(ATTACHMENT 2)

PARADICHLOROBENZENE (PDCB)
OPERATIONAL SUMMARY

Monsanto is the industry leader in aggressively pursuing technologies to eliminate wastes at the source. As part of Monsanto's commitment to reduce SARA emissions by 90% by the end of 1992 and organic wastes by 70% by the end of 1995, the following project was installed.

Paradichlorobenzene (PDCB) has been produced at Monsanto's W. G. Krummrich Plant, in Sauget, Illinois, since the 1940's PDCB's primary uses are as the active ingredient in mothball and toilet bowl fresheners. In the Fall of 1989, new technology was installed to produce PDCB.

The new technology is an excellent example of true source reduction. Rather than improving or adding to existing pollution control technology, the manufacturing process was totally changed, resulting in an almost waste-free process.

The old technology squeezed the hot, liquid ODCB from solid PDCB crystals forming a block of PDCB. The blocks were air cured before packaging and sale.

The new technology is known as continuous crystallization. A mixture of PDCB and ODCB and recycle stream are fed from storage to a crystallizer. The crystallizer's contents are cooled by a chilled water jacket. PDCB crystals freeze on the side walls and are scrapped off by a scraper/agitator assembly, much like ice cream in an ice cream freezer.

Crystal-free liquid overflows into a second crystallizer where it is cooled to a lower temperature to crystallizer more PDCB. This crystal slurry is recycled back to the first crystallizer while the remaining liquid is sent to another department for purification.

The crystal slurry from the first crystallizer flows to a tank where the PDCB crystals are purified, remelted and pumped to product storage for rail car shipment to customers. The PDCB has a purity of over 99.9%. The liquid ODCB, once separated from the PDCB, is also pumped to storage for sale to customers.

The environmental benefits of this new technology are considerable. The entire production process is conducted in a nitrogen atmosphere. Neither air nor water contact the chemicals during production. As a result, air pollutants have been essentially eliminated. Since water is no longer needed for manufacturing, water pollutants have been reduced by an estimated 40,000 pounds/yr. Total air emissions, are less than two (2) tons/yr.

ATTACHMENT 1-A

Continuous crystallization of PDCB in a closed system. With the new technology, air and water do not contact the product during manufacturing so air and water contaminants are essentially eliminated.

ATTACHMENT 1-B

The generation of 98% of air and water pollutants was eliminated with the new technology. Release reduction of over 1 million lbs. have been achieved. Since releases have been essentially eliminated, any potential toxicity has been significantly reduced.

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