

Central Engineering Department

Project Scope Report

Solid Aroclor Expansion

CEA 2080

New 20 M lbs./year Plant

Anniston, Alabama Plant

By: R. S. Yates
Central Engineering Department
January 14, 1969

0726018

TOWOLDMON0048806

DISTRIBUTION

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0726019

CEA 2080
Date: 1/16/69
By: R. S. Yates

TABLE OF CONTENTS

	<u>Page No.</u>
1.1 <u>Project Scope Summary</u>	1
1.11 Title	1
1.12 Synopsis and Project "Tone"	1
1.2 <u>Process Technology</u>	3
1.21 Process Description	3
1.211 Details of Process	3
1.212 Yields and Raw Material Usage	3
1.213 Process Documents	4
1.22 Raw Materials	4
1.221 Specifications	4
1.222 Sources	5
1.23 Products and By-Products	5
1.231 Quality Considerations	5
1.232 Specifications	5
1.233 By-Products	6
1.234 Packaging and Shipping	6
1.24 Waste Streams	7
1.25 Personnel, Property and Public Hazards	7
1.3 <u>Manufacturing Facilities</u>	9
1.31 Description	9
1.311 General	9
1.312 Manufacturing Facilities	9
1.32 Design Capacity	10
1.33 Flexibility Requirements	10
1.34 Future Expansion	11
1.35 Physical Appearance	11
1.36 Storage and Shipping Requirements	11
1.4 <u>Utilities</u>	12
1.41 Utilities Summary	12
1.42 Utilities Facilities	12

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Appendices

- A. Equipment Information Summary
- B. Process Flow Diagram
- C. Equipment Arrangement Study
- D. Building and Site Requirements
- E. Description of Work by Code of Accounts
- F. Preliminary Schedule
- G. Project Loss Prevention Report

0726021

1.1 Project Scope Summary

1.11 Title

Aroclors - Increase Solid Aroclor Capacity - Organic
Division at Anniston, Alabama Plant
CEA 2080

1.12 Synopsis and Project "Tone"

The objectives of this project are to

- a. Provide new facilities to increase solid Aroclor plant capacity from 9.6 M lbs./year to 29.6 M lbs./year.
- b. Provide an overall production capacity for solid Aroclors of up to 30% more than indicated in the latest sales forecast.
- c. Provide for an orderly expansion of the solid Aroclor facilities.
- d. Complete these facilities by December, 1969.

New facilities to be added are:

1. Two batch chlorinator systems consisting of a single terphenyl feed tank, two chlorination tanks with heat removal systems and one intermediate storage and blow tank.
2. An off-gas recovery system consisting of heat exchanger and surge tank to recover entrainment losses from both chlorinator systems.
3. One batch distillation system consisting of still pot, external circulating system through a gas-fired heater, condensing and receiving equipment, and a high vacuum ejector.
4. Sufficient piping tie-ins to insure good operating flexibility with the existing batch system.
5. Expand the existing control room to provide sufficient space for instrumentation for the new facility.
6. Expand the existing Therminol heating system to provide proper distribution of hot fluid to the new facility.
7. Add drowning facilities at the HCl plant to drown the extra HCl gas produced from the chlorinators.

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8. A new elevator in Building 27.
9. A flaker for Aroclor 1268.

Sales forecasts indicate that we will be out of solid Aroclor capacity in 1969. The plant is carrying out a debottlenecking program which will allow us to meet most of our 1969 requirements. The new facilities should be operational by December 1969 or earlier if possible. A preliminary schedule shows that if we can start definitive engineering in January, these new facilities will be available for start-up in December 1969.

Full design capacity will not be necessary until after 1973. It is divisional policy in certain product groups to provide excess capacity over and above sales forecasts and we are providing a 31% excess capacity in these new facilities for 1973 based on the sales forecast of December 6, 1968.

Low capital cost is important to this project, however, schedules must be met for a December 1969 or earlier start-up even at some increased capital cost. There are no items that could be deferred from this project to a later date.

It is estimated that the cost of these new facilities will be:

Capital	\$ 950,000
Expense	<u>50,000</u>
Total	\$1,000,000

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1.2 Process Technology

1.21 Process Description

1.211 Details of Process

Aroclors are the reaction products formed by the chlorination of biphenyl and/or terphenyls using an iron catalyst. The by-product HCl gas produced is absorbed in water to produce muriatic acid. Solid Aroclors are produced in chlorinator reaction vessels, air blown and distilled. They are drummed, flaked, or flaked and milled and packaged for shipment.

Distillation residues are discarded as waste or sold as Montars.

Aroclors, when used as plasticizers and that crystallize at ambient temperatures are considered solid Aroclors. Below is a list of the Aroclor grades that are considered solid Aroclors:

<u>Aroclor Designation</u>	<u>Starting Raw Material</u>	<u>Chlorination Level</u>	<u>Distilled</u>
1268	Biphenyl	68%	Yes
2565	25% Santowax C 75% Biphenyl	65%	No
4065	40% Santowax R 60% Biphenyl	65%	No
4465	40% Santowax R 60% Biphenyl	65%	Yes
5060	100% Santowax R	60%	No
5460	100% Santowax R	60%	Yes
5042	100% Santowax R	42%	No
5442	100% Santowax R	42%	Yes

We intend to make only Santowax R based Aroclors in this new equipment.

1.212 Yields and Raw Material Usage

Yields are calculated for both chlorine and Santowax and/or Biphenyl. Based on cost standards of January 1, 1969 these are (% theory to standard):

0726024

<u>Aroclor</u> <u>Designation</u>	<u>On</u> <u>Chlorine</u>	<u>On</u> <u>Biphenyl</u>	<u>On</u> <u>Santowax C</u>	<u>On</u> <u>Santowax R</u>
1268	73	73		
2565	96	96.2	96.2	
4465	73	73		73
5060	96			96
5460	82			85
5442	80.2			73

The yield on 5460 has not been demonstrated. Last year the standard yield on chlorine and Santowax R was 73.5%

Lime and Ferric chloride are added to all products as follows:

	<u>Lbs./100 Lbs. Aroclor</u>
Lime	1.000
Ferric Chloride	0.020

1.213 Process Documents

- "Standard Manufacturing Process for Aroclors
Anniston Plant" September, 1966, M. J. Williams
- "Standard Operating Instructions for Aroclors
Anniston Plant" November, 1968, M. J. Williams

1.22 Raw Materials

1.221 Specifications

Raw material specifications, as listed below, are appended.

<u>Material</u> <u>Code</u>	<u>Date</u>	<u>Material</u>
33500	2/26/57	Ferric Chloride Anhydride
83601	11/18/65	Biphenyl
82910	3/9/66	Santowax "C"
82602	3/2/66	Santowax "R"
82638	8/31/66	Chlorine Gas
38800	7/20/66	Lime Hydrate

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1.222 Sources

Biphenyl

Biphenyl is stored in horizontal tanks in the Biphenyl Area and pumped on demand into the Terphenyl Mix Tank.

Ferric Chloride

Received from the warehouse in 100 lb. kegs.

Chlorine

Received from tank cars and the chlorine plant. In 1969 the chlorine plant will be shut down and the entire supply will be from 44, 55 or 90 ton tank cars shipped into the plant. Liquid chlorine will be vaporized and transferred as a gas to the department area.

Lime Hydrate

Received from the warehouse in 50 lb. bags loaded on palettes.

Santowax "C"

Received from the continuous biphenyl stills on demand through a transfer line.

Santowax "R"

Received from a 50,000 gallon storage tank, heated west of the HB40 department, on demand, through a transfer line. Santowax "R" is obtained from the continuous Santowax still in the Biphenyl refining area.

1.23 Products and By-Products

1.231 Quality Considerations

Aroclor 5460 has a color and softening point specification which because of the nature of the process gets out of control on occasion. Color is more of a problem than softening point.

1.232 Specifications

Finished goods specifications, as listed below, are appended.

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<u>Product Code</u>	<u>Date</u>	<u>Product</u>
82616	3/11/66	Aroclor 1268
82618	3/11/66	Aroclor 2565
82619	3/11/66	Aroclor 4465
82620	3/11/66	Aroclor 5060
82622	3/11/66	Aroclor 5460
82621	3/15/66	Aroclor 5442

1.233 By-Products

HCl gas is a by-product of the chlorination reaction and can be absorbed in water to produce muriatic acid or sewerage and neutralized with limestone.

Residues from the distillation are drawn off to drums and sold as Montars or discarded. Listed below are data on the Montars.

<u>Montar No.</u>	<u>Aroclor</u>	<u>Softening Point Range</u>	<u>Calcium Oxide</u>
5	5460	155-195°C	1.6%
6	4465	135-190°C	2.0%
7	1268	200°C	
8	5442		

The plant is considering the flaking of Montars in order to change the product form.

Latest sales forecast, November 27, 1968, indicates sales requirements for the solid Montars as follows for the year 1969:

Montar 5	180,000 lbs.
Montar 5 crushed, dom.	400,000 lbs.
Montar 5 crushed, inter.	80,000 lbs.
Montar 6	50,000 lbs.

1.234 Packaging and Shipping

<u>Material</u>	<u>Weight - lbs.</u>	<u>Container</u>	<u>Form</u>
1268	200	41 gal. fibre drum	Flakes
2505	50 and 500	5 and 40 gal. drums	Solid
4465	50 and 500	5, 40 and 55 gal. drums	Solid
5060	50 and 100	paper bags	Flakes
5460	50 and 100	paper bags	Flakes
5442	50 and 450	5 and 40 gal. drums	Solid

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1.24 Waste Streams

Approximately 2200 gallons of Montar 5 will be produced daily with an approximate composition as follows:

Chlorine	57-59%
Iron	0.12%
Calcium Oxide	1.6%

Some of this material is sold, the remainder is put in drums and taken to the toxic dump. The plant has a project to pump these waste materials to Cleghorn's lake, a sump used for residue disposal.

An additional 70,000 lbs. of HCl gas will be produced daily from this new plant and will have to be absorbed and sewered at the acid plant. If additional absorption capacity is required, a separate project will be submitted.

1.25 Personnel, Property and Public Hazards

Chlorine Gas

Causes eye, skin and mucous membrane irritation. Maximum allowable concentration is 2 ppm. Concentrations in the order of 15 ppm will cause throat irritation. Cannister gas masks, Scott Air Paks or other similar equipment is required in strong concentrations.

Biphenyl

A toxic organic chemical. Breathing fumes or vapors should be avoided. During processing the material is usually hot (100°C or above) and can cause serious thermal burns in contact with the skin. Protective garments should be worn to avoid contact. Flash point of biphenyl is 235°F.

Ferric Chloride

Not toxic but presents an eye hazard. Normal precautions of wearing safety glasses should be followed.

HCl Gas

Fumes are toxic and hazardous to teeth, skin, eyes and mucous membranes. In strong concentrations, rubber protective equipment should be worn. Maximum allowable concentration of HCl gas in air is 10 ppm.

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Santowax R

Relatively non-toxic, however, the vapors are irritating to the bronchial tract. Prolonged breathing of vapors should be avoided. Material is generally hot (150°C or above) and can cause serious thermal burns in contact with the skin.

Crude Aroclors

Crude Aroclors are hot since all are handled in Therminol heated jacketed lines. They can cause serious thermal burns in contact with the skin.

Still Bottoms or Residue

Fumes from still bottoms are toxic. They are extremely irritating to the mucous membranes, eyes, and respiratory tract and should be avoided. They are hot (above 150°C) and can cause serious thermal burns.

Hydrated Lime

Dust is irritating to the eyes and skin and any material on the skin should be washed off with water.

0726029

1.3 Manufacturing Facilities

1.31 Description

1.311 General

The following information is included in the Appendix of this report:

- Equipment Information Summary
- Process Flow Diagram
- Equipment Arrangement Study
- Building and Site Requirement
- Description of Work by Code of Accounts
- Preliminary Schedule
- Project Loss Prevention Report

1.312 Manufacturing Facilities

A 2000 gallon mix tank for terphenyls with charge lines and supported on a 40,000 lb. hopper scale.

Two 3100 gallon chlorination tanks with circulation pumps and heat removal systems consisting of two shell and tube heat exchangers and a Therminol surge tank and pump.

An off-gas system consisting of heat exchanger and 2000 gallon storage tank to recover entrainment losses from the chlorinator off gases with tailings pump.

A 6500 gallon batch intermediate storage and blow tank with scrubber and transfer pump.

A 7300 gallon still pot, 3500 gallon receiver with entrainment separator, still condenser and external gas fired heater with submerged centrifugal pump.

A condenser control system consisting of two shell and tube heat exchangers and a Therminol surge tank and pump.

A three-stage ejector with intercondenser, and aftercondenser and catch tank and sump tank.

Additions to the present control room to provide space for additional instrumentation.

A two-stage HCl gas drowning system.

A new freight elevator for Building 27.

Additions to the present Therminol system.

