J. R. Savage

COMPANY CONFIDENTIAL

1975

MANUFACTURING IMPROVEMENT PLAN

FOR

File

AROCLORS AND PYRANOLS

DEPARTMENTS 246 AND 259

PREPARED BY:

K. E. Boucher
K. E. BOUCHER

B. C. Bosse
B. C. BOSSE

ISSUE DATE:

3/5/75

APPROVED:

A. E. Leisy
A. E. LEISY

W. C. Engman
W. C. ENGMAN

G. J. Geers
G. J. GEERS

J. R. Savage
J. R. SAVAGE

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DISTRIBUTION

B. C. Bosse
K. E. Boucher
W. P. Conant
C. N. Deubner
R. Eden
W. C. Engman
R. Flint
G. J. Geers
R. L. Heider
H. J. Horner
G. L. Johnson
R. M. Kountz - F4NA
W. A. Kuhn - B3NA
A. E. Leisy
D. K. Lynch
R. H. Munch - T1B
C. Paton - B2SC
E. M. Potter - B2NK
W. R. Richard - T3A
J. R. Savage - B2SL
G. W. Watson

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SUMMARY

Based on the sales and use forecast of 12-31-74, the department will have adequate capacity in 1975. As in 1974 there remains the potential problem of excess volume of residue from MCS 1016 production versus sales needs for Aroclor 1254 which is produced from this residue.

Forecast for 1976 indicates a major reduction in the capacitor (MCS 1016) market. Some equipment time will be available. Monochlorobiphenyl is the prime candidate to utilize the equipment as MCS 1016 production requirements decrease. Monochlorobiphenyl is a new product not used in the capacitor field.

There will be a tight capacity situation in 1976 if MCS 1016 sales remain at the 1975 forecast level and Monochlorobiphenyl sales approach 8M pounds annual rate in 1976.

Major technical effort in 1975 will be directed towards:

1. Completion of the Monochlorobiphenyl project.

2. Continued reduction of PCB losses to the environment.

3. Technical assistance to customers for PCB pollution control.

Total technical effort for 1975 is estimated at 28 man months of which 13 man months will be process engineering. Capital for defined projects comes to $408,000.

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WORK PLAN FOR 1975

Item	Potential Benefits	Capital (Rough)	Priority*	TSD Manpower (Man Months) Process	TSD Manpower (Man Months) Other	Responsible
I. COST IMPROVEMENT						
Replace steel demister tank with polyester	Reduce down-time & main-tenance	$13,700	Installation in 1975	0	1	Prod, TSD, Maint
II. POLLUTION CONTROL						
A. Continue study of PCB removal	Environmental control of PCB's		Continued Evaluation	3	0	TSD, AR&D, Research
B. Visit customers' plants to provide assistance	Environmental control of PCB's			1	0	TSD
C. Install interlocks on column vent condenser	Environmental control of PCB's	$5,000	Design Complete	0	0	Maint
	Total	$5,000		4	0	

*Priority 1 - Design will be completed in 1975
Priority 2 - Design will be completed in 1975 manpower permitting
Priority 3 - Backlog

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WORK PLAN FOR 1975

Item	Potential Benefits	Capital (Rough)	Priority*	TSD Manpower (Man Months) Process	TSD Manpower (Man Months) Other	Responsible
III. NEW PRODUCTS						
A. Demonstrate isomerization and prepare project for Monochlorobiphenyl	New sales, reduce fixed and budgeted costs from MCS 1016	$350,000	1	3	9	TSD, Prod, Research, Maint
B. Install absorber for new MCS 1489 blend	New sales	$ 20,000	Undetermined	1	2	TSD, Maint
C. Investigate selling MCS 1016 distilled residue	Reduce production costs, make product more acceptable to customer		Investigate	1	0	Prod, Marketing
	Total	$370,000		5	11	

*Priority 1 - Design will be completed in 1975
Priority 2 - Design will be completed in 1975 manpower permitting
Priority 3 - Backlog

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WORK PLAN FOR 1975

Item	Potential Benefits	Capital (Rough)	Priority*	TSD Manpower (Man Months) Process	TSD Manpower (Man Months) Other	Responsible
IV. PROCESS CONTROL						
A. Investigate changing Cl_2 distribution to continuous chlorinators	Decrease hi-boiler in crude	Investigation		1	0	TSD
B. Find cause of fluorescence change in Aroclor 1016	Maintain customer	Undetermined		Undetermined	0	Prod, AR&D, TSD
C. Evaluate hydrodechlorination	Eliminate MCS 1016 column residue if Aroclor 1242/1254 sales are lost	Undetermined		1	0	TSD, Researc
D. Upgrade fuel oil control system	Allow Aroclor column to run on oil at various rates	$2,000		0	1	TSD, Maint
	Total	$2,000		2	1	

*Priority 1 - Design will be completed in 1975
Priority 2 - Design will be completed in 1975 manpower permitting
Priority 3 - Backlog

