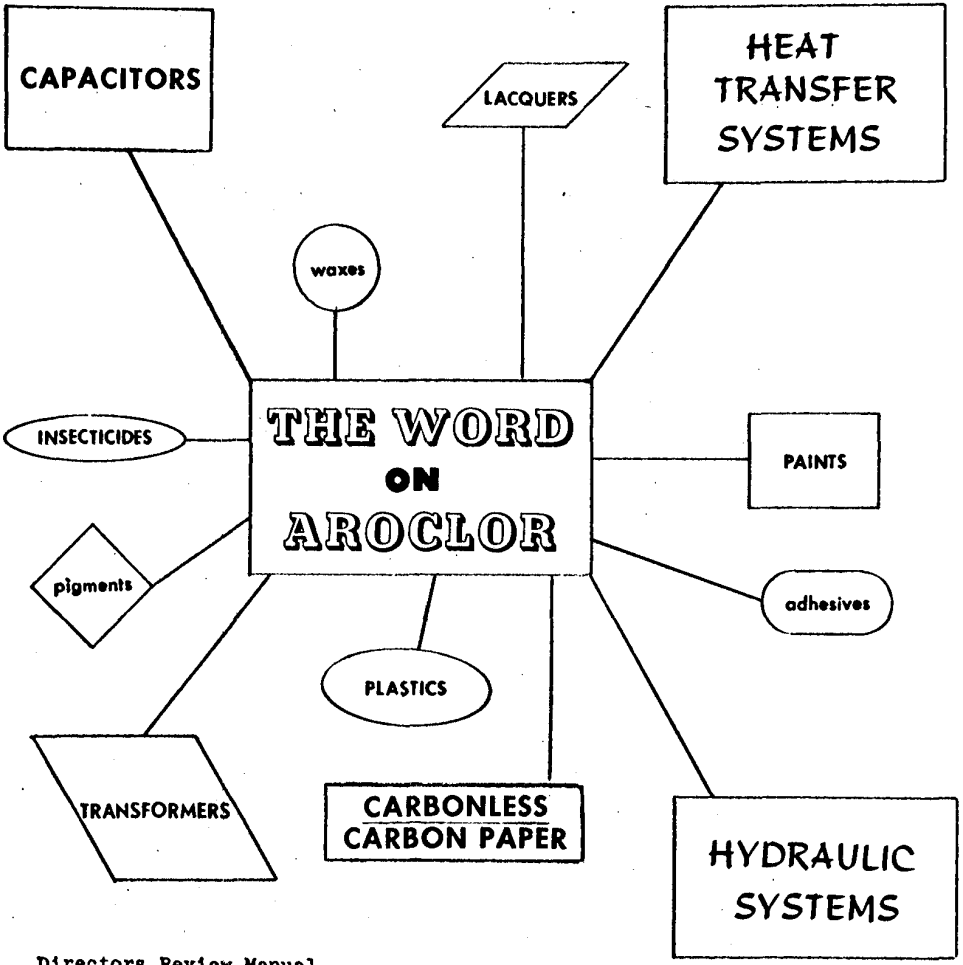
Aroclor Expan



Directors Review Manual

CEA-1800 - Aroclor Expansion - W.G.K.

0230079

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Meeting Agenda

AGENDA

For

Directors Review Meeting

On

Aroclor Expansion-WGK (CEA 1800)

I. Introduction ----------W. A. Kuhn and/or J. W. Molloy

II. Objectives (Dated 8/27/68 and Previously Issued) -- Specific Questions

III. Chemistry of Process ---------- C. W. Hamlet - PR&D

IV. Summary of Plant Process and Equipment -- R. S. Yates - CED

V. Current Status of Project

- A. Construction ---------- R. S. Yates - CED
- B. Manning ---------- H. F. Ray - Mfg.
- C. Training Program ---------- H. F. Ray - Mfg.
- D. Overall Timing ---------- H. F. Ray - Mfg.

VI. Start-Up Plan ---------- H. F. Ray - Mfg.

VII. Project Risks

- A. In Process ---------- C. W. Hamlet - PR&D
- B. In Design ----------R. S. Yates - CED
- C. In Operation ----------H. F. Ray - Mfg.

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Aroclor Expansion - WGK (CEA-1800)

Start-Up Objectives

Start-Up Objectives

A. Overall

Primary: 1. Demonstrate safe operation of the expanded Aroclor process within the control limits prescribed by PR&D in Tentative Process No. P1504.

Secondary: 1. Produce Aroclors which meet the specifications outlined in the Tentative Process.

2. Demonstrate the ability of the facilities to produce at designed capacity, specifically:

Aroclor 1242	40 M#/Yr.
All Other Aroclors	30 M#/Yr.
Total -	70 M#/Yr.

