Chevron

DUMAI BASE OILS PROJECT FEASIBILITY STUDY

FINAL REPORT APPENDIX

Volume II of II

July 1993

U.S. TRADE AND DEVELOPMENT AGENCY

FLUOR DANIEL

Contract 422700

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPOF
	7/1/1993	PB93-218121

4. TITLE AND SUBTITLE

Dumai Base Oils Project Feasibility Study- Final Report Appendix - Volume 2 of 2

5. FUNDING NUMBERS

6. AUTHOR(S)

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

8. PERFORMING ORGANIZATION REPORT NUMBER

92-328-02

9. SPONSORING MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

Volume 2 of 2

12a. DISTRIBUTION AVAILABILITY STATEMENT

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

This report was prepared by Fluor Daniel , Irvine, California with the cooperation of Pertamina, Chevron, Fluor Daniel & the process licensers.

This is volume 2 of 2 contains

(A) Terms Of Reference which is a document that outlines the study scope of work & deliverables
(B) Technical Reference Data
(C) Licensor Information
(D) Capital Cost Estimating Data
(E) Conference Notes
(F) Relevant Correspondence

14. SUBJECT TERMS			15. NUMBER OF PAGES
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

PROPRIETARY INFORMATION

NOTICE

This Feasibility Study was prepared for Pertamina, the U.S. Trade and Development Program (TDP) and Chevron's Dumai Base Oils Project at Dumai, Sumatra, Indonesia. This document contains proprietary information ("Information") which is confidential, and it should not be disclosed to or discussed with third parties who have not first executed a secrecy agreement with or who have not been approved by the owners of the Information.

These volumes and Information are intended solely for use in the performance of work related to the Lube Base Oils Project. Therefore, only individuals who are subject to an obligation of confidence under a proper secrecy agreement and who require Information as part of their duties associated with the Dumai Base Oils Project should be given access.

The following companies have provided Information which is contained in these volumes:

Chevron Research & Technology Company
Pertamina
Universal Oil Products (UOP)
Kerr McGee
Fluor Daniel

This Information may only be released to the Reader with prior written agreement between the Reader and respective Owner(s) which provided the Information. Recipients of the study will only release Information to other parties pursuant to the terms of the agreement between the original recipient and the owner of the Information.

All companies or organizations agree, by their acceptance or use of these documents, to return them upon Chevron Research and Technology Company's request, and not to reproduce, copy, lend, or otherwise disclose or dispose of the contents.

APPENDIX

A. Terms of Reference
B. Technical Support Data
C. Licensor Information
   - C-1 Chevron Lube Complex Process Package
   - C-2 Yield Confirmation Study Report
   - C-3 UOP HCR Study
   - C-4 UOP Coker Study
   - C-5 UOP Hydrogen Plant Study
   - C-6 Kerr-McGee SDA Plant Proposal
   - C-7 UOP UP-II Plant Test Report
D. Capital Cost Estimating Support Data
E. Conference Notes
F. Relevant Correspondence
   - F-1 Chevron Correspondence
   - F-2 Pertamina Correspondence
   - F-3 UOP Correspondence
   - F-4 Caltex Correspondence

A. TERMS OF REFERENCE

This section of the Appendix contains the Terms of Reference, which is a document that outlines the study scope of work and deliverables. This document was agreed to by the Consortium members (Pertamina, Chevron, and Fluor Daniel) at the feasibility study Kickoff Meeting held on July 28, 1992 at Fluor Daniel's Irvine offices.

EXHIBIT A

DUMAI BASE OILS PROJECT

FEASIBILITY AND SCREENING STUDY

TERMS OF REFERENCE

July 15, 1992

DATE: _____

PERTAMINA

CHEVRON

FLUOR DANIEL

DUMAI BASE OILS PROJECT FEASIBILITY AND SCREENING STUDY
TERMS OF REFERENCE
TABLE OF CONTENTS

1. Project Description 1
   1.1 Objectives 1
   1.2 Basis of Study 1
   1.3 Cases To Be Studied 2

2. Feedstock 2
   2.1 Limitations 2
   2.2 Specifications 2

3. Product Slate 3
   3.1 Limitations 3
   3.2 Specifications 3

4. Study Constraints 3

5. Layout Considerations 4

6. Participants/Responsibilities 4
   6.1 Consortium Responsibilities 4
   6.2 Pertamina Responsibilities 5
   6.3 Chevron Responsibilities 6
   6.4 Fluor Daniel Responsibilities 7

7. Study Costs 8

8. Work Schedule 9

9. Confidentiality 9

10. Study Report Contents 9

Attachments

Attachment 1 - UHVI Production Case 1
Attachment 2 - UHVI Production Case 2
Attachment 3 - UHVI Production Case 3
Attachment 4 - UHVI Production Case 4
Attachment 5 - Current UP II Process Configuration
Attachment 6 - Feedstock Specifications/Crude Assays
Attachment 7 - Product Specifications
Attachment 8 - Environmental Regulations/Specifications
Attachment 9 - Dumai Base Oils Project: Location Plan
Attachment 10 - UP II Test Program

DUMAI BASE OILS PROJECT FEASIBILITY AND SCREENING STUDY

TERMS OF REFERENCE

1. Project Description

1.1 Objectives

The study will evaluate the feasibility of producing of high quality lube oils at a new facility to be built adjacent to and integrated with Pertamina's existing UP II refinery at Dumai, Sumatra which processes Minas/SLC and Duri Crudes. These lube base oils will be produced from feed stocks derived primarily from Minas, Duri, and Pedada crude oils. Incremental feed for the new facilities will be additional low sulfur waxy residue (LSWR) from Pertamina's existing Sungai Pakning Refinery which processes Minas, Pedada, and other crudes.

The purpose of the feasibility study is to preliminarily define the facilities and estimate the associated capital and operating costs in order to allow economic assessment and selection of the best alternative by the Consortium.

1.2 Basis of Study

The base oils will be produced using Chevron Research and Technology Company's hydroprocessing technology. Feedstock for the plant will be In some cases feed will be HVGO, in other cases it will be a combination of HVGO and residue from the existing vacuum unit at Dumai. A shortfall in the existing HVGO and residue production will be augmented by debottlenecking the existing vacuum unit as required. The need for debottlenecking the existing coker and other ancillary systems will be defined as part of this feasibility study. Incremental feed for the new facilities will be additional low sulfur waxy residue (LSWR) from Pertamina's existing Sungai Pakning Refinery.

There are two ways to achieve the lube hydrocracking capacity required for this project. The first is by adding grass roots hydrocracking capacity. The second is by converting a portion of the existing fuels hydrocracker to this service. The base case of the study will be the addition of a new lube hydrocracker with associated utilities and offsites to produce lube base oils. A lube hydrodewaxer and a hydrofinisher complex will complete the processing required to transform the oils into premium high viscosity index lube base oils.

Under each hydrocracking variation, there will be two cases considered. In one case only light base oils will be produced using HVGO from the existing vacuum column. In the second case, in addition to the light oils, heavy neutral and bright stock base oils will be produced utilizing HVGO from the debottlenecked vacuum unit and solvent deasphalted oil from a new SDA unit. Although the number of grades of lube base oils to be produced in the second case will increase, the total annual quantity of lube base oils produced will remain unchanged in all cases.

The production rate of the finished products will be 6,000 BPSD. The existing quantity of HVGO and residue from the vacuum unit is not sufficient to support this level of production without affecting UP II product rates. Accordingly, the vacuum unit will be debottlenecked to add capacity to process an additional amount of LSWR for which the rate will be determined per 2.1 below. The byproducts returned from the vacuum unit and the lube hydroprocessing units will require additional debottlenecking to other units, most notably the coker.

The Hydrocracker, Isodewaxing, and Hydrofinishing Units will operate in blocked-operation mode, alternating among the base oil feed stocks. This mode of operation requires intermediate tankage in addition to finished product tanks.

1.3 Cases To Be Studied

The four conceptual cases to be considered are shown in Figure 1. Attachments 1,2,3 and 4 present a conceptual process block flow diagram for each case. Attachment 5 indicates the current UP II Process configuration.

The following approach will be used during the Feasibility Study considering the four cases:

The study will commence with the evaluation of Cases 1 and 2 while Cases 3 and 4 (the cases with SDA) will remain essentially at the conceptual level. If preliminary early evaluation by the Consortium provides justification, then the SDA cases will also be developed along with Cases 1 and 2 to the same level of detail.

2. Feedstock

2.1 Limitations

The feed to the Lube Oil Hydrocracker will be derived from the following crudes:

- A mixture of 80% (+) (volume) Minas plus 20% (volume) (max) Duri crude oils.
- Incremental LSWR from Sungai Pakning derived from local Sumatran Crude oils. The minimum required LSWR rate is the one that prevents a reduction in UP II middle distillate production relative to the current production. If justified, higher than the minimum rate of incremental LSWR will be used. The proportion of Minas in the crude feed to Sungai Pakning refinery will be at least 70%, with the remainder being Pedada and other crudes, limited to a maximum of 30% by volume.

2.2 Specifications

The Specifications for the Crude Oils (assays) and LSWR feedstock are contained in Attachment 6 of this Terms of Reference.

[The information contained in Figure 1 is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

3. Product Slate

3.1 Limitations

3.2 Specifications

The product specifications/properties are as contained in Attachment 7 to this Terms of Reference.

4. Study Constraints

Presented herein are the major constraints in performing the study:

- Current effective UP II unit capacities, as shown in Attachment 5, will be the basis for the study. The stock balances, to be provided by Chevron, will use appropriate rates that will not exceed these effective capacities except where debottlenecking is considered.
- Current UP II middle distillate production rates and quality will not be adversely affected by this project.
- UP II crude throughput will not be increased or crude slate changed.
- Only those UP II process units will be debottlenecked that are required to support the new Lube Base Oils Complex. Pertamina will be advised if current feed rates or quality of products are adversely affected in the other processing units.
- Utilities and offsites systems to support the new lube hydrocracking complex will be assumed to be new stand alone systems for this study. New utilities systems will be integrated with UP II systems as appropriate. Sufficient utilities shall be provided for operations as well as new infrastructure needs.
- Current Indonesian environmental rules and regulations as provided in Attachment 8, will be applicable only to new facilities. Modifications to the existing UP II facilities will be governed by the environmental design criteria used for the design of the original units.
- For hydrogen requirements above current UP II consumption levels, the existing hydrogen plant available capacity will be evaluated. The existing hydrogen plant(s) will be debottlenecked only if required.
- The existing UP II marine jetties or PT Caltex Pacific Indonesia shipping facilities will be assumed to be adequate for the added shipping of the additional lube products. However, tankage, pumps, piping, loading arms, etc., required to load the lube base oils from tankage to the jetties will be included in the study.

- Instrumentation for the new facilities will be electronic with a distributed control system (DCS). Debottlenecked UP II units and equipment will retain the same control system as presently exists for these units.

- Additional housing and other infrastructure will be added to the existing facilities for the supplemental personnel needed to operate and maintain the new facilities. Pertamina to define the requirements for Consortium review.

- A third party independent consultant, familiar with Chevron Hydroprocessing technology, will be used to evaluate UOP's proprietary information/design for integration with Chevron technology.

- A marketing survey will not be performed by Fluor Daniel. All marketing surveys required to support the project financial evaluations will be performed by the Consortium.

5. Layout Considerations

Attachment 9 presents the location plan for the new facilities, and shall be the basis for the study. Pertamina and Fluor Daniel equipment spacing requirements shall be used.

6. Participants/Responsibilities

Presented herein are the respective responsibilities of the participants in this study:

6.1 Consortium Responsibilities

The Consortium shall be responsible for providing the following data and actions to support the feasibility study effort. Those items denoted by an * are needed at the project kickoff meeting in order to maintain the study schedule.

- Appoint a Consortium Project Team with a designated project manager to provide direction to Fluor Daniel as required.*

- Review and approve UP II performance test program.

- Provide input to Fluor Daniel in assisting Pertamina during UP II performance tests.

- Manage and coordinate the study activities and deliverables of the respective Consortium members.

- Provide scope, technical definition and information as required by Fluor Daniel to perform the financial evaluations.

- Provide timely and expeditious review of all deliverables issued by Fluor Daniel.

- Review and approve invoices issued by Fluor Daniel.

- Issue payments to Fluor Daniel in accordance with the payment schedule.

6.2 Pertamina Responsibilities

Pertamina shall be responsible for providing the following data and actions to support the feasibility study effort. Those items denoted by an * are needed at the project kickoff meeting in order to maintain the study schedule.

- Provide crude assays for all crudes to be incorporated in the study evaluations*

- Provide design crude slates for proposed refinery operations*

- Provide product slates for current refinery operations*

- Provide assistance with Process Licensor in setting up UP II hydrocracker evaluation by an independent consultant.

- Provide copies of appropriate UP II plant drawings (cost of copying will be borne by Pertamina):*
  - Plot Plans
  - Block Flow Diagrams/Process Flow Diagrams/Offsites Flow Diagrams
  - P&IDs, UFDs
  - Electrical One-line Diagrams

- Provide process data for the existing refinery units, including yields for licensed units, operating data, equipment data sheets, inspection records, etc.*

- Provide input and conduct UP II performance tests, if required, in accordance with test procedures provided by Fluor Daniel and the Consortium as indicated in Attachment 10. A schedule for the performance tests will be developed during the Study.

- Provide previous and new performance test reports for appropriate UP II units.

- Provide information on operating and maintenance philosophies.

- Provide definition on supportive infrastructure and additional permanent housing requirements.

- Provide UP II utility and other operating cost data as appropriate.

- Provide access to the refinery facilities, and permission to photograph facilities pertinent to this study.

- Provide access to Pertamina technical and operating representatives through a designated project representative.

6.3 Chevron Responsibilities

Chevron shall be responsible for providing the following data and actions to support the feasibility study effort. These items denoted by an * are needed at the project kickoff meeting in order to maintain the study schedule.

- Provide finished product specifications, product values and projected demand for each product.*
- Review appropriate drawings and information on custody transfer, metering facilities, and product loading facilities, for the study.
- Provide appropriate product shipping information on items such as parcel size, frequency of shipping, vessel characteristics, type of products, etc.
- Provide information to support operating cost estimates (loading operations) as appropriate to the study.
- Provide initial estimates of rates and properties of the feed streams to the hydroprocessing units.*
- Provide input in development of the UP II performance test program.
- Provide Yield Confirmation Study (Pilot Plant testing) results to Fluor Daniel.
- Coordinate outside consultants work in the rerating of the existing UP II Hydrocracker equipment and provide a description of the proposed modifications.
- Provide process flow diagrams, utility and plot area requirements, flare sizing basis, byproduct stream rates and properties, etc. for the hydroprocessing units.
- Provide a descriptive key equipment list for the hydroprocessing units.

- Provide access to Chevron technical representatives through a designated representative.
- Provide information to support operating cost estimates as appropriate to the study.

6.4 Fluor Daniel Responsibilities

The scope of Fluor Daniel services provided in this study will include the following:

- Prepare for and participate in a kickoff meeting to initiate the project.
- Obtain data and drawings from Pertamina necessary for the study.
- Prepare a study basis for the work maximizing the use of EXOR IV data.
- Develop with Pertamina and Chevron a UP II performance testing program.
- Witness and provide guidance to Pertamina in conducting the performance test of the appropriate UP II units.
- Review performance test data and identify pertinent plant bottlenecks.
- Request technical information from the UP II process licensors where needed.
- Develop engineering solutions to the bottlenecks and rerate existing equipment as appropriate.
- Incorporate results from Chevron's yield confirmation study work.
- Develop utility balances to reflect new requirements and propose new stand alone utilities. New utilities will be integrated into UP II as appropriate.
- Develop offsite systems requirements and propose new stand alone offsite facilities.
- Define additional hydrogen requirements and propose solutions.
- Mark up UP II Process Flow Diagrams to reflect the proposed debottlenecked solutions for the existing units.
- Prepare an overall block flow diagram showing the major feed streams entering and the product streams leaving.
- Prepare preliminary process flow diagrams for the new units showing the material balances.
- Prepare a list of new and modified equipment required to meet the

- Prepare a list of new and modified equipment required to meet the requirements of the new facilities. This list will be in sufficient detail to provide the basis for equipment cost estimating. Included in this list will be all towers, drums, tanks, pumps, compressors, heat exchangers, furnaces, etc.

- Develop a preliminary overall plot plan for the new facilities and mark up the existing unit plot plans as appropriate to reflect modifications and additions to the existing units.

- Develop an overall execution plan for engineering, procurement and construction to support the cost estimates and financial evaluations. Estimated schedule of completion, manpower requirements (local and expatriate) and local materials and services will be provided.

- Develop a preliminary plan to implement proposed UP II modifications.

- Develop feasibility-grade cost estimates to include the installation of new and modified equipment together with costs for land purchase, engineering, site development, construction, infrastructure, expatriate housing, catalyst and chemicals, training, maintenance equipment, startup, contingency, spare parts, operating costs, etc. Accuracy of the estimates will depend on the information made available from the Consortium members.

- Prepare cash flow projections, financial evaluations etc., for the various cases studied. A simplified financing plan, including export credits and commercial bank loans, will be developed. Financing shall cover the cost of Pertamina's Scope of Work.

- Present intermediate and final results to the consortium.

- Prepare a final Feasibility Study Report including recommendations for further work.

Note that the scope of services does not include upgrading or modifying facilities unaffected by the proposed project. However, the Consortium may elect to broaden the scope to include evaluation of other UP II facilities.

7. Study Costs

The study cost will be in accordance with the guidelines provided in the Consortium Agreement.

8. Work Schedule

Figure 2 reflects the planned activities for execution of the feasibility study. The overall study schedule duration of approximately six months is dependent on the timely receipt of Pertamina/Chevron information and the completion of the UP II performance testing program on schedule.

9. Confidentiality

Confidentiality Agreements between process licensors and Consortium members covering the release of confidential information or proprietary know how associated with this study must be in place prior to the release of intermediate or final study information.

10. Study Report Contents

The information listed below will be furnished to all Consortium members. Certain proprietary or confidential information including, but not limited to, process licensor details, may be excluded from the Consortium members' final report unless all applicable confidentiality agreements are in place.

- Introduction
- Summary of Results
  - UP II modifications
  - New Hydroprocessing units
  - Overall plot plan
  - Utilities and offsites
  - Financial evaluations
  - Debottlenecking solutions
  - Recommendations
- Study Basis
  - Background and scope
  - Study limitations and assumptions
  - Crude slates
  - Overall Block Flow diagram
  - Product specifications
- High Vacuum Unit
  - Process description
  - Technical evaluation
  - System bottlenecks and recommended solutions
  - Equipment list/summary of modifications
  - Heat and Material balances as appropriate

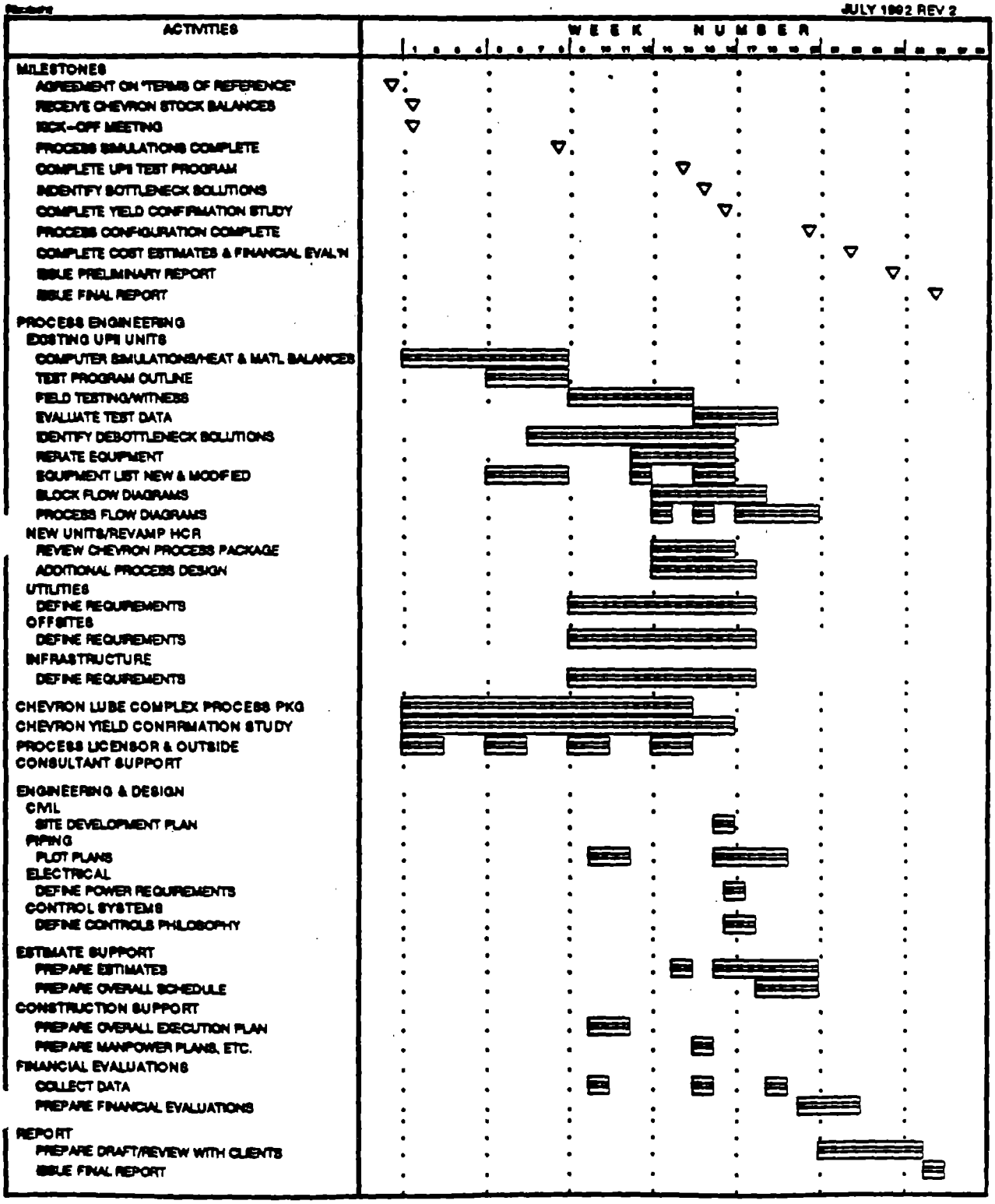
FIGURE 2

DUMAI BASE OILS PROJECT
FEASIBILITY STUDY WORK SCHEDULE

DUMAI, INDONESIA

FLUOR DANIEL, INC.

JULY 1992 REV 2



- Coker Unit
  - Process description
  - Technical evaluation
  - System bottlenecks and recommended solutions
  - Equipment list/summary of modifications
  - Heat and Material balances as appropriate

- H_2 System
  - Hydrogen balance evaluation and results

- Existing Hydrocracker
  - Process description
  - Technical evaluation
  - System bottlenecks and recommended solutions
  - Equipment list/summary of modifications
  - Heat and Material balances as appropriate

- Lube Base Oils Complex
  - Lube Oil Hydrocracker
    - Process description
    - Equipment list
    - Heat and Material balances as appropriate
  - Isodewaxing Unit
    - Process description
    - Equipment list
    - Heat and Material balances as appropriate
  - Hydrofinishing Unit
    - Process description
    - Equipment list
    - Heat and Material balances as appropriate
  - SDA Unit
    - Process description
    - Equipment list
    - Heat and Material balances as appropriate

- Utilities
  - Summary of new facilities
  - Equipment list

- Offsites
  - Summary of new facilities
  - Equipment list
- Environmental Considerations
- Infrastructure
  - Housing for additional operations personnel
  - Other infrastructure requirements
- Capital and Operating Cost Estimates
  - Summaries
  - Basis of estimate
  - Site development costs
  - UP II modifications and additions
  - New processing units
  - Utilities
  - Offsites
  - Start-up costs
  - Training costs
  - Operating costs
- Execution Plan and Schedule
  - Summary
  - Schedule of completion
  - Manpower requirements
  - Local materials and services
- Financial Evaluations
  - Summary
  - Financial Analysis
  - Sensitivities
- Recommendations for Further Study
- Opportunities for U.S. Sources of Supply
  - Breakdown of goods and services
  - Suggested list of U.S. suppliers
  - Probable U.S. locations for sources of supply
- Appendices
  - Process Flow Diagrams
  - Plot Plans
  - Licensor Information
  - Miscellaneous Information

ATTACHMENTS

[The information contained in Attachments 1 through 4 is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

ATTACHMENT 5

Current UP II Process Configuration

- Block Flow Diagram (Dumai - S. Pakning)
- List of (Dumai-S. Pakning) process units with capacities
- Jetty Facilities
- UP II Product Specifications (5 Sheets)

[The information contained in the Block Diagrams and List of Process Units with Capacities is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

Jetty Facilities

1. **Outer Jetty (Jetty #1)**
   - Capacity : 100,000 Dwt.
   - Qty. Of Chicksan : 3
   - Loading services : Kerosene, Diesel, Premium and Residue.

2. **Inner Jetty (Jetty #2)**
   - Capacity : 10,000 Dwt.
   - Qty. Of Chicksan : 2
   - Loading services : Mogas, Kerosene and ADO.

3. **Jetty #3**
   - Capacity : 35,000 Dwt.
   - Qty. Of Chicksan : 3
   - Loading services : Premium and Kerosene.

4. **Jetty #4**
   - Capacity : 25,000 Dwt.
   - Loading services : Special for loading Coke.

5. **Jetty #5**
   - Capacity : 35,000 Dwt.
   - Qty. Of Chicksan : 3
   - Loading services : Mogas, Kerosene and Diesel.

6. **Jetty #6**
   - Capacity : 3,000 Dwt.
   - Qty. Of Chicksan : 1
   - Loading services : Special for loading LPG.

UP II PRODUCT SPECIFICATION

LIQUIFIED PETROLEUM GAS (MIXED)

Analysis	Method	Specification
S.G. C 60/60 F	ASTM D. 1657	To be reported
Vapour Press. C 100 F, psi	ASTM D. 1267	Max. 120
Weathering Test C 36 F, Vol %	ASTM D. 1837	Min. 95
Copper Strip Corrotion (1 ht/100F)	ASTM D. 1838	Max. No. 1
Total Sulfur, grain/100 cuft	ASTM D. 2784	Max. 15
Water content	Visual	Free
Composition : Vol %	ASTM D. 2163	
Methanol		Nil
Ethane		Max. 0.2
Propane + Butanes		Min. 97.5
Pentanes & Heavies		Max. 2.0
Ethyl or Buthyl Mercaptan added, ml/1000 USG		Max. 5.0

PREMIUM - 88

Analysis	Method	Specification
S.G.C 60/60	ASTM D.1298	-
Colour	Visual	Yellow
Copper Strip Corrotion (3 hrs/122 F)	ASTM D.130	Max. No. 1
Distillation :	ASTM D. 86	
10 % Vol. evap., C		Max. 74
50 % Vol. evap., C		Min.88, Max.125
90 % Vol. evap., C		Max. 180
End Point		Max. 205
Residue, mg/100 ml		Max. 2.0
Existent Gum, mg/100 ml	ASTM D. 381	Max. 4
Induction Period, minute	ASTM D. 525	Min. 240
Octane Number, F-1	ASTM D.2699	Min. 88.0
TEL Content, ml/AG	ASTM D.2547	Max. 1.5
Sulfur Content, wt %	ASTM D.1266	Max. 0.20
RVP, psi	ASTM D. 323	Max. 9.0
Doctor Test, or alternatively	IP-30	Neg.
Dye Content Yellow, gr/100 AG		Min. 0.5
Odor		Marketable

TURBINE JET FUEL (AVTUR)

Analysis	Method	Specification
Density C 15 C	ASTM D.1298	Max. 0.840
Freezing Point, C	ASTM D.2386	Max. -47
Flash Point Abel, C	IP-170	Min. 38
Doctor Test	IP-30	Negatif
Copper Strip Corrotion 3 hrs/122 F)	ASTM D. 130	Max. No.1
Amiline Gravity Product	ASTM D. 611	Min. 4800
Distillation :	ASTM D. 86	
10 % Vol. evap., C		Max. 205
50 % Vol. evap., C		-
End Point, C		Max. 300
Silver Strip	IP-227	Max. 1
Appearance	Visual	C & B
Electrical Conductivity, pS/m	ASTM D.2624	Min.50 Max. 90
Smoke Point, mm	ASTM D.1322	Min. 20
Existent Gum, mg/100 ml	ASTM D. 381	Max. 7.0
Micro Separometer Index	ASTM D.3948	Min. 85
Water Reaction :	ASTM D.1094	
Interface Rating		Max. 1B
Separation		Max. 2
Aromatic, Vol. %	ASTM D.1319	Max. 22
Olefin, Vol. %	ASTM D.1319	Max. 5
Total Activity, mg KOH/q	ASTM D.3242	Max. 0.015
Visco, Kin.C - 20C, cSt	ASTM D. 445	Max. 8.0
Total Sulfur, wt %	ASTM D.1266	Max. 0.3
Sulfur, Mercaptan, wt %	ASTM D.3227	Max. 0.002
Thermal Stability :	ASTM D.3241	
Prest. Difference, mmHg		Max. 25
Tube Rating, visual		Max. 3
TDR Spun		Max. 15
Naphthalenes, Vol. %	ASTM D.1840	Max. 3
ASA-3, mg/l	Calculation	Max. 1

28

KEROSENE

Analysis	Method	Specification
S.G. C 60/60 F	ASTM D.1298	Max. 0.835
Colour Lovibond 18" Cell	IP-17	Max. 2.5
I dour		Marketable
Flash Point Abel, F	IP-170	Min. 100
Smoke Point, mm	IP-57	Min. 16
Char Value, mg/kg	IP-10	Max. 10
Sulfur Content, wt %	ASTM D-1266	Max. 0.20
Copper Strip Corrotion (3 hrs. 122F)	ASTM D. 130	Max. No.1
Distillation :		
Recovery C 200 C, Vol. %		Min. 18
FBP, C		Max. 310

AUTOMOTIVE DIESEL OIL

Analysis	Method	Specification
S.G. C 60/60 F	ASTM D.1298	Min. 0.820
		Max. 0.870
Colour ASTM	ASTM D.1500	Max. 3.0
Copper Strip Corrotion (3 hrs. 212 F)	ASTM D. 130	Max. No.1
Flash Point PM CC, F	ASTM D. 93	Min. 150
Pour Point, F	ASTM D. 97	Max. 65
Cetane Index/Cetane Number	ASTM D. 976	Min. 48
Neutralization Value :		
Strong Acid Number, mg KOH/g	ASTM D. 974	Nil
Total Acid Number, mg KOH/g	ASTM D. 974	Max. 0.6
Sediment, wt %	ASTM D. 473	Max. 0.01
Ash Content, wt %	ASTM D. 482	Max. 0.01
Water Content, Vol.%	ASTM D. 95	Max. 0.05
Conradson Carbon Residue, wt % (on 10% residue)	ASTM D. 189	Max. 0.10
Sulfur Content, wt %	ASTM D.1552	Max. 0.5
Distillation :	ASTM D. 86	
Recovery at 300 C, Vol.%		Min. 40
Visco Kin. C 100 F, cSt.	ASTM D. 445	Max. 5.8

MARINE DIESEL OIL

Analysis	Method	Specification
S.G. C 60/60 F	ASTM D.1298	Min. 0.840 Max. 0.920
Colour ASTM	ASTM D.1500	Max. 6.0
Flash Point PM CC, F	ASTM D. 93	Min. 150
Pour Point, F	ASTM D. 97	Max. 65
Cetane Index/Cetane Number	ASTM D. 976	Min. 48
Neutralization Value :		
Strong Acid Number, mg KOH/g	ASTM D. 974	Nil
Sediment, wt %	ASTM D. 473	Max. 0.02
Ash Content, wt %	ASTM D. 482	Max. 0.02
Water Content, Vol.%	ASTM D. 95	Max. 0.25
Conradson Carbon Residue, wt % (on 10% residue)	ASTM D. 189	Max. 1.0
Sulfur Content, wt %	ASTM D.1552	Max. 1.5
Visco Kin. C 100 F, cSt.	ID - 70	Max. 45

MARINE FUEL OIL

Analysis	Method	Specification
S.G. C 60/60 F	ASTM D.1298	Min. 0.990
Pour Point, F	ASTM D. 93	Min. 150
Water Content, Vol.%	ASTM D. 95	Max. 0.75
Pour Point, F	ASTM D. 97	Max. 80
Sulfur Content, wt %	ASTM D.1552	Max. 3.5 Min. 400
Visco Redwood I/100 F, Sec.	IP - 70	Max. 1250
Conradson Carbon Residue, wt %	ASTM D. 189	Max. 19
Strong Acid Number, mg KOH/2	ASTM D. 974	NIl
Sediment by Extraction, wt %	ASTM D. 473	Max. 0.15
Calorific Value (Coke), BTU/Lbr.	ASTM D.4868	Min. 1800

LOW SULFUR WAXY RESIDUE

Analysis	Method	Specification
S.G.C. 60/60 F	ASTM D.1298	Min. 0.8789
		Max. 0.9307
API Gravity C 60 F	ASTM D. 287	Min. 20.5
Flash Point, F		Max. 29.5
Water Content, Vol.%	ASTM D. 93	Max. 165
Pour Point, F	ASTM D. 97	Max. 120
Sulfur Content, wt %	ASTM D.1552	Max. 0.5
Visco Redwood I/140°F, Sec.	Convertion from	Min. 100
	ASTM D. 445	Max. 350
Conradson Carbon Residue, wt %	ASTM D. 350	Max. 8.0
Ash Content, wt %	ASTM D. 482	Max. 0.10

CALCINED COKE

Analysis	Method	Specification
Moisture Content, wt %	GLC.C-1C	Max. 0.50
Volatile Matter, wt %	GLC.C-2C	Max. 0.50
Ash Content. wt %	GLC.C-3a	Max. 0.50
Oil Content, wt %	GLC.SAM-159	Min. 0.2
		Max. 0.5
Vibrated bulk density, q/cc	GLC.SAM-144A	Min. 0.77
Real Density, q/cc	GLC.C-13C	Min. 2.07
Trace Element		
Iron Content, wt %	GLC.C-5	Max. 0.03
Silicon Content, wt %	GLC.C-6	Max. 0.03
Vanadium Content, wt %	GLC.C-7A	Max. 0.007
Sulfur Content, wt %	ASTM D.3177A	Max. 1.0
Partick Size, 4 Mesh and More, wt %	GLC.C-18	Min. 35.0

GREEN PETROLEUM COKE

Analysis	Method	Specification
Moisture, wt %	GLC.C-1C	Min 6 Max.8
Volatile, wt %	GLC.C-2C	Min.10 Max.13
Ash Content, wt %	GLC.C-3A	Max. 10
Fixed Carbon, wt %	ASTM D.3172	Min.87 Max.88
Sulfur Content, wt %	ASTM D.3174A	Max. 0.65

ATTACHMENT 6

Crude Assays (17 Sheets)

+ Sumatra Light
+ Sumatra Heavy/Duri
+ Lalang
+ Lirik
+ Pedada
+ Existing crude slate information (Enclosure 2)
  - Sumatran Light
  - LSWR from Sungai Pakning

CONFIDENTIAL

MINAS INDONESIA
Other name : SUMATRA LIGHT

GENERAL INFORMATION	LIGHT HYDROCARBONS (% M/M)		CRUDE OIL CHARACTERISTICS	
THIS EVALUATION WAS CARRIED OUT ON A SAMPLE COLLECTED FROM ACTUAL PRODUCTION. THE ANALYTICAL RESULTS ON THIS PAGE CAN BE REGARDED REPRESENTATIVE OF THE PRESENT QUALITY OF THE CRUDE OIL.	C3 MINUS	.02	DENSITY AT 15 C KG/L	.844
	IC4	.11	API GRAVITY 60 F DEGR.	36.0
	NC4	.09	BARREL/TONNE FACT.	7.461
	IC5	.25	MIN.VISC. AT 60 C MM2/S	5.74
	NC5	.28	MIN.VISC. AT 99 C MM2/S	4.16
	CYCLO C5	.29	SULPHUR CONTENT % M/M	.05
	2C6	.09	REID VAPOUR PRESSURE PSI/KPA	3.3c/ 22c
	BENZENE	.99	POURPOINT ASTM/IP/MAA/DEG C	30/ 30
	M.CYCLO C5	.26	EXIST. H2S CONTENT MG/KG	< 1
	CYCLO C6	<.01	POTENT. H2S CONTENT MG/KG	3
	OTHER C6	<.01	POTENT. MCL CONTENT MG/KG	1
SAMPLE-INFO: WATER < .02 % V/V SALT AS NACL < 8 MG/KG SEDIMENT < .01 % M/M		.49	CALC.GROSS CAL.VALUE MJ/KG	45810

NOTE : THIS PAGE REPLACES THE ONE ISSUED: 03/82
SAMPLE: ASSAY: ISSUED:

DISTILLATION FRACTIONS DEG C	CRUDE	C5- 65	65-100	100-150	150-200	200-250	250-300	300-350	350-370	370+	370-475	475+
YIELD ON CRUDE OIL % M/M		1.5	2.5	5.0	6.0	6.8	8.8	9.2	3.4	55.4	23.8	23.6
YIELD ON CRUDE OIL % V/V		2.0	3.0	5.8	6.6	7.7	9.0	9.3	3.4	53.5	22.8	30.7
POSITION IN CRUDE OIL % M/M		1.5 - 3.0	2.5 - 5	5 - 9.5	6.5 - 15.5	6.8 - 22.2	8.8 - 31.0	9.2 - 40.2	3.4 - 43.6	55.4 - 100	43.8-66.4	66.4 - 100
MID YIELD ON CRUDE % M/M		1.5	3.2	7.0	12.8	18.8	26.6	35.6	41.8	71.6	55.0	83.2
DENSITY AT 15 C KG/L	.844	.653	.708	.739	.788	.802	.851	.831	.836	.890	.851	.919
DENSITY AT 70 C KG/L										.857	.818	.887
KIN.VISC. AT 60 C MM2/S	5.24											
KIN.VISC. AT 99 C MM2/S	4.16											
KIN.VISC. AT 40 C MM2/S						1.84	2.76	4.92	7.43			
KIN.VISC. AT 80 C MM2/S										30.8	8.46	144
KIN.VISC. AT 100 C MM2/S										11.7	4.37	65.1
VISCOSITY VBO VALUE (CALC)	28.0					4.3	8.1	13.7	18.4	28.1	21.7	34.3
SULPHUR CONTENT MG/KG		< 1	2	7	21	80						
SULPHUR CONTENT % M/M	.008						.63	.07	.07	.12	.06	.16
TOTAL NITROGEN MG/KG	1010					2	8	38	170	1600C	280	
BASIC NITROGEN MG/KG										579	107	876
TOTAL ACID NUMBER MG KOH/G	.05				<---- .02 ---->	<--------		.05	------->	.16	.10	.20
RESEARCH ON-CLEAR		72c	67	< 40								
RESEARCH ON+.15 G PB/L (TEL)		79c	86c	43								
RESEARCH ON+0.4 G PB/L (TEL)		84c	92c									
TOTAL PARAFFINS % M/M		88.5	85.2	58.7	55.8							
TOTAL NAPHTHENES % M/M		10.0	14.8	37.3	39.8							
TOTAL AROMATICS % M/M		1.5	2.3	4.0	9.6							
PIA-AROMATICS % V/V					7	11	15					
NAPHTHALENES % V/V					.10	2.87	5.94					
SMOKE POINT MM					30	23	20					
FREEZING POINT DEG C					-58	-28	-10					
FREEZING POINT 150/250 DEG C					<---- -47 ---->							
CLOUDPOINT DEG C						-31	-8	14	31			
CLOUDPOINT 300/370 DEG C								<---- 18 ---->				
CLOUDPOINT 250/370 DEG C								<-------- 9 -------->				
CLOUDPOINT 200/370 DEG C								<---------- 3 ---------->				
POURPOINT (ASTM+MAA) DEG C	36						-9	12	27	48	45	51
POURPOINT 200/370 DEG C								<---------- 3 ---------->				
CETANE INDEX IP-218 (CALC)					63	55	61	69	> 70			
WAX CONTENT (SHELL) % M/M	28									41		38
CONGEALING POINT WAX DEG C	65									66		71
REFRACTIVE INDEX ND20C			1.3851	1.4119	1.4280	1.4468	1.4583	1.4637	1.4688		1.4545	
REFRACTIVE INDEX ND70C												
UOP-K-FACTOR (CALC)	12.51					12.12	12.14	12.29	12.38	12.39	12.53	12.27
C7-ASPHALTENES % M/M										1.8		3.3
CONRADSON CARBON RES. % M/M										4.6		8.3
ASH CONTENT % M/M										.010		
VANADIUM MG/KG										1.0		
NICKEL MG/KG										32		

CORRELATED/CALCULATED FLASHING DATA , BASIS LR (370+) MINAS

FRACTIONS (mass/vol/ATI) DEG C	370+	370-515	515+	370-555	555+
YIELD ON CRUDE OIL % M/M	56.4	30.9	25.5	38.4	20.0
YIELD ON CRUDE OIL % V/V	53.5	30.4	23.1	35.6	17.9
POSITION IN CRUDE OIL % M/M	43.6 - 100	43.6 - 74.5	- 100	43.6 - 80.0	- 100
MID YIELD ON CRUDE % M/M	71.8	59.0	87.2	61.8	90.0
DENSITY AT 15 C KG/L	.890	.858	.933	.864	.943
DENSITY AT 70 C KG/L	.857	.824	PV9	.830	.910
VISCOSITY VBO VALUE (CALC)	29.1	23.2	36.3	24.3	38.0
SULPHUR CONTENT % M/M	.12	.07	.18	.07	.20
TOTAL NITROGEN MG/KG	1660C	1256	2521	963	4339
BASIC NITROGEN MG/KG	579	428	1098	338	1341
WAX CONTENT (SHELL) % M/M	41		38		37
REFRACTIVE INDEX NDTOC	1.4784C	1.4597		1.4630	
MOLECULAR MASS	480C	402		416	
UOP-K-FACTOR (CALC)	12.39	12.50	12.20	12.49	12.15
RING INDEX % M/M	28.60C	19.90		21.33	
ARCH-INDEX % M/M	11.95C	8.15		9.27	
TETRA+ AROMATICS % M/M	2.10C	.61		.88	
C7-ASPHALTENES % M/M	1.8	.04	2.9	.06	3.6
CONRADSON CARBON RES. % M/M	4.6	.38	10.7	.80	13.3
VANADIUM MG/KG	2.0	.0	4.4	.0	9.6
NICKEL MG/KG	32	.8	68	1.1	60

C VALUE CALCULATED * VALUE ESTIMATED OR CORRECTED FROM OTHER ASSAY

SIPM 8F5643

CONFIDENTIAL

DURI (INDONESIA)
Other name(s): SUMATRA HEAVY / DURI

GENERAL INFORMATION

THIS EVALUATION WAS CARRIED OUT ON A SAMPLE COLLECTED FROM ACTUAL PRODUCTION.
THE ANALYTICAL RESULTS ON THIS PAGE CAN BE REGARDED REPRESENTATIVE OF THE PRESENT QUALITY OF THE CRUDE OIL.

