UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: PCB Inspection, Monsanto Krummrich Plant, Sauget, Illinois

DATE: MAY 20 1976

FROM: Chief, Air Surveillance Branch, Surveillance and Analysis Division

TO: Karl Bremer, Member, Lake Michigan Toxic Substances Committee

A preliminary survey was made of the above installation to identify and sample point sources of potential PCB emissions to the atmosphere. The sampling and analysis were carried out at this source to furnish information to arrive at a further decision that may require and intensive testing program to quantify the PCB emissions. The sample analysis revealed the following:

SAMPLING LOCATION	NO. OF SAMPLES	PCB CONCENTRATION ug/M3
Steam Ejector - Ground Level, Site #1	2	* 3A - 27.5 3B - 33.9
Steam Ejector - Top Level, Site #2	2	3A - N.A. 3B - N.A.
Calculated Storage Tank Emissions		
Virgin Product		59.7 kg/year
Product Loading and Waste Storage		0.02 kg/year

Monsanto has performed a stack test at the Sauget location quantifying the PCB emissions to the atmosphere. Stack-sampling and other reports describing process and sampling methodology used at this site are attached.

* 3A - Right Side of sampling train - 3B - Left Side

CORRECTED COPY

MONS 094828

EPA Form 1320-6 (Rev. 6-72)

Emissions:

$$\text{Kg/yr.} = 460{,}000 \times .0283 \times 1.41 \times \frac{1\ \text{kg}}{10^6\ \text{mg}}$$

$$\text{Kg/yr.} = 0.0184$$

Emissions from handling of waste aroclors:

Total waste material received into plant as reported by Monsanto for 9 mos. of 1975 = 1,431,000 lbs. Assume that all this material is received and stored at 70°F and that it displaced an equal volume of tank headspace gas at 70°F.

$$\text{Volume of product} = 1{,}431{,}000\ \text{lbs.} \times \frac{1\ \text{gal.}}{11.5\ \text{lbs.}} \times 3.785\ \frac{\text{liter}}{\text{gal.}}$$

$$\frac{1}{X10^3\ \frac{\text{liters}}{M^3}} = 471\ M^3$$

The concentration would be the same as in the loading operation that is 1.41 mg/M^3.

Emissions:

$$\text{Kg/yr.} = 471\ M^3 \times 1.4\ \text{mg}/M^3 \times \frac{1\ \text{kg}}{10^6\ \text{mg}}$$

$$\text{Kg/yr.} = .00066$$

Clarence Buckley of Monsanto estimated that storage and loading operations at the plant would displace the following volume of

1. Storage tanks 635,000 ft^3
2. Loading 460,000 ft^3

Calculation of emissions:

From Fig. 2.2 from the Draft Mitre report the vapor pressure of Aroclor 1242 is 0.3 mm Hg at 100°C and 10-4 at 21°C. The aroclors are stored at 100°C. It may be assumed that the temp. in the tanks being loaded would be approximately 70°F (21°C).

From Dolton's law of partial pressure:

$$Bx = \frac{Px}{P\ mix.}$$ where Bx = proportion by volume of a gas component

Px = partial pressure of gas component and
P mix. = absolute pressure of gas mixture.

$$Bx = \frac{0.3}{760} = \frac{.039}{1}$$ or 390 ppm

To change ppm to mg/M^3 use the following formula:

$$mg/M^3 = ppm \times \frac{mol.\ wt.}{molecular\ volume}$$

molecular volume = 30.62 liters/mol. at 100°C

$$mg/M^3 = 390 \times \frac{261}{30.62} = 3324$$

Emissions from storage tanks:
Emissions kg/year = Vol. of gas displaced/year x concentration of PCB

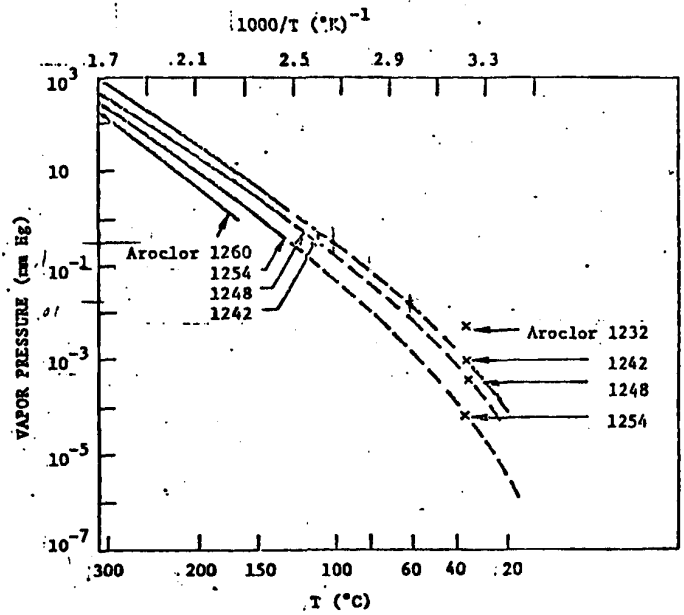
$$Kg/yr = 635000\ ft^3 \times .0283 \frac{M^3}{ft3} \times 3324 \times \frac{1\ kg}{10^6\ mg}$$

Kg/year = 59.7

Emissions from loading operations:

$$Bx = \frac{Px}{P\ mix.} = \frac{10^{-4}}{760} = 1.3 \times 10^{-7}$$ or .13 ppm

$$mg/M^3 = .13 \times \frac{261}{24.04} = 1.41\ mg/M^3$$



Source: Hutzinger, O., S. Safe, and V. Zitko, "The Chemistry of PCBs," CRC Press, Cleveland, Ohio, 1974.

FIGURE 2.2
VAPOR PRESSURES OF DIFFERENT AROCLOR PREPARATIONS

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