Facility: Monsanto Company
W.G. Krummrich Plant
Route 3
Sauget, IL 62201

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Participants: Monsanto
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Background:

Monsanto is the sole manufacturer of PCB in the United States. Production figures for the first nine months of 1975 are listed below:

Aroclor	Thousands of Pounds
1016	10350
1242	5120
1254	6980

Starting during the latter part of 1972, the only use for PCB compounds is in the manufacture of transformers and capacitors.

Process:

The chlorinator is charged with biphenyl and ferric chloride (catalyst) and then heated. Vaporized chlorine is fed into the chlorinator. The contact time varies from 12 to 36 hours, depending on the type of Aroclor to be produced, which determines the degree of chlorination. The vapor from the chlorinator (HCl containing PCB) goes to the scrubber where it is washed with liquid Aroclor. The gaseous HCl is sent to the purification section of the plant. The crude Aroclor goes to the Blower tank where it is blown with dry air for several hours. The air is scrubbed with water and vented to the atmosphere through a demister, the crude product is sent to a storage tank where a few tenths of 1% of alkali is added to react with any remaining hydrogen chloride or ferric chloride.

The method of distillation of the raw Aroclor varies depending upon the product to be produced. For types 1254, 1242, and 1221, the process is the same. Each is distilled in a vacuum still, the condensate being the finished product and the bottoms being the Montars which are sent to incineration. For Aroclor 1016, the crude aroclor is distilled in a vacuum distillation tower. The steam from the steam jet ejectors is partially condensed; the condensate being discharged into the plant discharge sump and the vapor exhausted to atmosphere. The overhead from the distillation tower is the product 1016 and is sent to storage. The bottoms are sent through another chlorination and distillation cycle. The overhead from this still is the finished product and the bottoms are the Montars which are sent to incineration. The three possible places where PCB can escape into the atmosphere are: vapor from jet ejectors, exhaust from the scrubber; and surface area evaporation (in general).

All aroclors are stored at 150°F with a layer of nitrogen on top of the liquid.

Incineration:

There are three points in the process that go to the incinerator: Montars, bottoms from separator sump, collection from all drip pans. In addition waste material from the users of PCB is sent to Monsanto to be destroyed. The type and concentration of these waste are unknown but it is estimated that they contain about 90% PCB. The amount of contaminated waste disposed of for the first nine months of 1975 is listed below:

	Thousands of Pounds
Customer returns, records exists	1109
Monsanto, records exists	322
Total receipts	1431
Destroyed by incineration	2808

The liquid waste stream is steam atomized and fed into the fire box. The feed is incinerated at a temperature above2200°F with natural gas used for combustion with 5% excess oxygen and a retention time of 2-3 seconds. The gases go through a quench pot, the exhaust of which passes through a venturi scrubber and then through a packed tower which is irrigated by the weak muriatic acid originating from the quench pot. The exhausts are vented to atmosphere thrpugh a demister and are monitored.

Loading and Unloading:

The majority of the PCB components and the products made using PCB are liquid and are transported in bulk or in steel drums. Bulk shipments are made in railroad tank car and tank trucks. Waste material shipped in from other locations in 55 gallon drums or tank trucks are unloaded into a concrete pit; the material in this pit is periodically pumped to one of four 20,000 gallon incinerator waste feed tanks. The waste material that is shipped in by rail truck is unloaded into a 500,000 gallon storage tank and is pumped into the feed tanks when required. In the truck or railcar loading area, drainage is directed into a small concrete pit which is periodically pumped into the basins located in the manufacturing area. Relief valve lines and atmosphere vents are routed through catch tanks or are redirected to underground settling basins.