

Monsanto

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August 3, 1983

T. M. Bistline - E2ND

Dioxin Levels - Nitro 2,4,5-T Plants

Memo: JLH/HCG-DLW 7/11/83

J. L. Henshaw - G2WB

ATTORNEY WORK PRODUCT
ATTORNEY-CLIENT PRIVILEGE

In response to your reference memo, we have examined the three Nitro 2,4,5-T plants to determine the areas of highest exposure and probable dioxin (TCDD) levels. The results are summarized on the attached table. Marked-up flowsheets are also attached to aid in clarity.

Two sets of data are presented for the second plant which operated from 1953 to 1962. As originally started up, that plant included a filter for NaTCP. Later research showed that such a filtration step could remove 88 percent of the TCDD present. Filtration was, however, a high exposure operation. As a result, filtration was eliminated by 1956 and downstream TCDD levels would have increased. This is reflected in the levels shown for 1956-1962. Filtration of NaTCP was always used in Plant 1 and never used in Plant 3.

All concentration data presented should be reviewed as order of magnitude only. TCDD levels in the NaTCP were estimated based on extensive research data published by J. L. Sims and W. R. Udell (Monsanto Agricultural Division, Agricultural Research Report No. 150, Final Report on 2,4,5-Trichlorophenol - Optimization of the Hydrolysis of 1,2,4,5-Tetrachlorobenzene, Job No. 9-23-760.01-2102) and knowledge of autoclave conditions used at the various times. TCDD levels in the final product were taken from actual lab analysis from 1958 until production ceased in 1969. All other concentrations are estimates.

Please advise if you have any questions. We would be happy to discuss this information with you as required.

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/sd

Attachment

C17995

2,4,5-T PRODUCTION, NITRO

AREAS OF HIGHEST OPERATOR EXPOSURE

(NA = Not Applicable)

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Operation	Estimated PPM TCDD			
	Plant 1	Plant 2		Plant 3
	1948- 1952	1953- 1955	1956- 1962	1963- ⁸ 1969
A. Cleaning NaTCP Filter Press ¹	30-60 ⁷	20-40 ⁷	NA	NA
B. Digging out cake from Na 2,4,5-T Centrifuges ²	5-10	5-10	10-20	NA
C. Cleaning out Na 2,4,5-T Slurry Filters ¹	1-5	1-5	NA	NA
D. 2,4,5-T Filtration Operation ³	1-10	NA	NA	5-25
E. Digging out cake from 2,4,5-T Centrifuge ²	NA	1-5	5-10	NA
F. Cleanout of Settling/Storage Tanks	5-10 ⁷	1-5 ⁷	15-30 ⁷	35-70
G. Rodding hopper feeding rotary dryer ⁴	NA	1-5	5-10	5-25
H. Assisting cake conveying operations ⁵	1-5	1-10	10-20	NA
I. Drying of Product on Tray Dryers ⁶	1-10	NA	NA	NA
J. Packaging of 2,4,5-T Product	1-10	1-5	5-10	5-25

¹ Operations eliminated by 1956.

² Plows added by 1958. No centrifuging in Plant 3.

³ High exposure applies to Plant 1 only. Plant 3 filter was automated thus low exposure.

⁴ Mechanical arch breaker (vibrating device) added by 1956.

⁵ Conveyors eliminated by 1960.

⁶ Tray dryers used in Plant 1 only. Rotary dryer used in Plants 2 and 3 thus low exposure.

⁷ Concentrations are for inlet stream. Actual cleanout operations would have resulted in exposure to cakes/residues/tars with a much higher TCDD content.

⁸ Exposure levels for Plant 3 are pre-1969. For the last eight months of operation (Jan.-Aug., 1969) changes were made in processing conditions which dramatically lowered TCDD levels; most product lots in the 1-3 ppm range.

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G17996

HCG/DLW
7/28/83

All construction work was completed approximately on schedule, and, after start-up, the expanded MHA Acid plant appears to be producing MHA Acid at design rates.

SANTOQUIN

Three batches of Santoquin residue were vacuum distilled at the J. F. Queeny plant to determine if Santoquin and para-phenetidine could be recovered from Santoquin residue. The percent recovery varied from 12.4 to 15.2 with approximately 90 percent usable product. Based on 1971 Santoflex AW requirements of 13.3 million pounds and a usage of 140 pounds of Santoflex AW per cwt of Santoquin, a residue recovery unit savings would be \$124,000 per year.

Santoquin losses, from the lower bearing of a LUWA thin-film evaporator, were encountered since the units initial start-up. Humble Oil's Primol 355 mineral oil was successfully substituted for Santoquin as the lower bearing lubricant. Raw material usage savings of approximately \$8,000 per year are now being demonstrated on this \$500 expenditure.

