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Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and Dosimeter Network: Third Quarter CY2023

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The Community Environmental Monitoring Program (CEMP) air sampling network is designed to monitor and collect radioactive airborne particles from Nevada National Security Site (NNSS) and non-NNSS activities, as well as background environmental sources. This report compiled by Desert Research Institute (DRI) summarizes the results from the analysis of air samples collected by CEMP station managers.

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 every two weeks with a target collection time of 336 hours. After October 1, 2013, approximately half of the stations were converted to "standby status," which means only one two-week sample was collected and analyzed each quarter during the year.

Beginning on October 1, 2017, all CEMP stations resumed full-time operation with samples being collected every two weeks. Currently, the procedure is to submit one set of samples per quarter 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 (e.g., major fires, a transportation incident, or an unusual result). 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 cubic feet per minute at Standard Temperature and Pressure (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) is recorded by the station managers. This allows for proper interpretation of the analytical results.

An accredited commercial laboratory analyzes the air filters for gross alpha/beta activity and uses high-resolution gamma spectrometry to detect the following isotopes:

- Actinium-228 (Ra-228)
- Americium-241
- Antimony-124
- Beryllium-7
- Bismuth-212
- Bismuth-214 (Ra-226)
- Cesium-134
- Cesium-137
- Cobalt-60
- Iridium-192
- Lead-212
- Lead-214
- Potassium-40
- Scandium-46
- Thallium-208
- Thorium-234 (U-238)
- Uranium-235

Table 1 contains the gamma results for the third quarter of calendar year (CY) 2023 for the analytes americium-241, cesium-134, cesium-137, cobalt-60, and uranium-235. The results for americium-241, cesium-134, cesium-137, cobalt-60, and

uranium-235 were all below the minimum detectable activity for all samples. Table 2 summarizes the gross alpha/beta results for the third quarter of CY2023. The average annual values for the previous year are provided for comparison. Table 3 shows the environmental dosimeter results for the third quarter of CY2023. The dosimeter results are reported in milliroentgens (mR). The pressurized ion chamber (PIC) exposure rate and dosimeter data from the previous year are also provided for comparison. Dosimeter values are commonly lower than the PIC results because the PIC offers greater sensitivity.

Table 1. Gamma spectroscopy results for select analytes for the third quarter of CY2023. Data represent one analysis per quarter.

Station	Americium-241 ($\times 10^{-15}$ µCi/mL)	Cesium-134 ($\times 10^{-15}$ µCi/mL)	Cesium-137 ($\times 10^{-15}$ µCi/mL)	Cobalt-60 ($\times 10^{-15}$ µCi/mL)	Uranium-235 ($\times 10^{-15}$ µCi/mL)
Alamo	below MDA	below MDA	below MDA	below MDA	below MDA
Amargosa Valley	below MDA	below MDA	below MDA	below MDA	below MDA
Beatty	below MDA	below MDA	below MDA	below MDA	below MDA
Boulder City	below MDA	below MDA	below MDA	below MDA	below MDA
Caliente	below MDA	below MDA	below MDA	below MDA	below MDA
Cedar City	below MDA	below MDA	below MDA	below MDA	below MDA
Delta	below MDA	below MDA	below MDA	below MDA	below MDA
Duckwater	below MDA	below MDA	below MDA	below MDA	below MDA
Ely	below MDA	below MDA	below MDA	below MDA	below MDA
Goldfield	below MDA	below MDA	below MDA	below MDA	below MDA
Henderson	below MDA	below MDA	below MDA	below MDA	below MDA
Indian Springs	below MDA	below MDA	below MDA	below MDA	below MDA
Las Vegas	below MDA	below MDA	below MDA	below MDA	below MDA
Mesquite	below MDA	below MDA	below MDA	below MDA	below MDA
Milford	below MDA	below MDA	below MDA	below MDA	below MDA
Overton	below MDA	below MDA	below MDA	below MDA	below MDA
Pahrump	below MDA	below MDA	below MDA	below MDA	below MDA
Pioche	below MDA	below MDA	below MDA	below MDA	below MDA
Rachel	below MDA	below MDA	below MDA	below MDA	below MDA
Sarcobatus Flat	below MDA	below MDA	below MDA	below MDA	below MDA
St. George	below MDA	below MDA	below MDA	below MDA	below MDA
Tecopa	below MDA	below MDA	below MDA	below MDA	below MDA
Tonopah	below MDA	below MDA	below MDA	below MDA	below MDA

MDA = minimum detectable activity

Table 2. Gross alpha/beta results for the third quarter of CY2023. Data represent one analysis per quarter.

Station	Gross Alpha ($\times 10^{-15}$ µCi/mL)	2022 Average ($\times 10^{-15}$ µCi/mL)	Gross Beta ($\times 10^{-14}$ µCi/mL)	2022 Average ($\times 10^{-14}$ µCi/mL)
Alamo	3.30	6.72	1.41	1.34
Amargosa Valley	6.99	7.79	1.42	1.35
Beatty	5.09	9.09	1.68	1.44
Boulder City	6.92	10.02	1.52	1.55
Caliente	5.63	13.13	1.25	1.69
Cedar City	4.64	8.93	1.38	1.45
Delta	3.13	10.92	1.21	1.77
Duckwater	6.51	8.69	1.94	1.35
Ely	5.52	7.15	1.42	1.11
Goldfield	7.14	8.34	1.73	1.38
Henderson	5.57	10.31	1.36	1.63
Indian Springs	7.39	8.73	1.50	1.40
Las Vegas	11.95	17.40	1.31	1.54
Mesquite	5.84	8.85	1.41	1.66
Milford	4.34	10.95	1.17	1.79
Overton	6.14	8.24	1.47	1.65
Pahrump	7.43	12.38	1.83	1.48
Pioche	13.65	9.04	1.62	1.41
Rachel	4.40	7.30	1.58	1.40
Sarcobatus Flat	10.37	8.90	1.94	1.56
St. George	7.42	9.07	1.55	1.81
Tecopa	7.40	8.88	1.76	1.73
Tonopah	6.18	11.18	1.69	1.50

Table 3. Dosimeter results for the third quarter of CY2023.

Station	Third Quarter Exposure (mR)	Est. Annual Exposure (mR/yr)	2022 Exposure (mR/yr)	2022 PIC Exposure (mR/yr)
Alamo	16	74	65	113
Amargosa Valley	17	61	64	102
Beatty	26	122	112	143
Boulder City	16	58	66	131
Caliente	21	88	81	136
Cedar City	9	34	56	117
Delta	8	39	56	113
Duckwater	13	74	80	134
Ely	8	46	53	104
Goldfield	16	74	90	138
Henderson	20	74	76	122
Indian Springs	17	59	52	98
Las Vegas	23	88	62	93
Mesquite	16	59	50	101
Milford	21	99	115	166
Overton	7	27	28	96
Pahrump	8	27	25	74
Pioche	14	59	90	136
Rachel	18	86	102	136
Sarcobatus Flat	21	98	109	146
St. George	14	51	76	122
Tecopa	16	55	64	109
Tonopah	23	108	96	140