Central Engineering Department

Project Scope Report

Solid Aroclor Expansion

CEA 2080

New 20 $\overline{M}$ lbs./year Plant

Anniston, Alabama Plant

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

0726095

TOWOLDMON0048883

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

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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

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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 lossss 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	50,000
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:

Aroclor Designation	Starting Raw Material	Chlorination Level	Distilled
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):

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Aroclor Designation	On Chlorine	On Biphenyl	On Santowax C	On Santowax R
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:

	Lbs./100 Lbs. Aroclor
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 Materails

1.221 Specifications

Raw material specifications, as listed below, are appended.

Material Code	Date	Material
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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Product Code	Date	Product
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 sewered 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.

Montar No.	Aroclor	Softening Point Range	Calcium Oxide
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 flakering 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

Container Weights

Material	Weight - lbs.	Container	Form
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 aboid 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 mucuous membranes. In strong concentrations, rubber protective equipment should be worn. Maximum allowable concentration of HCl gas in air is 10 ppm.

TOWOLDMON0048893

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.

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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 Capacity

Chlorination:

Basis	Producing Aroclor 5060
OST	6350 hrs./year
Rate	27.6 $\overline{M}$ lbs./year

Distillation:

Basis	Producing Aroclor 5460
OST	6350 hrs./year
Rate	20.0 $\overline{M}$ lbs./year

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

Present Capacity	9.6 $\overline{M}$ lbs./year
New Capacity	20.0 M lbs./year
Total Capacity	29.6 $\overline{M}$ 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:

	1970	1973
New Capacity	29.6 $\overline{M}$ lbs./yr.	29.6 $\overline{M}$ lbs./yr.
Required	17.1 $\overline{M}$ lbs./yr.	22.6 $\overline{M}$ lbs./yr.
Excess Capacity	12.5 $\overline{M}$ lbs./yr.	7.0 $\overline{M}$ 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.

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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.

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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.

TOWOLDMON0048898

MONSANTO CHEMICAL COMPANY
ORGANIC CHEMICALS DIVISION
W. G. KRUMMRICH PLANT
RAW MATERIAL SPECIFICATION

PRODUCT CODE: 33500
METHOD IDENTITY:
SUPPLIER:

ISSUED Feb. 26, 1957
STANDARDS DEPARTMENT
Wm. G. Krummrich Plant
By [signature]

MATERIAL: FERRIC CHLORIDE ANHYDRIDE

CHEMICAL FORMULA: $FeCl_3$

MOL. WT.: 162.21

SUPERSEDES SPECS. OF: New

SAMPLE FOR ANALYSIS: 1x8 oz. W. M. Bottle

UNCLASSIFIED INFORMATION

General Tests (made only on request)

Property	Specification	J.F.Q. Method No.
Appearance	Black powder or granules	16-A
Assay	97.0%, Min.	22-570
Sulfates	0.05%, Max.	120-570
Ferrous Salts	Trace, Max.	S-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.	

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TOWOLDMON0048899

MONSANTO CHEMICAL COMPANY
ORGANIC CHEMICALS DIVISION

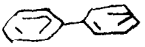
FINISHED PRODUCT SPECIFICATION

PRODUCT CODE	826.01
METHOD IDENTITY	
SALES CODE	135-000-03-09

Issued 5/5/61
Anniston Plant
By W. W. Klemmar
Revised to add typ values 11-18-65

PRODUCT (Trade name)	TYPE
Biphenyl	Technical
PRODUCT (Chemical name)	TYPE
Biphenyl	Technical

CHEMICAL FORMULA



$C_{12}H_{10}$

MOL WT. 154.20

USE Sales

SUPERSEDES SPECS OF	SPECIAL JOB NO.	SAMPLE FOR ANALYSIS
7/8/65		1 x 16 oz. can

Characteristics	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

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TOWOLDMON0048900

Monsanto
ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

PRODUCT		
Santowax C		32
PLANT	PRODUCT CODE	USE
Anniston	829.10	Internal
DATE EFFECTIVE	SALES CODE	
3-9-66	7795-050-99-009	

APPROVALS

PRODUCTION	RESEARCH
[illegible] Moody /s/ 2-1-66	L. R. Stark /s/ 2-3-66 - M. McEwen /s/ [illegible]-66
SALES	QUALITY CONTROL (Chief Chemist)
[illegible]. Ault /s/ 2-22-66	O. E. Dolin /s/ 2-1-66

GENERAL DESCRIPTION — CHEMICAL FORMULA

[illegible]ture

MOL WT.

SUPERSEDES SPECS. OF	SAMPLE FOR ANALYSIS	ISSUED BY
[illegible]-1-57	2 - 1 Pint Cans	J. A. Liddle 1-12-66

CHARACTERISTIC	LIMITS	METHOD
RICTED INFORMATION		
[illegible]earance	Brown, waxy solid	G-1
[illegible]ting Point, °C	350 Min.	
[illegible]ho Terphenyl, %	**10	064
M[illegible]a Terphenyl, %	**50	064
[illegible] Terphenyl, %	**26	064
[illegible]erphenyl, %	**14	072
[illegible]henyl, %	**0.1	064
[illegible] Point, °C	**375	114
[illegible]ine, ppm	2.0 (Typical)	
[illegible]r, ppm	2.0 "	

[illegible]ribution of isomers and quaterphenyls vary with operating condition.

[illegible] limited data is available; therefore, the limits given are typical values of [illegible]e characteristics.

[illegible]roduct is mainly used as a raw material for other finished products produced [illegible]on.

[illegible]pecification is for internal use only.

R Routine Analysis. All others Analyzed by request Only

MGM-382

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TOWOLDMON0048901

Monsanto
ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

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

APPROVALS

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

GENERAL DESCRIPTION: Mixed Terphenyls

CHEMICAL FORMULA

MOL WT.

SUPERSEDES SPECS. OF	SAMPLE FOR ANALYSIS	ISSUED BY
2-12-62	2 x 1 pint cans	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 Analysed by request Only

REVISED

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TOWOLDMON0048902

Monsanto
ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

MATERIAL CODE	MATERIAL
826.38	Chlorine Gas
PLANT	USING DEPTS.
Anniston	04, 05, 27
DATE EFFECTIVE	SUPPLIER
8-31-66	See below

APPROVALS

PRODUCTION	RESEARCH
R. G. Moody /s/R. G. Moody - 8/11/66	L. R. Stark /s/L. R. Stark - 8/29/66
PROCUREMENT	QUALITY CONTROL (Chief Chemist)
H. L. Phillips /s/H. L. Phillips - 8/15/66	O. E. Dolin /s/O. E. Dolin - 8/10/66

GENERAL DESCRIPTION: Greenish yellow gas

CHEMICAL FORMULA: Cl_2 Mol. wt. 70.91

SUPERSEDES SPECS OF	SAMPLE FOR ANALYSIS	ISSUED BY
Sept. 11, 1957	CLC sampling container	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-314

0726115

TOWOLDMON0048903

Monsanto
ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

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

APPROVALS

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

$Ca(OH)_2$

Mol. wt. = 74.10

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

CHARACTERISTIC	NUMBER	METHOD
	Typical Analysis	
UNRESTRICTED INFORMATION		
CaO (%)	73.00	
MgO (%)	1.20	
SiO_2 (%)	0.36	
Al_2O_3 (%)	0.60	
Fe_2O_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) $Ca(OH)_2$ % = 100% - [MgO(%) + SiO_2 (%) + Al_2O_3 (%) + Fe_2O_3 (%)]

