

Actinides in Deer Tissues at Rocky Flats Environmental Technology Site

EXECUTIVE SUMMARY

The United States Fish and Wildlife Service is releasing the final results of the deer tissue study done at Rocky Flats Environmental Technology Site. The U.S. Fish and Wildlife Service conducted this study to determine activity levels of selected radioactive isotopes in relevant Rocky Flats ungulate tissues. Further, these analytical results were used to carry out a series of conservative, risk-based calculations to define human risk associated with ingesting these tissues.

The deer tissues were collected in December of 2002 during a Chronic Wasting Disease (CWD) study done by the Colorado Division of Wildlife. Twenty-six deer were culled for the CWD study. All twenty six of the deer came back negative for CWD. Lung, liver, muscle, kidney and bone tissues were collected by U.S. Fish and Wildlife biologists and a Rocky Flats ecologist. Tissues of an off-site deer, inadvertently killed by a vehicle, were collected at the Rocky Mountain Arsenal National Wildlife Refuge (RMA). Tissues were stored frozen until they could be sent to an experienced and qualified analytical laboratory in Charleston, South Carolina.

In total, of the 454 individual isotopic analyses that were conducted on Rocky Flats deer tissue samples, only 17 resulted in activity levels measured above the method detection limits. Of the 26 individual isotopic analyses done on the RMA deer, only three resulted in activity levels above the method detection limits. Americium was detected in select lung, muscle, and kidney tissues of the Rocky Flats deer, and was also detected in kidney and liver tissues of the RMA deer. Plutonium was only detected in bone samples from the Rocky Flats deer. Uranium was detected in select liver and muscle tissues of the Rocky Flats deer, and was also detected in liver tissue of the RMA deer. Historical studies of plutonium analyses in deer tissues at Rocky Flats, although limited in number and scope, have yielded similar results to those presented in this study. One study included deer from Cache La Poudre Canyon and the captive herd at Colorado State University, showing tissue activity levels similar to Rocky Flats and RMA deer.

In order to predict potential radiological risk resulting from ingestion of edible deer tissues from Rocky Flats, a simple, but highly conservative estimate of risk was conducted. All liver and muscle tissues which yielded detections above the corresponding method detection limits were utilized to calculate risk values associated with the ingestion of these tissues. The risk calculations were based on one person eating the five pounds of liver or the 62 pounds of muscle from one deer in a year. The highest risk calculated in this exercise was attributed to Americium in muscle tissue of one deer, with tissue activity levels (0.000449 pCi/g) translating to a 6.76×10^{-8} risk level. This level of risk corresponds with a 1 in 14,700,000 increased chance of cancer resulting from the ingestion of the deer muscle. To carry this through, if this same individual consumed similar deer tissue yearly, throughout his/her lifetime (70 years), this would result in a 4.73×10^{-6} risk level, or a 1 in 210,000 increase chance of cancer. This risk

level falls within the U.S. Environmental Protection Agency's acceptable risk range of 1×10^{-4} to 1×10^{-6} .

The risk levels that have been calculated are a result of highly conservative assumptions, and as such, likely overestimate the risk associated with ingestion of Rocky Flats deer tissues. Since the detectable activity levels are only slightly above the detection limits, it is probable that several could be considered non-detects, given the magnitude of the uncertainty. It is also extremely unlikely that one person will eat an entire deer from Rocky Flats every year for seventy years. Results of this study will be used in the Comprehensive Risk Assessment being developed by DOE for the entire site. Therefore, the U.S. Fish and Wildlife Service believe that it is safe to eat the venison at Rocky Flats.

Cleanup activities at Rocky Flats will continue until the site closure, at which point all surface soils will meet human risk-based standards. Levels of these radioactive isotopes in deer tissues can be expected to decrease, as contaminated soils will have been removed.

The full report is on the U.S. Fish and Wildlife Service's Rocky Flats Web Site; <http://rockyflats.fws.gov>.

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