



Los Alamos National Laboratory Deer Monitoring



Soil, Foodstuffs, and Biota
Environmental Stewardship Group

December 2024



SFB Program Objectives & Drivers

Objectives

Determine whether LANL operations are impacting human health via the food chain and the environment

1. Determine concentrations and distribution of radionuclides, metals, and organic chemicals
 - A. Regional background
 - B. Screening levels
 - C. Standards
2. Evaluate trends over time
3. Assess dose and risk

Regulatory Drivers

- DOE order 458.1 “Radiation Protection of the Public and the Environment”
- NMED Consent Order
- DOE order 231.1B “Environment, Safety, and Health Reporting”



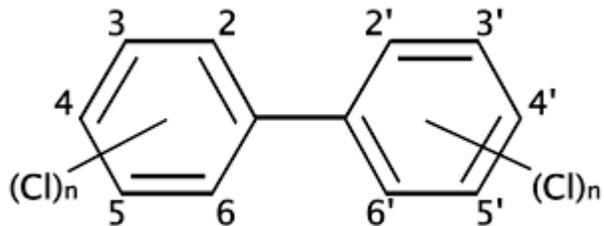
What is Monitored

Polychlorinated biphenyls (PCBs)

Radionuclides

Per- and polyfluoroalkyl substances (PFAS)

Inorganic elements – Metals



Regional Statistical Reference Levels (RSRL)

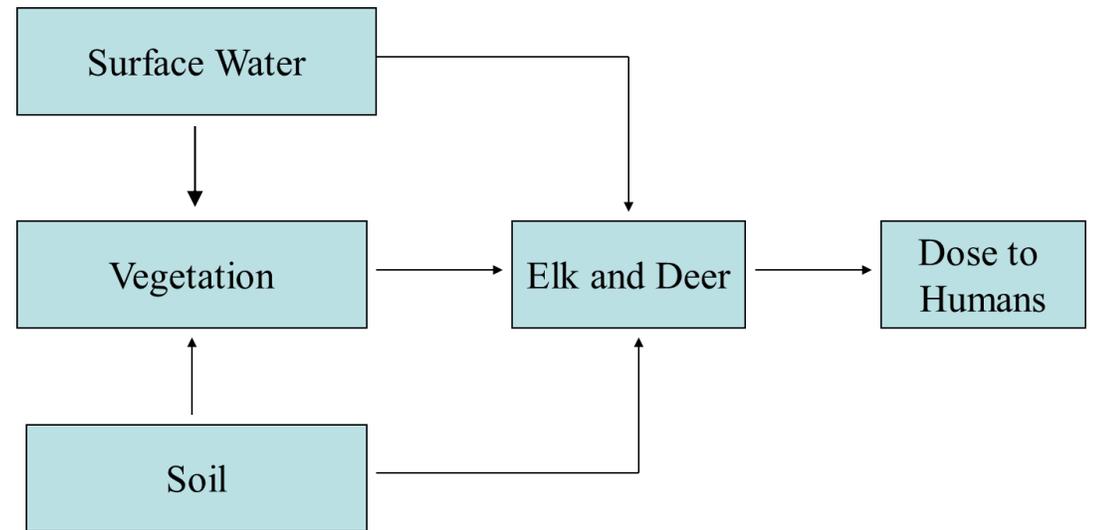
- Regional background from previous 10 years.
- Level below which precisely 99 percent of the results from regional background fall.

Biota Dose Screening Levels (BDSL)

- Levels of radionuclides in tissues (plants and animals) are compared with biota dose screening levels, which are set at **10 percent of the DOE limit** for radiation doses to biota.