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

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TOWOLDMON0048904

Monsanto
ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

PRODUCT			DEPT.
Aroclor 1268			27-S
PLANT	PRODUCT CODE	USE	
Anniston	826.16	Sales	
DATE EFFECTIVE	SALES CODE		
3-11-66	1040-340-04-11-16-009		

APPROVALS

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

GENERAL DESCRIPTION: Mixture

CHEMICAL FORMULA:

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

CHARACTERISTIC	LIMITS	METHOD
UNRESTRICTED INFORMATION		
(R) Appearance and color	White to off-white powder	G-1
Color, Gardner	6 Max.	
(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 Analysis, All others Analyzed by request Only

0726117

TOWOLDMON0048905

Monsanto
ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

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

APPROVALS

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

Mixture

CHEMICAL FORMULA

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

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

0726118

TOWOLDMON0048906

Monsanto
ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

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

APPROVALS

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

GENERAL DESCRIPTION: Mixture

CHEMICAL FORMULA:

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

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

0726119

TOWOLDMON0048907

Monsanto
ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

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

APPROVALS

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

GENERAL DESCRIPTION: Mixture

CHEMICAL FORMULA:

VOL 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

CHARACTERISTIC	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

0726120

TOWOLDMON0048908

Monsanto
ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

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

APPROVALS

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

GENERAL DESCRIPTION: Mixture

CHEMICAL FORMULA:

MOL WT.

SUPERSEDES SPECS. OF	SAMPLE FOR ANALYSIS	ISSUED BY
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

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

0726121

TOWOLDMON0048909

Monsanto
ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

PRODUCT		DEPT.
Aroclor 5442		27-S
PLANT	PRODUCT CODE	USE
Anniston	826.21	Sales
DATE EFFECTIVE	SALES CODE	
3-15-66	1040-470-04-009	

APPROVALS

PRODUCTION	RESEARCH
R. G. Moody /s/ 12-29-65	L. R. Stark /s/ 3-11-66
SALES	QUALITY CONTROL (Chief Chemist)
W. E. Ault /s/ 3-2-66	O. E. Dolin /s/ 12-29-65

GENERAL DESCRIPTION

Mixture

CHEMICAL FORMULA

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

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

0726122

TOWOLDMON0048910

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	CHECKED	APPROVED	DATE
[illegible]	[illegible]	1	1 15

PROJECT NAME: [illegible]

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE RATING MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	[illegible]	ESTIMATED PRICE ($)
1-101	TERPHENYL FEED TANK	1	[illegible]	[illegible]	[illegible]	[illegible]	N	
1-101-001	DRIVE, TERPH FEED TNK	1	FALK - 4EL HZ 1750 RPM			OUTPUT [illegible]	N	
1-1[illegible]	MOTOR TERPH FEED TANK AGITATOR	1	10 HP/1800 RPM			TEFC	N	
1-101-003	AGITATOR, TERPH FEED TANK	1	26" DIA TURBINE 6 BLADES SPEED - 125 RPM	CARBON STEEL		[illegible]	N	
1-1[illegible]	TERPHENYL [illegible] TANK [illegible]	1	40000 LB NET CAPACITY HORIZON [illegible]			[illegible]		

[illegible] E EXISTING R TO BE RELOCATED

[illegible] ESTIMATED WEIGHT FILLED WITH NORMAL CONTENTS OR TEST MATERIAL WHICHEVER IS HEAVIER

0726123

TOWOLDMON0048911

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	DATE	SHEET	[illegible]
[illegible]	[illegible]	1	[illegible] 15
APPROVED BY	INITIAL ISSUE	REV NO	REV ISSUE
	[illegible]	1	[illegible]

PROJECT NAME: [illegible]

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	CODE	ESTIMATED PRICE ($)
1-1[illegible]	Tenon Feed [illegible] [illegible] Centrifugal	1	125 GPM/75' [illegible] [illegible]	[illegible]		Incl [illegible] [illegible] [illegible] [illegible] [illegible]	N	
1-103-001	Motor, Tenon Feed Pump	1	5HP [illegible]			TEFC	N	
1-104	Chlorinator No 10	1	3064 GAL 54"OD x 25'HWH	Carbon Steel	460[illegible]	W/[illegible] [illegible] MH [illegible] [illegible] [illegible] W/30" [illegible] 84"/[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]	N	
1-1[illegible]	[illegible]	1	250 GPM/[illegible] [illegible]	[illegible]		[illegible] [illegible]	N	
[illegible]	[illegible]	1	[illegible]			[illegible]		

CE 224

E: EXISTING R: TO BE RELOCATED

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

0726124

TOWOLDMON0048912

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	DATE	REV.	SHEET
[illegible]	[illegible]	1	[illegible]

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REV. NO.	REV. ISSUE
[illegible]		[illegible]	1	[illegible]

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT POUNDS*	REMARKS	N & E	ESTIMATED PRICE ($)
1-1	[illegible] COOLER	1	6400.000 BTU/HR SHELL & TUBE 290 SQ.FT 16 [illegible] x 11 FT	[illegible] STEEL SHELL & BONNETS 316 [illegible] [illegible]	3625	[illegible] x 3/4 [illegible] x 3/4 [illegible] W/2 [illegible] [illegible]	N	
1-107	MIST ELIMINATOR	1	465 ACFM AT 250°C	316 STAINLESS STEEL SUPPORT WIRE	IN CHAR. WEIGHT	UNIT [illegible] INTO 2½" x 7" [illegible] [illegible] OF [illegible]	N	
1-10[illegible]	OFF GAS CONDENSER	1	100.000 BTU/HR SHELL & TUBE 250 SQ.FT 24[illegible] x 11 FT	CARBON STEEL	5650	[illegible] 1½ OD x 14 [illegible] 3/4 FT [illegible] W/4 [illegible] W/F [illegible] [illegible] 248 [illegible]	N	

LEGEND: N NEW E EXISTING [illegible] TO BE RELOCATED

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

[illegible]

0726125

TOWOLDMON0048913

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	DEPT. NO.	SHEET	DATE
[illegible]	205[illegible]	1	[illegible] 15

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REV. NO.	REV. ISSUE
[illegible]		1-27-[illegible]	1	1-6-[illegible]

LED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING MODEL, ETC	MATERIAL OF CONSTRUCTION	** OPERATING WEIGHT (POUNDS)	REMARKS	[illegible]	ESTIMATED PRICE ($)
1-1[illegible]	OFF GAS SURGE TANK	1	2000 GAL 79"OD x 73" HIGH	CARBON STEEL	31400	W/[illegible] W/2-36" HIGH x 120" [illegible] 410 LBS [illegible]	N	
1-110	TAILINGS PUMP HORIZ. CENTRIFUGAL	1	100 GPM/50'HS AVS 3x1½-10	DUCTILE IRON		INCL. MECH. [illegible] & DRIVE [illegible] & JCTL [illegible]	[illegible]	
1-110-001	MOTOR. TAILINGS PUMP	1	5HP/1800 RPM			TEFC	N	
1-111	THERMAL SURGE TANK	1	3[illegible] GAL 42"[illegible] x 51" HIGH	CARBON STEEL	5275	W/1 [illegible] [illegible]	N	

CE 224

Z SOURCE: N NEW E EXISTING R TO BE RELOCATED

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

0726126

TOWOLDMON0048914

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

REVISED BY	ITEM NO.	SHEET	TOTAL SHEETS
A. C. Y.	2	1	2

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REVISION	REVISED ISSUE
Lima Site Addition		12-1-65	1	1-2-71