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WORK PLAN FOR 1975

Item	Potential Benefits	Capital (Rough)	Priority*	TSD Manpower (Man Months) Process	TSD Manpower (Man Months) Other	Responsible
V. PLANT IMPROVEMENT						
A. Simplify lime handling	Work simplification	$7,000	3	0	1	TSD, Maint
B. Pave area between R.R. and department	Housekeeping	$4,500	3	0	1	TSD, Maint
	Total	$11,500		0	2	
VI. SAFETY						
A. Biphenyl unloading pump	Potential Safety Hazard	$10,000	1	½	½	TSD, Maint
B. Alter Chlorine vaporizer vent system	Safety	$ 1,000	2	0	0	Maint
C. Provide automatic Cl_2 shut off at main header	Safety		Undetermined	Undetermined		TSD
D. Replace top of #2 intermediate storage tank and provide platform	Safety	$ 3,400 - $ 4,000 Expense	Installation in 1975	0	0	Prod, Maint
	Total	$11,000		½	½	

*Priority 1 - Design will be completed in 1975
Priority 2 - Design will be completed in 1975 manpower permitting
Priority 3 - Backlog

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WORK PLAN FOR 1975

Item	Potential Benefits	Capital (Rough)	Priority*	TSD Manpower (Man Months) Process	Other	Responsible
VII. ENERGY CONSERVATION						
A. Improve furnace efficiency	Reduce energy consumption			¼	0	Prod, Maint
B. Reduce steam usage	Reduce energy consumption			1	0	Prod, Maint
	Total			1¼	0	
	Total Work Plan			12 3/4	15½	

*Priority 1 - Design will be completed in 1975
Priority 2 - Design will be completed in 1975 manpower permitting
Priority 3 - Backlog

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A. CAPACITY REQUIREMENTS

Forecasted sales of Aroclors and Aroclor blends, through 1984, are shown below. The figures were obtained from the MICC Production Plan dated 12-31-74. The forecast for Aroclors includes the Aroclor needed to make the various blends.

Sales and Use Forecast for Aroclor Department (M̄lb/yr)

Product	1975	1976	1977	1979	1984
1) 1016	28.20	23.00	19.06	14.35	14.30
2) 1221	0.15	0	0	0	0
3) 1242	7.53	6.58	6.68	6.16	4.14
4) 1254	10.00	8.83	7.89	7.76	6.39
5) Monochlorobiphenyl	0	8.00	9.00	15.00	20.00

Sales and Use Forecast for Aroclor Blend (M̄lb/yr)

Aroclor Blend	Aroclor Used	1975	1976	1977	1979	1984
1) Inerteen 54201 CM	1242	7.46	6.52	6.61	6.10	4.10
2) Pyranol A-13B3B-3	1254	0.95	0.76	0.67	0.70	0.70
3) Inerteen 70/30	1254	5.65	5.01	4.67	4.51	3.64
4) Aroclor 1489	1016	0.09	0.45	0.45	0	0

The following lists the present production capacity of the department.

Product	Capacity
1016	50.4 M̄lb/yr
1221 1242 1254	21.6 M̄lb/yr
Aroclor blends	20.3 M̄lb/yr

A. (Cont'd)

Based on the Sales and Use Forecast of 12-31-74, the department will have adequate capacity to meet expected demands for 1975. In 1976 the department will likely begin the production of 8$\overline{M}$ lb/yr of Monochlorobiphenyl. To achieve this production the Monochlorobiphenyl project will:

1. Increase the continuous chlorinator capacity by providing larger Cl_2 control valves.

2. Debottleneck the Aroclor column by removal of the blanking strips.

3. Activate the #1 still to provide isomerization facilities for converting Mono column residue into Aroclor 1242.

4. Revamp the existing blow tanks to provide hold tanks for lime treatment of the Aroclor 1242.

5. Provide new central instrumentation for the Aroclor column to automate Monochlorobiphenyl distillation.

In specification Monochlorobiphenyl was produced in the September, 1974, department demonstration. Also, column still bottoms were collected to be used early in 1975 for a department demonstration of the manufacture of Aroclor 1242 from Mono residue. During the demonstration, only 80% of the column design capacity could be achieved due to severe vibration in the still pot as boil-up was increased. Causes of the vibration are being investigated as the plant scope is being prepared.

The same equipment will be used for MCS 1016 and Monochlorobiphenyl production. Equipment occupancy in 1976 is given below:

Product	Capacity	Annual Month Occupancy in 1976
MCS 1016	5.4 $\overline{M}$ lbs/mo.	4.3 mo. @ 23$\overline{M}$ lb/yr
Monochlorobiphenyl	1.4 $\overline{M}$ lbs/mo.	5.7 mo. @ 8$\overline{M}$ lb/yr
	Total Occupancy	10.0 months

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A. (Cont'd)

The 12-31-74 forecast for 1976 is considered conservative in that 1016 sales could continue at the 1975 level of 28.2 $\overline{M}$ lb/yr. In this case equipment occupancy would be 11.2 months. This would leave little time for product changeovers.