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1.32 Design CapacityChlorination:

Basis	Producing Aroclor 5060
OST	6350 hrs./year
Rate	27.6 M lbs./year

Distillation:

Basis	Producing Aroclor 5460
OST	6350 hrs./year
Rate	20.0 M lbs./year

After these additions are complete, plant capacity will be as follows:

Present Capacity	9.6 M lbs./year
New Capacity	<u>20.0 M lbs./year</u>
Total Capacity	29.6 M lbs./year

Basis:	OST	6350 hrs./year
	OAY	73%

Based on the December 6, 1968 Sales Forecast, (HD to RY), excess capacity will be as follows:

	<u>1970</u>	<u>1973</u>
New Capacity	29.6 M lbs./yr.	29.6 M lbs./yr.
Required	<u>17.1 M lbs./yr.</u>	<u>22.6 M lbs./yr.</u>
Excess Capacity	12.5 M lbs./yr.	7.0 M lbs./yr.
Excess Capacity	73 %	31 %

1.33 Flexibility Requirements

Two complete and separate solid Aroclor systems will allow flexibility in our production runs. We will produce the larger volume requirement, Aroclor 5460 (82%) in the new units with the remaining solid Aroclors being produced in the smaller unit. Consideration will be given to incorporating the chlorinators into a continuous chlorination system at some future date. Both units will have the flexibility of being able to produce any of the solid Aroclor products. If fractionation is required to meet FDA standards, a separate distillation unit can be added to the existing system.

0726031

1.32 Design Capacity

As a supplement to the Design Capacity statements on Page 10, the following is added to show excess capacity of Aroclor 5460 only in the new facilities (based on the December 6, 1968, Sales Forecast, HD to RY):

	<u>1970</u>	<u>1973</u>
New Capacity	20.0M lbs./yr.	20.0M lbs./yr.
Required	<u>14.1M</u> lbs./yr.	<u>18.5M</u> lbs./yr.
Excess Capacity	5.9M lbs./yr.	1.5M lbs./yr.
Excess Capacity	42%	8%

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1.34 Future Expansion

The present expansion will occupy an 18 foot wide area directly to the north of Building 27. There is sufficient area to the north of this expansion to provide for two additional chlorination-distillation systems. In the meantime, work should proceed toward developing a continuous chlorination system which long range should provide greater flexibility in labor and equipment.

1.35 Physical Appearance

We propose to make the top roof deck concrete, a continuation of the surface we installed to the west of Building 27 on project OEA 4-488. Additional weather protection will be provided in the form of a panel enclosure on the north wall of the structure.

1.36 Storage and Shipping Requirements

No additional storage facilities are contemplated. Recently completed project CEA 1430 provided a 5500 gallon day tank for finished solid Aroclors. In addition, a new 6900 lb./hr. flaker with a 5500 gallon flaker feed tank has also been installed in a separate flaking and packaging building.

Raw material storage for Santowax R and Biphenyl are adequate.

0726033

1.4 Utilities and Services

1.41 Utilities Summary

The approximate utility requirements are as follows:

For ejector, lbs./hr.	450
For tracer and tank heating, lbs./hr.	250
Power, Installed HP	245
Cooling Tower Water, GPM	600
Potable Water, GPM	50
Natural Gas, Cu.Ft./hr.	2000

1.42 Utilities Facilities

No additional utility facilities are required for this project.

0726034

MONSIEUR'S CHEMICAL COMPANY
 ORGANIC CHEMICALS DIVISION
W. G. KRUMMREICH PLANT
RAW MATERIAL
SPECIFICATION

PRODUCT CODE

11222

NET WEIGHT

SUPPLIER

MATERIAL

FERRIC CHLORIDE ANHYDRIDE

CHEMICAL FORMULA

FeCl₃

ISSUED Feb. 26, 1957
STANDARDS DEPARTMENT

W. G. Krummreich

By *[Signature]*

REL. 97.

162.21

SUPPLEMENT SPEC. OF

New

SAMPLE FOR ANALYSIS

112 as, W. M. Bottle

UNCLASSIFIED INFORMATION

General Tests (made only on request)

<u>Property</u>	<u>Specification</u>	<u>J. F. O. Method No.</u>
Appearance	Black powder or granules	16-A
Assay	97.0%, Min.	22-579
Sulfates	0.95%, Max.	120-579
Ferrous Salts	Trace, Max.	8-570-1
Solubility:		112-B
10:10 of water	Complete to slightly turbid, Max.	
10:10 of Formula 30 alcohol	Complete to slightly turbid, Max.	

0726035

MONSANTO CHEMICAL COMPANY
ORGANIC CHEMICALS DIVISION

PRODUCT CODE

825.01

METHOD IDENTITY

SALES CODE

135-000-03-09

FINISHED PRODUCT SPECIFICATION

PRODUCT (Trade name)

Biphenyl

TYPE

Technical

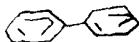
PRODUCT (Chemical name)

Biphenyl

TYPE

Technical

CHEMICAL FORMULA



C₁₂H₁₀

Issued 5/5/61

Anniston Plant

By W. W. Kiemmer

Revised to add typ
values 11-18-62

MOL WT.

154.20

USE

Sales

SUPERSEDES SPEC OF

7/8/65

SPECIAL JOB NO.

SAMPLE FOR ANALYSIS

1 x 16 oz. can

Characteristic

Limits

Typical Values

Routine tests

Appearance

White to pale
yellow crystals

White crystals

Crystallizing Point, °C

68.7 Min.

68.8

Color, Gardner

6 Max.

1.5

General Test (determined only on request)

Biphenyl, %

99.9

Napthalene, %

0.001

3 - Methylbiphenyl, %

0.05

4 - Methylbiphenyl, %

0.02

Unknown, %

<0.03

Distillation Range, °C
1st drop - Dry Point

Must include
255°C

This specification for internal use only

0726036

TOWOLDMON0048824

Monsanto
ORGANIC CHEMICALS DIVISION

**FINISHED PRODUCT
SPECIFICATION**

PRODUCT

Santowax C

PLANT

Annisston

DATE EFFECTIVE

3-9-66

PRODUCT CODE

829.10

SALES CODE

7795-050-99-009

USE

Internal

APPROVALS

PRODUCTION

J. S. Moody /s/ 2-1-66

SALES

J. A. Ault /s/ 2-22-66

GENERAL DESCRIPTION

RESEARCH

L. R. Stark /s/ 2-3-66 - M. McEwen /s/ 2-1-66

QUALITY CONTROL (Chief Chemist)

O. E. Dolin /s/ 2-1-66

CHEMICAL FORMULA

Structure

ANALYSIS

SPECIMENS SPEC. OF

1-57

SAMPLE FOR ANALYSIS

2 - 1 Pint Cans

ISSUED BY

J. A. Liddle 1-12-66

CHARACTERISTIC

LIMITS

METHOD

RESTRICTED INFORMATION

Appearance	Brown, waxy solid	G-1
Softening Point, °C	350 Min.	
Ortho Terphenyl, %	**10	064
Meta Terphenyl, %	**50	064
Para Terphenyl, %	**26	064
Quaterphenyl, %	**14	072
Other Terphenyl, %	**0.1	064
Softening Point, °C	**375	114
Residue, ppm	2.0 (Typical)	
Moisture, ppm	2.0 "	

Distribution of isomers and quaterphenyls vary with operating condition.

Only limited data is available; therefore, the limits given are typical values of these characteristics.

This product is mainly used as a raw material for other finished products produced in this division.

This specification is for internal use only.

Routine Analysis. All others Analyzed by request Only

MON-392

0726037

TOWOLDMON0048825

Monsanto
ORGANIC CHEMICALS DIVISION

**FINISHED PRODUCT
SPECIFICATION**

PRODUCT Santowax R		DEVT. 32
PLANT Anniston	PRODUCT CODE 826.02	USE Sales
DATE EFFECTIVE 3-2-66	SALES CODE 7795-000-11-009	

APPROVALS	
PRODUCTION R. G. Moody /s/ 1-31-66	RESEARCH L. R. Stark /s/ 2-3-66 - M. McEwen /s/ 2-22-66
SALES W. E. Ault /s/ 2-22-66	QUALITY CONTROL (Chief Chemist) O. E. Dolin /s/ 1-25-66
GENERAL DESCRIPTION	CHEMICAL FORMULA

Mixed Terphenyls

MULT. NO. 2-12-62	SAMPLE FOR ANALYSIS 2 x 1 pint cans	ISSUED BY J. A. Liddle 1-11-66
CHARACTERISTIC	LIMITS	METHOD

UNRESTRICTED INFORMATION

(R) Appearance	Yellow white noncrystalline flaked solid	G-1
(R) Color (liquid), NPA	4.0 Max.	128
(R) Upper Hold Point, °C	136 - 145	129
(R) Lower Hold, °C	48 - 63	129

RESTRICTED INFORMATION

Distillation Range, °C, 80% (Uncorrected)	350 - 400
Ortho terphenyl, %	10.0 - Typical Value
Meta terphenyl, %	54.0 - " "
Para terphenyl, %	27.0 - " "
Quaterphenyls, %	9.0 - " "

R. Routine Analysis. All others Analyzed by request Only

0726038

TOWOLDMON0048826

Monsanto

ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

MATERIAL CODE

826.38

PLANT

Anniston

DATE EFFECTIVE

8-31-66

MATERIAL

Chlorine Gas

USING DEPT.

04, 05, 27

SUPPLIER

See below

APPROVALS

PRODUCTION

R. G. Moody /s/R. G. Moody - 8/11/66

PROCUREMENT

H. L. Phillips /s/H. L. Phillips - 8/15/66

RESEARCH

L. R. Stark /s/L. R. Stark - 8/29/66

QUALITY CONTROL (Chief Chemist)

O. E. Dolin /s/O. E. Dolin - 8/10/66

GENERAL DESCRIPTION

Greenish yellow gas

Cl₂
Mol. wt. 70.91

CHEMICAL FORMULA

SUPERSEDES SPEC OF

Sept. 11, 1957

SAMPLE FOR ANALYSIS

GLC sampling container

ISSUED BY

J. A. Liddle - 5/16/66

CHARACTERISTIC

LIMITS

Typical
Values

METHOD

UNRESTRICTED INFORMATION

Material Supplied by Diamond Alkali Company

Assay, (Vol. %)	99.4 Min.	113
Residual Gases (Vol. %)	0.5 Max.	113
Moisture, ppm	40 Max.	
Non-volatile Matter, ppm	40 Max.	

Material Supplied by Depts. 56, 57 (Anniston)

Assay (Vol. %)	85.5 - 93.5	113
H ₂ (Vol. %)	1.5 - 2.5 (3 Max.)	113
CO ₂ (Vol. %)	0.5 - 1.0	113
CO (Vol. %)	Nil	113
N ₂ (Vol. %)	3.0 - 8.0	113
O ₂ (Vol. %)	1.2 - 3.0	113

(R. Routine Analysis, All others Analyzed by request only.)

WGK-214

0726039

TOWOLDMON0048827

Monsanto

ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

MATERIAL CODE	MATERIAL
38800	Lime Hydrate
PLANT	URING DEPTS.
Anniston	27, 28
DATE EFFECTIVE	SUPPLIER
7-20-66	Alabaster Lime Co.

PRODUCTION	RESEARCH
R. G. Moody /s/R. G. Moody 6/9/66	M. F. Mueller /s/M. F. Mueller 7/13/66
PROCUREMENT	QUALITY CONTROL (Chief Chemist)
H. L. Phillips /s/H. L. Phillips 6/10/66	O. E. Dolin /s/O. E. Dolin 6/8/66

GENERAL DESCRIPTION

White fine powder

CHEMICAL FORMULA



Mol. wt. = 74.10

SUPERSEDES SPEC OF	SAMPLE FOR ANALYSIS	ISSUED BY
Sept. 11, 1957	2 - 1 lb. cans	J. A. Liddle - 5/18/66
CHARACTERISTIC	INDEX	METHOD

Typical Analysis

UNRESTRICTED INFORMATION

CaO (%)	73.00
MgO (%)	1.20
SiO ₂ (%)	0.36
Al ₂ O ₃ (%)	0.60
Fe ₂ O ₃ (%)	0.30
Ignition Loss (%)	24.04
Ca(OH) ₂ (% Calculated)	97.50(1)

Screen Analysis

Through 200 mesh (%)	99.8	120
Through 325 mesh (%)	94.5	

Basis of Specifications: Suppliers typical analysis of product (5/23/66)

$$(1) \text{ Ca(OH)}_2 \% = 100\% - [\text{MgO}(\%) + \text{SiO}_2(\%) + \text{Al}_2\text{O}_3(\%) + \text{Fe}_2\text{O}_3(\%)]$$

(1) Routine Analysis, All others Analyzed by request only.

