Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and TLD Network Second Quarter CY2020

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 second quarter CY2020 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 (CY2019) is provided for comparison purposes. While some gross alpha results for the second quarter of CY2020 reflect values above CY2019 average values, values are well within the range of historical measurements. These data remain consistent with analyses used for comparison, especially when analytical error is considered. The second quarter CY2020 beta results are also consistent with previous results.

The second quarter gamma results for CY2020 are shown in Table 2. All of the samples were gamma spectrum negligible with the exception of beryllium (Be-7), a

naturally occurring element of atmospheric origin, and cesium (Cs-137) detected at one station. Overall, these data are consistent with previous analytical results.

The TLD results for the second quarter of CY2020 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 2019 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 second quarter shows consistency with CY2019.

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 Second Quarter of Calendar Year 2020. (Data represents one analysis per quarter)

Station	Gross Alpha (pCi/m^3)	2019 Average	Gross Beta (pCi/m^3)	2019 Average
Alamo	0.0045	0.0015	0.0259	0.0235
Amargosa	0.0021	0.0014	0.0248	0.0230
Beatty	0.0026	0.0013	0.0257	0.0246
Boulder City	0.0029	0.0015	0.0230	0.0235
Caliente	0.0017	0.0019	0.0257	0.0241
Cedar City	0.0020	0.0011	0.0212	0.0180
Delta	0.0014	0.0020	0.0207	0.0228
Duckwater	0.0049	0.0010	0.0254	0.0172
Ely	0.0022	0.0017	0.0215	0.0187
Goldfield	0.0026	0.0015	0.0242	0.0215
Henderson	0.0036	0.0019	0.0291	0.0238
Indian Springs	0.0027	0.0015	0.0285	0.0229
Las Vegas	0.0021	0.0017	0.0244	0.0253
Mesquite	0.0025	0.0022	0.0275	0.0270
Milford	0.0020	0.0014	0.0230	0.0226
Overton	0.0052	0.0015	0.0255	0.0250
Pahrump	0.0033	0.0021	0.0266	0.0225
Pioche	0.0015	0.0012	0.0236	0.0193
Rachel	0.0029	0.00158	0.0270	0.0215
Sarcobatus	0.0021	0.0017	0.0254	0.0230
St. George	0.0019	0.0017	0.0221	0.0228
Tecopa	0.0031	0.0016	0.0278	0.0264
Tonopah	0.0029	0.0017	0.0232	0.0215

Average analytical error gross alpha +/- 0.00064 (pCi/m^3)
Average analytical error gross beta +/- 0.00294 (pCi/m^3)

Table 2. Gamma Spectroscopy Results for the Second Quarter of Calendar Year 2020.

Station	Cs-137 (pCi/m^3)	Cs-137 MDC, (pCi/m^3)	Be-7 (pCi/m^3)	Be-7 MDC, (pCi/m^3)	Pb-210 (pCi/m^3)
Alamo	<MDC	0.019	0.105	0.051	N.D.
Amargosa	<MDC	0.016	N.D	N.D	N.D.
Beatty	<MDC	0.008	N.D	N.D	N.D.
Boulder City	<MDC	0.013	0.088	0.026	N.D.
Caliente	<MDC	0.015	0.163	0.043	N.D.
Cedar City	<MDC	0.013	N.D	N.D	N.D.
Delta	<MDC	0.009	0.078	0.038	N.D.
Duckwater	<MDC	0.010	0.135	0.037	N.D.
Ely	<MDC	0.008	N.D	N.D	N.D.
Goldfield	<MDC	0.010	N.D	N.D	N.D.
Henderson	<MDC	0.033	N.D	N.D	N.D.
Indian Springs	<MDC	0.017	N.D	N.D	N.D.
Las Vegas	<MDC	0.011	0.092	0.017	N.D.
Mesquite	<MDC	0.010	N.D	N.D	N.D.
Milford	<MDC	0.014	0.085	0.026	N.D.
Overton	<MDC	0.013	0.097	0.028	N.D.
Pahrump	<MDC	0.011	0.106	0.031	N.D.
Pioche	<MDC	0.012	N.D	N.D	N.D.
Rachel	<MDC	0.014	N.D	N.D	N.D.
Sarcobatus	<MDC	0.018	N.D	N.D	N.D.
St. George	<MDC	0.009	N.D	N.D	N.D.
Tecopa	<MDC	0.014	N.D	N.D	N.D.
Tonopah	0.009	0.009	N.D	N.D	N.D.

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

Table 3. TLD Analytical Results for the Second Quarter of Calendar Year 2020

Station	Second Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2019 TLD Exposure (mR/yr)	2019 PIC Exposure (mR/yr)
Alamo	28	112	125	115
Amargosa	27	99	122	101
Beatty	33	132	150	144
Boulder City	28	112	110	134
Caliente	28	103	127	141
Cedar City	21	85	102	114
Delta	24	96	111	112
Duckwater	31	98	120	138
Ely	27	87	110	107
Goldfield	27	105	132	132
Henderson	29	116	128	121
Indian Springs	25	91	107	100
Las Vegas	24	96	107	97
Mesquite	25	100	114	104
Milford	35	140	154	156
Overton	19	76	100	100
Pahrump	20	73	90	74
Pioche	29	107	135	136
Rachel	28	114	138	134
Sarcobatus	34	136	145	149
St. George	25	100	127	126
Tecopa	28	102	117	116
Tonopah	33	128	145	150