Another problem associated with making Monochlorobiphenyl is the residue disposal route. When making Mono, only Aroclor 1242 is made using the column residue. Likewise, when MCS 1016 is made, only Aroclor 1254 is produced from the column residue. There will be few exceptions, otherwise an imbalance may be produced causing additional production delays.

Analysis of equipment occupancy shows additional facilities for Monochlorobiphenyl may be needed in 1978.

Equipment Occupancy thru 1984 (Months)

Product	Rate	1976	1977	1979	1984
1016	5.4$\overline{M}$ #/Mo.	4.3	3.5	2.6	2.6
Monochlorobiphenyl	1.4$\overline{M}$ #/Mo.	5.7	6.4	10.1	14.3
Total Months		10.0	9.9	12.7	16.9

B. COST

The following is the budget total bulk production cost for 1975 as of 8-26-74:

MCS 1016	21.73¢/lb.
Aroclors	21.17¢/lb.
Pyranols	26.53¢/lb.

C. COST IMPROVEMENT

The existing steel demister blow tank will be replaced with polyester material to reduce maintenance cost and downtime.

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1975 COST IMPROVEMENT

PROJECT	GROSS ANNUAL SAVINGS RATE	1st Q.	2nd Q.	3rd Q.	4th Q.	UNBUDGETED CURRENT YEAR EXPENSE	ESTIMATED CAPITAL REQUIREMENT	EDC	ODDS OF SUCCESS
Replace Blow Tank Demister	$ 9,300	0	$2,500	$ 800	$ 3,100	0	$13,700	9/1/75	95%

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D. POLLUTION CONTROL

Monitoring and control of PCB losses to the sewer will continue. Current losses from the Aroclor department and the incinerator are below the target of 1 #/day. Federal regulations have not been promulgated as yet, but may be 0.54#/day excluding background. Technical effort may be required to develop means to reach this level on a consistent basis if 0.54 #/day becomes law.

TSD and Research will continue to evaluate various adsorption media for PCB removal from the department effluent. Such a study may prove useful in also finding ways to remove PCB's in effluent discharges from our Aroclor customers' plants.

At the request of the EIA (Electronic Industries Association), TSD is visiting each capacitor customer and obtaining the following samples for PCB content.

1. Samples of each plant's effluent.

2. Samples of the water used by each plant.

3. Samples of the body of water into which each plant discharges its waste streams.

Installation of a newly-designed temperature interlock for the Aroclor 1016 column vent condenser will be installed to further reduce the chance of discharging vapors containing PCB's to the atmosphere.

E. NEW PRODUCTS

In 1976, the department is expected to begin Monochlorobiphenyl production. The production of 8M lb/yr of Monochlorobiphenyl should result in a cost divisor savings of $125,000/yr in the production of Aroclor 1016 by spreading the base for fixed and budgeted costs.

New capital may be needed to make MCS 1489 in the department. MCS 1489 is a blend consisting of 10% by weight Tolylxylsulfone mixed into Aroclor 1016.

F. PROCESS CONTROL

Work may be needed in 1975 on altering the chlorine distribution among the four continuous chlorinators to reduce the amount of high boilers.

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F. PROCESS CONTROL (Cont'd)

A cooperative effort between production and AR & D is needed to identify the cause of the change in the fluorescence color of Aroclor 1016. The General Electric Company of Hudson Falls noticed this change.

Hydrodechloriantion process now under study by Research is the dechlorination of Aroclor by catalytic hydrogenation to recover the Biphenyl value of the residue. Hydrodechlorination appears to be the most promising use of the MCS 1016 distilled residue should loss of the 1242/1254 market occur. Major drawbacks to the hydrodechlorination route is the high capital ($1M +), and the generation of dissolved solids (NaCl). Further studies will be conducted by Research.

The column still fuel oil control system will be revised in 1975 to be capable of operating at various rates.

To reduce corrosion of the crude storage tanks, air blowing of the crude Aroclor 1142 has been resumed. Technical effort may be needed if increased PCB losses are caused by air blowing.

G. PLANT IMPROVEMENT

Two carryover projects are included:

1. A project is needed to simplify the handling of bagged lime.

2. The area between the department and the railroad tracks should be paved.

H. SAFETY

Two safety items from the safety audit remain to be completed. In addition, two additional items have been added. They are:

1. Provide Biphenyl unloading pump.

2. Replace rupture disc on the chlorine vaporizer with a relief valve.

3. Install automatic Cl_2 shut off on the chlorine header in case of an electrical failure.

4. Replace top of #2 intermediate storage tank and provide a platform.

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I. ENERGY CONSERVATION

To conserve energy, effort will be directed towards two items:

1. Improving the efficiency of the furnaces in the department by changing the air throughput to obtain maximum flame temperature.

2. Reducing steam usage--an item which is being done on a plantwide basis.