COMPANY CONFIDENTIAL

Director's Review Meeting

CEA 2417 - Aroclor 1016 Column

MONS 092801

COMPANY CONFIDENTIAL

8/5/71

AGENDA

DIRECTOR'S REVIEW MEETING

AROCLOR COLUMN - CEA 2417

I.	Introduction ----------	J. R. Savage
II.	Objectives - (questions only, will not be reviewed)	
III.	Chemistry of Process ----------	D. Cova Q. E. Thompson
IV.	Summary of Plant Process and Equipment ----------	N. B. Wolk
V.	Financial Status ----------	N. B. Wolk
VI.	Construction ----------	J. Petterson
VII.	Manning/Training ----------	R. M. McCutchan
VIII.	Start-up Plan ----------	R. M. McCutchan
IX.	Project Risks	
	a. In Process ----------	Cova/Thompson
	b. In Design ----------	A. J. Heinze
	c. In Maintenance ----------	J. Petterson
	d. In Operations ----------	R. M. McCutchan

A. Project Organization

Business Group:

H. S. Bergen - Specialty Products Director
J. R. Savage - Manufacturing Manager

Manufacturing:

A. E. Leisy - General Superintendent
Bob McCutchan - Dept. Supervisor & Mfg. Representative
Virgil Brawley - Dept. Foreman & Start-up Foreman
Tom Carrico - Dept. Foreman
Bill Crabtree - Hourly Foreman
Wayne Krull - Start-up Foreman
Arnold Zavadil - Start-up Foreman
Doug Elden - Cost Analyst
Ron Kuster - Laboratory Supervisor

Research:

W. R. Richard - Manager
R. H. Munch
Q. E. Thompson
D. R. Cova

CED:

R. M. Kountz
N. B. Wolk - Project Manager
A. J. Heinze - Project Engineer

Maintenance:

Bill Young - Area Supervisor
Jim Petterson - Project Construction Supervisor
Noel Fritsch - Project Planner
Roy Purkey - Project Foreman
Ron Leap - Project Foreman

PROJECT OBJECTIVES AND PREMISES

I. CEA 2417 OBJECTIVES

The following objectives will be demonstrated:

	STATUS/COMMENTS
1. Meet the CEA 2417 time schedule.	1. The original start-up date was 6/1, but was changed to 8/1 when MCS-1109 was added to the scope.
2. Stay within budgets on construction and start-up costs: CEA 2417 Capital $830 M CEA 2417 Expense 95 M Start-up expense 100 M	2. The 2417 budgets include Variance No. 1 which allowed for facilities to produce MCS-1109. It appears that both capital and expense will be within budget.
3. Demonstrate design capacity: Aroclor 1016 54 M#/yr. MCS-1109 18 M#/yr.	3. Underwriter Laboratories accepted Aroclor 1016 as being equivalent to 1242. If a forecut had been necessary, capacity would have been lower on 1016.
4. Meet specification qualities on all products. Those affected by CEA 2417 are: Aroclor 1016 MCS-1109 Aroclor 1254 Aroclor 1260 Aroclor 1221	
5. No increase in PCS's leaving Dept. 246 via sewers and no more than 1.0 lbs./day additional to atmosphere.	5. During the first run (only) of MCS-1109, 3-5 lbs./day of monochlorobiphenyl will be discharged to the sewer.
6. No significant change in department biphenyl yield.	

Objectives

MONS 092804

PROJECT OBJECTIVES AND PREMISES (contd.)

II. KEY DESIGN PREMISES

	STATUS/COMMENTS
1. Any remaining phthalic anhydride in column can be flushed out in initial startup.	1. The first run will be a "half-size" run of Aroclor 1016. Assuming acceptable quality, this production will be used for Therminol FR-1.
2. Volumetric control is adequate for determining: a. change in reflux ratio b. end of crude feed c. end of forward flow d. end of forecut for MCS-1109 Volume control within 250 gal. is necessary on the above determinations and can be achieved.	2. "End of forward flow" on MCS-1109 can also be determined by C.P. "End of forecut" on MCS-1109 can also be estimated by % Biphenyl in forward flow.
3. Still pot pressure can be controlled such that the furnace outlet temperature will be a maximum of 300°C., and the temperature differential on the furnace a maximum of 10°C.	
4. Still pot bottoms from Aroclor 1016 will be 50% Cl_2 or less.	
5. The C. B. 5+ level will not exceed 0.4% in the finished Aroclor 1016.	
6. The C. B. 2+ level will not exceed 1.0% in the finished MCS-1109.	
7. PCB discharge to the atmosphere will be an estimated 1.0#/day or less from the vacuum jet. There will be no significant PCB loss to the sewer from this project, and none from the vacuum jet. All sewers will pass through a settling basin.	7. During the first run (only of MCS-1109, 3-5 lbs./day of monochlorobiphenyl will be discharged to the sewer.
8. The severity of potential hazards in Dept. 246 will not be increased by CEA 2417.	MONS 092805
9. Stainless steel is a suitable material of construction for the Aroclor fractionating column.	

