different intermediate chemical products. The major raw materials included chlorine, phosphorus, and benzene. Major products included lower chlorinated benzenes, nitrochlorobenzene, orthonitrophenol, nitroaniline, PCL_3, P_2S_5, chlorine bleaches, and detergent materials. The plant had produced lower chlorinated phenols from 1931 to 1983, had produced polychlorinated biphenyls from [1936?]1929 to 1977, and had esterified 2,4,5-trichlorophenoxyacetic acid (brought in from another facility) from 1960-1971.

Pentachlorophenol was produced by direct chlorination of phenol, orthochlorophenol, parachlorophenol, 2,4-dichlorophenol and/or 2,4,6 trichlorophenol in the presence of an aluminum catalyst. The major changes in production between 1938 and 1978 were related to the form of the finished product. The physical forms of PCP included flakes from 1938 to 1963, a 40% solution 1938 to 1943, prills between 1963 and 1978, and blocks between 1972 and 1978. From 1938 to 1975 molten PCP was reacted with caustic soda to produce NaPCP. The NaPCP was produced as briquettes from 1938 to 1956 and as pellets from 1954 to 1975.

The company began measuring levels of CDDs in PCP produced at this plant in 1972. That year the total CDD content in a batch of PCP was determined by the company to be 2,500 ppm. The concentrations of CDDs and CDFs in samples of PCP produced at the study plant are given in Table 1.

Description of Study Populations

The exposed worker populations in this study were defined as all workers who were alive at the time of sample selection and who met one of the following definitions of exposure: 1) all hourly production workers who had been engaged in the production of PCP for 3 or more days between 1938 and 1978; 2) all hourly production workers who had been engaged in the production of mono- and dichlorophenols between 1931 and

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