

Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and TLD Network Fourth 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 principal 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 fourth 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. Overall, the gross alpha results for the fourth quarter of CY2020 reflect similar values to previous quarters. These data remain consistent with the average CY2019 analyses used for comparison, especially when analytical error is considered. The fourth quarter CY2020 beta results are also consistent with previous results.

The fourth quarter gamma results for CY2020 are shown in Table 2. All of the samples were gamma spectrum negligible. Overall, these data are consistent with previous analytical results.

The TLD results for the fourth quarter of CY2020 are shown in Table 3. Data for the environmental thermoluminescent dosimeter (TLD) is reported in milliroentgens (mR). The TLD at Duckwater could not be retrieved due to a temporary site access issue. 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 fourth 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 Fourth 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	0.0013	0.0015	0.0229	0.0235
Amargosa	0.0019	0.0014	0.0301	0.0230
Beatty	0.0017	0.0013	0.0235	0.0246
Boulder City	0.0022	0.0015	0.0331	0.0235
Caliente	0.0052	0.0019	0.0335	0.0241
Cedar City	0.0013	0.0011	0.0206	0.0180
Delta	0.0018	0.0020	0.0221	0.0228
Duckwater	0.0014	0.0010	0.0183	0.0172
Ely	0.0011	0.0017	0.0177	0.0187
Goldfield	0.0016	0.0015	0.0229	0.0215
Henderson	0.0024	0.0019	0.0286	0.0238
Indian Springs	0.0020	0.0015	0.0301	0.0229
Las Vegas	0.0010	0.0017	0.0221	0.0253
Mesquite	0.0014	0.0022	0.0291	0.0270
Milford	0.0018	0.0014	0.0280	0.0226
Overton	0.0018	0.0015	0.0289	0.0250
Pahrump	0.0030	0.0021	0.0254	0.0225
Pioche	0.0019	0.0012	0.0226	0.0193
Rachel	0.0023	0.0016	0.0159	0.0215
Sarcobatus	0.0019	0.0017	0.0242	0.0230
St. George	0.0023	0.0017	0.0292	0.0228
Tecopa	0.0025	0.0016	0.0334	0.0264
Tonopah	0.0017	0.0017	0.0277	0.0215

Average analytical error gross alpha +/- 0.00052 (pCi/m³)

Average analytical error gross beta +/- 0.00286 (pCi/m³)

Table 2. Gamma Spectroscopy Results for the Fourth 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	0.009	0.089	0.023	N.D.
Amargosa	<MDC	0.017	0.197	0.057	N.D.
Beatty	<MDC	0.007	0.080	0.019	N.D.
Boulder City	<MDC	0.009	0.148	0.025	N.D.
Caliente	<MDC	0.009	0.092	0.033	N.D.
Cedar City	<MDC	0.011	0.102	0.034	N.D.
Delta	<MDC	0.008	0.086	0.026	N.D.
Duckwater	<MDC	0.007	0.085	0.018	N.D.
Ely	<MDC	0.008	N.D.	N.D.	N.D.
Goldfield	<MDC	0.007	0.089	0.025	N.D.
Henderson	<MDC	0.007	N.D.	N.D.	N.D.
Indian Springs	<MDC	0.008	0.108	0.021	N.D.
Las Vegas	<MDC	0.010	N.D.	N.D.	N.D.
Mesquite	<MDC	0.003	0.082	0.012	0.042
Milford	<MDC	0.012	0.075	0.036	N.D.
Overton	<MDC	0.008	N.D.	N.D.	N.D.
Pahrump	<MDC	0.005	0.094	0.025	N.D.
Pioche	<MDC	0.010	N.D.	N.D.	N.D.
Rachel	<MDC	0.004	N.D.	N.D.	N.D.
Sarcobatus	<MDC	0.008	0.078	0.026	N.D.
St. George	<MDC	0.013	0.097	0.040	N.D.
Tecopa	<MDC	0.008	0.112	0.018	N.D.
Tonopah	<MDC	0.024	N.D.	N.D.	N.D.

MDC = Minimum detectable concentration

N.D. = Not detected

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

Station	Fourth Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2019 TLD Exposure (mR/yr)	2019 PIC Exposure (mR/yr)
Alamo	31	110	125	115
Amargosa	30	130	122	101
Beatty	37	130	150	144
Boulder City	26	108	110	134
Caliente	30	103	127	141
Cedar City	25	99	102	114
Delta	25	101	111	112
Duckwater	N/A	N/A	120	138
Ely	26	89	110	107
Goldfield	32	112	132	132
Henderson	28	115	128	121
Indian Springs	21	91	107	100
Las Vegas	25	99	107	97
Mesquite	26	103	114	104
Milford	37	150	154	156
Overton	20	75	100	100
Pahrump	19	83	90	74
Pioche	33	114	135	136
Rachel	33	117	138	134
Sarcobatus	36	126	145	149
St. George	30	119	127	126
Tecopa	27	92	117	116
Tonopah	36	126	145	150