II. KEY DESIGN PREMISES (contd.)

	STATUS/COMMENTS
10. WGK will be the only MCS-1016 supplier and will be reliable.	
11. Cross-contamination between Aroclor 1016 and MCS-1109 can be held to an acceptable level.	
12. The isomer distribution of crude for MCS-1109 (5.0% Cl_2) that will be produced in the continuous chlorinators will be adequate for the process which was based on batch-produced crude.	

III. OPERATIONAL PREMISES

1. Chlorine and biphenyl will be available in adequate quantities and proper quality.

2. WGK will produce Aroclor 1016; MCS-1109; Aroclors 1232, 1242, 1248, 1254, 1260, 1262, and 1221; blends Inerteen PPO, Inerteen 70/30, Inerteen 54201 CM, Pyranol A13B3B, Therminol FR-O, and FR-Low Temp. (or their equivalent by other names); Therminol FR-1, and MCS-1023.

3. WGK will not produce Therminol FR-II or FR-3, or Pydrauls after Antwerp is in Pydraul operation.

4. WGK will rework reclaimable scrap Aroclors or blends.

5. Therminol FR-1 will utilize Aroclor 1016 and Inerteen 54201 CM will use Aroclor 1242.

6. The 100% column capacity for Aroclor 1016 will be 54 M#/yr., and 18 M#/yr. for MCS-1109. Based on the 1971 forecast there will be 2.0-2.5 months of idle time.

7. The capacity for continuously chlorinated Aroclor 1142 (crude) will be approximately 54 M#/yr. This provides a surge capacity of 5-10% over expected 1971 demand.

III. OPERATIONAL PREMISES (contd.)

8. The sales and use forecast used in designing this project is:

	1971
Aroclor 1221/MCS-1109	2.3 M
1232	0.1 (approx.)
1242/MCS-1016	40.3 (about 5.0 M of 1242)
1248	1.4
1254	8.4
1260	2.7

9. Dept. 246 will have the following delivery capability (bulk):

	Necessary Lead Time
Aroclor 1016 & FR-1	Anytime
MCS-1109	5 days
Aroclor 1254	1 day
Aroclor 1260	2 days
Aroclor 1232	10 days
Inerteen 70/30	Anytime (assuming installation of 70/30 tank)
All other blends	3 days - 80% confidence 5 days - 95% confidence
Aroclor 1221 and 1242	2 days

When possible cars will be loaded prior to the receipt of an order.

10. All products will be available in drums and tank cars. Commercial trailers can be loaded with non-electrical grade products. Electrical grade products can be loaded into trailers reserved for this service.

11. Aroclor 1016 and MCS-1109 column bottoms will be distilled and further chlorinated to Aroclor 1254 or 1260. If there is an excess of still bottoms; it will be incinerated. If more 1254 or 1260 is needed, it will be batch chlorinated from biphenyl.

12. Off-gas condensate will be further chlorinated to Aroclor 1254.

13. The operation of the Aroclor incinerator will not be an integral part of the Aroclor production department.

III. OPERATIONAL PREMISES (contd.)

14. There can be blending of finished lots of Aroclor 1016 as long as each lot is a complete batch distillation.

15. Construction and tie-in of this project will not interrupt normal production, other than brief shutdowns for piping tie-ins (8-48 hours).

16. Customer acceptance of Aroclor 1016 will be such that there will not be parallel production of Aroclor 1016 and Aroclor 1242 for capacitor use.

SECTION IV - TRAINING PLANS

A.

AROCLOR COLUMN (CEA 2417)
OUTLINE OF
TRAINING PROGRAM

		Trainer	Days Required
I.	TRAINING FOR SUPERVISION		
A.	General		One
1.	Introduction to Personnel	McCutchan	
2.	General Introduction	McCutchan	
3.	Safety	McCutchan	
4.	Pollution Control	McCutchan	
5.	Tour	Brawley	
6.	Department Organization	Brawley	
7.	Security	McCutchan	
8.	Your responsibilities on this assignment - general	McCutchan	
B.	Present Process & Equipment		Four
Tools:	Flow Sheets	Brawley	
	Operating Instructions	Brawley	
	SMP	McCutchan	
	IFO's	Brawley	
	1800 Files	Brawley	
	Standards	McCutchan	
	Spec. Sheets	McCutchan	
1.	Each process step in detail		
2.	Other considerations:		
a.	Safety & safety devices/ check list	Brawley	
b.	Utilities	Brawley	
c.	Quality	Brawley	
d.	Quantity	Brawley	
e.	Material Handling	Brawley	
f.	Operator responsibility	Brawley	
g.	Item numbers	Brawley	
C.	New Process & Equipment		Ten
	(same "tools" as above, plus 2417 drawings and files)		
1.	Each process step in detail	McCutchan/ Brawley	
2.	Other considerations	McCutchan/ Brawley	

