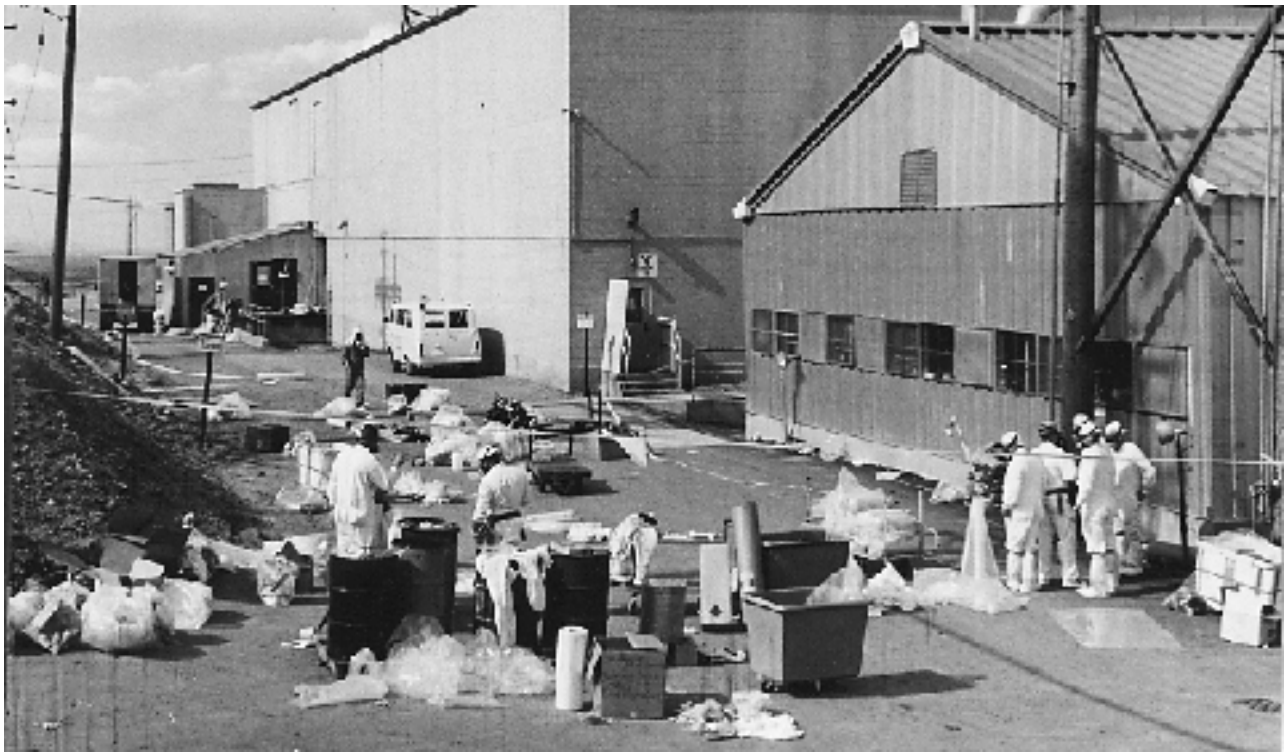
Citizen Summary

Rocky Flats Historical Public Exposures Studies

1969 Fire



Pictured are workers cleaning up after the 1969 fire.

Introduction

Researchers conducting the Historical Public Exposures Studies investigated several key releases of contaminants to the air from the former Rocky Flats Nuclear Weapons Plant. On May 11, 1969, a plutonium fire broke out in the processing section of Building 776, creating one of the most costly industrial accidents in United States history.

The fire started at approximately 2 p.m. in Building 776. Plutonium kept in a open can within a glovebox began to smolder due to spontaneous combustion. Plutonium burns slowly, much like charcoal. The heat of combustion caused the plastic storage chest to decompose and catch fire. The fire then spread quickly, burning plastic shielding and other flammable materials. The fire was drawn through the glovebox line by the glovebox ventilation systems. Because there were few fire breaks in this line, a large portion of the building was affected by the fire. The fire was contained by 6:40 p.m. and extinguished by 8 p.m. However, fire damage was severe, and only by heroic efforts were the firefighters able to maintain the integrity of the building.

Shown are remains of gloveboxes that burned during the May 11, 1969 fire.

Gloveboxes are enclosed containers designed with view panels and portholes. The portholes are sealed with protective rubber gloves. Workers put their hands in the gloves, reaching through the portholes to handle radioactive materials inside the gloveboxes without being exposed to plutonium dust.

The glovebox ventilation systems were equipped with four to six banks of High Efficiency Particulate Air (HEPA) filters. Each of the filters was designed to capture airborne plutonium particles. Unlike the filters used in Building 71 at the time of the 1957 fire, these filters were not highly flammable and performed well during the 1969 fire.

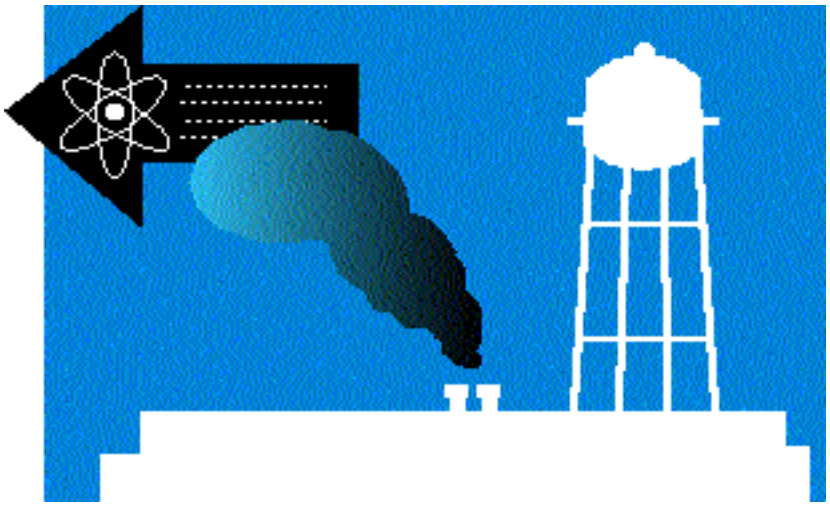
It is estimated that 0.14 - 0.9 gram (10-60 mCi) of plutonium-239, -240 was released to the atmosphere during the 1969 fire.

