PLAINTIFF'S EXHIBIT
CHV-713

# MEMORANDUM

San Francisco, California
December 1, 1969

Cost Estimate
HCC Conversion to Crude Unit
El Paso Refinery

MR. R. W. DAVIS:
EL PASO

At your request, we have prepared a cost estimate for converting the HCC fractionator into a crude topping still, the first of a 3-stage crude unit. We estimate the cost of the work at $3,390,000 but suggest a range of $3,200,000 to $4,000,000. While you have asked for an appropriation request accuracy estimate, we believe it a matter of prudence to consider it of less accuracy for the following reasons:

1. The process design is very preliminary and does not contain much fluid stream data as flow rates, temperatures and properties. Only a very rough heat and material balance was prepared.

2. No condensation data is available for any of the column overhead services.

3. Only preliminary data is available for furnace vaporization and the Alcorn furnace evaluation has not come through. While the furnace appears to be able to handle the 30,000 BPOD rate, its capacity to handle the 40,000 BPOD rate seems very questionable, even with a flash drum removing light ends from the crude. The estimate for 40,000 BPOD includes only the amount of money included in the 1966 estimate, updated.

We estimate the cost reduction for 30,000 BPOD Crude throughput at $300,000 or a cost of $3,090,000. The suggested cost range for this facility is $2,900,000 to $3,550,000.

Several other alternates are shown on the report pages entitled "Estimate Alternates."

The estimate includes no allowance for escalation of material, labor or design costs, which have been increasing substantially in the last few years. The estimate is based on El Paso direct labor costs and experience for Group I-B prorates.

The basis of the cost estimate is the following, all attached to this report:

CRC Preliminary Process Design GT-23259
Proposed Plot Plan GT-23257
El Paso Jet Bender Sweetener P&ID GT-23258
El Paso Off-Plot Marked up P&ID GT-23258
El Paso Off-Plot Marked up P&ID PA-13-21751
(included in work file only)
Bender and Tankage Scheme - Sketch #1
Materials Selection of Nov. 5, 1969
Previous Cost Estimate for #7 Crude Unit Feb. 1966 (not attached)
Description of Estimate and report

The CRC preliminary process design was revised to reflect equipment numbering, some of the assumed temperatures, and new equipment where existing equipment proposed by CRC for re-use was either inadequate or where such equipment has already been dismantled and removed.

Estimated utility requirements are indicated on the attached tables along with various alternates for air cooling vs. water cooling.

We plan to return the 1966 cost estimate work files to you very soon and will also ship the work files for this estimate.

Please advise if we can furnish further information on this cost estimate.

W. F. BRUSHER

JL:ff
Attachments

cc: Mr. F. S. Gates - El Paso
Mr. T. K. Ling - CRC
RCA/ETM/RPH/JLC
HLK
JL (2)

Date 11/17/69
By GCC

## EXCHANGER COST ESTIMATING WORK SHEET EF-510

This sheet assumes the designer is familiar with the texts of McAdams, Kern, TEMA Standards

ITEM E-14 WATER COOLER

| Fluid | P | T | | T |
|---|---|---|---|---|
| HC | | 135 | (S) | 100 |
| C.W. | | 95 | (T) | 80 |
| | | 40 | | 20 |

$\Delta t$ = LMTD = 29

$$A = \frac{Q}{U_f \Delta t f} = \frac{6.0 \times 10^6}{(110)(29)(0.89)} = 2110 \text{ Ft}^2$$

**TEMA LMTD. PERAMETERS**

$R = \frac{135-100}{95-80} = \frac{35}{15} = 2.2$

$P = \frac{95-80}{135-80} = \frac{15}{55} = 0.27$

$f = 0.89$ (1 SP - 2 TP)

= _____ ( )

= _____ ( )

$U_f$ Basis: 110 FROM COST ESTIMATING BOOK.

PRESSURE RATING
1. TUBES 150#
2. SHELL 150#

Selection 1 Shells 2110 Ft² Each

WATER 800 GPM.

Material Design Notes: ADMIRALTY (16GA) TUBES, 10' LONG
NRB TS
CS CHANNEL AND SHELL

SHELL ID = 29 IN.

COST = ( 1 ) ( 9000 ) ( 283/275 ) ( 1.22 ) = $11,300

(1 = No Shells From Curve; 9000 From Curve; 283/275 = EDC Ratio; 1.22 = NRB TS 0.22)

Extras 16 GA ADM. TUBES (0.84)(2110)(283/236) = 2,120

SUB TOTAL 13,420

Field Extras (10%) ( ) 1340

Test Jig 50 + 0.15(2110) = 50 + 320 370

Exchanger Cost $ 15,130

Revision ① ② _____

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PRINTED IN USA

Chevron BB
014327

EF-510 (150-CD-1-66)