3. Demonstrate the ability of the facilities to realize cost standard biphenyl yield or better on total Aroclor production, specifically:

Raw Material	% Theory Yield
Biphenyl	97%

4. Demonstrate the ability of the facilities to meet standard manufacturing cost.

5. Achieve the above objectives within a 45-day start-up and demonstration period and within budgeted start-up expense.

B. Technological Objectives

1. Demonstrate the optimum continuous porocel absorption column operating conditions in terms of capacity, quality, porocel usage and product loss.

2. Demonstrate the ability of the ferric chloride catalyst addition system to insure proper catalyst level in the continuous chlorinator line.

3. Demonstrate the ability of the "dynatrol" to control the Aroclor 1142 specific gravity within specification limits.

4. Demonstrate the ability to continuously monitor the power factor of the finished product with the in-line analyzer developed at Anniston.

Should review with Lew Fowler to correct operating difficulties

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B. Technological Objectives (continued)

5. Demonstrate the effect of maintaining finished product electrical properties (Power Factor and Resistivity) during extended storage periods through use of nitrogen blanketing.

6. Evaluate the effect of aging Aroclor 1142 on Aroclor 1242 stability.

7. Demonstrate operating conditions which will allow duplication of Anniston production.

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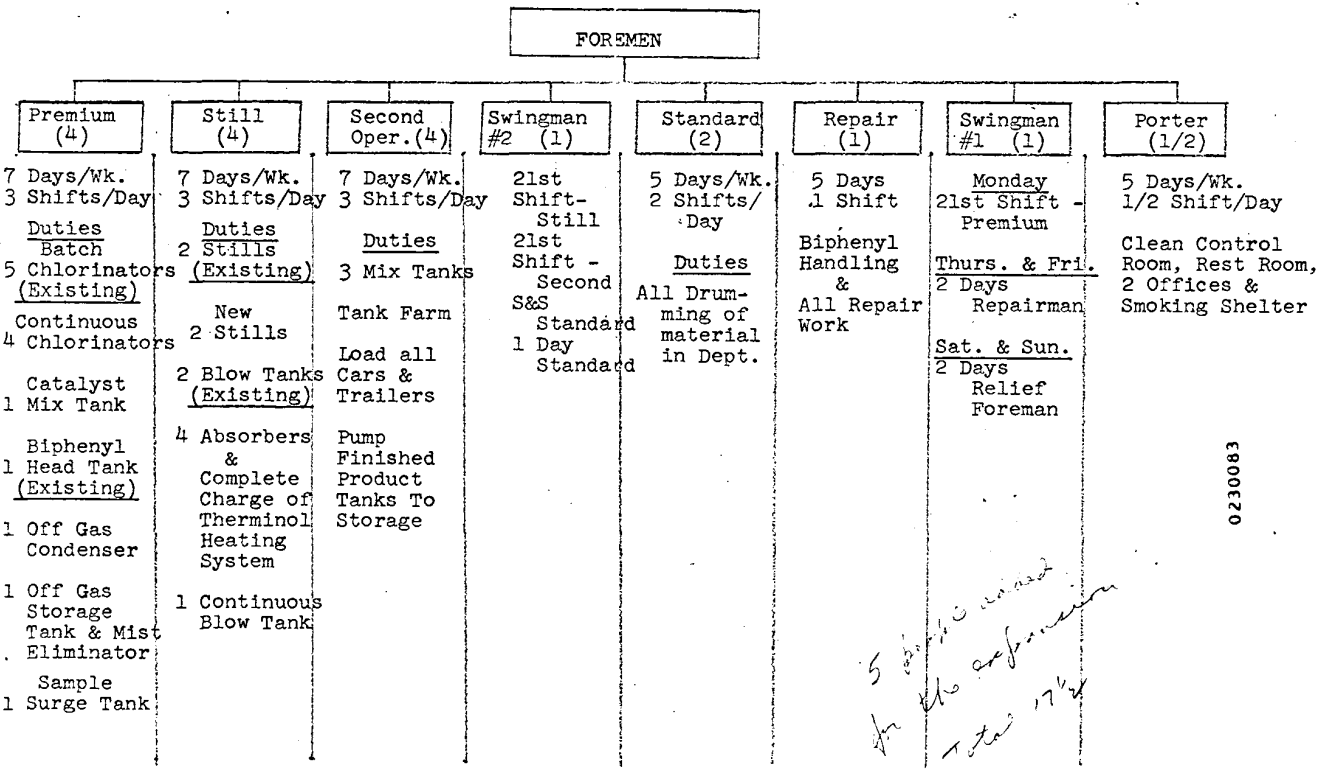
Manning Charts

