



Colorado Department  
of Public Health  
and Environment

# FAQ

## Hazardous Materials and Waste Management Division Colorado Department of Public Health and Environment

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### Rocky Flats Q&A

with Senator Jeanne Nicholson

Superior Town Hall – April 6, 2013

(recorded and forwarded by Debra Williams, Town of Superior Trustee)

**1. There is a lot of debate as to whether it is safe. If it is so safe as you contend, why not test it now as soil is being disturbed all around the refuge to ensure public health, after all that is what CDPHE is tasked to do?**

Additional sampling is not required because vast amounts of data regarding plutonium contamination at and near Rocky Flats have already been gathered. These data demonstrate that the area where plutonium contamination exceeds background levels is limited to a fairly small area immediately east of the former plant entrance on Indiana Street. Even the highest level of plutonium contamination recorded off-site poses a minimal risk – the odds of developing cancer as a result of exposure to this level of residual plutonium are about three in a million. In comparison, about 1 in 2 men will develop cancer during their life, as will about 1 in 3 women.

During characterization and remediation projects at the Site, about 1.3 million analyses were compiled from approximately 7,230 surface soil sample locations and from about 15,890 subsurface soil samples. These samples are reported in the RI/FS report ([http://www.lm.doe.gov/Rocky\\_Flats/Regulations.aspx](http://www.lm.doe.gov/Rocky_Flats/Regulations.aspx)), which was compiled to support a Comprehensive Risk Assessment and the final remedy decision.

The average concentration of plutonium in the surface soil of the Refuge portion of the Site is 1.1 pCi/g: a concentration that equates to an excess cancer risk below one in a million for any exposure scenario. There is essentially no plutonium in the subsurface soils of the Refuge. Because of these very low concentrations, no remediation was required in the Refuge portion of the Site.

Substantial off-site sampling has also been conducted over many years by many different entities and these studies have shown generally consistent results. The most extensive off-site sampling was done as part of the CERCLA/RCRA investigation that covered a 38-square mile

We currently have ongoing cancer surveillance for the entire state of Colorado and we participate in a national surveillance program. If your request is understood, specifically you want more intense study of alpha-radiation emitters. If such a study could be done, it would be a very expensive, long-term study best handled by an academic center, such as the University of Colorado. CDPHE would certainly cooperate if asked to participate.

**3. There is a strong need for current epidemiological studies of the communities surrounding Rocky Flats. Will you conduct these kinds of research studies? If not, who will?**

Again, CDPHE has long-term epidemiologic surveillance of cancers, infections and other reportable conditions. That data and information is available on the CDPHE website. If more intense surveillance is desired by the community, the state legislators would need to request funding and direct the department. Central Cancer Registry:

<http://www.colorado.gov/cs/Satellite/CDPHE-PSD/CBON/1251618784014>. Cancer Cluster Investigations: <http://www.colorado.gov/cs/Satellite/CDPHE-DCEED/CBON/1251610480022>.

Two of the several epidemiological studies that have already been conducted are cited in the response to Question #4 below.

**4. The medical community in the Denver area has cited frequent treatment of Rocky Flats-related diseases and medical issues. Has CDPHE considered creating a task force of medical professionals to track these frequencies among both construction workers and residents in the area?**

Chris Urbina: "I am not sure what medical community you are referring to regarding 'frequent treatment of Rocky Flats-related diseases and medical issues.' I would be open to discuss [these] concerns. Please contact us and please review the two studies regarding cancer exposure among the surrounding communities and workers:

*Report of Epidemiological Analyses Performed for Rocky Flats Production Workers Employed Between 1952 – 1989 (2003) and Ratios of Cancer Incidence in Ten Areas Around Rocky Flats, Colorado Compared to the Remainder of Metropolitan Denver, 1980-89 with Update for Selected Areas, 1990-95 (1998).* Both can be found at:

<http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251615995394>.