M-116

0726040

TOWOLDMON0048828

Monsanto
ORGANIC CHEMICALS DIVISION

**FINISHED PRODUCT
SPECIFICATION**

PRODUCT Aroclor 1268		DEPT. 27-S
PLANT Anniston	PRODUCT CODE 826 16	USE Sales
DATE EFFECTIVE 3-11-66	SHEET CODE 1040-340-04-11-16-009	

APPROVALS	
PRODUCTION R. G. Moody /s/ 12-30-65	RESEARCH L. R. Stark /s/ 3-8-66
SALES W. E. Ault /s/ 3-2-66	QUALITY CONTROL (Chief Chemist) O. E. Dolin /s/ 12-29-65
GENERAL DESCRIPTION Mixture	
CHEMICAL FORMULA	

MOL WT.	SAMPLE FOR ANALYSIS	ISSUED BY
SUPERSEDES SPEC. OF 4-25-61	1 x 16 oz. Can or W.M. Bottle	J. A. Liddle 11-30-65
CHARACTERISTIC	LIMITS	METHOD

UNRESTRICTED INFORMATION

(R) Appearance and color Color, Gardner	White to off-white powder 6 Max.	G-1
(R) Hold Point, °C	150 - 170	119
(R) Acid No., mg KOH	0.05 Max.	116

RESTRICTED INFORMATION

Screen Test, % retained on		
No. 16 mesh	0.1 Max.	120
No. 20 mesh	10 Max.	
Specific Gravity @ 25/25°C., Pycnometer	1.804 - 1.811	
Loss @ 163°C., %	0.15 - 0.24	

R. Routine Sampling, All others Analyzed by request Only

0726041

TOWOLDMON0048829

Monsanto
ORGANIC CHEMICALS DIVISION

**FINISHED PRODUCT
SPECIFICATION**

PRODUCT Aroclor 2565		DEPT. 27-S
PLANT	PRODUCT CODE 826.18	USE Sales
ANALYST 3-11-66	SALES CODE 1040-390-04-009	

PRODUCTION		RESEARCH	
R. G. Moody /s/ 12-29-65		L. R. Stark /s/ 3-8-66	
SALES		QUALITY CONTROL (Chief Chemist)	
W. E. Ault /s/ 3-2-66		D. E. Dolin /s/ 12-29-65	
GENERAL DESCRIPTION		CHEMICAL FORMULA	

Mixture

MOL WT.	SAMPLE FOR ANALYSIS	ANALYZED BY
4-25-61	1 x 16 oz. Can or W.M. Bottle	J. A. Liddle 11-30-65
CHARACTERISTIC	LIMITS	METHOD

UNRESTRICTED INFORMATION

(R) Appearance and Color	Black, brittle resin	G-1
(R) Softening Point, °C	66 - 72	115
(R) Acid No., mg KOH/g	1.4 Max.	116

(R) Routine Analysis. All others Analyzed by request Only

0726042

TOWOLDMON0048830

Monsanto
ORGANIC CHEMICALS DIVISION

**FINISHED PRODUCT
SPECIFICATION**

PRODUCT Arcochlor 4465		DEPT. 27-S
PLANT Anniston	PRODUCT CODE 826.19	USE Sales
DATE EFFECTIVE 3-11-66	SALES CODE 1040-430-04-11-16-009	

APPROVALS	
PRODUCTION R. C. Moody /s/ 2-29-66	RESEARCH L. R. Stark /s/ 3-8-66
SALES W. E. Ault /s/ 3-2-66	QUALITY CONTROL (Chief Chemist) O. E. Dolin /s/ 12-29-65
GENERAL DESCRIPTION	CHEMICAL FORMULA

Mixture

MOL WT.	SAMPLE FOR ANALYSIS	ISSUED BY
SUPERSEDES SPEC. OF 4-25-61	1 x 16 oz. Can or W.M. Bottle	J. A. Liddle 11-30-65
CHARACTERISTIC	LIMITS	METHOD

UNRESTRICTED INFORMATION

(R) Appearance and Color	Clear, light yellow resin	G-1
(R) Color, NPA, Molten	2 Max.	G-4
(R) Softening Point, °C	60 - 66	115
Acid No., mg KOH/g	0.05 Max.	116

R - Routine Analysis. All others Analyzed by request Only

0726043

TOWOLDMON0048831

Monsanto
ORGANIC CHEMICALS DIVISION

**FINISHED PRODUCT
SPECIFICATION**

PRODUCT Aroclor 5060		DEPT. 27-S
PLANT Annington	PRODUCT CODE 826.20	USE Sales
DATE EFFECTIVE 3-11-66	SALES CODE 1040-450-04-009	

PRODUCTION		APPROVALS	
R. C. Moody /s/ 12-30-65		J. R. Stark /s/ 3-8-66	
W. E. Ault /s/ 3-2-66		O. E. Dolin /s/ 12-29-65	
GENERAL DESCRIPTION		CHEMICAL FORMULA	

Mixture

MOL WT.		SUPERSEDES SPECS. OF		SAMPLE FOR ANALYSIS		ISSUED BY	
4-25-61				1 x 16 oz. Can or W.M. Bottle		J. A. Liddle 11-30-65	
CHARACTERISTICS				LIMITS		METHOD	

UNRESTRICTED INFORMATION

(R) Appearance and Color	Black, brittle resin	G-1
(R) Softening Point, °C	105 - 115	115
(R) Acid No. mg KOH/g	0.5 Max.	116

R - Routine Analysis. All others Analyzed by request Only

0726044

TOWOLDMON0048832

Monsanto
ORGANIC CHEMICALS DIVISION

**FINISHED PRODUCT
SPECIFICATION**

PRODUCT Aroclor 5460 (High Soluble Grade)		DEPT. 27-S
PLANT Anniston	PRODUCT CODE 826.22	USE Sales
DATE EFFECTIVE 3-11-66	SALES CODE 1040-480-04-009	

APPROVALS	
PRODUCTION R. G. Moody /s/ 12-30-65	RESEARCH L. R. Stark /s/ 3-8-66
SALES W. E. Ault /s/ 3-2-66	QUALITY CONTROL (Chief Chemist) O. E. Dolin /s/ 12-29-65
GENERAL DESCRIPTION	CHEMICAL FORMULA

Mixture

MULT. RT.	SAMPLE FOR ANALYSIS	ISSUED BY
SUPERSEDES SPEC. OF 4-21-61	1 x 16 oz. Can or W.M. Bottle	J. A. Liddle 11-30-65
CHARACTERISTIC	LIMITS	METHOD

UNRESTRICTED INFORMATION

(R) Appearance and Color	Clear, yellow to amber brittle resin or flakes	G-1
(R) Color, NPA, Molten	2 Max.	G-4
(R) Softening Point, °C	98 - 105	115
(R) Solubility (25 g in 25 g. Acetone @ 25°C.)	3 hour, Min.	117
Acid No., Mg KOH/gm.	0.05 Max.	116
Chlorine, %	58.5 - 60.6	093

RESTRICTED INFORMATION

Hydrolysis Stability, ppm Cl	300 Max.	092
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*R. Routine Analysis. All others Analyzed by request Only

0726045

TOWOLDMON0048833

Monsanto
ORGANIC CHEMICALS DIVISION

**FINISHED PRODUCT
SPECIFICATION**

PRODUCT

Araclor 5442

DEPT.

27-S

PLANT

Anniston

PRODUCT CODE

826.21

USE

Sales

DATE EFFECTIVE

3-15-66

SILVER CODE

1040-470-04-009

APPROVALS

PRODUCTION

R. G. Moody /s/ 12-29-65

SALES

W. E. Ault /s/ 3-2-66

RESEARCH

L. R. Stark /s/ 3-11-66

QUALITY CONTROL (Chief Chemist)

O. E. Dolin /s/ 12-29-65

GENERAL DESCRIPTION

CHEMICAL FORMULA

Mixture

MCL WT.

SUPERSEDES SPEC. OF

4-25-61

SAMPLE FOR ANALYSIS

1 x 16 oz. Can or W.M. Bottle J. A. Liddle 11-30-65

ISSUED BY

CHARACTERISTIC

LIMITS

METHOD

UNRESTRICTED INFORMATION

(R) Appearance and Color

Clear, yellow sticky resin

G-1

(R) Color, NPA, Molten

2 Max.

G-4

(R) Softening Point, °C

46 - 52

115

Acid No., mg. KOH/g

0.05 Max.

116

0726046

TOWOLDMON0048834

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

EQUIPMENT INFORMATION SUMMARY					OPERATING WEIGHT (POUNDS)	REMARKS	ESTIMATED PRICE (\$)
EQUIPMENT IDENTIFICATION NUMBER					REMARKS		
DESCRIPTION OF EQUIPMENT ITEM					REMARKS		
QTY					REMARKS		
SIZE RATING MODEL ETC					REMARKS		
MATERIAL OF CONSTRUCTION					REMARKS		
1-101	TERPH FEED TANK	1	28" DIA TANK TS 1/2" THICK	WELDED STEEL	2,400 LBS	28" DIA TANK WELDED STEEL 6" STAINLESS STEEL FEED	N
1-101-001	DRIVE, TERPH FEED TANK	1	FRAN-ALINE 1750 RPM		200 LBS		N
1-101-002	MOTOR, TERPH FEED TANK AGITATOR	1	10 HP/1800 RPM			TFC	N
1-101-003	AGITATOR, TERPH FEED TANK	1	28" DIA TANK 6 BLADES SPEED-135 RPM	WELDED STEEL	3,200 LBS		N
1-101	TERPH FEED TANK	1	4000 LBS WELDED STEEL SUPPORT				N

1. EQUIPMENT TO BE EXISTING 2. TO BE RELOCATED
 ** ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OR TEST MATERIAL, WHICHEVER IS HEAVIER

0726047

TOWOLDMON0048835

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY J. A. P.	DATE 2-2-57	SHEET 1	TOTAL SHEETS 15
PROJECT NAME Exhaust Stack	PROJECT NO.	DATE 2-2-57	REV. NO. 1
REV. DATE 1-1-57			

EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC.	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT* POUNDS	REMARKS	ESTIMATED PRICE	
							A	B
1-1	CHIMNEY CORROSION	1	6400 W. L. S. C. & T. E. A. 240 S. F. T. 16" x 11.5"	316 L. STEEL SHELL & END CAPS 316 L. S. F. T. 112 T. O. L.	5650	12" O. D. x 11.5" I. D. x 240' L. S. F. T. W/ 16" x 11.5" S. C. & T. E. A. S. F. T. 112 T. O. L.		
1-107	HEAT EXCHANGER	1	46.5 ACFM AT 250°C	316 STAINLESS STEEL SHEET PIPING	INSTRUMENT WEIGHT	UNIT: 11" x 7" x 11" T. O. L. OF CHIMNEY		
1-108	OFF GAS CONDENSER	1	1000 W. L. SHELL & TUBE 240 S. F. T. 24" x 11.5"	CARBON STEEL	5650	12" O. D. x 11.5" I. D. x 240' L. S. F. T. W/ 24" x 11.5" S. C. & T. E. A. S. F. T. 112 T. O. L.		

CE 214

LEGEND: N - NEW

E - EXISTING

R - TO BE RELOCATED

* ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OF TEST MATERIAL, WHICHEVER IS HEAVIER.

1/12/57

0726049

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PROJECT NAME				PREPARED BY	DATE	REV.	REV. DATE
L-1000 TOWER ADJUSTER				J. S. HARRIS	2-5-52	1	2-5-52
PROJECT NAME				APPROVED BY	DATE	REV.	REV. DATE
					1-27-52	1	1-27-52
QED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC	MATERIAL OF CONSTRUCTION	EST. OPERATING WEIGHT (POUNDS)	REMARKS	ESTIMATED PRICE (\$)
1-110	OFF GAS SURGE TANK	1	2000 GAL 78" DI x 73" HIGH	CARB. & STEEL	51100	W/ 1/2" DIA. V. R. - 26" H. 15" x 120" L. 10" x 120" C. 10" x 120" 4100 LBS W. 10" x 120"	N
1-110	TAILINGS PUMP HORIZ. CENTRIFUGAL	1	100 GPM/50' H. AVE 3 x 1 1/2 - 10	DUCTILE IRON		INCL. MECH. SET. 2. 10" DIA. 6" JOINT C. 10" DIA.	N
1-110-001	MOTOR, TAILINGS PUMP	1	5 HP / 1000 RPM			TEFC	N
1-111	THERMAL SURGE TANK	1	30 GAL 42" DI x 51" HIGH	CARB. & STEEL	5275	W/ 1/2" DIA. V. R. - 26" H. 15" x 120" L. 10" x 120" C. 10" x 120" 4100 LBS W. 10" x 120"	N