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	STATUS	ESTIMATED PRICE ($)
1-112	Thermonol Pump Motor Centrifugal	1	150 GPM, 75' HD 1½" Size 3x2-10	Ductile Iron		Incl. Motor & Fan	N	
1-113-001	Motor, Thermonol Cooler Fan	1	10 HP/1185 RPM			TEFC	N	
1-113	Thermonol Cooler	1	12500 BTU/HR Air Cooled 100 sq Ft	Carbon Steel	2000	W/Adjustable louvers & manual operator Empty weight 1500 lbs	N	
1-113-001	Motor, Thermonol Cooler Fan	1	2HP/1160 RPM			TEFC W/P Sheels	N	
1-114	Thermonol Surge Tank	1	300 Gal 42"OD x 51"H&H	Carbon Steel	4725	W/one turn of 1/2" Dia Coil (1ft) Incl. Empty Weight 925 lbs W/Support	N	
1-115	Thermonol Fluid Motor Centrifugal	1	300 GPM/150 HD 1½" Size 3x2-12	Ductile Iron		Incl. Motor & Base	N	
1-[illegible]	Motor Thermonol Pump	1	20 HP/1760 RPM			TEFC	N	

CE 114 A (ADDITION) N NEW E EXISTING R TO BE RELOCATED

** ESTIMATED WEIGHT (L.E. WITH NORMAL CONTENTS OF TEST MATERIAL WHICHEVER IS HEAVIER

0726127

TOWOLDMON0048915

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	DATE	SHEET	TOTAL
[illegible]	[illegible]	1	15

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REV. NO.	REV. ISSUED
[illegible]		[illegible]	1	[illegible]

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	SOURCE	ESTIMATED PRICE ($)
1-116	THERMINOL COOLER	1	1,4[illegible] BTU/HR SHELL [illegible] 937 [illegible] 20" DIA x 20 FT	[illegible] STEEL	9525	304 [illegible] 3/4" [illegible] EMPT. [illegible] 5815 LBS	N	
1-117	CHLORINATOR No 11	1	3064 GAL 54" OD x 25' HIGH	[illegible] STEEL	[illegible]	SAME AS ITEM 1-1[illegible] EMPT. WEIGHT 50[illegible] LBS	N	
1-118	CHLORINATOR PUMP HORIZ CENTRIFUGAL	1	25[illegible] GPM/75' TDH API	316 STAINLESS STEEL		INCL NECK SEAL & DRIP PAN JCTL COVER [illegible]	N	
1-118-[illegible]	[illegible]	1	15 HP/[illegible]			[illegible]	N	
1-119	CHLORINATOR COOLER	1	[illegible] BTU/HR SHELL [illegible] 24[illegible] FT [illegible] DIA x 11 FT	[illegible] STEEL [illegible]	[illegible]	[illegible] 3/4" [illegible] x 8 FT [illegible] EMPT. [illegible] 24[illegible]	N	

CE 224

* SOURCE: N NEW E EXISTING P TO BE RELOCATED

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

0726128

TOWOLDMON0048916

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	CHECKED	APPROVED	PAGE
[illegible]	[illegible]	[illegible]	[illegible] 15

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REV. NO.	REV. DATE
[illegible]		[illegible]	[illegible]	1-6-[illegible]

FIELD EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	[illegible]	ESTIMATED PRICE ($)
1-1[illegible]	MIST ELIMINATOR	1	465 ACFM AT 250°C	[illegible] STEEL [illegible] WIRE	[illegible] WEIGHT	[illegible] 2½ [illegible] [illegible] [illegible]	N	
1-121	THERMINOL SURGE TANK	1	300 GAL 42"[illegible] x 51" HIGH	CARBON [illegible]	4725	[illegible] INCL [illegible] EMPT WEIGHT 925 LB W/SUPPORT [illegible]	N	
1-12[illegible]	THERMINOL PUMP HORIZ. CENTRIFUGAL	1	300 GPM/[illegible] HD AT 3x2-13	DUCTILE IRON		INCL MECH SEAL & [illegible]	[illegible]	
1-122-0[illegible]1	MOTOR THERMINOL PUMP	1	20HP/[illegible]			TEFC	N	
1-123	THERMINOL COOLER	1	1,400 [illegible] SHELL [illegible] 937 SQ FT 20" DIA x 20 FT	CARBON STEEL	4525	304 TUBES x ¾" OD x 14 BWG x [illegible] [illegible] EMPT WEIGHT 5895 LB	N	

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* SOURCE: N NEW E EXISTING R TO BE RELOCATED

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

0726129

TOWOLDMON0048917

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	DEPT NO	AREA	SHEET
[illegible]	2040	1	5 - 15

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REV NO	REV DATE
[illegible] Analyzers		[illegible]	1	1-1-[illegible]

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL ETC	MATERIAL OF CONSTRUCTION	** OPERATING WEIGHT (POUNDS)	REMARKS	SOURCE	ESTIMATED PRICE ($)
1-124	AIR BLOWER	1	200 ACFM [illegible]	CARBON STEEL		W/BELT [illegible]	N	
1-124-001	MOTOR AIR BLOWER	1	15HP/1800RPM			TEFC	N	
1-125	BLOWING TANK	1	6500 GAL 120"OD x 120" HIGH	CARBON STEEL	82500	W/SUPPORT LUGS - INCL INSUL [illegible] W 2-48" HIGH x 180" LONG PLATE COILS MTY WEIGHT 6000 LBS W/SPARGER 2-2" OD x 10 FT LONG [illegible] WITH 1/4 DIA [illegible]	N	
1-126	BLOW TANK [illegible] CENTRIFUGAL	1	125 GPM/[illegible] HD [illegible] 3x2-10	DUCTILE IRON		INCL MECH SEAL, [illegible]	N	
1-126-[illegible]	[illegible]	1	5HP/1800 [illegible]			TEFC	N	

CE 224

* SOURCE: N - NEW E - EXISTING P - TO BE RELOCATED

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

[illegible]

0726130

TOWOLDMON0048918

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	CLASS	SHEET	PAGE
[illegible]	20[illegible]	1	7 of 15

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REV NO	REV ISSUE
[illegible] Solid [illegible]		7-27-69	1	1-17-67

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT POUNDS	REMARKS	NOTE	ESTIMATED PRICE ($)
1-127	Off Gas Scrubber	1	230 ACFM HT 0" WATER DRAFT S&K # 4014 Scrubber Set Size 6	Hrvg [illegible]			N	
1-128	Still No 5 Heater	1	1,300,000 Btu/Hr Outlet Temp 370°C 8' Dia x 35' High	Carbon Steel	16000	Eff = 50% Area = 550 ft² Fired with Natural Gas	N	
1-128-001	Still No 5 Heater Control	1				Approved S&PF System	N	
1-129	Still Pot No 5	1	7800 GAL 132" OD x 76" High	Carbon Steel	104000	W/Support Lugs Incl Insul Rings Incl Sump in Bottom DRAFT For Point Emit Weight 12000 LB.	N	

SOURCE: N NEW E EXISTING R TO BE RELOCATED

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

0726131

TOWOLDMON0048919

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY: A. [illegible] | DATE: 3-[illegible] | AREA: 1 | SHEET: 10 OF 15

PROJECT NAME: EXPAN. SULF. ACID PLT. | APPROVED BY: | INITIAL ISSUE: 1-27-63 | REVISION NO: 1 | REV. ISSUE: 1-[illegible]-[illegible]