FOREMEN



Premium (4)	Still (4)	Second Oper. (4)	Swingman #2 (1)	Standard (2)	Repair (1)	Swingman #1 (1)	Porter (1/2)
7 Days/Wk. 3 Shifts/Day Duties Batch 5 Chlorinators (Existing) Continuous 4 Chlorinators Catalyst 1 Mix Tank Biphenyl 1 Head Tank (Existing) 1 Off Gas Condenser 1 Off Gas Storage Tank & Mist Eliminator Sample 1 Surge Tank	7 Days/Wk. 3 Shifts/Day Duties 2 Stills (Existing) New 2 Stills 2 Blow Tanks (Existing) 4 Absorbers & Complete Charge of Therminol Heating System 1 Continuous Blow Tank	7 Days/Wk. 3 Shifts/Day Duties 3 Mix Tanks Tank Farm Load all Cars & Trailers Pump Finished Product Tanks To Storage	21st Shift-Still 21st Shift - Second S&S Standard 1 Day Standard	5 Days/Wk. 2 Shifts/Day Duties All Drumming of material in Dept.	5 Days 1 Shift Biphenyl Handling & All Repair Work	Monday 21st Shift - Premium Thurs. & Fri. 2 Days Repairman Sat. & Sun. 2 Days Relief Foreman	5 Days/Wk. 1/2 Shift/Day Clean Control Room, Rest Room, 2 Offices & Smoking Shelter

5 people added for the expansion
Total 17½

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START-UP ORGANIZATION (Tentatively Effective 10/15/68)

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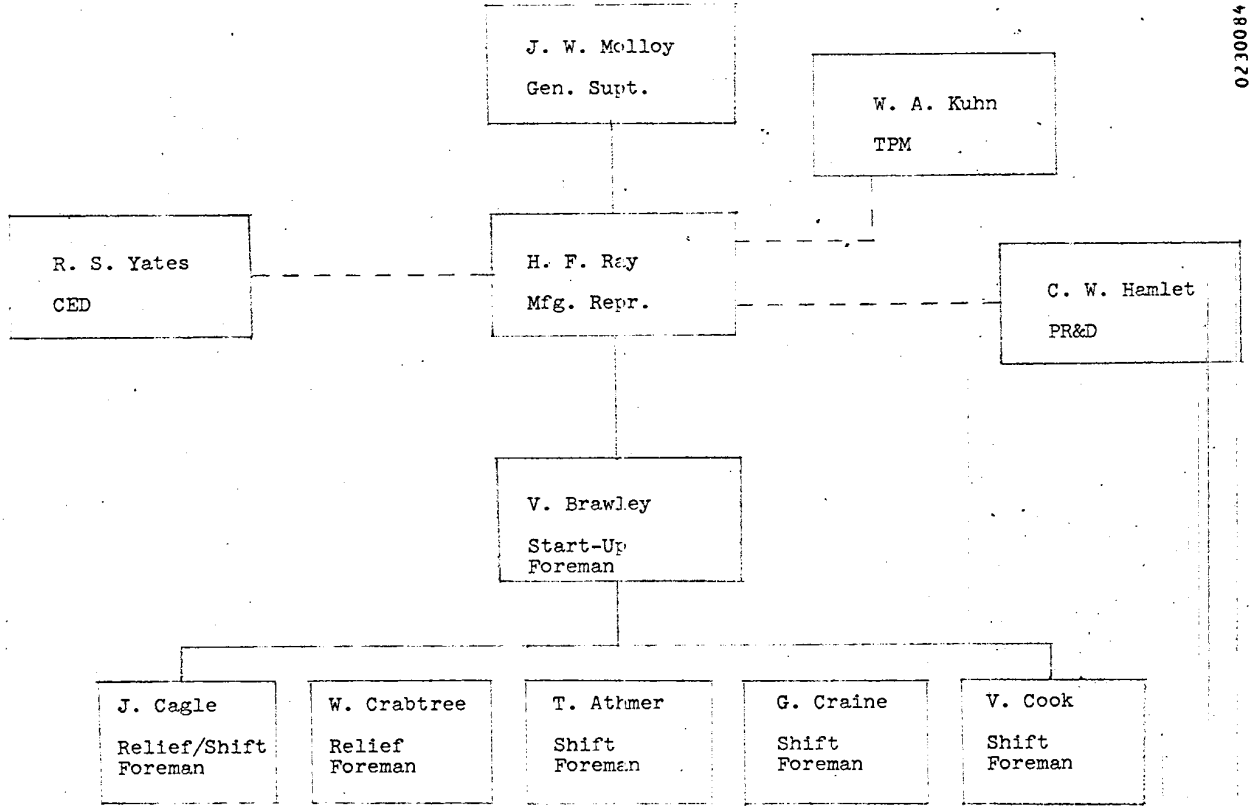

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AROCLOR EXPANSION (CEA 1800)