SAMPLE-INFO: WATER 0.25 % v/v
SALT as NaCl 8 MG/KG
SEDIMENT < 0.01 % m/m

SAMPLE: 04/80 ASSAY: ISSUED:

LIGHT HYDROCARBONS (% m/m)

C3 MINUS	<.01
C3	<.01
IC4	<.01
NC4	<.01
ICS	<.01
NCS	<.01
CYCLO C5	<.01
NC6	.03
M.CYCLO C5 + BENZENE	.04
CYCLO C6	<.01
OTHER C6	.05
	.04

CRUDE OIL CHARACTERISTICS

DENSITY AT 15/4 C	KG/L	.855
API GRAVITY 60 F	DEGR.	33.4
BARRELS/TONNE	FACT.	6.810
KIN.VISC. AT 40 C	MM2/S	298
KIN.VISC. AT 65 C	MM2/S	78.5
REID VAPOUR PRESSURE PSI/KPA		< .1 / < 1
SULPHUR CONTENT	% M/M	.18
POURPOINT ASTM(W/S/MAX)	DEG C	12/ 15
EXIST. H2S CONTENT	MG/KG	< 3
POTENT. H2S CONTENT	MG/KG	3
POTENT. HCL CONTENT	MG/KG	1
GROSS CALORIFIC VALUE	KJ/KG	44220

DISTILLATION FRACTIONS DEG C	CRUDE		C5-100	100-150	150-200	200-250	250-300	300-350	350-370	370+	370-475	475+
YIELD ON CRUDE OIL % M/M			.4	1.6	2.7	4.1	6.8	6.3	2.5	75.6	16.8	58.8
YIELD ON CRUDE OIL % V/V			.5	1.8	3.1	4.8	6.9	6.4	2.5	74.5	17.0	57.4
POSITION IN CRUDE OIL % M/M			.0 - .4	.4 - 2.0	2.0 - 4.7	4.7 - 8.9	8.9 - 15.8	15.8 - 21.8	21.8 - 24.3	24.3 - 100	24.3 - 41.1	41.1 - 100
MID YIELD ON CRUDE % M/M			.2	1.2	3.4	6.8	12.2	18.8	23.0	62.1	33.7	70.8
DENSITY AT 15 C KG/L	.825		.730	.768	.816	.852	.883	.903	.917	.841	.916	.948
DENSITY AT 70 C KG/L							.844	.866	.881	.808	.884	.916
KIN.VISC. AT 40 C MM2/S	289					1.81	3.28	7.48	14.8	724	98.4	2785
KIN.VISC. AT 60 C MM2/S												
KIN.VISC. AT 65 C MM2/S	78.5											
KIN.VISC. AT 100 C MM2/S										86.3	7.91	188
VISCOSITY VSO-VALUE	30.8					5.2	10.8	16.4	20.2	36.0	26.7	38.8
SULPHUR CONTENT MG/KG			80	70	190							
SULPHUR CONTENT % M/M	.18					.04	.12	.21	.25	.23	.18	.25
TOTAL NITROGEN MG/KG	1350					5	30	700	700		1300	
BASIC NITROGEN MG/KG										1300	400	1700
TOTAL ACID NUMBER MG KOH/G	1.14				<--- .10 --->		<--- 2.37 --->			.60	1.55	.52
RESEARCH ON-CLEAR			77*	88								
RESEARCH ON+.15 G PB/L (TEL)			83*	78*								
RESEARCH ON+0.4 G PB/L (TEL)			88*	82*								
TOTAL PARAFFINS % M/M			37.4	22.8	17.3							
TOTAL NAPHTHENES % M/M			61.7	73.4	64.1							
TOTAL AROMATICS % M/M			.9	3.7	18.6							
POLY-NAPHTHENES % M/M					24							
PIA-AROMATICS % V/V					13	20	31					
NAPHTHALENES % V/V					.08	3.30	14.80					
SMOKE POINT MM					23	18	13					
FREEZING POINT DEG C					< -60	< -60	< -60					
FREEZING POINT 150/250 DEG C					<--- < -60 --->							
CLOUDPOINT DEG C						< -60	< -60	-33	-13			
CLOUDPOINT 200/370 DEG C								<--- -25 --->				
CLOUDPOINT 250/370 DEG C								<--- -35 --->				
CLOUDPOINT 300/370 DEG C								<--- =65 --->				
POURPOINT (ASTM+MAX) DEG C	18						< -60	-36	-12	30	24	28
POURPOINT 200/370 DEG C								<--- =54 --->				
CETANE INDEX CALC. 19-218					32	34	37	42	44			
WAX CONTENT (SHELL) % M/M	19									33		37
CONGEALING POINT MAX DEG C	70									72		75
REFRACTIVE INDEX ND70C			1.4051	1.4220	1.4396	1.4490	1.4900	1.5033	1.5134		1.4925	
REFRACTIVE INDEX ND70C												
(UOP-FACTOR (CALC.)	11.84					11.42	11.31	11.27	11.28	12.03	11.78	12.11
ASPHALTENES CONTENT % M/M										.02		.90
CONRADSON CARBON RES. % M/M										8.8		11.2
H2S CONTENT % M/M										.020		
VANADIUM MG/KG										< 3		
NICKEL MG/KG										30		

* value calculated or derived from other assay

CORRELATED/CALCULATED FLASHING DATA , BASIS LR (370+) DURI

FRACTIONS (Max-Bon/AET) DEG C	370+	370-518	518+	370-555	555+
YIELD ON CRUDE OIL % M/M	75.8	22.2	53.6	26.4	49.4
YIELD ON CRUDE OIL % V/V	74.5	22.3	52.2	26.4	48.1
POSITION IN CRUDE OIL % M/M	24.3-100	24.3 - 46.4	-100	24.3 - 50.8	- 100
MID-YIELD ON CRUDE % M/M	62.1	35.3	73.1	37.6	75.3
DENSITY AT 15 C KG/L	.841	.892	.948	.896	.910
DENSITY AT 70 C KG/L	.808	.888	.917	.892	.917
VISCOSITY VSO-VALUE	36.0	37.8	39.8	38.3	40.1
SULPHUR CONTENT % M/M	.23	.18	.25	.18	.28
WAX CONTENT (SHELL) % M/M	33		36		35
REFRACTIVE INDEX ND70C		1.4950		1.4970	
MOLECULAR MASS		407		413	
TOTAL NITROGEN MG/KG		1318		1408	
BASIC NITROGEN MG/KG	1300	440		470	
ASPHALTENES CONTENT % M/M	.62	.01	.88	.01	1.1
CONRADSON CARBON RES. % M/M	8.8	.36	13.2	.42	13.2
NICKEL MG/KG	30	.4	42	.5	46
UOP-FACTOR	12.03	11.77	12.14	11.77	12.18
RING INDEX % M/M		42.43		43.10	
ARCH-INDEX % M/M		16.16		16.46	
TETRA+ AROMATICS % M/M		3.10		3.27	

SIPM WF30/6

PETA pack/code (2138/LALANG-1)

INDONESIA
LALANG

SOURCE OF SAMPLE		CRUDE DATA		ASSAY SUMMARY/TBP DATA		
		Gravity API	38.7	Yield on crude	%wt	%vol
		Light Hydrocarbon Analysis		Gas to C4	0.3	0.1
				Light distillate to 149 C (API)	12.35	14.6
				Kerosine 149-232 C	13.25	14.15
Field	LALANG (SUMATRA - MALACCA STRAITS)	H2S %wt	-	Gas oil 232-342 C	22.2	22.3
		Methane %wt	-	Residue above 342 C	51.7	48.85
		Ethane %wt	-			
Export Terminal	LALANG	Propane %wt	0.04	Gas to C4	- 0.3	- 0.1
		Isobutane %wt	0.06			
		n-Butane %wt	0.18	Total to 85 C (API)	4.85	5.7
				149 C	12.85	14.7
Source	JANUARY 1989 SAMPLE			175 C	16.25	19.1
		Total C1 - C4	0.30	232 C	24.1	28.85
	SR 50 666 (24.4.89)			342 C	46.5	51.15
				369 C	53.35	58.15
		Isopentane %wt	0.42	389 C	79.1	81.1
		n-Pentane %wt	0.30	550 C	83.15	84.9
				Volume expansion of 0.35 per cent vol on crude subtracted from the gas yield		

1: PLATE ASSAY			DISTILLATES							
TBP cut point C	API	Total Crude	C3-85	85-175	C5-149	149-232	232-342	342-369	369-389	389-550
									DWO	
Yield on crude %wt		100	4.85	12.8	12.35	13.25	22.2	5.85	25.75	- 4.85
Yield on crude %vol		100	5.6	13.4	14.6	14.15	22.3	5.0	24.85	- 3.8
Density at 15 C	kg/litre	0.830	0.677	0.7425	0.7125	0.7785	0.8285	0.8425	0.836	0.901	0.867
Sulphur %wt		0.046	<0.001	0.001	<0.001	0.004	0.036	0.050	0.050	-	0.071
Mercaptan sulphur %wt		-	<0.0002	<0.0002	<0.0002	0.0002	-	-	-	-	-
Viscosity at 20 C	cSt	-	-	-	-	-	-	-	-	-	-
30 C		-	-	-	-	-	-	-	-	-	-
40 C		30.15	-	-	-	1.13	-	-	-	48.10	-
50 C		8.47	-	-	-	-	2.81	5.66	-	-	-
60 C		4.45	-	-	-	0.88	-	-	11.11	20.65	27.10
80 C		-	-	-	-	-	-	-	5.82	-	19.35
100 C		-	-	-	-	-	1.26	2.27	4.60	8.32	11.46
Viscosity index		-	-	-	-	-	-	-	-	81	-
Cloud point C		-	-	-	-	-	-3	30	-	-	-
Pour point C		36	-	-	-	-	-3	30	-	-6	-
Wax %wt		-	-	-	-	-	12.0	47.0	58.0	-	51.0
Appearance of wax C		-	-	-	-	-	-	38	54	-	85
Total nitrogen ppm wt		-	-	-	-	-	18	98	280	-	730
Basic nitrogen ppm wt		-	-	-	-	-	-	-	91	-	219
Organic oxygen %wt		-	-	-	-	-	-	-	40.1	-	-
Acidity mgKOH/g		0.19	-	-	-	0.024	0.21	-	0.47	-	0.32
Carbon residue %wt		1.2	-	-	-	-	-	-	-	-	-
Asphaltenes %wt		0.23	-	-	-	-	-	-	-	-	-
Vanadium ppm wt		< 2	-	-	-	-	-	-	-	-	-
Nickel ppm wt		< 2	-	-	-	-	-	-	-	-	-
Aromatics %vol		-	-	-	-	8.7	-	-	-	-	-
Smoke point mm		-	-	-	-	32	-	-	-	-	-
Freezing point C		-	-	-	-	-48.8	-	-	-	-	-
Aniline point C		-	-	-	-	66.4	78.7	83.3	107.8	-	-
Cetane index ASTM D976-80		-	-	-	-	47.8	57.5	60.4	-	-	-
Refractive index at 70 C		-	-	-	-	-	-	-	1.4367	-	1.4804
Hydrogen content %wt		-	-	-	-	14.47	-	-			
Paraffins %wt		-	82.9	83.3	80.1	-	-	-			
Naphthenes %wt		-	17.7	11.7	18.8	-	-	-			
Aromatics %wt		-	0.3	5.0	1.1	-	-	-			
n-Paraffins %wt		-	33.3	31.7	32.2	-	-	-			
Colour stability		-	-	-	-	Stable	Unstable	-			
Naphthalenes %vol		-	-	-	-	0.02	-	-			
Salt lb/1000bbl		2.0	-	-	-	-	-	-			
Water %vol		< 0.05	-	-	-	-	-	-			

A/2051
June 1989

1st PLATE ASSAY		RESIDUES			
TBP cut point C	API	342	369	509	550
Yield on crude	1wt	51.7	46.65	20.9	18.85
Yield on crude	1vol	46.85	43.25	18.9	15.1
Density at 15 C	kg/litre	0.8765	0.8825	0.9175	0.925
Sulphur	1wt	0.87	0.87	0.89	0.89
Viscosity at 50 C	cSt	38.2	58.6	-	-
60 C		-	33.3	-	-
80 C		-	19.8	-	-
100 C		-	11.58	32.3	79.5
120 C		-	7.71	22.2	45.1
130 C		-	-	-	24.8
Penetration at 25 C	mm/10	-	-	385	116
Softening point	C	-	-	32.0	52.0
Pour point	C	36	37	-	-
Wax	1wt	22.0	23.0	50.0	-
mp of wax	C	-	67	76	-
Total nitrogen	ppm wt	830	910	1800	1920
Acidity	mgKOH/g	-	0.28	-	-
Carbon residue	1wt	2.3	2.8	5.6	6.8
Asphaltenes	1wt	0.45	0.50	1.1	1.4
Vanadium	ppm wt	< 2	< 2	< 2	< 2
Nickel	ppm wt	3	3	7	8
Xylene equivalent		-	18	-	20
Saturates	1wt	-	69	-	63
Aromatics	1wt	-	5	-	8
Resins A	1wt	-	3	-	7
Resins B	1wt	-	3	-	19

Crude: BALANC

PPETA deck/code: (2138/BALANC*1)

Comments:

TBP cut pt	C	30	35	60	65	70	75	80	85	90	95
Total distillate	1wt	1.42	1.64	1.89	2.17	2.50	2.87	3.30	3.77	4.28	4.83
TBP cut pt	C	100	105	110	115	120	125	130	135	140	145
Total distillate	1wt	5.46	6.12	6.81	7.53	8.28	9.05	9.83	10.62	11.42	12.22
TBP cut pt	C	150	155	160	165	170	175	180	185	190	195
Total distillate	1wt	13.01	13.79	14.56	15.32	16.08	16.83	17.61	18.36	19.15	19.92
TBP cut pt	C	200	205	210	215	220	225	230	235	240	245
Total distillate	1wt	20.70	21.48	22.26	23.10	23.94	24.81	25.72	26.66	27.67	28.70
TBP cut pt	C	250	255	260	265	270	275	280	285	290	295
Total distillate	1wt	29.76	30.80	31.85	32.89	33.93	34.96	35.97	36.99	38.00	39.01
TBP cut pt	C	300	305	310	315	320	325	330	335	340	345
Total distillate	1wt	40.01	41.02	42.02	43.01	44.01	45.00	45.99	46.96	47.92	48.86
TBP cut pt	C	350	355	360	365	370	375	380	385	390	395
Total distillate	1wt	49.78	50.69	51.61	52.56	53.55	54.59	55.66	56.75	57.83	58.86
TBP cut pt	C	400	410	420	430	440	450	460	470	480	490
Total distillate	1wt	60.85	62.17	64.23	66.27	68.28	70.20	71.97	73.62	75.16	76.62
TBP cut pt	C	500	510	520	525	530	540	550			
Total distillate	1wt	77.96	78.22	80.33	80.85	81.34	82.27	83.13			

PFEFA pack/code 2458/LIRIE**1

INDONESIA
LIRIE

SOURCE OF SAMPLE		CRUDE DATA		ASSAY SUMMARY/TBP DATA		
		Gravity API	34.3	Yield on crude	Wt%	Vol%
		Light Hydrocarbons Analysis		Gas to C4	0.1	-
				Light distillate to 149 C (API)	5.0	5.9
		H2S Wt%	-	Kerosine 149-232 C	8.7	9.55
Field	LIRIE	Methane Wt%	-	Gas oil 232-342 C	19.7	20.4
		Ethane Wt%	-	Residue above 342 C	65.3	64.15
		Propane Wt%	0.03			
Export Terminal	BELAWAN, SUMATRA	Isobutane Wt%	0.03	Gas to C4	0.1	-
		n-Butane Wt%	0.04			
				Total to 95 C (API)	1.2	1.35
Source	BP SINGAPORE	Total C1 - C4	0.10	149 C	5.1	5.9
				175 C	7.15	8.15
	- ST 50 362 (27.5.86)			232 C	13.8	15.45
		Isopentane Wt%	0.10	342 C	33.5	35.85
		n-Pentane Wt%	0.13	369 C	38.55	41.0
				509 C	71.5	73.85
				550 C	76.1	78.5
				Volume expansion of 0.15 per cent vol on crude subtracted from the gas yield		

16 PLATE ASSAY			DISTILLATES								
TBP cut point C	API	Total Crude	C5-95	95-175	C5-149	149-232	232-342	342-369	369-509		509-550
										FWD	
Yield on crude Wt%	100	1.1	3.95	5.8	8.7	19.7	5.85	32.95	-	4.6	
Yield on crude Vol%	100	1.35	4.8	5.9	9.55	20.4	5.15	32.85	-	4.45	
Density at 15 C kg/litre	0.853	0.8835	0.7445	0.7245	0.7775	0.823	0.834	0.835	0.905	0.8853	
Sulphur Wt%	0.07	<0.001	0.001	<0.001	0.004	0.04	0.06	0.05	-	0.01	
Mercaptan sulphur Wt%	-	<0.0002	<0.0002	<0.0002	<0.0002	-	-	-	-	-	
Viscosity at 20 C cSt	-	-	-	-	-	-	-	-	-	-	
30 C	-	-	-	-	-	-	-	-	-	-	
40 C	-	-	-	-	1.18	-	-	-	62.7	-	
50 C	14.65	-	-	-	-	2.66	3.37	-	-	-	
60 C	10.35	-	-	-	0.92	-	-	11.38	23.25	-	
80 C	-	-	-	-	-	-	-	7.00	-	28.65	
100 C	-	-	-	-	-	1.38	2.26	4.72	7.44	13.25	
Viscosity Index	-	-	-	-	-	-	-	-	73	-	
Cloud point C	-	-	-	-	-	4	31	-	-	-	
Pour point C	39	-	-	-	-	0	30	-	-6	-	
Wax Wt%	-	-	-	-	-	2.3	43.0	35.5	-	42.5	
mp of wax C	-	-	-	-	-	-	39	56	-	70	
Total nitrogen ppm wt	-	-	-	-	-	21	150	292	-	822	
Basic nitrogen ppm wt	-	-	-	-	-	-	-	100	-	320	
Organic oxygen Wt%	-	-	-	-	-	-	-	<0.05	-	-	
Acidity mgKOH/g	0.05	-	-	-	0.029	0.04	-	0.04	-	0.04	
Carbon residue Wt%	2.6	-	-	-	-	-	-	-	-	-	
Asphaltenes Wt%	0.09	-	-	-	-	-	-	-	-	-	
Vanadium ppm wt	< 1	-	-	-	-	-	-	-	-	-	
Nickel ppm wt	7	-	-	-	-	-	-	-	-	-	
Aromatics Vol%	-	-	-	-	7.5	-	-	-	-	-	
Smoke point mm	-	-	-	-	26	-	-	-	-	-	
Freezing point C	-	-	-	-	-43.5	-	-	-	-	-	
Aniline point C	-	-	-	-	69.0	80.6	95.5	106.9	-	117.0	
Cetane index ASTM D976-80	-	-	-	-	46.1	56.8	62.6	-	-	-	
Refractive index at 70 C	-	-	-	-	-	-	-	1.4343	-	-	
Hydrogen content (dodecane standard) Wt%	-	-	-	-	14.62	-	-				
Paraffins Wt%	-	73.7	61.3	62.2	-	-	-				
Naphthenes Wt%	-	23.5	33.2	33.4	-	-	-				
Aromatics Wt%	-	0.8	3.5	3.4	-	-	-				
n-Paraffins Wt%	-	36.3	43.8	42.4	-	-	-				
Colour stability	-	-	-	-	Stable	Stable	-				
Naphthalenes Vol%	-	-	-	-	0.31	-	-				
Salt lb/1000bbl	4.4	-	-	-	-	-	-				
Water Vol%	0.10	-	-	-	-	-	-				

A/1938
June 1986

14 Plate Assay		Residues			
TBP cut point	C	342	369	509	550
Yield on crude	%wt	66.5	61.45	28.5	23.9
Yield on crude	%vol	64.15	59.0	26.15	21.7
Density at 15 C	kg/litre	0.8845	0.8883	0.9305	0.9395
Sulphur	%wt	0.10	0.10	0.15	0.16
Viscosity at 50 C	cSt	72.3	98.5	-	-
60 C		-	60.2	-	-
80 C		-	27.0	-	-
100 C		-	14.4	101.1	148.5
120 C		-	-	52.85	74.8
150 C		-	-	-	33.1
Penetration at 25 C	mm/10	-	-	43	38
Softening point	C	-	-	52.5	53.0
Pour point	C	51	54	-	-
Wax	%wt	48.0	48.0	39.0	-
mp of wax	C	-	66	75	-
Total nitrogen	ppm wt	1500	1610	3130	3570
Acidity	mgKOH/g	-	0.07	-	-
Carbon residue	%wt	3.9	4.2	8.9	10.5
Asphaltenes	%wt	0.14	0.15	0.30	0.40
Vanadium	ppm wt	< 2	< 2	< 2	< 2
Nickel	ppm wt	11	11	25	29
Xylene equivalent		-	-	-	-

Crude LIRIK

PPEPA back/code 7436/LIRIK**1

Comments

BP cut pt	deg c	50	55	60	65	70	75	80	85	90	95
otal distillate	%wt	0.38	0.43	0.48	0.54	0.60	0.67	0.76	0.87	1.01	1.20
BP pt	deg c	100	105	110	115	120	125	130	135	140	145
otal distillate	%wt	1.43	1.71	2.02	2.37	2.74	3.14	3.54	3.95	4.37	4.78
BP cut pt	deg c	150	155	160	165	170	175	180	185	190	195
otal distillate	%wt	5.18	5.57	5.95	6.33	6.73	7.15	7.60	8.07	8.56	9.10
BP cut pt	deg c	200	205	210	215	220	225	230	235	240	245
otal distillate	%wt	9.65	10.22	10.81	11.43	12.08	12.77	13.50	14.27	15.08	15.92
BP cut pt	deg c	250	255	260	265	270	275	280	285	290	295
otal distillate	%wt	16.78	17.66	18.55	19.44	20.33	21.22	22.12	23.03	23.95	24.88
BP cut pt	deg c	300	305	310	315	320	325	330	335	340	345
otal distillate	%wt	25.83	26.77	27.72	28.66	29.59	30.50	31.40	32.28	33.15	34.02
BP cut pt	deg c	350	355	360	365	370	375	380	385	390	395
otal distillate	%wt	34.91	35.81	36.75	37.73	38.76	39.86	41.01	42.21	43.45	44.71
BP cut pt	deg c	400	410	420	430	440	450	460	470	480	490
otal distillate	%wt	46.00	48.62	51.34	54.20	57.15	60.00	62.61	64.94	66.98	68.75
BP cut pt	deg c	500	510	520	525	530	540	550			
otal distillate	%wt	70.29	71.63	72.82	73.38	73.92	75.00	76.10			

TECHNOLOGICAL REPORT

EVALUATION

PEDADA CRUDE OIL

REPORT No.: PL - 20

MARCH 1977

PERTAMINA UNIT PENGOLAHAN III
PLAJU LABORATORY

EVALUASI PEDADA CRUDE OIL

I. Ringkasan

Contoh Pedada Crude Oil yang diterima dari kapal "DONA YOULA" sebanyak dua drum &200 liter telah di-evaluasi di Laboratorium Plaju.

Evaluasi dilakukan menggunakan Fractional Distillation Column 4 meter, reflux radio = 10 : 1, untuk memperoleh fraksi-fraksi sampai 350°C, sedangkan fraksi-fraksi diatas 350°C digunakan Vigreux Column 1 meter dengan reflux ratio = 1 : 1.

Pedada Crude Oil berasal dari Central Sumatra, hasil Contractor Production Sharing "Caltex Pacific Indonesia".

II. Kesimpulan

Berbeda dari Crude Oil Central Sumatra biasa (Light Sumatra Crude) pourpoint 95°F, Pedada Crude mempunyai pourpoint 40°F ; tidak akan kesukaran handling pada temperature normal.

Pedada Crude termasuk jenis mixed base dengan K-factor 12.1 Crude ini mempunyai kadar sulfur 0.1 % wt. potential hydrogen Chloride 1.3 ppm. dan wax content 21.6 % wt.

Fraksi 150-250°C Pedada Crude yield 14.4 % dengan freezing point /-60°C memenuhi semua persyaratan (specifikasi) AVTUR.

Fraksi 350-475°C (POD) dengan kandungan wax hanya 7.0 %wt. mempunyai pourpoint 50°F ; dapat digunakan sebagai Lub.Oil base stock atau gasoil component.

Yield dan sifat-sifat utama fraksi-fraksi dapat dilihat dalam tabel dibawah ini.

T a b e l

Fraksi	Yield on Crude, %wt	Sifat-sifat utama	
Tops (100°C E.P)	3.1	F1 clear F1+2ml TEL/AG F1+3ml TEL/AG	1[illegible] ON 81.2 ON 85.2 ON
Naphtha (100-150°C)	6.9	F1 clear F1+2ml TEL/AG F1+3ml TEL/AG Aromatics	48.6 ON 67.1 ON 77.4 ON N[illegible]
Naphtha (150-200°C)	7.0	F1 clear F1+2ml TEL/AG F1+3ml TEL/AG Aromatics	40.9 ON 5[illegible] ON 5[illegible] ON 6.5 %vol
Avtur (150-250°C	14.4	Smoke Point Aromatics Freezing Point	23 mm 15.3 %vol ∠ -60°C.
Kerosine (150-300°C)	25.6	Smoke Point Aromatics	16 mm 34.9 %vol
Gasoil (250-300°C)	11.2	Pour Point Visc.Kin.100°F Cetane Number	∠ -15°F [illegible] cS 33.[illegible]
Gasoil (300-350°C)	7.0	Pour Point Visc.Kin.100°F Cetane Number	∠ -15°F 8.56 cS 49.[illegible]
Long Residue (Residue 7350°C)	57.3	Pour Point Visc.Kin.140°F CCR Sulfur Asphaltene	9[illegible]°F 118.[illegible] cS 5.[illegible] %wt 0.[illegible] %wt 0.6[illegible] %wt
P.O.D. (350-475°C)	17.7	Pour Point Visc.Kin.100°F Wax Content Congealing point of wax Diesel Index	50[illegible] 46.[illegible] cS 7.[illegible] %wt 34.[illegible] 47.0

Basic break down PEDADA CRUDE OIL on no loss basic

	Yield on Crude, %wt	Cutting range, %wt
C1 - C4	0.1	0.0 - 0.1.
C5 - 100°C	3.1	0.1 - 3.2
100 - 150°C	6.9	3.2 - 10.1
150 - 200°C	7.0	10.1 - 17.1
200 - 250°C	7.4	17.1 - 24.5
250 - 300°C	11.2	24.5 - 35.7
300 - 350°C	7.0	35.7 - 42.7
350 - 475°C	17.7	42.7 - 60.4
Residue 7475°C	39.6	60.4 - 100.0

GENERAL CHARACTERISTIC OF

PEDADA CRUDE OIL

SAMPLE	: PEDADA CRUDE OIL
LOCATION OF SAMPLING	: SEI.PAKNING (CENTRAL SUMATRA)
SAMPLE RECEIVED	: JAN. 1977
EVALUATION STARTED	: JAN. 1977
EVALUATION COMPLETED	: MARCH 1977

1	Specific Gravity 60/60°F		ASTM D-1298	0.8719
	Gravity API		ASTM D-287	30.8
2	Light Hydrocarbon Analysis (GLC)		SMS - 1749	
	C1	%wt. / %vol		- / -
	C2	" / "		- / -
	C3	" / "		traces/traces
	iC4	" / "		traces/ 0.1
	nC4	" / "		0.1 / 0.1
	iC5	" / "		0.1 / 0.2
	nC5	" / "		0.2 / 0.2
	C6+	" / "		99.6 / 99.4
3	Distillation :		ASTM D-285	
	Initial Boiling Point	°C		43
	10% vol. Recovered	"		136
	20% " "	"		200
	30% " "	"		258½
	40% " "	"		291
	50% " "	"		300
	Recovery at 100°C	%vol		3.5
	" " 150 "	" "		12.0
	" " 200 "	" "		20.0
	" " 250 "	" "		28.0
	" " 300 "	" "		44.0
4	Viscosity :		ASTM D-445	
	Kinematic at 100°F			18.00
	Kinematic at 122°F			12.01
5	Sulfur Content	% wt	ASTM D-1551	0.1
6	Water Content	%vol	ASTM D-95	traces
7	Water and Sediment	%vol	ASTM D-96	0.05
8	Pour Point	°F	ASTM D-97	40
9	Salt Content	mg.NaCl/liter	IP - 77	1
10	Ash Content	% wt	ASTM D-482	< 0.01
11	Flash Point, TAG closed tester	°F	ASTM D-56	41
12	Conradson Carbon Residue	% wt	ASTM D-189	2.7
13	Reid Vapor Pressure	lb	ASTM D-323	1.3
14	Asphaltens Content	% wt	IP - 143	0.17
15	UOP. Characterization factor		UOP - 375	12.1
16	Potential Hydrogen Chloride	ppm	SMS - 1710	1.3
17	Wax Content	% wt	SMS - 1769	21.6
18	Congealing point of Petroleum Waxes	°C	ASTM D-938	56.0

NAPHTHA FRACTIONS OF PEDADA CRUDE OIL

	T.B.P. Cutting Temperature			C5-100 C5-212	100-150 212-302	150-200 302-392
	Yield on crude	% wt		[illegible]	6.9	7.0
	Yield on crude	% vol		3.9	8.1	7.7
	Cutting range	% wt		0.1 3 2	3.2-10.1	10.1-17.1
	Cutting range	% vol		0.1-4.0	4.0-12.1	12.1-19.8
1	Specific Gravity 60/60°F		ASTM D-1[illegible]	0.6980	0.7448	0.7881
	Gravity API		ASTM D [illegible]	71.2	58.5	48.1
2	Distillation :		ASTM D-8[illegible]			
	Initial Boiling Point	°C		56	113	164
	10% vol. recovered	"		71	120	169
	20% " "	"		75	122½	170
	30% " "	"		78½	124	171½
	40% " "	"		81	125	173
	50% " "	"		84	127	175
	60% " "	"		87	128½	177
	70% " "	"		89	131	179
	80% " "	"		92	134	182
	90% " "	"		95	138	187
	Final Boiling Point	"		102	151	195
	Residue	% vol		1.0	1.0	1.0
	Loss	% vol		1 0	0.5	0.5
3	Sulfur Content	% wt	ASTM [illegible] 1266	0.01	0.02	0.02
4	Aromatics	% vol	ASTM [illegible]-1319	Nil	Nil	6.5
5	Reid Vapor Pressure	lb	ASTM [illegible]-323	5.0	-	-
6	Knock Rating		ASTM D-2699			
	RON, clear	ON		63.8	48.6	40.9
	+ 2ml TEL/AG	ON		81.2	67.1	57.5
	+ 3ml TEL/AG	ON		83.2	77.4	58.8
7	P.O.N.A. Analysis :					
	Paraffins	% vol	ASTM D-2159	77	60	36
	Naphthenes	% vol	ASTM D-2159	23	40	57
	Aromatics	% vol	ASTM D-1319	Nil	Nil	6.5
	Olefins	% vol	ASTM D-1319	Nil	Nil	Nil
8	Copper Corrosion, 3 hrs at 122°F		ASTM D-130	No.1	No.2	No.2
	2 hrs at 212°F		ASTM D-130	No.1	No.3	No.3

GASOLINE FRACTION OF PEDADA CRUDE OIL

	T.B.P. Cutting Temperature		°C °F	C5 - 200 C5 - 392
	Yield on curde	% wt		17.0
	Yield on crude	% vol		19.7
	Cutting range	% wt		0.1 - 17.1
	Cutting range	% vol		0.1 - 19.8
1	Specific Gravity 60/60°F		ASTM D-1298	0.7517
	Gravity API		ASTM D-287	56.5
2	Distillation :		ASTM D-86	
	Initial Boiling Point	°C		70
	10% vol. recovered	"		105
	20% " "	"		115
	30% " "	"		123
	40% " "	"		131½
	50% " "	"		140
	60% " "	"		150
	70% " "	"		159
	80% " "	"		168
	90% " "	"		179
	Final Boiling Point	"		197
	Residue	% vol		1.0
	Loss	% vol		0.5
3	Reid Vapor Pressure	lb	ASTM D-323	1.8
4	Copper Corrosion, 3 hrs at 122°F		ASTM D-130	No.1
5	Sulfur Content	% wt	ASTM D-1266	0.01
6	Knock Rating :		ASTM D-2699	
	RON , clear	ON		47.0
	+ 2ml TEL/AG	ON		66.2
	+ 3ml TEL/AG	ON		69.7

KEROSINE FRACTIONS OF

PEDADA CRUDE OIL

	T.B.P. Cutting Temperature			°C °F	150-250 300-482	150-300 300-572
	Yield on crude	% wt			14.4	25.6
	Yield on crude	% vol			15.5	26.7
	Cuttung range	% wt			10.1-24.5	10.1-35.7
	Cutting range	% vol			12.1-27.6	12.1-38.8
1	Specific Gravity 60/60°F			ASTM D-1298	0.8112	0.8368
	Gravity API			ASTM D-287	42.9	37.6
2	Distillation :			ASTM D-86		
	Initial Boiling Point		°C		174	177
	10% vol. recovered		"		184	195
	20% " "		"		188½	206
	30% " "		"		194	218
	40% " "		"		199	230
	50% " "		"		205	242
	60% " "		"		212½	253
	70% " "		"		220	262
	80% " "		"		227	270
	90% " "		"		234	279
	Final Boiling Point		"		247	294
	Residue		% vol		1.0	1.0
	Loss		% vol		0.5	0.5
3	Sulfur Content		% wt	ASTM D-1266	0.02	0.04
4	Aromatics		% vol	ASTM D-1319	15.3	34.9
5	Smoke Point		mm	IP - 57	23	16
6	Freezing Point		°C	ASTM D-2386	∠ -60	-
7	Flash point Abel		°F	IP - 170	135	148
8	Viscosity :			ASTM D-445		
	Kinematic at -30°F		cS		8.20	-
	Kinematic at 100°F		cS		1.46	2.05
9	Copper Corrosion, 3 hrs at 122°F			ASTM D-130	No.1	No.1
	2 hrs at 212°F			ASTM D-130	No.1	No.1
10	Colour Lovibond 18" cell			IP - 17	0.75	2.75

GAS OIL/PARAFFINIC OIL DISTILLATE FRACTIONS OF PEDALA CRUDE OIL.

	T.B.P. Cutting Temperature			°C °F	250-300 482-572	300-350 572-662	350-475 662-887
	Yield on crude	% wt			11.2	7.0	17.7
	Yield on crude	%vol			11.2	6.9	17.1
	Cutting range	% wt			24.5-35.7	35.7-42.7	42.7-60.4
	Cutting range	%vol			27.6-38.8	38.8-45.7	45.7-62.8
1	Specific Gravity 60/60°F		ASTM D-1298		0.8703	0.8867	0.9042
	Gravity API		ASTM D-287		31.1	28.1	25.0
2	Distillation :		ASTM D-86				x)
	Initial Boiling Point	°C			259	312	367
	10% vol. recovered	"			264	318	389
	20% " "	"			271	320	395
	30% " "	"			272½	321½	402
	40% " "	"			273½	323	406
	50% " "	"			275	324	411
	60% " "	"			277	325	418
	70% " "	"			279	326½	425
	80% " "	"			282	328	435
	90% " "	"			286½	331	446
	Final Boiling Point	"			293	339	463
3	Pour Point	°F	ASTM D-97		∠ -15	∠ -15	50
4	Sulfur Content	% wt	ASTM D-1551		0.08	0.12	0.12
5	Neutralization Value		ASTM D-974				
	Strong Acid Number	mg.KOH/g			Nil	Nil	-
	Total Acid Number	mg.KOH/g			0.09	1.89	-
6	Cetane Number		ASTM D-613		33.9	45.5	-
7	Wax Content	% wt	SMS - 1684		-	-	7.0
8	Congealing point of Petroleum Waxes	°C	ASTM D-938		-	-	34.0
9	Viscosity :		ASTM D-445				
	Kinematic at 100°F	cS			3.66	8.56	46.25
	Kinematic at 140°F	cS			-	-	18.06
	Kinematic at 170°F	cS			-	-	10.78
10	Conradson Carbon Residue	% wt	ASTM D-189		-	-	0.02
11	Metals Content :						
	V	ppm	ASTM D-1548		-	-	0.1
	Ni	ppm	SMS - 1370		-	-	0.08
	Fe	ppm	SMS - 1371		-	-	1.0
12	Diesel Index		IP - 21		-	-	47.0

x) According to SIL 10.06D

LONG RESIDUE AND BOTTOM OF PEDADA CRUDE OIL

	T.B.P. Cutting Temperature			Long Residue 7 350°C 7 662°F	Bottom 7 475°C 7 887°F
	Yield on crude	% wt		57.3	39.6
	Yield on curde	% vol		54.5	37.4
	Cutting range	% wt		42.7-100.0	60.4-100.0
	Cutting range	% vol		45.7-100.2	62.8-100.2
1	Specific Gravity 60/60°F		ASTM D-1298	0.9143	0.9221
	Specific Gravity 25/25°C		ASTM D-70	-	-
	Gravity API		ASTM D-287	23.3	21.9
2	Pour Point	°F	ASTM D-97	90	110
3	Softening Point Ring and Ball	°C	ASTM D-36	-	-
4	Sulfur Content	% wt	ASTM D-1551	0.13	0.14
5	Viscosity :		ASTM D-445		
	Kinematic at 140°F	cS		118.88	-
	Kinematic at 170°F	cS		58.33	133.43
	Kinematic at 210°F	cS		27.28	56.90
6	Conradson Carbon Residue	% wt	ASTM D-189	5.6	7.0
7	Asphaltenes Content	% wt	IP - 143	0.67	1.14
8	Metals Content :				
	V	ppm	ASTM D-1548	0.7	1.0
	Ni	ppm	SMS - 1370	6.4	10.0
	Fe	ppm	SMS - 1371	14.4	48.0

APPENDIX

COLOUR STABILITY TREATING FACILITIES

PERTAMINA OKTOBER '71

Distillation Range	°C	174-247	177-300	154-239	160-278
	Method				
Specific Gravity 60/60°F	ASTM D-1298	0.8113	0.8368	0.8004	0.8239
Distillation :	ASTM D-86				
I.B.P. °C		174	177	154	160
10% vol. rec. "		184½	193	169	178
50% " " "		205½	244	193	226
90% " " "		234½	282½	226	264
End Point "		247	300	239	278
Colour Stability (Lead Peroxide Test)	SMS - 99/3				
Colour Saybolt before treatment	ASTM D-156	-	-	+30	+28
Colour Saybolt after treatment	ASTM D-156	-	-	+27	+26
Colour Stability (Nitrogen Base Test)	SMS -100/3				
Nitrogen Base		negative	positive	negative	positive
Phenolic Content ppm	SMS - 246	45	85	35	65
Nitrogen Base ppm	UOP-313	0.21	1.27	0.35	1.4
Colour Stability sebelum dijemur	IP - 17	0.17	2.75	0.50	0.75
Colour Stability sesudah dijemur 2 jam	IP - 17	0.75	3.0	0.50	0.75
Colour Stability					
Colour Lovibond, 18"cell	IP - 17				
Setelah 0 hari		0.75	2.75	0.50	0.75
1 "		0.75	3.0	0.50	0.75
2 "		0.75	3.0	0.50	0.75
3 "		0.75	3.0	0.50	0.75
4 "		0.75	3.0	0.50	0.75
5 "		0.75	3.0	0.50	0.75
6 "		0.75	3.0	0.50	0.75
1 minggu		0.75	3.0	0.50	0.75
2 "		0.75	3.50	0.50	0.75
3 "		0.75	3.50	0.50	0.75
4 "		0.75	3.50	0.50	0.75

Colour Stability :

Contoh diisikan kedalam botol coklat berwarna penuh dan diberi strip besi.
Disimpan dalam kotak temperature 35°C constant selama satu bulan.
Tiap hari diperiksa colournya

ENCLOSURE - 2

Existing Crude Slate

Dumai Refinery	:	SLC/Minas Crude	80 % VOL
		Duri Crude	20 % VOL MAX
Sungai Pakning Refinery	:	Pedada Crude	15.5 % VOL
		Lirik Crude	15.5 % VOL
		SLC	69.0 % VOL

ANALISIS SUMATERA LIHGT CRUDE YANG DITERIMA

SELAMA PERIODE : OKTOBER / DESEMBER 1991

UNIT PENGOLAHAN II SEI-PAKNING

Jumlah (Barrels)			619.837			Spesifikasi	
Jenis Minyak			SUMATERA LIGHT CRUDE (MINAS)				
Macam Pemeriksaan		Methoda	Terendah	Rata-rata	Tertinggi	Minimum	Maximum
API Gravity at 60 F		ASTM D. 287	35.7	35.7	35.8		
Water Content	vol %	ASTM D. 95	0.50	0.50	0.600		
Water and Sediment	vol %	ASTM D.1796	0.80	1.60	3.00		
Viscosity Kinematic at 100 F	cSt	ASTM D. 445	-	-	-		
Pour Point	F	ASTM D. 97	-	-	-		

ANALISIS SUMATERA LIHGT CRUDE YANG DITERIMA

SELAMA PERIODE : OKTOBER / DESEMBER 1991

UNIT PENGOLAHAN II SEI-PAKNING

Jumlah (Barrels)			1.097.841 *			Spesifikasi	
Jenis Minyak			SUMATERA LIGHT CRUDE (PEDADA)				
Macam Pemeriksaan		Methoda	Terendah	Rata-rata	Tertinggi	Minimum	Maximum
API Gravity at 60 F		ASTM D. 287	30.6	30.9	31.3		
Water Content	vol %	ASTM D. 95	0.10	0.25	0.35		
Water and Sediment	vol %	ASTM D.1796	0.50	0.70	1.40		
Viscosity Kinematic at 100 F	cSt	ASTM D. 445	-	-	-		
Pour Point	F	ASTM D. 97	-	-	-		

* Angka Perkiraan

ANALISIS SUMATERA LIHGT CRUDE YANG DITERIMA

SELAMA PERIODE : OKTOBER / DESEMBER 1991

UNIT PENGOLAHAN II SEI-PAKNING

Jumlah (Barrels)			1.208.846 *			Spesifikasi	
Jenis Minyak		SUMATERA LIGHT CRUDE (LIRIK)					
Macam Pemeriksaan		Methoda	Terendah	Rata-rata	Tertinggi	Minimum	Maximum
API Gravity at 60 F		ASTM D. 287	33.9	34.3	34.6		
Water Content	vol %	ASTM D. 95	0.05	0.10	0.10		
Water and Sediment	vol %	ASTM D.1796	0.15	1.80	4.50		
Viscosity Kinematic at 100 F	cSt	ASTM D. 445	-	-	-		
Pour Point	F	ASTM D. 97	-	-	-		

ANALISIS SUMATERA LIHGT CRUDE YANG DITERIMA

SELAMA PERIODE : OKTOBER / DESEMBER 1991

UNIT PENGOLAHAN II SEI-PAKNING

Jumlah (Barrels)		: 618.425 *				Spesifikasi	
Jenis Minyak		: SUMATERA LIGHT CRUDE (LALANG)					
Macam Pemeriksaan		: Methoda	:Terendah	:Rata-rata	:Tertinggi	:Minimum	:Maximum
API Gravity at 60 F		:ASTM D. 287	: 39.1	: 39.3	: 39.4		
Water Content	vol %	:ASTM D. 95	: 0.05	: 0.05	: 0.10		
Water and Sediment	vol %	:ASTM D.1796	: 0.80	: 1.00	: 1.40		
Viscosity Kinematic at 100 F	cSt	:ASTM D. 445	: -	: -	: -		
Pour Point	F	:ASTM D. 97	: -	: -	: -		

* : Angka Perkiraan

ANALISIS LOW SULPHUR WAXY RESIDE YANG DIHASILKAN

SELAMA PERIODE : OKTOBER / DESEMBER 1991

UNIT PENGOLAHAN II SEI-PAKNING

Jumlah (Barrels)			2.176.472 *			Spesifikasi	
Jenis Minyak			LOW SULPHUR WAXY RESIDUE				
Macam Pemeriksaan		Methoda	Terendah	Rata-rata	Tertinggi	Minimum	Maximum
Specific Gravity at 60/60 F		Converted	0.8883	0.8894	0.8905		
API Gravity at 60 F		ASTM D. 287	27.4	27.6	27.8		
Flash Point	F	ASTM D. 93	265	280	295		
Water Content	vol %	ASTM D. 95	0.05	0.05	0.05		
Pour Point	F	ASTM D. 97	115	115	120 **		
Sulfur Content	wt %	ASTM D.1551	0.13	0.14	0.14		
Viscosity Redwood I/140 F	Sec	Conversion from ASTM D. 445	219	231	235		
Conradson Carbon Residue	wt %	ASTM D. 189	4.10	4.25	4.40		

ANALISIS SUMATERA LIGHT CRUDE YANG DITERIMA

SELAMA PERIODE : OKTOBER / DESEMBER 1991

UNIT PENGOLAHAN II DUMAI

Jumlah (M. Ton)			561.045			Spesifikasi	
Jenis Minyak			SUMATERA LIGHT CRUDE (D.C.O.)				
Macam Pemeriksaan		Methoda	Terendah	Rata-rata	Tertinggi	Minimum	Maximum
Specific Gravity at 60/60 F		ASTM D.1298	0.8888	0.8944	0.9111	-	-
Water Content	vol %	ASTM D. 95	0.4	0.6	1.0	-	-
Water and Sediment	vol %	ASTM D.1796	0.45	0.65	1.05	-	-
Viscosity Kinematic at 100 F	cSt	ASTM D. 445	90.02	153.3	181.3	-	-
Pour Point	F	ASTM D. 97	85	85	85	-	-

ANALISIS SUMATERA LIGHT CRUDE YANG DITERIMA (

SELAMA PERIODE : OKTOBER / DESEMBER 1991

UNIT PENGOLAHAN II DUMAI

Jumlah (M. Ton)			4.844.540 *			Spesifikasi	
Jenis Minyak			SUMATERA LIGHT CRUDE (S.L.C.)				
Macam Pemeriksaan		Methoda	Terendah	Rata-rata	Tertinggi	Minimum	Maximum
Specific Gravity at 60/60 F		ASTM D.1298	0.8413	0.8448	0.8499	-	-
Water Content	vol %	ASTM D. 95	0.4	0.6	1.1	-	-
Water and Sediment	vol %	ASTM D.1796	0.45	0.65	1.15	-	-
Viscosity Kinematic at 100 F	cSt	ASTM D. 445	17.85	19.50	21.56	-	-
Pour Point	F	ASTM D. 97	90	90	95	-	-

ANALISIS LOW SULFUR WAXY RESIDUE YANG DITERIMA (Produced by S Pekning)

SELAMA PERIODE : OKTOBER / DESEMBER 1991

UNIT PENGOLAHAN II DUMAI

Jumlah (M. Ton)			1.452.452				
Jenis Minyak			LOW SULFUR WAXY RESIDUE (L.S.W.R.)			Spesifikasi	
Macam Pemeriksaan		Methoda	Terendah	Rata-rata	Tertinggi	Minimum	Maximum
Specific Gravity at 60/60		ASTM D.1298	0.8855	0.8888	0..8933	0.8789	0.9307
API Gravity at 60 F		ASTM D. 287	26.9	27.7	28.3	20.5	29.5
Flash Point	F	ASTM D. 93	180	250	305	165	-
Water Content	vol %	ASTM D. 95	0.05	0.1	0.1	-	0.5
Pour Point	F	ASTM D. 97	110	115	115	-	120
Sulfur Content	wt %	ASTM D.1552	0.14	0.14	0.14	-	0.5
Viscosity Redwood I/140 F	Sec	Conversion from ASTM D. 445	194	230	230	100	350
Conradson Carbon Residue	wt %	ASTM D. 189	4.14	4.64	6.40	-	8.0
Ash Content	wt %	ASTM D. 482	0.01	0.01	0.01	-	0.10

Tanda Perkiraan

[The information contained in Attachment 7 is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

ATTACHMENT 8

Environmental Regulations/Specifications (2 Sheets)

Air Quality Std. (Column "B" to be used)
Water Quality Std. (Column II to be used)

LAMPIRAN XV : SURAT KEPUTUSAN
MENTERI NEGARA KEPENDUDUKAN
DAN LINGKUNGAN
NOMOR : KEP-03/MENKLH/II/1991
TANGGAL : 19 Januari 1991

BAKU MUTU UDARA EMISI
1. SUMBER TAK BERGERAK.