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE RATING MODEL, ETC	MATERIAL OF CONSTRUCTION	*OPERATING WEIGHT POUNDS	REMARKS	BASE	ESTIMATED PRICE ($)
1-130	CYCLONE SEPARATOR	1	DIA - 3'6 INCH CONE - 4'6" CYLIN. DIA - 4'6"	CARBON STEEL	450	W/SUPPORT LUGS INCL INCL. RINGS EMPTY WEIGHT 700 LBS	N	
1-131	STILL NO 5 CONDENSER	1	600000 BTU SHELL & TUBE 960 SQ FT 20" DIA x 20 FT	CARBON STEEL SHELL & BONNET & TUBES	4200	304 TUBES 3/4 OD X 14 BWG x 8FT LONG S.S. BAFFLES ON TUBE SIDE W/SUPPORT LUGS EMPTY WEIGHT 5100 LBS	N	
1-132	STILL NO 5 RECEIVER	1	3500 GAL 90"OD x 120"HIGH	CARBON STEEL	59000	W/SUPPORT LUGS INCL INSUL RINGS EMPTY WEIGHT 6500LBS W/SUPPORTS 21 FT. OF PIPE (3" SCH.	N	
1-133	RCVR TRANSFER PUMP HORIZ. CENTRIFUGAL	1	126 GPM 150' H.D. NPSH 3.2 - 11	DUCTILE IRON		INCL MECHANICAL SEAL AND JACKETED CPLG	N	
1-133-001	MOTOR, RCVR TRANSFER PUMP	1	25 HP 1750 RPM			TEFC	N	

CE 124

BOUNCE: N NEW E EXISTING R TO BE RELOCATED

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

[illegible]

0726132

TOWOLDMON0048920

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	DESIGN	SHEET	PAGE
[illegible]	2	1	11 15

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REV. NO.	REV. ISSUED
Extra [illegible]		9-21-69	1	1-10-67

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING MODEL, ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	SOURCE	ESTIMATED PRICE ($)
1-134	STILL NO 5 CIRCULATING PUMP VERTICAL CENTRIFUGAL	1	200 GPM 100' HD TABLE HEAVY DUTY	CARBON STEEL			N	
1-134-001	MOTOR STILL NO 5 CIRCULATING PUMP	1	25 HP / 1800 RPM			TEFC	N	
1-135	CATCH TANK	1	300 GAL 42" OD x 51" HIGH	CARBON STEEL	5275	W/2-20" HIGH x 65" LONG PLATE COILS EMPTY WEIGHT 925 LBS W/SUPPORT LEGS	N	
1-136	STILL NO 5 EJECTOR	1	3 STAGE WITH INTER CONDENSER AFTER FIRST STAGE	GRAPHITE NOZZLES, PORCELAIN INTER CONDENSER		WORTHINGTON #2½ JPE 1ST STGE SPEC 2ND STGE NO 5 3RD STGE [illegible] W/15" INTER CONDENSER	N	
1-136-001	AFTER CONDENSER	1	10" DIAMETER	CARBON STEEL		TO CONDENSE 35 LB/HR OF STEAM	N	

CE 224

* SOURCE: N NEW E EXISTING R TO BE RELOCATED

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

0726133

TOWOLDMON0048921

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	SEC'N	AREA	PAGE
R.S. [illegible]	2080	1	12 15

PROJECT NAME	APPROVED BY	N.T.A. ISSUE	REV NO	REV ISSUE
Exxon [illegible]		9-27-69	1	1-10-[illegible]

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE RATING MODEL, ETC	MATERIAL OF CONSTRUCTION	** OPERATING WEIGHT (POUNDS)	REMARKS	SOURCE	ESTIMATED PRICE ($)
1-137 (EXIST [illegible] 810)	FINISHED PRODUCT SURGE TANK	1	5000 GAL 102" OD x 135' HIGH	CARBON STEEL		[illegible] LEG SUPPORTS	E	
1-138 (EXIST [illegible] 837)	TRANSFER PUMP HORIZ. CENTRIFUGAL	1	120 GPM/[illegible] HD AVS 3x2-13	DUCTILE IRON				
1-139	THERMINOL SURGE TANK	1	300 GAL 42" OD x 51" HIGH	CARBON STEEL	5275	WINNER COIL FOR HEATING INCL INSULATION W/ SUPPORT LEGS EMPTY WEIGHT 925 LBS	N	
1-140	THERMINOL PUMP HORIZ. CENTRIFUGAL	1	100 GPM/75' HD AVS 3x2-10	DUCTILE IRON		INCL [illegible] SEAL & DRIP PAN	N	
1-140-001	MOTOR, THERMINOL PUMP	1	7½ HP/[illegible] RPM			TEFC	N	
1-141	THERMINOL COILER	1	600,000 [illegible] HR SHELL & TUBE 29[illegible] 15[illegible]	CARBON STEEL	380[illegible]	184 TUBES [illegible] 3/4 [illegible] x 9 FT [illegible] W/ [illegible] [illegible] 25[illegible]	N	

CE 224

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

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

0726134

TOWOLDMON0048922

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	CEA NO.	AREA	PAGE
[illegible]	20[illegible]	1	13 of 15

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REV. NO.	REV. ISSUED
Empire Solid Aerosols		1-27-69	1	1-15-[illegible]

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC	MATERIAL OF CONSTRUCTION	** OPERATING WEIGHT (POUNDS)	REMARKS	* SOURCE	ESTIMATED PRICE ($)
1-142	EJECTOR SUMP TANK	1	200 GAL 36" OD x 45 HIGH	CARBON STEEL	1880	W/LEGS MTY WEIGHT 650 LBS	N	
1-143	ELEVATOR	1	[illegible] 5000 LBS PLATFORM 9'0" x 6'0" OVERALL HEIGHT 35'0" HYDRAULIC TYPE				N	
1-143-001	MOTOR, ELEVATOR	1	30HP/1800RPM			TEFC	N	
1-144	PRIMARY SCRUBBER	1	8000 #/hr HCl	POLYESTER & FIBERGLASS			N	
1-145	PRIMARY SCRUBBER SEPARATOR BOX	1	65" x 48" x 24"	POLYESTER & FIBERGLASS			N	
1-146	SECONDARY SCRUBBER	1	45" [illegible]	POLYESTER & FIBERGLASS			N	
1-147	SECONDARY SCRUBBER SEPARATOR BOX	1	30" x 24" [illegible]	POLYESTER & FIBERGLASS			N	

CE 224

* SOURCE: N = NEW E = EXISTING R = TO BE RELOCATED

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

0726135

TOWOLDMON0048923

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	DESIGN	AREA	SHEET
[illegible]	[illegible]	1	14 of 15

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REV NO	REV ISSUED
Expand Solid Aroclors		1-10-61		

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING MODEL ETC	MATERIAL OF CONSTRUCTION	OPERATING WEIGHT (POUNDS)	REMARKS	SOURCE	ESTIMATED PRICE ($)
1-149	Motor Control Center	1					N	
1-149	Thermino Surge Tank	1	1900 SAL 60" OD x 144" Long	Carbon Steel	2600	W/Support Channels W/Insul. Support W/Pump Mount Flange	N	
1-150	Thermino Pump Vertical Centrifugal	1	400 GPM 100' TDH Taber Heavy Duty	Carbon Steel			N	
1-150-001	Motor, Thermino Pump	1	50 HP/1800 RPM			TEFC	N	
1-151	126# Flaker	1	24" OD x 48" Long Ni Rec. - Surf.	304 Stainless Hard			N	
1-151-001	Motor Flaker	1	5HP/180 RPM			TEFC	N	