TRAINING PROGRAM

I. Course Content

A. Supervisory

1. Introduction to Key Personnel
2. General Indoctrination
3. Dept. Tour
4. Dept. Organization
5. Security of Information
6. Process Technology
7. Review and Discussion
8. Introduction to Training
9. Assignments, Responsibilities and Authority
10. Process Equipment and Control Limits
11. Process Instrumentation
12. Assignments for Operator Training
13. Operating Instruction of Existing Equipment
14. Safety
15. Materials Handling
16. Utilities
17. Quality
18. Yields
19. Economics
20. Process Description
21. Risk Analysis
22. Communications
23. Equipment Repairs
24. Records
25. Follow Process in Field
26. Preparation for Water Batching

Training Plans

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COURSE CONTENT

A. Shift Supervisors

Week Beginning	Subject
Sept. 9, 1968	Introduction to Key Personnel General Indoctrination Dept. Tour Department Organization Security of Information Process Technology
Sept. 16, 1968	Review and Discussion of First Week Subjects Introduction to Training Assignments, Responsibilities, and Authority Process Equipment and Control Limits Process Instrumentation Process Technology Operating Instructions of Existing Equipment Assignments for Operator Training
Sept. 23, 1968	Review and Discussion of Previous Subjects. Safety Process Instrumentation Materials Handling Utilities Quality Yields, Economics Process Technology Process Description Risk Analysis
Sept. 30, 1968	Review and Discussion of Previous Subjects Communication Follow Process Flow in Field Materials Handling Records Equipment Repairs Check-out on Preparation for Operator Training Risk Analysis Review Preparation for Water Batching Materials Handling

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MASTER TRAINING SCHEDULE

Shift Supervision

Week Beginning	Subject
Sept. 9, 1968	1. Introduction to Key Personnel H. Ray - Manufacturing Representative and Dept. Supv. R. Yates - Project Manager (C.E.D.) J. Molloy - Production Superintendent V. Brawley -Dept. Foreman R. Cederstrom - CED Construction Supt. 2. General Indoctrination Introduction to Aroclor How it is made Uses 3. Dept. Tour Existing Equipment New Equipment 4. Dept. Organization Salaried: Supervisor, Foreman Hourly: Relief Foreman, Premium Oper., Still Oper., Second Oper., Standard Oper., Repairman, Porter 5. Security of Information Reason for Security 6. Process Technology a. Batch b. Continuous
Sept. 16, 1968	1. Review and Discussion of First Week 2. Introduction to Training Subjects to be Covered Trainers 3. Assignments, Responsibilities and Authority Assignments - shift coverage of entire dept. making flow sheets, completing IFO's, devise data sheets, etc. Responsibilities - Supervise safe running of equipment by hourly personnel, produce scheduled pounds of quality material as outlined in the Start-up Objectives.

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MASTER TRAINING SCHEDULE (cont'd)

Shift Supervision (cont'd)

Week Beginning	Subject
Sept. 16, 1968	3. cont'd. 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.
	4. Process equipment and control limits. Explanations of the function of each piece of equipment and safe limits of each. Make flow sheets for operator training.
	5. Process Instrumentation V.B. - Explain instrumentation on existing equip L.V. - Explain instrumentation on new equip. Complete IFO's on new equip.
	6. Process Technology
	7. Operating Instructions of existing equipment. Read & discuss Operating Instructions.
	8. Assignments for Operator Training Brawley - Biphenyl and catalyst mix tank. Sp. Gr. controller. Craine - All chlorinators and Intermediate Storage Tank. Athmer - 3 Blow tanks, 4 stills, therminol system. Cook - All still receivers, surge tanks, blend tanks, absorbers, finish product tanks and power factor analyzer.
Sept. 23, 1968	1. Review and discussion of previous subjects.
	2. Safety General Dept. safety, clean-up and housekeeping. Plant disaster plan for plant and dept. location and use of safety showers, fire extinguishers, gas masks, Scott air pak, emergency clothing, stretcher, fire alarm and eye protection.

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MASTER TRAINING SCHEDULE (cont'd)

Shift Supervision (cont'd)

Week Beginning	Subject
Sept. 23, 1968	2. cont'd. List safety devices for new equipment. List all grounding points in existing and new equipment. Hold Safety Review for project. 3. Process Instrumentation Complete writing IFO's. 4. Materials Handling Cover all chemicals used in dept., toxicity consistency, special precautions. Use "Standard Manufacturing Process" for existing dept. Sample raw materials for identification. 5. Utilities

Utility	Line Location and Shut-Off
Plant Air	Ground Floor at Catch Pot.
Inst. Air	Ground floor north of air dryers.
80# Steam	High-line - Dept. 254
200# Steam	" " " "
City Water	Next to roadway, south of water tank.
Natural Gas	Ground floor, north of sprinkler house.

6. Quality
   Review Spec Sheets
   List most critical properties
   List frequent problems and solutions
   Discuss sampling.

   List sample needs on start-up.