Deer Monitoring



Samples and Sampling Locations

Sample Collection:

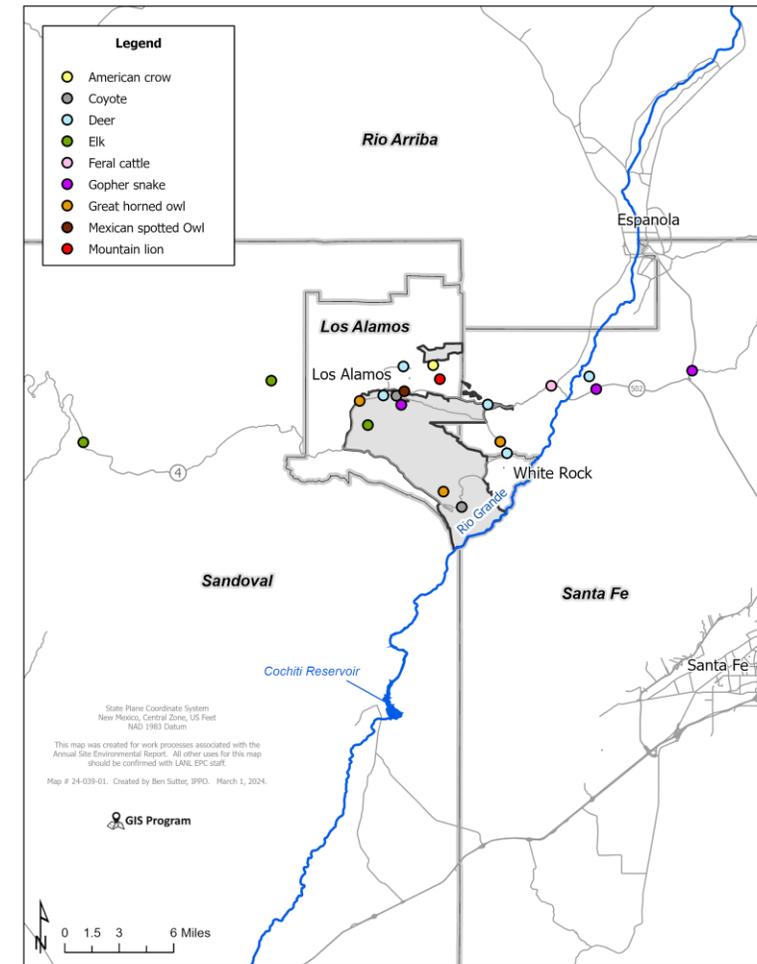
- Muscle, Liver, and Bone
- Roadkill
- Hunter donations
- All samples analyzed by a third party

Locations:

- LANL
- Perimeter – 0 to 15 kilometers from LANL
- Background – Greater than 15 kilometers from LANL

Timeframe: 1970's-2024:

- 2023 Sample number (n=6) – 2 Onsite, 3 Perimeter, 1 Background
- 2024 sampling – Ongoing, always looking for hunter donations from background locations (helps us perform statistical analysis)!



Sample Collections around LANL in 2023

Deer Results for 2023

Radionuclides

9 Radionuclides examined in 2023

- Americium-241
- Cesium-137
- Plutonium-238
- Plutonium-239/240
- Strontium-90
- Tritium
- Uranium-234
- Uranium-235/236
- Uranium-238

Bone and Muscle

- All samples **were well below** both the RSRL and BDSL (established reference levels).
- No detections in perimeter samples and even only one single detection in a LANL sample.

PCBs

Total polychlorinated biphenyl concentrations (PCBs; mg/kg) in deer muscle collected from LANL property and perimeter locations in 2023.

Concentrations of polychlorinated biphenyls.

Sample ID	General Location	Species	Sex	Total PCB mg/kg	Detected
SFB-23-292472	LANL	Deer	Male	0.0000231	Y
SFB-24-304085	LANL	Deer	Female	0.0000000	N
SFB-23-270749	Perimeter	Deer	Male	0.0000098	Y
SFB-24-301454	Perimeter	Deer	Female	0.0000000	N
SFB-24-304563	Perimeter	Deer	Female	0.0000000	N

Concentrations of screening level polychlorinated biphenyls.