CE 324

* SOURCE: N NEW E EXISTING P TO BE RELOCATED

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

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TOWOLDMON0048924

CENTRAL ENGINEERING DEPARTMENT EQUIPMENT INFORMATION SUMMARY

PREPARED BY	CLEANING	AREA	PAGE
[illegible]	[illegible]	1	15 [illegible]

PROJECT NAME	APPROVED BY	INITIAL ISSUE	REV NO	REV ISSUED
[illegible]		1-22-67		

CED EQUIPMENT IDENTIFICATION NUMBER	DESCRIPTION OF EQUIPMENT ITEM	QTY	SIZE, RATING, MODEL, ETC	MATERIAL OF CONSTRUCTION	** OPERATING WEIGHT (POUNDS)	REMARKS	SOURCE	ESTIMATED PRICE ($)
1-15[illegible]	FLAKER FEED TANK	1	3000 GAL 90 [illegible] 105# HIGH	CARBON STEEL	3860	WITH 5[illegible] [illegible] THERMOMETER [illegible]		

CE 224

* SOURCE: N NEW F: EXISTING R: TO BE RELOCATED

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

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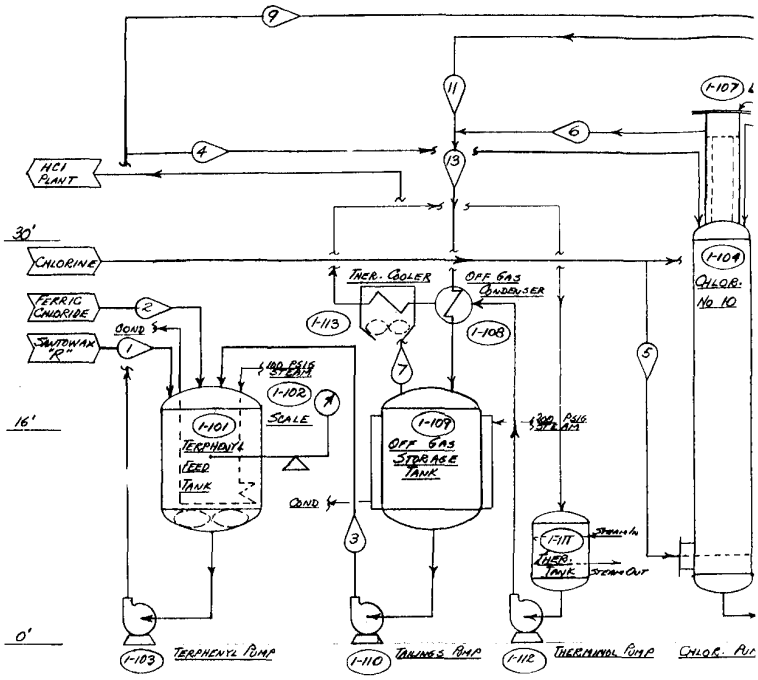
TOWOLDMON0048925



STREAM / COMPONENT	FORMULA	MOL WT	1	2	3	4	5	6	7	8	9	10	11
SANTOWAX "R"	$C_{18}H_{14}$	230.3	11200			11200					11200		
FERRIC CHLOR.	$Fe\,Cl_3$	162.2		15		15				15	15		
CHLORINE	Cl_2	70.9					32400	25	50			32400	25
AIR		29.0					3500	3500	7000			3500	3500
HYDROGEN	H_2	2.0					100	100	200			100	100
CRUDE 5060										25700			
HYDROGEN CHLOR	HCl	36.5						17425	34850	250			17425
LIME	$Ca(OH)_2$	74.1											
5460	$C_{18}H_9Cl_{10}$	514.8											
MONTAR 5													
TAILINGS					945	945		945			945		945
TOTAL LBS/HR			11200	15	945	12160	36000	21995	42100	26165	12160	36000	21995
GAL/HR			1930		95	1450				2160	1450		
CU FT/HR							100800	331080	494250			100800	331080
GPM - AVG					100	125				250	185		
GPM - MAX					100	125				250	125		
DENSITY LBS/CU FT			8.9		10	8.4	0.358 LBS/CU FT	0.664 LBS/CU FT	0.98 LBS/CU FT	12.1	8.4	2.778 CU FT/LB	3.024 CU FT/LB
VISCOSITY - CP			1.0		100	2.6				12	2.6		
TEMP °C			160		100	160	15	250		250	160	15	250
PRESSURE - ATM			1		1	1	1.35	1.35	1.35	1	1	1.35	1.35

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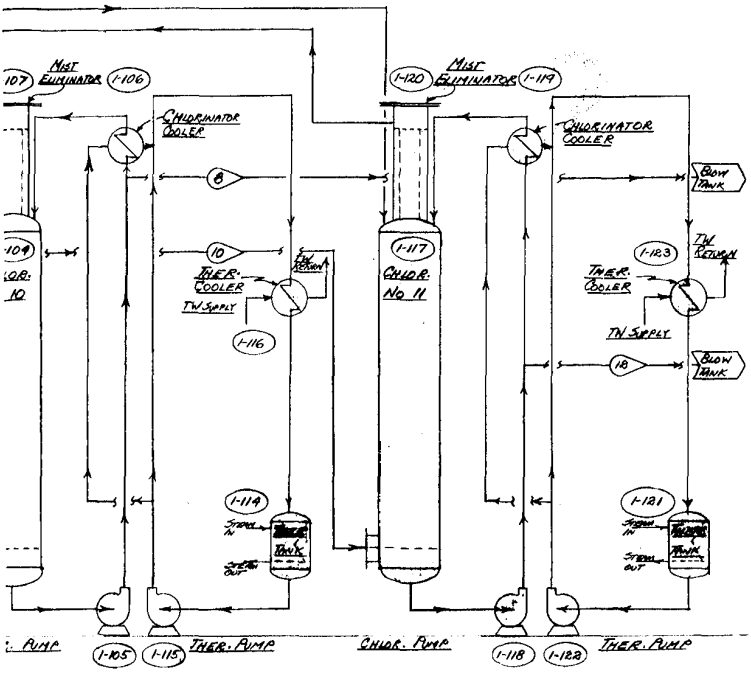


11	12	13	14	15	16	17	18	19	20	21	22	23	24
	15				30					30			
25		50											
3800		7000	900	300									
100		200											
	25900				51800								
17425	250	34850		500									
						400				400			
							37950	50	37900		100	37800	37800
										13900			
945		1890											
21975	26165	93990	300	800	51630	400	37950	50	37900	14330	100	37800	37800
	2160				4180			42	3020	1100		3020	3020
33080		46260	2910	11750			100000				14650		
	250											125	
	250											125	
2084 LBS/SQ.FT.	12.1	2084 LBS/SQ.FT.	1403 LBS/SQ.FT.	1403 LBS/SQ.FT.	12.4		2009 LBS/SQ.FT.	12.0	12.5	13	2007 LBS/SQ.FT.	12.5	12.5
	12								120	40		120	120
250	250	250	15	100	200		350-370	350-370	160	370	150	160	160
1.35	1	1.35	1.35	1	1		.033	.033	.0197	1	.0197	1	1