7. Yields, Economics
   Review 1969 Cost Standard (Start-up)
   Process yield loss points
   Blends
8. Process technology
   Read and discuss tentative process for continuous unit.

9. Process Description
   Read and discuss process description of new equipment.

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MASTER TRAINING SCHEDULE (cont'd)

Shift Supervision (cont'd)

Week Beginning		Subject
Sept. 23, 1968	10.	Risk Analysis Read and discuss risk analysis for start-up of new equipment.
Sept. 30, 1968	1.	Review and discussion of previous subjects
	2.	Communications Verbal Written
	3.	Follow process flow in field. Trace all process lines in existing and new equipment. Check out all instruments
	4.	Material Handling Explain trailer, car and drum loading. How to inspect each.
	5.	Records Make new data sheets for gathering information on start-up. Also determine where samples are to be taken, how many, what size and frequency.
	6.	Equipment Repairs Discuss equipment repairs that must be made soon as possible and what equipment can wait until next day. Also discuss how to contact necessary crafts on nights and weekends.
	7.	Check-out on preparation for operating training. Make certain each man is prepared to train, knows when to train and knows who he must train.
	8.	Risk analysis review Review risk analysis so possibly problems and possible solutions are discussed and known.
	9.	Preparation for water-batching Make final check on equipment. Discuss what material will be used for water-batching, how it will be transferred and what will be done with material after water batching. Check inventory of material carefully.

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B. Premium Operator

Week Beginning	Subject
Sept. 30, 1968	Water-batch Biphenyl/catalyst mix tank Check-out instrumentation on BiØ/catalyst mix tank. Water-batch #6 through #9 chlorinators. Check-out instrumentation on all chlorinators. Check-out instrumentation on intermediate storage tank. Check-out panel alarms and instruments. Trouble Shooting Equipment Failure Sampling Data Sheets

1. Water-batch Biphenyl/catalyst mix tank.
   Fill mix tank with 1242 Aroclor. Circulate to check-out line and pump.

2. Check-out instrumentation in Biphenyl/catalyst mix tank.
   Check-out all instrumentation in field and on panel board, including timer.

3. Water-batch #6 chlorinator
   Fill #6 chlorinator with 1242 Aroclor. Circulate to check out line and pump.

4. Check-out instrumentation on #6 chlorinator.
   Check-out all instruments in field and on panel board.

Oct. 1, 1968

1. Water-batch #7, 8 and 9 chlorinators.
   Check-out all instruments in field and on panel board, giving special attention to the specific gravity controller.

Oct. 2, 1968

1. Check-out instrumentation on intermediate storage tank.
   Check-out all instruments in field and on panel board.

2. Check-out panel alarms and instrument control points.
   Discuss each alarm on panel board stating problems and corrections. Discuss settings and control points on instruments.

TOWOLDMON0045538

B. Premium Operator

Week Beginning	Subject
Oct. 3, 1968	1. Equipment failure Discuss equipment failure and power failure.
	2. Sampling Discuss sampling frequency, size bottles, reason for and necessary analysis.
	3. Data Sheets Discuss record data sheets, what data is needed, how to record and what it should mean to operations.
	4. Check-out HCl line to condenser and drowning jet. Check-out valve line-up from each chlorinator to the HCl condenser and to the new drowning jet.
	5. Check-out chlorine lines Check-out lines and instrumentation for chlorine addition to each chlorinator.
Oct. 4, 1968	1. Review and discuss all equipment and training.

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Aroclor Expansion (CEA-1800)

Training Program

C. Still Operator

Content

1. General Indoctrination
2. Dept. Organization
3. Introduction to Personnel
4. Dept. Tour
5. Security of Information
6. Safety and Housekeeping
7. Introduction to Training
8. Classroom Training
9. Field Training
10. Materials Handling
11. Quality
12. Sampling
13. Instrumentation
14. Trouble Shooting
15. Recording Data
16. Plant Disaster Plan
17. Discussion

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C. Still Operator

1st Week

General Indoctrination
Dept. Organization
Introduction to Personnel
Dept. Tour
Security of Information
Safety and Housekeeping
Introduction to Training
Train on Existing Equipment

2nd Week

Monday

Review Training of Previous Week
Materials Handling
Quality
Sampling
Classroom Training on function of equipment

Tuesday

Field training for location of equipment, lines and process flow.

Wednesday

Field training for location of instruments
Classroom training for function of instruments

Thursday

Field training on complete operation of continuous blow tank.
" " " " still operations
" " " " therminol system

Friday

Field training on receivers 3 and 4, surge tanks 3&4, All 4 porocel absorbers both Power Factor Analyzers and finish product tanks 3 and 4.

3rd Week

Monday

Review and discussion of previous training.
Safety, plant disaster plans.
Field train on rework and transfer lines.
Field train on therminol system.

Tuesday

Field training on complete process flow on all 4 still systems.