Screening Levels	Sample Type	Total PCB mg/l
RSRL	Deer	0.0000095
FDA	NA	3.00

Golf Course Sample

References

FDA (U.S. Food and Drug Administration). 1987. "CPG Sec. 565.200 Red Meat Adulterated with PCBs," <https://www.fda.gov/ICECI/ComplianceManuals/CompliancePolicyGuidanceManual/ucm074589.htm>, accessed May 2020.

Deer Results for 2023

Inorganic elements

- 23 Organic elements were examined
- Almost all inorganic elements in deer were below their RSRL.
- Only manganese was slightly above RSRL (0.016 mg/kg higher) in the Golf Course deer sample. All other inorganic elements were below the RSRL in this sample.

PFAS

~37 PFAS compounds examined in each sample

Select per- and polyfluoroalkyl substances (PFAS; ng/g) in deer (muscle and liver) collected from Los Alamos National Laboratory property and perimeter locations in 2023

Concentrations of PFAS Chemicals.

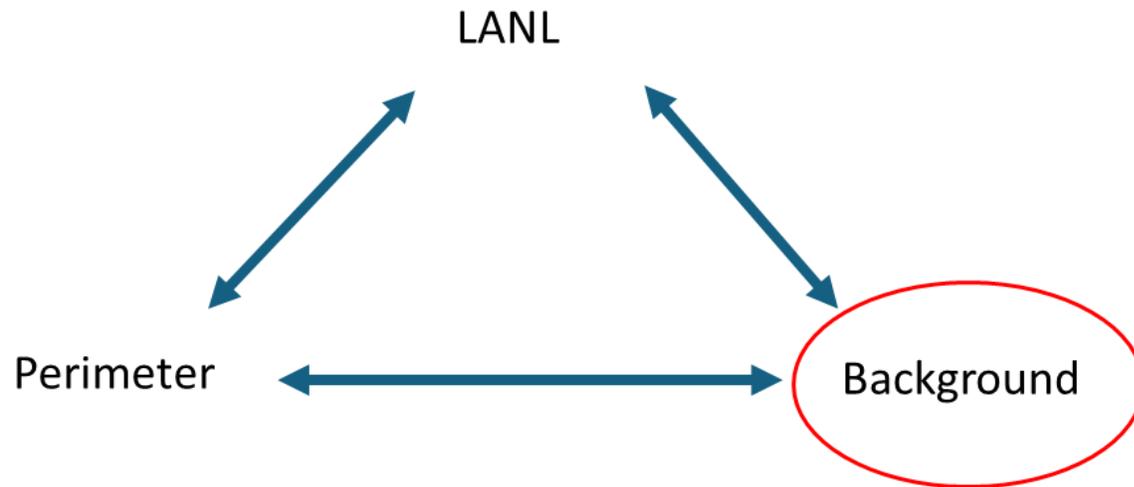
Sample ID	Location	Species	Tissue	Perfluorobutanoic acid ng/g	Perfluorobutanoic acid Detected	Perfluorooctane sulfonic aci	Perfluorooctane sulfonic aci	Perfluoropenta noic acid ng.	Perfluoropenta noic acid
SFB-23-292472	LANL	Deer	Muscle	0.394	N	0.394	N	0.325	N
SFB-23-292473	LANL	Deer	Liver	6.35	Y	9.38	Y	0.933	Y
SFB-24-304085	LANL	Deer	Muscle	0.398	N	0.398	N	0.328	N
SFB-24-304086	LANL	Deer	Liver	0.396	N	3.59	Y	0.327	N
SFB-23-270749	Perimeter	Deer	Muscle	0.357	N	0.357	N	0.295	N
SFB-24-301454	Perimeter	Deer	Muscle	0.396	N	0.396	N	0.327	N
SFB-24-304563	Perimeter	Deer	Muscle	0.398	N	0.398	N	0.328	N

Golf Course Sample

No RSRL currently available for Deer PFAS-Need more background samples

Trends Analysis

Current trend analysis are calculated between LANL and perimeter samples which can be found in the yearly ASER reports. In the future we would like to include trends between background samples and our other locations.



