

M.B. Rogers

CRAWFORD & RUSSELL

INCORPORATED

CHEMICAL & PROCESS PLANTS

STAMFORD, CONNECTICUT 06904

March 24, 1967

*CC HLT
MBR*

*File - VCM -
Oxychlorination*

Mr. Milton Rogers
Escambia Chemical Corporation
P.O. Box 467
Pensacola, Florida

Dear Mr. Rogers:

Attached are three cost sheets for manufacture of chlorine,
ethylene and vinyl chloride. *368¢/Tcl*

The chloride plant is a 337 million pound per year plant with
a cost of chlorine of 1.84¢ per pound based on \$7.5/ton salt,
\$28/ton credit for caustic, and 0.7¢/KW electric power.

The ethylene plant is a 500 million pound per year plant
with a cost of ethylene of 2.67¢ per pound based on 1.2¢ per
pound for propane. Only half of the 500 million pound per
year is required to make the required production of VCM.
It is assumed the remainder can be sold (at 3.5¢ per pound
at the plant gate).

The VCM plant has a capacity of 500 million pounds per
year. The prices for chlorine and ethylene are those
developed above, giving a cost for VCM of 3.45¢ per pound,
with no allowance for sales expenses, transportation,
etc.

The capital requirements for the facilities is \$39,500,000,
using only half of the capital cost of the ethylene plant.
Start-up expense and working capital were assumed at
\$500,000 and \$4,000,000 respectively giving a total capital
requirements of \$44,000,000. The attached table gives a
breakdown of capital and operating requirements.

AP00034069

CRAWFORD & RUSSELL
INCORPORATED

Mr. Milton Rogers

- 2 -

March 24, 1967

As I told you on the phone, C&R is now designing a 300 ton per day chlorine plant for Olin Mathieson, and we are a licensee of Olin. We have engineers in our office who have worked on the design of ethylene plants, and, as a result, we think our estimate of the ethylene plant is reasonably accurate. On the oxychlorination process, we are familiar with the economic figures for the process.

Some capital and operating savings should result from the integration of the three plants in one complex. We have not taken this into account, however.

I trust that this information will serve your present needs. If we can be of further help, please call.

Very truly yours,

CRAWFORD & RUSSELL
Incorporated

L. Basel

L. Basel
Vice President - Sales

LB:pmt
Enclosures

cc: Mr. H. Harwell - New York

AP00034070

500 MM #/YR VCM COMPLEX FOR ESCAMBIA

<u>CAPITAL COST:</u>	Chlorine Plant	\$ 18,000,000	450 T/D
	Ethylene Plant	7,500,000	$\frac{1}{2}$ of 500 MM #/yr
	VCM Plant	<u>14,000,000</u>	500 MM #/yr
	Capital	\$ 39,500,000	
	Start-up Expenses	500,000	
	Working Capital	<u>4,000,000</u>	
	Total Capital	\$ 44,000,000	

<u>DIRECT LABOR:</u>	Chlorine	27
	Ethylene	15
	VCM	<u>18</u>
	Total Direct Labor	60

<u>FEEDSTOCKS:</u>	Rocksalt	285,000 tons/yr
	Propane	296,250 tons/yr @ 0.8 - 1.2¢/lb.

<u>PRODUCTS:</u>	VCM	250,000 tons/yr
	Caustic Soda	169,500 tons/yr
	Hydrogen	4,750 tons/yr
	Liquid Distillate	37,800 tons/yr

<u>CHEMICALS:</u>	Acetylene Conversion Catalyst	1,600 cu. ft./yr
	Desiccant (Alumina)	128,000 #/yr
	MEA	48,000 #/yr
	HCl (30%)	26,500,000 #/yr
	Methanol	400 Barrels/yr
	Graphite	725,000 #/yr
	Mercury	64,000 #/yr
	VCM Plant Chemicals	\$ 312,500 per yr.

<u>UTILITIES:</u>	Fuel 40 MM Btu/hr Credit
	Power 80,000 KW Consumption
	150 psig Steam 30,000 #/hr Consumption
	50 psig Steam 62,000 #/hr Consumption
	EFW - 71 GPM Consumption
	Cooling Water 54,000 GPM Consumption

The mercury inventory of 400,000# cannot be depreciated. Part of the 20% HCl water stream of the VCM Plant may be upgraded to 30% to supply the Chlorine Plant. This has not been taken into account, however.