MONS 092809

Training

AROCLOR COLUMN (CFA 2417)
OUTLINE OF
TRAINING PROGRAM

	Trainer	Days Required
C. New Process & Equipment (Cont'd.)		
a. Safety and material handling		
b. Quality		
c. Quantity		
d. Risk analysis		
e. Process Control		
f. Yields		
g. Identify equipment and process lines		
h. Operator responsibility		
D. Preparation for Operator training		
1. Write operating instructions for assigned equipment		
2. Make flow sheets and data sheets		
3. Water-batching instructions		
4. Detailed daily plan for operator training		

SECTION IV - TRAINING PLANS

A.

AROCLOR COLUMN (CEA 2417)

DETAILED MASTER TRAINING SCHEDULE - SHIFT SUPERVISION

I. GENERAL

A. Introduction to Key Personnel

R. M. McCutchan	Mfg. Representative and Dept. Supervisor
A. E. Leisy	Group D Supt.
N. B. Wolk	Project Manager (CED)
A. Heinze	Project Engineer (CED)
F. Werner	Project Lead Draftsman (CED)
J. Petterson	Project Shop Supervisor
R. Purkey	Project Foreman
R. Leap	Project Foreman
N. Fritsch	Project Planner
V. Brawley	Dept. Foreman
T. Carrico	Dept. Foreman
W. Crabtree	Dept. Foreman (Hourly)
D. Elden	Cost Analyst
R. Kuster	Lab II Supervisor

B. General Introduction

1. Introduction to Aroclor

   How It Is Made
   Uses

2. Reason for Column Project
3. Liquid Aroclor Shift to WGK

C. Safety

1. General Dept. Safety
2. Cleanup
3. Housekeeping
4. Plant Disaster Plan
5. Location of Equipment
6. Fire Zone

D. Pollution Control

1. Reason for Tight Control
2. Review Dept. Procedure for Control
3. Overall Plant Effort on PCB's

E. Tour

1. Existing Equipment
2. New Equipment
3. Area 5 Shop

MONS 092811

I. GENERAL (Cont'd.)

F. Department Organization

Salaried	Hourly
Supervisor	Relief Foreman & #1 Swingman
Foremen	Repairman
	Premium Operator
	Column Operator
	Still Operator
	Second Operator
	Standard Operator
	#2 Swingman
	Porter

G. Security

1. Reasons for Security
2. Other Producers

H. Your Responsibilities on this Assignment - General

1. Assignments - Shift coverage of entire department, making flow sheets, completing IFO's, devise data sheets, logging data, training operators, setting personal objectives, etc.

2. Responsibilities - Supervise safe running of equipment by hourly personnel, produce scheduled pounds of quality material as outlined in the startup objectives.

3. Authority - Overall direction of all operators and operations. Make decisions on process changes for safe operations and quality material. Have equipment maintained on shifts and weekends.

II. PRESENT PROCESS AND EQUIPMENT

A. Process in Detail, using:

1. Discussion
2. Operating Instructions
3. Flow Sheets
4. IFO's
5. 1800 Files
6. Standards
7. Spec. Sheets
8. SMP

II. PRESENT PROCESS AND EQUIPMENT (Cont'd.)

B. Other Considerations

1. Safety and Safety Devices (Rupture Discs and Interlocks)
2. Utilities
3. Quality
4. Quantity
5. Material Handling (SMP and Operating Instructions)
6. Operator Responsibility
7. Item Numbers

III. NEW PROCESS AND EQUIPMENT

A. Process in Detail, using:

1. Model
2. Flow Sheets
3. IFO's
4. 2417 Drawings
5. Tentative Processes

B. Other Considerations

1. Safety and Safety Devices (Rupture Discs and Interlocks)
2. Quantity
3. Quality
4. Material Handling
5. Operator Responsibility
6. Item Numbers
7. Identify Equipment and Process Lines
8. Yields
9. Risk Analysis
10. Make Log Book for Recording Equipment Data
11. Process Control
12. Control Limits

IV. PREPARATION FOR OPERATOR TRAINING

A. Make Flow Sheets For:

1. Individual Training Needs for Operator Training
2. Complete Sheets of Entire 2417 Project

B. Water Batching Instructions for Area of Responsibilities:

1. Pressure Testing Tanks and Lines
2. Material to be Used
3. Instrumentation and Panel Board Checkout

IV. PREPARATION FOR OPERATOR TRAINING

C. Write Tentative Operating Instructions for Area of Responsibility

D. Make Data Sheets for Operators to Record Pressures, Temperatures, Etc.

E. Write Detailed Daily Plan for Operator Training

1. Classroom
2. Field
3. Instrumentation and IFO's
4. Pollution Control
5. Safety and Plant Disaster Plan
6. Material Handling
7. Troubleshooting
8. Communications
9. Work Schedules
10. Water Batching and Pressure Testing Plans
11. Operating Instructions
12. Power Failure
13. Sampling
14. New Data Sheets and Expected Readings
15. Quality
16. Utilities
17. Housekeeping
18. Training with Other Operators