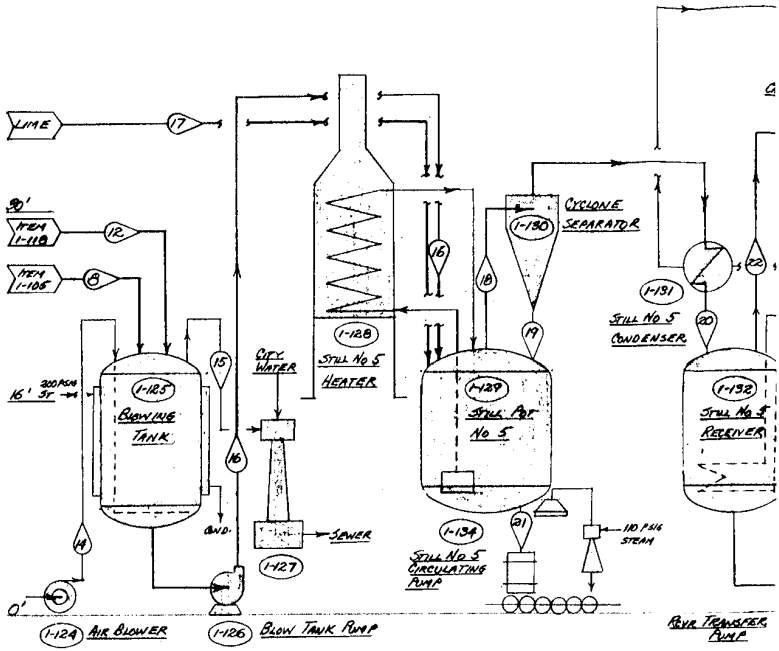
NO.	DATE	BY
8	1-12-49	

MONSANTO CHEMICAL COMPANY
CENTRAL ENGINEERING DEPARTMENT
ST. LOUIS, MISSOURI
ORGANIC DIVISION — ANNISTON PLANT
PROCESS FLOW DIAGRAM & MATERIAL BALANCE
SODA ASH/CAUSTIC EXPANSION
CHLORINATION
DRAWN — RS — DATE 1-12-49
CHECKED — DATE
SCALE — NONE
DWG. NO. 2080
REVISIONS — NO. — DESCRIPTION — DATE
8 — 1/
C

APP "B"

0726139

TOWOLDMON0048927



BATCH CHLORINATOR CYCLE	TIME-HRS
CHARGE SANTOWAX (2,9)	0.50
CHLORINE AT: 1500 LBS/HR (3,10)	1.00
2000 "	1.00
3000 "	9.00
EMPTY (12)	0.50
TOTAL	12.00 HRS

BATCH STILL CYCLE	TIME-HRS
CHARGE STILL (16)	0.50
HEAT UP	2.00
DISTILL (19)	8.50
EMPTY (23)	1.00
TOTAL	12.00 HRS

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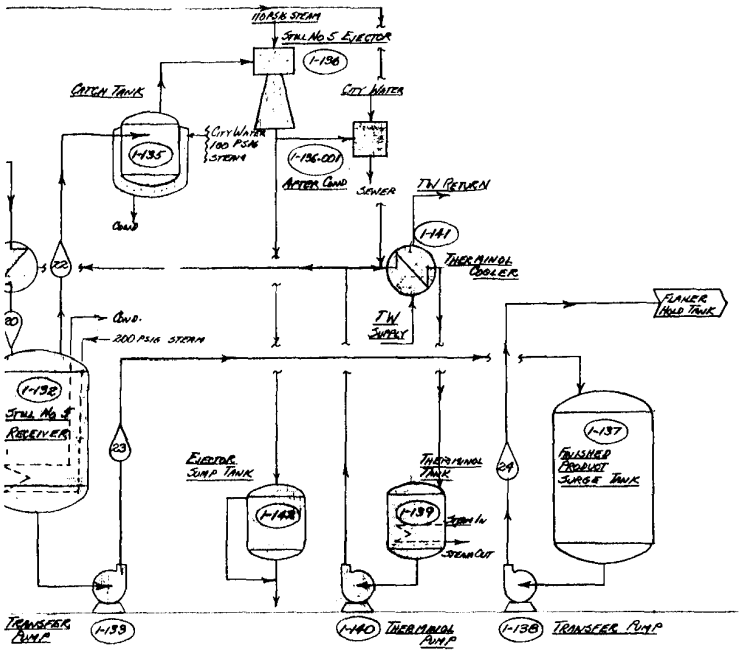

ANNUAL CAPACITY = LBS/BATCH × BATCH/HR × OPERATING HRS.

20,000,000 = 37,800 LBS/BATCH × ONE BATCH / 1.2 HOURS × 6350 HRS

T-HRS
.50
00
.50
00
00 HRS

B	I-1069	FINAL			RST
REV	DATE				BY

MONSANTO COMPANY
CENTRAL ENGINEERING DEPARTMENT
ST. LOUIS, MISSOURI

ORGANIC DIVISION | ANNISTON PLANT

PROCESS FLOW DIAGRAM & MATERIAL BALANCE
SOLID AROCLOR EXPANSION
DISTILLATION

	BY	DATE
DRAWN	R.S. YATES	1-10-69

DER. NO.	ISSUE	SIZE	DEPT.	TYPE	NUMBER	REV.
2080		C		D	2	B

App B

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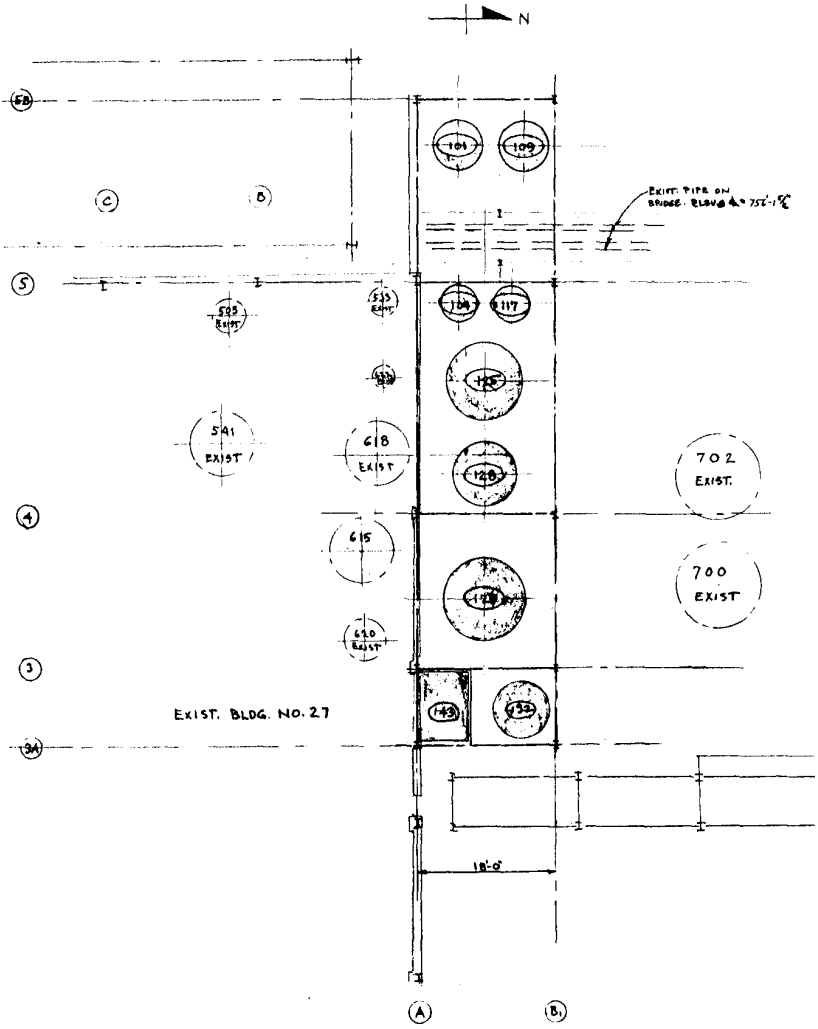
TOWOLDMON0048929