One conclusion of the first study is that Standardized Mortality Ratios for production era workers (1951-1989) were significantly lower for all causes of death and all deaths with cancer as an underlying cause. A key finding of the second study was that, "communities in the

well as to monitor fugitive radionuclide emissions from decommissioning, remediation, and demolition operations. At its peak, the radioactive ambient air monitoring included 39 samplers operating continuously both on-site and off-site. sets an annual dose standard of 10 millirem (mrem) effective dose equivalent (EDE) to any member of the public.

The air pathway was investigated as part of the comprehensive Remedial Investigation/ Feasibility Study: [http://www.lm.doe.gov/Rocky\\_Flats/Regulations.aspx#RIFS](http://www.lm.doe.gov/Rocky_Flats/Regulations.aspx#RIFS). Section 6 of this report discusses the nature and extent of air contamination.

Wind tunnel experiments were conducted at seven off-site locations to measure the effects of wind erosion on different terrains. These investigations are described in a three-volume report of the investigation of Operable Unit 3 (Off-Site Areas). The first volume of the report can be accessed at: [http://www.lm.doe.gov/cercla/documents/rockyflats\\_docs/OU03/OU03-A-000465.pdf](http://www.lm.doe.gov/cercla/documents/rockyflats_docs/OU03/OU03-A-000465.pdf). Wind tunnel studies were also conducted on-site following prescribed burn in 2002 to determine the effects of fire on air-borne contamination. Conclusions from this test burn were incorporated into the calculations for the Site's soil action levels.

The State also ran a couple of monitoring networks – one with stations inside the plant boundary and a network of 5 perimeter samplers. During closure, EPA set up monitors adjacent to cleanup projects to ensure that radiation limits for workers were not exceeded.

Now that potential sources in the surface soil have been removed, there is even less of a chance of radiological contaminants becoming airborne. Because of the history of analyses at or near the detection limit at the State monitoring stations, CDPHE's air sampling program ended in 2006. DOE discontinued its air sampling in 2007.

**6. At the meeting in Superior on Saturday, Carl Spreng spoke briefly about prairie dogs at Rocky Flats, saying we keep a close watch on them, that they die off from the plague but then come back. He said something like "we take care of them." I and others with whom I spoke thought he implied that the prairie dogs on the site are sometimes killed. Is it true that prairie dogs on the Rocky Flats site are sometimes killed? If so, who does it? And by what means?**

No prairie dogs have been killed at the Site. The prairie dog town that existed in the southeastern part of the Refuge when the Site closed was wiped out by plague and has not returned.

The US Fish & Wildlife Service's Comprehensive Conservation Plan for the Refuge calls for limiting prairie dog populations to "750 acres outside of recognized Preble's Habitat and Xeric Tallgrass Habitat." Populations will be controlled by trapping and relocating or "other methods." Local jurisdictions which manage open spaces around the Site also have prairie dog control programs.

The most comprehensive of contamination on or adjacent to Rocky Flats was the RI/FS report discussed in the response to Question #1. Of the thousands of samples analyzed for plutonium, the 31 samples collected within the 300-foot right-of-way for the Parkway average 1.4 pCi/g, which equates to a risk below one in a million for any exposure scenario. Of the 31 samples, eight are above the State's "construction standard" (see response to Question #20). These eight are clustered near the middle (north to south) of the right-of-way and average 3.2 pCi/g.

The samples that were used for the remedy decision for the Site were required to be collected, analyzed, and validated according to precise regulatory standards. Although the samples collected and analyzed by Kaltofen in 2011 did not meet these standards, the reported measurements (from 0.019 to 1.579 pCi/g) would confirm the very low levels of plutonium just off-site that have been measured by numerous other studies.

The final decision for the Refuge portion of the Site was based on an abundance of data and risk assessments demonstrating that risks to future refuge visitors and workers are extremely low. According to regulatory requirements and guidance, EPA and CDPHE agreed that the Refuge lands, including the right-of-way, could be available for "unrestricted uses and unlimited exposure."

Proposed language for signs at Refuge entrances has been drafted with the US Fish and Wildlife Service and reviewed in a public forum. The draft language does acknowledge potential low-level risks to visitors.