Wednesday

Review instrumentation and panel board.
Trouble shooting and discussion on equipment failure.

Thursday

Review record sheets, how to fill out, where to get readings and samples.
Run #1 and #2 stills.

Friday

Open discussion of all equipment and training.
Final check-out in field of any problem or questionable areas.

TOWOLDMON0045541

C. Still Operator

1st Week

1. General Indoctrination
   Introduction to Aroclor, areas of responsibilities, plant and dept. procedures.

2. Department organization

Salaried	Hourly
H. Ray - Dept. Supv.	Premium Operator
J. Molloy - Prod. Supt.	Still Operator
V. Brawley - Foreman	Second Operator
J. Cagle - "	Standard Operator
T. Athmer - "	Repairman
G. Craine - "	Porter
V. Cook - "	
G. Schwartztrauber- Cost Analyst	

3. Introduction to personnel

4. Dept. tour
   Existing Equipment
   New Equipment

5. Security of information
   Reason for security

6. Safety and Housekeeping
   Discuss dept. safety record, eye protection, safe working habits. Location and use of emergency equipment & how to turn in fire alarm.
   Discuss housekeeping expected.

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

8. Train on existing equipment
   Actual training with Premium Operator on existing blow tanks, preheater, stills 1 and 2, jets, receivers, blend and finish product tanks, city water tank and pumps.

2nd Week
Monday

1. Review training of previous week.
   Discussion of Stills 1 and 2

2. Materials Handling
   Discuss all chemicals used on immediate job in respect to toxicity, consistency, special precautions.

3. Quality
   Review spec sheets and discuss how the operation will affect the material specifications.

TOWOLDMON0045542

C. Still Operator

2nd Week
Monday (cont'd)

4. Sampling
   Discuss sampling. Importance of good samples and how to sample.

5. Classroom training on function of equipment.
   Chalk talk on function of new equipment and safe limits of each.

Tuesday

1. Field training for location of equipment, lines and process flow.
   Identify new equipment, trace out all connecting lines and follow process flow.

Wednesday

1. Field training for location of instruments
   Locate instrumentation in the field and identify its function.

2. Classroom training for function of instruments.
   Chalk talk on function and operation of instruments.

Thursday

1. Field training on complete operation of continuous blow tank. Dry-run complete operation of the continuous blow tank.

2. Field training on complete operation of #3 & #4 still operations.
   Dry-run complete operation of Stills 3 & 4.

3. Field training on complete Therminol system.
   Dry-run complete operation of therminol system.

Friday

1. Field train on receivers 3 & 4, surge tanks 3 & 4, all 4 porocel absorbers, both power factor analyzers and finish product tanks 3 & 4.

   Dry-run complete operation of the above equipment.

3rd Week
Monday

1. Review and discussion of previous training.
   Review and discussion of all equipment.

2. Safety and Plant Disaster Plan.
   Discussion of all safety devices including therminol unit.
   Review of the Plant Disaster Plan.

3. Field train on rework and transfer lines.
   Trace all connecting process lines so necessary transfers can be made. Also locate all valves in lines.

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C. Still Operator

3rd Week

Monday (cont'd)

4. Field train on Therminol system.
   Final check-out on Therminol system.

Tuesday

1. Field train on complete process flow on all 4 still systems.
   Dry-run complete operations of all 4 still systems.

Wednesday

1. Review instrumentation and panel board.
   Discussion of panel alarms and how to correct problems. Also demonstrate how to change charts.

2. Trouble shooting and discussion on equipment failure.
   Discuss how to correct problems indicated on instruments on panel board and in field.
   Discuss in detail, equipment failure and power failure.

Thursday

1. Review record data sheets, how to fill out, where to take readings and samples.
   Discuss record data sheets so each operator will know what data is needed and how data should be recorded. Also where readings are to be taken from and what they should mean to operations.

2. Run Stills #1 and #2.
   Run existing Stills 1 and 2 at direction of Premium Operator.

Friday

1. Open discussion of all equipment and training.
   Question, answer and discussion of any or all subjects.
2. Final check-out in field of any problem or questionable areas.
   Make final check-out in field, of previous known problem areas of equipment.

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TOWOLDMON0045544

C. Still Operator

3rd Week (Alternate Plan)

Monday	Review and discussion of previous training Water batch & simulate continuous blow tank operation. Water batch & simulate #3 Still operation, #3 Receiver, Surge tank, then Finish Product Tank.
Tuesday	Water batch & simulate #4 still operation, #4 Receiver, Surge tank, then Finish Product tank. Trouble shoot during simulation.
Wednesday	Water batch & simulate Therminol system operation Pack all Porocel absorbers.
Thursday	Review record sheets, how to fill out, where to get readings & samples. Review instrumentation on panel board Field train on rework and transfer lines. Discuss equipment and power failure. Discuss polishing filters on absorber lines.
Friday	Open discussion of all equipment and training. Final check-out in field of any problem or questionable areas.

