

SINCLAIR REFINING COMPANY

1790

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 Reel 166
 Frame 761-768

S-105

Estimate of plant for the processing of 100,000 m³/hr.
 ideal synthesis gas (CO + H₂) according to the Duftschaid process

January 12, 1939

Data: Pressure 100 atm.
 Performance: 100 kg/m³/hr.
 Conversion rate: 0.8 with three steps
 Yields: 14.7 g of liquid product/1 m³ converted gas = 25 g of gasol +
 61 g of benzine + 52 g of Diesel oil + 9 g of alcohol.

350 days in operation, 10% reserves in the aggregates.

1) Gas Production

1) Gas plant	8,400,000 - R.M.
2) H ₂ S-purification (Luxmass plus soda)	2,700,000 -
3) Organic sulfur purification	1,000,000 -
4) Compression unit	6,000,000 -
5) Gas containers and pipe lines	3,000,000 -
	21,000,000 -

2) Synthesis and gasol recovery

1) Reactor unit 100 atm. gauge pressure, first, second and third step, 5 x 3 fold chambers	10,000,000 - R.M.
2) CO ₂ -washing	
a) after the first step washing out ca. 12,700 m ³ /hr. CO ₂	
b) after the second step washing ca. 3,700 m ³ /hr. CO ₂	
c) after the third step washing ca. 3,700 m ³ /hr. CO ₂	3,500,000 -
3) Olefin recovery	2,000,000 -
4) Alcohol distillation	570,000 -
5) Intermediate storage tank farm	170,000 -
6) Gasol container	200,000 -
7) Hy-gas container	230,000 -
8) External pipe lines 5%	910,000 -
	17,700,000 R.M.

3) Processing the products

1) Distillation	850,000 - R.M.
2) Stabilisation	350,000 -
3) Polymerisation for C ₂ , C ₃ , C ₄	1,800,000 -
4) Refining	700,000 -
5) Re-distillation	800,000 -
6) Intermediate-storage tank farm	250,000 -
7) Finished-product tank farm	550,000 -
8) Filling station	250,000 -
9) External pipe lines	450,000 -
	6,000,000 - R.M.

Compilation

1) Gas production	21,100,000 - R.M.
2) Synthesis and gasol recovery	17,700,000 -
3) Processing of products	6,000,000 -
4) Generation of energy	11,000,000 -
5) Distribution of energy	4,000,000 -
6) Subsidiary unit	6,500,000 -
7) Working capital	3,800,000 -
8) Catalyst	1,000,000 -
9) Construction and setting-up overhead	350,000 -
10) Purchase of ground	450,000 -
11) Stocks and supplies	1,500,000 -
12) Cost of drawing up the project and training personnel	800,000 -
13) Housing facilities	2,300,000

Capital investment required for processing 100,000 m³/hr.
of ideal synthesis gas 79,500,000 - R.M.

Capital required to finished product
(benzine, Diesel oil, alcohol) 670 - R.M.

Annex I

Synthesis reactor unit for working up 100,000 m³/hr. of ideal gas.

I Step (3 x 5 fold chambers)

Cost of one three-fold chamber

1 Chamber, construction cost incl. fundaments, prop. part of crane tracks	120,000 - R.M.
3 Reactors 1100, 1.5 x 18 m, 100 atm. g.p. consisting of:	
3 jackets with covers	
3 insertions and installation	
3 bases	
Insulation, installation	450,000 -
2 Regenerators, 600 1.5 x 18 m, 100 atm. g.p. consisting of:	
2 jackets	
2 bundles at ca. 150 m ² heating area	
2 bases	
Installation	220,000 -
1 Cooler ahead of the hot separator ca. 100 m ² , 100 atm. g.p., incl. setting up and transport	40,000 -

1 Hot separator, 1300 ϕ x 12 m, 100 atm. g.p. incl. setting up and transport	60,000 - R.M.
1 Preheater (gas heated)	
a) for circulating oil 900 m ² = 6 H.H.	
b) for gas 935 m ²	
incl. burners, blowers, recycle-gas pipe lines, motors, cold air, fundaments, setting up	800,000 -
4 + 1 hot recycle pumps at 25 to/hr. incl. driving unit (motor, machinery), funda- ments, setting up	200,000 -
1 Cooler after hot separator incl. in- stallation and transport	30,000 -
<u>High-pressure pipe lines</u> 100 atm. g.p. Connecting lines in the chambers	
" " to the service station	
Pressure release lines for products and gas	
Emergency pressure release lines	
Insulations	150,000 -
<u>Low-pressure lines</u>	
Steam pipe-lines	
Pipe lines for cooling water	
Insulations	40,000 -
Measuring Instruments	
Distribution of electric energy	
Lighting	
Heating, ventilation, telephone	40,000 -
Emergency pressure-release (part)	20,000 -
Crane above chambers (part)	30,000 -
Contingency	200,000 -
	<u>2,000,000 - R.M.</u>
Three threefold chambers are planned for the first step, consequently the costs for this step amount to	6,000,000 - R.M.

MB/BA

M. Beth

June 3, 1948

(There is one drawing showing the lay-out
for the Duftschild-Process, but it is
too faint for tracing of photostats. M.B.)