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Tri-Valley CAREs' Analysis of Livermore Lab's 2023 Site Environmental Reports

Lawrence Livermore National Laboratory (LLNL) releases an annual public document that discloses the environmental impacts of operations at the Livermore Main Site and Site 300 entitled "Site Environmental Report." It presents environmental monitoring results, compliance (or non-compliance) with environmental standards, and outlines LLNL's environmental protection and remediation programs for the previous year.

The recently released report for 2023 includes sections such as an environmental "Compliance Summary, Environmental Program Information, Air Monitoring Programs, Water Monitoring Programs, Terrestrial Monitoring, Groundwater Investigation and Remediation, and Quality Assurance" and also includes numerous appendices containing site data and supplemental. Tri-Valley CAREs reviewed the reports and pulled out the following items that we believe our members would be most interested in.

Radiation Releases in 2023 from LLNL Main Site

LLNL reported all radioactive air emissions to be within compliance limits in 2023. However, the site's nuclear weapons development activities result in routine radioactive emissions. When added to the sites overall radioactive emissions over its 71 year history (estimated to be over 1 million curies of radiation), these routine releases add to already large impact to the surrounding community.

LLNL measured radioactive releases in 2023, with some measurable emissions at the Livermore Site:

- **Tritium**: 57.6 Ci (2131 GBq)[1] from the Tritium Facility (pg. 4-2), and 8.35 Ci (309 GBq) from the National Ignition Facility (NIF) (pg. 4-2).
- **Iodine-131 Vapor**: 1.3E-6 Ci (4.8E-5 GBq) at the NIF
- **Iodine-133:** 4.1E-8 Ci (1.5E-6 GBq) at the NIF
- **Bromine-82**: 1.4E-6 Ci (5.2E-5 GBq) at the NIF

[1] Ci=Curie, which is a unit of measurement of radioactivity, defined as the amount of radioactive material in which the decay rate is 3.7 × 10^10 disintegrations per second or 2.22 × 10^12 disintegrations per minute; one Ci is approximately equal to the decay rate of 1 gram of pure radium. GBq=Gigabecquerel (10^9 Bq). A becquerel is an SI (metric system) unit of activity of a radionuclide, equal to the activity of a radionuclide having one spontaneous nuclear transition per second.

LLNL Main Site Issues of Concern in 2023

In addition to radiation, the lab utilizes many toxic substances, creates large amounts of wastes, and emits large quantities of greenhouse gases. The following exerpts of the report touch on these issues from 2023.

- **Mercury Release**: LLNL reported mercury releases above threshold levels in compliance with the Emergency Planning and Community Right-to-Know Act (EPCRA) (pg. 2-5).
- **Permit Violations**: Two significant violations occurred: failure to properly install leak detection in underground storage tanks (UST) and using incompatible materials in UST systems. Two minor violations involved inspection failures and improper paperwork (pg. 2-21/2-22). Additionally a missing inspection log was reported to the California Department of Toxic Substances Control (DTSC) in 2023 (pg. 2-23).
- **Hazardous Waste Generation**: LLNL generated more hazardous waste in 2023 than in any of the previous four years (pg. 3-4).
- **Climate Change and GHGs**: Progress on greenhouse gas (GHG) emission reductions was minimal (pg. 3-8).
- **Priority Pollutants**: Phenol and Di-N-Butyl Phthalate, toxic organics, were detected in LLNL effluent above the reporting limit (pg. 5-4). Acetone, a non-regulated compound, was also found above the reporting threshold.
- **Sampling Issues**: Wells W-008 and W-373 were not sampled due to equipment and access issues, which affects data completeness (pg. 5-13).
- **Contaminant Detection**: At well W-14B1, nitrate exceeded the Maximum Contaminant Level (MCL), and manganese was detected at well W-307 for the first time since 2014 (pg. 5-15). Gross alpha and beta radioactivity were detected above the limit at the TAP location for the first time in years (pg. 5-24).
- **Groundwater Investigation and Remediation**: Several contaminants, including trichloroethylene (TCE), perchloroethylene (PCE), and tritium, were detected in groundwater at concentrations above drinking water standards (MCLs). PCE also extends off-site (pg. 7-1). Six of the nine hydrostratigraphic units (HSUs) contain contaminants at concentrations above their MCLs (pg. 7-2).

Site 300

While radioactive emissions remain within compliance at Site 300, the persistence of contaminants, gaps in monitoring data, and the potential for groundwater contamination highlight the need for ongoing vigilance and remediation. Site 300's contaminants are described in the report as "mainly confined" and include perchlorate, nitrate, the high-explosive compound RDX, uranium, and organosilicate oil (pg. EX-7).

- **Contaminants of Concern**: Present within the different environmental restoration operable units were trichloroethylene (TCE), high-explosive compounds, tritium, depleted uranium, silicone-based oils, nitrate, perchlorate, polychlorinated biphenyls, dioxins, furans, and metals (pg. 2-3).

- **Lead Release**: Lead was released above threshold levels and reported in compliance with the Emergency Planning and Community Right-to-Know Act (EPCRA) (pg. 2-5).
- **Depleted Uranium Emissions**: The Contained Firing Facility (B801A) at Site 300 released depleted uranium emissions in 2023, in both particulate and gaseous forms (pg. 4-2).
- **Data Loss**: Data loss due to process failures and human performance issues occurred at the same facility, making some emission estimates uncertain (pg. 4-2).
- **Depleted Uranium Shots**: Site 300 has not conducted open-air depleted uranium shots since 2007, but contaminated soil remains (pg. 4-7).
- **Wastewater Discharge**: Treated wastewater from Site 300's sewage evaporation pond is occasionally released into an unlined percolation pond, which then enters the ground and shallow groundwater (pg. 5-6).
- **Magnesium and TSS Exceedance in groundwater**: Site 300 is at Exceedance Response Action Level 1 for Total Suspended Solids (TSS) due to a previous exceedance during the 2019-2020 reporting year. Magnesium levels remain at Exceedance Response Action Level 2 due to natural aerial deposition (pg. 5-10).
- **Tritium and Metals in groundwater**: Elevated tritium levels persist at well NC7-61 (pg. 5-18). Manganese exceedances were reported at wells W-829-15 and W-829-22, and barium levels exceeded the limit at W-829-1938 (pg. 5-20).
- **Nickel Detection in groundwater**: Nickel was detected at well W-35A-04 in 2022 after being absent since 2010. Concentrations were lower in 2023 than on 2022 (pg. 5-22).

Tri-Valley CAREs seeks to highlight the contents of this report to underscore that fact that Livermore Lab's ongoing operations, 85% of which were funded as "Nuclear Weapons Activities" in the Fiscal Year 2023 Budget Request, add to the radioactive and toxic burden experienced by the directly affected public living around the main site in Livermore and Site 300 in Tracy.

Tri-Valley CAREs will continue monitoring Livermore Lab, which includes reviewing the documents like the annual Environmental Reports, using the Freedom of Information Act to request documents that are not routinely released, and much more. Check out the Government Documents section of our website where we post other Lab documents.