SECTION IV. TRAINING PLAN

B. OPERATOR TRAINING

1. Column Operator Training (outline)

1st Week
General indoctrination
Department organization
Introduction to personnel
Department tour
Security of information
Pollution control
Plant disaster plan
Safety and housekeeping
Introduction to training
Training on existing equipment
Classroom training
Discuss water batching plans
Field training.

2nd Week
Review training of previous week
Water batching plans
Instrumentation
Dry out reboiler furnace
Recording data
Run existing equipment
Drop bottoms
Material handling
Quality
Sampling
Process simulation
Data sheets

3rd Week
Review training of previous week
Process and instrumentation
Field training on valves and lines
Check out reboiler furnace system
Run the column
Take inventory

MONS 092815

SECTION IV. TRAINING PLAN (contd.)

1. Column Operator Training (details)

1st Week

1. General Indoctrination
   Introduction to Aroclor
   Plant and Department Procedures

2. Department Organization

Salaried	Hourly
R. McCutchan - Dept. Supvr.	Relief Foreman
A. Leisy - Prod. Supt.	Premium Oper.
T. Carrico - Foreman	Still Operator
V. Brawley - Foreman	Second Operator
A. Zavadil - Foreman	Standard Operator
W. Krull - Foreman	Repairman
D. Elden - Cost Accountant	Porter

3. Introduction to Personnel

4. Department Tour
   Existing Equipment
   New Equipment

5. Security of Information
   Reason for security
   Other producers

6. Pollution Control
   Background
   Customer control
   Department control
   Clean-up

7. Safety and Housekeeping
   Discuss department safety record, eye protection, safe working habits. Location and use of emergency equipment. How to turn in a fire alarm.
   Discuss housekeeping expected.
   Plant Disaster Plan.

8. Introduction to Training
   Discuss briefly how training will be done, subjects to be covered and probable timing.

9. Training on Existing Equipment
   Actual training with still operator on all existing blow tanks, intermediate storage tank, #1 and #2 blend and F.P. tanks, city water system, drowning jet, #2 still system and porocel treatment.

SECTION IV. TRAINING PLAN (contd.)

1. Column Operator Training (details)

1st Week (contd.)

10. Class-room Training
    Use model, chalkboard, detail function of each piece of equipment, discuss theory of column operation.
    Discuss normal operation.

11. Field Training
    Discuss equipment and water batching

2nd Week

1. Review training of previous week.

2. Discuss water batching plans.
   Use flow sheets, model

3. Instrumentation
   Discuss different types used, location of instruments in field and on panel board.
   Discuss testing to be done and data to be recorded.

4. Water batch equipment, check instruments and dry refractory in furnace.

5. Run existing equipment
   Run #2 still with the still operator, all blow tanks, #1 and #2 blend and F.P. tanks, city water system, and the drowning jet.

6. Drop Bottoms
   When #2 still is ready to drop bottoms, drop them in drums.

7. Material Handling
   Discuss all materials used on the job in respect to toxicity, consistency, special precautions.

SECTION IV. TRAINING PLAN (contd.)

1. Column Operator Training (details)

2nd Week (contd.)

8. Quality
   Review spec sheet and tell how the operation will affect material specification.

9. Sampling
   Discuss sampling. Importance of good sampling and how to sample.

10. Process simulation
    Discuss process start-up.

11. Data sheets
    Review data needed and where to get data.

3rd Week

1. Review training of previous weeks.

2. Make a classroom dry run of charging and running the column and porocel systems. Discuss instrumentation.

3. Make a dry run, in the field, of charging and running the column and porocel systems. Discuss instrumentation at its location.

4. Check out the reboiler system.

5. Charge crude and run column on Aroclor 1016.

6. Take inventory using new sheets.

START-UP PLANS

A. General Time Schedule

Week No.	Date (Week of)	Operations/Comments
1	8/2	Simulate process, checking for process leaks, vacuum leaks, instrumentation, etc.
2	8/9	First distillation run (1/2 size) on Aroclor 1016. Use as Therminol FR-1 (a new spec. will be necessary).
3	8/16	Second distillation run of Aroclor 1016 (EG).
4	8/23	Third distillation run of Aroclor 1016 (EG). Should be able to begin shipments of Aroclor 1016 by 9/1/71.
5	8/30	First distillation run of mono-chlorobiphenyl.
6	9/6	Second distillation run of mono-chlorobiphenyl. Should be able to begin shipments of mono- by 9/15/71.