No. Urut	PARAMETER	BAKU MUTU EMISI			KETERANGAN
		A	B	C	
1.	Kabut asam sulfat atau sulfur trioksida atau keduanya	0,20	0,25	0,30	1. g SO_3/Nm^3 dari buangan gas. 2. buangan gas bebas dan kabut yang persisten.
2.	Oksida nitrogen (NO_x)	1,70	4,60	4,60	Buangan gas tak berwarna g/Nm^3
3.	Karbon monoksida (CO)	1,00	1,00	1,00	g/Nm^3
4.	Partikel padat (operasi lainnya)	0,40	0,50	0,60	g/Nm^3
5.	Hidrogen sulfida (H_2S)	5,00	5,00	6,25	ppm (v/v)
6.	Metil merkaptan (CH_3SH)	0,002		0,01	ppm
7.	Amonia (NH_3)	1		5	ppm
8.	Gas klorin	0,20	0,25	0,30	g HCl/Nm^3
9.	Hidrogen klorida (HCl)	0,40	0,50	0,60	gm HCl/Nm^3
10.	Fluor, asam hidrofluorida atau senyawa inorganik fluor	0,02	0,02	0,02	gm asam hidrofluorida/Nm^3 dari buangan gas.
11.	Timah hitam (Pb)	0,025	0,025	0,04	gm/Nm^3
12.	Gas-gas asam	3,50	6,00	7,50	gm SO_3/Nm^3 dari buangan gas.
13.	Seng (Zn)	0,10	0,10	0,15	gm/Nm^3
14.	Air raksa (Hg)	0,01	0,01	0,02	gm/Nm^3
15.	Kadmium (Cd)	0,015	0,015	0,025	gm/Nm^3
16.	Arsen (As)	0,025	0,025	0,04	gm/Nm^3
17.	Antimon (Sb)	0,025	0,025	0,04	gm/Nm^3
18.	Radio nuklida				
19.	Asap	x	x	x	x = Ringlemann no.2

Keterangan A = baku mutu ketat.
B = baku mutu sedang.

ENCLOSURE - 4

LAMPIRAN XV : SURAT KEPUTUSAN
MENTERI NEGARA KEPENDUDUKAN
DAN LINGKUNGAN
NOMOR : KEP-03/MENKLH/II/1991
TANGGAL : 1 Pebruari 1991

BAKU MUTU AIR LIMBAH *)

No. Urut	PARAMETER	SATUAN	GOLONGAN BAKU MUTU AIR LIMBAH			
			I	II	III	IV
	F I S I K A					
1.	Temperatur	^{o}C	35	38	40	45
2.	Zat padat terlarut	mg/L	1500	2000	4000	5000
3.	Zat padat tersuspensi	mg/L	100	200	400	500
	K I M I A					
1.	pH		6 - 9	6 - 9	6 - 9	5 - 9
2.	Besi terlarut (Fe)	mg/L	1	5	10	20
3.	Mangan terlarut (Mn)	mg/L	0,5	2	5	10
4.	Barium (Ba)	mg/L	1	2	3	5
5.	Tembaga (Cu)	mg/L	1	2	3	5
6.	Seng (Zn)	mg/L	2	5	10	15
7.	Krom Heksavalen (Cr^{6+})	mg/L	0,05	0,1	0,5	1
8.	Krom total (Cr)	mg/L	0,1	0,5	1	2
9.	Cadmium (Cd)	mg/L	0,01	0,05	0,1	0,5
10.	Raksa (Hg)	mg/L	0,001	0,002	0,005	0,01
11.	Timbal (Pb)	mg/L	0,03	0,1	1	2
12.	Stanum (Sn)	mg/L	1	2	3	5
13.	Arsen (As)	mg/L	0,05	0,1	0,5	1
14.	Selenium (Se)	mg/L	0,01	0,05	0,5	1
15.	Nikel (Ni)	mg/L	0,1	0,2	0,5	1
16.	Kobalt (Co)	mg/L	0,2	0,4	0,5	1
17.	Sianida (CN)	mg/L	0,02	0,05	0,5	1
18.	Sulfida (H_2S)	mg/L	0,01	0,05	0,1	1
19.	Flourida (F^2)	mg/L	1,5	2	3	5
20.	Klorin bebas (C_2)	mg/L	0,5	1	2	5
21.	Amoniak bebas (NH_3-N)	mg/l	0,02	1	5	20
22.	Nitrat (NO_3-N)	mg/L	10	20	30	50
23.	Nitrat (NO_3-N)	mg/L	0,06	1	3	5
24.	BOD_5	mg/l	20	50	150	300
25.	COD	mg/L	40	100	300	600
26.	Senyawa aktif biru metilen	mg/L	0,5	5	10	15
27.	Fenol	mg/L	0,01	0,5	1	2
28.	Minyak nabati	mg/L	1	5	10	20
29.	Minyak mineral	mg/L	1	10	50	100
30.	Radioaktifitas **)					
31.	Pestisida termasuk PCB ***)					

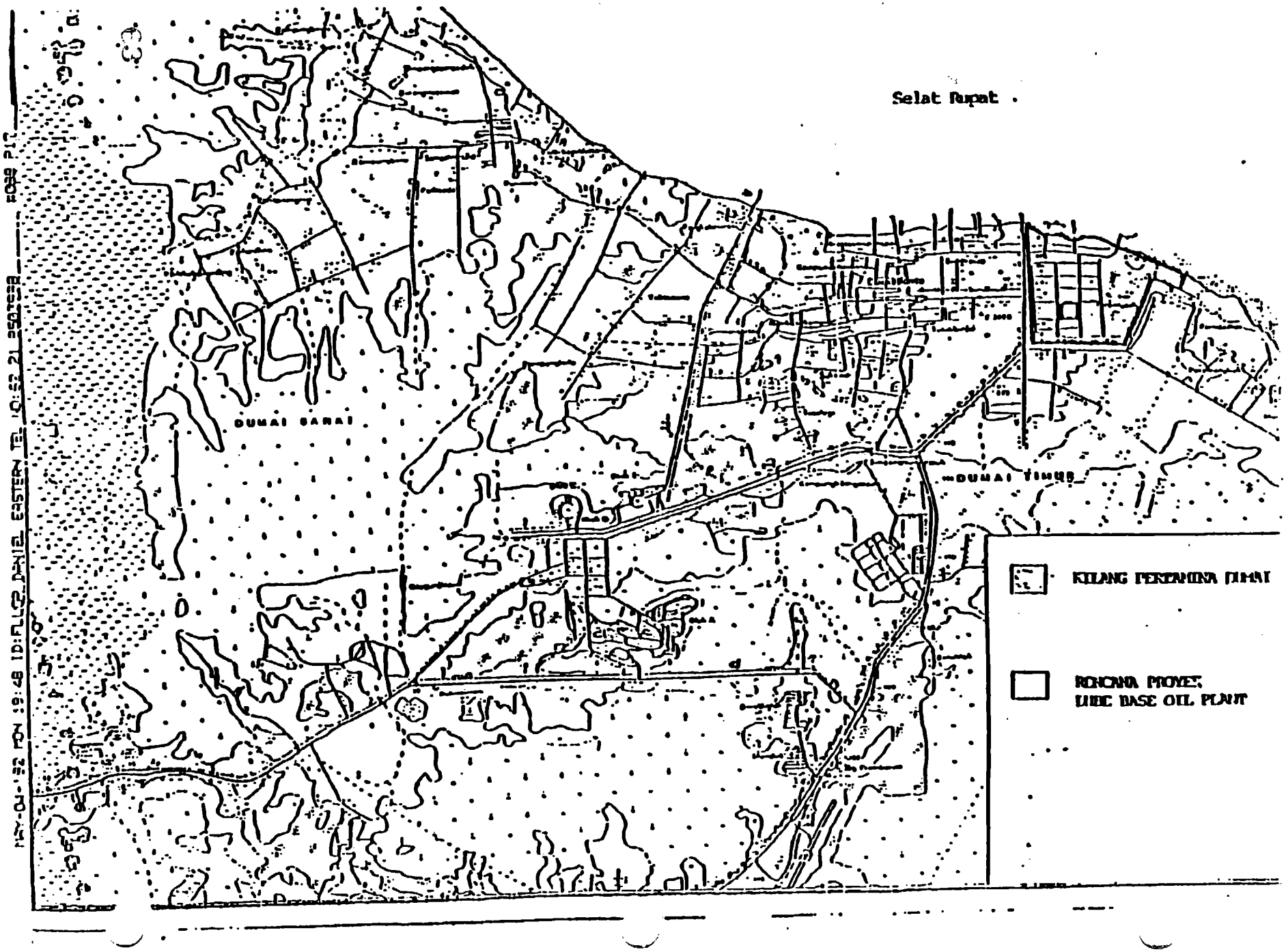
Catatan :

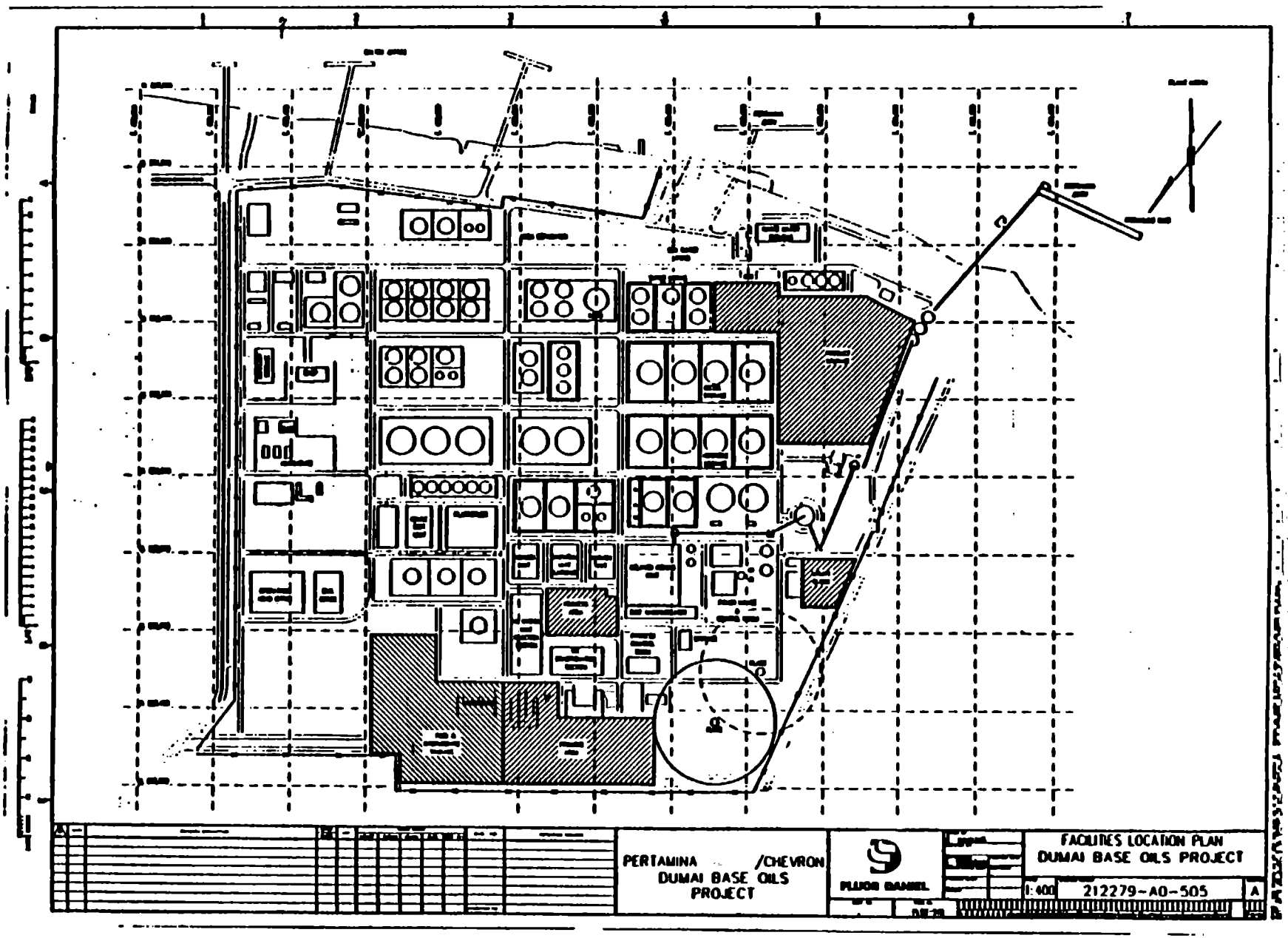
*) Kadar bahan limbah yang memenuhi persyaratan baku mutu air limbah tersebut tidak diperbolehkan dengan cara pengenceran yang airnya secara langsung di ambil dari sumber air.

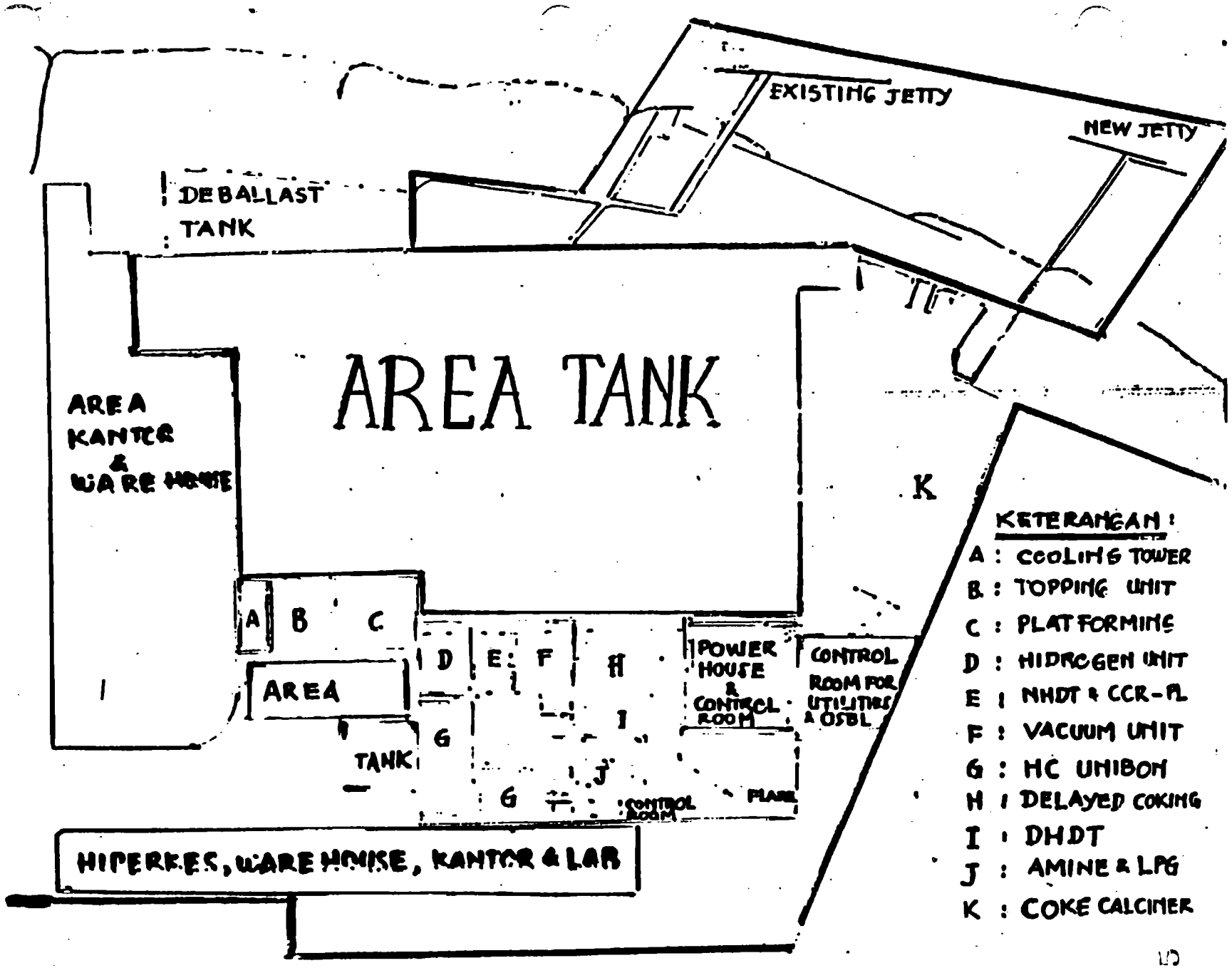
ATTACHMENT 9

Dumai Base Oils Project Facilities Location Plans (3 Sheets)

- UP II/Dumai Location Plan
- Base Oils Project Facilities Location Plan
- UP II Area Designation Plan


Selat Rupat
DUMAI BARAT
DUMAI TIMUR
KILANG PERTAMINA DUMAI
RENCANA PROYEK
LUBE BASE OIL PLANT


PERTAMINA /CHEVRON
DUMAI BASE OILS
PROJECT
FLUOR DANIEL
FACILITIES LOCATION PLAN
DUMAI BASE OILS PROJECT
1:400
212279-A0-505
A



ATTACHMENT 10

UP II Refinery Test Program (4 Sheets)

ATTACHMENT 10

UP II Refinery Test Program

INTRODUCTION

This document outlines the process unit test program which is required as part of the feasibility study for the Dumai Base Oils Project.

PRE-TEST ACTIVITIES

Fluor Daniel will assist Pertamina in developing test procedures for the UP II process units.

The following process documentation will be required for developing the test procedures:

- Block Flow Diagrams for UP II
- Design basis for affected process units
- Material balances for affected process units
- "P&ID's" (as built or modified) for process units
- Equipment specifications for process units
- Instrument specifications for process units
- Utility balances for process units
- Utility Flow Diagrams for utilities systems
- Design basis for offsites systems
- Operating and plant manuals

The test procedures will specify the following:

- Operating conditions
- Operating data recording requirements: Flows, temperatures, pressure, etc.
- Stream sampling
- Sampling frequency
- Laboratory test requirements (specific gravity, distillation, weight percent sulfur, etc.)

Pertamina will make the following general preparations prior to the UP II performance test runs:

- Crude slate definition and unit feed rate specification
- Complete any equipment maintenance presently in progress
- Calibrate instruments
- Review/update log sheets
- Ensure uninterrupted supply of feedstock

- Ensure sufficient downstream storage and/or downstream unit capacity to allow test runs to be conducted
- Develop a schedule for the availability of process units
- Develop plans for providing additional operations personnel to support the test run activities
- Develop plans for providing instrument technician round-the-clock coverage during performance test runs
- Ensure that laboratory equipment has been tested and calibrated. Also ensure adequate laboratory supplies are available.

TEST ACTIVITIES

Pertamina will complete the following activities prior to undertaking the individual performance test:

- Line out the process unit
- Verify instrument calibrations
- Sample process streams
- Log operating data
- Log laboratory results

Each process unit will be lined out for at least 24 hours prior to the test run. During this period, final instrument calibrations and operating adjustments would be completed. The material balance will be checked to verify accuracy of instruments. Logging of operating data and laboratory analysis: The logging, testing, etc., would be done for several 24 hour periods. The most stable operation of the test periods will be selected for engineering analysis and evaluation.

The actual duration of each test run would be 24 hours.

POST-TEST ACTIVITIES

Based on the process unit test data and historical performance of the process unit, Pertamina, Fluor Daniel and Chevron will identify the bottlenecks. Fluor Daniel will assist Pertamina in the following activities:

- Calculate average operating conditions: temperatures, pressures, flow rates, etc.
- Calculate average physical properties of streams
- Correct meter factors and flow rates for test conditions
- Develop overall material, sulfur and hydrogen balances

We envision that the performance testing phase of the project will last 4-6 weeks. This phase is largely Pertamina's responsibility with assistance from Fluor Daniel and Chevron.

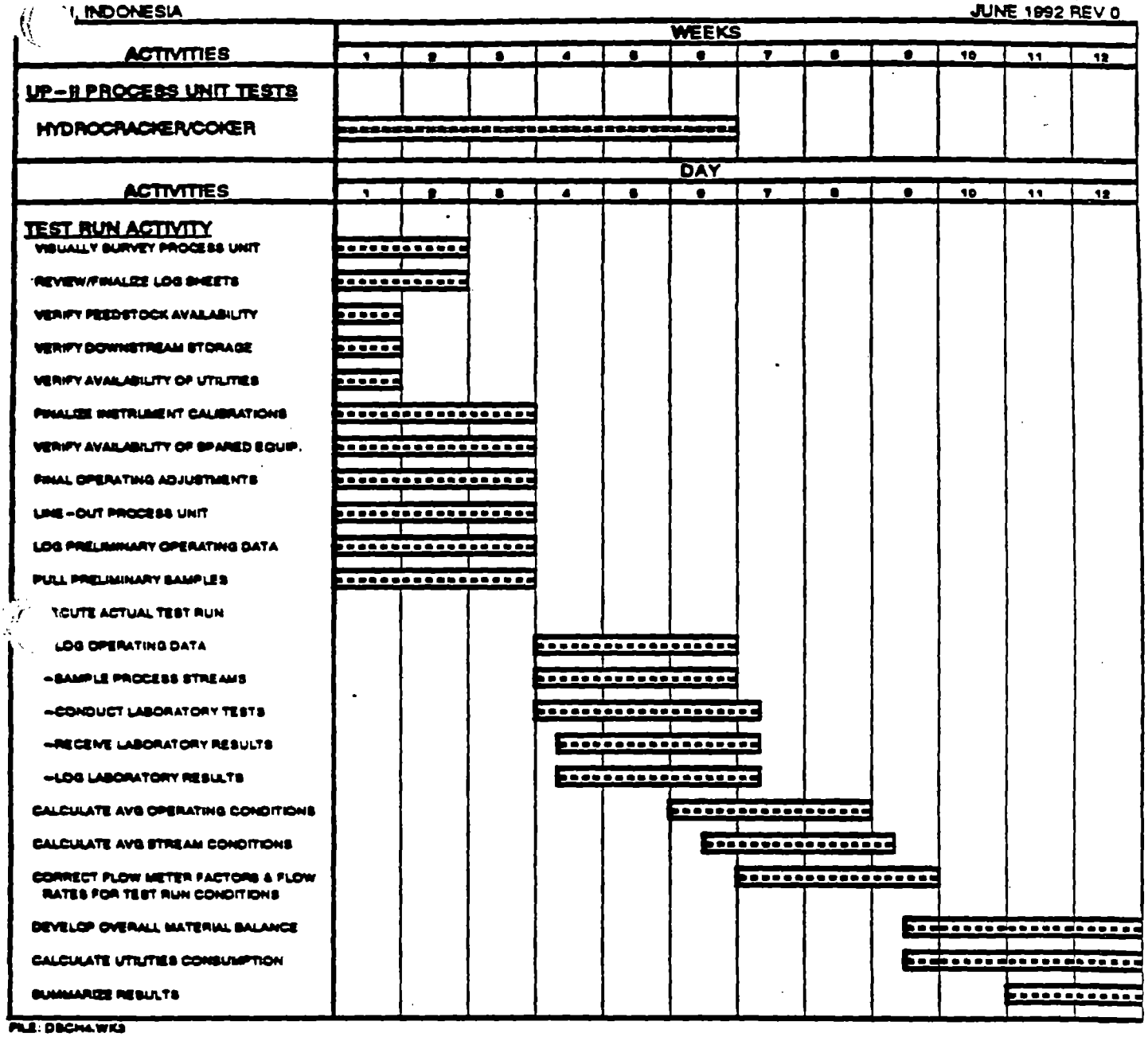
SCHEDULE

The schedule for executing the UP II test runs and typical activities is shown in Figure 3. The actual sequence of performance test will depend not only on the availability of the process units, but also on the availability of support personnel such as operators, laboratory and instrument technicians, unit engineers, etc. The number of process units that can be tested simultaneously may also be limited by the availability of support personnel.

FIGURE 3
DUMAI BASE OILS PROJECT
SCHEDULE OF UP-II TEST RUNS AND TYPICAL TEST RUN ACTIVITIES

PERTAMINA
INDONESIA

FLUOR DANIEL, INC
JUNE 1992 REV 0



FILE: DSCHA.WK3

B. TECHNICAL SUPPORT DATA

Appendix B contains Dumai UP-II Refinery technical data that was used, along with various other information, to perform the study. The data was collected during two site visits by Chevron and Fluor Daniel personnel. It includes schematics for the existing UP-II Refinery process units, as well as technical notes on the operation and capacities of process, utility, and offsite units. A "Technical Data Notebook" was assembled during the initial stage of the project. The data book contains UP-II refinery design data, marine survey data, UP-II plant operating data and test runs.

UP - II REFINERY

EXISTING PROCESS UNITS SCHEMATICS

[The information contained in the Process Unit Schematics is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

SPESIFIKASI DERMAGA PELSUS UP.II DUMAI

NPT : Non Power Facilities

NO. URUT	URAIAN	DERMAGA PERTAMINA DUMAI						DERMAGA EX. PT. C P I DUMAI				SEI PAKNING
		D.P - 1	D.P - 2	D.P - 3	D.P - 4	D.P - 5	D.P - 6	WHARF. I	WHARF. II	WHARF. III	WHARF. IV	DERMAGA II
01.	DWT. KAPAL MAKSIMUM	100.000 T	10.000 T	35.000 T	25.000 T	35.000 T	3.000 T	150.000 T	150.000 T	100.000 T	55.000 T	60.000 T
02.	DWT KAPAL MINIMUM	10.000 T	5.000 T	5.000 T	10.000 T	5.000 T	1.000 T	-	-	-	-	900 T
03.	KAPAL LIGHTER/SMALL - T	-	-	1.000 T	-	1.000 T	-	-	-	-	-	900 T
04.	PANJANG DERMAGA	360 M	200 M	250 M	300 M	250 M	115 M	368 M	424 M	326 M	206 M	317 M
05.	KOLAM PELABUHAN (LWS)	15,1 M	12,1 M	12,9 M	13,0 M	16,0 M	13,0 M	18,5 M	17,9 M	17,9 M	15,5 M	17 M
06.	JARAK FENDER (TERPENDEK)	55 M	27 M	34 M	45 M	34 M	-	-	-	-	-	33 M
07.	JARAK FENDER (TERPANJANG)	110 M	55 M	70 M	155 M	70 M	40 M	-	-	-	-	123 M
08.	P R O D U C T S	AVGAS, KERO PREMTUR, LSWR NAPTHA	AVGAS, KERO PREMTUR, NAPTHA	AVGAS, PREMTUR KERO, AVTUR SUPER-98, JP-5	C O R E	AVGAS, PREMTUR KERO, AVTUR SUPER-98, LPG	L P G	C R U D E	C R U D E	C R U D E	C R U D E	NAPTHA, KERO AVGAS, LSWR
09.	JARAK FENDER DAN BITTS KE TERMINAL	30 CM	85 CM	25 CM	-	25 CM	-	-	-	-	-	200 CM
10.	LOADING ARM	3 BUAH CHICKSAN	3 BUAH CHICKSAN	3 BUAH CHICKSAN 0 12"	CORE LOADING MACHINE	3 BUAH CHICKSAN 0 12" HOSE	1 BUAH CHICKSAN 0 6"	4 BUAH/12"	1 BUAH/16" 2 BUAH/12"	4 BUAH/12"	2 BUAH/12"	LOADING HOSE 1 BUAH 0 6"
11.	LOADING RATE	KEROSIN 0 16" 2.500 MT/JAM KERO/AVGAS 0 12" 1.500 MT/JAM AVGAS 0 8" 1.000 MT/JAM BBM/MINYAK NABAR	KERO, AVG 0 8" 1.000 MT/JAM AVGAS 0 12" 1.500 MT/JAM BBM/MINYAK NABAR	KERO, AVG & AVGAS 1.750 MT/JAM BBM/MINYAK NABAR	C O R E 700 MT/JAM	KERO, AVG AVGAS 1.750 MT/JAM BBM/MINYAK NABAR & LPG	L P G 250 M3/JAM	35.000 BBL/JAM	40.000 BBL/JAM	35.000 BBL/JAM	15.000 BBL/JAM	NAPHTA 6" 450 MT/JAM KEROSIN 10" 1.500 MT/JAM AVG/KERO 8" 500 MT/JAM LSWR

WHARF OCCUPANCY YETTY (%)
THN 1991/1992

KETERANGAN	YETTY 1		YETTY 2		YETTY 3		YETTY 4		YETTY 5		YETTY 6		BULAN
	PENG	IDLE	PENG	IDLE	PENG	IDLE	PENG	IDLE	PENG	IDLE	PENG	IDLE	
APRIL 91	44.51	55.49	31.24	68.76	44.12	55.88	7	93	59.62	40.38	2.59	97.41	4
MEI	49.5	50.5	24.14	75.86	63.04	36.96	35.1	64.9	39.57	60.43	9.07	90.93	5
JUNI	41.52	58.48	25.35	74.65	66.19	33.81	2.74	97.26	60.64	39.36	11.31	88.69	6
JULI	24.49	75.51	20.51	79.49	46.97	53.03	19.76	80.24	44.92	55.08	4.57	94.43	7
AGUSTUS	37.31	59.55	13.47	86.53	37.31	62.69	-	100	64.08	35.92	2.67	97.33	8
SEPTEMBER	20.12	79.88	18.03	81.79	52.58	47.42	16.8	83.2	41.02	59.98	2.11	97.89	9
OKTOBER	17.72	82.28	11.99	88.01	26.94	73.06	19.18	80.82	11.11	88.89	-	100	10
NOPEMBER	40.52	59.48	22.74	77.26	46.01	53.99	32.23	67.77	40.08	59.82	-	100	11
DESEMBER 91	52.11	47.89	18.87	81.13	37.87	62.13	25.48	74.42	42.43	57.57	-	100	12
JANUARI 92	36.12	63.88	18.75	81.25	56.13	43.87	11.85	88.15	49.69	50.31	14.24	85.76	1
FEBUARI	21.91	78.09	29.78	70.22	53.04	46.96	40.24	59.76	51.98	48.02	5.45	94.55	2
MARET	35.25	64.75	25.46	74.54	44.53	55.47	7.26	92.74	39.03	60.97	11.69	88.31	3
RATA-RATA	35.09		21.69		47.69		18.18		45.35		5.39		

CALTEX JETTY

% PEMAKAIAN DERMAGA CALTEX. TH 1991/1992.

BULAN.	DERMAGA 1	DERMAGA 2	DERMAGA 3	DERMAGA 4.
April '91	48,06.	42,9	45,10	8,87.
Mei	48,25	50,99	45,59	3,92
Juni	57,75	54,32	45,69	13,79
Juli	54,78	38,12	40,27	24,37.
Agustus	21,91	45,91	43,59	28,44
Septemb.	38,01	52,22	59,25	28,07
Oktb.	44,46	56,23	33,66	18,84.
Nop.	38,15	45,9	43,3	36,7.
Des 91.	37,0	46,9	55,0	37,4.
Jan. 92	44,7	45,3	41,6	33,4
Feb.	35,3	47,3	45,5	27,0
Mar.	51,3	31,3	34,3	34,7.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TEL: (62) (21) 371002, 370810
TLX: 44294, 45140 INH JKT
FAX: (62) (21) 3810534

P.T. INDHASANA
JL. SURYOPRANOTO NO. 9
P.O. BOX 4171 JKT
JAKARTA 10110

FACSIMILE LEAD SHEET

NUMBER OF PAGES INCLUDING LEAD SHEET: 2

URGENT

DATE: October 11, 1990

To: Company: FLUOR DANIEL
City/Country: Irvine, California, USA
Fax No.: (714) 975-6411
Attn.: R.J.BAYTALA/W.RICHARDSON/J.GATLIN
cc/ W.J. HEBERT

From: G.H.HILLEBRAND, Jakarta
Log No : GHH-043

Subject : Your FXI-062

1.0 ROKAN RIVER WATER ANALYSIS

(TYPICAL)

PH	= 6.0
TDS	= 44.0 ppm
Cl^-	= 3.0 ppm
Na^+	= 6.0 ppm
Ca^{++}	= 3.1 ppm
Mg^{++}	= 1.5 ppm
Fe	= 1.5 ppm
SiO_2	= 10.5 ppm
COD	= 60.6 ppm
TC	= 22.0 ppm
IC	= 4.0 ppm
TDC	= 18.0 ppm

2.0 Fresh Water Chemical Injection at Water Treatment Plant Pertamina Village.

- Chlorine (Cl_2) = 0.5 - 2.0 ppm
- Chemical used at Plan Bukit Datuk :
  a. Coagulant : 0.6 - 1.2 ppm
  b. Caustic Soda :30.0 - 50.0 ppm

3.0 Raw Water Chemical Injection at Sei Rokan River :
- Nalco 918 and Pentaclene
(Filming and Corrosion Inhibitor)

4.0 Chlorine (Gas) is shipped in Skid Mounted Tanks by boat.
Coagulant - ditto -
All imported chemicals are shipped by boat.

Liquid Caustic Soda (Local Product) is shipped to Dumai by truck and/or boat.

Filming and Corrosion Inhibitor (Local Product) shipped to Dumai by truck and/or boat.

Regards,

Gunter W. Hillebrand

TEL: (62) (21) 371002, 370810
TLX: 44294, 45140 INH .IKT
FAX: (62) (21) 3810534

P.T. INDHASANA
JL. SURYOPRANOTO NO. 9
P.O. BOX 4171 JKT
JAKARTA, 10110

FACSIMILE LEAD SHEET

NUMBER OF PAGES INCLUDING LEAD SHEET: 9

URGENT

DATE: October 10, 1990

To: Company: FLUOR DANIEL
City/Country: Irvine
Fax No.: (714) 975-6411
Attn.: R.J.Baytala/C.E. Gatlin

From: GUNTER H.HILLEBRAND, Jakarta
Log No. : GHH-041

As per our telecon please find attached :

1.0 North New Housing Area
Photo location map, Swamp location, and approximate slope of area.

2.0 South New Housing Area
Location of jungle, swamps, and approximate slope of area.

3.0 Missing pages 51 and 52 of our GHH-038.

4.0 Copy of Original :
General Information
Infrastructure Exor IV

Note left hand initial of Mr.Soebijono, Project Manager Exor IV.

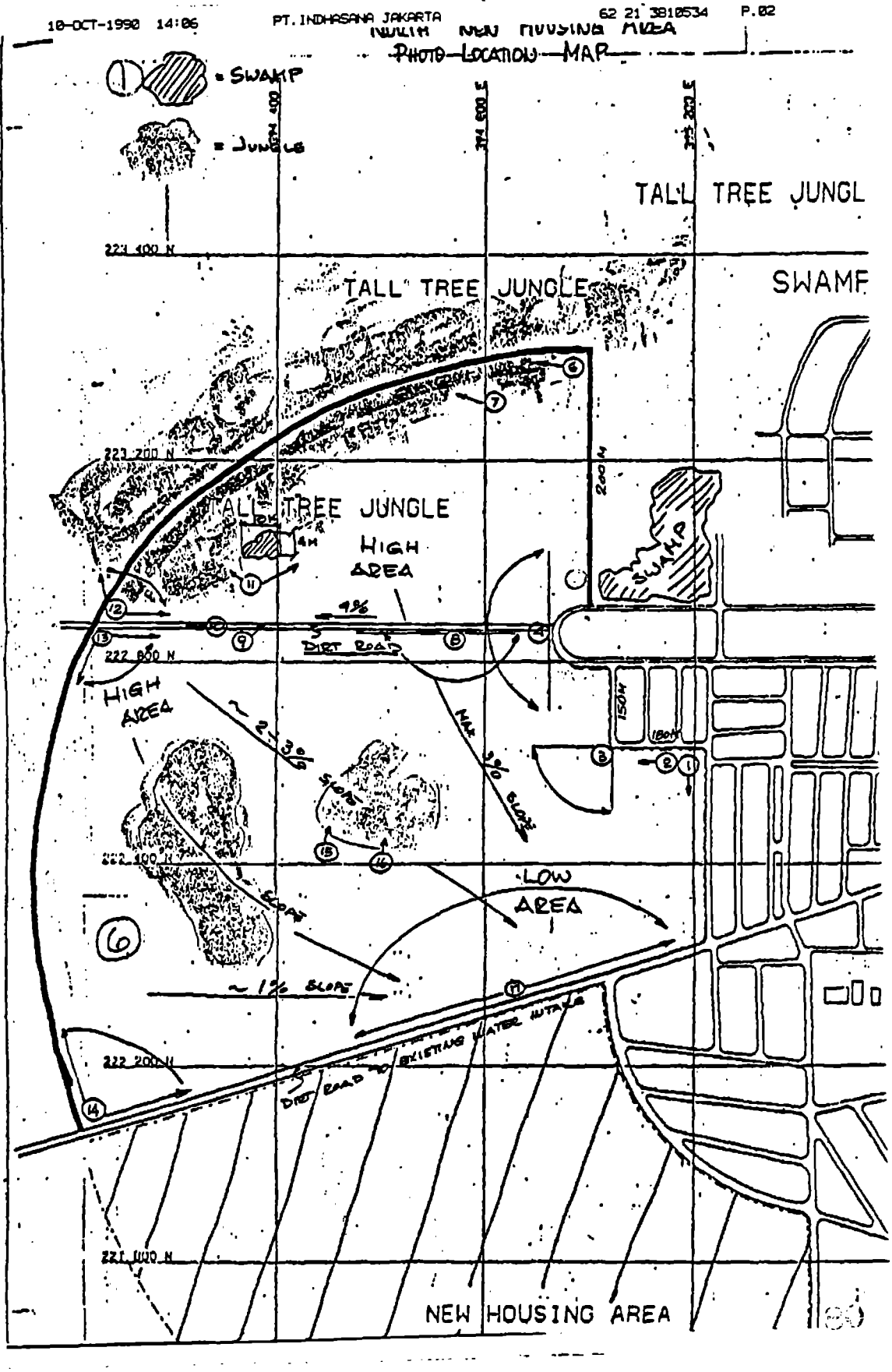
5.0 Copy of our GHH-033, Re: Exor IV Admin.Building.

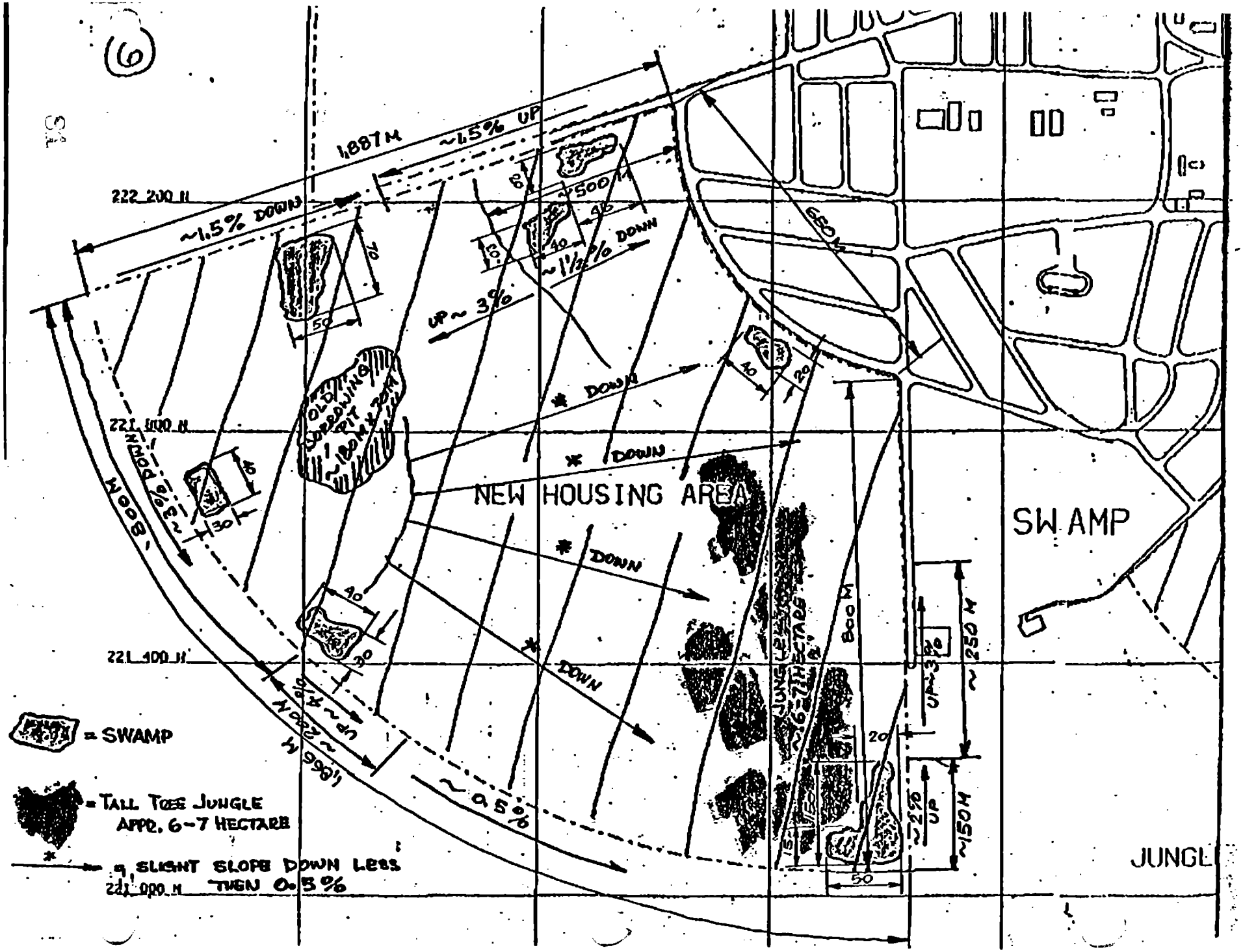
6.0 Two pages of fire and safty department organization charts for UP-II.

