

McGavran, P.D., A.S. Rood., and J.E. Till. 1999. "Chronic Beryllium Disease and Cancer Risk Estimates with Uncertainty for Beryllium Released to the Air from the Rocky Flats Plant." *Environmental Health Perspectives*. Vol. 107 (9): 731-744.

**ABSTRACT:** Beryllium was released into the air from routine operations and three accidental fires at the Rocky Flats Plant (RFP) in Colorado from 1958 to 1989. We evaluated environmental monitoring data and developed estimates of airborne concentrations and their uncertainties and calculated lifetime cancer risks and risks of chronic beryllium disease to hypothetical receptors. This article discusses exposure-response relationships for lung cancer and chronic beryllium disease. We assigned a distribution to cancer slope factor values based on the relative risk estimates from an occupational epidemiologic study used by the U.S. Environmental Protection Agency (EPA) to determine the slope factors. We used the regional atmospheric transport code for Hanford emission tracking atmospheric transport model for exposure calculations because it is particularly well suited for long-term annual-average dispersion estimates and it incorporates spatially varying meteorologic and environmental parameters. We accounted for model prediction uncertainty by using several multiplicative stochastic correction factors that accounted for uncertainty in the dispersion estimate, the meteorology, deposition, and plume depletion. We used Monte Carlo techniques to propagate model prediction uncertainty through to the final risk calculations. We developed nine exposure scenarios of hypothetical but typical residents of the RFP area to consider the lifestyle, time spent outdoors, location, age, and sex of people who may have been exposed. We determined geometric mean incremental lifetime cancer incidence risk estimates for beryllium inhalation for each scenario. The risk estimates were  $< 10^{-6}$ . Predicted air concentrations were well below the current reference concentration derived by the EPA for beryllium sensitization.