

Workplace Airborne Hexavalent Chromium Concentrations for the Painesville, Ohio, Chromate Production Plant (1943–1971)

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Hexavalent chromium [Cr(VI)] is recognized as an inhalation carcinogen, based primarily on the increased incidence of lung cancer among occupationally exposed workers. To assess the carcinogenic potency of Cr(VI), both the U.S. Environmental Protection Agency and the Occupational Safety and Health Administration have relied on data from a 1930s cohort of workers from the Painesville, Ohio, chromate production plant. However, the exposure information for this cohort has several shortcomings. In an effort to provide better exposure information, we present here recently identified historical exposure data for the Painesville workers. More than 800 measurements of airborne Cr(VI) from 23 newly identified surveys conducted from 1943 to 1971 are presented. The results indicate that the highest Cr(VI) concentrations recorded at the plant occurred in shipping (e.g., bagging of dichromate), lime and ash, and filtering operations, with maximum yearly average Cr(VI) concentrations of 8.9, 2.7, and 2.3 mg/m³, respectively. The locker rooms, laboratory, maintenance shop, and outdoor raw liquor storage areas had the lowest average Cr(VI) air concentrations over time, with yearly average concentrations that rarely exceeded the historical and current Threshold Limit Value TLV[®] of 0.05 mgCr(VI)/m³ (0.1 mgCrO₃/m³). Concentrations generally decreased in the plant over time. The average airborne concentration of Cr(VI) in the indoor operating areas of the plant in the 1940s was 0.72 mg/m³, that from 1957 through 1964 was 0.27 mg/m³, and that from 1965 through 1972 was 0.039 mg/m³. Although in some ways limited, these data are of sufficient quality to allow for exposure reconstruction for workers employed at this plant from 1940 to

1972, and to provide the basis for an improved cancer risk assessment.

Keywords Hexavalent Chromium, Historical Methods for Airborne Sampling, Chromate Production Industry, Occupational Health