B. Sequence for Water Batching and Testing

1. Lime slurry tank
2. Continuous blow tank
3. Vacuum jet
4. Column
5. Condenser
6. Still pot
7. Residue tank
8. Tempered water system and flash tank
9. Vent cooler
10. Finished goods storage tanks
11. Light ends receiver
12. Fuel oil storage tank
13. #2 Intermediate storage tank

Start-Up

MONS 092819

START-UP PLANS (contd.)

C. Comments on "water batching"

Crude Aroclor 1142 will be used for water batching the still pot, lime slurry tank and the residue tank.

City water will be used to check out the tempered water system, vent cooler, and flash tank.

Vacuum will be used to check for leaks in the column, condenser and still pot before crude 1142 is used.

Plant air will be used to pressurize all lines to check for leaks before any liquids are used.

The instrumentation and pumps will be tested during water batching.

AREA: VI. OTHER AREAS

Specific Potential Problems	Preventive Action	Contingent Action	Comments	Responsibility
1. Can't keep seal in lt. ends rec.	Low level alarm and loop in suction line to pump. Low risk.			CED
2. Can't keep seal in #3 prod. tank	Add side nozzle			CED
3. Inadequate FIC on #2 & #3 Abs.	Accept risk	FIC may be necessary		CED
4. Inadequate Cl_2 Demister capacity	Check further into demister capacity ratings	Install a third demister in parallel		CED/TSD
5. Inadequate drowning jet capacity	Accept risk	Install a second drowning jet in parallel		CED/TSD
6. Inadequate lt. ends flow control	Accept low risk	Install FIC on transfer line and LI on tank/ readout in control room		MR/CED
7. Inadequate temp. control on #4 finished product tank		Install TIC on #4 F.P. tank	Without TIC, temp. will be determined by condenser cooling	MR/CED
8. Switch failure on head tk. overflow		Blank overflow line to Bi Ø tank; tie-in lower nozzle to #7 overflow		MR
9. #7 stg. tk. pump inadequate	Low risk			CED
10. Inadequate heat on #7 stg. tk.		Install larger coil		CED
11. Alsop filters leak	Low risk		Dept. experience indicates that Alsop better than Cuno	MR
12. Poor TC on F.G. storage tanks		Install TC's.	Current design is same as on existing storage tanks	MR/CED

MONS 026821

AREA: V. CONDENSER, VENT COOLER, JET, TEMPERED H_2O/CITY H_2O (Continued)

Specific Potential Problems	Preventive Action	Contingent Action	Comments	Responsibility
11. Too many PCB's to atmosphere	Designed for <1.0#/day to atmosphere.		Will take air samples	TSD
12. Too many PCB's to sewer	All water except drowning jet water will go through a settling basin		Less than 0.5#/day currently leaves Dept. 246 via sewers.	MR/CED

MDNS 092822

AREA: V. CONDENSER, VENT COOLER, JET, TEMPERED H_2O/CITY H_2O

Specific Potential Problems	Preventive Action	Contingent Action	Comments	Responsibility
1. Condenser plugs with product	Run at 65°C on MCS-1016. Low risk of pluggage.	Corby on tempered H_2O line for steam		MR
2. Condenser tubes fail	Break vacuum with N_2. Put corrosion samples in condenser head.	May want to inspect periodically on a scheduled turnaround.		Maint/Corr. Group
3. H_2O pump failure/ power off	Temperature alarm on tempered watered to condenser	TJR1A on vent gases existing vent cooler will alarm at 55°C and shut down furnace at 100°C.		CED
4. Aluminum head damage	Accept low risk.			CED
5. Vent cooler plugs (on p. 1).	(covered under Area I.)			
6. Vent cooler fails	Treat the same as main condenser - monel is lower risk.			CED
7. City H_2O line freezes	Trace sections that are not in circulating loop.	Drain lines when down.		MR/CED
8. Vacuum line plugs	Trace and insulate lines			CED
9. No spare ejector causes too much D/T	Accept risk.			Maint.
10. Can't read bleed valve position due to location	Will read out in control room.			CED

AREA: IV. FRACTIONATING COLUMN

Specific Potential Problems	Preventive Action	Contingent Action	Comments	Responsibility
1. Can't hold vacuum	Must have good construction			Maint.
2. Sieve trays plug	Accept risk. There is 3' of disengaged space still pot.	Go to baffles, strainers, etc., in vapor line between still pot and columns		CED
3. Can't clean trays		Go to valve trays if problem is extreme		CED
4. Moisture damages 316 SS.	Seldom break vacuum on column/pot system; break with nitrogen.			MR
5. Inadequate control of reflux		Go to ratio control if necessary	Constant heat equals constant boil up rate.	CED
6. ΔP too high (included on p.1).				

