



MICHIGAN DIOXIN STUDIES

Incinerator Exhaust and Ambient Air Study Fact Sheet

Midland, Michigan

April 1988

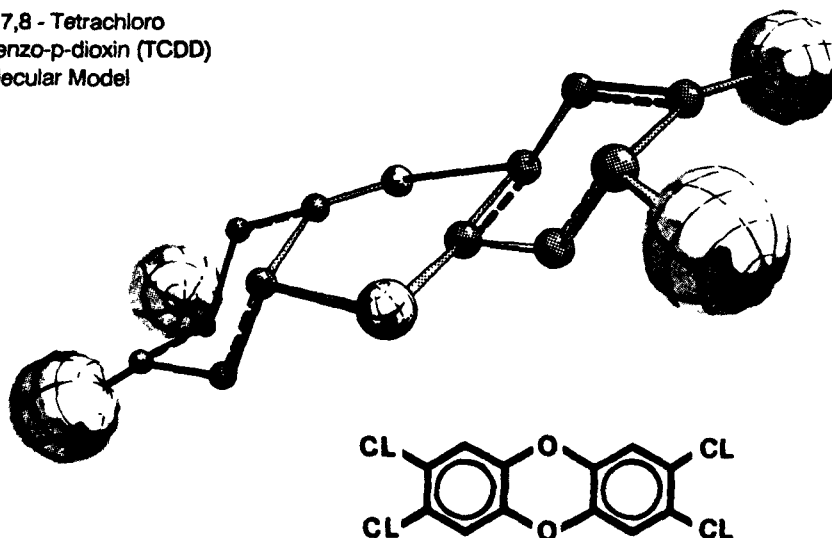
INTRODUCTION

At the request of the Michigan Department of Natural Resources (MDNR), the U.S. Environmental Protection Agency (U.S. EPA) has conducted a series of studies in and around the Dow Chemical Company plant in Midland, Michigan. These studies were designed to determine the concentrations of dioxins and other toxic pollutants present at and near the Dow Chemical Midland plant in air, soil, fish, drinking water, and wastewater. Results of these studies were released in 1985 and 1986.

This fact sheet summarizes the results of an incinerator exhaust and ambient air study conducted by the U.S. EPA in fall 1984, and compares those results with similar testing at other sites from U.S. EPA's National Dioxin Study. Incinerator emissions samples for these studies were collected at the Dow Chemical Company Midland plant Building 703 incinerator. Samples of ambient air also were collected at the plant fence line and in the city of Midland.

Using the results from all of these studies, U.S. EPA has evaluated the risks of dioxins to Midland area residents and presented the findings in a risk assessment report. The U.S. EPA has also developed a set of proposed risk management actions to reduce and manage exposures to dioxins in the environment. These reports are summarized in another fact sheet. ♡

2,3,7,8 - Tetrachloro
dibenzo-p-dioxin (TCDD)
Molecular Model



ABOUT DIOXINS

The word dioxin is a generic name for a group of 75 related chemicals known as chlorinated dibenzo-p-dioxins (CDDs). 2378-TCDD or 2,3,7,8-tetrachlorodibenzo-p-dioxin, is believed to be the most toxic of the dioxin group, and is very persistent in the environment. Once dioxins are released to the air, water, and soil, they are not easily broken down into less harmful substances. Dioxins have been formed as unwanted by-products during the manufacture of certain pesticides, during combustion of waste materials, and through other reactions involving chlorine and organic chemicals. U.S. EPA has developed a procedure to estimate the toxicity of mixtures of dioxins and related compounds

compared to 2378-TCDD. For purposes of this fact sheet, all dioxin measurements have been converted to 2378-TCDD equivalents, or TEQs, unless otherwise noted.

Experimental studies with 2378-TCDD in laboratory animals have shown a variety of toxic effects. These include cancer, reproductive effects, liver damage, effects on the skin and thyroid, and effects on unborn offspring.

U.S. EPA has determined that the critical concerns associated with exposure to dioxins in the Midland area are cancer, reproductive and teratogenic effects, and liver damage. A teratogen is a substance which has adverse effects on an unborn child, when the mother is exposed.

Continued on next page

About Dioxins Continued

The evidence for the cancer-causing effects of 2378-TCDD comes mainly from several long-term studies of laboratory animals exposed to the substance. Based on these studies and other factors, U.S. EPA has concluded that 2378-TCDD causes cancer in animals and should be regarded as a probable human carcinogen. U.S. EPA used the experimental animal data to develop dose levels at which various health effects may occur. U.S. EPA is currently re-evaluating its estimates of the cancer potency of 2378-TCDD.