Filters in four banks were damaged. In the early stages, filters in one glovebox ventilation system were plugged. Subsequently, another ventilation system, which was not plugged, pulled the fire through the glovebox system. The highest measured plutonium contamination outside the building was found on the roof beneath an exhaust duct for this system.

It is estimated that between 0.14 and 0.9 gram (or 10 and 60 mCi) of plutonium-239, -240 was released into the atmosphere during the fire. The median value was 0.3 gram (or 20 mCi). Additional plutonium particles were deposited on the roof of Building 776 and on the ground nearby. Plutonium also was tracked out of the building on the boots of firefighters.

How did plutonium travel off-site as a result of the 1969 fire?

Plutonium present as very fine particles in the smoke from the fire was carried away from the plant into surrounding areas by wind.



Plutonium released through the roof vents in Building 776 had passed through filter banks. Winds carried this plutonium away from the plant and into surrounding areas. The size of particles released is not known.

It does not appear that contaminated fire-fighting water left the site. Most of the water used to fight the fire was trapped in pits under equipment and stairwells, and went to process drains leading to underground storage tanks. It was then transferred to the waste water treatment facility.

Assessment of how airborne plutonium moved off-site was based almost entirely on computerized air dispersion modeling performed by researchers in the studies. The same model was used to evaluate the transport of plutonium from the 1957 fire.

An air dispersion model is a mathematical representation using wind speed and direction, and other information to estimate how material suspended in air traveled downwind from the Building 776 stack. The model also predicts concentrations of material near ground level where people breathe the air.

How were people exposed to plutonium from the 1969 fire?

People living downwind of the Rocky Flats Plant during the May 11, 1969 fire could have been exposed to plutonium in several ways. The most important exposure pathway was inhalation of plutonium in the air the day it was released and transported by wind off-site. Some plutonium was deposited onto the soil downwind of the plant and could have been ingested later by children who played in the dirt. Inhaled plutonium poses a greater human health risk than ingested plutonium, most of which passes through the gastrointestinal tract without being absorbed. However, ingestion may have been the only exposure from the fire for small children born after the event.

Researchers estimated the risks of cancer to persons in the study area who were exposed by inhaling

particles of plutonium. The highest risks were to persons who were exercising or working outside on May 11, 1969, in areas where the plume of plutonium particles was near the ground.

What were the cancer risks to people working or living off-site?

Researchers calculated the cumulative cancer risk of plutonium released from the plant. This information is available in the *Summary of Findings* booklet.

How can I get more information about the studies?

The reports, *Estimated Airborne Releases of Plutonium During the 1969 Fire in Building 776*, written by P.G. Voilleque, M.S., C.H.P., and *Estimated Exposure and Lifetime Cancer Incidence Risk from Plutonium Released from the 1969 Fire at the Rocky Flats Plant*, written by A.S. Rood, M.S., H.A. Grogan, Ph.D., and J.E. Till, Ph.D., (principal investigator) of Radiological Assessments Corporation, provide a detailed, technical account of this topic. This Citizen Summary provides a simplified overview of the technical reports. The reports are available at the locations listed here.

For more information on the Rocky Flats Historical Public Exposures Studies call **303-692-2700** or visit the web site: **www.cdphe.state.co.us/rf** or any of the following libraries or Rocky Flats Reading Rooms:

Colorado Department of Public Health and Environment
Information Center,
Building A, First Floor
4300 Cherry Creek Drive S.
Denver, CO 80246-1530
Phone: (303) 692-2037

Front Range Community College
DOE Rocky Flats
Reading Room
College Hill Library
33705 W. 112th Ave.,
Room L 169
Westminster, CO 80030
Phone: (303) 469-4435

Citizens Advisory Board
9035 N. Wadsworth Pkwy, Suite 2250
Westminster, CO 80021
Phone: (303) 420-7855

University of Colorado Boulder
(After January 1, 2000)
Government Publications Library
Campus Box 184
3rd Floor, Norlin Library
Boulder, CO 80309
Phone: (303) 492-8834

Study Overview

Research concerning releases of plutonium from the 1969 fire at Rocky Flats was part of a

comprehensive study of all major contaminant releases from the plant. The Rocky Flats Historical Public Exposures Studies involved nine years of research including identification and assessment of past releases of radioactive materials and chemicals from the former Rocky Flats Nuclear Weapons Plant. The researchers estimated the cancer risk to residents living or working in surrounding communities during the plant's operation from 1952 to 1989.

The project was administered by the Colorado Department of Public Health and Environment and overseen by a 12-member Health Advisory Panel appointed by former Governor Roy Romer.

Phase I of the Historical Public Exposures Studies, a toxicologic review and dose reconstruction, began in 1990 and concluded in 1994. ChemRisk, a division of McLaren/Hart Environmental Engineering, conducted Phase I. Radiological Assessments Corporation conducted Phase II, a toxicity assessment and risk characterization, from 1992 to 1999.

Back to Index

8/99