Regards,

Gunter H.Hillebrand

79


NEW HOUSING AREA
PHOTO LOCATION MAP
= SWAMP
= JUNGLE
TALL TREE JUNGL
SWAMP
TALL TREE JUNGLE
TALL TREE JUNGLE
HIGH AREA
SWAMP
4%
DIRT ROAD
HIGH AREA
~ 2-3% SLOPE
MAX 3% SLOPE
LOW AREA
~ 1% SLOPE
EXISTING WATER INTAKE
DIRT ROAD
NEW HOUSING AREA
222 800 N
222 400 N
222 200 N
221 600 N
374 600 E
375 200 E
200 M
150M
180M


(6)
1887M
~4.5% UP
~1.5% DOWN
222 200 N
500M
~1½% DOWN
UP ~ 3%
DOWN
OLD DREDGING PIT
~180M x 70M
NEW HOUSING AREA
SWAMP
JUNGLE
221 400 N
221 000 N
N 30° W
N 60° W
N 68° W
~0.5%
800M
~250M
~150M
UP ~3%
UP
20
50
40
30
70
60
= SWAMP
= TALL TREE JUNGLE APPX. 6-7 HECTARE
= SLIGHT SLOPE DOWN LESS THAN 0.5%

APPENDIX C

LICENSOR INFORMATION

This section of the Feasibility Study contains information ("Proprietary Information") related to proprietary and nonproprietary processes of pre-selected Licensors and Technology suppliers. In particular, this study contains data provided by:

Chevron Research & Technology Company
UOP, Inc.
Kerr McGee
Fluor Daniel, Inc.

All companies or organizations considered for and desiring to be in receipt of this Proprietary Information shall have, prior to receiving the Proprietary Information, executed a secrecy and/or licensor agreement with each of the above referenced companies.

The Proprietary Information contained therein is confidential and proprietary to the Dumai Base Oils Project and all such Proprietary Information shall be used solely for the performance of work on the Dumai Base Oils Project. No Proprietary Information shall be disclosed to any third party for any purposes other than performance of work on the Dumai Base Oils Project. Any parties having access to such Proprietary Information shall be obligated to keep such Proprietary Information confidential and shall not disclose such Proprietary Information to any other party for any purposes other than performance of work on the Dumai Base Oils Project.

Proprietary Information refers to all information directly or indirectly disclosed as a result of participation in the Dumai Base Oils Project except any information the recipient can prove was in his possession prior to receipt as a participant in the Dumai Base Oils Project; received from a third party rightfully in possession of it and which is free of any restrictions; or which is generally known to the public other than through the fault of the recipient.

Furthermore, it is expressly understood that the Proprietary Information so disclosed is based on very preliminary Licensor data without the benefit of adequate pilot plant testing or complex Licensor

involvement in the development of this Feasibility Study. The reader shall be aware that an extensive Licensor pilot plant testing program may be required and this may cause equipment sizing, processing schemes, design conditions, etc. depicted herein to change.

C. LICENSOR INFORMATION

C-1 Chevron Lube Complex Process Package

Chevron is the licensor for the Lube Complex, which includes the Lube Hydrocracker and Lube Isodewaxer/Hydrofinisher Units and miscellaneous supporting units (e.g., Tempered Water System). Appendix C-1 contains the process design package prepared by Chevron during the course of the study to define the process configurations and equipment design information required to produce lube base oils. Two versions of the process design package are included in this section. The first version, dated January 26, 1993, titled "Lube Base Oils Complex" was completed before the completion of the Chevron Yield Confirmation Pilot Plant Study. This version was used to generate the "Dumai Base Oils Project Feasibility Study Draft Final Report." The second (final) version of the Chevron process design package was completed and issued on May 26, 1993, with the same title as the earlier version. Fluor Daniel used information contained in this package to generate capital and operating costs for the "Dumai Base Oils Feasibility Study Final Report."

[The information contained in the Chevron Lube Complex Process Package is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

C. LICENSOR INFORMATION

C-2 Yield Confirmation Study Report

Chevron Research and Technology Company carried out a pilot plant feasibility study for obtaining yield data and relevant product properties to support the Chevron process package (included in Appendix C-1) for the Lube Isocracker and Isodewaxer/ Hydrofinisher Units. The information contained in the Chevron process package was used by Fluor Daniel to generate cost estimates and the design of related processing units. Appendix C-2 contains the pilot plant test report prepared by CRTC.

[The information contained in the Yield Confirmation Study Report is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

C. LICENSOR INFORMATION

C-3 UOP HCR Study

UOP was the original licensor of the existing HC Unibon Unit, and was retained by Chevron to perform a feasibility study on whether one train of the two existing HC Unibon Unit trains could be converted to produce lube base oils feedstocks. This section of the appendix contains UOP's report documenting their efforts. It includes modified process configurations and equipment design information for the converted HC Unibon Unit Train, as well as the new Distillate Hydrotreater and the new DAO Hydrocracker.

[The information contained in the UOP HCR Study is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

C. LICENSOR INFORMATION

C-4 UOP Coker Study

Prior to this study, Pertamina requested that UOP evaluate the existing Delayed Coker Unit (DCU) to determine what modifications would be required to reestablish its capacity at the original design level. The original design capacity is the basis for the four study cases. Appendix C-4 contains excerpts (Process Flow Diagrams, equipment data sheets) from the UOP Revamp Schedule "A" package originally submitted by UOP to Pertamina in 1990. This information was used by Fluor Daniel to determine capital costs for modifying the DCU.

[The information contained in the UOP Coker Study is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

C. LICENSOR INFORMATION

C-5 UOP Hydrogen Plant Study

Hydrogen output in excess of the original Hydrogen Unit design capacity is required in all four study cases and the two Balanced Operation cases. As a result, UOP, the Hydrogen Unit licensor, was asked to evaluate the unit to determine what modifications, if any, are required at throughputs of 110% and 125% of original design capacity. This section of the Appendix contains UOP's report on their evaluation. It includes summary operating data, catalyst requirements, and recommended equipment design modifications for both capacity cases.

[The information contained in the UOP Hydrogen Plant Study is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

C. LICENSOR INFORMATION

C-6 Kerr-McGee SDA Plant Proposal

Study Cases 3 and 4 require a Solvent Deasphalting (SDA) Plant to supply Deasphalted Oil to produce Bright Stock base oil. Kerr-McGee, a major licensor of SDA Plants, was requested to provide preliminary design information for the SDA Plant. Appendix C-6 contains their proposal, including process flow schemes, a material balance, and equipment design information. This data was used by Fluor Daniel to generate capital and operating cost estimates for the SDA Plant.

[The information contained in the Kerr-McGee SDA Plant Proposal is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

C. LICENSOR INFORMATION

C-7 UOP UP-II Plant Test Report

The capacity of the existing UP-II Refinery units was defined at the beginning of the feasibility study to provide a basis for the study case evaluations. However, as the study progressed it became increasingly important to more firmly establish the maximum capacity of the High Vacuum Unit and the Hydrogen Plant. Therefore, it was decided to perform test runs on these units to determine their capacity limits and to identify the bottlenecks that caused the limits. The test runs were jointly conducted by Pertamina, Chevron, Fluor Daniel, and UOP during the period from January 29, 1993, through February 3, 1993. UOP prepared a detailed test run report which is included in this section. The attached report contains definition of test run cases, test run data, analysis of results, conclusions, and recommendations.

[The information contained in the UOP UP-II Plant Test Report is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

D. CAPITAL COST ESTIMATING SUPPORT DATA

Based on the process equipment data supplied by the various licensors and generated in-house, Fluor Daniel prepared capital cost estimates for each study case. This section of the Appendix contains support data used to generate the capital cost estimates, including Indonesian Material Survey Unit Prices and Budgetary Vendor Price Quotes for Major Equipment.

INDONESIAN MATERIAL SURVEY

UNIT PRICES

Jl. Abdul Muis No. 46, Jakarta 10160, Indonesia
Tel. (021) 3861010, 3861027 Fax. (021) 3861022, 3846774
Tlx. 67025, 67026 SGDY IA. P.O. Box 4171 Jkt.

FACSIMILE LEAD SHEET

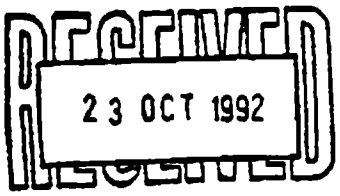
NUMBER OF PAGES INCLUDING LEAD SHEET : 6

( ) URGENT ( ) CONFIDENTIAL

DATE : OCTOBER 23, 1992

TO : COMPANY :
CITY/COUNTRY : SINGAPORE
FAX. NO. : 65-4756757

ATTENTION : MR. GUNTER H. HILLEBRAND



FROM : DIDI INDRA SUDEWA

NO : 330/IGR/X/92-P002

SUBJECT : DUMAI LUBE BASE PROJECT PRICE SURVEY

PLEASE FIND AN ENCLOSED MATERIAL SURVEY PRICE FOR YOUR PERUSAL.

BEST REGARDS,

DIDI INDRA SUDEWA

INDONESIA MATERIAL SURVEY
UNIT PRICE

SUPPLIER : PT. ALIDA CATUR SENTOSA
ADDRESS : JAKARTA

DATE : 16-10-92

CONTRACT :

11st10

ITEM	DESCRIPTION	PRICE (S$)	UNIT	REMARKS
1	FITTING 90 ELL, SCH 40, CARBON STEEL, SIZE :			CNF DUMAI
	DIA 2"	3.50	EA	
	DIA 4"	12.60	EA	
	DIA 6"	35.00	EA	
	DIA 8"	63.00	EA	
	DIA 10"	133.00	EA	
	DIA 12"	203.00	EA	
2	GATE VALVES - 150#, RF, CARBON STEEL, FURUKAWA BRAND EX JEPANG			
	DIA 2"	778.40	EA	
	DIA 4"	1,397.20	EA	
	DIA 6"	2,202.20	EA	
	DIA 8"	3,463.60	EA	
	DIA 10"	4,897.20	EA	
	DIA 12"	6,403.60	EA	
3	FLANGES, 150#, RF, CARBON STEEL.			
	DIA 2"	12.60	EA	

INDONESIA MATERIAL SURVEY
UNIT PRICE

SUPPLIER : PT. BUDIDHARMA
ADDRESS : JAKARTA

DATE : 07-10-92

CONTRACT :

list9

ITEM	DESCRIPTION	PRICE (US$)	UNIT	REMARKS
1	PLAIN BAR (TP-24)			
	Dia 8 mm	0.43	KG	
	Dia 10 mm	0.42	KG	
	Dia 12 mm	0.42	KG	
	Dia 16 mm - 25 mm	0.42	KG	
2	DEFORMED BAR (TD-40)			
	D-10 (Dia 10 mm)	0.44	KG	
	D-13 (Dia 13 mm)	0.44	KG	
	D16 - D25	0.43	KG	
	D-29	0.44	KG	
	D-32	0.45	KG	
	D-36	0.48	KG	
3	CONCRETE			
	K-280	68.55	M3	
	K-245	67.27	M3	
	K-175	64.07	M3	

INDONESIA MATERIAL SURVEY
UNIT PRICE

SUPPLIER : PT. WIJAYA KARYA
ADDRESS : JAKARTA

DATE : 16-10-92

CONTRACT :

list11

ITEM	DESCRIPTION	TYPE	LENGTH (M)	SEGMENT			
				SINGLE (US$/M)	BOTTOM (US$/M)	MIDDLE (US$/M)	UPPER (US$/M)
	PRECAST PILES						
1	DIA 350 MM	A3	6.00	35.92	40.51	45.10	40.10
		A3	12.00	30.65	32.98	35.24	32.78
		A3	15.00	29.90	31.27	33.05	31.13
2	DIA 400	A2	6.00	38.18	47.15	51.94	44.95
		A2	12.00	35.38	38.66	41.06	37.57
		A2	15.00	34.42	37.00	39.00	36.13
	PRICE : CNF DUMAI PORT						

pt. Indhasana Gemareksa
Jl. Abdul Muis No. 46, Jakarta 10160, Indonesia
Tel. (021) 3861010, 3861027 Fax. (021) 3861032, 3846774
Tlx. 67025, 67026 SGDY IA. P.O. Box 4171 Jkt.

FACSIMILE LEAD SHEET

NUMBER OF PAGES INCLUDING LEAD SHEET :

DATE : September 28, 1992 ( ) URGENT ( ) CONFIDENTIAL

TO : Company : FLUOR DANIEL EASTERN INC.
City/Country : Jakarta
Fax No. :
Attention : Mr. Sumitro

FROM : Didi Indra Sudewa

NO. : 289/IGR/IX/92

RE : Dumai Lube Base Project Price Survey

Please find enclosed faximile sent to Mr. Hillebrand dated September 18, 1992 for your perusal.

Regards,

Didi Indra Sudewa

DIS/aa

FLUOR DANIEL
JAKARTA
SEP 28 '92
ROUTE
☐ RJR :
☐ WLH :
☐ DJG :
☐ GS :
☐ JH :
☐ :
☐ :
FILE

FAX TO: Fluor Daniel Inc.
FAX NO.: 714 975 9006 PAGE: 1 OF: 7
ATTENTION OF: R. J. Baylor
FROM: R. J. Ragan FAX NO.: 850 3798
COMPANY: TAG. DATE: 2 19 92
Ref. No. 7688

INDONESIA MATERIAL SURVEY
UNIT PRICE

SUPPLIER : PT. KELOLATAMA ALBES
ADDRESS : JAKARTA

DATE : Sept. 24, 1992

CONTRACT :

list6/lubebase

ITEM	EQUIPMENT	MARK / TYPE	CAPACITY	YEAR	RENTAL RATE PER HOUR (US$)
1	BULDOZER	CATERPILLAR D7G	200 HP	1981	62.79
2	BULDOZER	KOMATSU D 65 E	155 HP	1984	45.05
3	BULDOZER	KOMATSU D 155 A	320 HP	1990	122.85
4	BULDOZER	KOMATSU D 85 E SS	215 HP	1990	62.79
5	LOZER SHOVEL	KOMATSU D 75 S	2.2 M3	1990	62.79
6	EXCAVATOR	MITSUBISHI MS 180	0.8 M3	1987	40.95
7	EXCAVATOR	CATERPILAR E 150	0.8 M3	1988	40.95
8	EXCAVATOR	CATERPILAR E 200 B	0.9 M3	1989	45.05
9	EXCAVATOR	KOMATSU PC 200	0.7 M3	1990	40.95
10	EXCAVATOR	CATEPPILAR S 200 B SLA	0.45 M3	1990	55.96
11	EXCAVATOR	KOMATSU PC 650	2.8 M3	1990	195.75
12	MOTOR GRADER	KOMATSU GD 500 R	130 HP	1987	40.95
13	MOTOR GRADER	KOMATSU GD 500 R	140 HP	1982	40.95
14	MOTOR GRADER	KOMATSU GD 613 R	155 HP	1987	45.05
15	SWAMP DOZER	CATERPILAR D 3 C LGP	67 HP	1988	31.40
16	SWAMP DOZER	KOMATSU D 31 P	70 HP	1988	31.40
17	SWAMP DOZER	KOMATSU D 65 P	165 HP	1990	47.25
18	VIBRATOR ROLLER	DYNAPAC CA 25 PD	125 HP	1984	31.40
19	VIBRATOR ROLLER	DYNAPAC CA 25	125 HP	1984	25.94
20	VIBRATOR ROLLER	BOMAG BW 212 D	116 HP	1989	31.40

SUPPLIER : PT. KELOLATAMA ALBES
ADDRESS : JAKARTA

DATE : Sept. 24, 1992

liet6/lubebase

ITEM	EQUIPMENT	MARK / TYPE	CAPACITY	YEAR	RENTAL RATE PER HOUR (US$)
21	COMPACTOR	KOMATSU WF 22 A	22.5 TON	1980	61.43
22	WHEEL LOADER	FURUKAWA FL 230	2.4 M3	1982	45.05
23	WHEEL LOADER	HANOMAG MF 55 D	2.3 M3	1982	40.95
24	DUMP TRUCK	MARCEDES 917	8 TON	1989	12.29

pt. Indiasana Gemareksa
Jl. Abdul Muis No. 46, Jakarta 10160, Indonesia
Tel. (021) 3861010, 3861027 Fax. (021) 3861032, 3846774
Tlx. 67025, 67026 SGDY IA P.O. Box 4171 Jkt.

FACSIMILE LEAD SHEET

NUMBER OF PAGES INCLUDING LEAD SHEET : 6

DATE : September 18, 1992 ( ) URGENT ( ) CONFIDENTIAL

TO : Company : FLUOR DANIEL INC.
City/Country : Irvine
Fax No. : 714 975 3719
Attention : Mr. Gunter H. Hillebrand

FROM : Didi Indra Sudewa
NO. : 276/IGR/IX/92

RE : Dumai Lube Base Project Price Survey

Please find an enclosed material survey price for your perusal.

Best Regards,

Didi Indra Sudewa

DIS/aa

INDONESIA MATERIAL SURVEY
UNIT PRICE

SUPPLIER : PT. GAYA MOTOR (ASTRA INT'L)
ADDRESS : JL. JOS SUDARSO, SUNTER II

DATE : 15 SEPT. 92

CONTRACT :

11st2/1ubebase

ITEM	DESCRIPTION	PRICE (US$)	UNIT	REMARKS
1	ZEBRA PICK UP 1,3	8,732.85	EA	ON THE ROAD
2	ZEBRA VAN 1,3	11,374.65	EA	ON THE ROAD
3	ROCKY 4WD , 5 SPEED	27,520.50	EA	ON THE ROAD
4	TAFT GT 4 WD, 5 SPEED	26,786.55	EA	ON THE ROAD
5	CHARADE CLASSY	24,951.15	EA	ON THE ROAD
6	TRUCK DELTA 4 BAN	17,246.25	EA	ON THE ROAD

Gemareksa

INDONESIA MATERIAL SURVEY
UNIT PRICE

SUPPLIER : PT. PERMORIN
ADDRESS : JL. ABDUL MUIS NO. 14
JAKARTA

DATE : 15 SEPT. 92

CONTRACT :

list2/lubebase

ITEM	DESCRIPTION	PRICE (US$)	UNIT	REMARKS
1	MERCY BUS TYPE OH-1113 FULL AIR CONDITIONING	127,435.35	EA	ON THE ROAD

INDONESIA MATERIAL SURVEY
UNIT PRICE

SUPPLIER : PT. KARIMUN GRANITE
ADDRESS : JL. KEBON SIRIH NO. 39
JAKARTA

DATE : 15 SEPT. 92

CONTRACT :

list3/lubebase

ITEM	DESCRIPTION	PRICE (S$)	UNIT	REMARKS
1	GRANITE 3/4" - 1/4"	24.00	MT	CNF DUMAI
2	GRANITE 1 1/2" - 3/4"	24.00	MT	CNF DUMAI

INDONESIA MATERIAL SURVEY
UNIT PRICE

SUPPLIER : PT. K.H.I PIPE
ADDRESS : WISMA BAJA
JL. JEND. GATOT SOEBROTO

DATE : 15 SEPT. 92

CONTRACT :

list4/lubebase

ITEM	DESCRIPTION	PRICE (US$)	UNIT	REMARKS
	K.H.I PIPE AS PILES			
1	OD = 406.4 MM T = 9 MM	65.10	METER	EX FACTORY CILEGON
2	OD = 406.4 MM T = 12 MM	86.10	METER	EX FACTORY CILEGON
3	OD = 508.0 MM T = 9 MM	81.90	METER	EX FACTORY CILEGON
4	OD = 508.0 MM T = 12 MM	108.15	METER	EX FACTORY

INDONESIA MATERIAL SURVEY
UNIT PRICE

SUPPLIER : VAN LEEWEN
ADDRESS :
JAKARTA

PAGE : 1 OF 1

DATE : 15 SEPT. 92

CONTRACT :

list5/lubebase

ITEM	DESCRIPTION	PRICE (US$)	UNIT	REMARKS
1	CARBON STEEL, ERW API-5L SCH. 40			
	DIA 2"	4.10	METER	FOB S'PORE
	DIA 3"	8.24	METER	FOB S'PORE
	DIA 4"	11.74	METER	FOB S'PORE
	DIA 6"	20.62	METER	FOB S'PORE
2	CARBON STELL, SEAMLESS BEVELLED END. SCH. 40 ASTM A106 GR.B			
	DIA 2" SCHEDULE 80	6.52	METER	FOB S'PORE
	DIA 3" SCHEDULE 40	9.83	METER	FOB S'PORE
	DIA 4" SCHEDULE 40	14.00	METER	FOB S'PORE
	DIA 6" SCHEDULE 40	24.60	METER	FOB S'PORE
	DIA 8" SCHEDULE 40	36.40	METER	FOB S'PORE
	DIA 10" SCHEDULE 40	52.50	METER	FOB S'PORE
3	CARBON STEEL ASTM A.333-6 SEAMLESS BEVELLED END , SCH. 40			
	DIA 3"	15.75	METER	FOB S'PORE
	DIA 4"	18.66	METER	FOB S'PORE
	DIA 6"	39.47	METER	FOB S'PORE

PRICE AND RATE SCEDULE

(Alternative)

Name of Work : FOUNDATION PILING
Project : EXOR IV at DUMAI

400x400 SQUARE SOLID P.C. PILE

ITEM NO.	D E S C R I P T I O N	UNIT	UNIT PRICE IN RUPIAH
1.1	Mobilization	rig	12,500,000.00
1.2(1)	Production of PC Pile SS-40	lin.meter	46,600.00
1.2(2)	Production of Pile Splices	each	157,200.00
1.2(3)	Additional Mild Steel Rebars (8D16)	lin.meter	20,000.00
1.2(4)	Transportation of PC Pile SS-40	lin.meter	21,550.00
1.3	Install Indicator Piles	lin.meter	26,200.00
1.4	Test Piles	each	15,850,000.00
1.5(1)	Install Production Piles	lin.meter	20,400.00
1.5(2)	Welding of Pile Splices	each	65,000.00
1.6	Cut-off Piles	each	22,000.00
1.7	Demobilization	rig	12,500,000.00
1.8	Standby of Piling Rig and its Crew	rig.hour	87,500.00

CONDITIONS

1. PC Piles shall be casted at CBBP plant in Cikarang, West Java accordance with the proposed design of PC Pile SS-40 and the CBBP Standa... Specifications.

2. If scope of work includes 'Furnish PC Pile SS-40' only, the piles will be supplied to the project site on the top of trailers (unloading of piles is excluded).

3. If required so, additional steel pile shoe (CBBP Star Pile Tip) can be attached to the PC Pile.
   Unit price of the steel pile shoe SS-40 : Rp 45,000.00/each.

4. The scope of works shall exclude the following items :
   a. Provision and maintenance of access to the site.
   b. Provision and maintenance of working areas in the site.
   c. Removal of any obstructions whether they are located below or above ground surface.
   d. CAR and TPL Insurances.
   e. Excavation and or backfilling, for cut-off pile.

5. Working areas shall be all on shores with adequate ground surface conditions.

6. Standby of piling rig and its crew that occured after completion of installation of indicator & test piles until the commencement o... installation of the production piles shall be chargeable.

7. Method of measurements shall be as those stipulated in the proposed General Specifications.

8. Conditions of payments in general shall be as follows :

   a. Advance Payment of 20% x Contract Amount shall be made prior to the commencement of works, and balanced by two-week progress payments.

   b. Progress payments shall be made within 7 days after receipt of relevan invoices.

9. Validity of the prices : until 31st October 1990

Jakarta, 17th September 1990
PT CITRA BUANA BETON PERKASA

PT. CITRA BUANA BETON PERKASA
JAKARTA

BUDGETARY VENDOR PRICE QUOTES

for

MAJOR EQUIPMENT

ACCOUNT 42 PRESSURE VESSELS
PERTAMINA/CHEVRON 422700
Nov. 20, 1992

Tag No.	Service	Budget Price	Vendor
010-C-1200	Atmos. Column	$ 337,000	ATB
010-C-1250	Vac. Column	$ 560,000	ATB
010-R-1110	Reactor	$ 5,080,000	ATB
010-V-1110	Separator	$ 645,000	ATB
011-C-1650	Vac. Column	$ 602,000	ATB
012-C-1430	Atm. Strip	$ 155,000	ATB
012-C-1460	Vac. Column	$ 170,000	ATB
012-R-1420	Hydro Reactor	$ 2,970,000	ATB
012-R-1410	Dewax Reactor	$ 1,561,000	ATB
014-R-1010	Deasphalt Reactor	$ 1,346,000	ATB
014-R-1020	Deasphalt Reactor	$ 1,331,000	ATB
014-V-1100	Hot Separator	$ 282,000	ATB
014-V-1110	Cold Separator	$ 527,000	ATB
041-V-01	N2 Storage Tank	$ 250,000	CBI
212-R-010	HC Unibon Reactor #3	$ 4,315,000	ATB

TELEFAX MESSAGE

FROM: INSECO USA **FAX:** (713) 781-2645 **TEL:** (713) 781-2620

TO: FLUOR DANIEL -IRVINE **FAX NO:** 714-975-5949

ATTN: MANFRED LENGSFELD **DATE:** 11/17/92 **PGS.** 04

SUBJECT: BUDGET PRICES FOR HIGH PRESSURE VESSELS
ATB CALDERERIA, SPA.

URGENT **URGENT** **URGENT** **URGENT**

ACTING FOR AND ON BEHALF OF ATB CALDERERIA, SPA,BRESCIA, ITALY AND IN RESPONSE TO YOUR FAX DATED 11 NOV.1992, WE ARE PLEASED TO PROVIDE THE ATTACHED BUDGET PRICE INFORMATION. PLEASE CONTACT US IF WE MAY PROVIDE ANY ADDITIONAL INFORMATION.

BEST REGARDS
JAMES E. FISHER

CC: ATB/S.PODIGHE

[The information contained in the High Pressure Vessels Budget Quotation is considered confidential and proprietary to the Dumai Base Oils Project or to the licensors who have provided the information under a secrecy and/or licensor agreements. This information has been removed from this Study Report in order to comply with the required agreements.]

CBI

a national construction services organization

CBI Na-Con, Inc.

11001 Etiwanda
P.O. Box 2500
Fontana, California 92335

714 986 2550
FAX: 714 986 0689

November 18, 1992
Via FAX: 975-5949

Manfred Langsfeld
Fluor Daniel

Reference: Budget for 100 Cubic Meter N_2 Pressure Vessel

Dear Manfred,

Confirming our conversation today we are pleased to quote a budget price of $250,000 for the supply of a 100 Cubic Meter N_2 Bullet. This price is based on a 10.2 bar pressure with stainless steel inner vessel, carbon steel outer vessel and Perlite insulation.

I hope this information is helpful in your project plans.

Very truly yours,

Kenneth D. Primavera
Contracting Engineer

COMPRESSORS

AND

POWER GENERATOR

DRESSER-RAND

Turbo and Recip Sales

1375 S. Acacia, Unit A . Fullerton, CA 92631 714/778-3750

November 25, 1992

Fluor Daniel, Inc.
3333 Michelson Drive
Irvine, California 92730

Attention: MR. HARRY SEARLE VIA FAX 975-5949

Subject: Dumai Base Oils Project
D-R File LA5328

Dear Harry,

Further to our 11/18/92 estimate and your advisement of more detailed operating conditions, attached please find our revised price and horsepower summary for these applications. Revised prices are budgetary ± 15%.

Should you have any questions, please do not hesitate to call our Fullerton office.

Very truly yours,

DRESSER-RAND COMPANY

B. W. Dickson

B. W. Dickson
Sales Engineer

BWD:jl
attachments

LA5328

Telex: 674881 DRESMACHLSA
Fax: COMPLETES – (714) 778-2781, PARTS – (714) 778-8020

ELLIOTT

Elliott Company
855 Anaheim Puente Road
P.O. Box 384
City of Industry, California 91748-0384
(818) 810-2121
Telecopy: (818) 964-0506
Telex: 675-527

received
11/17/92

November 11, 1992

FLUOR DANIEL, INC.
3333 Michelson Drive
Irvine, CA. 92730

ATTN: Mr. Harry Searle

Subject: Pertamina/Chevron - Dumai, Sumatra
14 MW Induction Turbine Generator 024-G-01/024-G-01T
Ref: LA93-120-029

Gentlemen:

In response to your request, we are pleased to provide the following estimate for the subject equipment.

The conditions of service are as follows:

Turbine

14 MW Condensing Auto Induction Steam Turbine

Inlet Conditions - 40.8 Kg/cm2 gage @ 371 C
max. = 42.2/398
min. = 40.8/343
des. = 45.2/426

Exhaust - 0.248 Kg/cm2 Abs

Induction - 68,000 Kg/hr @ 3.2 Kg/cm2 gage @ 160 C

Generator

AC Generator with the following:

-Short circuit ratio = 0.5
-Subtransient reactance = 18
-11,000 V
-0.85 PF
-1500 RPM
-Brushless exciter
-PMG
-TEWAC emclosure

Based on the above rated conditions, the steam usage rate is * 36,900 Kg/hr. Elliott's steam turbine would be a 2SRQV-9 with a controlled port for induction. The budget price for the above equipment which includes the turbine, generator, baseplate for the turbine and generator, API oil system, reduction gear, basic controls (switchgear not included) and

*(72,260 Kg/HR WITH ZERO INDUCTION)

turning gear is $4,675,000 US Dollars. Delivery is 55-60 weeks ARO.

Note that Elliott has vast experience in the field of turbine generators. We look forward to discussing this experience with you in the near future.

Meanwhile, if you have any questions, please do not hesitate to contact me.

VERY TRULY YOURS

Joseph N. Barry
Field Sales Engineer

HEAT EXCHANGERS

ACCOUNT 44 HEAT EXCHANGERS
PERTAMINA/CHEVRON 422700
Nov. 20, 1992

Tag No.	Service	Budget Price	Vendor
010-E-1110 A	Rx Feed/Eff Exchanger	$ 440,000	Belleli
010-E-1110 B	Rx Feed/Eff Exchanger	$ 440,000	Belleli
010-E-1113	Rx Eff Air Cooler	$ 1,100,000	Hudson
012-E-1420 A	HF Reactor Exchanger	$ 295,000	Belleli
012-E-1420 B	HF Reactor Exchanger	$ 295,000	Belleli
012-E-1420 C	HF Reactor Exchanger	$ 295,000	Belleli
014-E-1001 A	DAO React Feed/Eff Exch	$ 720,000	Belleli
014-E-1001 B	DAO React Feed/Eff Exch	$ 720,000	Belleli
023-E-01	Stg Steam Condenser	$ 1,800,000	Hudson

Note: Motor Requirements are as follows:

Tag No.	Quantity	Rating Ea.
010-E-1113	10	18.5 kW
023-E-01	5	132 kW

0001.1

Please deliver to Andranik Arabyan ext 3550

FAX TRANSMITTAL

R & C SALES COMPANY
16861 ENCINO HILLS DRIVE
ENCINO, CA 91436
TEL: (818) 981-7046
FAX: (818) 981-7217

COMPANY: FLUOR DANIEL
ATTENTION: ANDRANIK ARABYAN 533 X
FROM: R REICHHELM Hudson
SUBJECT: AIR COOLED HEAT EXCHANGER - BUDGET ESTIMATE
REFERENCE: FAXES DATED 11/11 & 12/92
DATE: 11/16/92

FAX NO: 714 975 5271

With reference to your faxes dated 11/11 & 12/92 we submit the following budget estimate information:

Item	Service	Units	Bare Surface	Press/Temp	Estimated Price FOB Factory
010-E-1113	Reac. Effl	(5) 10.5-344	8,564		$1,100,000
023-E-01	Stm Cond	(4) 36.0-324	47,194	5/302	$1,800,000

Designs are based on data included the referenced faxes. Bundle materials are Incoloy 800 forItem 1113 and carbon steel for Item 01. The steam condenser price includes in-perimeter condensate and non-condensible handling components. The steam condenser units are based on an A-frame configuration, however if adequate plot area is available horizontal units would be lower cost based on an erected price.

Please call me at 818 981 7046 should you need additional information.

RR
11/16/92
budest

*faxed 11/16/92 - 1 pg

121

BELLELI

FAX N.: 1008 DATE: NOVEMBER 16, 1992

TO : FLUOR DANIEL FAX N.: 714-975-5981
ATTN.: ADRANIK ARABYAN PG 1 of 3
FROM: BELLELI S.p.A./
MR. ROBERTO CASTELLI

SUBJ./REF.: BUDGET PRICE FOR HIGH PRESSURE EXCHANGER
FOR A PERTAMINA/CHEVRON PROJECT.
YOUR CONTRACT NO. 422700
OUR REF. 8645 DC1/RT

DEAR SIRS,

WITH REFERENCE TO YOUR FAX DATED NOVEMBER 11,1992 WE SUBMIT OUR BUDGET PRICE (+/- 20%) FOR THE BELOW MENTIONED H.P. HEAT EXCHANGERS.

H.P. HEAT EXCHANGERS - TYPE: DEU SPECIAL (THREADED BREECH LOCK TYPE CLOSURE) IN COMPLETE ACCORDANCE WITH YOUR CALCULATIONS AND SKETCHES SHEET 1 OF 1.

ITEM	QTY	INDICATIVE NET WEIGHT PER SHELL KG.	EX- WORKS BUDGET PRICE PER SHELL U.S. $
10-E-1110 A/B	2	36,000	440,000
12-E-1420 A/B/C	3	32,000	295,000
14-E-1001 A/B	2	74,000	720,000
TOTAL		316,000	3,205,000

BELLELI

DESIGN/FABRICATION:

ASME VIII DIV. 1 CODE.

MATERIALS:

HEAT EXCHANGERS WILL BE FABRICATED WITH THE FOLLOWING MATERIALS:

ITEM	SHELLS	TUBES	CHANNELS
10-E-1110 A/B	2 1/4 CR-1 MO PLUS 0,1" TP.347 SS OVERLAY	A 213 TP.321	2 1/4 CR-1MO PLUS 0,1" TP. 347 SS OVERLAY
12-E-1420 A/B/C	2 1/4 CR- 1MO	2 1/4 CR-1MO	2 1/4 CR-1MO
14-E-1001 A/B	2 1/4 CR-1MO	A 213 TP. 321	2 1/4 CR-1 MO PLUS 0,1" TP 347 SS OVERLAY

INSPECTION

BY YOU OR YOUR CLIENT.

DELIVERY TERMS

F.C.A. OUR MANTOVA WORKS.

DELIVERY TIME

WITHIN 12 MONTHS FROM P.O.

BELLELI

PAYMENT

- 10% WITH ORDER
- 40% FIVE MONTHS AFTER P.O.
- 50% ON DELIVERY

BEST REGARDS,

BELLELI S.P.A. / E. CASTELLI

CC: BELLELI S.P.A. /MANTOVA

FIRED HEATERS AND BOILERS

TULSA HEATERS INC.

4500 Exchange Tower
4500 South Garnett
Tulsa, Oklahoma 74146-5213
Phone: (918) 665-6512
Fax: (918) 665-2019

November 17, 1992

Fluor Daniel, Inc.
3333 Michelson Drive
Irvine, CA 92730

Attention: Mr. Wayne Thompson

Ref: Pertamina/Chevron
THI Ref: P92-1313

Dear Mr. Thompson,

We are pleased to offer for your review our Budget Proposal to furnish twelve direct fired heaters. Pricing will relect a plus or minus 30%.

Our proposal is based on the information furnished in your fax of November 10, 1992 and the attached proposal sketches.

Please note the dimensions on the proposal sketches are preliminery.

				PR Adjust.
1.	010-H-1100 Reactor Feed Heater	(347)	14.12 MMBTU/HR $280,000	350K
2.	010-H-1200 Atmospheric Col Feed Heater	(347)	12.08 MMBTU/HR $145,000	250K
3.	010-H-1250 Vacuum Column Feed Heater	(1¼)	10.08 MMBTU/HR $76,000	100K
4.	010-H-1650 Vacuum Column Feed Heater	(1¼)	22.2 MMBTU/HR $156,000	250K
5.	012-H-1410 Dewaxer Reactor Feed Heater	(347)	9.08 MMBTU/HR $154,000	265K
6.	012-H-1420 Hydrofinish Reactor Feed Heater	(347)	3.04 MMBTU/HR $70,000	80K

FLUOR DANIEL, INC.
THI REF. P-92-1313
November 17, 1992

7.	012-H-1450 Vacuum Column Feed Heater	(1¼)	15.12 MMBTU/HR $114,000	175K
8.	013-H-1000 Prod Fractionator Feed Heater	(cs)	42.8 MMBTU/HR $256,000	320K
9.	014-H-1001 Combined Charge Heater	(347)	9.12 MMBTU/HR $165,000	300K
10.	014-H-1200 Prod Fractionator Feed Heater	(9)	24.92 MMBTU/HR $274,000	340K
11.	140-H-2A/B Light Coker Gas Oil Heater	(9)	36.24 MMBTU/HR ..... $644,000 ea.	750 K x 2

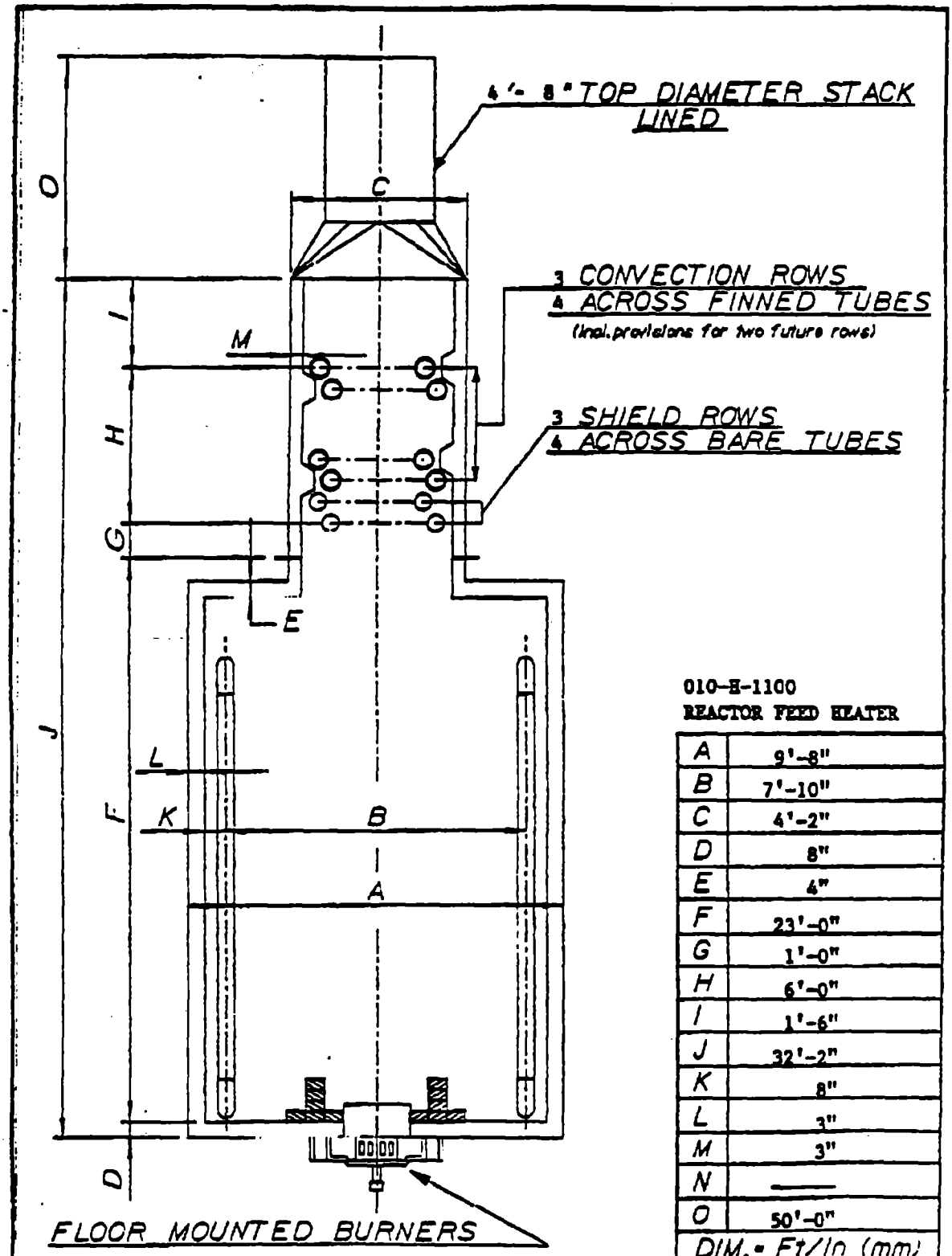
If you have any questions please don't hesitate to call.

Very truly yours,

TULSA HEATERS, INC.

Robert L. Gibson

Robert L. Gibson
Marketing Manager



010-E-1100
REACTOR FEED HEATER

A	9'-8"
B	7'-10"
C	4'-2"
D	8"
E	4"
F	23'-0"
G	1'-0"
H	6'-0"
I	1'-6"
J	32'-2"
K	8"
L	3"
M	3"
N	—
O	50'-0"

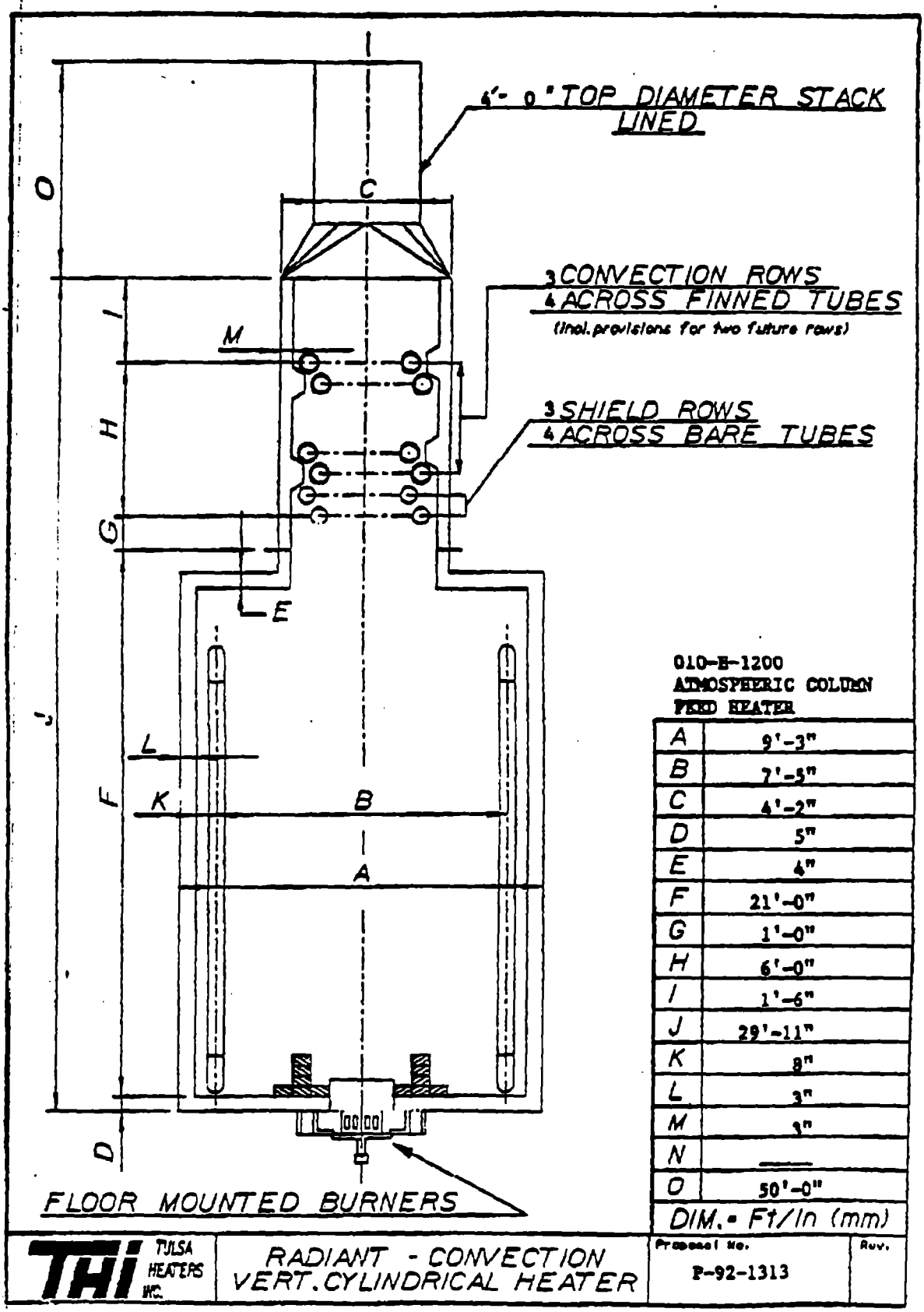
DIM. = Ft/In (mm)

THI TULSA HEATERS INC.