CE 724

S: SOURCE: N: NEW E: EXISTING R: TO BE RELOCATED

** ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OR TEST MATERIAL WHICHEVER IS HEAVIER

1-27-52

0726050

TOWOLDMON0048838

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

CENTRAL ENGINEERING DEPARTMENT			EQUIPMENT INFORMATION SUMMARY					
PROJECT NAME			PREPARED BY		DATE	APPROVED BY	DATE	REVISIONS
S. L. ...			...		...	...	...	15
CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC.	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	ESTIMATED PRICE (\$)	
1-116	THERMOMETER COOLER	1	1/4" DIA. 20' L SPEL. 1/4" DIA. 9.37' L 20' DIA. 20' FT	STEEL	95.25	30' L x 14' W 1/4" DIA. 20' DIA. 20' DIA. 20' DIA. 58.15 LBS	N	
1-117	CHLORINATION No 11	1	3/4" GA. 5'4" DIA. x 25' DIA.	STEEL	1600	SAME AS 1-116 1-1/2" EST. WEIGHT 500 LBS	N	
1-118	CHLORINATION PUMP HORIZ. CENTRIFUGAL	1	25' GPM/1750 RPM 1/2"	20' GALV. STEEL		1/4" NIP SEAL 6' DIA. PAN TOTAL CWT. 1100	N	
1-118-G	CHLORINATION PUMP HORIZ.	1	15' AF/1100 RPM			1100	N	
1-119	THERMOMETER COOLER	1	1/4" DIA. 20' L SPEL. 1/4" DIA. 28' L x 11' FT 1/4" DIA. 11' FT	STEEL	3000	1/4" DIA. 20' L 34' L x 14' W 1/4" DIA. 1/4" DIA. 1/4" DIA. 1/4" DIA. 28' L	N	

1-119

A SOURCE: N=NEW

E=EXISTING

P=TO BE RELOCATED

** ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OR TEST MATERIAL WHICHEVER IS HEAVIER

1/11/52

0726052

TOWOLDMON0048840

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PROJECT NAME <i>EXPLOSION PROOF AIRCRAFT</i>					PREPARED BY <i>F. C. H. H.</i>	CLERK NO. <i>3945</i>	ANALYST <i>1</i>	DATE <i>8-15</i>
APPROVED BY <i>F. C. H. H.</i>					DATE <i>1-1-54</i>	REVISION <i>1</i>	REVISION <i>1-1-54</i>	
CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	ESTIMATED PRICE (\$)	
1-124	AIR ENGINE	1	200 HP FAI 2000 RPM 2000 RPM 2000 RPM 2000 RPM 2000 RPM	CARBON STEEL		2100 LBS. 15	A	
1-124-001	Motor Air Engine	1	15HP/1800RPM			TEFC	N	
1-125	RESERVE TANK	1	6500 GAL 120"OD x 120" HIGH	CARBON STEEL	62500	N/SUPPORT INSUL. PIPING N 2-48" DIA x 120' LONG PATE COILS MAY BE HEAT CORE-25 N/SUPPORT 2-2" OD x 100' LONG PATE COILS MAY BE HEAT CORE-25	N	
1-126	Room Tank Pump N/SUPPORT	1	125GPM/21" HD N/SUPPORT	BUTYLE RUBBER		N/SUPPORT 21" DIA. 100' LONG PATE COILS MAY BE HEAT CORE-25	A	
1-126-001	Room Tank Pump N/SUPPORT	1	500GPM/21" HD N/SUPPORT			TEFC	N	

CE 324

S SOURCE: N NEW

E EXISTING

R TO BE RELOCATED

** ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OR TEST MATERIAL, WHICHEVER IS HEAVIER

1-1-54

0726054

TOWOLDMON0048842

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

EQUIPMENT INFORMATION SUMMARY					PREPARED BY 1. S. YATES	CEA NO. 2041	AGE 1	REV. NO. 9
APPROVED BY 1. S. YATES					INITIALS 9-21-69	REV. NO. 2	REV. DATE 2-1-61	
EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC.	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	ESTIMATED PRICE (\$)	
1-121	GR. CO. SWABBER	1	230 ACFA AT 0" WATER 2 1/2" HT 5/8" x 4 1/4" SWABBER - 2" x 5 1/2" x 6"	HAVE G. 61 75 1/2"			N	
1-128	SKILL NO. 5 HEATER	1	1,300,000 ⁸⁵ BTU Hr OUTLET TEMP 470°C 8" DIA x 35" HIGH	CARBON STEEL	26000 △	EFF = 50% AREA - 550 FT. PAID WITH NATURAL GAS	N	
1-128-001	SKILL NO. 5 HEATER CONT'D.	1				APPROVED S & P SYSTEM	N	
1-127	SKILL POT NO. 5	1	1800 GAL 132" O.D. x 96" HIGH	CARBON STEEL	104000	N/S. SP. RT. LUGS W/CL. INSUL. RING W/CL. SUMP IN BOTTOM DASH FOR PUMP EMPTY WEIGHT 12000 LBS.	N	

CE 274

SOURCE: N - NEW E - EXISTING R - TO BE RELOCATED

* ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OR TEST MATERIAL, WHICHEVER IS HEAVIER

APPENDIX A

0726055

TOWOLDMON0048843

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

DATE FORWARDED	FILE NO.	REF. #	PAGE
1-30-68	204	1	10-15
DATE RECEIVED	INSTR. NO.	REV. NO.	REV. DATE
	1-27-68	2	2-7-68

ITEM NUMBER (EQUIPMENT IDENTIFICATION NUMBER)	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC.	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT POUNDS	REMARKS	ESTIMATED PRICE \$
1-132	Small 50 Cal. Rifle	1	14.5" L Cal. 5.56 1/2" Dia. 416	Chrome Steel	4000	W/STAMPING 2" H 1/2" DIA. 416 2" DIA. 416 2" DIA. 416	N
1-133	Small 50 Cal. Rifle	1	Small 50 Cal. 4600 FT 20" Dia. 416	Chrome Steel Steel & Brass & Tubes	4200	3/4" DIA. 416 X 1/2" DIA. 416 LONG 5" H FALL ON 2" H SIDE W/STAMPING 2" H EMPTY WEIGHT 3100 LB.	N
1-134	Small 50 Cal. Rifle	1	4000 Gm 96" Dia. 120" High 1/2"	Chrome Steel	62400	W/STAMPING 2" H 1/2" DIA. 416 X 1/2" DIA. 416 EMPTY WEIGHT 7800 LB. W/STAMPING 2" H 1/2" DIA. 416 (75FT)	N
1-135	Small 50 Cal. Rifle	1	126" Dia. 130" High 1/2" Dia. 416	Chrome Steel	1200	1/2" DIA. 416 1/2" DIA. 416 1/2" DIA. 416 1/2" DIA. 416	N
1-136-001	Small 50 Cal. Rifle	1	Small 50 Cal. 4600 FT 20" Dia. 416	Chrome Steel	4200	3/4" DIA. 416 X 1/2" DIA. 416 LONG 5" H FALL ON 2" H SIDE W/STAMPING 2" H EMPTY WEIGHT 3100 LB.	N

61 2,2

Abstract

4. Conclusions

RELOCATED

⁶ ESTIMATES OF WEIGHTS FOR LOG-NORMAL CONTAMINANTS ON 1987 MATERIAL HANDLING WORKERS IN LAURENS.

Mean . . . 1

0726056

TOWOLDMON0048844

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

CENTRAL ENGINEERING DEPARTMENT					EQUIPMENT INFORMATION SUMMARY			
EQUIPMENT NAME		EQUIPMENT IDENTIFICATION NUMBER		DATE	BY	NO.	REV.	
1-1500		1-1500-001		2-7-1	1	11	15	
1-1500		1-1500-001		2-7-1	2	2-7-1		
EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC.	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (LBS)	REMARKS	ESTIMATED PRICE	
1-1500	SING. NO. 5 CONDENSER PUMP ELECTRIC CONDENSER	1	200 GPM 100" DIA 100" DIA	CHINA STEEL			N	
1-1500-001	150" DIA. P. 5 CONDENSER PUMP	1	200 GPM 100" DIA	CHINA STEEL			N	
1-1500	SING. NO. 5	1	200 GPM 36" DIA. 45" HIGH A	CHINA STEEL	5400	W/2-20" HIGH X 6.5" DIA. PUMP PUMP ELECT. WEIGHT 600 LBS W/3 SUPPLY 1560	N	
1-1500	SING. NO. 5 EXHAUST	1	3 STAGE WITH INTER CONDENSER AFTER FIRST STAGE	GRANITE NOZZLES, PUMP PIN INTER ANGLE		WORTH WEIGHT # 2 1/2" TPL 1ST STAGE 2ND. ST. NO. 5 3RD. ST. NO. 5 W/10 INCH CONDENSER	N	
1-1500-001	DIET. CONDENSER	1	10" DIAMETER	CHINA STEEL		TO CONDENSE 350 LBS. / H. OF STEAM	N	

1-1500

1-1500-001

E. EXISTING

N. TO BE RELOCATED

1-1500-001 IS HEAVIER FILLED WITH OIL, CONTENTS OR TEST MATERIAL, WHICHEVER IS HEAVIER

App. n.

0726057

TOWOLDMON0048845

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PROJECT NAME EXPAN. COIL AT 1200'S				PREPARED BY R.C. H.E.	DATE 2080	SHEET 1	PAGE 12 15
				APPROVED BY 7-27-69	INITIAL ISSUE 1	REV. NO. 1	REV. ISSUE 1-K-K-1
EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC.	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	ESTIMATED PRICE (\$)
1-137 (EXIST. R10)	FINISHED PRODUCT SURGE TANK	1	5000 GAL 102"OD x 135" HIGH	CARBON STEEL		5" THICK SURGE TANK	E
1-138 (EXIST. R10)	TRANSFER PUMP HORIZ. CENTRIFUGAL	1	12" DIA. / 11.5" H AV. 3/2" I.D.	DUCTILE IRON			
1-139	THERMAL SURGE TANK	1	300 GAL 42"OD x 51" HIGH	CARBON STEEL	6775	W/INNER COIL FOR HEATING ONLY. INSULATED W/ SUPPLY - 166 - EMPTY HEIGHT 92" L.B.	N
1-140	THERMAL PUMP HORIZ. CENTRIFUGAL	1	100 GPM / 75" H AV. 3/2" I.D.	DUCTILE IRON		IN. 1/2" DIA. - 1/2" H W/ 1/2" DIA. - 1/2" H	N
1-140-001	MOTOR, THERMAL PUMP	1	7 1/2 HP / 175 RPM			TEFC	N
1-141	THERMAL COIL	1	600,000 BTU SHELL & TUBE 28" DIA. x 10' L 16" DIA. x 10' L	CARBON STEEL	3800	18" TUBE 24" DIA. x 14' L W/ 3/4" DIA. x 14' L 1/2" DIA. x 14' L 28" DIA. x 10' L	N

CE 124

S SOURCE: N-NEW E EXISTING R-TO BE RELOCATED

** ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OR TEST MATERIAL WHICHEVER IS HEAVIER

0726058

TOWOLDMON0048846

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY P. J. HART	DATE 8/26/65	SHEET 1	PAGE 12 OF 15
APPROVED BY	DATE 7-27-65	REV. NO. 1	REV. ISSUE 1-16-65

PROJECT NAME
L-1001 Solid Ammonia

EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	ESTIMATED PRICE (\$)
1-142	EJECTOR SWAMP TANK	1	200 GAL 36" OD x 45" HIGH	CARBON STEEL	1880	1/4" LESS DITY HEIGHT 600 LB	N
1-143	ELEVATOR	1	3.60' - 5000 LBS PLATFORM - 78" x 60" OVERALL HEIGHT 35' 0" HYDRAULIC TYPE				N
1-143-001	MOTOR, ELEVATOR	1	50HP/1800RPM			TEFC	N
1-144	PRIMARY SERVOSTAT	1	8000 1/2 IN. HCL	PUYESTER & FIBERGLASS			N
1-145	PRIMARY SERVOSTAT SEPARATION BOX	1	60" x 48" x 24"	PUYESTER & FIBERGLASS			N
1-146	SECONDARY SERVOSTAT	1	48" x 24" x 24"	PUYESTER & FIBERGLASS			N
1-147	SECONDARY SERVOSTAT SEPARATION BOX	1	30" x 24" x 24"	PUYESTER & FIBERGLASS			N

CE 724

A SOURCE: N=NEW

E=EXISTING

R=TO BE RELOCATED

** ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OR TEST MATERIAL WHICHEVER IS HEAVIER

APR 1965

0726059

TOWOLDMON0048847

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PROJECT NAME EXHAUST FUEL AIRCRAFTS				PREPARED BY AS 11-55	DATE 2060	AREA 1	REV 15
APPROVED BY				INITIAL ISSUE 110-61	REV NO	REV ISSUED	
CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	ESTIMATED PRICE (\$)
1-148	MOTOR CONTROLS CENTER	1					N
1-149	THERMOMETER SURFACE TANK	1	1900 GAL 60"OD x 184"LONG	CHROME STEEL	26200	W/TEMP. AT CHAMBER MINIMUM SURFACE W/TEMP. MOUNT FRANGE	N
1-150	THERMOMETER PIPE VERTICAL CENTRAL-VALVE	1	400 GPM 100' TDH TAPER HEAVY DUTY	CHROME STEEL			N
1-150-001	MOTOR THERMOMETER RAIL	1	50 HP/1800 RPM			TFC	N
1-151	1364 FLAPKID	1	24"OD x 48" LONG M. R. - SURF.	304 STAINLESS STEEL			N
1-151-001	MOTOR FLAPKID	1	5HP/1800 RPM			TFC	N