U.S. EPA has not adopted an ambient air standard for dioxins. When dioxins are found, the Agency assesses risk on a site-specific basis to determine whether a public health concern is present. ♡

AIR MONITORING STUDY

Project Approach

The purpose of this study was to determine the levels of dioxins and other toxic compounds in ambient air near the Dow Chemical Midland plant. Air samples were taken at three locations near the plant fence line and one location in the city (Midland Community Center at George and Jefferson Streets). Sampling was conducted on 18 days between September 7 and September 27, 1984. Over 300 samples were gathered. Based on wind conditions during the study, selected samples were analyzed for dioxins and other pollutants.

Air Study Conclusions

Low levels of dioxins were found at air monitoring sites near the plant fence line and at the site located in the city, ranging up to 0.0004 ug/m^3 for the less toxic forms. 2378-TCDD, the most toxic form of dioxin, was found on one day at a site near the Dow Chemical fence line at a level of 0.000005 ug/m^3 .

The proportions of various dioxin compounds found in this study were similar to those found in previous studies of air in incinerator areas and soils sampled by U.S. EPA in 1984. Also, U.S. EPA determined that the levels of dioxin found in air around the plant are higher than can be accounted for by the current incinerator emissions. This

suggests that some dioxins found in air outside the plant may have come from past incinerator emissions, windblown dusts from the plant, or past process emissions. The possible health risks associated with the air data are described in the risk assessment.

INCINERATOR EXHAUST STUDY

Project Approach

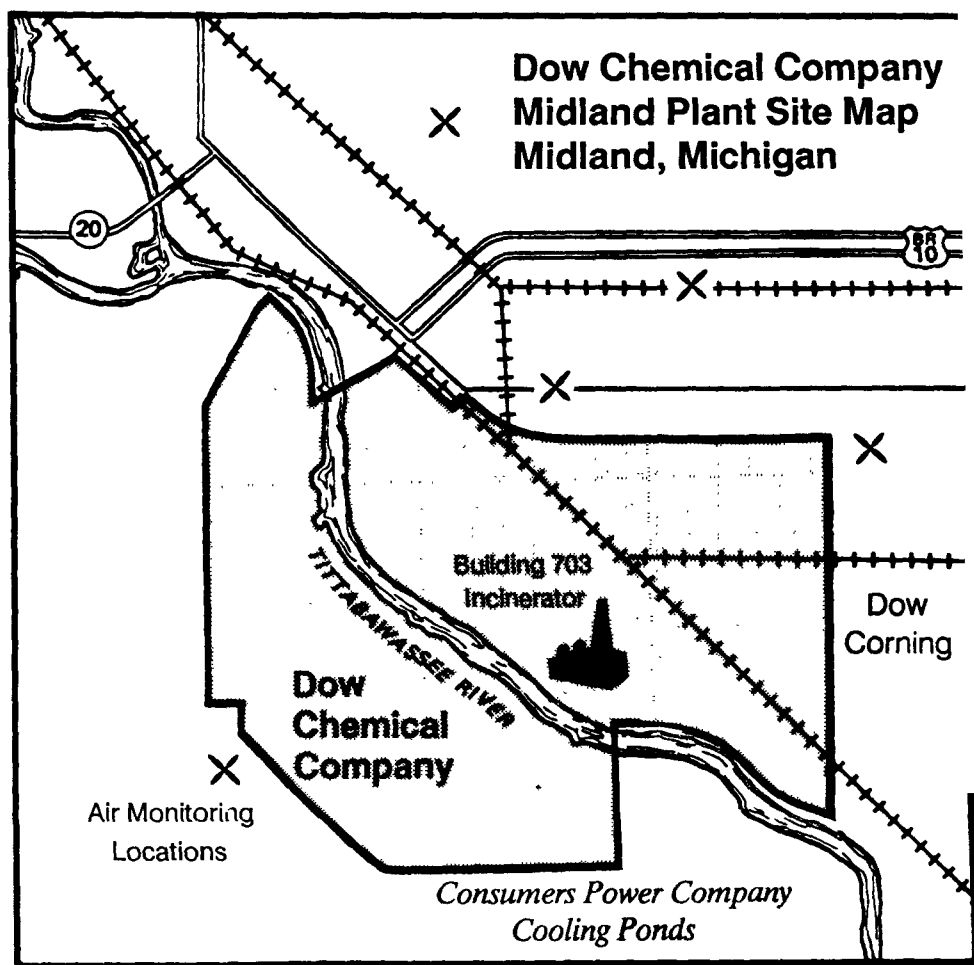
The purpose of this study was to determine the levels of dioxin and other chemicals in the Building 703 incinerator exhaust gas, wastewater, and ash, under normal operating conditions. The discharged compounds detected were then compared to the liquid and solid wastes incinerated at those times. Based on previous Dow Chemical studies, the Building 703 incinerator is believed to be a principal source of dioxin contamination at the Dow/Midland plant.

