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Analytical Results for the Community Environmental Monitoring Program (CEMP) Air Sampling and Dosimeter Network: First Quarter CY2024

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Submitted to

Nevada Field Office
National Nuclear Security Administration
U.S. Department of Energy
Las Vegas, Nevada

September 2024

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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 first quarter of calendar year (CY) 2024 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 first quarter of CY2024. The average annual values for the previous year are provided for comparison. Table 3 shows the environmental dosimeter results for the first quarter of CY2024. 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 spectrometry results for select analytes for the first quarter of CY2024. Data represents one analysis per quarter.

| Station | Americium-241 ($\times 10^{-15}$ $\mu\text{Ci/mL}$) | Cesium-134 ($\times 10^{-15}$ $\mu\text{Ci/mL}$) | Cesium-137 ($\times 10^{-15}$ $\mu\text{Ci/mL}$) | Cobalt-60 ($\times 10^{-15}$ $\mu\text{Ci/mL}$) | Uranium-235 ($\times 10^{-15}$ $\mu\text{Ci/mL}$) |
|-----------------|--|---|---|--|--|
| 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 first quarter of CY2024. Data represents one analysis per quarter.

| Station | Gross Alpha ($\times 10^{-15}$ $\mu\text{Ci/mL}$) | 2023 Average ($\times 10^{-15}$ $\mu\text{Ci/mL}$) | Gross Beta ($\times 10^{-14}$ $\mu\text{Ci/mL}$) | 2023 Average ($\times 10^{-14}$ $\mu\text{Ci/mL}$) |
|-----------------|--|---|---|---|
| Alamo | 3.58 | 4.03 | 0.70 | 1.16 |
| Amargosa Valley | 3.75 | 5.01 | 0.67 | 1.05 |
| Beatty | 3.23 | 4.58 | 0.69 | 1.24 |
| Boulder City | 3.27 | 6.60 | 0.82 | 1.58 |
| Caliente | 3.75 | 4.76 | 0.62 | 1.10 |
| Cedar City | 2.76 | 5.07 | 0.54 | 1.23 |
| Delta | 3.62 | 4.14 | 0.80 | 1.18 |
| Duckwater | 2.57 | 5.20 | 0.63 | 1.25 |
| Ely | 2.36 | 4.64 | 0.59 | 1.08 |
| Goldfield | 2.48 | 6.46 | 0.49 | 1.20 |
| Henderson | 5.62 | 5.62 | 1.24 | 1.27 |
| Indian Springs | 3.63 | 5.46 | 0.83 | 1.17 |
| Las Vegas | 3.01 | 8.34 | 0.66 | 1.19 |
| Mesquite | 4.01 | 4.95 | 0.88 | 1.27 |
| Milford | 3.24 | 4.90 | 0.85 | 1.27 |
| Overton | 3.51 | 5.32 | 0.86 | 1.39 |
| Pahrump | 3.10 | 5.73 | 0.72 | 1.48 |
| Pioche | 2.80 | 7.81 | 0.50 | 1.34 |
| Rachel | 3.67 | 4.49 | 0.68 | 1.21 |
| Sarcobatus Flat | 2.70 | 5.98 | 0.67 | 1.37 |
| St. George | 4.15 | 6.72 | 0.93 | 1.57 |
| Tecopa | 3.42 | 5.64 | 0.74 | 1.30 |
| Tonopah | 2.22 | 5.07 | 0.53 | 1.13 |

Table 3. Dosimeter results for the first quarter of CY2024.

| Station | First Quarter Exposure (mR) | Est. Annual Exposure (mR/yr) | 2023 Exposure (mR/yr) | 2023 PIC Exposure (mR/yr) |
|-----------------|------------------------------------|-------------------------------------|------------------------------|----------------------------------|
| Alamo | 9 | 39 | 66 | 110 |
| Amargosa Valley | 14 | 51 | 65 | 99 |
| Beatty | 22 | 98 | 102 | 141 |
| Boulder City | 11 | 45 | 66 | 125 |
| Caliente | 15 | 68 | 84 | 144 |
| Cedar City | 9 | 38 | 43 | 109 |
| Delta | 9 | 31 | 44 | 107 |
| Duckwater | 20 | 68 | 76 | 132 |
| Ely | 6 | 22 | 47 | 99 |
| Goldfield | 11 | 49 | 81 | 132 |
| Henderson | 13 | 55 | 80 | 124 |
| Indian Springs | 15 | 52 | 48 | 96 |
| Las Vegas | 17 | 62 | 85 | 99 |
| Mesquite | 17 | 72 | 61 | 99 |
| Milford | 21 | 74 | 97 | 159 |
| Overton | 5 | 21 | 28 | 94 |
| Pahrump | 6 | 20 | 24 | 73 |
| Pioche | 14 | 62 | 73 | 132 |
| Rachel | 14 | 64 | 80 | 133 |
| Sarcobatus Flat | 16 | 70 | 95 | 143 |
| St. George | 18 | 77 | 65 | 120 |
| Tecopa | 14 | 50 | 59 | 114 |
| Tonopah | 18 | 80 | 104 | 138 |