MONS 092824

AREA: III. STILL POT, FURNACE, OIL TANK, RESIDUE TANK

Specific Potential Problems	Preventive Action	Contingent Action	Comments	Responsibility
1. Still Pot LIC Failure	Accept risk; displacer is in a well.		LIC's in similar service in 246 are satisfactory.	MR
2. Pump size inadequate - flow too low	Have charged from an internal pump to an external Dean Bros. pump.			CED
3. Can't pump bottoms out under vacuum	Will use Dean Bros. pump. Low risk	Break vacuum - not a good alternative.		CED
4. Furnace coil plugs with power failure.	Gas/oil interlocked with pump. Six inch coil not likely to plug due to residual furnace heat.	Nitrogen can be used to blow coil clear.		MR/CED
5. Coil fails for other reasons	Accept risk. Plans will be in hand on procedure for changing out coil.			Maint.
6. Can't drain furnace coil	Use nitrogen on inlet of coil. vacuum on outlet.			MR
7. Fuel FIC not adequate	Put on total reflux when changing fuels.	If not adequate, go to fuel control by ΔP on column.		MR/CED
8. Oil control system won't work when needed.	Check oil system in advance of need.			MR
9. Oil line plugs up	Two parallel strainers are provided.			MR/CED
10. Won't know when RD has blown on residue tank.	Check periodically; nipples provided for checking with air or N_2.			MR

MONS 092825

AREA: II. #2INTERMEDIATE TANK & LIME SLURRY TANK

Specific Potential Problems	Preventive Action	Contingent Action	Comments	Responsibility
1. Diff. to clean	Accept risk. Eductor improves situation.		Same problem on present Intermediate Tank.	MR
2. Vent line pluggage between Int. Tk?	Low risk			MR
3. Dust when charging lime	Lime slurry tank vent line will be tied into transfer line whioh is under vacuum			CED
4. Agitator failure		Have adequate spare parts.		Maint.
5. Level Indicator failure	Accept risk			MR
6. Outlet line pluggage	Flush line with regular crude 1142			MR

MONS 092826

AREA: I. QUALITY (Continued)

Specific Potential Problems	Preventive Action	Contingent Action	Comments	Responsibilit
10. Too many heavy fractions	None - accept risk	Incinerate excess residue	Could Anniston use in solid Aroclor production?	MR
11. Cross contamination of MCS-1016	Drain and blow lines as best possible; analyze first T/C's for CB 5+.		Piping too expensive to completely separate - unless absolutely necessary	MR
12. Vent cooler pluggage by product	No H_2O on vent cooler during light ends cut on MCS-1016, or on Bi ø cut on monochlorobiphenyl		Additional steam tracing and insulation will be provided on exhaust system	MR/CED
13. Pump lubricants in product	No risk		Dry seal on Aroclor flush seal on all pumps	CED
14. First prod. contaminated with phthalic anhydride	(1) Make thorough physical check of column. (2) Make first batch be monochlorobiphenyl. (3) If first batch is 1016, make it small. (4) Analyze first batch for phthalic anhydride.	Slightly contaminated 1016 batch can be used in a non-electric application		MR
15. Vol. control inadequate for good quality	Analyze 1242 samples for S.G. vs. higher homologs.		Operator must make switch from light ends to product cut.	MR/Researc
16. Change to 1016 is staggered.	Some storage tanks can be used for either MCS-1016 or Aroclor 1242			MR

AREA: I. QUALITY

Specific Potential Problems	Preventive Action	Contingent Action	Comments	Responsibility
1. Isomer separation not adequate	Add 3-1" nozzles on side of column for sampling and pressure	Increase reflux ratio at expense of rate.	The tentative spec. of <0.4% C.B. 5+ is self-imposed and could be changed.	CED
2. High ΔP on column, high temp. in still pot	Check further on 300°C as max. still pot temperature	Reduce head pressure to a minimum (<40 mm).	300°C is not a break-point. Level of decomposition doubles for every increase of 106°.	Research
3. F.G. out of spec on S.G.	Make S.G. of crude a control point.			MR
4. F.G. poorer elect. prop. than 1242.	Low risk.	Low risk.	"Clean room" should be used routinely for 1016.	Lab
5. F.G. out of spec. on other prop's		Provide tee in transfer line so an out of spec. lot can be brought back to distillation system.		CED
6. Lt. ends effect on 1142 quality	Analyze light ends for build-up of any contaminant.	Purge as necessary		MR/Research
7. Poor chlor. control due to lt. ends.	Low risk	Low risk		
8. Poor quality 1254 & 1260	MONS 092828	Keep close record of current analyses and compare results after process change	May have to shorten production run on #2 still and/or boil-down less.	MR
9. Length of runs on #2 still	(Included in above potential problem)			MR