TETRACHLOROPROPENE

By-products formed from overchlorination of trichloropropene are responsible for considerable yield losses in the tetrachloropropene process. To prevent this overchlorination, evaluations are being made to control the chlorine charge endpoint and also to insure that better assay trichloropropene is being supplied. Laboratory work was begun to find a solvent or catalyst to change the reaction mechanism. However, this was unsuccessful and work on development of an inline GLC is in progress. Inquiries have been sent out to determine the cost of better assay trichloropropene.

2,4,5-T

A \$1,070 capital project, to improve the color of 2,4,5-T, was installed during March, 1969. The project provided for a new Elmco cake wash system that would permit the sodium 2,4,5-T cake to be washed with caustic. A plant demonstration showed that a caustic wash improved the product color and decreased the percent TCP in the product. This quality improvement was necessary to maintain sales to certain customers.

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New autoclave charging conditions were initiated during February, 1969. These new charging conditions, recommended by Agricultural Research, were intended to reduce the TDD content from the 1968 average of 40-50 ppm to 5-7 ppm with an associated reduction in the TCA content from 1 percent to trace amounts. Results from a thirty-day extended trial run showed a concentration drop in TDD to an average of 4 ppm with an associated reduction in the percent TCA to approximately 0.17%.

A \$2,200 capital project to control the condensation reaction pH is awaiting installation. This project will permit the use of a 34% NaTCP solution instead of the present 25% NaOH solution. A four-day trial run was conducted during August, 1969, with no adverse effects on product quality or yield. Estimated caustic savings will be \$7,900 per year based on a product rate of 1.0 million pounds per year.

An experimental project permitting the recycle of the pan filter wash water to the Na 2,4,5-T reslurry tank and the pan filter filtrate to the primary settler was installed in November, 1969. Recycling wash water to the Na 2,4,5-T reslurry tank will permit the recovery of dissolved 2,4,5-T. Also, recycling the filtrate to the primary settler will reduce the amount of new 93% H_2SO_4 required to lower the settler pH. Estimated TCB and H_2SO_4 raw material savings are \$22,000 per year based on a product rate of 1.0 million pounds per year. The experimental project is due to be tested during the next 2,4,5-T production period.

Additional H_2SO_4 raw material savings may be realized by the installation of a \$7,500 capital project to reduce the H_2SO_4 usage in the primary TCP settler. The project provides for a ratio control loop to add H_2SO_4 to the Elmco filtrate as it is transferred to the settler rather than depending on a variance of pH at the lower portion of the pH scale. Installation of this project will result in a H_2SO_4 raw material savings of \$8,100 per year based on a product rate of 1.0 million pounds per year.

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C22894

Isam Dep Gx #3
(2/21/83 K14

Approved 2/7/79

POSITION STATEMENT - STURGEON, MO. - o-CHLOROPHENOL DERAILEMENT
QUESTIONS & ANSWERS FOR USE BY MIC PR IN RESPONDING TO DIRECT
MEDIA INQUIRIES

Q. Are the people of Sturgeon being harmed by the smelly air?

A. We have no data indicating that the atmospheric concentrations of o-chlorophenol crude in Sturgeon and the surrounding area are harmful either to humans or to domestic animals. The concentrations are far below toxic levels. For example, the highest concentration in the air samples taken by Monsanto in the afternoon and evening of January 11 was 85 parts per billion. By contrast, the maximum permissible concentration in our manufacturing unit is 5,000 parts per billion, although we seldom exceed 1,000. o-Chlorophenol can be detected at levels far below the level established by OSHA as being safe for long-term industrial exposure.

Q. What about long-term effects such as cancer?

A. We have operated the chlorophenol unit at our Sauget, Ill., plant for years and have seen no chronic toxicity problems among our workers.

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C00444

Q. When will the smell go away?

A. That can't be answered with certainty. When the excavations have been completed and the area recovered, the odor will be very much less than it has been; but it may not disappear entirely for some time. The odor threshold for o-chlorophenol is very low, just a few parts per billion in air. Since people vary in their ability to perceive odors, some may smell it and others may not.

Q. Was there any tetrachloro dioxin in the material spilled?

A. We have never detected tetrachloro-dibenzo-p-dioxin in that product or any of our chlorophenols. Our reserve sample of this particular shipment has not been tested for this compound.

Q. Have you found any dioxins?

A. On one sample of three tested, we found 0.2 parts per million of the monochloro dioxin and 0.05 parts per million of the dichloro compound. These materials are much less toxic than the o-chlorophenol itself.

Q. What is your ability to detect the tetrachloro dioxin?

A. In crude o-chlorophenol we can detect 10-30 parts per billion, depending on the precise analytical conditions used.