RADIANT - CONVECTION
VERT. CYLINDRICAL HEATER

Proposal No. P-92-1313

Rev.



010-E-1200
ATMOSPHERIC COLUMN
FEED HEATER

A	9'-3"
B	7'-5"
C	4'-2"
D	5"
E	4"
F	21'-0"
G	1'-0"
H	6'-0"
I	1'-6"
J	29'-11"
K	8"
L	3"
M	3"
N	———
O	50'-0"

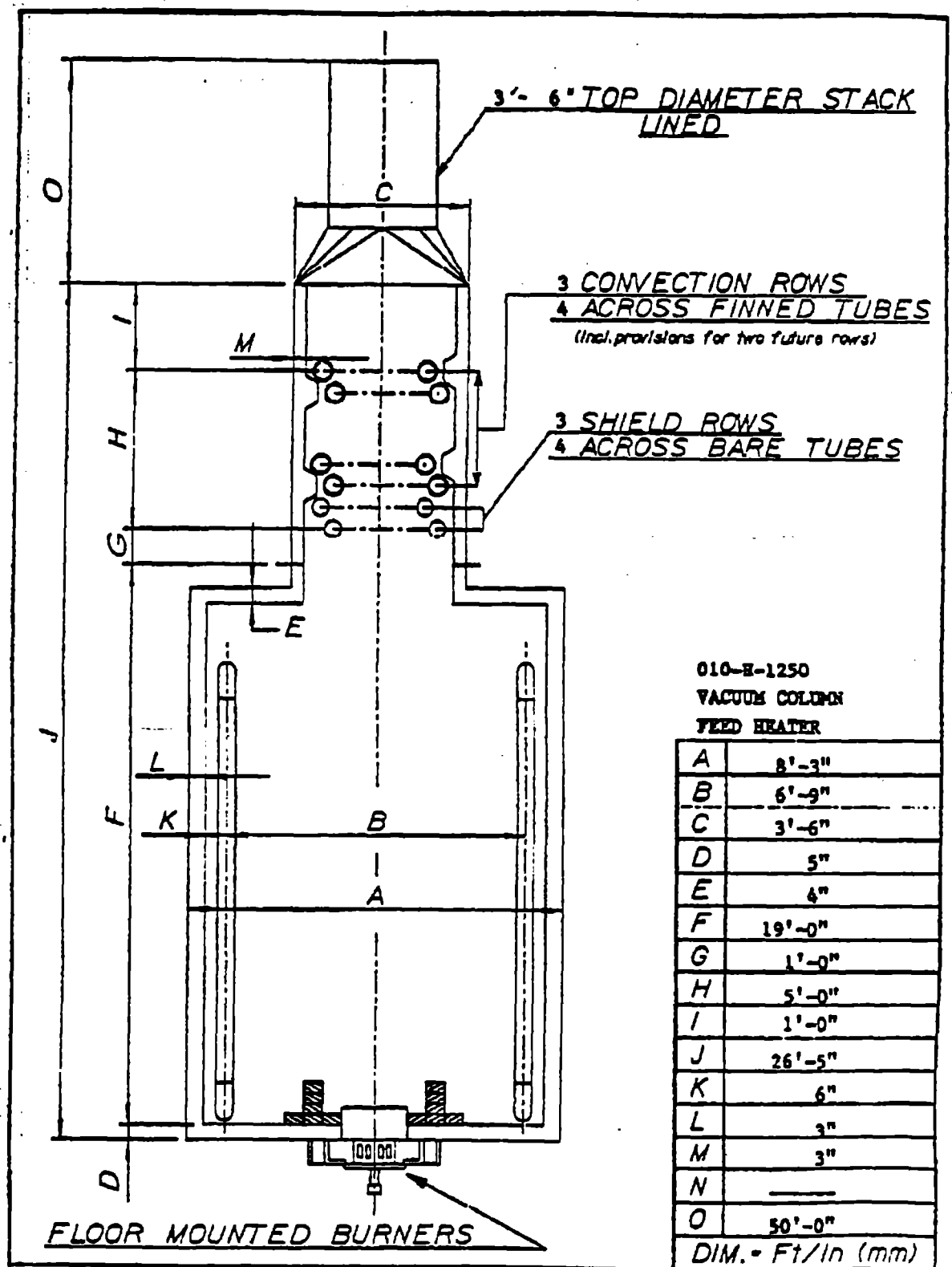
DIM. = Ft/In (mm)

THI TULSA HEATERS INC.

RADIANT - CONVECTION
VERT. CYLINDRICAL HEATER

Proposal No. P-92-1313

Rev.



010-H-1250
VACUUM COLUMN
FEED HEATER

A	8'-3"
B	6'-9"
C	3'-6"
D	5"
E	4"
F	19'-0"
G	1'-0"
H	5'-0"
I	1'-0"
J	26'-5"
K	6"
L	3"
M	3"
N	———
O	50'-0"

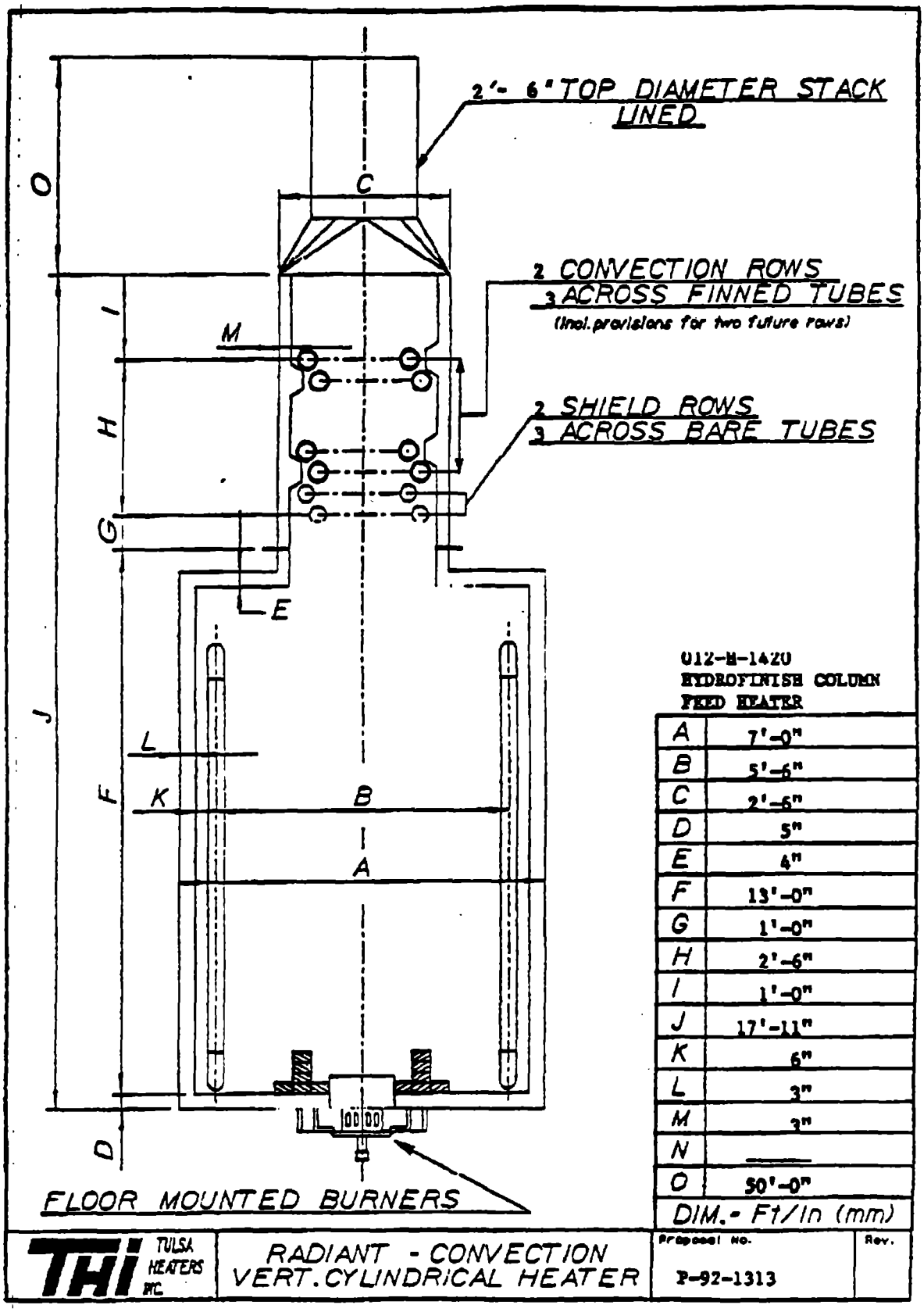
DIM. - Ft/In (mm)

THI TULSA HEATERS INC.

RADIANT - CONVECTION
VERT. CYLINDRICAL HEATER

PT Upusat No.
P-92-1313

Rev.



U12-H-142U
HYDROFINISH COLUMN
FEED HEATER

A	7'-0"
B	5'-6"
C	2'-6"
D	5"
E	4"
F	13'-0"
G	1'-0"
H	2'-6"
I	1'-0"
J	17'-11"
K	6"
L	3"
M	3"
N	———
O	50'-0"

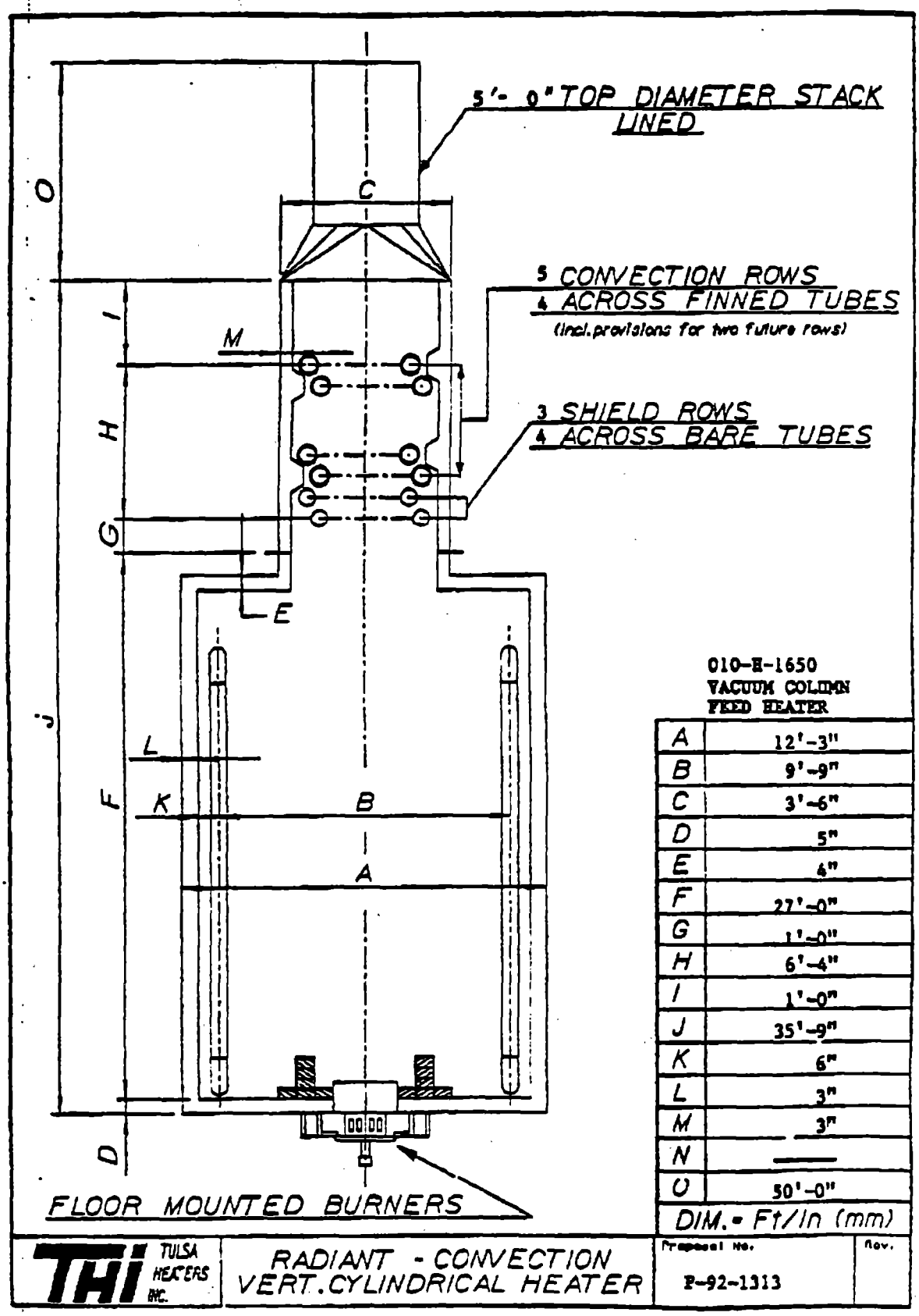
DIM. - Ft/In (mm)

THI TULSA HEATERS INC.

RADIANT - CONVECTION
VERT. CYLINDRICAL HEATER

Proposal No. P-92-1313

Rev.



010-E-1650
VACUUM COLUMN
FEED HEATER

A	12'-3"
B	9'-9"
C	3'-6"
D	5"
E	4"
F	27'-0"
G	1'-0"
H	6'-4"
I	1'-0"
J	35'-9"
K	6"
L	3"
M	3"
N	———
O	50'-0"

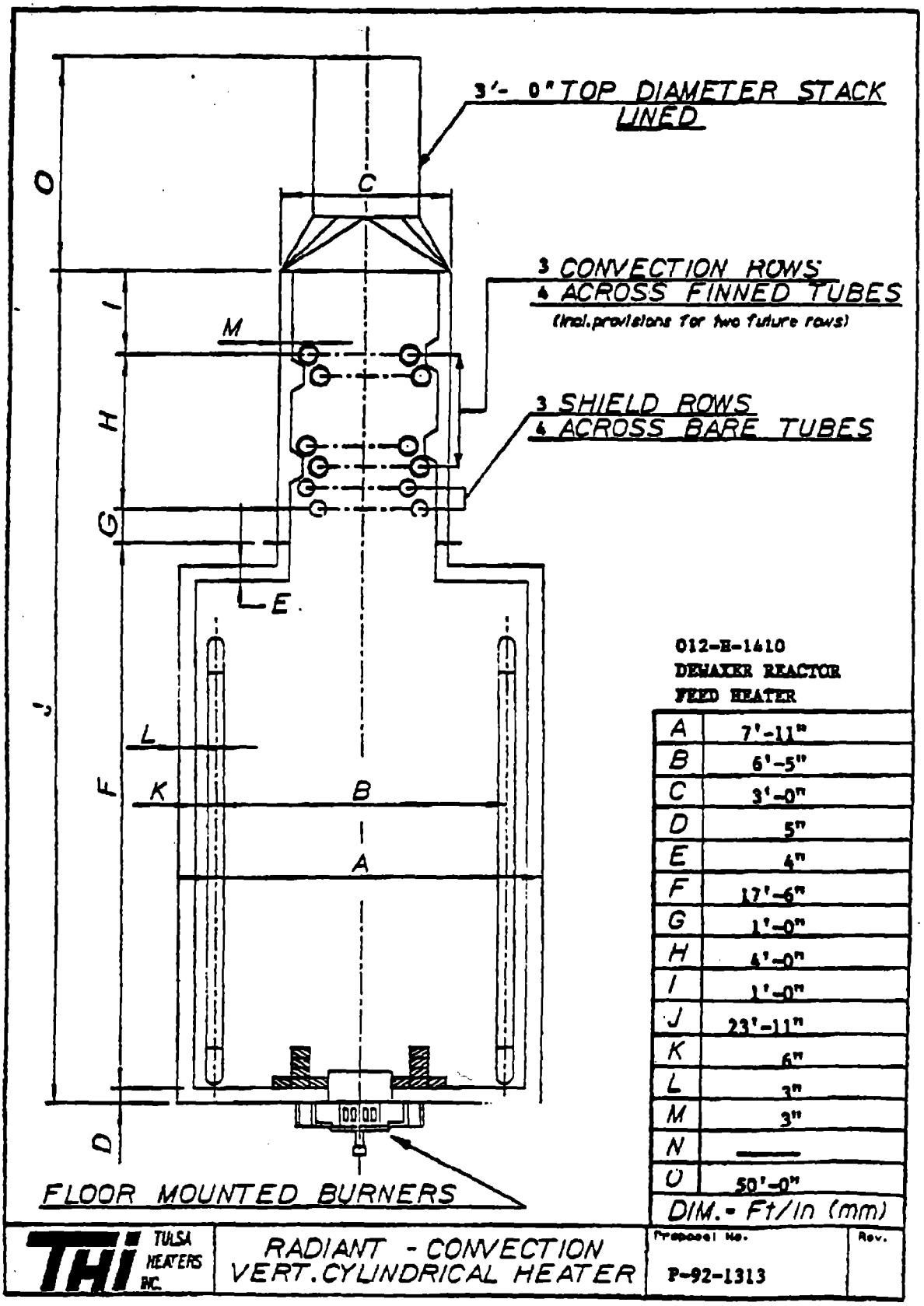
DIM. = Ft/In (mm)

THI TULSA HEATERS INC.

RADIANT - CONVECTION
VERT. CYLINDRICAL HEATER

Proposal No. P-92-1313

Rev.



012-E-1410
DEWAXER REACTOR
FEED HEATER

A	7'-11"
B	6'-5"
C	3'-0"
D	5"
E	4"
F	17'-6"
G	1'-0"
H	4'-0"
I	1'-0"
J	23'-11"
K	6"
L	3"
M	3"
N	———
O	50'-0"

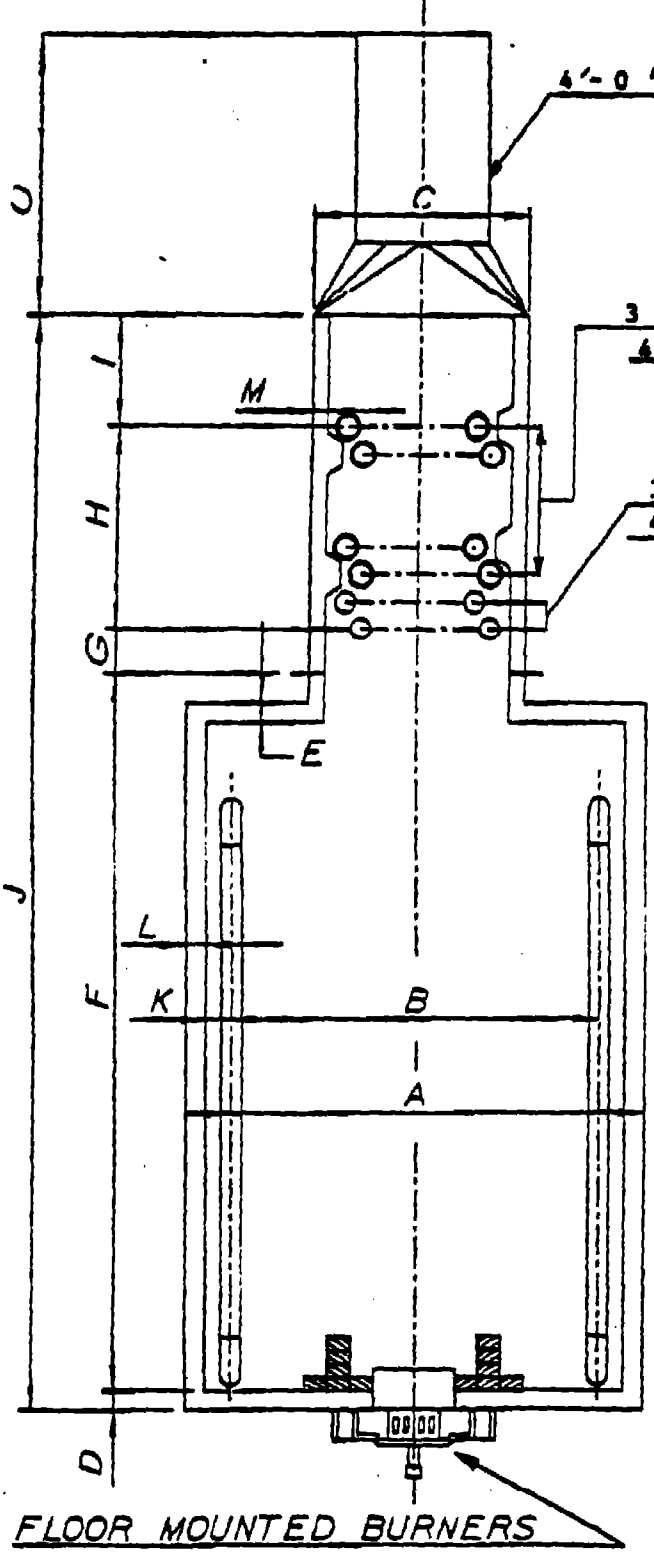
DIM. - Ft/In (mm)

THI TULSA HEATERS INC.

RADIANT - CONVECTION
VERT. CYLINDRICAL HEATER

Proposal No. P-92-1313

Rev.



012-B-1450
VACUUM COLUMN
FEED HEATER

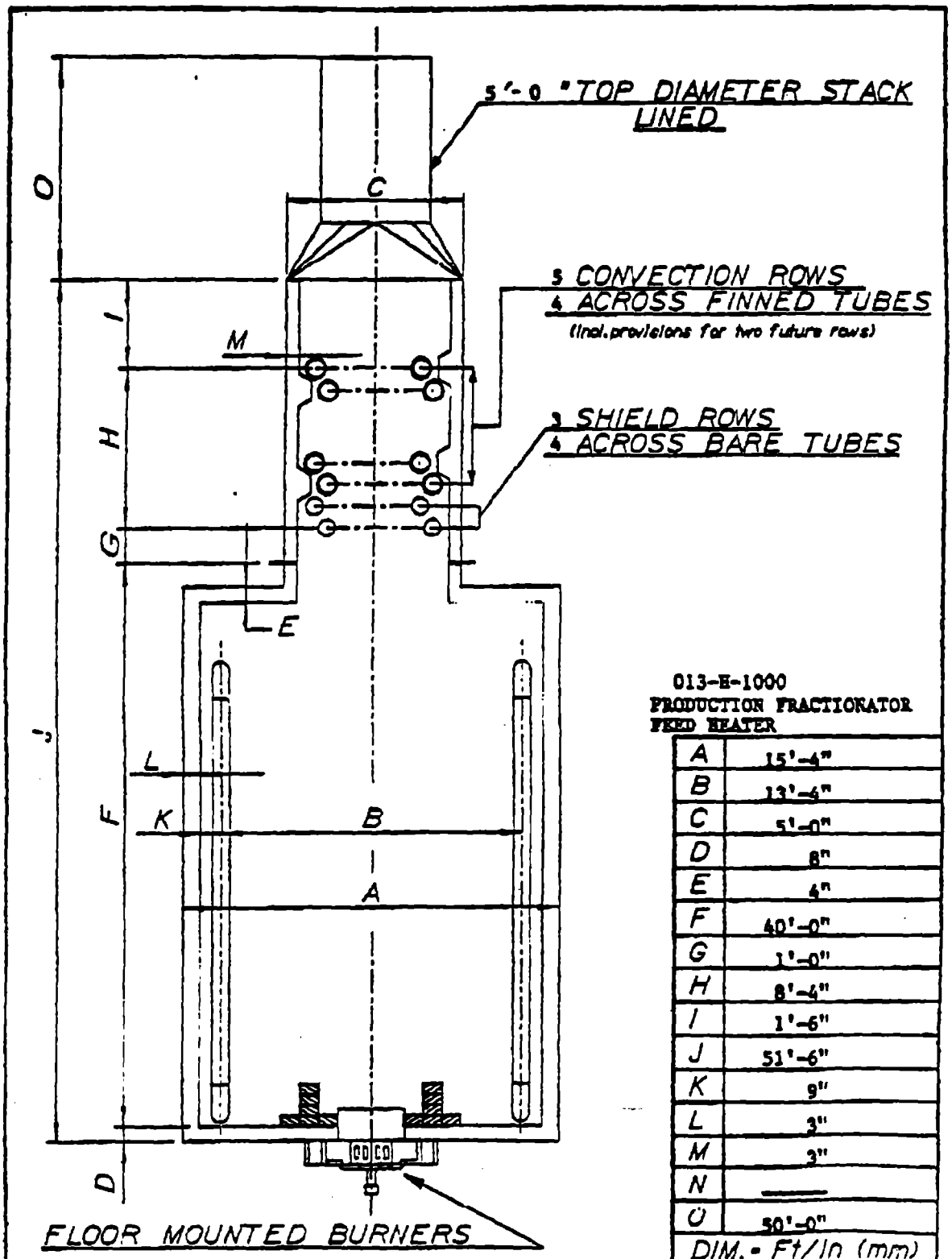
A	10'-6"
B	8'-6"
C	3'-6"
D	8"
E	4"
F	23'-0"
G	1'-0"
H	5'-0"
I	1'-6"
J	31'-2"
K	9"
L	3"
M	3"
N	———
O	50'-0"

DIM. - Ft/In (mm)

THI TULSA HEATERS INC.

RADIANT - CONVECTION
VERT. CYLINDRICAL HEATER

P-92-1313

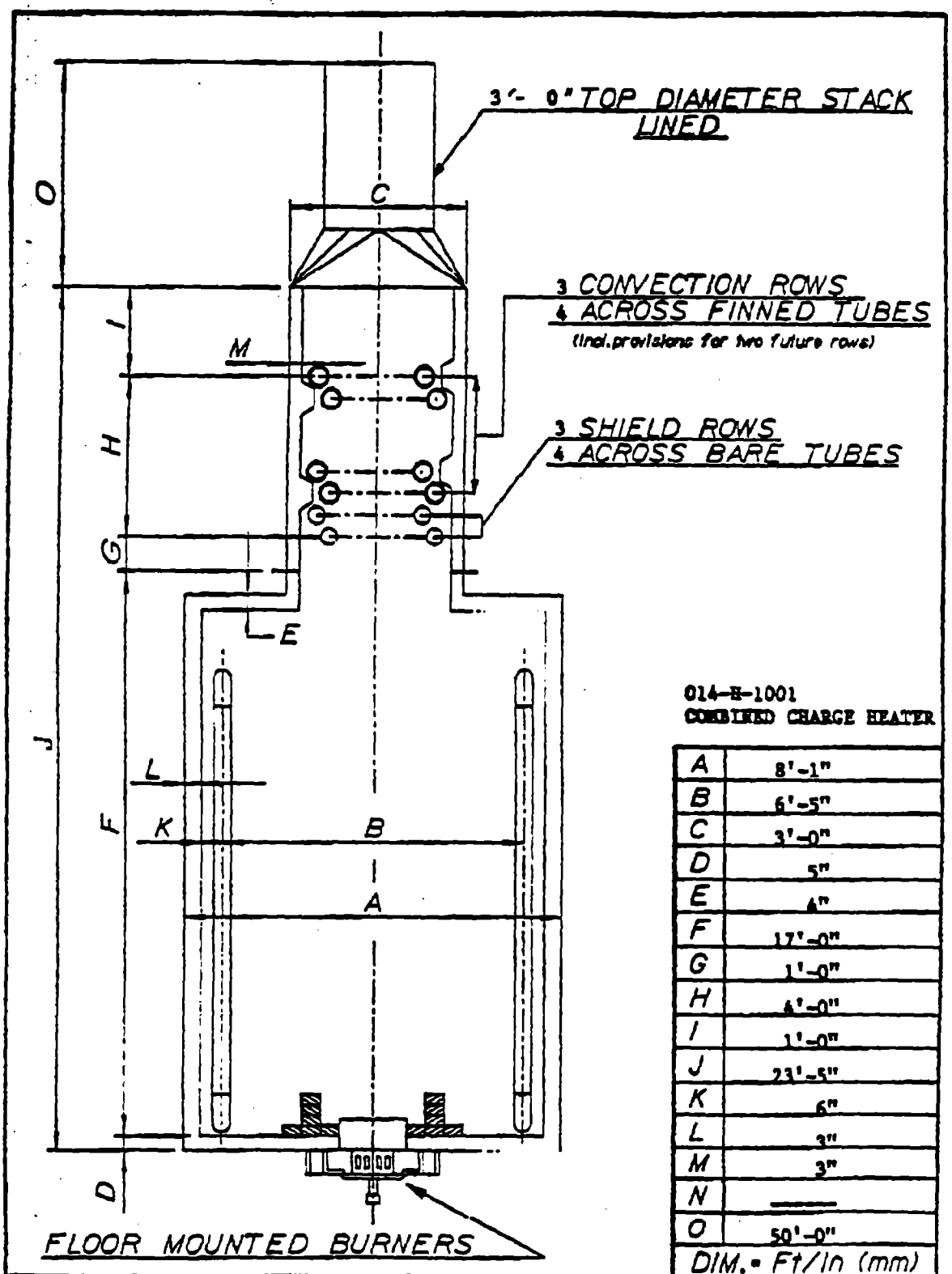


013-H-1000
PRODUCTION FRACTIONATOR
FEED HEATER

A	15'-4"
B	13'-4"
C	5'-0"
D	8"
E	4"
F	40'-0"
G	1'-0"
H	8'-4"
I	1'-6"
J	51'-6"
K	9"
L	3"
M	3"
N	—
O	50'-0"

DIM. - Ft/In (mm)

THI TULSA HEATERS INC.	RADIANT - CONVECTION VERT. CYLINDRICAL HEATER	Proposal No. P-92-1313	Rev.



014-H-1001
COMBINED CHARGE HEATER

A	8'-1"
B	6'-5"
C	3'-0"
D	5"
E	4"
F	17'-0"
G	1'-0"
H	4'-0"
I	1'-0"
J	23'-5"
K	6"
L	3"
M	3"
N	———
O	50'-0"

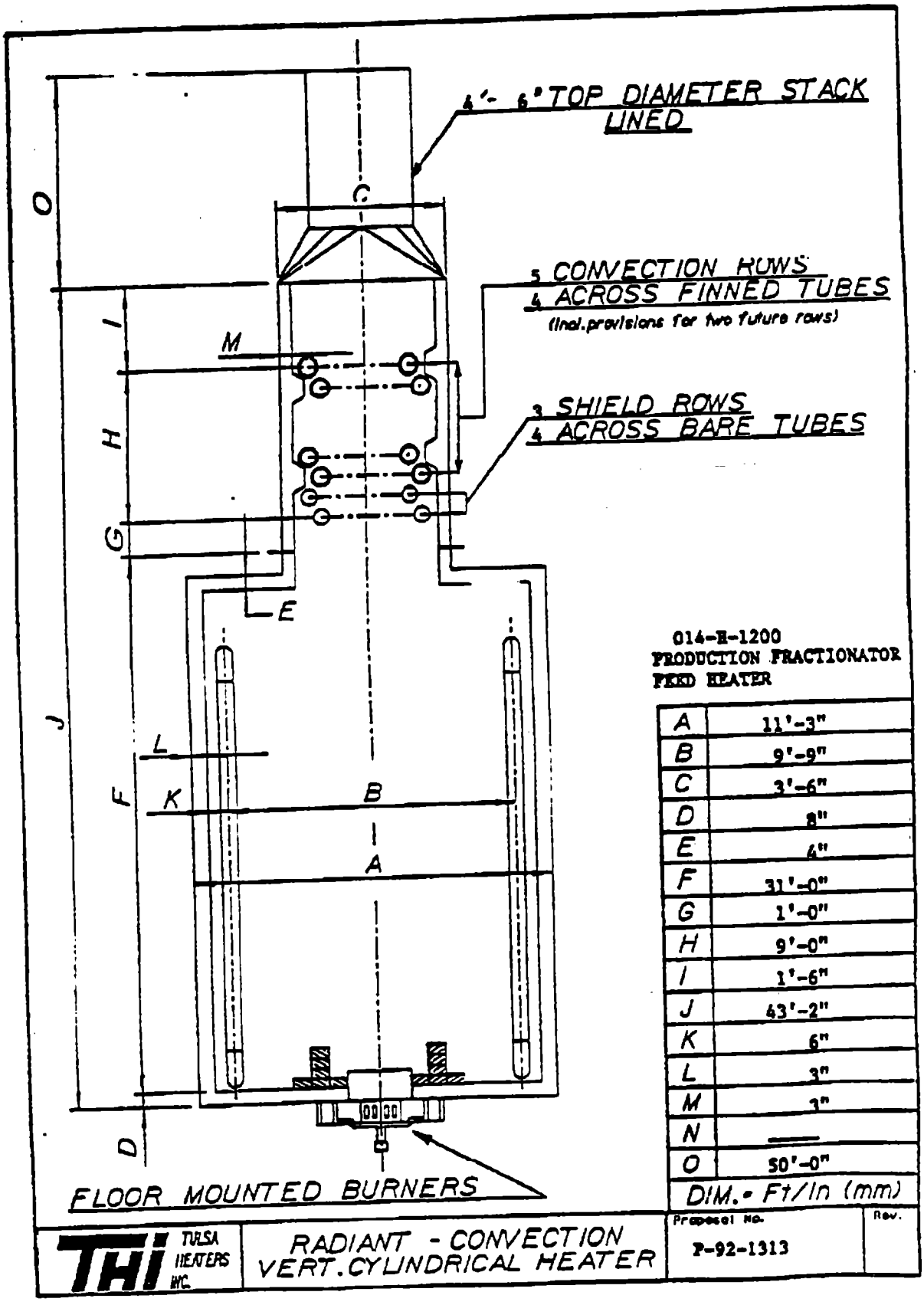
DIM. = Ft/In (mm)

THI TULSA HEATERS INC.

RADIANT - CONVECTION
VERT. CYLINDRICAL HEATER

Proposal No. P-92-1313

Rev.



014-B-1200
PRODUCTION FRACTIONATOR
FEED HEATER

A	11'-3"
B	9'-9"
C	3'-6"
D	8"
E	4"
F	31'-0"
G	1'-0"
H	9'-0"
I	1'-6"
J	43'-2"
K	6"
L	3"
M	3"
N	———
O	50'-0"

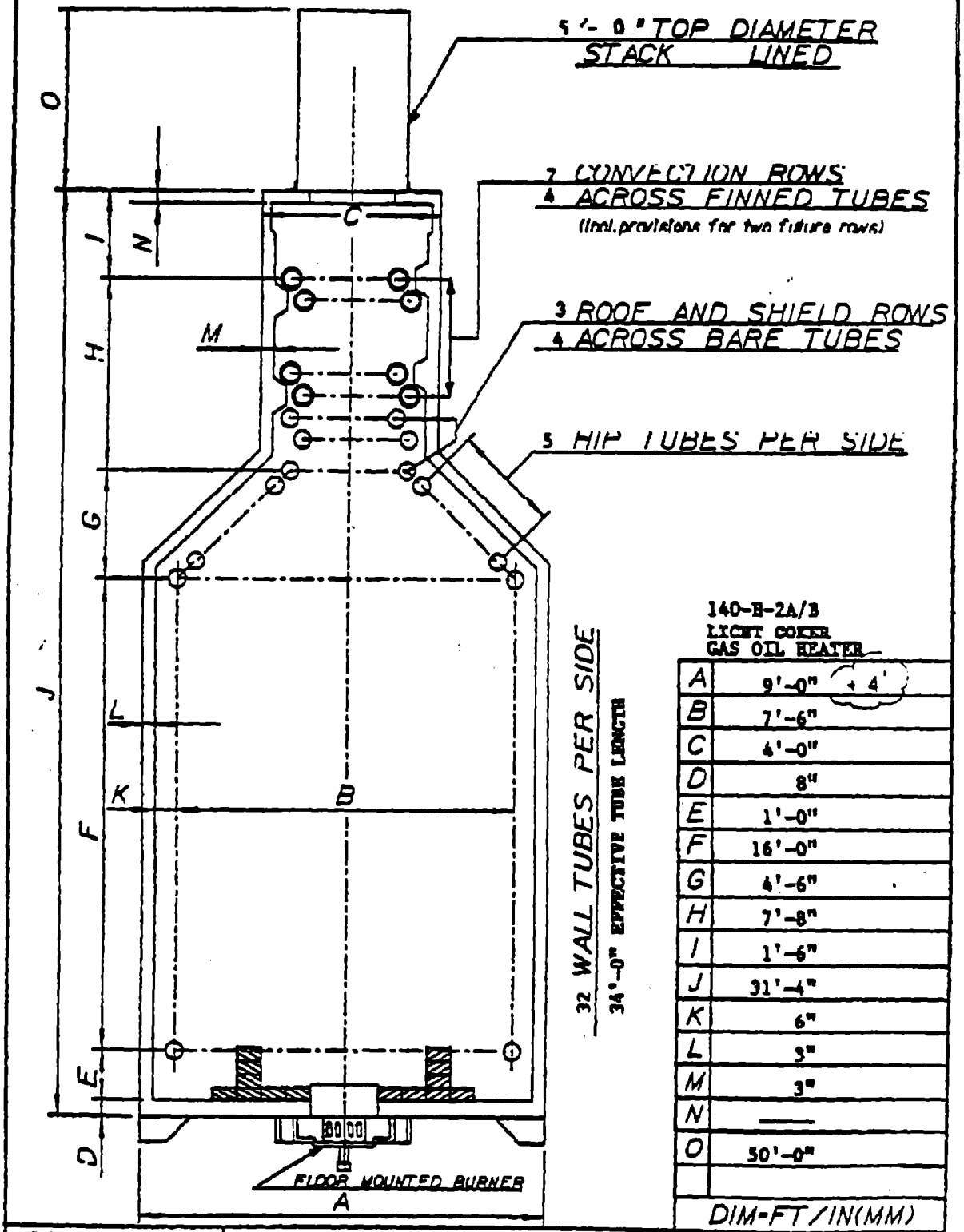
DIM. = Ft/In (mm)

THI TULSA HEATERS INC.

RADIANT - CONVECTION
VERT. CYLINDRICAL HEATER

Proposal No. P-92-1313

Rev.



140-H-2A/B
LIGHT COKER
GAS OIL HEATER

A	9'-0" + 4'
B	7'-6"
C	4'-0"
D	8"
E	1'-0"
F	16'-0"
G	4'-6"
H	7'-8"
I	1'-6"
J	31'-4"
K	6"
L	3"
M	3"
N	———
O	50'-0"

DIM-FT/IN(MM)

THI TULSA HEATERS INC.

FLOOR FIRED HORIZONTAL HEATER

Proposal No. P-92-1313

Rev.

ABB
ASEA BROWN BOVERI

November 16, 1992

FLOUR DANIEL, INC.
3333 Michelson
Irvine, CA 92730
Attn: Mr. V. Wayne Thompson (Fax- 714/975-5271)

Subject: Budget Price - 2 x 150,000 Lb/Hr Shop Assembled Boilers

Dear Mr. Thompson:

In response to your request for budget pricing for two (2) shop-assembled boilers rated at 150,000 lbs/hr, ABB has selected a design designation of 35A14. Each boiler will produce 150,000 lbs/hr of steam at superheater outlet and feedwater inlet conditions of 700PSIG/750° F and 230° F, respectively. This performance can be achieved while fiving either natural gas or No. 6 fuel oil. The scope of supply included is in accordance with the attached "ABB Combustion Engineering Systems Marine & Package Boiler" budget price development sheet. ABB's current day (no escalation) budget price for these two (2) fully shop-assembled boilers is:

TWO MILLION EIGHT HUNDRED THOUSAND DOLLARS
($2,800,000)

F.O.B Point of Manufacture.

Should you have any questions or further requirements, please do not hesitate to call me.

Very truly yours,

Bernie Barbuti

Bernie A. Barbuti

BAB/vc

Enclosures

FDI1116.bab

Asea Brown Boveri Inc.

ABB Power Plant Systems Sales
5 Park Plaza
Suite 550
Irvine CA 92714-8120
Telephone (714) 955-0711
Fax (714) 955-0216

ABB COMBUSTION ENGINEERING SYSTEMS
MARINE & PACKAGE STEAM GENERATORS

BUDGET PRICE DEVELOPMENT SCOPE

CUSTOMER : Fluor Daniel, Inc. **NEG. NO.**

SCOPE OF EQUIPMENT:

X Package Boiler - Assembled	X Economizer
X Superheater	X Water Column
___ Desuperheater	X Safety Valves
X Stack (50' C.S.)	X Comb. & F.W. Controls
X Burner	___ Steam Temperature Controls
X Burner Controls	X Control Valves
X Platforms & Ladders	___ Feedwater Control Valve Bypass
X Structural Steel	X Forced Draft Fan
X Gas & Air Ducts	X F.D. Fan Motor Drive
X Insulation & Lagging	___ F.D. Fan Turbine Drive
X Shop Mount Burner	___ Gas Recirc. Fan
X Soot Blowers	___ G.R. Turbine Drive
X Outdoor Prep.	___ G.R. Fan Motor Drive
___ Export Prep.	X Main Steam Stop Valve
X Trim Valves & Piping	X Freight- F.O.B. Point of Manufacture
X Non-Return Valve	

Comments:

1. Budget Price For Shipment By:
2. Shipment Approximately 36 Weeks After Receipt Of An Order.
3. Taxes And Duties Not Included.
4. Construction And Service Representatives - Per Diem & Time of Work.

PUMPS

A COPY GIVEN TO P. GAMBARO & K. MURDIA. EACH

11/25/92

ACCOUNT 46 PUMPS
PERTAMINA/CHEVRON 422700
November 24, 1992
Revision 1

010-P-1101 A	CHARGE PUMP	$425K	1300KW M	IDPC(ORANGE)
010-P-1101 B	CHARGE PUMP	$472K (1)	1300KW ST	IDPC(ORANGE)
014-P-1001 A	CHARGE PUMP	$405K	450KW M	IDPC(ORANGE)
023-P-02 A	H.P. BFW PUMP	$152K	380KW ST	IDPC(ORANGE)
023-P-02 B	H.P. BFW PUMP	$144K	450KW M	IDPC(ORANGE)
026-P-01	SEA WTR INTAKE	$177K	250KW M	GOULDS
026-P-02	SEA WTR SUPPLY	$215K	746KW M	GOULDS
140-P-28A	LCGO RECYCLE PUMP	$347K	225KW M	IDPC(ORANGE)
140-P-28B	LCGO RECYCLE PUMP	$347K	225KW M	IDPC(ORANGE)
140-P-29A	FRACTIONATOR OVHD	$70K	110KW M	IDPC(LA)
140-P-29B	FRACTIONATOR OVHD	$70K	110KW M	IDPC(LA)

NOTES: Prices are in US$ and are total for each item shown. ST is for steam turbine and M is for motor.

Item 013-P-1001 has been deleted.

Item 010-P-1101B driver changed to steam turbine drive.

Ingersoll-Dresser Pump Company
2140 W. Chapman Avenue, Suite 202
Orange, CA 92668
(714) 978-8133 Fax (714) 978-6512

received
11/24/92

November 24, 1992

Mr. Harry Searle, Senior Technical Specialist
Fluor Daniel, Inc.
3333 Michelson Drive
Irvine, CA 92730

Subject: Fluor Daniel, Inc./Indonesia
IDP Quote LA-2134-2

Dear Mr. Searle:

Reference your service inquiry.

Reference our telephone conversation this morning, attached is the revised price tabulation incorporating the turbine driver for item 1101.

If there are any further questions please feel free to call my office at (714) 978-8133.