A. Start-Up Budget

MONSANTO COMPANY
Sauget, Illinois

Wm. G. Krummrich

February 1, 1971

cc: G. L. Bratsch
B. W. Corlew
R. M. Stovall/J. Littich
R. M. Kountz
A. J. Koenig

SUBJECT: Manufacturing Start-Up
Expense Budget - CEA 2417
MCS-1016 Distillation

TO: Mr. J. R. Savage (3)
General Offices

Attached for the approval of the Organic Chemicals Division, Functional Fluids Business Group, is the proposed manufacturing start-up budget for the MCS-1016 Distillation project at WGK. Following is a summary of the manufacturing start-up expense budget:

Preparation Phase	$ 31,480
Operations Phase	$ 60,370
Contingency (9%)	$ 8,150
TOTAL	$100,000

In addition to the manufacturing start-up expense, the following expenses are anticipated:*

Divisional Expense

Dismantling	$ 30 M
Repairs	$ 7.5 M
Relocations and Modifications	$ 29 M
Taxes	3.5 M
TOTAL	$ 70. M

CED Expenses	$ 5 M

*as per A. R. Data Transmittal for CEA 2417 (1/15/71)

Total Division expense incurred will be $175M or 21% of the anticipated capital appropriation request ($820M). This percentage is about "normal".

MONS 092829

To: Mr. J. R. Savage
Manufacturing Start-Up
Expense Budget - CEA 2417
MCS-1016 Distillation

The manufacturing start-up expense budget was prepared on the following bases:

1. Chemical start-up will begin on June 1, 1971.
2. The key premises on which the project is based are valid (memo McCutchan to Wolk, 12/10/70).
3. The demonstration period will be completed by July 31, 1971.

The expense charges through May, 1971, will be charged to Start-Up Job 829-916.62, which will close monthly to 811.00 (expense class 644).

The charges for June through August that are considered operational start-up will be charged to 829-916.62 and will appear on the Aroclor cost report as start-up (644).

R. M. McCutchan
Manufacturing Representative

/ejs

APPROVED: J. R. Savage

MUNS 092830

MANUFACTURING START-UP BUDGET

	PREPARATION PHASE	OPERATIONAL PHASE
Raw Materials	-0-	$ 7,800
Utilities	$ 2,870	$ 5,180
Wages	$ 7,320	$ 2,600
Wages O.H.	$ 1,800	$ 650
Salaries	$ 9,000	$10,800
Salaries O.H.	$ 1,700	$ 2,050
Supplies	$ 500	$ 500
Mechanical Expense	$ 2,000	$20,000
Laboratory	$ 4,500	$ 7,000
Clothing and Laundry	$ 350	$ 150
Safety Equipment	$ 500	-0-
Technical Services	$ 440	$ 2,640
Miscellaneous	$ 500	$ 1,000
TOTALS	$31,480	$60,370

MCS-1016 DISTILLATION MFG. START-UP BUDGET	PREPARATION PHASE						OPERATIONAL PHASE			
	JAN.	FEB.	MARCH	APRIL	MAY	PREP. TOTAL	JUNE	JULY	AUG.	OPER. TOTAL
Raw Materials	-	-	-	-	-	-	$ 7800	-	-	$ 7800
Utilities										
Steam	-	-	-	-	$ 1800	$ 1800	$ 2700	$ 900	-	$ 3600
Electricity	-	-	-	-	$ 300	$ 300	$ 300	$ 150	-	$ 450
Gas	-	-	-	-	-	-	$ 60	$ 30	-	$ 90
Plant Air	-	-	-	-	$ 350	$ 350	$ 350	$ 170	-	$ 520
Purchased Water	-	-	-	-	$ 420	$ 420	$ 280	$ 140	-	$ 420
Fuel Oil	-	-	-	-	-	-	$ 100	-	-	$ 100
Other										
Mfg. Wages	-	-	-	$ 900	$ 6420	$ 7320	$ 1700	$ 900	-	$ 2600
Labor O.H.	-	-	-	$ 200	$ 1600	$ 1800	$ 450	$ 200	-	$ 650
Salaries	$ 600	$ 600	$ 600	$ 1800	$ 5400	$ 9000	$ 5400	$ 5400	-	$10800
Salaries O.H.	$ 110	$ 110	$ 110	$ 350	$ 1020	$ 1700	$ 1020	$ 1030	-	$ 2050
Factory Supplies	-	-	-	-	$ 500	$ 500	$ 500	-	-	$ 500
Mechanical Exp.	-	-	-	-	$ 2000	$ 2000	$10000	$ 5000	$ 5000	$20000
Laboratory	-	-	-	$ 1250	$ 3250	$ 4500	$ 7000	-	-	$ 7000
Clothing & Laundry	-	-	-	-	$ 350	$ 350	$ 150	-	-	$ 150
Safety Equipment	-	-	-	-	$ 500	$ 500	-	-	-	-
TSD	-	$ 220	$ 220	-	-	$ 440	$ 2200	$ 440	-	$ 2640
Miscellaneous	-	-	-	-	$ 500	$ 500	$ 500	$ 500	-	$ 1000
TOTALS	$ 710	$ 930	$ 930	$ 4500	$24410	$31480	$40510	$14860	$ 5000	$60370
TO DATE SUB-TOTALS	$ 710	$ 1640	$ 2570	$ 7070	$31480		$40510	$55370	$60370	
TOTAL BUDGET TO DATE	$ 710	$ 1640	$ 2570	$ 7070	$31480		$71990	$86850	$91850	

