Progress Report

TECHNICAL SERVICES DEPARTMENT - W. G. KRUMMRICH PLANT

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Title	TSD Job & Report No.
MONOCHLOROBIPHENYL: FINAL REPORT ON MCS 1547 MONOCHLOROBIPHENYL MANUFACTURE IN THE AROCLOR DEPARTMENT.	91370-4461(1)
	Business Group: SPECIALTY PRODUCTS

Product Code	Product	Dept. No.
811.11	AROCLOR	246

Personnel	Report Date
K. E. Boucher (W. C. Engman)	5/7/75

SUMMARY:

Facilities to manufacture 8 M lb/yr of Monochlorobiphenyl (MCBP) consisting mostly of the isomer, o-chlorobiphanyl, were required. Dow would use this intermediate for the manufacture of o-phenylphenol. The Research process produces large amounts of residue that is converted into Aroclor 1242. This report summarizes the work to alter the existing Aroclor facilities for the manufacture of Monochlorobiphenyl. It is a final report since Dow has decided not to purchase MCBP from Monsanto.

In brief, the plant has assisted Research in the development of a process suitable for use in the WGK plant Aroclor department. One tank car of MCBP was produced in the department and sent during December, 1974, to Dow. A plant preliminary design scope was prepared from which CED estimated $1,300,000 new capital, plus $300,000 expense, would have been needed to de-bottleneck the Aroclor facilities. Using this information, manufacturing cost estimates were prepared (reference 8).

Finding out Dow no longer wishes to purchase MCBP from Monsanto, the disposition of some $150,000 of capital work related to improving the existing Aroclor facilities was determined. Required safety work will be done. No. 2 intermediate tank will be replaced. Other remaining work will be further evaluated (see reference 7 attached) considering if improvements might in some other manner be more economically achieved.

Cost for the work includes $38,000 for technical services and $14,000 for experimental expense.

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DETAILS

In 1973 Research developed a process for making MCBP. In 1974 the disposal route for Mono still residue was found - chlorination followed by isomerization to Aroclor 1242. Research process is given in reference 1.

The plant was involved in making evaluations, demonstrating the process and preparing a plant preliminary engineering scope.

A. EVALUATIONS

1. Manufacturing and capital cost estimates were made based on the original 1973 Research process in reference 2.

2. Rough production and capital estimates were prepared assuming no Aroclor sales (reference 7). This evaluation includes a look at residue disposal by either incinerator or by hydrochlorination to recover Biphenyl.

3. A final manufacturing estimate was prepared based on the plant preliminary design scope (reference 8).

B. DEMONSTRATIONS

1. Analytical tools from process control and product analysis were developed (references 9, 10, 11,12, 14, 15, 16, 17).

2. Department piping was modified for the demonstration.

3. The Research process was demonstrated in the Aroclor department in two steps:

Monochlorobiphenyl	-	September 1974, expense - $ 2,591
Aroclor 1242 from residue	-	February 1975, expense - $11,479

4. One tank car of Monochlorobiphenyl was shipped to Dow in December, 1974, for their evaluation.

C. ENGINEERING SCOPE

A detailed plant scope (references 4 and 5) was prepared in March, 1975, from which CED could prepare an estimate within ± 15%. Estimate included $1,300,000 new capital and $300,000 expense.

Engineering problems resolved were:

1. Method to de-bottleneck the Aroclor column -
   Blanking strips had to be removed and more cooling water supplied to the column condenser.

2. Incorporation of means for removal of dissolved HCl gas in the crude 1111 - After Research process was issued, air blowing of crude to remove HCl was resumed due to severe corrosion of crude storage facilities caused by neutralization in storage of the dissolved HCl gas. Air blow of mono crude was not recommended due to its flammability (reference 17) and possible high PCB losses. Vacuum degassing was selected to remove HCl gas with N_2 blowing as a back-up.

Under ISD job number 4461, the plant assisted Research from August, 1973, through April, 1975, in developing the Monochlorobiphenyl process for incorporating in the existing Aroclor department. About 14 man-months of technical service effort was involved divided into various skills as shown:

	Man-Months	
Process Engineering	7.5	
Mechanical Engineering	3.5	
Instrument Engineering	1.5	
Drafting	1.5	
Total	14.0	($38,000)

In addition, plant effort also included help from the laboratory, accounting, production, and Area 5 shop.

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Technical Services Department

REFERENCES

1. Process For Engineering Design for Monochlorobiphenyl, Report No. P-1766, Job No. 43-000-760.22-1016005, dated July 29, 1974 by D. R. Cova.

2. Fractionation to Produce Monochlorobiphenyl, memo dated September 19, 1973, by T. R. Cova.

3. Monochlorobiphenyl - Plant Demonstration of the Conversion of Mono Residue into Aroclor 1242', Progress Report dated February 25, 1975, by K. E. Boucher.

4. Preliminary Plant Project Scope for Manufacture on Monochlorobiphenyl in the Aroclor Department at 8 M lb/year Rate, Dept. 246, WGK Plant, dated March, 1975, by K. E. Boucher.

5. Project Scope for Electrical and Instrumentation Design to Manufacture Monochlorobiphenyl in Existing Aroclor Facilities, dated March 24, 1975, by R. L. Heider.

6. Cost Analysis for MCS 1547 - Monochlorobiphenyl memo dated October 19, 1973, by K. E. Boucher to J. R. Savage.

7. Manufacturing Cost for Monochlorobiphenyl Assuming No Aroclor Sales, memo dated September 12, 1974, by K. E. Boucher to J. R. Savage.

8. Cost Estimate for MCS 1547 - Monochlorobiphenyl, memo dated April 21, 1975, by K. E. Boucher to J. R. Savage.

9. Department 246 - Monochlorobiphenyl Profile of Chlorinators During MCS 1111 Production, WGK AR&D Report No. 2565, dated October 10, 1975 by L. H. Horcher.

10. Department 246 - Monochlorobiphenyl - Start-up Liaison Method Development and Analytical Work, WGK AR&D Report No. 2567, dated October 11, 1974 by L. H. Horcher.

11. Dept. 246 - Analysis of Forward Flow During Column Change-over Between MCS 1109 to MCS 1016, WGK AR&D Report No. 2566, dated October 11, 1974 by L. H. Horcher.

12. Dept. 246 - 1242' Aroclor Plant Isomerization Run, WGK Analytical R&D Report No. 2644, by L. H. Horcher dated February 19, 1975.

13. Demonstrate the Conversion of Distilled Monochlorobiphenyl Residue into Aroclor 1242' memo dated December 4, 1974 by K. E. Boucher to A. E. Leisy.

14. Analyze Monochlorobiphenyl Residue for DSC, AR&D work proposal initiated February 17, 1975 by K. E. Boucher, report by T. R. Berner.

15. Aluminum Content in Aroclor 1242, AR&D work proposal initiated November 22,1974 by K. E. Boucher, report by M. E. Webb.

16. Identify Solids from 1254 Polishing Filter, AR&D work proposal initiated by G. Johnson, reported by M. E. Webb.

17. Flash Point of Crude Aroclor 1111, AR&D work proposal initiated September 12, 1974 by K. E. Boucher, report by T. M. Berner.

18. Viscosity of Monochlorobiphenyl, memo dated August 20, 1974, to K. E. Boucher from D. R. Cova.

19. Disposition of Aroclor Related Projects in Monochlorobiphenyl Scope, memo dated April 29, 1975 to A. E. Leisy from K. E. Boucher.