Need more background samples!!!

sfb@lanl.gov

Lions, Coyotes, and Bears! Oh My!



The primary goal of the Los Alamos National Laboratory (LANL) Soil, Foodstuffs, and Biota Program (SFB) is to determine whether LANL operations are affecting chemical concentrations in environmental media, such as soil, foodstuffs, plants, and animals. To accomplish this goal, we collect samples from onsite, perimeter,¹ and background² locations for testing. These environmental samples are analyzed for radionuclides, metals, and/or organic chemicals such as PCBs, PFAS, dioxins, and furans; and/or for high explosives. We use the analytical results to evaluate whether concentrations are impacting human health via the food chain and/or the environment.

We collect **recently hit roadkill** year-round as opportunities arise. The SFB program also accepts **hunter donations**; only small amounts are needed for a sample (less than ½ lb of muscle, 1" cube of liver, ¼ lb of bone). Some examples of roadkill include

- large mammals: elk, deer, bear, mountain lion, and coyote;
- avian animals: crow, raven, hawk, vulture, and falcon; and
- other deceased animals collected opportunistically (gopher snakes, gray fox, etc.).

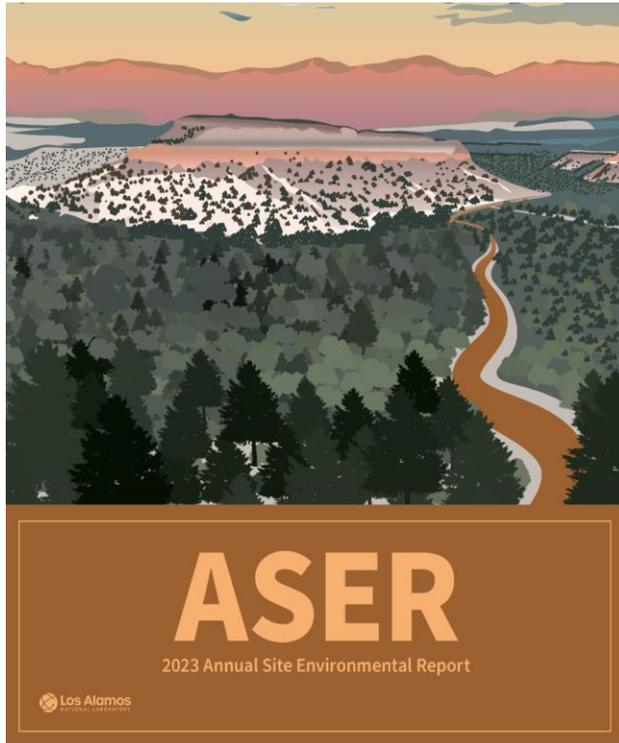
If you would like more information on how to **donate samples** or how to **help LANL receive roadkill samples**, please contact us at SFB@lanl.gov. All of the analytical sample results and context are publicly available at

- Intellus data base: www.intellusnm.com
- Annual Site Environmental Reports: <https://environment.lanl.gov/resources/annual-site-environmental-reports/>

¹ Los Alamos and White Rock townsites

² Greater than 9 miles away from LANL

Resources



<https://www.intellusnm.com/>

Common Deer Diseases

Photos of diseased deer were sourced from the internet and not taken from Los Alamos County

Deer have a lot of diseases that would not be associated with environmental contaminants

1-5% of deer will have growths on their bodies, more common in higher densities of deer*

Fibromatosis – Viral



Chronic wasting disease – Prion based disease



Caseous Lymphadenitis – Bacterium disease





Questions?
sfb@lanl.gov