**8. I appreciate the measurement and contamination efforts, which have been made during cleanup phase. What level of cleanup has been performed on the specific area, which is proposed for toll road construction? Do we know the level of risk that exists of plutonium particles in the specific zone slated for construction? For instance, as a percent chance of exposure? Are the details and rationale for this level of confidence documented somewhere?**

No cleanup was required on any of the land that became part of the Refuge. Data from the right-of-way strip was not specifically segregated for the final remedy decision, but it was addressed in the Environmental Assessment issued by the US Fish and Wildlife Service. The response to Question #7 provides details on sampling done within the right-of-way and the associated risk levels.

The Comprehensive Risk Assessment prepared to support the final remedy decision developed a site conceptual model which identified multiple exposure pathways. Risk to a construction worker was not directly calculated in that assessment. Because the exposure pathways, work activities and assumptions are similar to those used for a refuge worker, the risks should be

cancer risks below 1 in a million are considered to be negligible. (Also see response to Question #8.)

**10. Why were homebuyers required to sign a waiver that they were aware of the potential exposure to radiation by living close to Rocky Flats if it was deemed safe after the cleanup? And then, why did it become no longer necessary to alert homeowners living near it such as Candelas, Whisper Creek and other developments closer than Superior?**

Home owners were not required to sign waivers by the state or local governments. The Federal Housing Administration apparently began the waiver program in 1979 while the plant was still in operation. Input from current FHA personnel could not clarify why the program ended.

Off-site areas near Rocky Flats were thoroughly investigated and risk assessments confirmed that all areas adjacent to the Site could be used for any purpose. Samples collected on land being developed south of the Site present minimal risks and are at or below background levels.

**11. If we launch tons of dust at 6.5 picocuries/gram into the air, will it violate state standards? Should it be tested?**

State standards that are applicable to the assessment of dose to the public are the effluent limits in Table 4B2 in the Colorado Rules and Regulations Pertaining to Radiation Control (6 CCR 1007-1). The effluent limit for plutonium in that table is equivalent to 0.02 pCi/m<sup>3</sup>.

Total Suspended Particulates (TSP) were measured at CDPHE's 5 perimeter air samplers from 1992 through 2002, including station X-3 located across Indiana Street from the Woman Creek Reservoir. Levels of TSP at X-3 usually averaged about 36 micrograms/cubic meter of air (µg/m<sup>3</sup>) with the exception of the summer of 1995. During this period, particularly in August 1995, construction of the Woman Creek Diversion Reservoir was taking place immediately across the street from the X-3 site. As a result of earth moving operations, TSP levels at X-3 were very high with a maximum of 501 µg/m<sup>3</sup>. Using this peak level as an average for a construction scenario, the maximum level of plutonium in the air due to 6.5 pCi/g in soil would be 0.00325 pCi/m<sup>3</sup>:

$$501 \mu\text{g}/\text{m}^3 \times 6.5 \text{ pCi}/\text{g} = 0.00325 \text{ pCi}/\text{m}^3$$

(This estimated value is an order of magnitude below the state standard for plutonium in air.)

The average concentration of plutonium particles sampled in the right-of-way is 1.4 pCi/g. (See response to Question #7.) This contamination is at the very surface and the vast majority of any

EPA first studied Standley Lake in the early 1970s. Several other later studies indicated that the sediments in the reservoir contained levels of plutonium slightly above global fallout levels, probably attributable to 903 Pad releases. Water sampling by the City of Westminster and DOE established the immobility of plutonium in Standley Lake sediments. Extensive sampling in Great Western Reservoir by the City of Broomfield and DOE also confirmed the immobility of plutonium in the sediments there. Studies of Standley Lake fish conducted by CDPHE in 1989 found no radionuclides in tissue samples. The amount and depth of plutonium contamination in the reservoirs was reaffirmed by sediment sampling and coring done for Operable Unit 3 (Off-Site Areas) at 99 locations. Nearly 200 sediment samples were collected and analyzed for plutonium in Great Western Reservoir and Standley Lake; the average plutonium concentrations were 0.267 pCi/g and 0.033 pCi/g respectively. (See sections: 2.3.3, 4.5, and 7.1.3 of the OU 3 RFI/RI Report at [http://www.lm.doe.gov/cercla/documents/rockyflats\\_docs/OU03/OU03-A-000465.pdf](http://www.lm.doe.gov/cercla/documents/rockyflats_docs/OU03/OU03-A-000465.pdf))

The ultimate and most important testing of the water in Standley Lake is done by the cities that use it as a drinking water supply.