AP00034071

PRODUCTION COST ESTIMATE
CAP. COST \$18,000,000

Products	Quantity	Units	Sales Price	Annual Value
CHLORINE	337,000,000	#		
CAUSTIC	379,000,000	#	1.4 ¢	5,300,000
HYDROGEN	NOT EVALUATED			

COST OF PRODUCTION					¢/#
RAW MATERIALS	Quantity	Units	Price	Annual Cost	Product Unit Cost
ROCKSALT	577,000,000	#	0.375 ¢	2,162,000	
HCL	26,500,000	#	2.50 ¢	660,000	
SULFURIC ACID	3,000,000	#	1.25 ¢	40,000	
GRAPHITE	725,000	#	48.50 ¢	350,000	
MERCURY	64,000	#	600 ¢	380,000	
CAUSTIC CREDIT	379,000,000	#	1.4 ¢	-5,300,000	
RAW MATERIAL COST			Subtotal	- 1,710,000	- 0.51
UTILITIES					
Steam					
Steam					
Cooling Water	2,520,000	1000 G	\$0.02	50,000	
Power	580,000,000	KWH	\$0.007	4,040,000	
Fuel					
UTILITY COST			Subtotal	4,090,000	1.22
OPERATING EXPENSES					
Labor					
Foremen	30		12,000	360,000	
Supervision					
Maintenance 5% OF CAPITAL				900,000	
Supplies 8% OF LABOR				30,000	
OPERATING EXPENSE			Subtotal	1,290,000	0.38
OVERHEAD EXPENSES					
Payroll Overhead				275,000	
General Plant Overhead	70% TOTAL LABOR				
Property Taxes, Insurance, etc. 2 1/2% CAP				450,000	
Depreciation 10% CAPITAL				1,800,000	
OVERHEAD EXPENSE			Subtotal	2,525,000	0.75
TOTAL COST OF PRODUCTION			TOTAL	6,135,000	1.84

AP00034072

PRODUCTION COST ESTIMATE

CAP. COST \$15,000,000

CUSTOMER: ESCAMBRIA

PLANT: ETHYLENE PLANT

CAPACITY: 500 MM #/YR

LOCATION: GULF COAST

OPERATING HOURS PER YEAR:

PROJECT NO.

DATE: 3-23-67

BY: TJP

All Cost Figures Are In U. S. Dollars Unless Currency Shown Here:

Products	Quantity	Units	Sales Price	Annual Value
ETHYLENE	500,000,000	#		
LIGHT DISTILLATE	151,200,000	#	1¢	1,512,000
GROSS SALES VOLUME			TOTAL	

COST OF PRODUCTION					¢/#
RAW MATERIALS	Quantity	Units	Price	Annual Cost	Product Unit Cost
PROPANE	1,018,000,000	#	1.2	12,000,000	
LIGHT DISTILLATE	151,200,000	#	1.0	- 1,512,000	
RAW MATERIAL COST			Subtotal	10,488,000	2.10
UTILITIES					
Steam					
Steam					
Cooling Water	7,930,000	1000 G	\$0.02	327,000	
Power	6,450,000	KWH	\$0.007	45,000	
Fuel CREDIT	2,480,000	MMBTU	\$0.25	- 620,000	
BFW	586,000	1000 G	\$0.07	41,000	
UTILITY COST			Subtotal	- 207,000	- 0.04
OPERATING EXPENSES					
Labor					
Foremen	30		12,000	360,000	
Supervision					
Maintenance 3% OF CAPITAL				450,000	
Supplies, CATALYST & CHEMICALS				90,000	
OPERATING EXPENSE			Subtotal	900,000	0.18
OVERHEAD EXPENSES					
Payroll Overhead				270,000	
General Plant Overhead					
Property Taxes, Insurance, etc. 2 1/2 % CAP				375,000	
Depreciation 10 % STRAIGHT				1,500,000	
OVERHEAD EXPENSE			Subtotal	2,145,000	0.43
TOTAL COST OF PRODUCTION			TOTAL	13,326,000	2.67

AP00034073

PRODUCTION COST ESTIMATE

IP. COST: \$ 14,000,000

CUSTOMER: ESCAMBIA

PLANT: VCM

CAPACITY: 500 MM #/yr

LOCATION: GULE COAST

OPERATING HOURS PER YEAR:

PROJECT NO.

DATE: 3-23-67

BY: TJP

All Cost Figures Are In U. S. Dollars Unless Currency Shown Here:

Products	Quantity	Units	Sales Price	Annual Value
GROSS SALES VOLUME			TOTAL	

COST OF PRODUCTION					¢/x
RAW MATERIALS	Quantity	Units	Price	Annual Cost	Product Unit Cost
ETHYLENE	242,000,000	#	2.67	6,463,000	
CHLORINE	337,000,000	#	1.84	6,195,000	
CHEM. SCAT				312,000	
RAW MATERIAL COST			Subtotal	13,170,000	2.64
UTILITIES					
Steam 150 psig	1,150,000	tons	\$ 0.90	104,000	
Steam 50 psig	2,675,000	tons	\$ 0.80	214,000	
Cooling Water	15,150,000	1000 g	\$ 0.02	315,000	
Power	53,500,000	KWH	\$ 0.007	375,000	
Fuel	875,000	MMBTU	\$ 0.25	210,000	
UTILITY COST			Subtotal	1,218,000	0.24
OPERATING EXPENSES					
Labor					
Foremen	18		12,000	216,000	
Supervision					
Maintenance 5% OF CAPITAL				700,000	
Supplies 3% OF LABOR				17,000	
OPERATING EXPENSE			Subtotal	933,000	0.19
OVERHEAD EXPENSES					
Payroll Overhead				162,000	
General Plant Overhead	70% OF TOTAL LABOR				
Property Taxes, Insurance, etc. 2 1/2 % CAP.				350,000	
Depreciation	10 % STRAIGHT			1,400,000	
OVERHEAD EXPENSE			Subtotal	1,912,000	0.38
TOTAL COST OF PRODUCTION			TOTAL	17,233,000	3.45