SECOND LEVEL
SCALE 1" = 10'-0"

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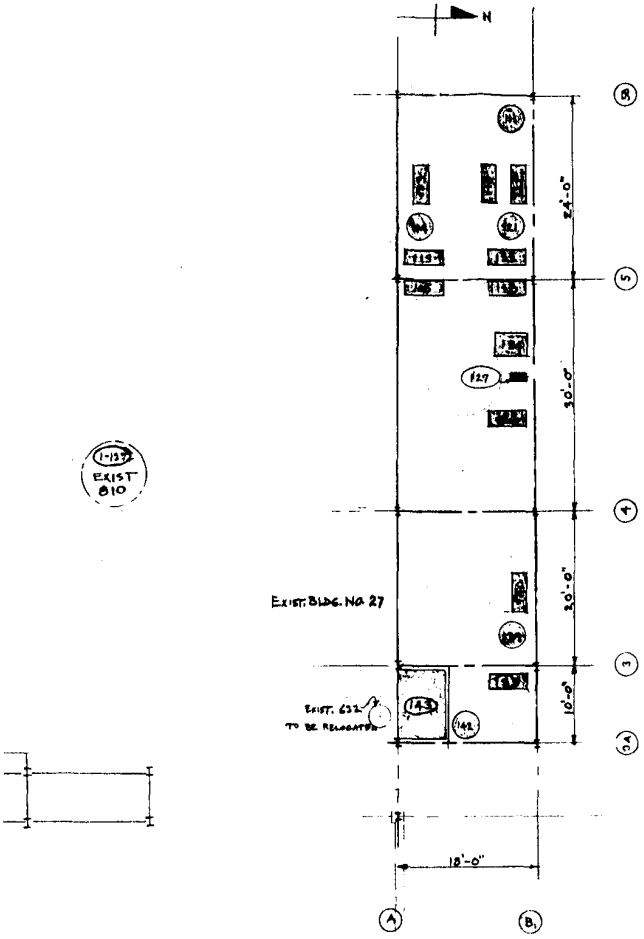


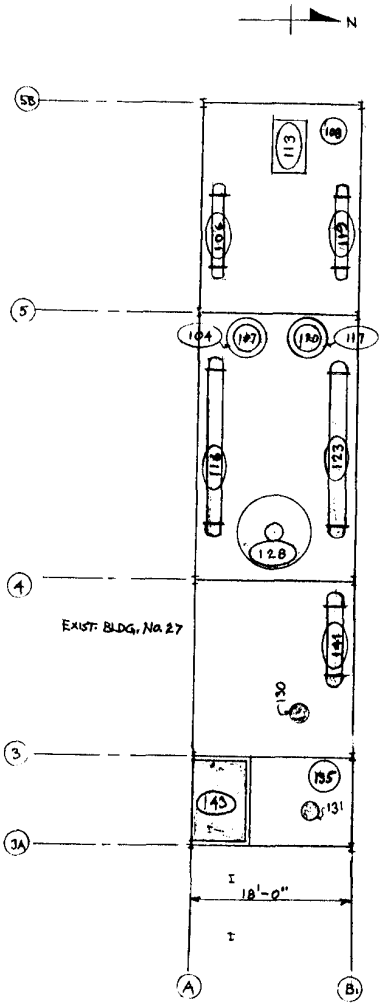
GROUND LEVEL (Elev. = 749.9')
SCALE 1"=10'-0"

EQUIPMENT ARRANGEMENT STUD
SOLID AROCLOR EXPANSION
CEA-2080 SCALE 1"=10'-0"
By H.D. Gabelman
1/14/69
sheet 1 of 2

App C

0726143

TOWOLDMON0048931



THIRD LEVEL
SCALE 1"=10'-0"

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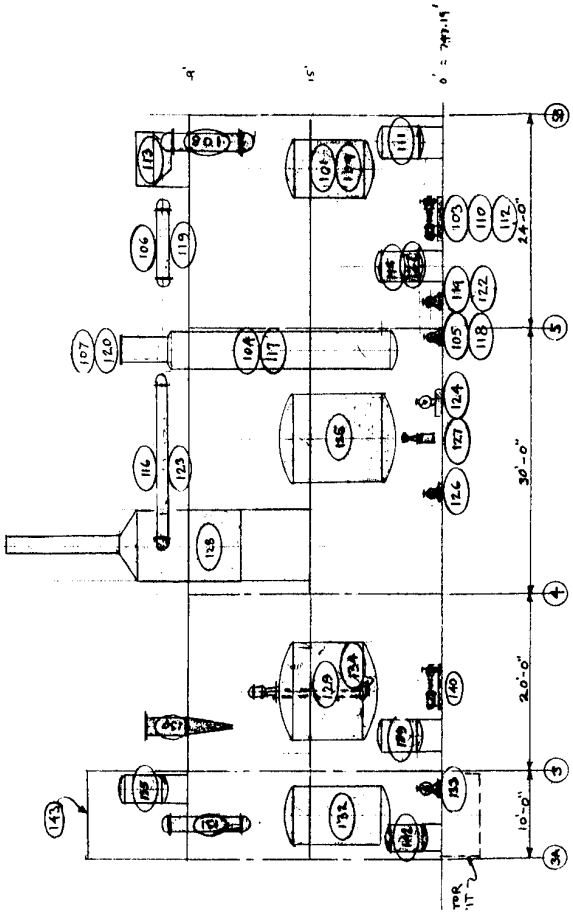
TOWOLDMON0048932



EQUIPMENT ARRANGEMENT STUDY
SOLID AROCLOR EXPANSION

CEA-2080 SCALE 1" = 10'-0"

by H.D. Gabelman
1/14/69
sheet 2 of 2

App C

0726145

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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.

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

Provide two small tool outlet 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.

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M. Dock Facilities

None required.

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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.

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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.

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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

Item	Service	Material	Size	Rmks.	Length	Insul.	Valves
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. Jkt. S.S.Inner	3"X4"	Jacketed	30 ft.	2"	1 - Jctd.
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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Item	Service	Material	Size	Rmks.	Length	Insul.	Valves
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. S.S.Inner	3"X4"	-	30 ft.	2"	1 - Jctd.

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Item	Service	Material	Size	Rmks.	Length	Insul.	Valves.
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

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TOWOLDMON0048941

Item	Service	Material	Size	Rmks.	Length	Insul.	Valves
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

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TOWOLDMON0048942

Item	Service	Material	Size	Rmks.	Length	Insul.	Valves
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"	-

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TOWOLDMON0048943

Item	Service	Material	Size	Rmks.	Length	Insul.	Valves
Misc.	Therm 14 Conn. In	C.S.	1½"	-	500 ft.	1½"	30 - FA37
	Therm 14 Conn. Out	C.S.	1½"	-	500 ft.	1½"	30 - FA37
	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:

Number	Horsepower
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

1. 50 ft. of 4" permanite sewer pipe with one tie-in to existing 8" sewer which runs west of Building 27.
2. 150 ft. of 304 S.S. guttering around the top of the new structure with 3-4" downspouts, each 30 ft. long

TOWOLDMON0048944

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

Item	Area	Thickness
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.