C. Still Operator

3rd Week (Alternate Plan)

Monday

1. Review and discuss previous training.
2. Water batch and simulate continuous blow tank operation.
   Fill continuous blow tank with 1242 Aroclor and simulate actual operation, pumping material to #3 still pot.
3. Simulate actual operation of #3 still line.
   Circulate material in #3 still pot, check-out all possible instrumentation, then move material to #3 receiver, surge tank, and finish product tank.

Tuesday

1. Simulate actual operation of #4 still line.
   Circulate material in #4 still pot, check out all possible instrumentation, then move material to #4 receiver, surge tank, and finish product tank.
2. Trouble shoot during simulation.
   Trouble shoot in each possible area to learn possible problems and corrective action needed.

TOWOLDMON0045545

C. Still Operator

3rd Week (Alternate Plan) - cont'd

Wednesday

1. Water-batch and simulate Therminol system operation.
   Fill Therminol surge tank with 1242 Aroclor and simulate actual operation, checking out instrumentation and trouble shoot to learn possible problems and corrective action needed.

2. Pack Porocel absorbers.
   Fill absorbers with Porocel.

Thursday

1. Review record sheets, how to fill out, where to get readings and samples.
   Review record sheets, discussing what information is needed and what value the readings should be to the operator and why it is necessary to record it. Also discuss sampling, where to get samples and what is to be done with them.

2. Review instrumentation on panel board.
   Final check-out on panel board.

3. Field train on rework and transfer lines.

4. Discuss equipment failure and power failure.
   Discuss what is expected to happen if any equipment should fail and necessary action to be taken.

   Discuss what will happen to equipment if the power fails and what are the most critical operation to be performed after failure.

5. Discuss polishing filters on absorber lines.
   Discuss polishing filters, purpose, and actual change of cartridges and gasket.

Friday

1. Open discussion of all equipment and training.

2. Final check-out in field of any problem or questionable areas.

TOWOLDMON0045546

CEA-1800 - AROCLOR EXPANSION - WGK

Start-Up Plans

PROJECT SCHEDULE

In order to demonstrate the expanded Aroclor facilities at WGK while adhering to the requirements outlined in the start-up objectives, Phase II will be completed on the following construction schedule.

Phase II Area	Construction Completion Date
A. Off-gas Purification System	9/4
B. Chlorinator Area (catalyst mix tank thru continuous blow tank)	9/30
C. Therminol System	10/14
D. #3 Still System and #1 Absorber (1242 Line)	10/21
E. #4 Still System and #2 and 3 Absorbers (1248/1254 line)	11/4
F. #4 Absorber (1260 line)	11/11
G. Anniston Duplication	11/18 thru 12/1 (Demonstration)

PROJECT DEMONSTRATION

A. Off-Gas Purification System - This system was activated on 9/4 due to earlier failure of the existing department purification system. The equipment was thoroughly checked out prior to start-up and as a result no operating difficulties were incurred. The only aspect of the system not yet demonstrated is utilization of the material recovered from the off-gas in production of non-electric Aroclor. This will be completed as soon as sufficient material has accumulated.

B. Chlorinator Area - Process simulation will be accomplished using Aroclor 1242. Chlorination control in the continuous line will be checked out by chlorinating the 1242 to 1148. Catalyst addition effectiveness will be measured by allowing an Aroclor 1242/catalyst mix to cascade thru the system.

When the above operations have been checked-out (1 week maximum) the continuous chlorinator line will be brought on-stream to produce Aroclor 1142. This material will be collected in the intermediate storage tank brine which it will either be transferred to the existing #1 and #2 blow tanks for future processing to Aroclor 1242, or else transferred to the batch chlorinator head tank for further chlorination.

C. Therminol System - This system will be charged with Aroclor 1248 from the department storage tanks. The entire therminol control system can be demonstrated prior to start-up of the stills.

TOWOLDMON0045547

PROJECT DEMONSTRATION (continued)

D. #3 Still System and #1 Absorber (1242 line) - This line will be simulated using Aroclor 1242. Complete checkout of the system excepting effectiveness of tie-up of residual HCl and ferric chloride with lime will be possible prior to actual start-up on Crude 1142. Demonstration of this system will allow production of Aroclor 1242 and one other Aroclor simultaneously. Only the 1242 will be upgraded in the Porocel columns at this point; however.

E. #4 Still Area and #2 and 3 Absorbers (1248/1254 line) - This line will be checked out similar to the procedure outlined in Section D. Start-up of this system will allow demonstration of the 40 M #/yr. Aroclor 1242 design rate as well as the effect of porocel treatment on Aroclors 1248 and 1254.

