

Rood, A.S., P.G. Voillequé, S.K. Rope, H.A. Grogan, and J.E. Till, 2008. "Reconstruction of Atmospheric Concentrations and Deposition of Uranium and Decay Products Released from the Former Uranium Mill at Uravan Colorado USA." *Journal of Environmental Radioactivity*, 99: 1258–1278.

ABSTRACT: Radionuclide concentrations in air from uranium milling emissions were estimated for the town of Uravan, Colorado, USA and the surrounding area for a 49-yr period of mill operations beginning in 1936 and ending in 1984. Milling processes with the potential to emit radionuclides to the air included crushing and grinding of ores; conveyance of ore; ore roasting, drying, and packaging of the product (U₃O₈); and fugitive dust releases from ore piles, tailings' piles, and roads. The town of Uravan is located in a narrow canyon formed by the San Miguel River in western Colorado. Atmospheric transport modeling required a complex terrain model. Because historical meteorological data necessary for a complex terrain model were lacking, meteorological instruments were installed, and relevant data were collected for 1 yr. Monthly average dispersion and deposition factors were calculated using the complex terrain model, CALPUFF. Radionuclide concentrations in air and deposition on ground were calculated by multiplying the estimated source-specific release rate by the dispersion or deposition factor. Time-dependent resuspension was also included in the model. Predicted concentrations in air and soil were compared to measurements from continuous air samplers from 1979 to 1986 and to soil profile sampling performed in 2006. The geometric mean predicted-to-observed ratio for annual average air concentrations was 1.25 with a geometric standard deviation of 1.8. Predicted-to-observed ratios for uranium concentrations in undisturbed soil ranged from 0.67 to 1.22. Average air concentrations from 1936 to 1984 in housing blocks ranged from about 2.5 to 6 mBq m⁻³ for (238)U and 1.5 to 3.5 mBq m⁻³ for (230)Th, (226)Ra, and (210)Pb.