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League of Women Voters -- Rocky Flats Cold War Museum -- Rocky Flats Homesteaders
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Off-Site Lands – Contamination and Risk

To the extent people are concerned about on-site contamination they are equally if not more concerned about off-site contamination. This paper addresses the latter issue.

Contamination Spreads Off-Site

Throughout site operations, and especially during the 1950s through the early 1970s, radioactive and other hazardous materials were released into the environment which, in a few instances, migrated onto off-site lands neighboring Rocky Flats. Contamination included plutonium, tritium, organic solvents (e.g. carbon tetrachloride), and heavy metals. The greatest concentrations are east and south-east of the site, including lands within the municipal boundaries of Arvada, Broomfield and Westminster.

The two primary pathways contaminants moved off site were high winds and surface water flows. Some of the major events which led to the off-site dispersion were:

- During the 1950s and 1960s leaking drums of plutonium-contaminated liquid wastes were stored outside in an area known as the 903 pad. When the Atomic Energy Commission (AEC; a precursor to the Department of Energy) tried to remediate this area in the early 1960s, high winds dispersed the contamination eastwards. While much of it and the highest concentrations remained on-site, low levels spread beyond the site boundary.
- A fire in Building 771 in 1957 released plutonium into the air.
- A fire in Building 776 in 1969 released plutonium into the air.
- Various releases contaminated Walnut and Woman Creeks as they run through Rocky Flats. Some contaminated water moved off-site. As part of the plan to address this problem, in the mid-1970s the AEC built water settling and holding ponds.

Radioactive contamination that migrated off-site by high winds and surface water is found in surface soils, stream bed sediments (Walnut and Woman Creeks), and in lake sediments (Standley Lake, Great Western Reservoir and Mower Reservoir).

How Do We Know What Is There?

Starting in the 1970s as public interest over the extent of off-site contamination and potential threats to public health and the environment rose, the federal government, health regulators and

independent scientists began exploring the extent of off-site contamination and potential health impacts.

The Colorado Department of Public Health and Environment (CDPHE) monitored the air to identify any potential airborne contamination coming from the site. CDPHE also collected soil and water samples from areas surrounding Rocky Flats. Local governments, who were likewise concerned about the extent of off-site contamination, began collecting water and soil samples. Independent citizen groups and university research scientists also played a role in determining the extent of off-site contamination. The Department of Energy (DOE) also embarked on an effort to better understand the extent of contamination on off-site lands, as did the Environmental Protection Agency (EPA).

Extent of Off-Site Radioactive Contamination and Associated Risk

In order to assess the risk to human health and the environment it is vital to know how much contamination there is. Throughout the Denver-metro area, the background level for plutonium in soils is approximately 0.06 picoCuries per gram of soil (pCi/g), a measure of radioactivity. Background is above 0.0 pCi/g as a result of radioactive fall-out from atmospheric testing of nuclear weapons; background, however, does not include a contribution from Rocky Flats contamination.

Most of the soil samples taken by CDPHE and others were either at background or slightly higher. However, a few samples were greater. The highest concentration, which was found 1,800 feet east of Indiana Street near the site's east entrance, was 6.5 pCi/g. This level of radioactivity corresponds to approximately 0.12 millirem/year, another measure of radioactive dose.

To help understand what this level means, it is helpful to compare it to other doses of radiation we experience:

- Average dose from all sources = 360 mrem/year
- Terrestrial background (Rocky Mountains) = 40 mrem/year
- Cosmic radiation (Denver) = 50 mrem/year
- Drinking water = 5 mrem/year
- Chest X-ray = 8 mrem
- Dental X-ray = 10 mrem
- Coast-to-coast airplane (roundtrip) = 5 mrem
- Eating one banana per day per year = 5 mrem/year (source is potassium)

Based on this data, in 1997 DOE, CDPHE and EPA determined that there was no need to perform environmental remediation of any off-site lands. Their findings and conclusions were subsequently submitted to the Agency for Toxic Substances and Disease Registry (ATSDR), a division within the Federal Centers for Disease Control. ATSDR evaluated whether the risk posed to residents was adequately calculated. They also evaluated whether DOE, EPA and CDPHE's determination to not remediate off-site lands was supportable. ATSDR affirmed DOE's data and conclusions – no additional cleanup activities were needed to protect public health and the environment.

Independent Analyses and an Enormous Lawsuit

From the mid-1990s onwards, Rocky Flats was the subject of many independent reviews. Some of those reviews included assessments of contamination on off-site lands and potential impacts to surrounding communities.

Health Advisory Panel – Potential Impacts to Neighboring Communities

In 1990 Governor Roy Romer directed CDPHE to conduct an in-depth study on historical public exposures from off-site contamination. Gov. Romer also appointed an independent panel, the Health Advisory Panel (HAP), to oversee CDPHE's work.

In order to determine the extent of contamination, CDPHE took extensive soil, water and air samples. CDPHE also reviewed historical information. With this data, the researchers determined that the two most prevalent types of off-site contamination are radioactive (primarily plutonium and americium) and carbon tetrachloride. CDPHE and the HAP then undertook a risk assessment to determine the effects (potential of increased cancer risk due to exposures) these two forms of contamination would have on public health. The researchers concluded, in short, the risk of developing cancer due to off-site contamination was extremely low and did not pose a significant threat to human health or the environment. The risk ranges associated with off-site exposure to plutonium and carbon tetrachloride were very similar to the risks discussed above.

For more information about this study please go to: <http://www.cdphe.state.co.us/rf/index.htm>

Community Independent Review

This aforementioned risk posed to residents living on lands adjacent to Rocky Flats also tracks an independent, community led study undertaken in the late 1990s. This study, led by Dr. John Till with the Risk Assessment Corporation, established a cleanup range that would be protective of a family with children living at Rocky Flats. Under Dr. Till's scenario, which was developed in partnership with a community oversight board, the family would live in the most contaminated part of the site and get all of its food and water from within Rocky Flats.

As a result of this work, a few years later, DOE, EPA and CDPHE adopted cleanup levels that fell within Dr. Till's cleanup range. Importantly, though, most of Rocky Flats, including all of the lands that comprise the Rocky Flats National Wildlife Refuge, are significantly cleaner than the range established by Dr. Till.

Cook vs. Rockwell—Neighbors Sue

In the early 1990's, property owners within a certain radius of Rocky Flats filed a class action lawsuit against the first two site contractors, Dow Chemical (site operator from 1952 to 1975) and Rockwell International (site operator from 1975 to 1990). The lawsuit alleged that the contractors released off-site contamination that resulted in a diminution of property values. In 2006, the jury awarded the plaintiffs \$553.9 million based on trespass and nuisance resulting from contamination spreading to off-site lands.

Importantly, Cook vs. Rockwell concerned off-site contamination and did not speak to the cleanup. The reason is that the class of property owners closed in the early 1990s so they were

compensated for their loss in property value up to the early 1990s. The case also did not address the health risks associated with off-site contamination.

Dow and Rockwell appealed, and the 10th Circuit Court of Appeals threw out the judgment. The US Supreme Court denied a petition to reinstate the judgment.

May 2008
Updated May 2014