

FROM ANNISTON, ALABAMA

cc: J. R. Durland - MMK Tokyo

DATE July 30, 1969

V. R. Haupt

W. A. Kuhn - WKUHN

SUBJECT TRIP REPORT - CED Job 1668

H. L. Williams

R. S. Yates - RYATE

MMK Yokkaichi CPH* Plant Start-Up

8 June - 17 July, 1969

REFERENCE *MMK refers to Aroclor Plant as
CPH Plant (Chlorinated Polyphenyl)

TO: D. Danna (3)

ST. LOUIS

SUMMARY:

The June - July MMK Yokkaichi Plant, Aroclor start-up, demonstrated a new site production unit by producing Aroclors 1242, 1248, and 1254. The very satisfactory start-up highlighted good basic design, equipment selection, instrumentation, and an effective preliminary effort with laboratory, training, and equipment preparation. The system produced specification material at approximately 90% of design rate. At this writing, there were no major operation problems. There were, however, a number of minor problems, some of which are listed in the report.

A summary meeting was held at Yokkaichi by Plant Manager, Mr. Murakami. The plant's major current concerns were: varying stability analysis of Aroclor 1242, lack of sufficient design information to give complete engineering service to new users of Santotherm, and the need for additional specification information for the Biphenyl project. Mr. Murakami considered the CPH start-up successful and gave the plant's thanks for the overall MC effort. A summary report was given the MMK Board of Directors, and thanks for the MC effort was given by MMK President, T. Nishikawa, and J. R. Durland.

Permission to take pictures of the operating CPH plant was given by Mr. Murakami. These will allow CED to see the results of their design manual and perhaps help on related projects. A set has been forwarded to Mr. Danna.

Every consideration was given by MMK personnel to make the MC representative's stay a pleasant one.

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OUTLINE OF MAJOR AREAI. Pre-Design Contact

The adequate MC background effort prior to design was well done and contributed in a major way in the production of this workable manufacturing unit.

Some of this effort is listed below:

<u>What</u>	<u>MMK</u>	<u>Where</u>	<u>Time</u>
1) Laboratory Training	N. Arasaki K. Yamamoto	Anniston Laboratory (G. Miller)	2-1/2 Months
2) Engineering Liaison	M. Okamura	CED (Hinze-Yates) WCK (TSD-Prod.) Anniston (TSD & Production)	Approx. 3 Wks.
3) Production Liaison	M. Tuska jima	Anniston (TSD & Production) WCK (TSD-Prod.)	Approx. 7 Wks.

The understanding barrier, due to language and terminology, etc., requires as much face to face discussion with engineering flow sheets and in-field observations as can be arranged. To minimize this step is to invite major problems in the final unit. In this case, the very observant technically competent MMK personnel with a great deal of MC cooperation, produced a first rate plant. In my opinion, for a complex unit, a CED visit with the MMK design-production team after their definitive design would insure that all know-how had been effectively transmitted.

II. Yokkaichi Observations (See Slides)

- A. Plant Location - New site reclaimed land 250 yards from ship channel, all on concrete pilings. Biphenyl unit now in process of being reclaimed.
- B. Layout & Safety- Very good from operation, safety, maintenance and limited expansion. MMK use open sewers and recovery traps (recovery trap we should have).
- C. Equipment - Good selection - no major problem.
- D. Instrument - Good performance - followed CED recommendations.
- E. Design Info. - Good - I heard no complaints.

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- F. Construction - (See Slides) The equipment and lines were insulated and painted; structure, erector set, looked good. No line leaks while on site. All seals worked, no leaks in vacuum system. Most instruments functional and controlled. Insulation covering enameled steel sheeting. All open sewers. Engineering liaison on site. Construction very responsive. Contractors used to keep MMK employe level (900 men) stable. For example, MMK will use contractors to load bagged biphenyl into melter if production personnel not available. One complaint, step treads too short for representative's feet.
- G. Operation - Good - they followed with great care (V. R. Haupt).
Manual
- H. Pre-Start-up - They wrote the Book.
Planning and
Training
- I. Manpower - Plan to operate with 2 operators per shift until biphenyl on-stream then one operator plus supervisor, foreman, engineer, T.S. engineer (temp.), laboratory analyst (2), secretary.
- J. Production - Approximately 90% of design. Cycle lengthened by B.O.S. to give longer catalyst dissolving time.
Chlorination: 8:1242; 7: 1248; 7: 1254
- K. Yield - 1242 run poor - due to calibration and tank and line
Matl. Bal. filling. 1242-1254 good (97%+) All chlorine, HCl,
(See Attach.) biphenyl and Aroclor accounted for. No actual losses.
- L. Quality Fair to good. Physical Properties in spec.
(See Attach. Electrical - too good. Stability & Inorganic Cl - mixed.
Analyses)
- M. Bottleneck Chlorinator was operated at maximum rate based on free
(See Bottle- chlorine in HCl. MMK may have to reduce chlorine flow
neck analyses) above 1248 gravity.

Next: Jet capacity
Still furnace (can be increased by minor jet change)
- N. Research MMK did a lot of pre-start-up research work on preparation, adsorbent and analysis. MMK research has responsibility of training control laboratory personnel.
MMK research program for 1970 included the following:

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1. Chlorinator design.
2. Relation of stability values to any measurable variables in the chlorination steps.
3. Catalyst study to maximize electrical properties.
4. Continued adsorbent study for improved electrical properties.
5. Undefined work for heat exchanger use.