Incinerator exhaust samples were collected by U.S. EPA on three separate days in August and September 1984. Over two hundred samples of wastes fed into the incinerator, exhaust gas, wastewater, and ash were gathered. The samples were analyzed for dioxins, volatile organic compounds (VOCs), and semi-volatile compounds.

Incinerator Exhaust Study Conclusions

Various forms of dioxin were found on all three sampling days in the incinerator exhaust gases at concentrations between 0.005 and 0.125 ug/m^3 .

The study concluded there were no readily observable relationships between the incinerator temperature, pressure, air pollution control device and flow rates, and the levels of certain dioxins found in the exhaust during the three days of testing. However, there may be a relationship between the levels of dioxin being drawn into the incinerator and the levels of dioxin being discharged after burning has taken place.



Comparison With Other Sites

The following table compares the amount of dioxins discharged from Dow Chemical's waste incinerator in 1983, 1984, and 1987, with the amounts coming from other sources studied by U.S. EPA in the National Dioxin Study. Data from the Dow incinerator were developed by Dow Chemical in 1983 and 1987, and by U.S. EPA in 1984. These results show two things:

1. The Dow Chemical incinerator emits less dioxins into the air than some other types of sources; and
2. The amounts of dioxins emitted by Dow Chemical have been reduced by more than 95 percent from levels measured in 1983. (Levels emitted by Dow prior to 1983 are believed to be higher than those measured in 1983.)

COMPARISON OF DOW CHEMICAL INCINERATOR EMISSIONS WITH NATIONAL DIOXIN STUDY RESULTS

Source	2378-TCDD Equivalent Emissions (grams/year)
Secondary Copper Smelter	>800
Municipal Waste Combustor	500
Municipal Waste Combustor	140
Municipal Waste Combustor	95
Municipal Waste Combustor	80
DOW CHEMICAL - 1983	>12
Sewage Sludge Incinerator	2
Hazardous Waste Incinerator	2
Industrial Waste Incinerator	0.7
Wood-fired Boiler	0.6
DOW CHEMICAL - 1984	0.3
Kraft Recovery Boiler	0.3
DOW CHEMICAL - 1987	0.2
Sewage Sludge Incinerator	0.04
Kraft Recovery Boilers (two)	0.03
Sewage Sludge Incinerator	0.02
Industrial Carbon Regenerator	0.02
Wire Reclamation Incinerator	>0.01
Drum and Barrel Furnace	0.009
Municipal Carbon Regenerator	0.00004
Municipal Waste Combustor	0.00001

NOTE: > means greater than. For the Dow Chemical tests in 1983, not all forms of dioxin were analyzed.

GLOSSARY

Ambient Air -- The air in a given location people breathe, usually referred to as outdoor air outside of industrial facilities.

Concentrations -- The amount of a chemical in a given unit of measure. For air measurements, concentrations are usually expressed in terms of the weight of the compound in one cubic meter of air, which is about 35 cubic feet. One microgram of a chemical per cubic meter ($\mu\text{g}/\text{m}^3$) is equivalent to 0.00000000006 lbs. of that chemical in one cubic foot of air.

Incinerator -- A furnace or other apparatus used for burning waste. Incinerator exhaust is made up of fumes, gases and particles left over from the burning process, and may or may not contain toxic chemicals.

Particulate Matter -- Dust and small particles of material blown by the wind. Particulates may float in the air for some time; chemicals can become attached to them and be transported some distance from their original site.

Pesticide -- A general term for chemicals used to destroy or control unwanted insects, plants, fungi, mites, rodents, bacteria, or other organisms.

Potentially Responsible Party (PRP) -- Any individual(s) or company(s) potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible, U.S. EPA requires the PRPs, through administrative and legal actions, to clean up hazardous waste sites they have contaminated.

Toxic Pollutant or Compound -- Any of a number of chemicals under special regulation by U.S. EPA because of the harmful effects these compounds can have on humans, animal life, or the environment.

FOR MORE INFORMATION

INFORMATION REPOSITORIES

For more information about U.S. EPA's dioxin studies in the Midland area, you may review site related documents at the following locations:

Grace A. Dow Memorial Public Library
Emilia Parker
1710 West St. Andrews Drive
Midland, Michigan 48640
(517) 835-7157

Ingersoll Township Hall
Kurt Shaffner, Supervisor
4400 Brooks Road
Midland, Michigan 48640
(517) 835-5289

Midland Health Department
Dr. Winifred Oyen, Director
125 West Main Street
Midland, Michigan 48640
(517) 832-6655

U.S. EPA CONTACTS

The following U.S. EPA personnel are available to answer any further questions you may have about the studies, this fact sheet, and future activities planned for the site.

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