TOWOLDMON0048946

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

Item	Service	Material	Size	Rmks.	Length	Insul.	Valves
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

Item	Area	Thickness
1-152	320 ft^2	2"

90 - Dismantling

A section of floor in Building 27 - Area 400 ft^2 for 1268 flaker.

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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.

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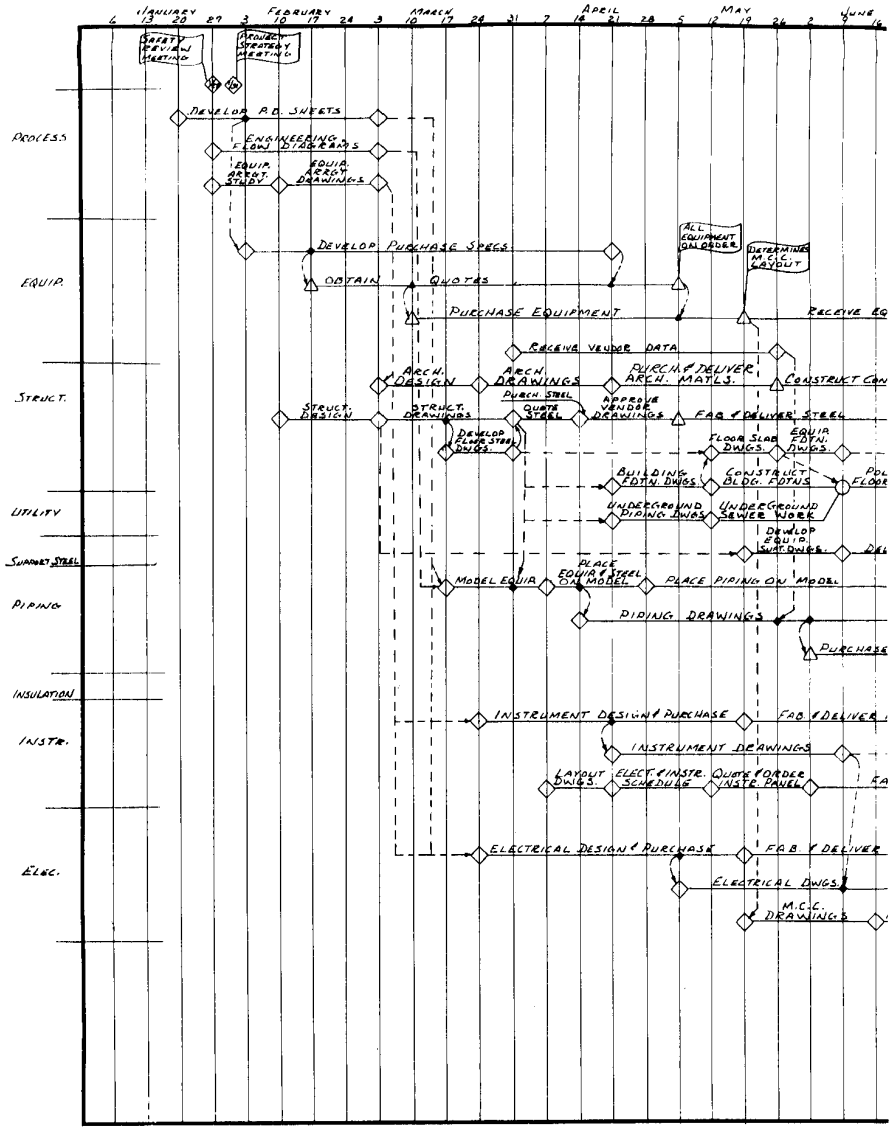

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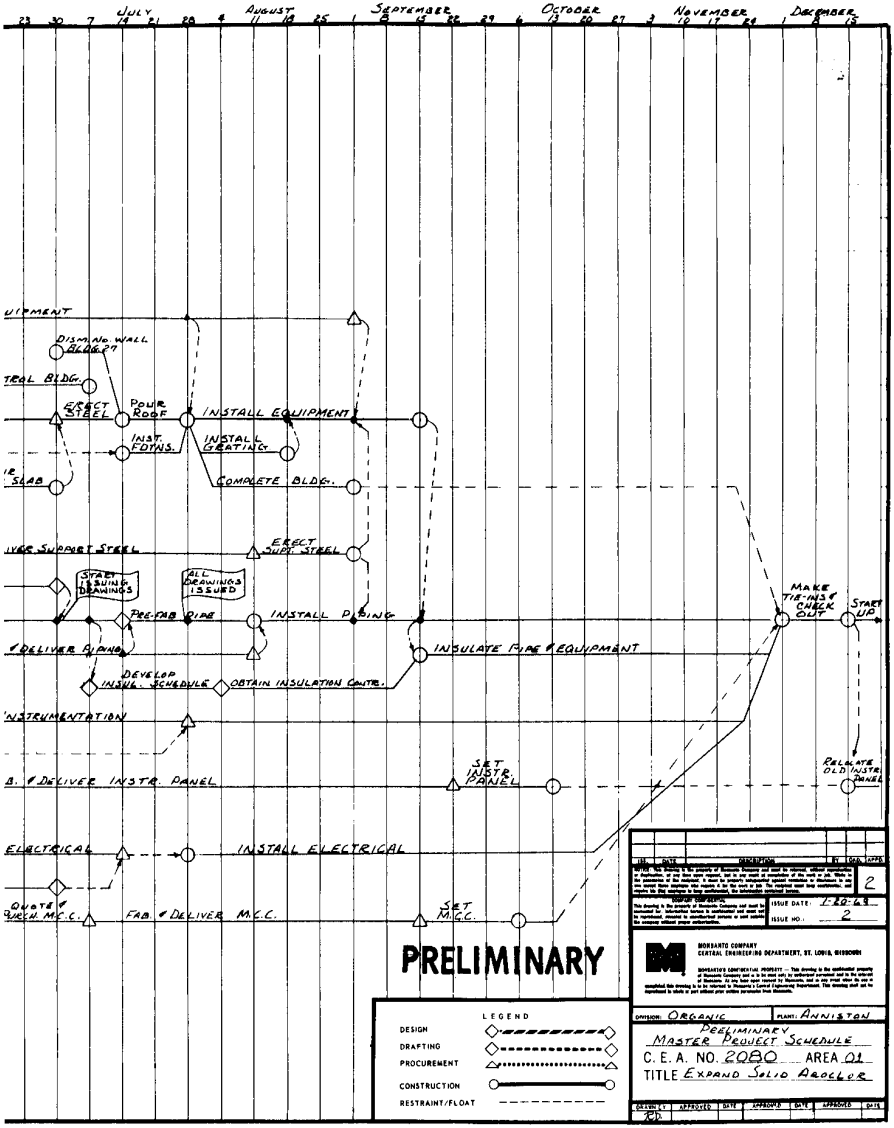

App 'F'

0726162

TOWOLDMON0048950

Monsanto

FROM (NAME & LOCATION) General Offices - St. Louis

DATE January 24, 1969

SUBJECT Project Loss Prevention
Report 69-7

REFERENCE CEA 2080

TO : Mr. R. S. Yates

cc R. E. Howard
G. O. Hunt
P. K. Ward - Anniston
S&PP Project File
S&PP Location File

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.

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IN 10 REV. 11 65

TOWOLDMON0048951

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 "A" 0726164

TOWOLDMON0048952

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.

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TOWOLDMON0048953

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

W. B. Howard

bjr
Attachment

0726166

TOWOLDMON0048954