O. Production-T.S.

Future Work:

1. Procedure for recovery of:
 - A. Aroclor returned from capacitor plants, which has soldering flux and other contaminations.
 - B. Returned Santotherm.
2. Studies on the return of poor stability HCl entrained Aroclors and their effect on stability.
3. Installation and start-up of drum washing operation for new and returned drums.
(see attached sheet)
4. Re-refining Aroclor that analyses above specification on Inorganic chlorides or TCC.

P. Not Tested:

1. Production of 1260 - none needed - 1970.
2. Blending operation.
3. Rework of returned material.
4. Drumming operation - July.
5. Drum washing operation - July-August.

Q. Project Expenditure (Est.)

Underspent --- all projects that Dr. Durland had handled have been underspent. Only the oil additive project, which was changed after start-up, came up to appropriation level. The Board and Dr. Durland are quite pleased. There is a message here for CED.

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III. Problem List* (Equipment and Other)

*No major problems - just getting into process understanding and adjustments.

203 - Biphenyl Melt Tank - Do not have ability to mix contents of tank.

Biphenyl quality 68.7°C (one sample) of Yawata Chemical Com may be variable. Some brown color.

201 - Biphenyl Charge Tank -

May give short charge

202 - Chlorination System -

204 - Air cooler oversized - required manual on-off until full load reached.

Chlorine piping required trace and insulation to prevent Biphenyl freeze-up.

Chlorine not always available due to PVC plant replacement requirements. Note that DeNora cell chlorine was a remarkable 97-98%.

HCl produced from chlorinator above 1148 had excessive free chlorine (see attachment). Chlorine feed rate reduction may be required to eliminate.

Possibility that high capacity pump is pulling chlorine into circulating line.

Return of poor stability (TTC 6.0) material from HCl knock-out tank may contribute to lowered stability.

Defination of stability for Therminol (Santotherm) sales is not clear. MC uses trappings (poor stability) to produce Therminol FR-2 (1248).

HCl storage facilities limited chlorinator run.

204 - Off gas drain pot

Required method to measure level.

Acid containing free chlorine could not be used in back washing ion exchange for water treatment.

207-208- Blow Tank

Not as effective as Anniston in reduction of HCl content. Possibly due to tank diameter and length of sparger.

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*More
catalyst?* →

215 - Still System -

Circulating pump 221 had rapid failure of Graphite 100 (Spun Graphite) packing. Plant selected and ordered a mechanical seal.

The two burner on-off temperature control on Furnace 222 was ragged.

The dip leg on separator 216 was not long enough to allow complete boil down before loosening seal.

The spare coil was rolled tight with no space and the coils were welded together (CED recommended against this).

218 - Still Receiver -

The jet operated to maximum capacity with no control, i.e., bleed valve remained closed. Probably undersized.

Inorganic chloride on distilled product varied and were higher than U.S. production. The distillation step would be the most likely cause (i.e., lime contact, still temperature, still vacuum, distillation end point, etc.).

223 - 225 - Feed Tank Adsorption System -

226 - 242 -

No recognized problem

1242 and 1248 processed through Silica Gel.

1254 processed through Porocel since 110°C was above Silica Gel limit.

Open question: Life of Silica Gel packing.

Jim Bryant - In line Analyzer: Not placed in operation during run due to
Special electrical problems. Remains Research responsibility to place in operation.

Final product analyses showed variations in Inorganic chlorides and TTC stability. Samples are to be exchanged with WCK and Anniston Chief Chemists.

Biphenyl
Project:

1. Site being reclaimed.
2. Layout approved early July.
3. Some equipment on order.
Some major equipment (i.e. Furnace) being held up to resolve some design problems with CED.
4. Most important that CED give good review of layout and hardware.

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5. Schedule May - 1969.

6. Look for problems on putting this one on the road.
I think furnace design should be reviewed with Sela at once -
Newport coke may be due to increased heat flux over Anniston
(M.P.Lux)

Santowax-
HB-40

1. Equipment selection and final cost estimate underway.

2. Scheduled - August 1969.

MMK is very anxious to get HB-40 on market.

3. MMK may send representative to CED and Anniston on this one.
Not clear.

Competition-

Biphenyl producers: Primary: Yawata
(New Sela Furnace unit reported to be operating 6-9 months
with no problems).

By-Product Biphenyl: Mitsubishi-Yoka
Tokyo - Rayon

HB-40 Type - Yawata
Not yet on market

Aroclor - Kanechlor by Kanegafuchi

MMK will push new heat exchange market.
Will push to exceed competitions quality
(i.e., stability and electrical)

Note: Kawachlor practice is to give credit for returned drums.
MMK will follow this practice using 3 type drums.

1. Zinc line drum for transfer site.

2. Lined drum (2 coats) electrical

3. Steel drum for Santotherm

Kanegafuchi has serious problem in heat transfer market due to
the Rice Oil Case. (See attachment)


Burns Severson

smd
Attachments

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Attachments

66 Slides of GPH Plant (D. Danna) sent separately and tape.

1. Chlorination Cycles 1242
2. Analysis - 1242
3. Chlorinator Cycles 1248
4. Blow Tank Results - 1248
5. Analyzer - Receiver - 1248
6. Analysis after treatment 1248- 1254
- 7.-11. Cycle Analysis to determine bottleneck
12. Annunicator
13. Annunicator
14. Free Chlorine vs. level of chlorination
15. Discussion on use of Purchased By-Product Biphenyl and Hydrogen Clean-Up
16. Drum Cleaning Equipment
17. Bran Oil Poisoning
18. Personnel List - Yokkaichi Plant

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