

How to Hide the Poison

Under-Quantification of Polychlorinated Camphene (Toxaphene) in Brunswick, Glynn County, Georgia. January 2001

Summary

The U.S. EPA, Georgia EPD, and Hercules Inc. met as the "Toxaphene Task Force" (TTF) and developed a method for identifying and quantifying the pesticide toxaphene in Brunswick, Georgia. The TTF method has threatened human health by failing to detect or significantly under quantifying toxaphene levels present in the environment. U. S. EPA and the Agency for Toxic Substance and Disease Registry toxicologist have documented why the TTF method fails to produce data that is useful in making their decisions and recommendations to protect human health. Analysis for toxaphene by gas chromatography with electron capture negative ionization mass spectrometric detection (GC-ECD and GC-ECNI-MS) has produced the data needed for toxicologist to make decisions protective of human health.

Background

The Glynn Environmental Coalition (GEC) is located in Brunswick, Glynn County, Georgia, where an insecticide mixture of polychlorinated camphene (PCC), commonly called toxaphene, was manufactured by Hercules Incorporated. Manufacturing of PCC took place at Hercules Incorporated, Brunswick, Georgia, from 1948 to 1980.[\[1\]](#) PCC is defined as camphene with 67% to 69% chlorine by weight, and is a complex mixture of over 670 separate chemicals.

[\[2\]](#),[\[3\]](#),[\[4\]](#) During the period PCC was manufactured, PCC manufacturing wastes and PCC was discharged into the estuary by way of Dupree and Terry Creek at a rate of 250 to 300 pounds of PCC per day.[\[5\]](#) Fugitive emissions of PCC contaminated wind-blown dust, water runoff, and vehicle traffic distributed PCC throughout the neighborhoods around the Hercules Plant site.

[\[6\]](#) In addition, significant amounts of PCC were deposited into at least four landfills and dumps in Glynn County.[\[7\]](#), [\[8\]](#)

In 1991, chemists from the EPA, EPD, and Hercules Inc., performed a limited study and developed a set of guiding principles for the determination of PCC in groundwater, soil, and manufacturing waste sludge samples from the Brunswick, Georgia, area.[\[9\]](#), [\[10\]](#) The results of this limited study was the development of the "Toxaphene Task Force" (TTF) methodology for the identification and quantification of PCC. The TTF methodology was further modified in August 1997. [\[11\]](#) Even though the August 1997 modifications were proposed for only specified areas and only for soil and groundwater, the method has been used at Sites throughout Glynn County and has been used to determine PCC's in fish tissue for human health determinations.[\[12\]](#) The August 1997 method is also referred to as the "Hercules Protocol".[\[13\]](#)

The ability of the agreed upon TTF method to accurately identify and quantify PCC has been questioned by the Agency for Toxic Substance and Disease Registry (ATSDR) and the EPA.

Statement of the Problem

The method developed by the TTF for the identification and quantification of PCC in Brunswick, Georgia, seriously underestimates the true amount present, and excludes the PCC chemicals that health officials are most concerned about. Specifically, the TTF method fails to report the "total toxaphene" and "apparent toxaphene" that are the basis of recommendations by the EPA, Food and Drug Administration (FDA), and ATSDR toxicologist to protect human health and establish cleanup levels at PCC contaminated sites.

Local, State and Federal health officials rely upon the accuracy of data gathered on PCC levels to make recommendations to minimize or eliminate exposure of citizens through consumption of contaminated seafood, water, or contact with contaminated soil, sediments, and sludge. Based on PCC data collected, interim actions are recommended to protect the public in the form of seafood consumption advisories, and emergency removal actions, while long-term remedies are developed. High quality and accurate data is crucial in taking short-term actions and recommendations, and developing long term remedial plans.

Health officials from the EPA and ATSDR have identified the TTF method as seriously flawed in providing data meaningful to their deliberations on the potential health ramifications from the consumption of PCC contaminated seafood, and exposure to PCC contaminated air, soil, sludge, sediments, and water. The EPA and ATSDR are specific in the type and quality of data needed to make decisions protective of human health and the environment. Likewise, the EPA and ATSDR have been specific in the ways the TTF method has threatened human health by failing to detect and understating actual PCC levels present. Most notable is that the TTF method excludes the fraction of the 670+ PCC chemicals that are of concern in making health based recommendations. Recent re-analysis of samples has shown that the TTF method failed to identify the presence of PCC in seafood at levels 52 times the EPA "do not eat" recommendation. The TTF method has failed to accurately identify PCC in many other samples, or to significantly understate actual levels of PCC present.

Discussion

Formation of the Toxaphene Task Force began at meeting on September 30, 1991, at the Georgia EPD. It was agreed that previously the regulatory agencies and Hercules had used a procedure that identified "apparent toxaphene" when analyzing environmental samples.[\[14\]](#) Analysis for "apparent toxaphene" is the criteria used by the U.S. Food and Drug Administration (FDA) to make health based recommendations for maximum levels of PCC in food.[\[15\]](#) It was agreed that if the U.S. EPA, Georgia EPD, and Hercules agreed upon the method

and the findings of the task force, it would be used by the EPA for any work relating to the Superfund Site[16] or any RCRA matters pertaining to the Hercules facility involving toxaphene. It was proposed that those in attendance meet again to review the work of the task force and to discuss whether the samples do, in fact, reflect toxaphene or some other product. Clearly, a decision was made at the meeting to develop a PCC analytical method different from the health-based method currently in use.

The report of TTF, released June 4, 1993, was described as a very limited study of toxaphene analysis of real samples collected at the Hercules facility in Brunswick, Georgia.[17] The TTF method was designed to identify and quantify "technical toxaphene", instead of the "total toxaphene" or "apparent toxaphene" used by toxicologist in determining the potential risk to human health and the environment.

