

Exposure Study of Persons Living in the Vicinity of the Times Beach, Missouri Dioxin Hazardous Waste Incinerator

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Introduction

In 1971, dioxin (2, 3, 7, 8-tetrachlorodibenzo-p-dioxin; TCDD) contaminated industrial sludge waste from a hexachlorophene production facility in Verona, Missouri was mixed with waste oil and sprayed for dust control on residential, commercial, and recreational areas of eastern Missouri. Forty-four sites throughout the state were related either to the contaminated oil or to other waste products from the production facility, at levels equal to or greater than one part per billion (ppb) parts of soil. Contamination from some of the western Missouri sites was destroyed in 1986 using an Environmental Protection Agency (EPA) mobile incinerator (1). Based upon the success of that process, the 1990 Record of Decision for the Times Beach Superfund Site and 26 other eastern Missouri dioxin sites called for thermal destruction of contaminated soils and other materials (2).

Approximately 265,000 tons of soil and other materials containing TCDD from the 27 eastern Missouri sites was burned at the Times Beach, Missouri Superfund Site during the period March 17, 1996 through June 21, 1997. Times Beach was formerly an incorporated city located in southwest St. Louis County, approximately 30 miles from the City of St. Louis. Dioxin concentrations in the soil materials ranged from one part per billion (ppb) to approximately 3000 ppb.

Air dispersion and deposition modeling developed by an EPA contractor estimated the area at greatest risk of toxicant exposure resulting from the incinerator plume (3). From this modeling, the Missouri Department of Health (DOH) predicted a population potentially at risk from exposure to contaminants. Based upon this prediction, the DOH and the St. Louis University School of Public Health conducted an exposure study of residents around the Times Beach hazardous waste incinerator site before, during, and after incineration of the dioxin wastes. Prior to the hazardous waste incinerator test and dioxin emission burns in

November 1995, we initiated dioxin blood tests on persons potentially exposed to incinerator emissions and a control group with no known exposure.

Here we report the results of TCDD and related compounds measurements in serum on the study and control groups taken in September 1995, July 1996, and June 1997. Based upon an extensive literature review, this appears to be the first reported study of persons residing near a hazardous waste incinerator, where biological markers were collected prior to any incinerator operation, and the populations studied had only background exposure to TCDD and related compounds prior to initiation of the study.

Methods

The intent of this study was to collect pre-, mid-, and post-incineration serum samples from a group of persons potentially exposed to emissions from a dioxin hazardous waste incinerator. From air dispersion and deposition modeling, the DOH determined a population potentially at risk of exposure. Based upon census tract information of this population contained in the 1990 U. S. Census data, the DOH chose a comparison population that was similar in socio-economic status. The comparison census tract is located in the city of Manchester, Missouri, approximately 15 miles west of the City of St. Louis.

A door to door census of the study and comparison areas was conducted to determine the population between the ages of 17 and 64 years. From the census, a random sample of 246 study area and 243 comparison area candidates were chosen for possible recruitment into the study. All recruitment was done by telephone and at least five attempts were made to reach a candidate. Once reached by telephone, the candidate was informed about the study, questioned about eligibility, explained the risks and benefits, and invited to participate. To be eligible for the study, a person must not have had an employment history that was associated with possible dioxin exposure, not be living or have lived at a known dioxin site, and agree to a residency requirement. Pregnant women or women who planned to become pregnant during the study period were automatically excluded.

Participation in the study's three blood specimen collection rounds included answering a questionnaire, determination of height, weight and blood pressure, and donation of approximately 350 to 495 milliliters of whole blood. The questionnaire sought personal and exposure source information. The study investigators administered all survey questionnaires. All blood collection was by trained professionals from the St. Louis University Medical Sciences Center. Whole blood samples were transported by study investigators to St. John's Hospital Laboratory, St. Louis, Missouri, where they were processed. Each participant received \$100 compensation for travel and expenses for each completed interview and specimen collection attempt.

TCDD, other congeners of dibenzodioxins and dibenzofurans, polychlorinated biphenyls (PCB), and lipid laboratory analyses on the serum specimens were performed by Division of Environmental Health Laboratory Sciences, Centers for Disease Control and Prevention using previously described methods (4). Quality control/quality assurance procedures

established by the DEHLS for their laboratory were the standards used by this study for sample analysis integrity.

The middle blood sample was collected for use in assessing the possibility of community exposure within a relatively short time after initiation of the incineration process. Upon receipt of the first and second round serum results, the TCDD values only were compared between study and comparison area. The results were reported in November 1996 to the community.

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) and included descriptive and inferential statistical analysis.

Results

The initial study group consisted of 76 persons randomly selected from the target population and the comparison group was 74 persons. Sixty four study and 60 comparison group participants completed all three rounds of testing. Because of grant requirements the results and conclusions of this study cannot be released until peer review is completed through the Agency for Toxic Substances and Disease Registry. Completion of this process and release of the results to the participants is expected for mid-to late-June 1998. Therefore, the first scientific release of study findings will be during Dioxin 98. A complete copy of the study for Dioxin 98 attendees will be made available at the conference.

References

1. Mortensen H, and Sherman A; (Report to the U. S. Environmental Protection Agency). Destruction of dioxin-contaminated solids and liquids by mobile incineration, IT Corporation, 1988.
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3. CH2M Hill; (Report to the U. S. Environmental Protection Agency), Times Beach Multimedia Risk Assessment Report, 1995, 2.7-2.16.
4. Missouri Department of Health, Dioxin exposure study from incinerator emissions, Times Beach, Missouri protocol, 1994, 14.