MONS 092832

MCS-1016 DISTILLATION (CEA 2417)

START-UP EXPENSE CALCULATIONS & COMMENTS

DETAIL	Prep.	Oper.
1. Raw Materials		$ 7800
10,000 gallons of Aroclor 1242 will allow a double start-up/rinsing of the fractionating column and break-in of related equipment (June): 1000 gal. x 10.8 #/gal. x 7.2¢/lb.		
2. Utilities		
Utility usages are estimated as percentages of 1970 average monthly usages.		
a. Steam		
May - 20% x 8000 M BTU's x $1.135	$ 1800	
June - 30%		$ 2700
July - 10%		$ 900
b. Electricity		
May - 20% x 1400 CKWH x $1.098	$ 300	
June - 20%		$ 300
July - 10%		$ 150
c. Gas		
May - -0-	-0-	
June - 20% x 450 M BTU's x $0.656		$ 60
July - 10%		$ 30
d. Plant Air		
May - 20% x 20,000 MCF x $0.086	$ 350	
June - 20%		$ 350
July - 10%		$ 170
e. Purchased Water		
May - 30% x 8000 M gal. x $0.175	$ 420	
June - 20%		$ 280
July - 10%		$ 140
f. Fuel Oil		
Run on oil long enough to check control (June).		$100

MCS-1016 DISTILLATION (CEA 2417)

START-UP EXPENSE CALCULATIONS & COMMENTS (con'td.)

DETAIL	Prep.	Oper.
3. Manufacturing Wages		
a. Training (May):		
NEW JOB:		
4 Still Operators x 120 hrs. x $4/hr.	$ 1920	
CURRENT JOBS: (on overtime)		
5 Still Operators x 80 hrs. x $4/hr. x 1.5	$ 2400	
5 Premium Operators x 16 hrs. x $4/hr. x 1.5	$ 480	
5 Second Operators x 24 hrs. x $4/hr. x 1.5	$ 720	
b. Training (June):		
5% overtime over built-in amount		$ 800
c. Hourly Foreman:		
April thru July @ $900/mo. Will cover for Production Foreman	$ 1800	$ 1800
4. Labor Overhead		
23.3% x $7320	$ 1800	
23.3% x $2600		$ 650
5. Salaries		
a. Manufacturing Representative $600/mo. (January thru July)	$ 3000	$ 1200
b. Production supervisor $300/mo. (May thru July)	$ 300	$ 600
c. Start-up Foreman $1200/mo. (April thru July)	$ 2400	$ 2400
d. Shift Supervision (3) $1100/mo. (May thru July)	$ 3300	$ 6600

MCS-1016 DISTILLATION (CEA 2417)

START-UP EXPENSE CALCULATIONS & COMMENTS (cont'd.)

DETAIL	Prep.	Other
6. Salaries Overhead		
19% x $9000 19% x $10,800	$ 1700	$ 2050
7. Factory Supplies		
Housekeeping supplies, identification tags and signs, miscellaneous (May-June).	$ 500	$ 500
8. Mechanical Expense		
a. Allowance for miscellaneous repair, modification or relocation expenses required after plant acceptance. (June-August)		$20000
b. Temporary connections and modification for process simulation (May).	$ 2000	
9. Laboratory Analysis & Methods		
a. Analyses at So. 2nd Street (May-June).	$ 2000	$ 3000
b. WGK analyses during startup (June) 100% of Standard.		$ 4000
c. AR&D of isomer analysis (April-May).	$ 2500	
10. Clothing and Laundry		
5% of operating wages (May) 5% of operating wages (June)	$ 350	$ 150
11. Safety Equipment (May)	$ 500	
12. Technical Service		
a. Process (June) 20 days x $88/day		$ 1760
b. Materials (Feb.-March) 5 days	$ 440	
c. Pollution control (June) 5 days		$ 440
d. IFO assistance (July) 5 days		$ 440
13. Miscellaneous (May-July)		
Office supplies, meetings, communications	$ 500	$ 1000
TOTALS	$31,480	$60,370
GRAND TOTAL		$91,850

MONS 092835

TENTATIVE 1972

COST STANDARDS

MONS 092836

Tentative 1972 cost standards