CE 71a

S SOURCE: N NEW

E EXISTING

R TO BE RELOCATED

** ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OR TEST MATERIAL WHICHEVER IS HEAVIER

11-151-001

0726060

TOWOLDMON0048848

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY R.S. WITE	CEA NO 2080	AREA 1	REV 15
APPROVED BY	INITIAL ISSUE 1-22-67	REV. NO 1	REV. ISSUE 1-27-69

PROJECT NAME
EXPANSION AIR LOCKS

CEQ EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC	MATERIAL OF CONSTRUCTION	** OPERATING WEIGHT (POUNDS)	REMARKS	ESTIMATED PRICE (\$)
1-152	FLAKEN FEED TANK	1	3000 GAL 90" DIA x 105" HIGH	CARBON STEEL	38600	WITH 50 PSLG JACKET FOR THEORETICAL EMPTY WEIGHT 5300 LBS	N
1-153	PULVERIZER	1	#28H MIKRO PULVERIZER 3000 #/HR	CARBON STEEL		EMPTY WEIGHT 1200 LBS	N
1-153.001	MOTOR, PULVERIZER	1	10HP/1800RPM			TEFC	N
1-153.002	AIR CONVEYING HOPPER	1	27" x 12 1/2" x 16 1/2" HIGH	CARBON STEEL		FOR A NO 28H UNIT	N
1-153.003	AIR CONVEYING DUCT	1	6" DIA	CARBON STEEL		FOR A NO 28H UNIT	N
1-154	DUST COLLECTOR	1	#25.5-6-30 MIKRO RISING CURVE	WITH WOOL FELT (HCE) FILTER MEDIA		EMPTY WEIGHT 700 LBS	N
1-154.001	CONTAINER, DUST COLLECTOR	1				ESTIMATED LBS	N
1-155	AIR LOCK	1	8" MIKRO	CAST IRON		SPEED 45/16 RPM	N
1-155.001	MOTOR, AIR LOCK	1	1/4 HP/1800 RPM			TEFC	N
1-156	BLOWER	1	#5E BUFFALO	CAST IRON		11/22ALF GATE	N
1-156.001	MOTOR, BLOWER	1	5HP/3450 RPM			TEFC	N
1-157	CONVEYOR	1	24" WIDE x 20 FT LONG			FOR A NO 158 CONTAINER	N

CE 774

* SOURCE: N-NEW

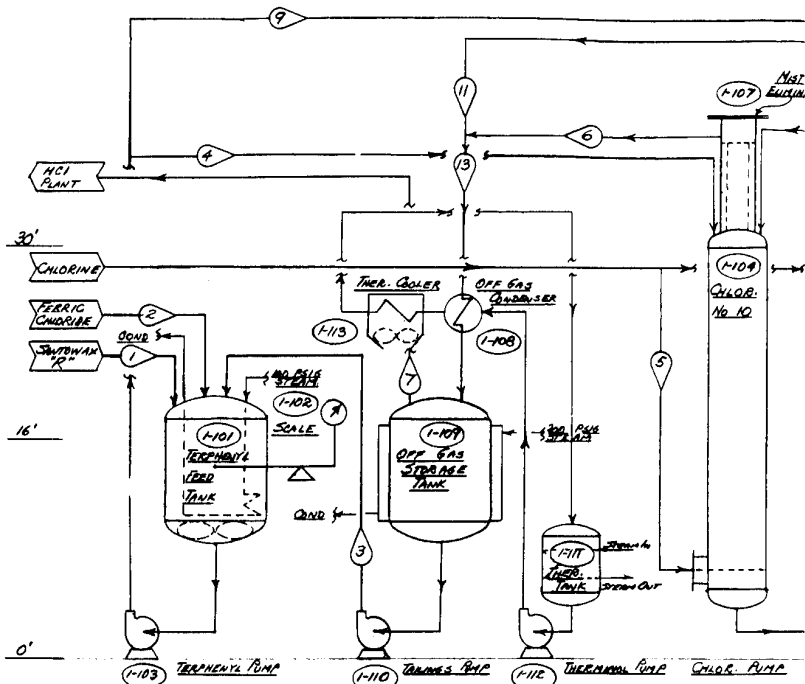
E-EXISTING

R-TO BE RELOCATED

** ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OR TEST MATERIAL, WHICHEVER IS HEAVIER

0726061

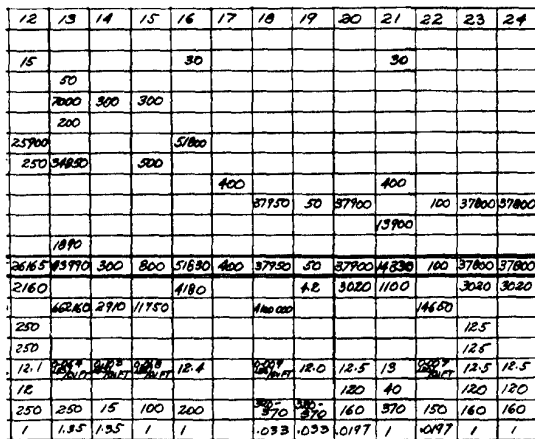
TOWOLDMON0048849



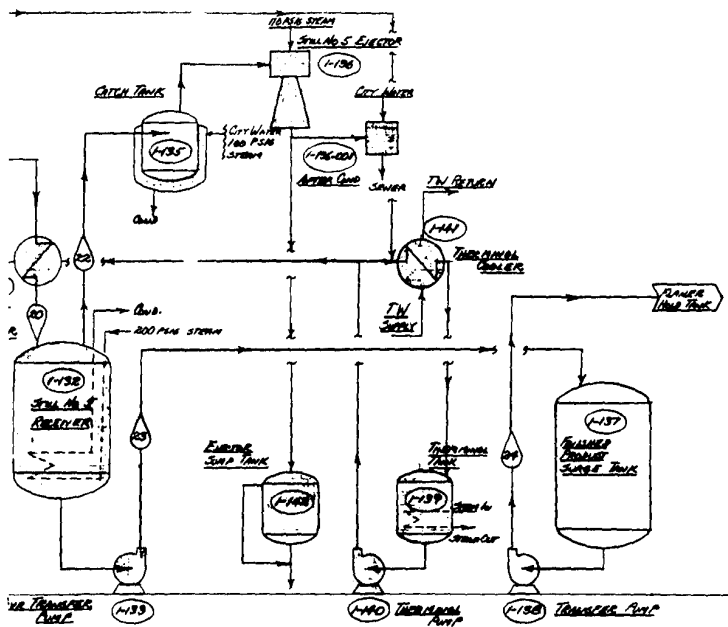
PROPERTY	FORMULA	MOL WT	1	2	3	4	5	6	7	8	9	10	11	12
SAWTOOTH 50	C_6H_6	78.1	11200			11200					11200			
FERRIC CHLOR.	$FeCl_3$	162.2		15		15				15	15			15
CHLORINE	Cl_2	70.9					32400	26	50			32400	25	
AIR		29.0					35000	3500	7000			3500	3500	
HYDROGEN	H_2	2.0					100	100	200			100	100	
CHLOR. 5060										25900				2590
HYDROGEN CHLOR.	HCl	36.5					17425	34850	250				17425	250
LIME	$Ca(OH)_2$	74.1												
5460	CaH_2Cl_2	574.6												
SAWTOOTH 5														
TAILINGS					945	945		945			945		945	
80% 20% BA			11200	15	945	2160	36000	21995	42100	2165	12160	36000	21995	26160
Gal / BA			1350		95	1450				2160	1450			2160
CU FT / BA							100800	33080	41420			100800	33080	
SPIN - AVG					100	125				250	125			250
SPIN - MAX					100	125				250	125			250
DENSITY - 50% BA			8.4		10	8.4	5.33	5.33	5.33	5.33	5.33	5.33	5.33	5.33
VISCOSITY - CP			10		100	26				12	26			12
TEMP °C			160		160	15	250			250	160	15	250	250
PRESSURE - ATM			1		1	1	1.35	1.35	1.35	1	1	1.35	1.35	1

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TOWOLDMON0048850

[illegible]

TOWOLDMON0048851



ANNUAL CAPACITY = LBS/BATCH * BATCH/YR = OPERATING HRS.

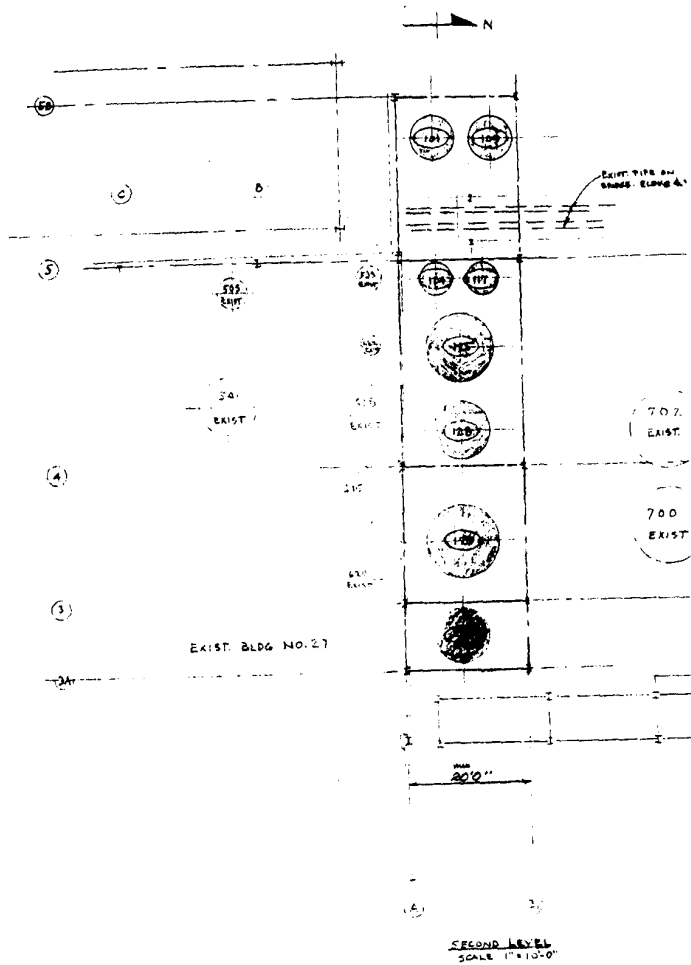
80,000,000 = 37800 LBS/BATCH * ONE BATCH / 2 HOURS = 6350 HRS

TIME - HRS
0.50
2.00
8.50
1.00
12.00 HRS

B	V-138 FINAL	REV
EN	DATE	BY
MONSANTO COMPANY CENTRAL ENGINEERING DEPARTMENT ST. LOUIS, MISSOURI		
ORGANIC DIVISION		AMMONIUM PLANT
PROCESS FLOW DIAGRAM & MATERIAL BALANCE		
SOLID AROMATIC EXPANSION		
DISTILLATION		
BY DATE		
DRAWN ASHATES 10-69		
DESIGN	PLANT	DATE
2080	C	D 2 8

0726065

TOWOLDMON0048853



0726066

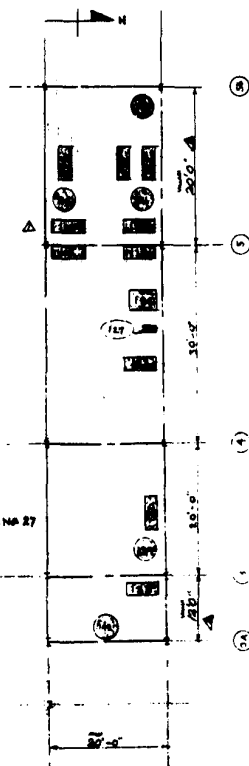
1. 200
200 4. 775-1. 5

0. 2.
11ST.

EXIST
810

0. 0.
11ST.