Very truly yours,

INGERSOLL-DRESSER PUMP COMPANY

D. M. Kalin

Dan M. Kalin
Sr. Sales Engineer

115

Fluor-Daniel, Inc./Pertamina-Indonesia
IDP Quote LA-2134-2

Item Number	Qty	Pump Size	Type Pump	Stages	Pump $ Each	Motor $ Each	Motor KW/RPM	Turbine $ Each	Delivery Weeks
010-P-1101A/B	@ 2	4"	IJ	10	$335,000	$90,000	1300/3000	$136,500	48
014-P-1001A/B	2	3"	IJ	11	$325,000	$80,000	675/3000	NA	48
023-P-02A/B	2	4x10	DA-A	9	$76,000	$68,000	450/3000	$75,500	36
026-P-01	1	24QL21	QL	1	$38,650	$31,000	300/1000	NA	40
026-P-02	1	20/28 LPLD 3	LPLD	1	$123,100	$76,000	820/1000	NA	40

ACCOUNT 46 PUMPS
PERTAMINA/CHEVRON 422700
November 19, 1992

010-P-1101 A	CHARGE PUMP	$425K	1300KW M	IDPC(ORANGE)
010-P-1101 B	CHARGE PUMP	$425K	1300KW M	IDPC(ORANGE)
014-P-1001 A	CHARGE PUMP	$405K	450KW M	IDPC(ORANGE)
023-P-02 A	H.P. BFW PUMP	$152K	380KW ST	IDPC(ORANGE)
023-P-02 B	H.P. BFW PUMP	$144K	450KW M	IDPC(ORANGE)
026-P-01	SEA WTR INTAKE	$177K	250KW M	GOULDS
026-P-02	SEA WTR SUPPLY	$215K	746KW M	GOULDS
140-P-28A	LCGO RECYCLE PUMP	$347K	225KW M	IDPC(ORANGE)
140-P-28B	LCGO RECYCLE PUMP	$347K	225KW M	IDPC(ORANGE)
140-P-29A	FRACTIONATOR OVHD	$70K	110KW M	IDPC(LA)
140-P-29B	FRACTIONATOR OVHD	$70K	110KW M	IDPC(LA)

NOTES: Prices are in US$ and are total for each item shown. ST is for steam turbine and M is for motor.

Item 013-P-1001 has been deleted.

Ingersoll-Dresser Pump Company

received
11/19/92

November 19, 1992

2140 W. Chapman Avenue
Orange, CA 92668
714/978-8133 • Fax: 714/978-6519

Mr. Harry Scarle, Senior Technical Specialist
Fluor Daniel, Inc.
3333 Michelson Drive
Irvine, CA 92730

Subject: Fluor Daniel, Inc./Indonesia
IDP Quote LA-2134-2

Dear Mr. Scarle:

Reference your service inquiry.

Attached is our pricing tabulation for the services discussed in our telephone conversation.

We were able to quote a single pump for the 014-P-1001 service. A quote for reciprocating pump design can be provided later if needed.

If there are any further questions please feel free to call my office at (714) 978-8133.

Very truly yours,

INGERSOLL-DRESSER PUMP COMPANY

D. M. Kalin

010-P-1101
014-P-1001
023-P-02

Dan M. Kalin
Sr. Sales Engineer

Fluor-Daniel, Inc./Pertamina-Indonesia
IDP Quote LA-2134-2

Item Number	Qty	Pump Size	Type Pump	Stages	Pump $ Each	Motor $ Each	Motor KW/RPM	Turbine $ Each	Delivery Weeks
010-P-1101A/B	2	4"	IJ	10	$335,000	$90,000	1300/3000	NA	48
014-P-1001A/B	2	3"	IJ	11	$325,000	$80,000	675/3000	NA	48
023-P-02A/B	2	4x10	DA-A	9	$76,000	$68,000	450/3000	$75,500	36
026-P-01	1	24QL21	QL	1	$38,650	$31,000	300/1000	NA	40
026-P-02	1	20/28 LPLD 3	LPLD	1	$123,100	$76,000	820/1000	NA	40

received
11/18/92

GOULDS PUMPS, INC.

3333 Bree Canyon Road, #107
Diamond Bar, CA 91765-3782
Phone: 714-594-1093
Fax: 714-594-5207

TO: Fluor Daniel
ATT: Harry Sayle
FROM: Dermot Cullen

Number of Pages 3
(including Cover Page)
DATE: 11/16/92
RE: Chevron/Pertamina

Pricing is +/- 25%

→ 026- -01
→ 026-P-02

If you experience any problems, please contact the Los Angeles Sales Office at (714) 594-1093/Fax: (714) 594-5207.

ESTIMATE SHEET

GOULDS PUMPS, INC.
VERTICAL PUMP DIVISION

VERTICAL TURBINE PUMP
TO: FLUOR DANIEL

REPLY TO:

All quotations subject to terms and conditions on the reverse side and expire unless accepted within 30 days from date of quotation. All quotations subject to change with or without notice.

Date: 11/19/92 Page:
Proposal No.: KL2118
Revision No.:

Attention: Harry Searle Item No.: 006 P-01

Inquiry No.: Equipment No.:

Inquiry Date: Service:

Copies:

In answer to your inquiry, we propose to furnish GOULDS PUMPS as described below:

CONDITIONS OF SERVICE –

Liquid: SEA WATER
G.P.M.: 14310 Sp. Gr. @ 60°F: 1.02
T.D.H.: 71 (FT.) Sp. Gr. @ P.T.: 1.02
Pumping Temp.: Visc. @ P.T.:
Suct. Press.:
Abrasives:
NPSHA: (FT.) Disch. Press.:
NPSHR: Solids %:
@ % Imp.: (FT.) Solids Size: (IN.)
Subm. Req'd.: (IN.)

PUMP DESCRIPTION –

Quantity	1	Bowl	NiAlBr	Col./Mat'l	NiAlBr		Efficiency	85	%
Model	VIT-FF	Impeller	NiAlBr	Col. Dia./Lgth	20"/10.2	(IN./FT.)	B.H.P. Rating	309	
Size/Stgs.	34EHC	Bowl Brg.	Rubber	Col. Brg./Mat'l	Rubber		B.H.P. Max.	315	
Lube	Product	Bowl Shaft	Nitronic 50	Col. Shaft/Mat'l	Nitronic 50		Pump Thr. Rtg.	—	
Pump Lgth.	15	Bowl Wrg. Ring	NF 3166	Col. Shaft/Size	2.69	(IN.)	Pump Thr. Max.	—	
Curve No.	1942	Strainer	N/A	Disch. Hd./Mat'l	NiAl-Br		Imp. Dia. Rtg.	22.00	
Bulletin	433			Disch. Hd./Size	20	(IN.)	Imp. Dia. Min/Max.	20.00	
								23.35	

DRIVER –

H.P.: 350 R.P.M.: 735 PH/CYCLES: 3/50 VOLTS: 3300 INSUL./ENCL.: F/TEFC S.F.: 1.0
V.H.S.: V.S.S.: X THRUST: S.D.: S.R.C.: N.R.R.: MFG.: FURN. BY:

UNIT PRICES –	List Price	Selling Mult.	Net Price	S.R. Mult.	S.R. Cost	Weight lbs.
BOWL ASSEMBLY –			46,092			
STRAINER						
COLUMN ASSEMBLY – Length FT.			38,250			
" Column " Shaft						
DISCH. HEAD – Size			82,701			
Head Shaft Sleeve						
Mech Seal						
Coupling						
Bshg						
Testing, NW Perf & Hydro			2454			
			47040			
DRIVER						
Total Unit $ and Wt. (Pgs. Alt. to Port)			156,577			Net
			19,782			Gross
Export Boxing			*177,000			Cu. Ft.
A.S. Port						
Handling						
F.O.B. Vessel						
15 3166 Add 19,782						

Shipment Weeks

This Estimate Prepared by

A486-

CENTRIFUGAL PUMP ESTIMATE SHEET

Attach: _____
Shipment: _____

To: FLUOR DANIEL

Date: 11/14/92 Page:
Proposal No.: KC2118
Revision No.:
Copies: _____

Attention: Harry Searle
Inquiry Date:
Inquiry No.:

User Name: _____
Plate Size: _____

In answer to your inquiry, we propose to furnish GOULDS PUMPS as described below:

ITEM NO. 026-P-02
EQUIP. NO.
SERVICE

Quantity	Model	Size	Rotation	Liquid	Temp. °F	Sp. Gr. @ P.T.
1	3420	14X20-30	RH	SEA WATER	Amb	1.02

Casing	Impeller	Shaft	Sleeve	G.P.M.	T.D.H.	V.P.	Visc.
Ni Resist	Monel	Monel	Monel	14310	295	—	—

Wear Plate	Lubrication	Base Plate	Coupling	Eff.	Rated B.H.P.	Max. B.H.P.	Suct. Press
HF Monel	Ring OIL	FS	THOMAS	.87	995	1008	—

Mechanical Seal - Packing	Imp. Type	Disch. Press.	Perf. Curve	$NPSH_R$	$NPSH_A$
PACKING	OPEN	—	1747-6	22	—

Impeller Diameter Rated	Min.	Max.	Bulletin
27	22	30	721.10C4

DRIVER

H.P.	R.P.M.	Enclosure	Frame	S.F. / Insulation
1000	1140/1000	TEFC		F / 1.15

Phase	Hertz	Voltage	Furnished By	WILL NOT COME TO SF	WILL COME TO SF
3	50	3300			ON

UNIT PRICES	LIST PRICE OR COST	SELLING MULT.	NET SELLING PRICE*	AGENT MULT.	AGENT COST	WGT. LBS.
Pump			91,274			
Baseplate & Cplg			4211			
Cplg Guard			2150			
~~Fasteners~~			1520			
Gear			27000			
Motor			42000			
			214,160			
			~~215,000~~			

*F.O.B. SHIPPING POINT
A-8404-EF SUP. 0618A

This Estimate Prepared by _____

Ingersoll-Dresser Pump Company
2140 W. Chapman Avenue, Suite 202
Orange, CA 92668
(714) 978-8133 Fax (714) 978-6512

received
11/17/92

November 16, 1992

Mr. Harry Searle, Senior Technical Specialist
Fluor Daniel, Inc.
3333 Michelson Drive
Irvine, CA 92730

Subject: Fluor Daniel, Inc./Indonesia
IDP Quote LA-2134-2

Dear Mr. Searle:

Reference your service inquiry. 140-P-28ARB

We would quote the following pump and accessories:

3" Barrel Pump	$272,000. -	
API 610 Lube Oil Skid	$ 35,000.-	$347,000
Siemens 300 HP Mtr. NEMA	$ 25,000.	
Siemens 300 HP mtr. IEC TP-54	$ 40,000.-	

Attached is performance and additional information. If there are any further questions please feel free to call my office at (714) 978-8133.

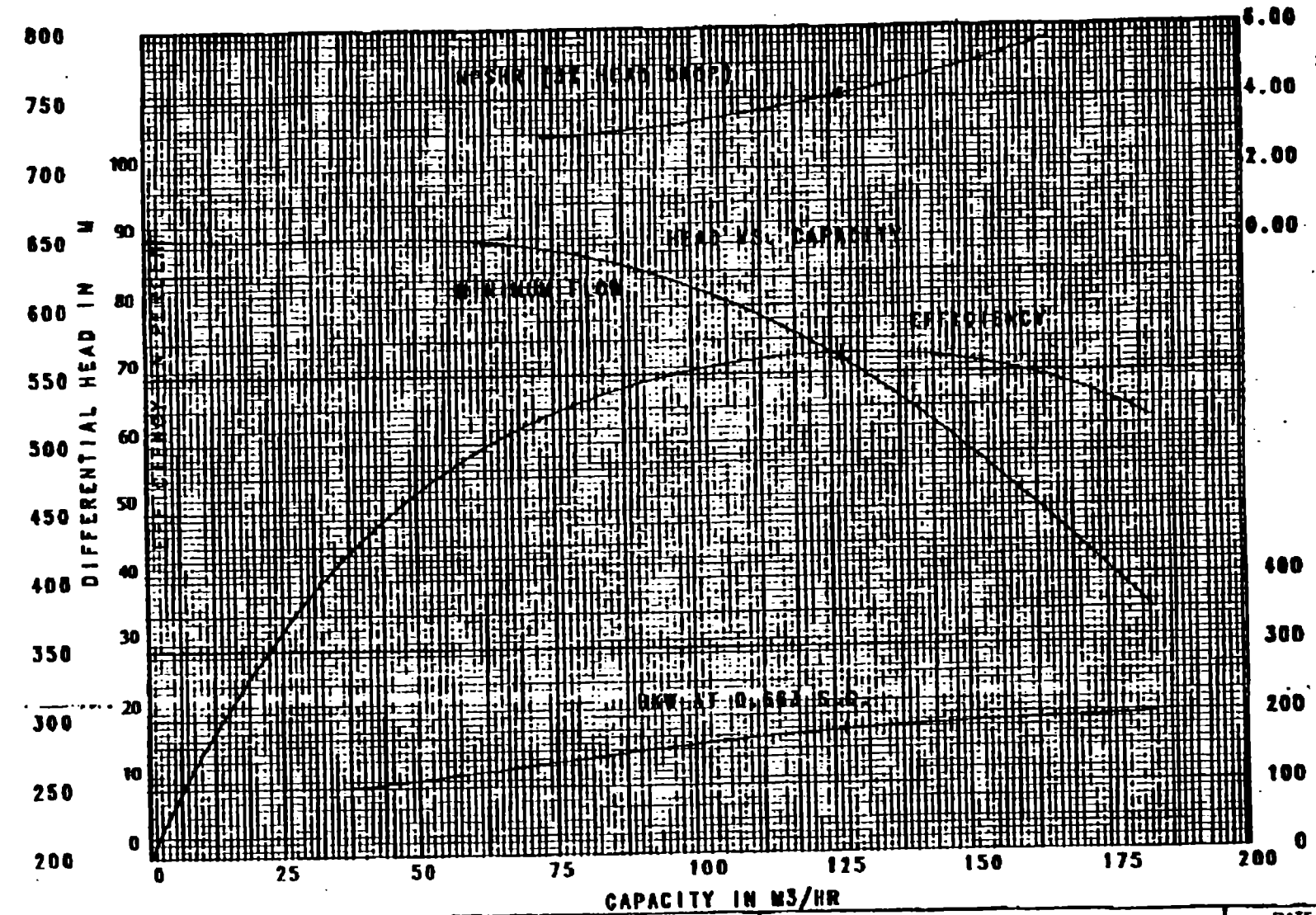
Very truly yours,

INGERSOLL-DRESSER PUMP COMPANY

D. M. Kalin

Dan M. Kalin
Sr. Sales Engineer

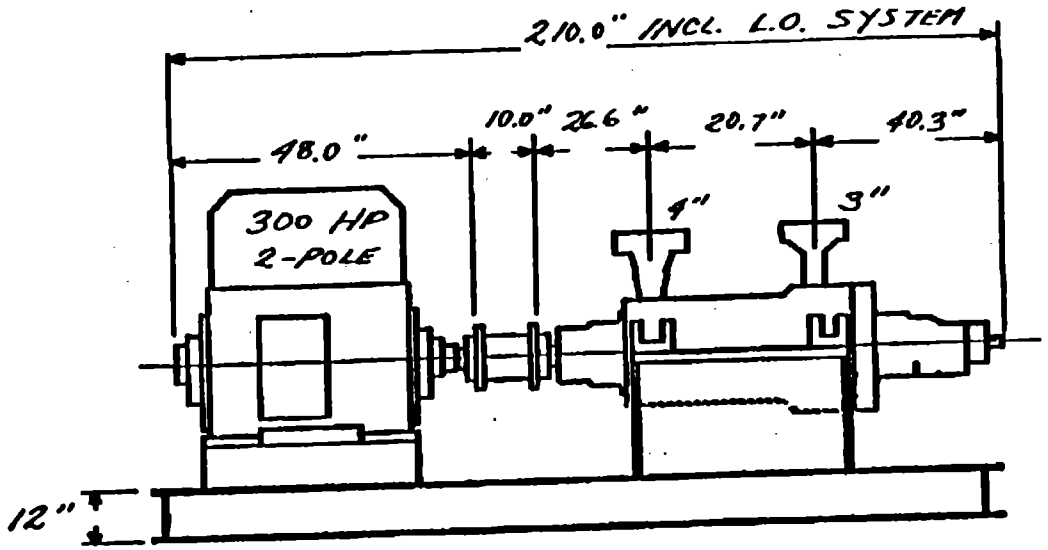
153

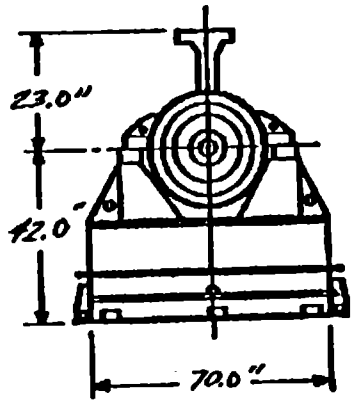


DRESSER PUMP DIVISION / DRESSER INDUSTRIES, INC.	DRG NO. LA-2134-2		ITEM NO. P-22 A/B	FLUOR-DANIEL / INDONESIA COKER RECYCLE PUMPS	DATE 11-11-92
PUMP SIZE AND TYPE 3" BARREL	NO. STAGES 6	RPM 2970	INQUIRY NO.		CURVE NO. 8111-XE10-6L

PAC 2383

PRELIMINARY DIMENSIONS -NOT FOR CONSTRUCTION-





WEIGHTS

PUMP	7000 LBS
MOTOR	3700 LBS
BASE, L.O.	7000 LBS
TOTAL	17,700 LBS

DRESSER PUMP DIVISION — DRESSER

ESTIMATE

TITLE: PUMP-MOTOR OUTLINE DRAWING

CUSTOMER\CONTRACTOR: FLUOR-DANIEL / INDONESIA

SERVICE: COKER RECYCLE

SIZE / TYPE: 3" BARREL NO. OF STAGES: 6

ITEM NO.: P-22 A/B QUOTE NO: LA-2134-2

INGERSOLL-DRESSER PUMP COMPANY - LOS ANGELES OFFICE

FACSIMILE COVER LETTER

COMPANY: Fluor Daniel

FAX: _____

ATTENTION: Harry Searle

OF PAGES 1 (INCLUDING THIS COVER SHEET)

DATE: November 17, 1992

cc: _____

FROM: BILL CRAWFORD
INGERSOLL-DRESSER PUMP COMPANY
5533 E. OLYMPIC BLVD.
LOS ANGELES, CA 90022
TEL: (213) 725-2852
FAX: (213) 725-2890

SUBJECT: Pertamina / Cheuron
Item # 023-P-02A/B &
140-P-29 A/B

MESSAGE: Gentlemen,

Per your request, budget estimates for the subject item numbers are as follows:

Item 023-P-02A - 4X10 DA-9 Stage, 346 K.W. BHP; Pump Price: $200,000, Motor Price: $30,000.

Item 140-P-29A/B - 4X15 J, Pump Price: $65,000, Motor Price for 100 KW: $5,000. $70,000

Please advise should you have any questions. Regards, Bill Crawford

106

ACCOUNT 47 MATERIAL PROCESSING
PERTAMINA/CHEVRON 422700
Nov. 20, 1992

Tag No.	Service	Budget Price	Vendor
021-F-01	Clarifier Water Filter	$ 100.000	Permutit
021-SE-01	Clarifier	$ 325,000 (Incl erection)	Permutit
026-ME-01	Seawater Strainer	$ 300,000	Tate Andale
040-ME-1	Flare System (stack,tip,KO drum)	$ 350,000	John Zink

PERMUTIT®

A ZURN COMPANY

FACSIMILE

30 TECHNOLOGY DRIVE
CN 4920
WARREN, NJ 07059-0920
(908) 668-1700 - office
(908) 668-1393 - fax

TO: Elmer Daniel DATE: 11/13/92

ATTN: Matt Goren FAX NO: 714-975-6411

SUBJECT: Project: 422 700 Illumai FROM: Bill Leitheiser

NO OF PAGES: 1 INC. THIS PAGE (CALL IF ALL PAGES NOT RECEIVED)

Dear Gentlemen -

Please Note our address above (we moved from Lawrence over 2 years ago). We are responding today since the Flower Gen Show is next week, and we will be out of the office. The Clarifier and both of the filters will need to be field bracted.

Looked over prices and as follows:

TAG 21-SE-01
SE-01A
SE-01B
PAG 21-F-3

1) Clarifier $175,000 Fob Shipping pt
2) AVG's 78' Dia x 14'-10 1/4" SSH (2 Filters) - overall Ht of 20'-10 1/4" (Top of Headbox) : $100,000 Fob Shipping pt.

Add $30,000 total for FAS Port of Export We don't have a close [redacted] feel for freight But would roughly estimate $150,000 for all of the above

Hope this assists you

CC: Fluid Systems Rep/Collins
S. Pratt

FLUOR DANIEL

Fluor Daniel
3333 Michelson Drive, Irvine CA 92730
(714)975-4466

To: Permutit
Location: Paramus, New Jersey
Atten: Mr. Bill Willersdorf
Fax No: (908) 668-1393

Date: Nov. 12, 1992

From: Matt Gorry
Location: Fluor-Daniel, Irvine Ca.
Fax No.: (714) 975-6411
Phone No: (714) 975-4466

Subject: Budgetary and Planning Estimate for Clarifier & Filter

Ref: Fluor-Daniel Project 422700 Dumai, Indonesia

Flour-Daniel is in need of a budgetary and planning estimate ± 30% for the following equipment:

1. Clarifier, Tag No: 21-SE-01, for processing river water:
   Size: 14 Meters dia. by 5.3 Meters high (260 Cu. M/hr)
   Material of construction: Carbon Steel
   including agitator with 3.7 KW motor driver

2. Two (2) Valveless gravity filters Tag No: 21-F-01
   Size: 5.5 meters dia. by 5 meters high (each), (160 Cu.M/hr)
   Material of construction: Carbon Steel
   Including all filtration media and spilterbox

Need capital cost estimate for equipment and do you have eatimate for field erection time say based upon U.S. construction standards.

Would appreciate your return Fax with eatimates on or before Tuesday Nov 17th. Bill, if you have any questions please give me a call, number above. Tomorrow, Friday Nov 13th our offices are closed, give me a call Monday, first thing if necessary.

Matt Gorry

1-9

M & B PROCESS SYSTEMS & EQUIPMENT CO., INC.

FACSIMILE MESSAGE

M & B PROCESS SYSTEMS
& EQUIPMENT CO., INC.
P.O. BOX 1419
SAN JUAN CAPISTRANO, CA 92675

TELEPHONE (714) 248-1133
FAX (714) 248-9009

714-975-6411

ATTN: MATT GORRY DATE: NOV 12, 1992

COMPANY: FLUOR DANIEL NO. OF PAGES: 1

FROM: RON TYMINS

SUBJECT: PROJ# 422700 DUMA, BASED OIL PROJECT
TAG# 26-ME-01

MESSAGE: RE: TATE ANDALE SEA WATER STRAINER

FOR YOUR SEA WATER STRAINING APPLICATION, TATE ANDALE OFFERS THE FOLLOWING:

ONE(1) TATE ANDALE MODEL CCF SELF CLEANING STRAINER, 36"ϕ IN-OUT FLANGES, 316 SS CONSTRUCTION COMPLETE WITH AUTOMATIC BACKWASH SYSTEM, CONTROL PANEL WITH CYCLE TIMERS & D.P. SWITCH.

BUDGET PRICE: $300,000.00

Ron Tymins

FAX TRANSMITTAL FORM

JOHN ZINK COMPANY
A Division of Koch Engineering Company, Inc.
P.O. Box 2047
Carrites, California 90701

DELIVER TO: Matt Gorry DATE: November 18, 1992
COMPANY: Fluor Daniel
FAX NUMBER: 714/975-6411
TOTAL PAGES: 2

SENDER'S NAME: Bob Ferraro BAB MSG. NO.:

YOUR REFERENCE: DEMAI Based Oil Project, 422700
OUR REFERENCE:

FAX COPIES TO: Flare Division
OFFICE COPIES TO

IF MISSENT, PLEASE TELEPHONE 310/402-0119. THIS MESSAGE IS BEING SENT FROM RAPICOM 310/860-5481.

Thank you for considering the John Zink Company. Based on the information contained in your request, we are pleased to offer a budgetary price for an elevated flare system.

DESIGN CRITERIA

Flow Rate:	250,000 lb/hr., 20% Smokeless
Molecular Weight:	86
Temperature:	152°C
Pressure Available:	Unknown
Composition:	Unknown
Stack Height:	150 ft.

SCOPE OF SUPPLY

- One (1) knock-out drum (or liquid seal) at base of stack.
- One (1) 150 ft. self supported stack.
- One (1) steam assisted flare tip.
- One (1) molecular seal.

101

- Three (3) pilot assemblies with thermocouples.
- One (1) auto/manual Flame Front Generator for pilot ignition.
- One (1) SAF-T-Climb ladder extending from grade to a 360° platform at base of flare tip.

UTILITIES REQUIRED

•	Pilot Gas:	50 SCFH of Natural Gas at 10 PSIG per pilot.
•	Ignition Gas:	150 SCFH of Natural Gas at 15 PSIG during ignition (light off only).
•	Ignition Air:	1500 SCFH of Air at 15 PSIG during ignition (light off only).
•	Ignition Power:	220 Volt, 50 or 60 Cycle, 1 Phase.
•	Continuous Purge Gas:	108 SCFH (assuming 24" Flare Tip).
•	Steam Capacity:	30,000 lb/hr. capacity (assuming 24" Flare Tip).

PRICING

The total ± 30% budget price for the Flare System is $350,000.

F.O.B. Point of Manufacture.

DELIVERY

Approval Drawings:	8 weeks after receipt of order.
Shipment:	16 weeks after receipt of approval drawings.

We thank you for this opportunity to quote John Zink equipment. If you have any questions or require additional information, please give us a call.

CONTROL SYSTEMS

ESTIMATE BACK-UP

DUMI BASE OILS PROJECT
FEASIBILITY STUDY
CONTRACT No. 422700

CONTROL SYSTEMS FEASIBILITY STUDY SUMMARY

CLOSED CIRCUIT VIDEO SYSTEM PRICING
$5,950 APPLIES TO ALL CASES

CONTROL SYSTEMS DCS SYSTEM PRICING

CASE I	CASE II	CASE III	CASE IV
$1,706,111	$1,783669	$1,822,436	$1,998,202

ESD SYTEM PRICING
$175,000 APPLIES TO ALL CASES

FIRE DETECTION SYSTEM
$180,000 APPLIES TO ALL CASES

COMBUSTIBLE AND H2S GAS DETECTION SYSTEM
$80,000 APPLIES TO ALL CASES

LABORATORY ANALYSIS COMPUTER SYSTEM
$30,000 APPLIES TO ALL CASES

METER PROVER SYSTEM
$215,000 APPLIES TO ALL CASES

PROCESS ANALYZER SYSTEM PRICING
$500,000 APPLIES TO ALL CASES

STEAM GENERATION SYSTEM
$260,000 APPLIES TO ALL CASES

TANK GAUGING SYSTEM PRICING

CASE I	CASE II	CASE III	CASE IV
$46,150	$50,225	$74,675	$86,900

DUMI BASE OILS PROJECT
FEASIBILITY STUDY
CONTRACT No. 422700

CLOSED CIRCUIT VIDEO SYSTEM PRICING BASIS

The following pricing is based on a recent quotation to the PROJECT from the Carlberg Warren & Associates Company.

VIDEO CAMERA	$600
ZOOM 6 X @ F/1.2	$1,000
13" COLOR MONITOR	$450
PAN & TILT	$1,200
CAMERA HOUSING	$300
COLUMN MOUNTING	$100
PAN-TILT-ZOOM CONTROL	$1,650
MONITOR (WALL MOUNTING)	$150
EXPLOSION PROOF KIT	$1,500

TOTAL COST $5,950 APPLIES TO ALL CASES

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

CONTROL SYSTEMS DCS SYSTEM
CASE # 1

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS : THE PRICES ARE BASED ON A CURRENT PROJECT IN HOUSE WHICH IS USING THE CENTRUM II DISTRIBUTED CONTROL SYSTEM.	1	LOT						1,706,100			1,706,100	
	NOTE: COSTS ARE BASED LIST PRICING - TYPICALLY DISCOUNTS RANGE BETWEEN 15% TO 30% AND MAY VARY BETWEEN HARDWARE, SOFTWARE AND SERVICES ON A GIVEN CONTRACT. ALSO THE CENTRUM II SYSTEM IS BEING REPLACED BY A NEW GENERATION DCS SYSTEM WHICH IS BETA TESTING AT THIS TIME.												

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

CLOSED CIRCUIT VIDEO SYSTEM
ALL CASES

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS :												
	VIDEO CAMERA	1	EA						600			600	
	ZOOM 6X @ F/1.2	1	EA						1,000			1,000	
	13" COLOR MONITOR	1	EA						450			450	
	PAN & TILT	1	EA						1,200			1,200	
	CAMERA HOUSING	1	EA						300			300	
	COLUMN MOUNTING	1	EA						100			100	
	PAN-TILT- ZOOM CONTROL	1	EA						1,650			1,650	
	MONITOR (WALL MOUNTING)	1	EA						150			150	
	EXPLOSION PROOF KIT	1	EA						1,500			1,500	
	TOTAL											6,950	

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

CONTROL SYSTEMS DCS SYSTEM
CASE #2

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS :												
	THE PRICES ARE BASED ON A CURRENT PROJECT IN HOUSE WHICH IS USING THE CENTRUM II DISTRIBUTED CONTROL SYSTEM.	1	LOT						1,783,700			1,783,700	
	NOTE : COSTS ARE BASED LIST PRICING - TYPICALLY DISCOUNTS RANGE BETWEEN 15% TO 30% AND MAY VARY BETWEEN HARDWARE, SOFTWARE AND SERVICES ON A GIVEN CONTRACT. ALSO THE CENTRUM II SYSTEM IS BEING REPLACED BY A NEW GENERATION DCS SYSTEM WHICH IS BETA TESTING AT THIS TIME.												

REV. DATE CHKD. BY DATE PAGE NO. 1 OF 1

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

CONTROL SYSTEMS DCS SYSTEM
CASE # 3

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS : THE PRICES ARE BASED ON A CURRENT PROJECT IN HOUSE WHICH IS USING THE CENTRUM II DISTRIBUTED CONTROL SYSTEM.	1	LOT						1,822,400			1,822,400	
	NOTE : COSTS ARE BASED LIST PRICING - TYPICALLY DISCOUNTS RANGE BETWEEN 15% TO 30% AND MAY VARY BETWEEN HARDWARE, SOFTWARE AND SERVICES ON A GIVEN CONTRACT. ALSO THE CENTRUM II SYSTEM IS BEING REPLACED BY A NEW GENERATION DCS SYSTEM WHICH IS BETA TESTING AT THIS TIME.												

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

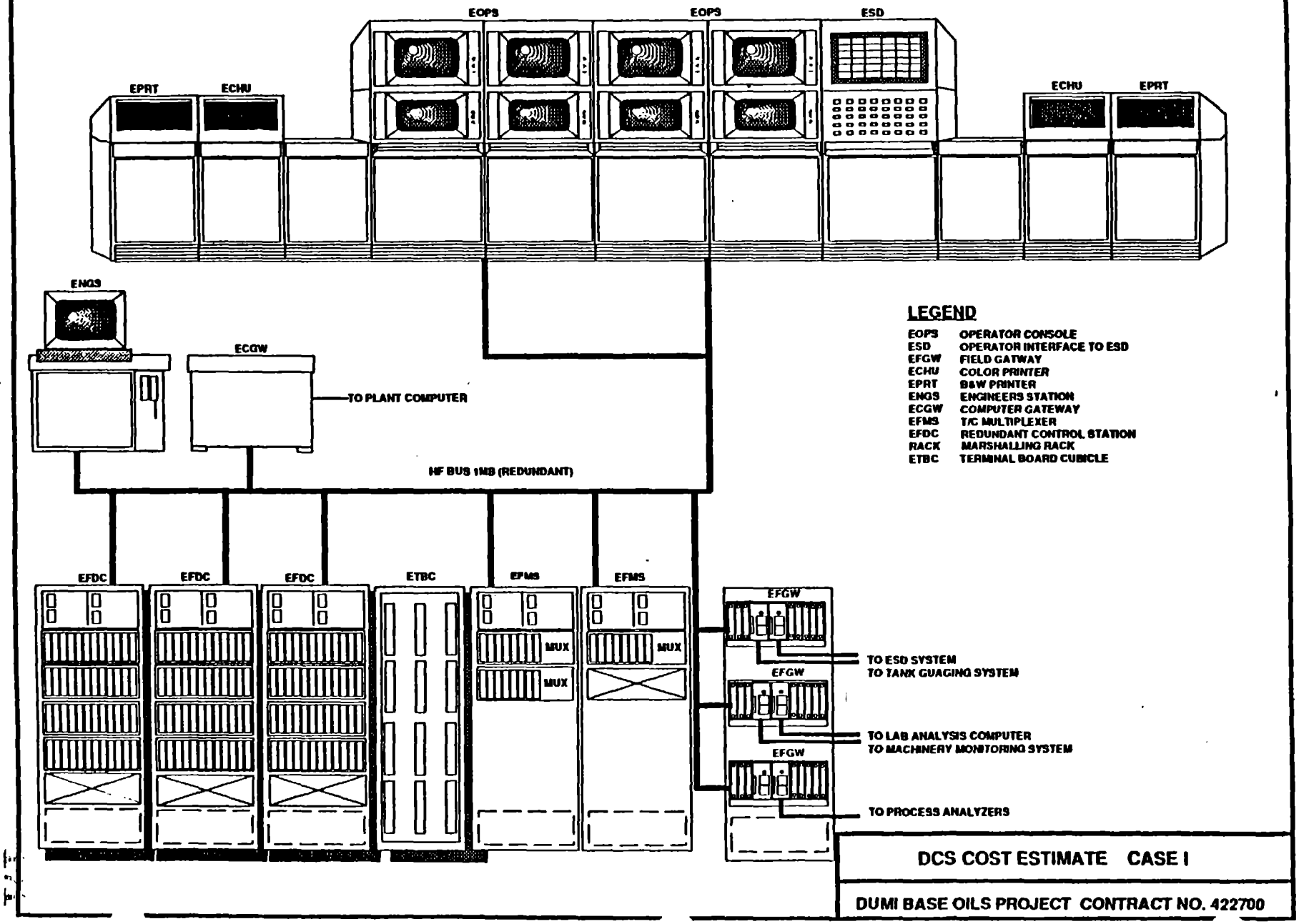
CONTROL SYSTEMS DCS SYSTEM
CASE #4

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS :												
	THE PRICES ARE BASED ON A CURRENT PROJECT IN HOUSE WHICH IS USING THE CENTRUM II DISTRIBUTED CONTROL SYSTEM.	1	LOT						1,998,200			1,998,200	
	NOTE : COSTS ARE BASED LIST PRICING - TYPICALLY DISCOUNTS RANGE BETWEEN 15% TO 30% AND MAY VARY BETWEEN HARDWARE, SOFTWARE AND SERVICES ON A GIVEN CONTRACT. ALSO THE CENTRUM II SYSTEM IS BEING REPLACED BY A NEW GENERATION DCS SYSTEM WHICH IS BETA TESTING AT THIS TIME.												

REV DATE CHKD BY DATE PAGE NO. 1 OF 1

OPERATORS CONSOLE

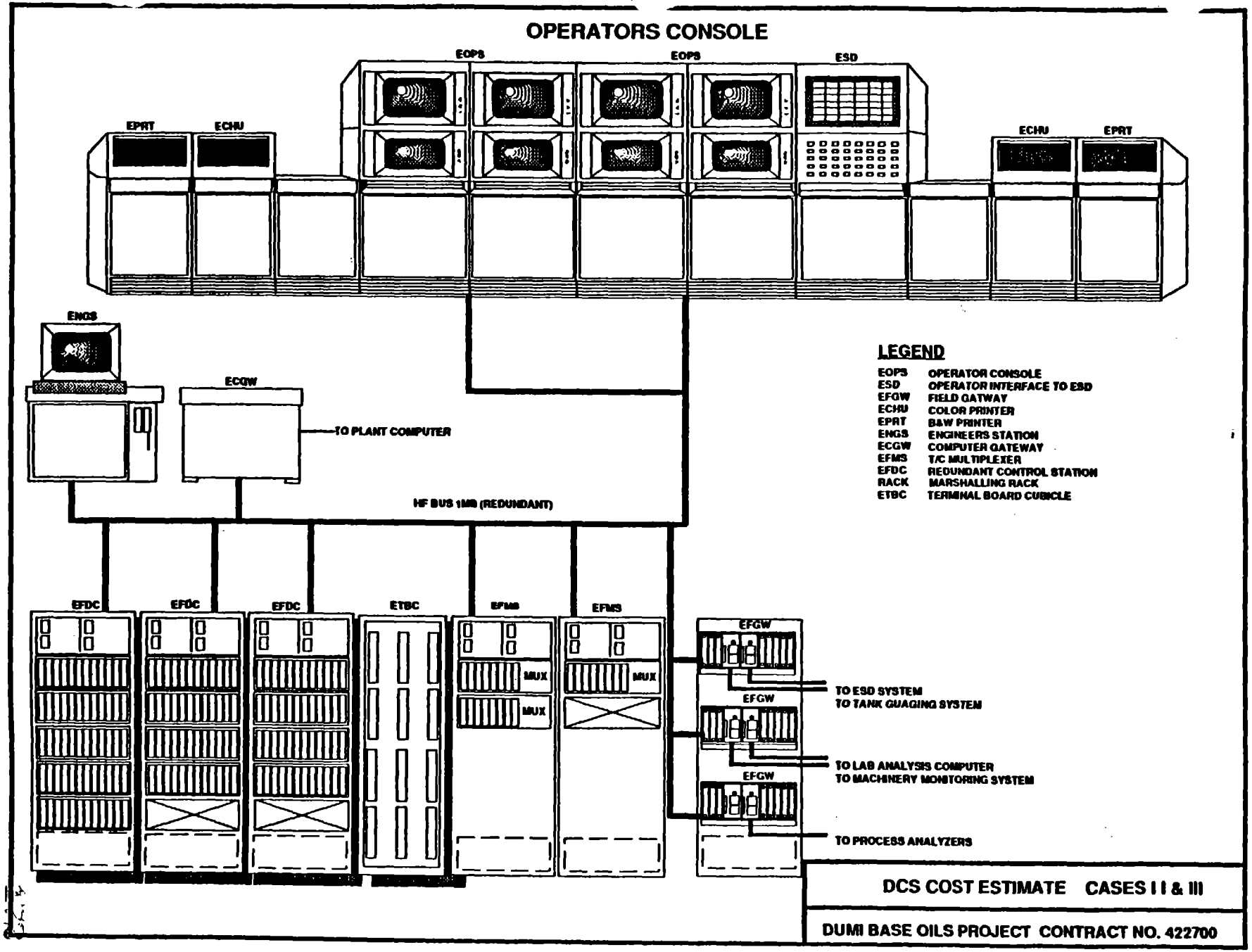


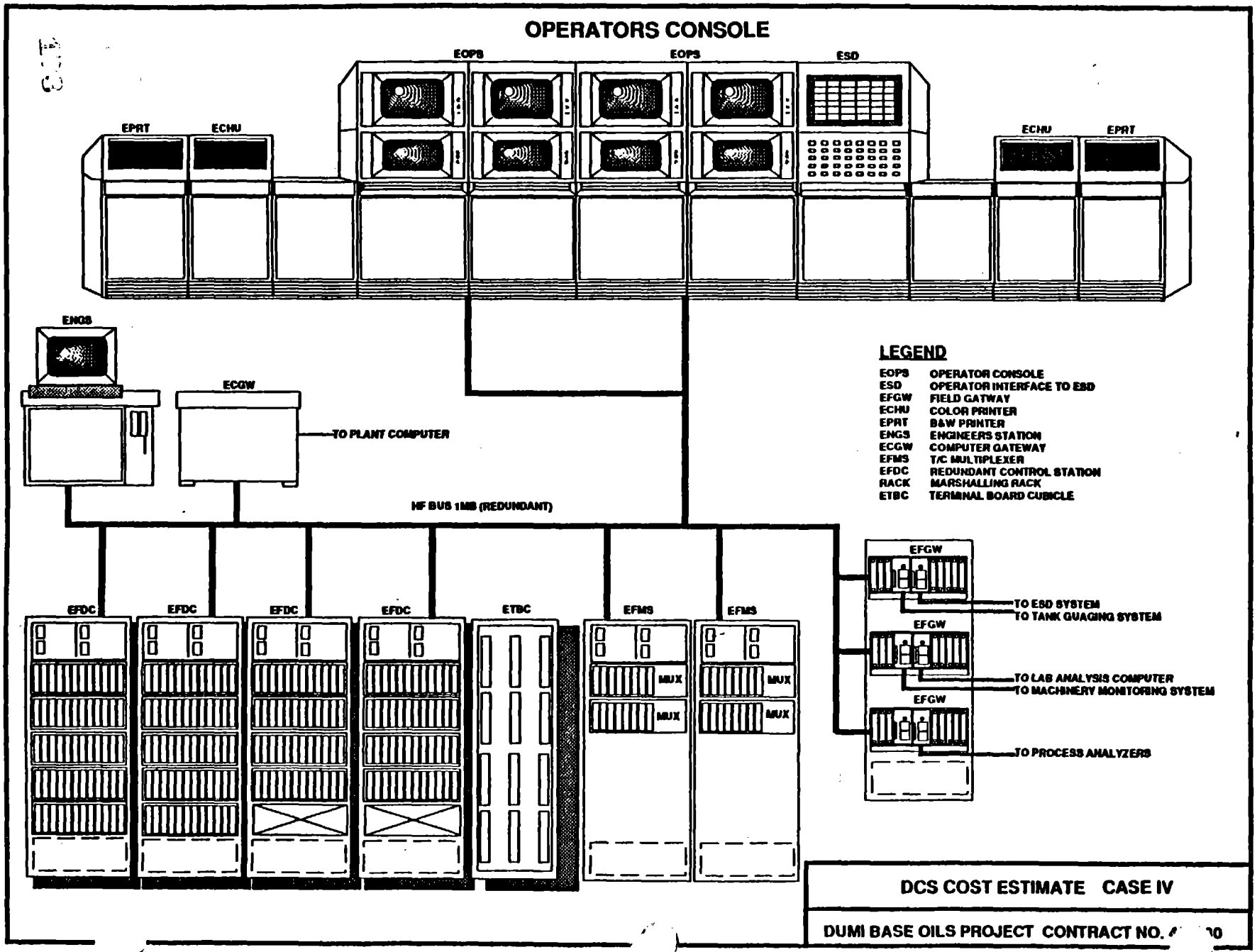
LEGEND

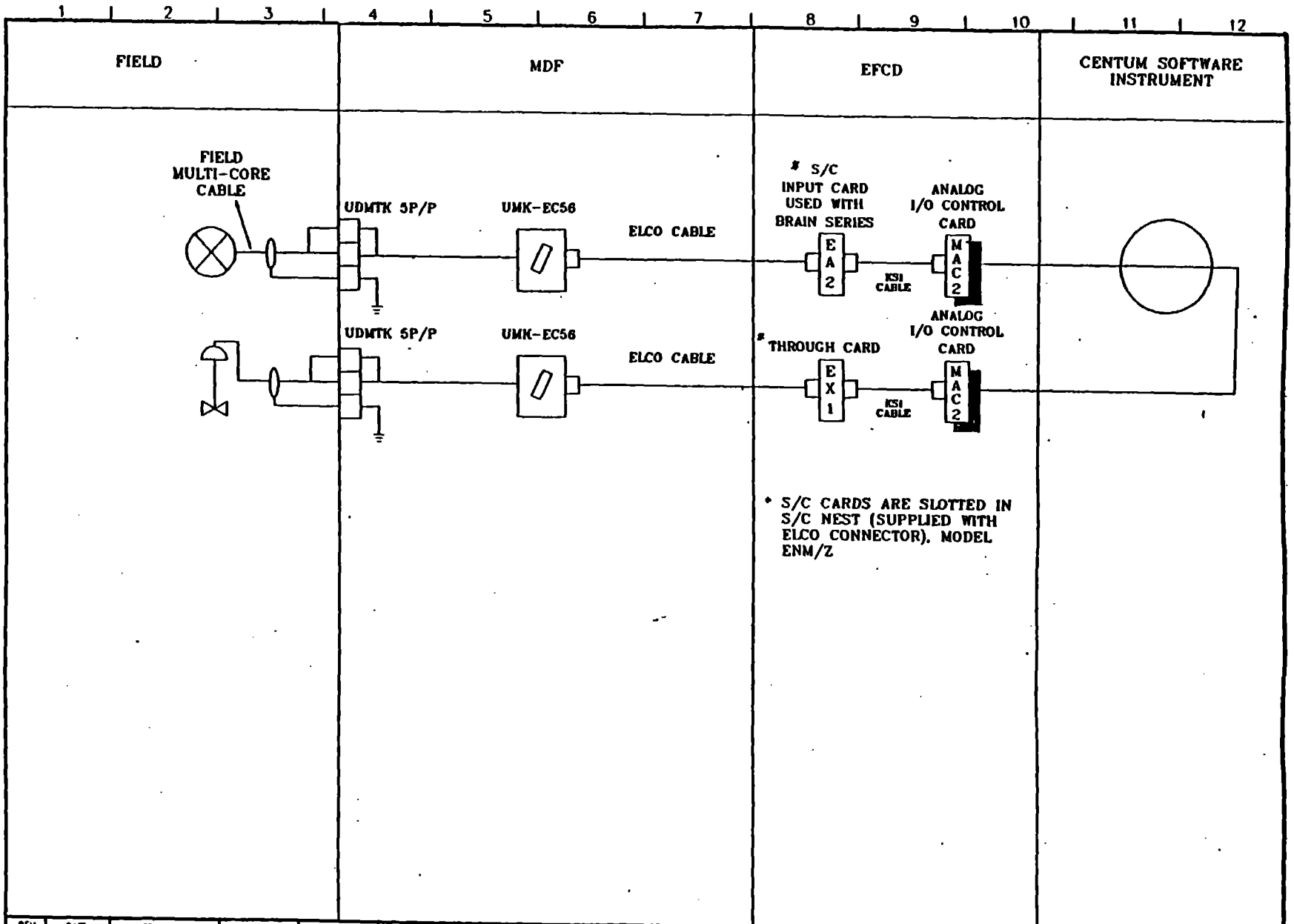
EOPS	OPERATOR CONSOLE
ESD	OPERATOR INTERFACE TO ESD
EFGW	FIELD GATWAY
ECHU	COLOR PRINTER
EPRT	B&W PRINTER
ENGS	ENGINEERS STATION
ECGW	COMPUTER GATEWAY
EFMS	T/C MULTIPLEXER
EFDC	REDUNDANT CONTROL STATION
RACK	MARSHALLING RACK
ETBC	TERMINAL BOARD CUBICLE

