.00	0.111	0.018	N.D.
Tecopa	-6.1	17.80	0.099	0.044	N.D.
Tonopah	-1.6	19.90	N.D.	N/A	N.D.

MDC = Minimum detectable concentration
N.D. = Not detected

Table 3. TLD Analytical Results for the Third Quarter of Calendar Year 2019

Station	Third Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2018 TLD Exposure (mR/yr)	2018 PIC Exposure (mR/yr)
Alamo	30	120	125	115
Amargosa	28	112	123	102
Beatty	38	153	150	145
Boulder City	29	116	114	138
Caliente	27	157	121	145
Cedar City	22	87	110	126
Delta	27	110	108	114
Duckwater	22	124	127	138
Ely	24	137	108	107
Goldfield	34	137	132	138
Henderson	31	124	125	119
Indian Springs	24	96	110	99
Las Vegas	25	114	107	96
Mesquite	28	111	115	105
Milford	35	142	151	169
Overton	21	84	103	107
Pahrump	21	84	96	72
Pioche	28	162	129	140
Rachel	34	137	136	134
Sarcobatus	38	153	146	148

St. George	32	127	126	125
Tecopa	27	108	120	117
Tonopah	35	141	144	148