Exhibit B-10, No. 27



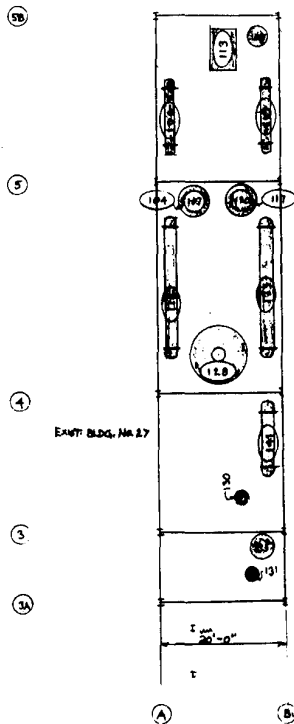
Light Pole (A) Corrected height 115' min.
21/11/11 Rev (B) DIMENSION CABLE - DIMENSION
FLOOR

GROUND LEVEL (ELEV. = 749.1')
SCALE 1"=10'-0"

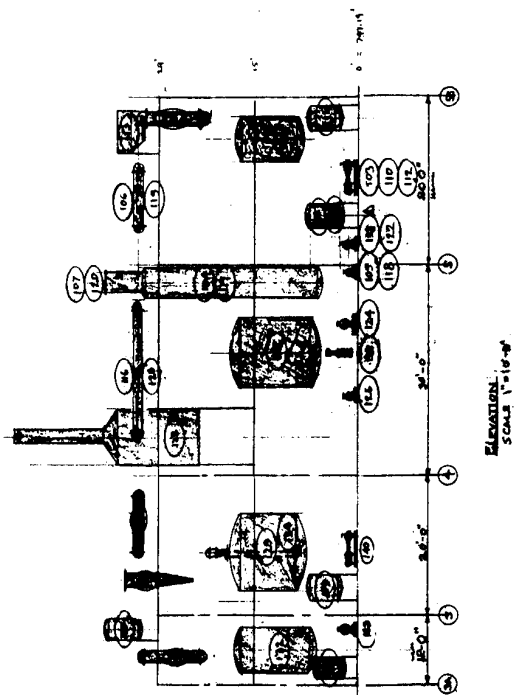
EQUIPMENT ARRANGEMENT STUDY
SOLID ARCADE EXPANSION
CEA-2080 SCALE 1"=10'-0"

By H.D. Gabelman
11/1/69

0726067



0726068



Verify Rev. 15 corrected as per Rev. 115
 Added item (115) to elevation view
 2/17/69 Rev. 15 diameter change - hand elevation

EQUIPMENT ARRANGEMENT STUDY
SOLID ROCKET EXTENSION

CRA-2080

SCALE 1"=10'-0"

by H.D. Guberman
 1/4/69
 Sheet 2 of 2

0726069

TOWOLDMON0048857

Appendix D

Building and Site Requirement

A. Building Size

Number of Floors - Three (includes ground and roof level)
Area per floor - 1500 sq/ft.
Bay Size - 20' X 18' - 2 required
 - 30' X 18' - 1 required
 - 12' X 18' - 1 required

B. Type of Construction

1. Structure - Open steel structure.
Roof to be reinforced concrete.
North wall to be enclosed with Monsanto
Lustra span panels or equal.
Second level floor to be grating.
Finish on steel to be coating standard
No. 502 or equal.
One stair at the east end of the structure.
2. Rooms
Control room ceiling will be acoustical tile.
Control room floor will be terrazzo to
conform to existing floor.
Walls will be painted concrete block.
3. Personnel Service Facilities - None required.
4. Elevators - A freight elevator for moving bags of lime
and rework to the operating floor is required.
Capacity - 5000 lbs. Only one floor is served.
5. Heating and Ventilating - None required.

C. Electrical

There are no flammable materials handled in the immediate operating area. Classification is water resistant.

Normal grounding requirements.

Lighting requirements - Allow sufficient lighting for operations at the ground, operating and roof level.

0726070

TOWOLDMON0048858

Provide two welding receptacles at each operating level, six required.

Provide two small tooloutlet receptacles at each operating level, six required.

D. Maintenance Provisions

The coil in the furnace, Item 1-128, has to be accessible for repair.

The submerged pump, Item 1-134, in the still pot, Item 1-129, must be installed so that it is readily removable.

E. Drainage

No spacial materials are required for drainage. Drainage ditches will be constructed in the ground level concrete pad and a curb installed around three sides of the entire pad.

F. Communications

None required.

G. Safety

No safety showers or eye wash fountains are required.

No explosion barricades are required.

No blow out panels are required.

H. Fire Protection

No sprinkler systems are required.

No fire wall, fire hose stations, fire alarms, or foam systems are required.

No building steel fireproofing is required.

I. Walks and Roads

None required.

J. Railroads

None required.

K. Parking Lots

None required.

L. Fences

None required.

M. Dock Facilities

None required.

0726071

N. Facilities to be Relocated

The control room will be expanded and the existing chlorinator panel will be relocated into this new control room addition.

O. Grading and Excavation

The area to the north of Building 27 is a filled area and good soil is available at 12 to 15 feet from the surface.

P. Site Covering

Rock covering in the areas around the site location.

0726072

Appendix E

Solid Aroclor Expansion

Scope of Work

01 - Equipment

See Equipment Information Summary

02 - Instrument Items

See Instrument List and Summary

03 - Setting and Testing Equipment

Area accessible for truck and train unloading. High lift can be used to set larger units. The new elevator will be installed in Building 27.

04 - Setting and Testing Instruments

An addition to the present control room will be required to make space available for setting instruments. The new addition will be 20 ft. X 30 ft.

05 - Piling

None required.

06 - Excavation

For operating floor 2200 cu.ft.
100 ft. X 22 ft. X 1 ft.

For elevator pit 360 cu.ft.
6 ft. X 10 ft. X 6 ft.

For structural piers 7700 cu.ft.
Mfg. Area 7 piers X 8 ft. X 8 ft. X 12 ft. = 5400
= 5400

Control Room 3 piers X 8 ft. X 8 ft. X 12 ft.
= 2300

Backfill required 5000 cu.ft.

Remove spoil - Sheet piling may be required
for shoring.

0726073

07 - Foundations

For Structural Steel	700 cu.ft.
10 pads X 6 ft. square X 1.2 deep with 12 ft. column 1.5 ft. square	
Floor Slab - Reinforced Concrete	1100 cu.ft.
24 ft. X 90 ft. X 6" thick	
Equipment Pads	120 cu.ft.
10 items X 6" Thick X 6 ft. X 4 ft.	
Concrete Basin Within Floor Slab for drainage	450 cu.ft.
2 ft. wide X 1-1/2 ft. deep X 6" thick X 90 ft. long, 2 required	

08 - Supports, Platforms and Structures

Equipment Supports	55 tons
Grating Requirement	2000 sq.ft.
Handrails	400 ft.
Toeplate	400 ft.
Misc. Structural Supports	8 tons
Stair Requirement	One complete stairway for two levels
Control Room Building Frame	10 tons
Control Room Floor	300 cu.ft.
30 ft. X 20 ft. X 6" thick	

09 - Other Building Items

Floor Covering for Control Room	600 sq.ft.
30 ft. X 20 ft. terrazzo to conform to existing floor	
Acoustical Ceiling for Control Room	600 sq.ft.
Windows for Control Room - Four Units	
5 ft. X 4 ft.	
Doors for Control Room - Two Hollow Steel Units	
3 ft. X 7 ft.	

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10 - Sprinklers

None required.

11 - Piping

<u>Item</u>	<u>Service</u>	<u>Material</u>	<u>Size</u>	<u>Rmks.</u>	<u>Length</u>	<u>Insul.</u>	<u>Valves</u>
1-101	Sant R	C.S.	2"X3"	Jacketed	75 ft.	1"	2 - Jctd.
	Biphenyl	C.S.	2"	Traced	75 ft.	1"	2 - CD3
	Vent	C.S.	3"X4"	Jacketed	35 ft.	1"	1 - Jctd. Vent
	To It.103	C.S.	3"X4"	Jacketed	30 ft.	1"	1 - Jctd.
	Misc.	C.S.	3"X4"	Jacketed Hose	2 ft.	-	-
	Misc.	C.S.	2"X3"	Jacketed Hose	2 ft.	-	-
	Misc.	C.S.	2"X3"	Jacketed Hose	2 ft.	-	-
	Therm.Ret.	C.S.	1"	-	50 ft.	1"	3 - FA37
	Steam	C.S.	1½"	-	40 ft.	1"	-
	Cond.	C.S.	1"	-	40 ft.	1"	-
1-103	Chlor. Charge	C.S.	3"X4"	Jacketed	100 ft.	1½"	1 - Jctd.
1-104	Relief	C.S.	2"	Traced	50 ft.	-	1 - CA46
	Relief	C.S.	3"	-	50 ft.	-	-
	Chlorine	C.S.	3"	-	60 ft.	-	4 - DE41M
	To It. 105	C.S.	3"X4"	Jacketed	30 ft.	2"	1 - Jctd.
	Jkt. S.S.Inner						
1-105	To It. 106	C.S.Jkt. S.S.Inner	3"X4"	Jacketed	50 ft.	2"	2 - Jctd.
	To It. 125	C.S.	3"X4"	Jacketed	25 ft.	2"	1 - Jctd.
	Sample	C.S.	2"X3"	Jacketed	30 ft.	2"	1 - Jctd.
1-106	To It. 104	C.S.Jkt. S.S.Inner	3"X4"	Jacketed	25 ft.	2"	-
	To It. 116	C.S.	4"	-	25 ft.	No	2 - FA42

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<u>Item</u>	<u>Service</u>	<u>Material</u>	<u>Size</u>	<u>Rmks.</u>	<u>Length</u>	<u>Insul.</u>	<u>Valves</u>
1-107	To It. 108	C.S.	4"	2 tracers	50 ft.	1½"	1 - CA46
	To HCl Line	C.S.	4"	2 tracers	50 ft.	1½"	2 - CA46
	To It. 109	C.S.	4"	2 tracers	30 ft.	1½"	1 - CA46
1-108	To It. 113	C.S.	3"	-	20 ft.	1"	-
	To It. 109	C.S.	4"	2 tracers	15 ft.	1½"	-
	Drain	C.S.	1"	-	20 ft.	-	1 - FA42
1-109	Vent	C.S.	2"X3"	Jacketed	25 ft.	1½"	1 - Jctd.
	Relief	C.S.	2"	-	25 ft.	-	-
	200 psig steam In.	C.S.	1"	-	50 ft.	1½"	2 - FA37
	Cond. Out	C.S.	1"	-	50 ft.	1½"	2 - FA37
	To It. 110	C.S.	2"X3"	Jacketed	30 ft.	2"	1 - Jctd.
1-110	To It. 101	C.S.	2"X3"	Jacketed	70 ft.	2"	2 - Jctd.
1-111	Vent	C.S.	2"	-	20 ft.	-	-
	Therm.In	C.S.	1½"	-	40 ft.	1½"	2 - FA37
	Therm.Out	C.S.	1½"	-	40 ft.	1½"	2 - FA37
	To It. 112	C.S.	3"	-	25 ft.	1"	1 - FA42
1-112	To It. 108	C.S.	3"	-	50 ft.	1"	1 - FA42
1-113	To It. 111	C.S.	3"	-	50 ft.	1"	-
1-117	Relief	C.S.	2"	Traced	50 ft.	-	1 - CA46
	Relief	C.S.	3"	-	50 ft.	-	-
	Chlorine	C.S.	3"	-	100 ft.	-	4 - DE41M
	To It.118	C.S. Jkt.3"X4" S.S.Inner		-	30 ft.	2"	1 - Jctd.

0726076

TOWOLDMON0048864

<u>Item</u>	<u>Service</u>	<u>Material</u>	<u>Size</u>	<u>Rmks.</u>	<u>Length</u>	<u>Insul.</u>	<u>Valves.</u>
1-118	To It. 119	C.S.Jkt. S.S.Inner	3"X4"	Jacketed	50 ft.	2"	2 - Jctd.
	To It. 123	C.S.	3"X4"	Jacketed	25 ft.	2"	1 - Jctd.
	Sample	C.S.	2"X3"	Jacketed	30 ft.	2"	1 - Jctd.
1-119	To It. 117	C.S. Jdt. S.S.Inner	3"X4"	Jacketed	25 ft.	2"	-
	To It. 123	C.S.	4"	-	25 ft.	No	2 - FA42
1-120	To It. 108	C.S.	4"	2 Tracers	50 ft.	1½"	1 - CA46
	To HCl Line	C.S.	4"	2 Tracers	50 ft.	1½"	2 - CA46
1-121	Vent	C.S.	4"	-	30 ft.	-	-
	To It. 122	C.S.	4"	Traced	30 ft.	No	2 - FA42
	Steam In	C.S.	1½"	-	50 ft.	1"	-
	Steam Out	C.S.	1½"	-	50 ft.	1"	-
1-122	To It. 119	C.S.	4"	Traced	70 ft.	No	3 - FA42
	To It. 123	C.S.	4"	Traced	30 ft.	No	1 - FA42
1-123	To It. 121	C.S.	4"	Traced	40 ft.	No	1 - FA42
	TW In	C.S.	6", 3"	-	50 ft.	-	1 - EA46
	TW Out	C.S.	6", 3"	-	50 ft.	-	1 - EA46
1-114	Vent	C.S.	4"	-	30 ft.	-	-
	to It. 115	C.S.	4"	Traced	30 ft.	No	2 - FA42
	Steam In	C.S.	1½"	-	50 ft.	1"	-
	Steam In	C.S.	1½"	-	50 ft.	1"	-
1-115	To It. 106	C.S.	4"	Traced	70 ft.	No	3 - FA42
	To It. 116	C.S.	4"	Traced	30 ft.	No	1 - FA42