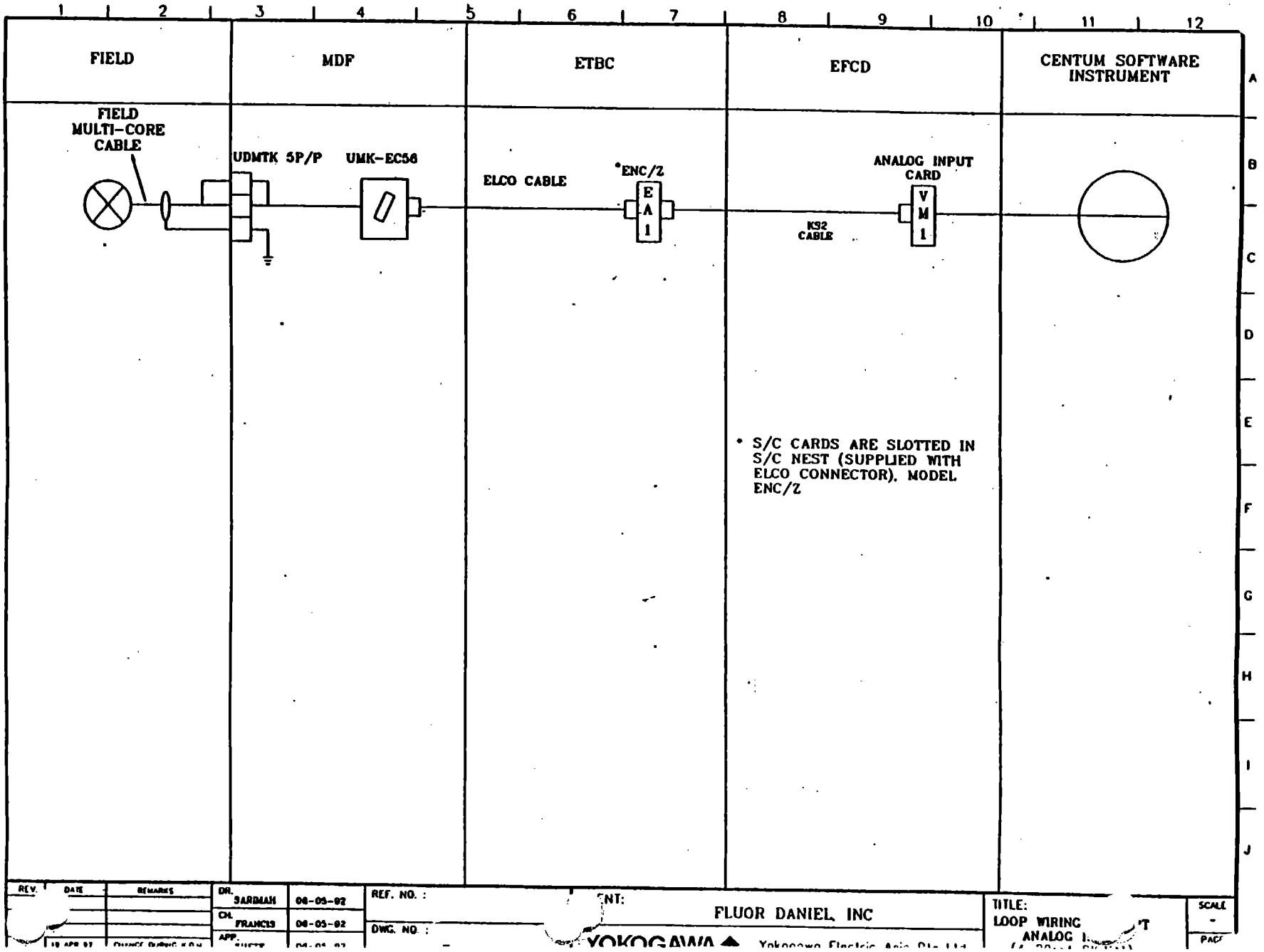
DCS COST ESTIMATE CASE I

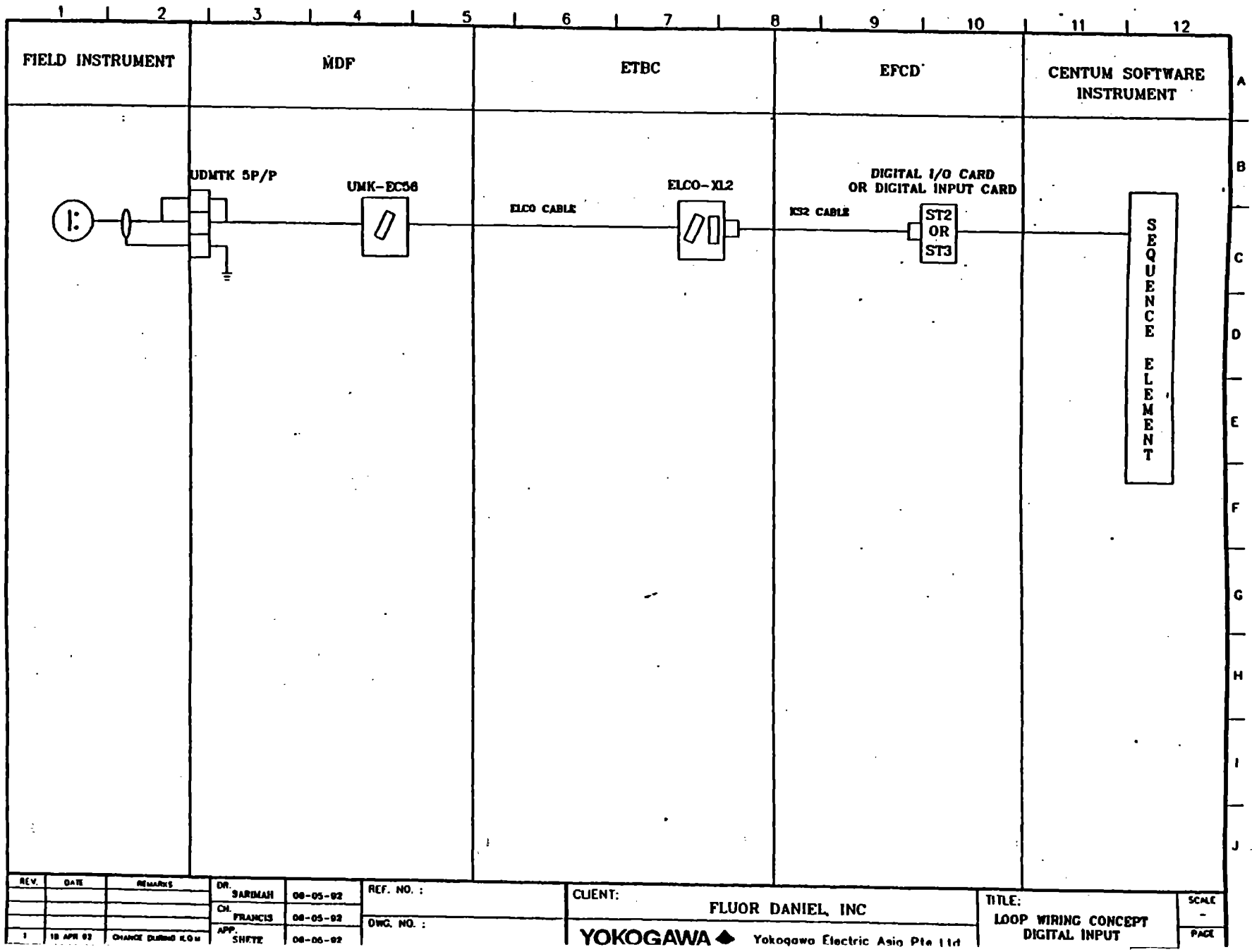
DUMI BASE OILS PROJECT CONTRACT NO. 422700

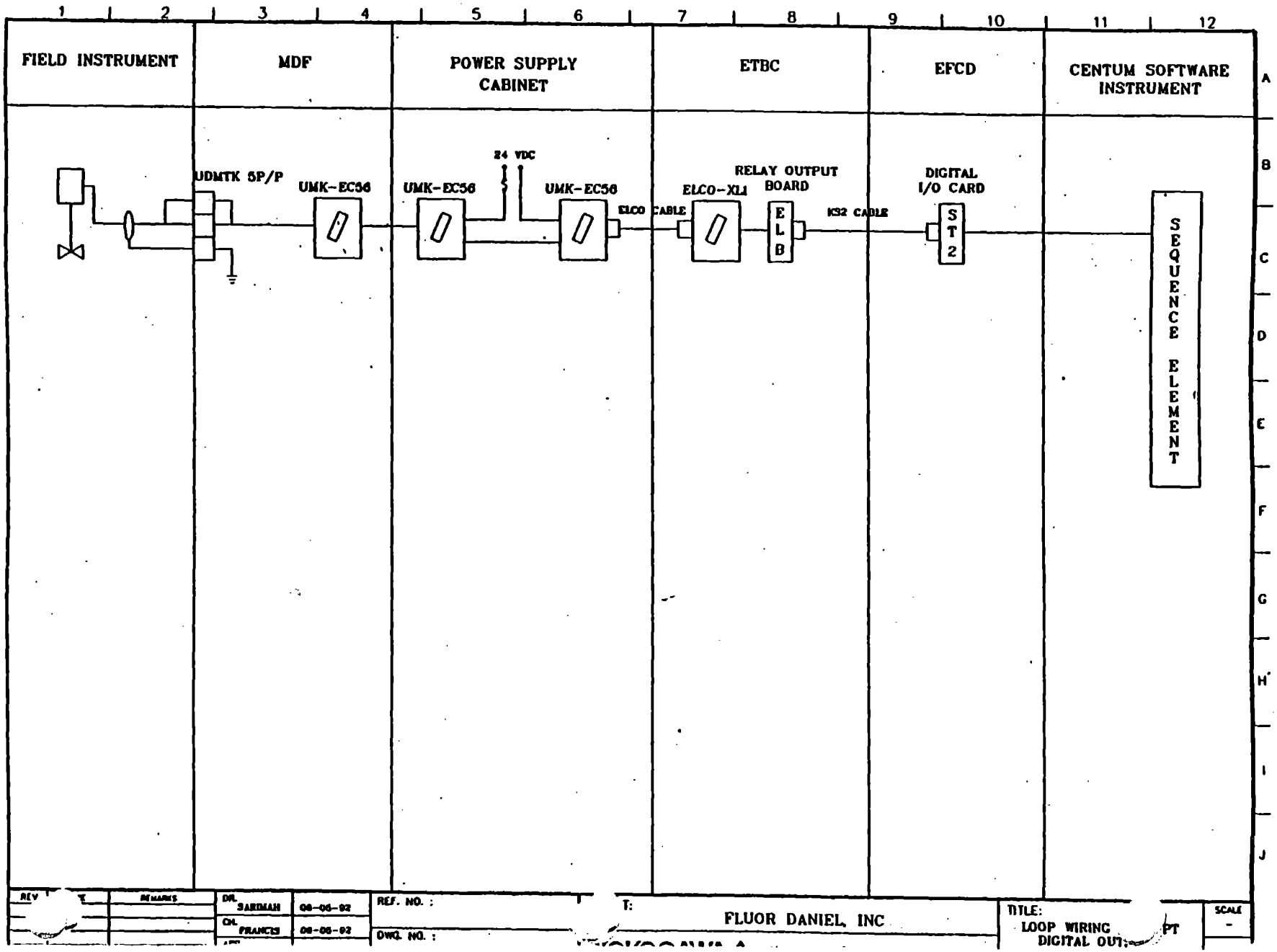

OPERATORS CONSOLE
EOPS
EOPS
ESD
EPRT
ECHU
ECHU
EPRT
ENGS
ECGW
TO PLANT COMPUTER
HF BUS 1MB (REDUNDANT)
EFDC
EFDC
EFDC
ETBC
EFMS
EFMS
MUX
MUX
MUX
EFGW
EFGW
EFGW
TO ESD SYSTEM
TO TANK GUAGING SYSTEM
TO LAB ANALYSIS COMPUTER
TO MACHINERY MONITORING SYSTEM
TO PROCESS ANALYZERS
LEGEND
EOPS OPERATOR CONSOLE
ESD OPERATOR INTERFACE TO ESD
EFGW FIELD GATWAY
ECHU COLOR PRINTER
EPRT B&W PRINTER
ENGS ENGINEERS STATION
ECGW COMPUTER GATEWAY
EFMS T/C MULTIPLEXER
EFDC REDUNDANT CONTROL STATION
RACK MARSHALLING RACK
ETBC TERMINAL BOARD CUBICLE
DCS COST ESTIMATE CASES I I & III
DUMI BASE OILS PROJECT CONTRACT NO. 422700


OPERATORS CONSOLE
EOPS
EOPS
ESD
EPRT
ECHU
ECHU
EPRT
ENGS
ECGW
TO PLANT COMPUTER
HF BUS 1MB (REDUNDANT)
LEGEND
EOPS OPERATOR CONSOLE
ESD OPERATOR INTERFACE TO ESD
EFGW FIELD GATWAY
ECHU COLOR PRINTER
EPRT B&W PRINTER
ENGS ENGINEERS STATION
ECGW COMPUTER GATEWAY
EFMS T/C MULTIPLEXER
EFDC REDUNDANT CONTROL STATION
RACK MARSHALLING RACK
ETBC TERMINAL BOARD CUBICLE
EFDC
EFDC
EFDC
EFDC
ETBC
EFMS
EFMS
MUX
MUX
MUX
MUX
EFGW
EFGW
EFGW
TO ESD SYSTEM
TO TANK GUAGING SYSTEM
TO LAB ANALYSIS COMPUTER
TO MACHINERY MONITORING SYSTEM
TO PROCESS ANALYZERS
DCS COST ESTIMATE CASE IV
DUMI BASE OILS PROJECT CONTRACT NO.


1
2
3
4
5
6
7
8
9
10
11
12
FIELD
MDF
EFCD
CENTUM SOFTWARE INSTRUMENT
FIELD MULTI-CORE CABLE
UDMTK 5P/P
UMK-EC56
ELCO CABLE
* S/C INPUT CARD USED WITH BRAIN SERIES
E A 2
ANALOG I/O CONTROL CARD
M A C 2
KSI CABLE
UDMTK 5P/P
UMK-EC56
ELCO CABLE
* THROUGH CARD
E X 1
ANALOG I/O CONTROL CARD
M A C 2
KSI CABLE
* S/C CARDS ARE SLOTTED IN S/C NEST (SUPPLIED WITH ELCO CONNECTOR), MODEL ENM/Z
REV.
DATE
REMARKS
DR. BARDHAN 08-05-92
CH. FRANCIS 08-06-92
APP.
REF. NO. :
DWG. NO. :
CLIENT:
FLUOR DANIEL, INC
YOKOGAWA
Yokogawa Electric Asia Pte Ltd
TITLE:
LOOP WIRING CONCEPT
ANALOG I/O
SCALE
-
PAGE


1 2 3 4 5 6 7 8 9 10 11 12
FIELD
MDF
ETBC
EFCD
CENTUM SOFTWARE INSTRUMENT
A B C D E F G H I J
FIELD MULTI-CORE CABLE
UDMTK 5P/P
UMK-EC56
ELCO CABLE
*ENC/Z
E A 1
ANALOG INPUT CARD
V M 1
K92 CABLE
* S/C CARDS ARE SLOTTED IN S/C NEST (SUPPLIED WITH ELCO CONNECTOR), MODEL ENC/Z
REV.
DATE
REMARKS
DR. SARDAR 08-05-92
CH. FRANCIS 08-05-92
APP.
REF. NO. :
DWG. NO. :
CLIENT:
FLUOR DANIEL, INC
YOKOGAWA
TITLE:
LOOP WIRING
ANALOG I
SCALE
-


1
2
3
4
5
6
7
8
9
10
11
12
FIELD INSTRUMENT
MDF
ETBC
EFCD
CENTUM SOFTWARE INSTRUMENT
A
B
C
D
E
F
G
H
I
J
UDMTK 5P/P
UMK-EC56
ELCO CABLE
ELCO-XL2
DIGITAL I/O CARD
OR DIGITAL INPUT CARD
KS2 CABLE
ST2
OR
ST3
SEQUENCE ELEMENT
REV.
DATE
REMARKS
1
18 APR 02
CHANGE DURING K.O.M
DR. SARIMAH 08-05-02
CH. FRANCIS 08-05-02
APP. SHETE 08-06-02
REF. NO. :
DWG. NO. :
CLIENT:
FLUOR DANIEL, INC
YOKOGAWA
Yokogawa Electric Asia Pte Ltd
TITLE:
LOOP WIRING CONCEPT
DIGITAL INPUT
SCALE
-
PAGE


1
2
3
4
5
6
7
8
9
10
11
12
FIELD INSTRUMENT
MDF
POWER SUPPLY CABINET
ETBC
EFCD
CENTUM SOFTWARE INSTRUMENT
A
B
C
D
E
F
G
H
I
J
UDMTK 5P/P
UMK-EC56
UMK-EC56
24 VDC
UMK-EC56
ELCO CABLE
ELCO-XL1
RELAY OUTPUT BOARD
E
L
B
K32 CABLE
DIGITAL I/O CARD
S
T
2
SEQUENCE ELEMENT
REV
REMARKS
DR. SARMAH
08-06-92
CH. FRANCIS
08-06-92
REF. NO. :
DWG. NO. :
T:
FLUOR DANIEL, INC
TITLE:
LOOP WIRING
DIGITAL OUT
SCALE
-

	CONTRACT	AI	AO	D/E	D/O	IC
1. 010	71	34	5	9	12	29
012	67	37	8	13	8	175
015	10	5	5	10	5	5
017	5	3	3	5	5	20
018	6	3	2	5	5	5
	159	82	23	42	35	234
X15%	183	94	27	48	40	269
ISE 2. 011	40	24	11	9	5	13
012	67	37	8	13	8	175
013	40	30	10	15	10	80
015	10	5	5	10	5	5
017	5	3	3	5	5	20
018	6	3	2	5	5	5
	170	102	39	57	38	298
X15%	195	117	45	65	44	342
E 3 010	71	34	5	9	12	29
012	67	37	8	13	8	175
015	10	5	5	10	5	5
016	30	15	5	10	5	20
017	5	3	3	5	5	20
018	6	3	2	5	5	5
	189	97	28	52	40	254
X15%	217	112	32	60	46	292
CASE 4 011	40	24	11	9	5	13
012	67	37	8	13	8	175
013	40	30	10	15	10	80
014	45	13	7	15	13	35
015	10	5	5	10	5	5
016	30	15	5	10	5	20
017	5	3	3	5	5	10
018	6	3	1	5	5	5
	243	130	49	82	47	343
X15%	280	150	56	94	54	394

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

ESD SYSTEM
ALL CASES

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS :												
	FACTORED TRICON ESTIMATE	1	LOT						175,000			175,000	

REV. DATE D. BY DATE PAGE N FO OF

PRINTED IN U.S
3L/A522/1368

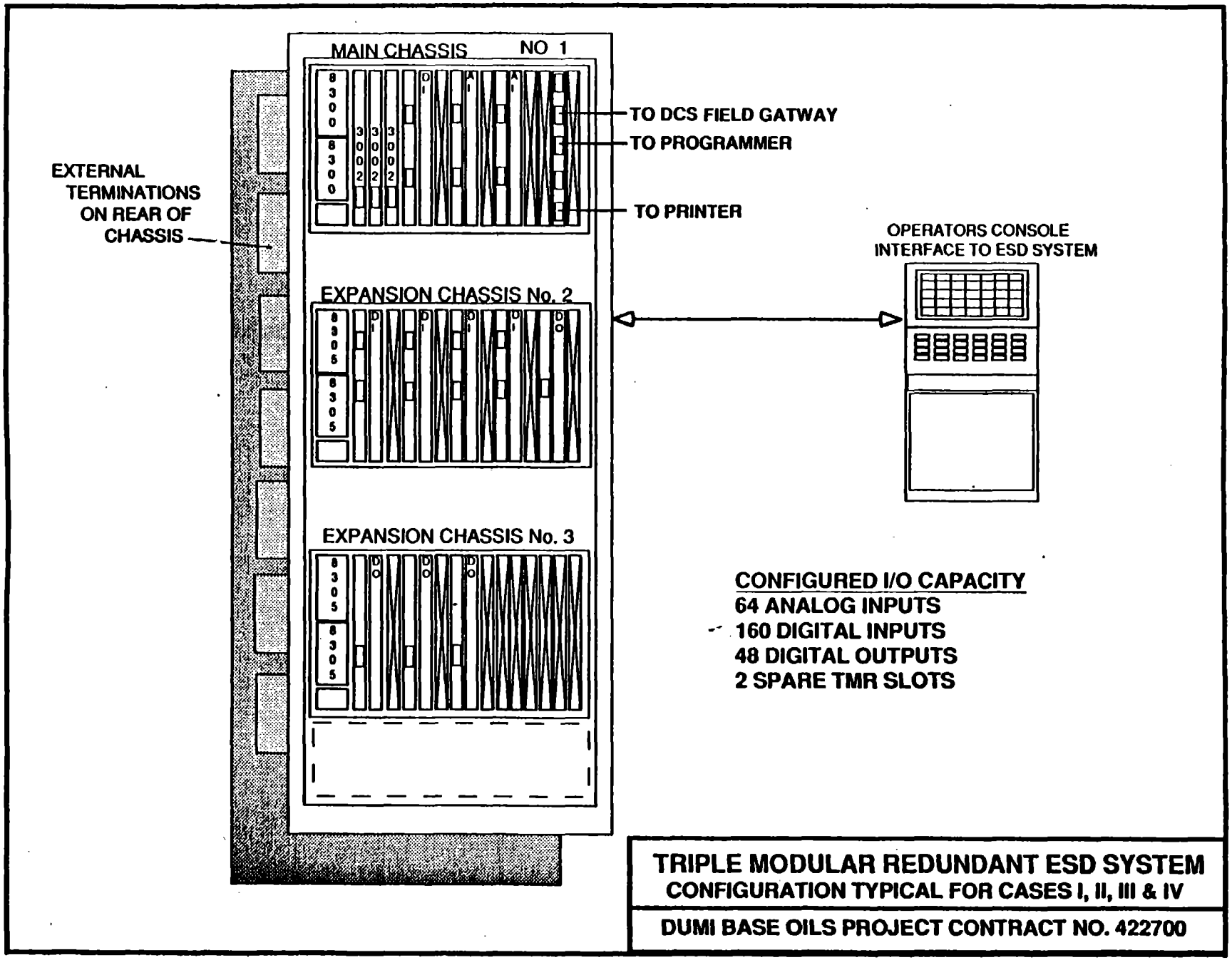
153A REV. 1/89

DUMI BASE OILS PROJECT
FEASIBILITY STUDY
CONTRACT No. 422700

ESD SYSTEM PRICING BASIS

The ESD pricing is factored from the PROJECT ESD System which is a TRICONEX TMR SYSTEM manufactured in Irvine by TRICONEX and purchased thru HONEYWELL CARACAS, S.A. as a product called Critical Process Controller. The I/O count was scaled down and the I/O mix changed to reflect the DUMI PROJECT

FACTORED TRICON ESTIMATE $175,000 APPLIES TO ALL CASES


MAIN CHASSIS NO 1
8300
8300
3002
3002
3002
TO DCS FIELD GATWAY
TO PROGRAMMER
TO PRINTER
EXTERNAL TERMINATIONS ON REAR OF CHASSIS
OPERATORS CONSOLE INTERFACE TO ESD SYSTEM
EXPANSION CHASSIS No. 2
8305
8305
EXPANSION CHASSIS No. 3
8305
8305
CONFIGURED I/O CAPACITY
64 ANALOG INPUTS
160 DIGITAL INPUTS
48 DIGITAL OUTPUTS
2 SPARE TMR SLOTS
TRIPLE MODULAR REDUNDANT ESD SYSTEM
CONFIGURATION TYPICAL FOR CASES I, II, III & IV
DUMI BASE OILS PROJECT CONTRACT NO. 422700

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

FIRE PROTECTION SYSTEM
ALL CASES

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS :												
	BASIC FIRE PROTECTION SYSTEM BASED ON PYROTRONICS CERBERUS SYSTEM WITH MXL PROCESSOR AND FOUR SATELLITE PANELS CONTROLLING FIELD DEVICES. THE MAIN FIRE PANEL WOULD BY HOUSED IN THE NEW CONTROL ROOM AND NO INTELLIGENT LINK IS PROPOSED TO THE DCS SYSTEM IN THIS PRICING.	1	LOT						180,000			180,000	

(1)
(2)

PRINTED IN U.S.A.
3L/A522/1368

REV. ____ DATE ____ CHKD. BY ____ DATE ____ PAGE NO. 1 OF 1

FORM E-153A REV. 1/89

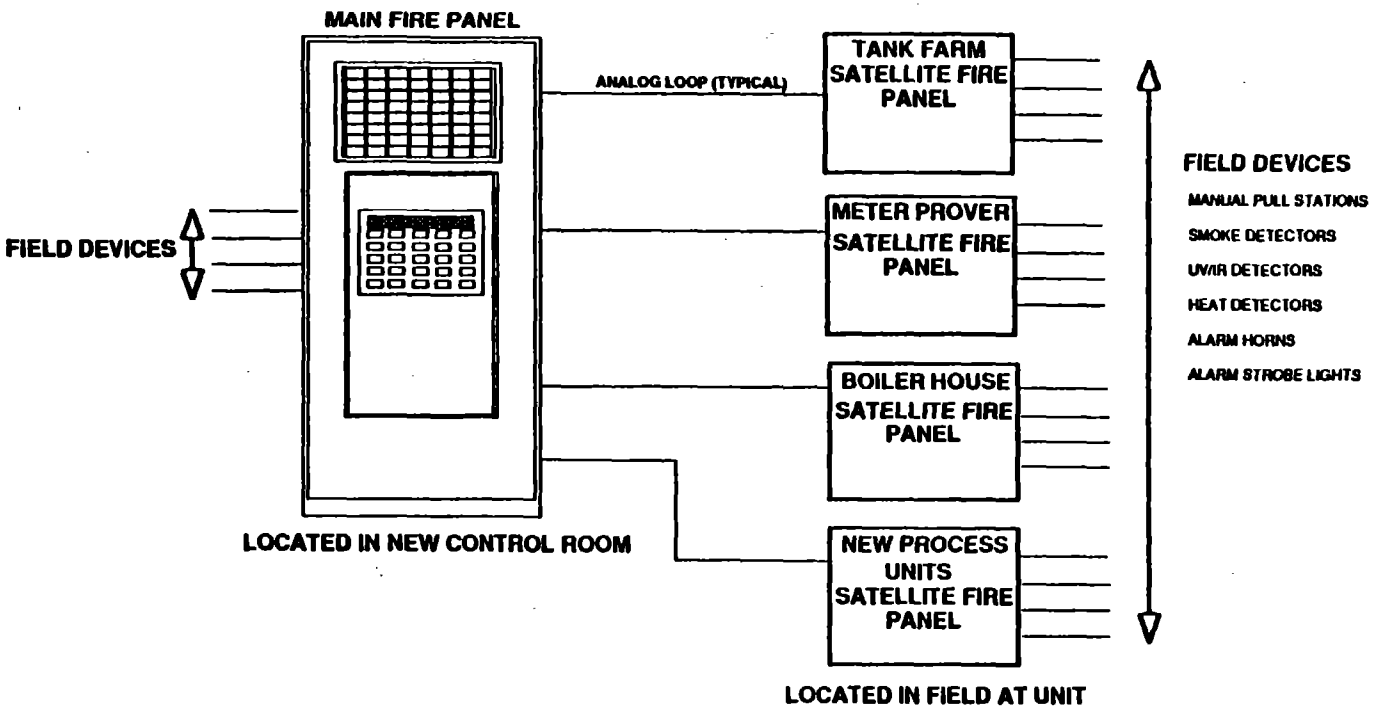
DUMI BASE OILS PROJECT
FEASIBILITY STUDY
CONTRACT No. 422700

FIRE AND GAS DETECTION SYSTEM PRICING

The Fire and Gas Sytem pricing was worked beyween Flour and Detection Systems using a system quite similar to that being purchased for the PROJECT. Since there is no real definition of the scope of the fire protection and gas monitoring effort at this point I used the PROJECT as the basis with adjustments to the DUMI PROJECT. It should be noted that the PROJECT has no automatic extinguishing systems and none are included in this estimate.

BASIC FIRE PROTECTION SYSTEM BASED ON PYROTRONICS CERBERUS SYSTEM WITH MXL PROCESSOR AND FOUR SATELLITE PANELS CONTROLLING FIELD DEVICES. THE MAIN FIRE PANEL WOULD BY HOUSED IN THE NEW CONTROL ROOM AND NO INTELLIGENT LINK IS PROPOSED TO THE DCS SYSTEM IN THIS PRICING.

FIRE PROTECTION SYSTEM $180,000 APPLICABLE TO ALL CASES.



FIRE SYSTEM CONFIGURATION

CONFIGURATION TYPICAL FOR CASES I, II, III & IV

UMI BASE OILS PROJECT CONTRACT NO. 4227

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

THE COMBUSTIBLE GAS & H_2S SYSTEM
ALL CASES

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS : THE COMBUSTIBLE GAS AND H_2S MONITORING SYSTEM WOULD BE SIMILAR IN CONCEPT TO THE FIRE SYSTEM BUT WOULD USE GENERAL MONITORS (OR EQUAL) SENSING EQUIPMENT AND CONTROLLER WITH NO INTELLIGENT LINK PROPOSED IN THIS PRICING.	1	LOT						80,000			80,000	

DUMI BASE OILS PROJECT
FEASIBILITY STUDY
CONTRACT No. 422700

FIRE AND GAS DETECTION SYSTEM PRICING

The Fire and Gas Sytem pricing was worked beyween Flour and Detection Systems using a system quite similar to that being purchased for the PROJECT. Since there is no real definition of the scope of the fire protection and gas monitoring effort at this point I used the PROJECT as the basis with adjustments to the DUMI PROJECT. It should be noted that the PROJECT has no automatic extinguishing systems and none are included in this estimate.

THE COMBUSTIBLE GAS AND H2S MONITORING SYSTEM WOULD BE SIMILAR IN CONCEPT TO THE FIRE SYSTEM BUT WOULD USE GENERAL MONITORS (OR EQUAL) SENSING EQUIPMENT AND CONTROLLERS WITH NO INTELLIGENT LINK PROPOSED IN THIS PRICING.

GAS DETECTION SYTEM $80,000 APPLICABLE TO ALL CASES.

CONSTRUCTION COSTS

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

LABORATORY ANALYSIS COMPUTER SYSTEM
ALL CASES

WORK ORDER
CONTRACT 427700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRCING BASIS :												
	PC BASED WORK STATION & PRINTER W/ RS-232 INTERFACE	1	LOT						15,000			15,000	
	PC COMPATIBLE FRONT END HARDWARE	1	LOT						5,000			5,000	
	SOFTWARE	1	LOT						10,000			10,000	
	TOTAL											30,000	

REV. ____ DATE ____ BY ____ DATE ____ PAGE NO. 1 OF 1

PRINTED IN U.S.A.
3L/A522/1368

F-153A REV. 1/89

DUMI BASE OILS PROJECT
FEASIBILITY STUDY
CONTRACT No. 422700

LABORATORY ANALYSIS COMPUTER SYSTEM PRICING BASIS

The Laboratory Analysis Computer System estimate is based on the EXOR IV Specification for functioal requirements. The following figures are budgetary only.

PC Based Work Station and printer with RS-232 Interface	$15,000
PC Compatible front end hardware	$5,000
Software	$10,000

TOTAL COST $30,000 APPLIES TO ALL CASES (BUDGETARY)

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

METER PROVER SYSTEM
ALL CASES

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS :												
	6" ANSI 150 BIDIRECTIONAL METER PROVER SKID.												
	METER PROVER	1	EA						50,400			50,400	
	SKID W/ CONTROLS & COMPUTER	1	EA						164,600			164,600	
	TOTAL											215,000	

REV. ____ DATE ____ D. BY ____ DATE ____ PAGE N° 1 OF 1

PRINTED IN U
3L/A522/1368

153A REV. 1/89

DUMI BASE OILS PROJECT
FEASIBILITY STUDY
CONTRACT No. 422700

METER PROVER SYSTEM PRICING BASIS

The EXOR IV Meter Prover Specification was modified to the DUMI product slate and DANIEILS Flow Products Inc., Special Systems group put together a budgetary quotation for a 6" ANSI 150 Bidirectional Meter Prover Skid. A piping sketch along with weights and sizes is attached.

METER PROVER	$50,400
SKID WITH CONTROLS & COMPUTER	$164,600

DANIEL FLOW PRODUCTS, INC., SYSTEMS

P.O. BOX 55891
HOUSTON, TEXAS 77255 U.S.A.

PHONE: (713) 467-6000
TELEX: 6868068 DNSYS UW
FACSIMILE: (713) 827-3808

DATE: 11-17-1992

REF. DANIEL QUOTE NO. 9399-024

FROM: J.WALLACE BROWN
BILL DAUGHERTY

DEPT: SALES ENGINEERING
PHONE: (713) 827-3839 - BILL

DANIEL FAX REF.NO. 3153/92

TO COMPANY: DANIEL / CALIFORNIA

ATTN: MR. TERRY SHEA
PHONE: 1-714-259-8300

TELECOPY NO: 1-714-259-8342

PAGES TO FOLLOW 4 (NUMBER PAGES EXCLUDING COVER SHEET)

REFERENCE: METER SYSTEM QUOTE FOR JIM DIMOCK AT FLOUR ENGINEERING, DANIEL BUDGET PROPOSAL 9399-024 REV. 1.

DANIEL OFFERS A DUAL 3" ANSI 150 POSITIVE DISPLACEMENT METER STATION WITH A 6" ANSI 150 BIDIRECTIONAL METER PROVER AND A CONTROL PANEL.

PRODUCT:	LUBE OIL
FLOW RATE:	500 BPH
ANSI RATING:	150# ANSI
METER TYPE:	POSITIVE DISPLACEMENT

TOTAL BUDGET PRICE, EX-WORKS HOUSTON, TEXAS ..... $ 215,000.00

TYPICAL SKETCHES FOR THE METER STATION AND PROVER ARE ATTACHED, ALONG WITH APPX. SIZES AND WEIGHTS, AND A BRIEF DESCRIPTION.

BEST REGARDS,

J.W. BROWN

REFERENCE: METER SYSTEM QUOTE FOR JIM DIMOCK AT FLOUR ENGINEERING, DANIEL BUDGET PROPOSAL 9399-024 REV. 1.

METER STATION DESCRIPTION

THE DUAL 3" ANSI 150 POSITIVE DISPLACEMENT METER STATION WILL CONSIST OF 6" INLET AND OUTLET HEADERS, A 3" PROVER DIVERSION HEADER, TWO 3" METER RUNS, AND A STRUCTURAL STEEL SKID.

EACH METER STREAM WILL BE EQUIPPED WITH A MANUALLY OPERATED 3" ANSI 150 INLET DANIEL M-303 GATE VALVE, A 3" X 6" X 3" ANSI 150 DANIEL INLINE VERTICAL BASKET STRAINER, A 3" ANSI 150 POSITIVE DISPLACEMENT METER, A 3" ANSI 150 DANIEL DANEX PROVER DIVERSION PLUG VALVE, AND A 3" ANSI 150 OUTLET DANIEL DANEX PLUG VALVE.

METER PROVER

THE 6" ANSI 150 BIDIRECTIONAL METER PROVER WILL BE EQUIPPED WITH A 3" ANSI 300 DANIEL DANEX 4-WAY DIVERTER VALVE, TWO (2) DETECTOR SWITCHES, TWO (2) 10" ANSI 150 LAUNCH CHAMBERS, PROVER LOOP CALIBRATED SECTION PIPING, A NITRILE SPHERE, VENT AND DRAIN VALVES, AND A STRUCTURAL STEEL SKID.

CONTROL PANEL

THE CONTROL PANEL FOR THE ABOVE SYSTEM WILL CONSIST OF DANIEL MODEL 2500 FLOW COMPUTERS, A PRINTER, AND TERMINAL BOARDS, ALL EQUIPMENT WILL BE MOUNTED IN A STEEL CONTROL CABINET FOR INDOOR USE.

JIM DIMOCK'S PHONE NO. IS 714-975-4695 OR 714-975-4696.

9399-024
APPROXIMATE SHIPPING
SKID - SIZES AND WEIGHTS

ITEM 1. 6" ANSI 150 BIDIRECTIONAL METER PROVER:

WIDTH = 6 FEET
LENGTH = 30 FEET
HEIGHT = 8 FEET

WEIGHT = 12,000 POUNDS

ITEM 2. DUAL 3" ANSI 150 POSITIVE DISPLACEMENT METER STATION:

WIDTH = 7 FEET
LENGTH = 18 FEET
HEIGHT = 8 FEET

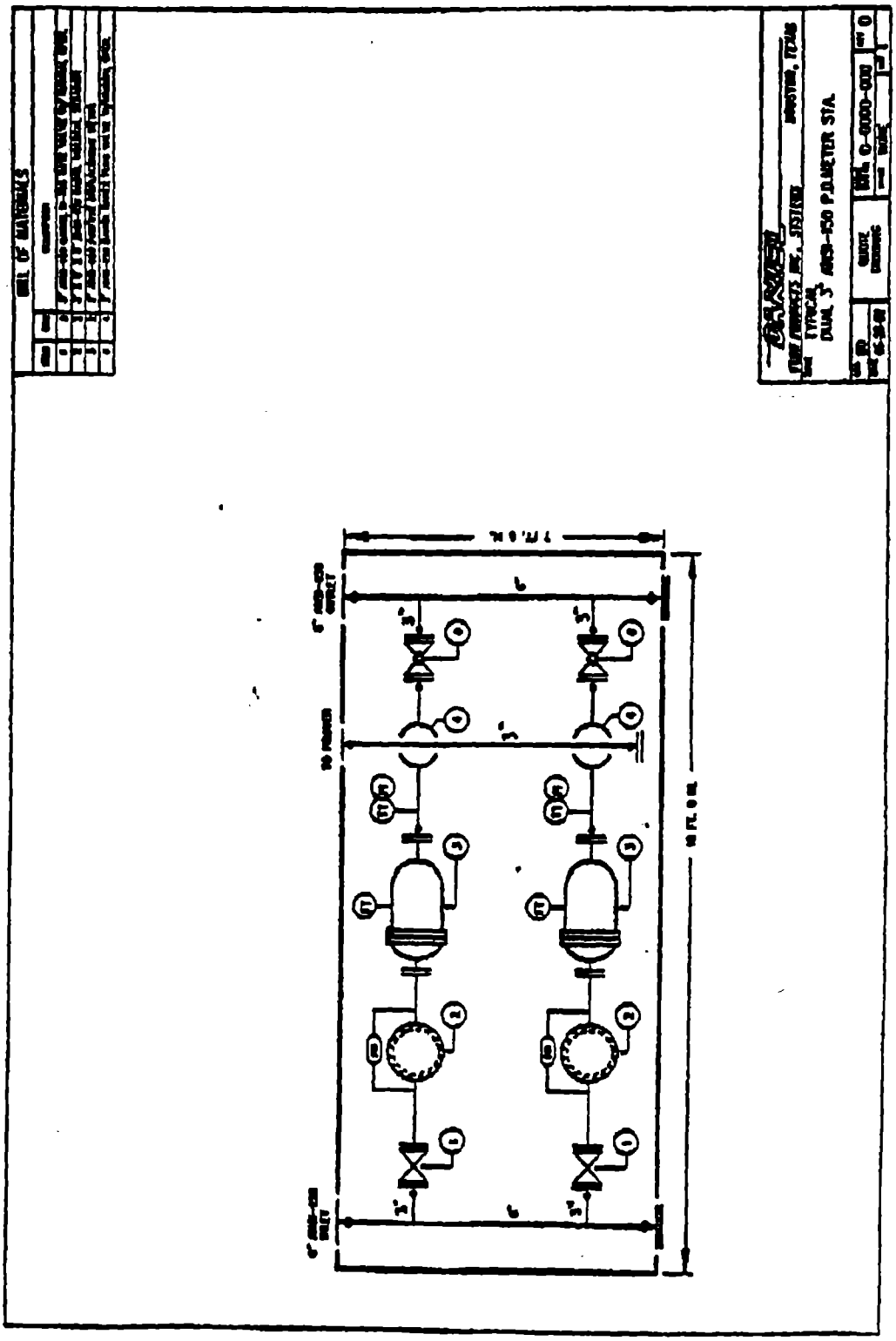
WEIGHT = 9,000 POUNDS

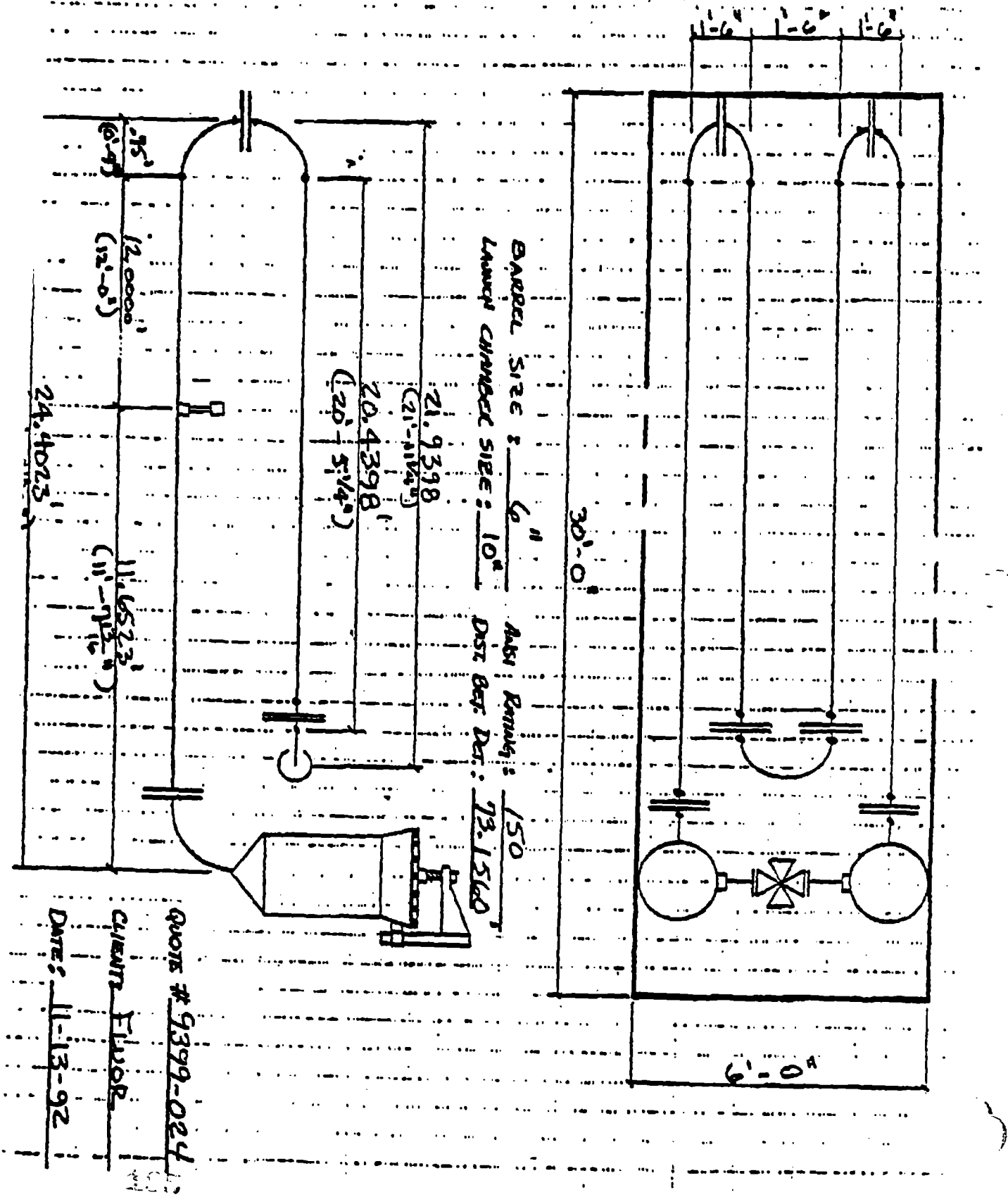
ITEM 3. CONTROL PANEL:

DEPTH = 2 FEET
LENGTH = 2 FEET
HEIGHT = 6 FEET

WEIGHT = 700 POUNDS

2





QUOTE # 9399-024

CLIENT: FLUOR

DATE: 11-13-92

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

PROCESS ANALYZER SYSTEM
ALL CASES

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS :												
	BOILING POINT ANALYZER	1	EA						50,000			50,000	
	VACUUM BOILING POINT ANALYZER	1	EA						60,000			60,000	
	FLASH POINT ANALYZER	1	EA						60,000			60,000	
	DENSITOMETERS	1	EA						40,000			40,000	
	VISCOSITY ANALYZER	1	EA						40,000			40,000	
	COLOR ANALYZER	1	EA						35,000			35,000	
	OXYGEN ANALYZER	1	EA						12,000			12,000	
	CARBON MONOXIDE ANALYZER	1	EA						35,000			35,000	
	NITROGEN OXIDE ANALYZER	1	EA						35,000			35,000	
	AIR CONDITIONED SHELTER 24x12x8	1	EA						200,000			200,000	
	TOTAL											567,000	
	NOTE : ABOVE PRICES INCLUDE SAMPLE SYSTEM DESIGN, HARDWARE AND ALL CALIBRATION GASES.												