AP00034074

For Paul

3/24/67

Olin Matheson

300 T/D expansion @ Charleston
(to 600 T/D)

Ethylene	3.5†
Cl ₂	2.65 @ 53°F/T
UCM	4.42 4/6

x
41.
142

AP00034075

INTEROFFICE COMMUNICATION

TO

R. L. Hill

3/23/67

FROM

M. Logue

SUBJECT

Cl₂ & VCM Investment and Costs

MESSAGE:

In our discussions, we are developing grassroots VCM costs to appraise the Allied supply deal. Can you get some valid numbers for chlorine per the following:

Large capacity, ca. 500 T/D

Mercury cells - modern plant

1. Need investment - define basis - whether by the line or including offsites, initial mercury, electrode change, etc.

2. Production cost \$/lb or \$/T and basis:

(a) Salt cost

(b) Caustic credit

(c) Power cost

(d) Whether mercury and electrode costs are included

DATE

SIGNATURE

REPLY:

Chlorine is our weakest link. If you can get easily VCM and ethylene costs as secondary, much the better.

DATE

SIGNATURE

ORIGINATOR: DETACH THIS COPY. SEND REMAINING SET, CARBON INTACT, FOR USE BY REPLIER.

AP00034076

①

1/2 Howell Calc

3/21/67

Alled VCM dis

Investment

500 MM l/yr VCM plant \$10 MM B/L

500 MM
1/2 Ethylene plant (1/2 \$16.5 MM B/L)
8.3

500 T/D C/L plant

\$20 MM B/L

+ 750 OB

\$6.538.3

~~1000~~

~~569~~ 48

Cost of Production

Plant Costs

16/16 VCM

4/16 VCM

VCM

0.505 Ethylene

1.34/16

66

.702 C/L

{ 25¢/t

.88

30¢/t

1.05

17

VCM

26

VCM

0.88
2.97 \$/16 excluding raw materials

Chlorine

Caustic soda @ \$45/t

AP00034077

②

5005/D Clr p

M. Arroyo	9.75
Primer Smith	21.50
Falso Mallo	6.50
Reple	11.50
	<u>40.75</u>

17 Ch
1.1 T. 12.011

1.75 T. 12.011 / 17 Ch @ 5/1

8.75

8.75
\$49.50

Crusier credit 35
31

38.50
1.00

AP00034078

③

$$55.8 \times \frac{75}{500} = 8.36$$

2614

Cont of

Mfg Co

0.88

0.66

0.88

2.42

~~+ 9.3 mm OS @ 107.4 days~~

~~0.14~~

~~107.4 days~~

500

2.37

Sitra deprecum

$$25\% \text{ of } 46.5 = 11.625$$

$$\text{@ } 15\% \text{ depn} = \frac{10\%}{15} \times 11.625$$

$$\frac{100 \times 7110 \text{ M}}{500 \text{ mm}} = 0.1422 / 10 \text{ VCS}$$

AP00034079

Call from H&L Karve

3/7/66

300 MM VCM #1 MM investment
including allocation for Cl₂ & ethylene from
"large facilities" 2.75¢/lb VCM

#12 M in VCM @ 4¢/lb capacity

$$\left(\frac{500}{300}\right)^{0.6} \times 12 M$$
$$1.67^{0.6}$$

$$1.36 \times 12 MM = \$16.33 MM \text{ for } 500 MM \text{ lb/yr. VCM}$$

$$\frac{(41-12)}{29} \times \left(\frac{500}{300}\right) = \frac{48.40}{\$64.73 \text{ M total}} \text{ for allocated Cl}_2 \text{ \& ethylene}$$

Allies has 500 M lb/yr. VCM

$$\frac{1.37}{3/7/66}$$

AP00034080

Sam Forester

3/7/67

Raw Material Prices

3¢/lb ethylene for people basing
ethylene cracking - mil. profit

Chlorine min @ 35¢/ton & 1.45¢/lb
mil profit

Investment

25 mm	4 mm ethylene plant
1000 plants	25% ethylene

mill 61

100 M

AP00034081

Bill from / covered

3/6/67

VCM Production Facilities

Cl₂ & Ethylene, related in by Allied

Ethylene investment \$/annual production

Asked for estimate from:
L. Basee

C. Schuler

Met to speak

L. Basee

E. Kay

M. Chapman

L. Forester

AP00034082

ESCAMBIA CHEMICAL CORP.

JOB NO. _____
 LOCATION _____
 SUBJECT _____

PAGE _____
 DATE _____
 BY _____

Call from M. Chmura 3/8/67
Chlorine

#33 /T transfer charge - incl. inter. during prep

#23 /T production cost at plant site - Saltville, Va

Ethylene

94 mm 12/yr plant 34/16 - Midwest
 (Plus 78 mm gas of fiber hydrocarbons)
 Pipeline feed - 2 T/yr portion of gas
 ethane - propane - May be
 3 1/2 - 4 1/2 gal

AP00034083