0726077

TOWOLDMON0048865

<u>Item</u>	<u>Service</u>	<u>Material</u>	<u>Size</u>	<u>Rmks.</u>	<u>Length</u>	<u>Insul.</u>	<u>Valves</u>
1-116	To It. 114	C.S.	4"	Traced	40 ft.	No	1 - FA42
	TW In	C.S.	6", 3"	-	50 ft.	-	1 - EA46
	TW Out	C.S.	6" 3"	-	50 ft.	-	1 - EA46
1-124	To It. 125	C.S.	2"	-	60 ft.	-	-
1-125	Steam In	C.S.	1½"	-	60 ft.	2	2 - FA37
	Steam Out	C.S.	1½"	-	60 ft.	2	2 - FA37
	Vent	Saran Lined Steel	6"	Traced	50 ft.	No	-
	To It. 126	C.S.	3"X4"	Jacketed	30 ft.	2	2 - Jctd.
1-126	To It. 129	C.S.	3"X4"	Jacketed	75 ft.	2	2 - Jctd.
1-127	Vent	P.E.	6"	-	50 ft.	-	-
	Drain	Saran Lined Steel	3"	-	50 ft.	-	-
1-128	To It. 129	C.S.	3"X4"	Jacketed	30 ft.	2"	2 - Jctd.
	Gas In	C.S.	1½"	-	50 ft.	-	2 - CD3
1-129	To It. 130	C.S.	18"	-	-	2"	-
	To It. 134	C.S.	3"X4"	Jacketed	40 ft.	2"	2 - Jctd.
1-130	To It. 131	C.S.	16"	-	30 ft.	2"	-
	To It. 129	C.S.	2"X3"	Jacketed	10 ft.	2"	Site Glass
	To It. 141	C.S.	2"	-	30 ft.	-	-
1-131	To It. 132	C.S.	3"X4"	Jacketed	20 ft.	2"	2 - Jctd. Site Glass
	To It. 141	C.S.	2"	-	40 ft.	-	2 - FA37

0726078

<u>Item</u>	<u>Service</u>	<u>Material</u>	<u>Size</u>	<u>Rmks.</u>	<u>Length</u>	<u>Insul.</u>	<u>Valves</u>
1-132	Vent	C.S.	3"X4"	Jacketed	30 ft.	2"	1 - Jctd.
	Relief	C.S.	4"	-	30 ft.	-	-
	To It. 135	C.S.	3"X4"	Jacketed	40 ft.	2"	2 - Jctd.
	To It. 133	C.S.	3"X4"	Jacketed	30 ft.	2"	2 - Jctd.
	Steam In	C.S.	1½"	-	60 ft.	2"	2 - FA37
	Steam Out	C.S.	1½"	-	60 ft.	2"	2 - FA37
1-133	To It. 137	-	3"X4"	Jacketed	110 ft.	2"	2 - Jctd.
1-134	To It. 128	-	3"X4"	Jacketed	40 ft.	2"	2 - Jctd.
1-135	To It. 136	-	3"X4"	Jacketed	30 ft.	2"	2 - Jctd.
	Steam In	-	1"	-	30 ft.	1"	-
	Steam Out	-	1"	-	50 ft.	1"	-
	Water In	-	1"	-	50 ft.	1"	-
	Water Out	-	1"	-	50 ft.	1"	-
1-136	Steam In	C.S.	2"	-	30 ft.	1½"	-
	Water In	C.S.	2"	-	30 ft.	-	-
	Water Out Aftercond.	C.S.	2"	-	40 ft.	-	-
	Water Out Intercond.	C.S.	2"	-	40 ft.	-	-
	Vent	C.S.	3"	-	20 ft.	-	-
1-139	Steam In	C.S.	1½"	-	50 ft.	-	-
	Steam Out	C.S.	1½"	-	50 ft.	-	-
	Vent	C.S.	3"	-	20 ft.	-	-
	To It. 140	C.S.	2"	-	30 ft.	1"	2 - FA42
1-140	To It. 131	C.S.	2"	-	70 ft.	-	2 - FA42
1-141	To It. 139	C.S.	2"	-	50 ft.	1"	-

0726079

<u>Item</u>	<u>Service</u>	<u>Material</u>	<u>Size</u>	<u>Rmks.</u>	<u>Length</u>	<u>Insul.</u>	<u>Valves</u>
Misc.	Therm	C.S.	1½"	-	500 ft.	1½"	30 - FA37
	14 Conn. In						
	Therm	C.S.	1½"	-	500 ft.	1½"	30 - FA37
	14 Conn. Out						
	Therm	C.S.	6"	-	500 ft.	-	4 - FA37

12 - Ductwork

A 6 ft. X 6 ft. cabinet will be required for housing drums for draw-off of residue product for still pot.

13 - Electrical

Motors to be installed and wired:

<u>Number</u>	<u>Horsepower</u>
1	2
5	5
1	7½
2	10
3	15
2	20
1	25
1	30
1	50

Allow for remote pushbuttons and alarms for 10 motors.

Lighting required in operating area:

Ground Area,	18 ft. X 82 ft.	1476 ft ²
Operating Area,	18 ft. X 82 ft.	1476 ft ²
Roof Area,	18 ft. X 82 ft.	1476 ft ²

14 - Site Preparation

None required.

15 - Sewers

- 50 ft. of 4" permanite sewer pipe with one tie-in to existing 8" sewer which runs west of Building 27.
- 150 ft. of 304 S.S. guttering around the top of the new structure with 3-4" downspouts, each 30 ft. long

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16 - Underground Mains

None required.

17 - Yards, Roads and Fencing

None required.

18 - Railroads

None required.

19 - Insulation

Piping - Refer to Code 11

Equipment - As below - material Standard #100
Weatherproof, Std. #65

<u>Item</u>	<u>Area</u>	<u>Thickness</u>
1-101	250 ft ²	2"
1-104	200 ft ²	2"
1-107	50 ft ²	1"
1-109	250 ft ²	2"
1-111	80 ft ²	1½"
1-117	200 ft ²	2"
1-120	50 ft ²	1"
1-125	550 ft ²	2"
1-129	550 ft ²	4"
1-130	150 ft ²	3"
1-132	350 ft ²	2"
1-139	80 ft ²	1½"
10 Pumps		2"

20 - Painting

Coating Standard #502, Epoxy System.

All uninsulated piping, air, water, gas.

Supports for Items 106, 113, 116, 119, 123, 128, 141, 142,
132, 135.

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21 - Walls, Masonry, Roofs and Roofing

Concrete roof deck for mfg. area - reinforced concrete, 20 ft. X 90 ft. X 5" thick	750 cu.ft.
Concrete roof for control room - reinforced concrete, 20 ft. X 35 ft. X 5" thick	290 cu.ft.
Concrete wall for control room - concrete block, 3 walls, total feet - 70 ft. X 15 ft. high	1050 sq.ft.
Concrete enclosure for elevator - concrete block, 4 walls, total feet - 30 ft. X 25 ft. high	750 sq.ft.
Built up 4-ply roof for control room, 20 ft. X 35 ft.	700 sq.ft.
North wall of mfg. structure will have Monsanto Lustra Span panels for a distance of 80 ft. and height of 12 ft. in each level.	1920 sq.ft.

90 - Dismantling

1. North wall of Building 27, approximately 1500 sq. ft. of brick wall.
2. South wall of present control room, 450 sq.ft. of concrete block wall.
3. Shed to south of present control room, approximately 600 sq.ft. of transite roof and steel platforms inside shed.
4. Biphenyl heater on Still No. 1. This is a unit heater in the shed.

92 - Repairs Expense

Replace existing head on Item 535. This is a 2000 gallon vessel and requires a new 78" O.D. carbon steel head.

93 - Relocation and Modification Expense

1. Remove and relocate Item 205, a 14' dia. X 10' high storage tank with coil and agitator.
2. Remove and relocate stairway to the north of Building 27.
3. Remove and relocate 10 ton stand-up tube air-conditioner which is now in the south section of the control room.
4. Remove and relocate a 20 ft. chlorinator panel from its existing position in the present control room to the new control room.
5. Remove the present 1268 flaker (24" X 48" unit) and replace with a new unit. This unit will be relocated to an area just east of the present flaker.

0726082

APPENDIX E - Amendment No. 1

Scope of Work - CEA 2080

07 - Foundations

For Elevator Pit (Reinforced Concrete) 150 cu.ft.

08 - Supports, Platforms and Structures

Equipment Support For Item 152 6 tons
Grating Requirement For Item 152 225 sq.ft.
Handrails 60 ft.
Toeplate 60 ft.
Stair Requirement One Stairway For One Level

11 - Piping

<u>Item</u>	<u>Service</u>	<u>Material</u>	<u>Size</u>	<u>Rmks.</u>	<u>Length</u>	<u>Insul.</u>	<u>Valves</u>
1-152	Charge	C.S.	3"X4"	Jacketed	125 Ft.	2"	1 - Jctd.
	Charge	C.S.	2"X3"	Jacketed	125 Ft.	2"	1 - Jctd.
	Therminol	C.S.	1½"	-	200 Ft.	1½"	2 - FA5
	Vent	C.S.	3"X4"	Jacketed	30 Ft.	-	-
	Overflow	C.S.	3"X4"	Jacketed	30 Ft.	1½"	-
	Outlet	C.S.	2"X3"	Jacketed	50 Ft.	1½"	1 - Jctd.

12 - Ductwork

A 6 ft. X 8 ft. X 10 ft. hopper will be required under the new flaker.

13 - Electrical

Use PVC coated conduit.

19 - Insulation

<u>Item</u>	<u>Area</u>	<u>Thickness</u>
1-152	320 ft ²	2"

90 - Dismantling

A section of floor in Building 27 - Area 400 ft² for 1268 flaker.

0726083

92 - Repairs Expense

5. Repair or replace section of floor at new 1268 flaker.

93 - Relocation and Modification Expense

Remove Item (5) from original scope and replace with the following:

5. Relocate 18" I beam to south of control room. This beam is 40 ft. long and will be moved south approximately one foot.
6. Relocate 2 - 6" IPS tower water lines to south of control room - Total feet = 100.
7. Relocate miscellaneous 2" IPS pipe to south of control room - Total feet = 100.

0726084

APPENDIX E - Amendment No. 2

Scope of Work - CEA 2080

This amendment describes the work required to install a power pulverizer to grind flakes of Aroclor 1268. It includes a mill, conveying duct to dust collector, air lock to discharge material into fiber containers and a dust collector with blower. Instruments will be required at the dust collector.

03 - Setting and Testing Equipment

Pulverizer will be located under the flaker unit. The dust collector and pulverizer will be located on support steel.

08 - Supports, Platforms and Structures

Miscellaneous equipment supports, light steel 1 Ton

12 - Ductwork

Install 75 feet of 6 and 8" duct for blower and pulverizer.

11 - Piping

Install 100 feet of 1½" IPS piping to filter for air.

13 - Electrical

Motors to be installed and wired:

Number	Horsepower
1	10
1	5
1	¼

Conduit run to dust collector controls.

20 - Painting

Support steel with Std. #502 Epoxy System.

0726085

APPENDIX E - Amendment No. 3

Scope of Work - CEA 2080

22 - Spares

A pump, indential to Item 1-134, is to be purchased and held as a spare in the storeroom. Item 1-134 is a special submerged pump, critical to the operation of the Aroclor plant, and is required to prevent losses due to pump failures.

Size	200 GPM
TDH	100 Feet
Make	Taber Heavy Duty

0726086

TOWOLDMON0048874

APPENDIX E - Amendment No. 4

Scope of Work - CEA 2080

07 - Foundations

For access to elevator

1 ft wide x 4 ft high x 40 ft 160 cu ft

Retaining wall at west end of manufacturing area

1 ft wide x 2 ft high x 25 ft 50 cu ft

Floor slab for elevator access

8 ft wide x 6" thick x 25 ft 100 cu ft

11 - Piping

300 ft of 2" lps

200 lb steam line, insulated

13 - Electrical

Lighting for Control Room area

20 ft x 30 ft 600 ft²

15 - Sewers

Add 25 ft of 4" permanite to existing 6" sewer in the HCl area.

90 - Dismantling

Remove existing elevator after new elevator is installed.