The TTF made specific changes in the identification and quantification of PCC that result in a significant reduction of "total toxaphene" and "apparent toxaphene". Quantification was limited to the 4-6 major peaks on the "back half" of the toxaphene chromatogram while many of the prominent PCC's found in the "front half" are associated with unmodified technical toxaphene.[18],[19],[20],[21] The TTF further excluded PCC from the quantification process by eliminating any peak which is larger in proportion to the other component peaks in the sample than in the toxaphene standard.[22] The U.S. Food and Drug Administration, in the "apparent toxaphene" method, instructs to include all peaks, and notes that relative heights and widths of matching peaks in the residue and reference standard will probably differ. [23]

One chemist from the U.S. EPA noted that the "latter peaks" in samples were decreased and the "early peaks" were increased in environmental samples from Brunswick, and that the TTF method may seriously underestimate the true concentration of toxaphene.[24],[25] Because early and disproportionate peaks are eliminated from the quantification in the TTF method, it produces much lower PCC quantification results than those found using the U.S EPA approved Contract Laboratory Program (CLP) analytical method. The U.S. EPA Region 4 Environmental Services Division Laboratory analyzed split samples by the TTF method and a contracted laboratory by the U.S. EPA approved CLP method. Results showed that the TTF method either failed to detect PCC or only identified as little as 3.2% of the PCC present.[26]

Seafood samples collected in 1997 by the Georgia Department of Natural Resources, and analyzed by the Georgia Environmental Protection Division using the TTF method, were re-analyzed by the Skidaway Institute.[27] While PCC was not detected in any sample (n=56) using the TTF method, Skidaway detected PCC in every sample up to 26 parts per million (PPM). Even when the EPA "do not eat" levels of 0.5 PPM was exceeded by 52 times, PCC was reported as "not detectable" in fish by the TTF method.[28] The Food and Drug Administration (FDA) has a maximum allowable PCC level of 5 PPM in commercially caught seafood sold in the United States,

until revoked in 1993.[\[29\]](#) In addition, in setting the FDA level, it makes the assumption that the seafood will be diluted in the Nation's food basket. The FDA also explicitly states that FDA maximum allowable levels are not to be applied to a seafood source consumed by the local population. The TTF method failed to find PCC at over five-times the FDA commercial level, yet commercial seafood harvest continues within the areas. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), food tolerance restrictions for toxaphene (PCC) range from 0.1 to 7 ppm. Therefore, the failure of the TTF method to detect toxaphene at levels meaningful to the protection of human health and the environment presents local health threats and may have national significance.

ATSDR evaluated the data produced by the TTF method and found many concerns over its use.[\[30\]](#) The TTF method failed to accurately identify and quantify a known amount of the PCC in the calibration standard. They found that the composition of the weathered PCC in fish differs from that in the technical-grade PCC, and the PCC adsorbed on soil may have a different bioavailability than technical-grade PCC. In addition, the TTF method seems to eliminate the option to conduct a total area method that estimates the PCC concentration from all peaks in the chromatogram.[\[31\]](#) The ATSDR concluded that the use of the "back half" peak method (TTF method) is likely to result in significant underestimation of PCC concentration, and the estimated dose could be 10 times higher if historical data are taken into account for dose estimation.[\[32\]](#) ATSDR recommended that sensitive and specific methods, such as electron capture negative ion mass spectrometry (GC-ECNIMS) be used for the evaluation of toxaphene in fish and sediment.

Local, State, and Federal health officials depend on PCC data from the EPA, EPD, and Hercules Incorporated, in preparing remedial plans and making recommendations to potentially exposed citizens around contaminated areas. In addition, the Georgia EPD will NOT make a consumption recommendation without data.[\[33\]](#) An analytical method that fails to find the chemical of concern or that seriously understates the actual levels present fails to protect human health. Bad data leads to bad decisions and recommendations by local, State, and Federal officials that result in health threatening exposure of the citizenry. The integrity of the Nation's food basket is compromised by flawed analysis that allows contaminated seafood to be harvested and sold.

Corrective action plans required by the EPA and EPD are promulgated on protection of human health and the environment. Remedial actions that are based upon faulty or inaccurate data will fail to fulfill the intent of the law, which is to protect human health. Any analytical method that fails to find the chemical(s) of concern (COC) at levels meaningful to the protection of public health is a threat to public health. When a method is represented to be accurate at levels meaningful to public health and fails to detect COC's, and the COC is reported as not

present, public health is jeopardized by the false belief that the seafood, soil, water, or sediments are safe to consume or be exposed.

Conclusions

The Glynn Environmental Coalition (GEC) believes that the U.S. EPA, Georgia EPD, and Hercules have entered into an agreement that failed to identify and under reported PCC levels present. This agreement has led to data that is a threat to human health and the environment because health agencies are making seafood consumption and soil, sediment, and sludge exposure recommendations based upon flawed data. In addition, remedial actions by the U.S. EPA and Georgia EPD will not be protective of human health and the environment because cleanup levels will not accurately reflect true levels of PCC present.

Recommendations

The GEC is seeking the following remedy for PCC sampling that has not produced data meaningful to the protection human health .

- 1.) Order that all future PCC analysis and quantification be done using Gas Chromatography with Electron Capture and Electron Capture Negative Ionization Mass Spectrometric Detection (GC-ECD and GC-ECNI-MS) for environmental samples such as fin- and shellfish or other biota, soil, sediment, sludge, and water.
- 2.) Order that all analysis and quantification report "total" PCC levels present.
- 3.) Order sampling, analysis, and quantification of PCC by GC-ECNI-MS in all areas and media previously analyzed and quantified by the TTF method in Brunswick, Glynn County, Georgia.

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