**15. Can we seek to reduce the state standard of plutonium contamination of 2.0 disintegrations per minute per gram of soil? This is not the original figure and it was raised to accommodate higher contamination as society experiments with nuclear testing.**

This construction guideline is well below cleanup levels established at any remediation site in the country. There was considerable uncertainty about the calculations used to derive it in 1973 when it was adopted and there was debate about whether to raise or lower the number. Using currently accepted input parameters, this value equates to a risk that is below EPA's acceptable risk range for any exposure scenario.

Anyone can approach the Board of Health with proposed changes to regulations. Check with the Board to determine what specific procedures would apply.

**16. What micron size filters were and are being used in suspended particulate air monitoring?**

Air monitoring done by the State at Rocky Flats met all applicable state and federal requirements pertaining to sampling equipment used, particle size collected, and analyses performed. The Air Pollution Control Division of the Department of Public Health & Environment collected samples for radiological analysis of both TSP (total suspended particulates) and PM10 (particulates 10 microns in diameter and smaller). Particulate filters

the most contaminated areas on-site, the amounts measured at the sampling stations were well below national and state standards. (See the responses to Questions #5 and #11.)

**18. What are existing H2O test results in Superior's water supply?**

Superior's Drinking Water Consumer Confidence Report for 2012 states, "All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk." The Town's drinking sources are Carter Lake and Terminal Reservoir via Marshall Lake. The water is tested for microbial, inorganic, herbicide, pesticide, radioactive, and organic chemical contaminants. The Maximum Contaminant Level for alpha radiation (the type of radiation that plutonium emits) is listed as 15 pCi/L, which is the same as for drinking water supplies in other municipalities. The average level measured in 2012 was 1.4 pCi/L and "erosion of natural deposits" was given as the "typical source." This amount of plutonium would, however, be considered an exceedance of the plutonium standard for surface water leaving the Rocky Flats Site, where a 0.15 pCi/L standard is imposed by the state.

**19. How long did the analysis and monitoring continue? What has been discontinued regarding monitoring?**

See the response to Question #17.

**20. Is it too late to block the road to nowhere? Dig now, ask questions later, and test later?**

CDPHE does not have a position regarding the desirability of the proposed Parkway. It does, however, have a position regarding the protectiveness of the remedy in the area of the right-of-way transferred from the Refuge property. Those questions have already been asked and answered: the testing has already been done and the results are available. (See response to Question #7.) The analysis of all the sampling done in the lands that became the Refuge support a decision that allowed EPA and the CDPHE to declare that the Refuge lands are suitable for any use.

There are a number of state and federal environmental requirements that may apply to the proposed construction, such as a stormwater permit, dredge and fill permit, air permit, etc. The decommissioning criteria in Section 4.61 of the Colorado Standards for Protection Against Radiation (6 CCR 1007-1) set dose limits for members of the public. These limits were considered "relevant and appropriate requirements" for determining if the Refuge lands were acceptable for unrestricted use. Surface soil sample results in the Refuge indicate that doses to

**22. Surface cleanup to 3-6 ft., trenches, buildings, walls, etc. have been identified as buried. Question for Legacy Management, for residual contamination: There are two remaining ash pits with unknown potential risks? What has become of those?**

The Rocky Flats Legacy Management Agreement

([http://www.lm.doe.gov/Rocky\\_Flats/Regulations.aspx](http://www.lm.doe.gov/Rocky_Flats/Regulations.aspx)) Figure 3 of Attachment 2 shows remaining infrastructure in the DOE-retained portion of the Site. The infrastructure consists mostly of decontaminated building slabs and tunnels. Process waste lines that were not removed were flushed then grouted in place. Figure 4 shows where pits and trenches, including the Ash Pits, were left in place.

