

Dioxin Registry Report  
for  
Thompson Chemical Company  
St. Louis, Missouri

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## Abstract

The National Institute for Occupational Safety and Health (NIOSH) Dioxin Registry is a compilation of demographic and work history information for all U.S. production workers who synthesized products known to be contaminated with 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and/or hexachlorodibenzo-p-dioxins (HxCDD). Currently, there are fourteen production facilities and approximately 7000 workers included in the Registry. The first use of this information is a retrospective cohort mortality study for which the comparison group is the U.S. male population. This study will evaluate the causes of death among workers exposed to products contaminated with TCDD and HxCDD.

The Thompson Chemical Company, located in St. Louis, Missouri, produced sodium 2,4,5-trichlorophenolate (NaTCP), 2,4,5-trichlorophenoxyacetic acid (2,4,5-T acid), and esters and amines of 2,4,5-T from 1949 through 1970. NaTCP and 2,4,5-T have been shown to be contaminated with TCDD. Present in this report is a compilation of information describing the facility, its processes, its workforce, and TCDD analytical results for Thompson Chemical products. Thompson Chemical filed for bankruptcy in 1970 and therefore only limited information still exists.

## Introduction

The National Institute for Occupational Safety and Health (NIOSH), Division of Surveillance, Hazard Evaluation, and Field Studies, Industrywide Studies Branch, is conducting an investigation of health effects resulting from occupational exposure to polychlorinated dibenzo-p-dioxins, and in particular 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and/or hexachlorodibenzo-p-dioxins (HxCDD). This study, referred to as the Dioxin Registry, is a compilation of demographic and work history information for all U.S. production workers who have synthesized products known to be contaminated with TCDD and/or HxCDD. The Registry, initiated in 1979, was prompted by animal studies indicating that TCDD was acutely toxic and a chloracnegen, as well as a carcinogen and teratogen (1,2,3,4,5,6,7). TCDD is a contaminant found in 2,4,5-trichlorophenol (2,4,5-TCP) and its sodium salt (NaTCP), which are raw materials used to produce chemical compounds such as 2,4,5-trichlorophenoxyacetic acid (2,4,5-T acid) and 2,2'-methylenebis-(3,4,6-trichlorophene) (hexachlorophene). Currently, there are fourteen production facilities and approximately 7000 workers included in the Registry. The first use of the Registry will be a mortality study for which the comparison group will be the U.S. male population. This study will evaluate the causes of death among workers exposed to products contaminated with TCDD and/or HxCDD.

Presented is a compilation of available information and data pertaining to NaTCP and 2,4,5-T production at the Thompson Chemical Company, a St. Louis, Missouri facility. This facility, which went out of business in 1970, produced NaTCP and 2,4,5-T products from 1949 until 1970. Limited information about the production processes and the workforce involved was obtained from the Budd, Laner, Kent, Gross, Picillo, and Rosenbaum, Counselors at Law, 33 Washington St., Newark, New Jersey, who represented and maintained some records for the Thompson Chemical Company.

## Description and History of the Facility

The Thompson Chemical company purchased a Chemical plant on 1017 South Wharf Street, St. Louis, Missouri from the Allied Chemical Company in 1946. Thompson Chemical manufactured NaTCP and 2,4,5-T products at the South Wharf Street plant from 1949 through November 11, 1970. Thompson also produced 2,4-dichlorophenol (DCP) and 2,4-dichlorophenoxyacetic acid (2,4-D) products using the same equipment used to produce NaTCP and 2,4,5-T. Insecticides and pentachlorophenol were also formulated at the Wharf Street plant during this time. From the beginning until 1967, production at the Wharf Street plant was primarily 2,4-D with a small amount of 2,4,5-T being produced. Thompson Chemical manufactured Agent Orange for the U.S. Air Force under contract

from 1967 until January 1, 1969. Agent Orange was a 50:50 mixture of 2,4,5-T and 2,4-D esters. During the time of Agent Orange manufacture, the primary product was 2,4,5-T, and 2,4-D was purchased from a Canadian company. With the end of the contract to produce Agent Orange for the U.S. Air Force, production at the South Wharf Street plant stopped, and by November 11, 1970, the plant was closed and had gone out of business.

