

Historical Environmental Monitoring Data

Introduction

One of the most important aspects of the Rocky Flats Historical Public Exposures Studies was an evaluation of information gathered in the past about contaminants in the air, vegetation, water, sediment and soil in areas surrounding the Rocky Flats site.

The process of collecting this information is called environmental monitoring. It involves analysis of samples from a variety of environmental media in the area in and around the facility. Samples can be taken from:

- Air
- Water
- Sediment
- Soil
- Plants
- Animals
- Animal products, such as milk and meat

The samples can be gathered at different locations and periods of time, and analyzed by different techniques.

How were environmental monitoring data used in the Historical Public Exposures Studies on Rocky Flats?

Environmental monitoring data were a crucial component of the Rocky Flats studies because the data contained a record of some of the materials released from the site. The data were used in four ways:

1. Check the quality of the measurements made of the contaminants released from buildings, creeks and ponds at Rocky Flats;
2. Estimate quantities of contaminants released;
3. Derive data for mathematical models used to identify potential contaminant releases that were transported off-site into the community; and
4. Estimate the quantities of contaminants in the environment.

What environmental monitoring was done at Rocky Flats?

Throughout the history of Rocky Flats, employees and contractors have monitored radioactivity in air, water and vegetation on and around the plant site; however, the monitoring programs changed significantly over time. Early environmental monitoring included a 1951 background survey of soil, vegetation and surface water to determine the levels of naturally occurring radioactive materials in the Rocky Flats area. The use of simple gummed-paper collectors to monitor deposits of radioactive materials from air began in 1954. (Gummed paper collectors consisted of square metal frames covered with sticky paper placed about three feet above the ground surface. Dust and other substances settled onto the sticky surfaces of the collectors and were later tested for radioactivity.)

How did scientists use these environmental monitoring data?

Scientists searched for information that verified reported radioactive or non-radioactive releases or identified previously unreported releases. To determine the accuracy of the historical data, scientists searched for descriptions of both the analytical techniques used and the methods for collecting and processing environmental samples before analysis. Old records that reported problems and noted the times when new methods and techniques were introduced provided clues to the quality and accuracy of the data.

Environmental monitoring data also were used in several other ways:

- Radioactive materials detected in air samples from locations on and off the Rocky Flats site were used to confirm the presence and quantity of radioactive materials reported as contaminants released through the air.
- Scientists looked at sudden increases in concentrations of radioactive substances in air sample records for indications of accidental releases of radioactivity.
- Data from special monitoring conducted after unplanned releases helped scientists clarify the magnitude and extent of the releases.
- Samples collected over long periods of time, such as soil samples, traced cumulative changes in quantities of contaminants that remained in the environment for a long time.

How reliable are past environmental monitoring data?

It is not easy to determine the quality and reliability of past environmental monitoring data, especially if there are no other data available for comparison. Fortunately, some environmental data were collected independently by more than one organization, allowing scientists to check and compare the data:

- In addition to the site contractors, the Colorado Department of Public Health and Environment has monitored air, water and soil around Rocky Flats on a regular basis, beginning in July 1970.
- The Public Health Service and later the Environmental Protection Agency monitored the air and water in the vicinity of Rocky Flats since April 1960.
- Other monitoring was carried out by the cities of Westminster (January 1989 to December 1991) and Broomfield (September 1981 to December 1991).

Was monitoring done for toxic chemicals?

Historically at Rocky Flats, very little environmental monitoring was conducted for non-radioactive contaminants, such as the metal chromium and chemicals including carbon tetrachloride or beryllium. There was little concern about non-radioactive chemicals, and it was difficult to measure these chemicals in the environment. However, some special studies of the distribution of the metal beryllium in soils were located. Also, from 1970 to 1976, the Rocky Flats contractor routinely monitored air for beryllium.

What environmental monitoring does Rocky Flats do now?

The current program includes routine on-site and off-site monitoring of air and surface water. Special studies of other environmental media are conducted on a non-routine basis.

Important Conclusions based on historic environmental monitoring data

Air

- Air samples collected since 1951 strongly suggest that the 903 barrel storage area, on the eastern side of the plant, was one of the primary sources of airborne plutonium released from Rocky Flats.
- After an asphalt cover was applied to the 903 Area in 1969, plutonium concentrations in air greatly declined into the 1970s.

Vegetation

- Vegetation data from routine monitoring and special studies (from 1951 to 1970) provided information on how radioactivity was spread out around Rocky Flats and how radioactivity levels in the area changed over time. The data clearly recorded the deposition patterns that resulted from key on-site release events, specifically the higher plutonium releases that occurred as a result of the cleanup activities around the 903 Area.

- High levels of radioactivity were measured in air just east of on-site holding ponds in 1962 and in 1970, corresponding to times when the ponds were undergoing repairs and modifications.

Surface Water

- Radioactivity in water samples taken prior to 1970 from Rocky Flats ponds corresponds fairly well to release events on-site. These ponds were used to hold wastewater.
- The monitoring data clearly show the effectiveness of the ponds in decreasing the levels of radioactivity released to off-site streams.
- Water monitoring by the Colorado Department of Public Health and Environment identified the release of tritium from Rocky Flats in 1973.

Sediment

- Sediment profiles of plutonium in Great Western Reservoir and Standley Lake clearly show a peak concentration occurring at a time corresponding to the 903 Area release (1969 to 1970). Some evidence shows that this peak extends into the early 1970s and may include the surface water releases during reconstruction of the Rocky Flats holding ponds.
- Sediment data indicate that liquid, as well as airborne releases, contributed to the contamination in Great Western Reservoir sediments.

Soil

- The majority of plutonium released to the off-site environment from Rocky Flats occurred from the 903 Area. This occurred primarily between 1965 and 1970. Lesser contributions were released from the 1957 fire and the 1969 fire, although the 1957 fire's plume moved farther from the plant and contributed more significantly to health risks.
- Although some plutonium has migrated down into the soil, most is contained in the upper few inches.
- Using sophisticated means, Rocky Flats plutonium can be detected as far as 12 miles (19.3 km) east of the plant.