F. #4 Absorber (1260 line) - This line will be checked out with Aroclor 1242 prior to start-up. Start-up of this system will allow demonstration of the effect of porocel treatment on Aroclor 1260.

G. Anniston Duplication - Start-up of Item F completes demonstration of the design premises outlined in the CEA-1800 scope report. The final item to be demonstrated in the start-up objectives is duplication of Anniston production. Process conditions will be modified at this time to conform with those at Anniston in attempt to duplicate this production and allow shipment to any customer from both plants.

Prepared by: H. F. Ray

ghw

cc: Messrs. R. S. Yates
C. W. Hamlet
R. Kuster
J. W. Molloy
V. Brawley
J. Cagle
T. Athmer
V. Cook
G. Craine
R. Cederstrom

0230101

TOWOLDMON0045548

W. G. Krummrich Plant
Sauget, Illinois

August 22, 1968

Aroclor Expansion - WGK (CEA 1800)
Risk Analysis

To:

D. C. Armstrong - WGK	H. S. Bergen - G.O.
V. Brawley - WGK	D. B. Hosmer - G.O.
M. S. Feld - WGK	R. E. Howard - G.O.
T. E. Greenman - WGK	R. M. Kountz - G.O.
C. W. Hamlet - WGK	W. A. Kuhn - G.O.
J. R. McClain - WGK	R. J. Stratmeyer - G.O.
R. M. McCutchan - WGK	
J. W. Molloy - WGK	M. E. Gibbs - 2nd St.
P. Verna - WGK	R. H. Munch - 2nd St.

Attached are the Aroclor Expansion - WGK (CEA 1800) Risk Analysis Data Sheets indicating the major and minor risk considerations in this start up. Considerable preventive action has been taken to minimize the risk involved in the major problem areas.

If there are questions concerning this analysis or any of the risks indicated, do not hesitate to contact the appropriate representative of CED, Research (PR&D) or Manufacturing.

Risk Analysis

H. F. Ray
Mfg. Rep.

R. S. Yates
Proj. Mgr.

ap

Attachments:

0230102

TOWOLDMON0045549

Specific Potential Problems

	Threat.		
	Probability	Seriousness	Total
1. Raw Materials Received			
a. Biphenyl			
1) Variation in quality	60	3	180
a) Moisture contaminated	30	1	30
b) Impurity level	50	9	450
2) Availability	10	10	100
b. Chlorine Snift Gas			
1) Variation in quality	100	9	900
a) Impurity level (Bromine)	100	9	900
b) Sulfuric Acid content	5	9	45
2) Availability	10	10	100
c. $FeCl_3$			
1) Particle size too large or too small	5	5	25
2) Moisture contamination	5	10	50
3) Availability	10	10	100
d. Lime			
1) Availability	5	10	50
2) Moisture contamination	5	2	10
e. Porocel			
1) Availability	5	10	50
2) Moisture contamination	5	9	45
3) Particle size too large or too small	10	5	50
2. Raw Materials In Storage			
a. Biphenyl			
1) Moisture contamination	10	10	100
2) Storage tank freeze-up	10	3	30

TOWOLDMON0045550

	Threat Probability	Seriousness	Total
3. Chlorinator Area			
a. $FeCl_3$ Mix Tank			
1) Inadequate catalyst supply to #6 chlorinator	5	10	50
b. Chlorinators			
1) Unstable product	20	10	200
2) Crude 1142 out-of-spec on Sp. Gr.	20	10	200
3) Inadequate biphenyl feed to #6 chlorinator	10	10	100
4) Inadequate temperature control	10	3	30
c. Intermediate Storage Tank			
1) Cannot feed stills or head tank	10	3	30
2) Cannot maintain proper aging temperature	10	6	60
3) HCl emissions	20	8	160
d. Blow Tank			
1) Cannot feed stills at required rate	10	8	80
2) Cannot control level in tank	10	8	80
3) HCl emissions	20	8	160
4) HCl is not removed to desired level	10	2	20
e. Off-gas system			
1) Cannot control off-gas temperature	10	5	50
2) Drowning jet will not handle full HCl load	10	8	80
3) High back pressure	10	9	90
4) Water in HCl off-gas	10	10	100

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	Threat Probability	Seriousness	Total
4. Stills			
1) Erosion and/or pluggage of reboiler tubes	30	10	300
2) Cannot maintain vacuum	10	10	100
3) Cannot meet forward flow color spec.	10	10	100
4) Cannot control temperature	10	8	80
5. Absorbers			
1) Cannot meet electrical property specs	20	10	200
2) Cannot feed desired rate thru absorber	10	10	100
3) Cannot meet free chloride spec	10	10	100
6. Therminol Furnace			
1) Coil failure	10	10	100
2) Cannot provide adequate heat for stills	10	10	100
7. Housekeeping			
1) Unable to achieve acceptable level	10	8	80

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