#### Description of the Workforce

Information about the workforce at the Thompson Chemical plant is limited. From the few records available, and interviews with former employees, it appears that about twelve people were employed year round to operate the production process. The busy season for the plant was from January to June, and the workforce would double during this time. Employment peaked at the South Wharf Street plant early in 1967 through January 1969, year round, during the time Agent Orange was being produced.

#### Description of the Processes

Except for interviews with former employees, there is no available information describing the operations of the production processes at the Thompson Chemical plant. NaTCP was batch manufactured in an autoclave reactor using 1,2,4,5-tetrachlorobenzene, methanol, and caustic. The reaction time for this operation was approximately eleven hours and then the NaTCP was purified by distillation for five to six hours. Following distillation, the NaTCP was reacted with monochloroacetic acid in the presence of sulfuric acid catalyst to form 2,4,5-T acid. This reaction took between six and seven hours. Following the reaction, the 2,4,5-T acid was filtered, dried, and then reacted with isooctyl alcohol or triethylamine to form 2,4,5-T esters or amines. The 2,4,5-T esters or amines were used to produce herbicides with product names such as Bramble Weedicide and Bramblecide. Some of these formulations combined 2,4-D esters or amines. There was some indication that some insecticides and pentachlorophenol were also formulated at the South Wharf Street plant. The insecticides, however, were more than likely manufactured at a Thompson Chemical plant in Los Angeles. In 1966, an accident occurred in the NaTCP process. The autoclave exploded, spraying its contents out and starting a fire, which was extinguished by the local fire department. Nine persons developed chloracne over the next three to five days following this accident.

## Analytical TCDD Data

The only analyses of Thompson Chemical products for TCDD concentrations were those made on Agent Orange supplied to the U.S. Air Force. These analyses were a part of a group of analyses conducted on samples collected in 1972 from stock piles of Agent Orange at U.S. Air Force base in Gulfport, Mississippi<sup>(8)</sup>. Six samples of Thompson Chemical 2,4,5-T were analyzed. The results were 0.3, 0.2, 0.2, 0.1, 0.1, and 0.1 ug of TCDD/g of 2,4,5-T (mean value of 0.17 ug/g, and a standard deviation of 0.08 ug/g.)

## Construction of Detailed Work Histories

Very few personnel records remain. Social security FICA Forms 941 were obtained for all quarters (1949 through 1970) in order to identify the workers. Thompson Chemical Company owned three facilities during that time period, all of which appeared on the quarterly SS 941 forms; one in Los Angeles, an office on Locust Street in St. Louis, and the production facility on South Wharf Street in St. Louis. Only the South Wharf Street facility had a potential for exposure to TCDD. From 1949 to December 1956, an alphabetical list of names of workers from all three facilities appeared on the SS 941 forms, making it impossible to know who worked at the South Wharf Street plant. However, from March 1957 to December 1970, three facility identifiable lists appeared in each SS 941 form. On October 16, 1984, an employee who worked as a bookkeeper in the Locust Street office from 1960 through 1970, confirmed the NIOSH identification of the South Wharf Street workers by reviewing the lists.

The cohort for the Thompson Chemical Company consists of all male workers employed at South Wharf Street after January 1, 1957. The calendar time and length of employment for each worker were calculated from a listing of all quarters in which the name appears with a monetary deduction. The assumption was made that the workers worked the entire quarter in which their names appeared. If a name appeared on the first two quarters of a year and again on the first quarter of the next year, the worker was assumed to have worked for the entire previous year. This was done because the name would be missing if the worker completed payment of the FICA deduction before the final quarter of the year.

Using this system, 93 workers were identified as assigned to processes contaminated with TCDD. Workers who terminated prior to January 1957 could not be identified in this system. However, it was possible to include the full work history of the persons employed between 1949 and 1957 if they continued working after January 1957. Because the work histories were constructed from SS 941 forms, no job titles and descriptions could be associated with individual workers.

## Conclusions

The workers employed at the Thompson Chemical plant on Wharf Street in St. Louis, Missouri from 1949 through 1970 are suitable for inclusion into the Dioxin Registry. Since the two main activities of this plant were the manufacture of 2,4,5-T and 2,4-D products, it was assumed that everyone who worked at the plant was exposed to TCDD. Therefore, all workers were included. There is not enough information pertaining to the operation of the production processes or the workforce activities to construct a TCDD exposure matrix for this site.

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