Dismantle 10 foundations in ground to north of Building 27:

Size: 4.5 ft x 13.5 ft x 1.25 ft thick

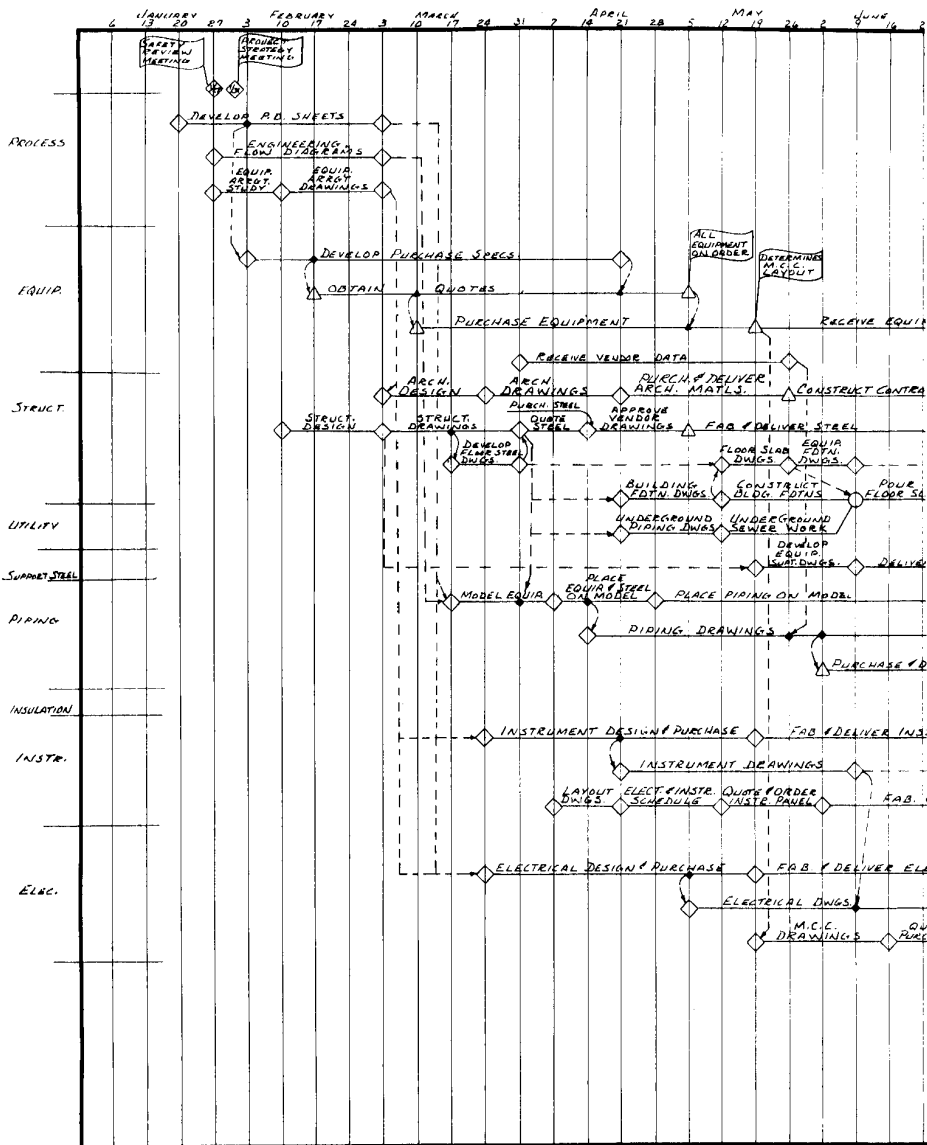
Dismantle 500 gallon jacketed tank with agitator at present 1268 flaker.

0726087

93 - Relocation and Modification Expense

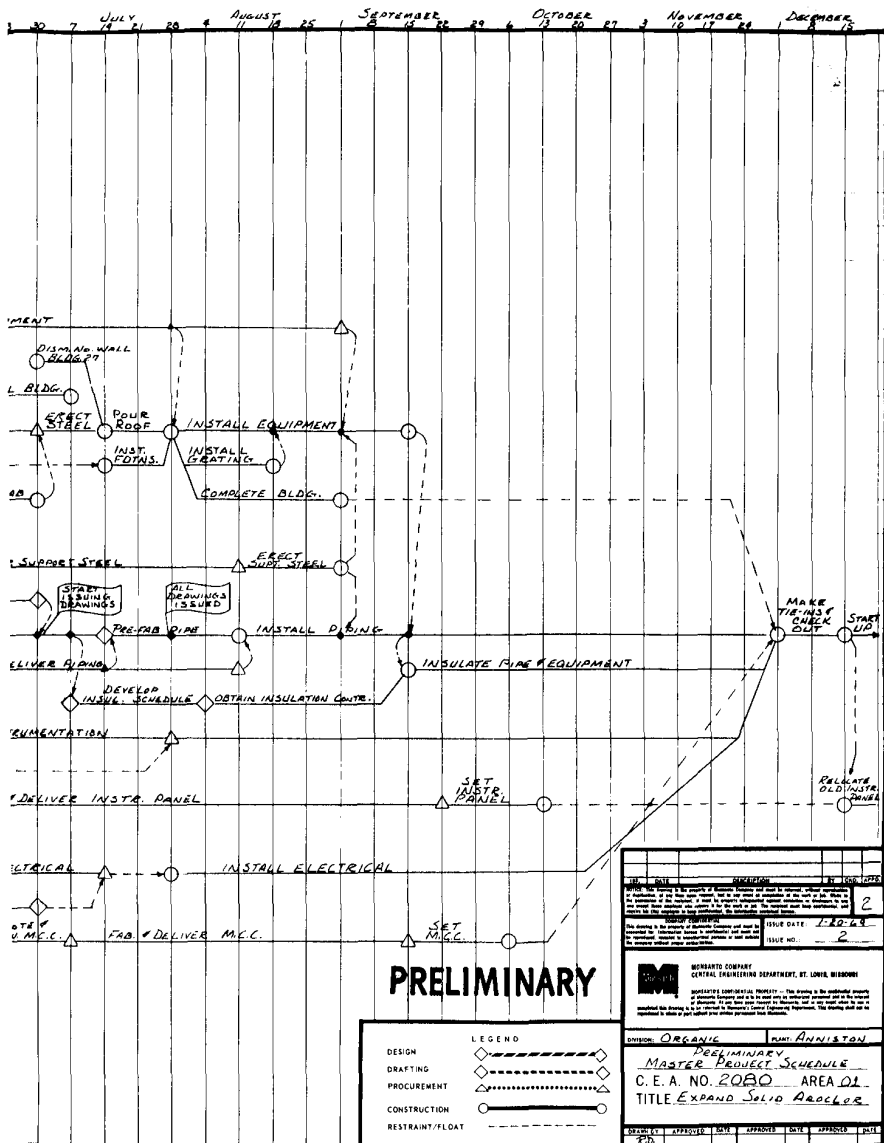
8. Relocate telephone lines to north of Building 27.
9. Relocate 100 ft of 2" lps nitrogen line to north of Building 27.
10. Relocate 50 ft of 2" process lines from new pipe bridge to north of Building 27--two lines.
11. Relocate steam tracers and trap discharge to new condensate pig.
12. Relocate 3" lps gas line in control room area - 30 ft.
13. Relocate 4" cast iron vent from toilet.
14. Relocate stove, sink, refrigerator and water cooler into new control room.
15. Relocate stairway to third level of Building 27 to ejector operating level.
16. Relocate No. 3 Blower to No. 4 Still Blower Tank.
17. Add 20 ft of 10 inch duct to existing tar blow stack.
18. Relocate and modify stairway outside of Building 27 at NE corner which will interfere with elevator.

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0726089

TOWOLDMON0048877



0726090

TOWOLDMON0048878

Monsanto

FORM NAME & LOCATION: General Offices - St. Louis

DATE January 24, 1969 cc R. E. Howard
G. O. Hunt
SUBJECT Project Loss Prevention P. K. Ward - Anniston
Report 69-7 S&PP Project File
REFERENCE CEA 2080 S&PP Location File
TO : Mr. R. S. Yates

COPIES TO THOSE PRESENT

R. J. Green
W. B. Howard
R. M. Kountz
W. E. Voss - Anniston
R. S. Yates

DATE AND PLACE OF MEETING

January 23, 1969, Creve Coeur,
Missouri.

CEA 2080 Expand Solid Arochlors, Anniston Plant, Anniston,
Alabama.

This project is increasing the plant capacity for manufacture of solid arochlors from 9.6 to 29.6M ppy. The project capital is approximately \$1.03M. Completion target is December 15, 1969.

PERSONNEL

1. Chlorinated Biphenyl Content of Product An overall project objective is to minimize chlorinated biphenyl content in the solid arochlor 5460. This is needed for FDA approval of the material, since it is used in hot-melt adhesives in food packaging. It is also used in plasticizers.
2. Elevator It is planned to install an elevator to handle both freight and passengers. The elevator will have the capacity for 5000 pounds and will likely be hydraulically operated. It was agreed that the project manager will review the elevator design and safety controls with Mr. George Gorbell.
3. Lime Addition Lime is added to the still pot from 50 pound bags. This size bag is considered safe for personnel handling.

0724091

MECHANICAL

An external gas-fired heater is used for the still pot. Combustion safeguards are planned by the project; these will include a Honeywell protecto-glow unit. There will also be a pilot interlock. The combustion safeguards should be reviewed with Mr. George Ostroot when the heater design is further along.

In addition, some process safety provisions will be incorporated in the heater. A high temperature sensing unit on the process material coming out of the furnace will shut down the burner on high temperature. If the circulation through the heater stops, an alarm will sound. Standard instrumentation will be employed for these functions.

PROCESS

1. Alarms and Interlocks The operation of the chlorinators will be sequence controlled. Chlorination starts at a temperature of about 150°C. As the batch progresses the sequence controller steps the temperature upward so that, at the conclusion of chlorination of a batch, the temperature is in the range of 250-255°C. The temperature will be recorded in the chlorinator; an alarm will be actuated at high temperature. It was agreed that the project will consider use of a differential temperature alarm, based on the desired temperature at any stage of the batch, rather than a high temperature alarm which must function at a temperature higher than the maximum batch temperature. It was believed that this type of alarming would be a better investment of money than the addition of a second high temperature alarm on the reactor, and located in the vapor discharge from the reactor.

There will also be temperature detection in the arochlor circulating line on the chlorinator. A high temperature in this line will give an alarm and will also close the chlorine supply valve. The complete closure of the chlorine supply valve will not be possible because chlorine will come from tank cars rather than from the chlorine unit.

If flow should cease in the arochlor circulating line there will be an alarm and the chlorine valve will be closed.

There will also be an alarm if the therminol circulation should stop.

Appendix

0726092

January 24, 1969

Other alarms include the following: a scale alarm to prevent overcharge of the weigh tank; a low temperature alarm on the chlorinator at 120°C; water coolant to the therminol cooler to prevent too low a water temperature; a signal when the batch is 80% chlorinated in order to signal the time to initiate sampling; high (80°C) and low (60°C) temperature on the circulating therminol. The project is also considering installation of a nuclear instrument on the process circulating line at the chlorinator to determine density; it is hoped that this density figure can be correlated with softening point. If the correlation works out on a present plant test, the equipment will be installed.

2. Operating Time The operating time of the present unit is only about 74%. Downtime on a chlorine plant has been a part of the problem; the new purchased chlorine arrangement should help this. Another part of the problem has been maintenance. It is also hoped that this can be improved in order to improve the on-stream factor.
3. HCl Scrubber In order to minimize the HCl venting to the atmosphere the project will add equipment for improved HCl absorption and scrubbing.
4. Gas Fired Heater Operation The firing rate on the heater is manually indexed on a flow controller on the gas to the burner. This type of control has proved adequate with the present plant installation and is believed to be adequate for the new heater. The project will also try to design the heater coils in such a manner as to simplify coil removal for the furnace. The furnace coils can be expected to burn out approximately annually. This is considered a normal maintenance item and presents no major problems.
5. Residue Removal If the residue is removed from the system in the manner used at present, the fume hood venting provisions will be improved over those at present. The project also plans to try to develop a system for flaking the residue.

BUILDING AND FIRE PROTECTION An 18' x 90' x 2 level bay will be erected adjacent to the north wall of Building No. 27. The construction will be open steel frame with reinforced fiber glass polyester wind-breaks, concrete slab roof and steel grate flooring at the first level above ground level.

Hydrant #13 with hose house and hydrant #19 with attached monitor nozzle are adequate fire protection. No sprinklers or fire-proofing are needed.

0726093

TOWOLDMON0048881

January 24, 1969

A 20' x 30' extension to the existing control room will be erected at the 16 ft. level. The construction will be concrete block walls and non-combustible roof. No fire protection is needed.

LOSS EXPOSURE The maximum probable loss was considered to come from loss of the heater for the still pot as a result of explosion in the fire box. It was considered that approximately six days will be required to re-brick and repair the heater. A spare coil will be kept in stock.

It was estimated that the repairs would cost about \$10M. Six days were estimated to be sufficient for the repairs. The business interruption loss during this period of time would be approximately \$45M.

LOSS PREVENTION REVIEW CHECK LIST Attached to R. S. Yates' copy of this report is a copy of Form G-1425, Loss Prevention Review Check List, which can be used as a safety check list for this project.

LOSS PREVENTION REVIEW BY PLANT The S&PP Branch of CED cannot review design prints and construction steps in detail as this project progresses. S&PP requests plant personnel, including plant safety personnel, to hold additional safety reviews at the plant, to follow the development of design prints, and to check the progress of construction in order to make maximum contributions from their experience with these operations to the CED personnel involved in execution of this project.

SAFETY MANAGER G. O. Hunt will be Safety Manager for this project. Please contact him for additional safety reviews needed during design.

R. J. Green
R. J. Green

W. B. Howard
W. B. Howard

bjr
Attachment

0726094