These features are noted and located in this three-agency Agreement so that even though they do not pose an exposure risk, their presence will be considered by any future maintenance activities. Controls prohibiting digging and drilling are in the Agreement, in the final decision document, and in an Environmental Covenant with the State. The area of the ash pits is inspected annually for any signs of disturbance or erosion. Monitoring stations in the Woman Creek drainage analyze collected water for uranium and would report any impacts to surface water. The ash pits have been there for around 50 years and surface water remains un-impacted.

**23. Colorado's standard for plutonium in soil and its relation to respirable dust. A statement prepared by LeRoy Moore, PhD, April 6, 2013:**

In response to revelations of major releases of plutonium from Rocky Flats, in January 1973, Colorado mandated that land where plutonium contamination exceeds 0.2 disintegrations per minute per gram of soil (dpm/g) is "unfit for residential use, subdivision development, or commercial and industrial uses." (i) Less than two months later, the state increased by tenfold the amount of plutonium to which exposure was allowed, from 0.2 to 2.0 dpm/g while at the same time dropping its prohibition against residential, commercial, or industrial uses in areas too contaminated to meet the new, more relaxed standard. Hereafter, it would merely require "special techniques" for construction in such areas, such as plowing plutonium under. (ii) Thus, the state gutted its original, fairly-protective standard for one that is essentially worthless.

Speaking at an EPA hearing in Denver in 1975, NCAR radiochemist Edward Martell pointed out that 2.0 dpm/g equals 0.9 pCi/g, or about 1.0 pCi/g. Allowing 1.0 pCi/g of plutonium in surface soil "will give rise to an estimated 10 to 100 pCi/g of insoluble airborne dust of respirable size." It thus is far from clear he said, that the state standard "is safe and acceptable." It may be "at least 20 times too high." (iii)



to be devoted to cleanup. And removing these two items from the list would greatly reduce security costs. These three items would not have to be paid for 70 years. And there's no reason to think that demolition of the more contaminated buildings would be long delayed once materials requiring high security have been removed from them.

DOE's 1996 Baseline Environmental Management Report, the first report to show reductions from its original \$70 billion estimate for the Rocky Flats cleanup, projects large cost reductions in handling nuclear waste, environmental restoration, and decontamination of buildings prior to their demolition. Some cost reduction is also attributed to the decision to do a "risk-based" cleanup, by which I believe DOE means the cheaper cleanup only to the level required to protect a wildlife refuge worker. Since Dr. Urbina's statement differed so greatly from the information I have provided here, I'd like to ask him for the source and documentation of what he as head of CDPHE said. I certainly would like to know if I have been misinformed.

Reducing mortgage costs, roughly \$475 million per year at the start of cleanup activities at Rocky Flats, meant the amount of funds for actual cleanup work could increase. Over 30 years, the \$475 million per year comes to roughly \$33 billion and that amount would not have included cleanup work. So by reducing the security costs, shipping special nuclear material off-site, and cleaning up and taking down buildings, substantial amounts could be saved from the original projections. The faster work could get done, the greater the savings. Very tight and efficient project management, along with the congressional promise of a steady budget, allowed this to happen.

The dose-based action level for plutonium contained in the cleanup agreement in 1996, 651 pCi/g, is the level used as the basis for the cleanup costs that were originally estimated at \$70 billion. When the action levels were reset, the calculated risk-based action level, 116 pCi/g, was reduced to 50 pCi/g after discussions with surrounding communities. Using this level to trigger remedial actions resulted in an average residual concentration of 2.3 pCi/g of plutonium in soil in the DOE-retained area of the Site. The reduction in overall cleanup costs did not result in a lesser cleanup – it left the Site in a more protective state.