SCI-V

DUMI BASE OILS PROJECT
FEASIBILITY STUDY
CONTRACT No. 422700

PROCESS ANALYZER SYSTEM PRICING BASIS

The Process Analyzer System estimate is based on the EXOR IV Specification as to types of analyzers that may be required, I have been unable to get a better definition of the types and quantities of analyzers because the design is not advanced enough. The following figures were worked up by ABB Process Analytic and are budgetary only.

BOILING POINT ANALYZER	$50,000
VACUUM BOILING POINT ANALYZER	$60,000
FLASH POINT ANALYZER	$60,000
DENSITOMETERS	$40,000
VISCOSITY ANALYZER	$40,000
COLOR ANALYZER	$35,000
OXYGEN ANALYZER	$12,000
CARBON MONOXIDE ANALYZER	$35,000
NITROGEN OXIDE ANALYZER	$35,000
AIR CONDITIONED SHELTER 24x12x8	$200,000

ABOVE PRICES INCLUDE SAMPLE SYSTEM DESIGN, HARDWARE AND ALL CALIBRATION GASES.

TOTAL COST $500,000 APPLIES TO ALL CASES (BUDGETARY)

CLIENT PERTAMINA / CHEVRON
PROJECT PUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

STEAM GENERATION SYSTEM
ALL CASES

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS :												
	BURNER MANAGEMENT SYSTEM	2	EA						55,000			110,000	
	PROCESS INSTRUMENTATION	2	EA						50,000			100,000	
	COMBUSTION ANALYZERS	4	EA						12,500			50,000	
	TOTAL											260,000	

PRINTED IN U.S.A.
3L/AS22/1368

REV. ____ DATE ____ CHKD. BY ____ DATE ____ PAGE NO. 1 OF 1

FORM E-153A REV. 1/89

DUMI BASE OILS PROJECT
FEASIBILITY STUDY
CONTRACT No. 422700

STEAM GENERATION SYSTEM PRICING BASIS

The Steam Generation System consists of two boilers, BFW System, Deaerater, and Condensate System controlled from the existing Utilities Control Room which will be expanded with conventional instrumentation. The burner management system was based on a TRICONEX TMR System with pricing from the Lagoven Project. All other pricing was based on catalog list with some input from Detection Systems on conventional panel costs.

BURNER MANAGEMENT SYSTEM X 2	$110,000
PROCESS INSTRUMENTATION X 2	$100,000
COMBUSTION ANALYZERS X 4	$50,000

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

TANK GAUGING SYSTEM
CASE #1

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS :												
	THE PRICING IS BASED ON VERBAL QUOTATION FROM THE LOCAL VEREC SALES REPRESENTATIVE.	1	LOT						46,200			46,200	

0023

PRINTED IN U.S.A.
3L/A522/1368

REV. ____ DATE ____ CHKD. BY ____ DATE ____ PAGE NO. 1 OF 1

FORM E-153A REV. 1/89

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

TANK GAUGING SYSTEM
CASE #2

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS : THE PRICING IS BASED ON VERBAL QUOTATION FROM THE LOCAL VEREC SALES REPRESENTATIVE.	1	LOT						50,200			50,200	

REV. DATE CKD. BY DATE PAGE 1 OF 1

PRINTED IN
3L/A522/1368

E-153A REV. 1/89

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

TANK GAUGING SYSTEM
CASE #3

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS :												
	THE PRICING IS BASED ON VERBAL QUOTATION FROM THE LOCAL VEREC SALES REPRESENTATIVE.	1	LOT						74,700			74,700	

2232

PRINTED IN U.S.A.
3L/A522/1368

REV. ____ DATE ____ CHKD. BY ____ DATE ____ PAGE NO. 1 OF 1

FORM E-153A REV. 1/80

CLIENT PERTAMINA / CHEVRON
PROJECT DUMAI BASE OILS
LOCATION
DESCRIPTION

CONSTRUCTION COSTS

TANK GAUGING SYSTEM
CASE #4

WORK ORDER
CONTRACT 422700
PREPARED BY W. KUAN
DATE 12-1-92
APPROVED BY

A/C NO.	ITEM AND DESCRIPTION	QUANTITY	UNIT	MANHOURS PER UNIT	MANHOURS TOTAL	MANHOURS RATE	COST/UNIT LABOR	COST/UNIT CONTR.	COST/UNIT MATL	COSTS LABOR	COSTS SUBCONTRACT	COSTS MATERIAL	COSTS TOTAL
	PRICING BASIS : THE PRICING IS BASED ON VERBAL QUOTATION FROM THE LOCAL VEREC SALES REPRESENTATIVE.	1	LOT						86,900			86,900	

REV. ____ DATE ____ D. BY ____ DATE ____ PAGE 1 OF 1

PRINTED IN U.S.
7L/A522/1368

-153A REV. 1/89

DUMI BASE OILS PROJECT
FEASIBILITY STUDY
CONTRACT No. 422700

TANK GAUGING SYSTEM PRICING BASIS

The following pricing is based on verbal quotation from the local VEREC sales representative.

2500 SERIES GAUGE AND FLOAT	$1,000
1900 SERIES AVG. TEMP XMITTER	$2,300
3401 MARK SPACE XMITTER/RS-232	$2,700
TANKVIEW WORK STATION with S.W.	$7,000
9901 AVERAGING TEMP SENSOR 40'	$700
TANK CONFIGURATION	$75 per tank
START UP SERVICE	$760 per day plus expenses (N/I)

TOTAL ESTIMATED TANK GAUGING COST ON A PER CASE BASIS:

CASE I	CASE II	CASE III	CASE IV
$46,150	$50,225	$74,675	$86,900

ELECTRICAL SYSTEMS

ESTIMATE BACK-UP

FLUOR DANIEL

INTEROFFICE CORRESPONDENCE

To:	Peter Gaunban	Date:	December 3, 1992
Location:	533G	Reference:	Electrical Estimate
From:	R. Ganatra		
Location:	472F C2-E6-9	Client:	Pertamina/Chevron
Extension:	7074	Subject:	Dumai Base Oils Project

cc: Ray Baytala

Attached herewith is our major Equipment Cost Estimate based on Process provided motor list and our conceptual One Line Diagram # 422700-A-601-SK-1.

The estimate assumes the following:

- The 16 MW generator will be connected into the existing system through synchronizing bus.
- The existing synchronizing bus and associated parameters are suitable to add new 16 MW generator. The syncronizing equipment to be estimated by Mechanical Engineer.
- Power feed for staff housing unit transformer is locally available.
- Alternate feed for UPS is available from existing emergency power system.

MAJOR ELECTRICAL EQUIPMENT ESTIMATE
DUMAI BASE OILS PROJECT

ITEM	EQUIPMENT DESCRIPTION	QUANTITY	$/UNIT	TOTAL $	VENDOR
1	11 kV Switchgear, 3 ph, 50 Hz with 4 BKRs and 1 additional BKRs for existing 11 kV gear.	1	200,000	200,000	ABB
2	10 MVA Pwr Transformers 11-3.3kV, 3 ph 50 Hz.	2	110,000	220,000	Brush
3	4 MVA Pwr Transformers 11-3.3kV, 3 ph 50 Hz.	2	50,000	100,000	ABB
4	Neutral Grounding Resistors 2 kV Class, 1000 Amp, 10 sec.	4	11,600	46,400	ETN
5	1600 kVA Pwr Transformers 3.3 kV-380V, 3 ph 50 Hz.	2	25,000	50,000	Brush
6	630 kVA Pwr Transformers 3.3 kV - 380V, 3 ph 50 Hz.	3	17,000	51,000	Brush
7	3-3 kV Switchgear with main- tie-main BKRs and 16 starters for 3-3 kV motors (at process substation).	1	494,000	494,000	GEC
8	3.3 kV Switchgear with main-tie-main BKRs and 7 starters for 3.3 kV motors (at seawater substation).	1	290,000	290,000	GEC
9	380V, 3 ph, 50 Hz 250 Amp motor control center for process substation (132 motors + feeders).	1	248,000	248,000	ABB
10	380V, 3 ph, 50 Hz 1000 Amp Motor Control Center for sea water substation (20 motors + feeders).	1	48,000	48,000	ABB
11	Switchgear for 380V, 3 ph 50 Hz Motor Control Centers.	2	48,000	96000 ~~48,000~~	ABB
12	50 kVA UPS Systems complete with DC batteries.	2	118,000	236,000	Siemens
13	DC Batteries for Substations (120V DC).	2	9,500	19,000	GEC
14	Dry Type Area Transformer 30 kVA ea.	6	400	2400 ~~4,800~~	
15	Synchronizing Panel for generator and bus work with generator. (With generator estimate).				
16	Relay Cabinets (one for each substation).	2	1,500	3,000	Estimate
17	Instrument Panels.	4	6,900	27,600	Siemens
18	Lighting and Power Panels including Heat Tracing Panels.	8	3,000	24,000	Siemens
TOTAL EQUIPMENT COST				2,157,800	

FROM

Eaton Ltd
Power Control Division
Elstow Road
Bedford MK42 9LH
ENGLAND
Telephone 0234 267433
Telex 82261
Fax 0234 350210 or 272754

(FRI) 11.06.'92 :6129 PAGE 1

To: TOM FORQUE

Company/Location: FLUOR DANIEL INC.

Telefax/Telex number: 0101 714 975 5123.

From: LAURENCE G WILLIAMS

Department: RESISTORS

Reference: EARTHING

Date: 6.11.92.

Page 1 of 23 pages

☐ Message to receiver; please pass copies to:

RECEIVED
NOV 09 1992
T. FORQUER

Cutler-Hammer
Industrial Controls

Eaton Ltd
Power Control Division
Elstow Road
Bedford MK42 9LH
Telephone 0234 267433

EATON

With Compliments
Laurence G. Williams

Cutler-Hammer
Industrial Controls

EATON

Telefax Message ☐
Telex Message ☐

2 3

Cutler-Hammer
Industrial Controls

Eaton Ltd
Power Control Division
Elstow Road
Bedford MK42 9LH
Telephone 0234-267433

3rd November 1992

Fluor Daniel Inc.
3333 Michelson Drive
Irvine
CA 92730
USA

FAO: Mr. Tom Forque

Dear Sir,

EATON

FLUOR DANIEL ACTING FOR AND ON BEHALF

PSPC RFQ NO. HP9100/65/03 RPH/ENQ.

NEUTRAL EARTHING RESISTORS

STATEMENT OF COMPLIANCE

3. "Our quotation is in exact accordance with the specifications, drawings, terms and conditions and other requirements of this Request for Quotation with no exceptions other than those listed below".

3.1.1 Due to the design and construction, cover nuts and bolts will not be retained when they are undone.

3.2.1 Our design is of a grid type, drawing 57-4444 supplied, albeit the resistor grids are mounted with mica insulation on tie rods.

3.6.1 We have not included for sun/rain canopies over the cable box arrangements.

Yours faithfully,

LAURENCE G. WILLIAMS

Telex: 82261
Fax. 0234 350210 or 272764
Registered in England No. 155621
Registered office Eaton House, Hounslow, TW4 5DX

FROM

Cutler-Hammer
Industrial Controls

Eaton Ltd
Power Control Division
Elstow Road
Bedford MK42 9LH
Telephone 0234-267433

Your Ref: RFQ403210-6-0007-RQ
Our Ref: RD/LGW/R25843

2nd November 1992

Fluor Daniel Inc.
3333 Michelson Drive
Irvine
CA 92730
USA

FAO: Mr. Tom Forquer

Dear Sir,

EATON

FLUOR DANIEL ACTING FOR AND ON BEHALF

PSPC RFQ NO. EP9100/65/03 RPH/EXQ.

NEUTRAL EARTHING RESISTORS

We thank you for your recent enquiry concerning the above project and associated equipment and we submit our quotation as follows.

2 Off		EATON Cutler Hammer Grid Type Neutral Earthing resistors suitable for a 11kv system rated 1000 amps, 6.4 ohms for 10 seconds. Tag Nos. ER-GT1, and ER-GT2.
Price:		£7,827 each
1 Off		EATON Cutler Hammer Grid Type Neutral Earthing resistors suitable for a 11kv system rated 600 amps, 10.6 ohms for 10 seconds. Tag No. ER-ST1
Price:		£5,986 each

/Cont'd.....

EATON

2 Off	EATON Cutler Hammer Grid Type Neutral Earthing resistors suitable for a 6.9kv system rated 1000 amps, 4 ohms for 10 seconds. Tag Nos. ER12-1L and ER12-1R
Price:	£6,012 each
4 Off	EATON Cutler Hammer Grid Type Neutral Earthing resistors suitable for a 6.9kv system rated 600 amps, 6.7 ohms for 10 seconds. Tag Nos. ERPP-1L, ERPP-1R, ERDG-1L and ERDG-1R
Price:	£4,615 each
	TOTAL CONTRACT PRICE NOT INCLUDING SPARES £52,124
Delivery:	Packed for shipment to be collected at our packers near Northampton.
Despatch:	We feel we require 16 weeks from an order or drawing approval which allows us to proceed with uninterrupted manufacture.
Validity:	The validity period shall be for 90 days from 6th November 1992.
Payment Terms:	100% payment 30 days from date of collection.
Price Basis:	Firm for delivery in 1993.

EATON

Terms & Conditions:	In the event of an order we will accept terms and conditions of purchase - International on Form P6-4 Rev 10/89 pages 1 to 3.
Documentation:	We will provide documents, drawings and manuals as requested within your enquiry.
Commissioning:	Due to the simplistic and static nature of our product, we have not allowed for any visits to site.
Language:	English shall be used in all correspondence and drawings, etc.
U.K. Origin:	The Neutral Point Earthing Resistors offered would be wholly produced and manufactured in the United Kingdom.
Inspection & Testing:	Fluor Daniel or its appointed representatives will be given access to the manufacturing plant for inspection and quality audits etc.
Progress Reports:	In the event of an order we will submit as requested Production/Barchart schedule which will include engineering, major material procurement and fabrication. This will be updated every 30 days.

Spares: We do not envisage the use of spares during the start up and commissioning stages, however we quote a spares level for normal operation.

EATON

We trust the above and attached information is to your immediate requirement. Please do not hesitate to contact us if you require any further information.

Yours faithfully,

L G Williams

LAURENCE G. WILLIAMS
SALES MANAGER
Resistor Sales Division

Encs.

EATON

SPARES

	RESISTOR BANKS COMPLETE WITH SUPPORT INSULATORS	TOTAL FITTED	SPARE LEVEL	PRICE EACH
ER-GT1 ER-GT2		24	2	£395
ER-ST1		8	1	£375
ER12-1L ER12-1R		16	2	£375
ERPP-1L ERPP-1R ERDG-1L ERDG-1R		20	2	£362
CABLE BOX INTERNAL ASS. COMMON TO ALL UNITS		18	2	£80

PRICES INCLUDE FOR PACKED FOR SHIPMENT

SHIPPING DIMENSIONS

The earthing resistors will be contained in wooden cases having the following dimensions:-

2 CASES EACH	Height	2310mm
	Width	1590mm
	Depth	1800mm
ER-GT1		
ER-GT2	Gross weight	1200 kg

EATON

3 CASES EACH	Height	1930mm
	Width	1590mm
	Depth	1800mm
ER-ST1		
ER12-1L		
ER12-1R	Gross weight	970 kg

4 CASES EACH	Height	1540mm
	Width	1590mm
	Depth	1800mm
ERPP-1L		
ERPP-1R		
ERDG-1L		
ERDG-1R	Gross weight	775 kg

TENDER

This tender is subject to confirmation
and to the terms and conditions enclosed herewith

HAWKER SIDDELEY
BRUSH TRANSFORMERS

BRUSH TRANSFORMERS LIMITED
PO Box 20, Loughborough, Leics.
LE11 1HN England
Tel: Loughborough (0509) 611411
Telex: 341094 BTL G
Cables: Brushtran Lobro Telex
Telefax: (0509) 610550
Direct Line No. 0509 612885.
Extension:
Your ref:
Our ref: CT-Z2/2502/BX/RFS
Date: 10th July, 1992

Fluor Daniel Inc,
3333 Michelson Drive
IRVINE
California,
U. S. A.

For the attention of Melissa Harvard
Mail Station 472H

Dear Sirs,

PSPC RFQ No. HP 9100/65/01 RPH/ENQ
Power Transformers

PRICED OFFER

We thank you for your enquiry dated the 10th June, 1992, and in reply have pleasure in submitting our detailed Commercial Offer for the power transformers as follows.

ITEM 1 - Equipment Nos. TX12 -1L/R, TX14-1L/R, TXDG-1L/R and TX13-1L/R

EIGHT - BRUSH, 10MVA, 3 phase, 60 Hz., 11/6.9 kV at no load, oil immersed, naturally cooled, free breathing transformers, in accordance with the attached specification.

PRICE EACH F.O.B. UNITED KINGDOM PORT. $ 109,025.00 Nett

ITEM 2 - Equipment Nos. TX12 -2L/R, TX13-2L/R, TX14-2L/R, TX12-3L/R and TX15-1L/R

TEN - BRUSH, 1600kVA, 3 phase, 60 Hz., 6600/460 volts at no load, oil immersed, naturally cooled, hermetically sealed transformers, in accordance with the attached specification.

PRICE EACH F.O.B. UNITED KINGDOM PORT. $ 23,218.00 Nett

- Continued -

To: Fluor Daniel Inc. Ref: CT-Z2/2502/BX/RFS. Date: 10th July, 1992.

ITEM 3 - Equipment Nos. TX15-2L/R

TWO - BRUSH, 630kVA, 3 phase, 60 Hz., 6600/460 volts at no load, oil immersed, naturally cooled, hermetically sealed transformers, in accordance with the attached specification.

PRICE EACH F.O.B. UNITED KINGDOM PORT. $ 14,288.00 Nett

ITEM 4 - Equipment Nos. Later

TWO - BRUSH, 6.3MVA, 3 phase, 60 Hz., 11/6.9 kV at no load, oil immersed, naturally cooled, free breathing transformers, in accordance with the attached specification.

PRICE EACH F.O.B. UNITED KINGDOM PORT. $ 74,837.00 Nett

ITEM 5 - Equipment Nos. Later

TWO - BRUSH, 12.5MVA, 3 phase, 60 Hz., 11/6.9 kV at no load, oil immersed, naturally cooled, free breathing transformers, in accordance with the attached specification.

PRICE EACH F.O.B. UNITED KINGDOM PORT. $ 125,525.00 Nett

ITEM 6 - Equipment Nos. Later

TWO - BRUSH, 8MVA, 3 phase, 60 Hz., 11/6.9 kV at no load, oil immersed, naturally cooled, free breathing transformers, in accordance with the attached specification.

PRICE EACH F.O.B. UNITED KINGDOM PORT. $ 97,741.00 Nett

- Continued -

Fluor Daniel Inc. Ref: CT-Z2/2502/BX/RFS. Date: 10th July, 1992.

TYPE TESTS

The above F.O.B. prices include for routine works tests in accordance with Clause 8.1.1. of IEC Publication No. 76 to be carried out on each transformer prior to despatch. The witnessing of these tests is included, but should type tests be required, then the following additional charges would apply.

	Items 1, 4 & 6	Items 2 & 3	Item 5
Temperature Rise Test Per Transformer	$ 2325.00	$ 1550.00	$ 2900.00
Impulse Withstand Test Per Transformer	$ 2715.00	$ 1940.00	$ 2900.00
Noise Level Test Per Transformer	$ 1260.00	$ 1260.00	$ 1260.00
Partial Discharge Test Per Transformer	$ 1260.00	$ 1260.00	$ 1260.00

PRICES

The F.O.B. prices quoted above are strictly nett and include for packing for export shipment in accordance with our Packing Manual No. 65/0004. They are firm and fixed without adjustment for the validity and despatch periods detailed below.

DESPATCH

We would anticipate being able to despatch the transformers ex-works within the following periods which date from receipt of order together with full and final manufacturing information. These times are based on our present production position and would be subject to confirmation upon receipt of your order.

Item 1 - 28/32 working weeks.
Items 2 and 3 - 18 working weeks.
Item 4 - 28 working weeks.
Item 5 - 34 working weeks.
Item 6 - 30 working weeks.

- Continued -

To: Fluor Daniel Inc. Ref: CT-Z2/2502/BX/RFS. Date: 10th July, 1992.

STATEMENT OF COMPLIANCE

Our quotation is in exact accordance with the specifications, drawings, Terms and Conditions of your Request For Quotation with no exceptions other than those listed below.

CONDITIONS OF PURCHASE

Our offer is submitted subject to the Fluor Terms and Conditions of Purchase - International, Form P6-4 Rev 10/89, except for the following comments. These comments are based on those mutually agreed between Fluor Daniel and our associate company Hawker Siddeley Power Transformers Limited during the negotiations on the Port Dickson Contract and for any order resulting from this offer, Brush Transformers are pleased to indicate our willingness to accept an identical set of Conditions negotiated between Fluor Daniel and Hawker Siddeley Power Transformers.

We understand the above Fluor Daniel Terms and Conditions of Purchase have been qualified and amended as follows:-

Clause 2 Complete Agreement.

We accept the principle that the Purchase Order shall become the binding agreement of the Seller and Buyer.

However, this Clause imposes the discipline that all aspects must be fully agreed before work commences, which may not be either feasible or desirable. In such an instance we would wish the Purchase Order to record those aspects yet to be formally agreed.

The third paragraph appears to effectively prevent any Seller initiated changes from becoming incorporated into the Purchase Order. We would therefore wish to see this Clause to find how mutually agreed changes become effective (e.g. Official Amendment to Contract).

Our Tender is made against the specifications and drawings provided to us and defines all ambiguities known at this stage. In the event that ambiguities arise during the order these should be dealt with as Clause 12 - "Changes".

- Continued -

Fluor Daniel Inc. Ref: CT-Z2/2502/BX/RFS. Date: 10th July, 1992.

Conditions of Purchase continued .....

Clause 3 - Title

No patterns, tools or other items will be preparatory to production and therefore this Clause does not apply to those aspects.

Shop drawings are not normally called for, except as a precaution in the event that we fail to produce spare parts in the future. These drawings contain Commercially Confidential information and would therefore only be made available against a Confidentiality Agreement defining their strict use.

Clause 4 - Reservation of Rights

The criteria for acceptance/rejection shall be the Factory Tests detailed on the P.O./ Specification.

Clause 7 - Warranty

We are unable to accept this Clause without amendment as it introduces provisions that are inappropriate to this order or conflict with other Clauses herein, viz;

Paragraph 1

We warrant that the goods will conform to your specification, but do not warrant that the goods will be fit for the purpose as this is the responsibility of the author of the Specification.

All Materials and Components selected by us for incorporation into the Goods will be fit for the purpose intended.

Paragraph 4

This contradicts Clause 2 and is therefore not accepted.

Clause 8 - Inspection and Expediting

We will make all reasonable endeavours to include the provisions of this Clause accepted by Sub-Suppliers where it is applicable and feasible to do so.

We wish the period of days in the last paragraph to be 28 and not 14.

- Continued -

220

To: Fluor Daniel Inc. Ref: CT-Z2/2502/BX/RFS. Date: 10th July, 1992.

Conditions of Purchase continued .....

Clause 9 - Indemnity

This Clause has no limitation and the Sellers liability is not mitigated to the extent that loss, damage etc. is caused by an indemnity. We understand that amended clauses covering "Liability for Accidents and Damage", "Additional Liability of Contractor" and "Limitations of Contractors Liability" have been agreed with Hawker Siddeley Power Transformers and we are prepared to accept identical clauses.

Clause 9.2 of your Conditions of Purchase to be deleted.

Clause 10 - Delays

Time of the essence is not acceptable. We would wish delay to be dealt with through mutually acceptable Liquidated Damages based upon the following scale.

For lateness in delivery damages charged at 1% of the price of the items so delayed per week up to a maximum of 10%.

Clause 13 - Cancellation For Default

Whilst accepting this Clause in principle we consider the terms onerous and would prefer a more equitable arrangement and we understand that Fluor Daniel are proposing an additional Clause providing a seven day remedy period on default.

Clause 15 - Laws and Regulations

We understand that English Law has been accepted by Fluor Daniel on the order with Hawker Siddeley Power Transformers. Wherever applicable we will comply with the equivalent U.K. legislation regarding Health and Safety at Work and Sexual and Racial Equality. There is no U.K. equivalent to the Vietnam Era Veterans Readjustment Act.

Clause 26 - Insurance

We note your insurance requirements. Evidence of applicable U.K. Insurance cover will be provided on receipt of your order and we would ask you to note that our scope of work does not currently cover erection services.

Clause 28 - Export Authorisation

We do not consider this Clause applicable.

221

- Continued -

Fluor Daniel Inc. Ref: CT-Z2/2502/BX/RFS. Date: 10th July, 1992.

TERMS OF PAYMENT

We note that progress payments will be considered and our offer is based on the following:-

10% on submittal of Priority 1 drawings.

15% when the copper has been covered and the transformer core cut.

12.5% when windings have been manufactured and the core built.

12.5% on completion of assembly of core and winding assembly prior to tanking.

50% on delivery F.O.B. United Kingdom Port, or if delivery is delayed by your instructions or lack of instructions, on notification by ourselves that the equipment is ready for despatch.

COMMENTS/DEVIATIONS ON SPECIFICATION

1) Engineering Notes, Clause 2

As an alternative to the membrane type of conservator detailed in this clause, our offer includes for a three part type, detailed on the attached leaflet. This type of conservator also prevents oil to air contact and has been supplied on previous contracts for Shell.

2) Addendum to Shell DEP 33.65.40.31-Gen, Clause 6.1.13

Our offer consists of sidewall mounted bushings and the internal HV winding ends will always be submerged under the cold oil level. Therefore the original wording of the above Shell DEP Standard would apply.

VALIDITY

Unless previously withdrawn by ourselves, our offer will remain open for acceptance for a period of 90 days from the 15th July, 1992.

ATTACHMENTS

Please find herewith the following:-

1. Copy of your sample order duly signed and completed where requested.

- Continued -

To: Fluor Daniel Inc. Ref: CT-Z2/2502/BX/RFS. Date: 10th July, 1992.

Attachments continued .....

2. Copy of the schedule of transformers which have been short circuit tested.
3. Reference List covering transformers of similar size and voltage supplied throughout the world in recent years.
4. Packing Manual 65/0004.
5. Leaflet on the three part conservator.
6. Transformer specifications and associated paint specifications and publications.
7. Completed technical data schedules.

We trust you will find our offer will be found in line with your requirements and should you require any further information please do not hesitate to contact the undersigned.

Yours faithfully,
p.p. BRUSH TRANSFORMERS LIMITED,

R. F. Sibson,
Commercial Department.

BMH.RFS:1

Incorporated in England: Registration No. 589650: Registered Office: Falcon Works, Loughborough, Leicestershire, LE11 1HN

BILL OF MATERIAL				
Item	Qty	Unit	Description	Price
1	1	Ea.	Tag No. TX12-1L Power Transformer: 10 MVA, Onan, Primary: 11 kV, 3-Phase, 60 Hz, Delta Connected, Secondary: 6.9 kV, 3-Phase, 60 Hz, Wye Connected, Resistance Grounded, all in accordance with Specification SP-4032-60-2 (DEP 33.65.40.31-Gen and Addendum) and Requisition Data Sheets (DEP 33.65.40.93-Gen) 1 and 2	$ 109,025
2	1	Ea.	Tag No. TX12-1R Power transformer Identical to Item 1 above	$ 109,025
3	1	Ea.	Tag No. TX14-1L Power Transformer Identical to Item 1 above	$ 109,025
4	1	Ea.	Tag No. TX14-1R Power Transformer Identical to Item 1 above	$ 109,025
5	1	Ea.	Tag No. TX DG-1L Power Transformer Identical to Item 1 above	$ 109,025
6	1	Ea.	Tag No. TX DG-1R Power Transformer Identical to Item 1 above	$ 109,025
7	1	Ea.	Tag No. TX13-1L Power Transformer Identical to Item 1 above	$ 109,025
8	1	Ea.	Tag No. TX13-1R Power Transformer Identical to Item 1 above	$ 109,025
9	1	Ea.	Tag No. TX12-2L Power Transformer: 1600 KVA, Onan, Primary: 6.6 kV, 3-Phase, 60 Hz, Delta Connected, Secondary: 460 V, 3-Phase, 60 Hz, Wye Connected, Solidly Grounded, all in accordance with Specification SP-4032-60-2 (DEP 33.65.40.31-Gen and Addendum) and Requisition Data Sheets (DEP 33.65.40.93-Gen) 4 and 5	$ 23,218
10	1	Ea.	Tag No. TX12-2R Power Transformer Identical to Item 9 above	$ 23,218

BILL OF MATERIAL				
Item	Qty	Unit	Description	Price
11	1	Ea.	Tag No. TX13-2L Power Transformer Identical to Item 9 above	$ 23,218
12	1	Ea.	Tag No. TX13-2R Power Transformer Identical to Item 9 above	$ 23,218
13	1	Ea.	Tag No. TX14-2L Power Transformer Identical to Item 9 above	$ 23,218
14	1	Ea.	Tag No. TX14-2R Power Transformer Identical to Item 9 above	$ 23,218
15	1	Ea.	Tag No. TX12-3L Power Transformer Identical to Item 9 above	$ 23,218
16	1	Ea.	Tag No. TX12-3R Power Transformer Identical to Item 9 above	$ 23,218
17	1	Ea.	Tag No. TX15-1L Power Transformer Identical to Item 9 above	$ 23,218
18	1	Ea.	Tag No. TX15-1R Power Transformer Identical to Item 9 above	$ 23,218
19	1	Ea.	Tag No. TX15-2L Power Transformer: 630 KVA, Onan, Primary: 6.6 kV, 3-Phase, 60 Hz, Delta Connected, Secondary: 460 V, 3-Phase, 60 Hz, Wye Connected, Solidly Grounded, all in accordance with Specification SP-4032-60-2 (SEP 33.65.40.31-Gen and Addendum) and Requisition Data Sheet (DEP 33.65.40.93-Gen) 6	$ 14,288
20	1	Ea.	Tag No. TX15-2R Power Transformer Identical to Item 19 above	$ 14,288
21	1	Ea.	Unit price difference if manufacturer's standard finishing is to be used on the 10 MVA transformer	$ —

BILL OF MATERIAL				
Item	Qty	Unit	Description	Price
22 X	1	Ea.	Unit price difference if manufacturer's standard finishing is to be used on the 6300 KVA transformer	$ —
23 X	1	Ea.	Unit price difference if manufacturer's standard finishing is to be used on the 1600 KVA transformer	$ —
24 X	1	Ea.	Unit price difference if manufacturer's standard finishing is to be used on the 630 KVA transformer	$ —
25 X	1	Ea.	Partial discharge test on one 10 MVA transformer	$ 1260
26 X	1	Ea.	Partial discharge test on one 6300 KVA transformer	$ 1260
27 X	1	Ea.	Partial discharge test on one 1600 KVA transformer	$ 1260
28 X	1	Ea.	Partial discharge test on one 630 KVA transformer	$ 1260
29 /	2	Ea.	Tag No. (Later) ✓ Power Transformer: 6300 KVA, Onan, Primary: 11 kV, 3-Phase, 60 Hz, Delta Connected, Secondary: 6.9 kV, 3-Phase, 60 Hz, Wye Connected, Resistance Grounded, all in accordance with Specification SP-4032-60-2 (DEP 33.65.40.31-Gen and Addendum) and Requisition Data Sheet (DEP 33.65.40.93-Gen) 3	$ 74,837
30 ✓	2	Ea.	Tag No. (Later) Power Transformer: 12.5 MVA, Onan, Primary: 11 kV, 3 Phase, 60 Hz, Delta Connected, Secondary: 6.9 kV, 3-Phase, 60 Hz, Wye Connected Resistance Grounded all in accordance with Specification SP-4032-60-2 (DEP 33.65.40.31-Gen and Addendum).	$125,525

BILL OF MATERIAL				
Item	Qty	Unit	Description	Price
31 ✓	2	Ea.	Tag No. (Later) Power Transformer: 8 MWA, Onan, Primary: 11 kV, 3 Phase, 60 Hz, Delta Connected, Secondary: 6.9 kV, 3-Phase, 60 Hz, Wye Connected Resistance Grounded all in accordance with Specification SP-4032-60-2 (DEP 33.65.40.31-Gen and Addendum).	$ 97,741
32 ✗	1	Lot	Spare parts per SPIR form attached to this RFQ	$ To Follow
33 ✗	1	Lot	Start-up spare parts with itemized pricing and delivery	$ To Follow.
34 ✗	1	Lot	Shipment of the above items FOB, jobsite	$ FOB UK Port only.

227

7

GEC ALSTHOM

T&D

VACUUM EQUIPMENT

Fluor Daniel,Inc
Mail station 472H,
3333 Michelson Drive,
Irvine, CA
Attention Mr Ernest Boykin

30 July 1992

Our Ref: 04S/AWH/X49339
Your Ref:

Dear Sirs,

PSPC RFQ NO HP.9100/67/02 RPH/ENQ
Hi-Volt Switchgear & Control Gear Assemblies

We thank you for your above referenced enquiry dated 30th June and have pleasure in providing details of our bid as follows.

We are offering four Vacuum Switchboards comprising central type HWX vacuum circuit breakers manufactured by our associated company GEC Alsthom Distribution Switchgear Ltd and as described in the enclosed specification and publication, together with our own busbar transition cubicles and type HMC1172 fused protected vacuum contactor equipment for the transformer feeders and motor starter units.

The HMC1172 equipment is detailed in our customer Design and Practice specification CDP007 & 8 enclosed and these specifications are approved by _ ,e,subject to the attached comments.

Appendixed to CDP007 & 008 are a list of additions/deletions necessary to modify the standard HMC1172 Shell equipment in line with the requirements of your enquiry.

In detail our quotation is as follows:-

PRICES

The prices detailed in our 'Bill of Material' are strictly net and fixed for the validity and delivery periods specified.

GEC ALSTHOM VACUUM EQUIPMENT LIMITED. Leicester Road, Rugby, Warwickshire. CV21 1BD England

VALIDITY

Unless previously withdrawn, our offer will remain open for acceptance for 90 days only from 30th July 1992.

STATEMENT OF COMPLIANCE

Our quotation is in exact accordance with the specifications, drawings , terms and conditions and other requirements of RFQ with no exception other then those listed below:-

1 CONDITIONS OF SALE

As the manufacture and erection of the equipment would occur outside the USA, we consider that the Terms and Conditions of Purchase form P6-4 Rev 10/89 - are not directly suitable for a subsequent order and, as we note the involvement of Shell, we submit this offer on the basis of use of the Shell Conditions MA92-2000.

2 DOCUMENTATION

Two transparencies of the equipment outline- arrangement/foundation drawing, combined wiring/schematic diagrams, standard operating/maintenance manuals,parts list,recommended spares list, test reports and certificate of compliance are included. All documentation would be in the English Language.

The following is a brief description of the contents of the standard Operation and Maintenance manual included in our offer.

1. General description of the HMC1172 Fused Vacuum Contactor Equipment.
2. Installation and Commissioning procedure.
3. Operation of the equipment.
4. Preventative maintenance.
5. Lubrication.
6. Fault finding and rectification.
7. Changeout times for major assemblies.
8. Bought out items - includes operating details of major bought out items.
9. Contract schematic diagrams and Outline drawing.

Copies of a typical manual are available on request. However should your requirements differ to that offered, we reserve the right to make additional charges.

Please also refer to our comments against your document SP-4032-90-30 enclosed

3 TERMS OF PAYMENT

Our offer is based upon the following Terms of Payment:-

10% - upon submission of general arrangement drawings for approval.
20% - at start of sub-assembly (approx 3 months from receipt of order)
20% - at start of main assembly (approx 4 months from receipt of order).
50% - on despatch or notification of readiness for despatch of the equipment.

Please note we have not allowed for the cost of bonds that you may require from us for the above terms of payment.

4 TECHNICAL SPECIFICATIONS

Please refer to our **Comments/Deviations** section enclosed

DESPATCH

Based upon our present factory commitments, we estimate that the equipment covered by this tender would be available for despatch within 26/28 working weeks dating from receipt by us of your official order complete with full and final information, enabling manufacturing to proceed uninterrupted.

DELIVERY

Our offer includes our standard export packing delivered FOB UK Port.

VALUE ADDED TAX

The prices quoted in our offer exclude Value Added Tax and we reserve the right to recover by way of extra to the contract price any monies we may have to pay in respect to value added tax. Direct export orders are not currently the subject of V.A.T.

WORKS TEST

Routine works tests in line with our standard procedures are included at the respective manufacturers premises for main items of equipment. The price also includes for you or your representative to witness these tests, on the basis of 5 days at each of the main manufacturers premises. If tests other than our standard are required or should the tests extend beyond 5 days, we reserve the right to charge an additional sum. Currently the rate is £350.00 per normal working day or part thereof.

Note: We have not included for a combined board line-up or tests with the circuit breakers. Fused vacuum contactor equipment & circuit breakers would be despatched direct to site from the respective manufacturing locations.

SITE WORK

Our offer excludes all site work however, the services of engineers to supervise or carry out installation and/or commissioning are available. This would be carried out on a T & Expenses basis, alternatively we would be happy to prepare a firm quote against your detailed requirements.

Current Time and Expenses rates are enclosed.

PRODUCTION PROGRAMME

The attached production programme is provided for tendering purposes only and is subject to conformation/review at the time of order placement.

SHIPPING POINTS

The HWX vacuum circuit breakers would be shipped directly from GEC Alsthom Distribution Switchgear's factory at Manchester and the busbar transition cubicles and the HMC1172 equipment would be shipped from our factory at Rugby

SHIPPING SPECIFICATION

Our tender arrangement drawings provide details of the shipping sections for each switchboard and we have also enclosed our HMC1172 shipping specification which gives the full details of 2,3 & 4 pitch shipping sections.

Details of the Vacuum circuit breakers shipping specification will follow shortly.

CONCLUSION

We trust that the information contained in the above and in the enclosed Technical Specification and Publications meets with your entire approval. Should you require any further information, please do not hesitate to contact the writer here in Rugby.

Yours faithfully

A.W. Haycock
Principal Sales Engineer
M.V. Products

Bill of Materials

1 1 - HMC1172/HWX Vacuum Switchboard 12-2 Suitable for a 6.6kV ,1250 amp, 31.5 Ka for 1 secs, 80 Ka peak and comprising-

2 - 1250 amp type HWX Incoming Vacuum circuit breakers
1 - 1250 amp type HWX Incoming Vacuum circuit breaker
4 - 630 amp substation feeder circuit breakers
2 - 630 amp skeleton circuit breaker cubicles
2 - HWX/HMC1172 busbar transition cubicles
4 - HMC1172 Latched Vacuum Contactor Transformer feeder units 1600kVA
12-HMC1172 electrically held Vacuum Contactor D.O.L. starters 200-1320kW
5 - HMC1172 Skeleton cubicles

TOTAL PRICE **£324,473.00**

1A 1 - 6.6kV Switchboard as detailed under item 1 But having 1600 amp incoming and bus section circuit breakers

TOTAL PRICE **£336,741.00**

125958

2 1 - HMC1172/HWX Vacuum Switchboard 13-1 Suitable for a 6.6kV ,1250 amp, 31.5 Ka for 1 secs, 80 Ka peak and comprising-

TIE

2 -1250 amp type HWX Incoming Vacuum circuit breakers
1 -1250 amp type HWX Incoming Vacuum circuit breaker
2 -HWX/HMC1172 busbar transition cubicles
2 -HMC1172 Latched Vacuum Contactor Transformer feeder units 1600kVA
2 -HMC1172 electrically held Vacuum Contactor D.O.L. starters 200kW
2 -HMC1172 Skeleton cubicles

TOTAL PRICE **£134,509.00**

add
to above
STILL
@£120,000 ea

306486

3 1 - HMC1172/HWX Vacuum Switchboard 14-1 Suitable for a 6.6kV ,1250 amp, 31.5 Ka for 1 secs, 80 Ka peak and comprising-

2 -1250 amp type HWX Incoming Vacuum circuit breakers
1 -1250 amp type HWX Incoming Vacuum circuit breaker
2 -HWX/HMC1172 busbar transition cubicles
2 -HMC1172 Latched Vacuum Contactor Transformer feeder units 1600kVA
27-HMC1172 electrically held Vacuum Contactor D.O.L. starters 200-2650kW
4 -HMC1172 Skeleton cubicles

TOTAL PRICE 621280 **£360,247.00**

3A 1- 6.6Kv Switchboard as detailed under item 3 But having 1600 amp incoming and bus section circuit breakers

TOTAL PRICE **£371,746.00**

4 1- HMC1172/HWX Vacuum Switchboard 15-1 Suitable for a 6.6kV ,1250 amp, 31.5 kA for 1 secs, 80 kA peak and comprising-

2 -1250 amp type HWX Incoming Vacuum circuit breakers
1 -1250 amp type HWX Incoming Vacuum circuit breaker
2 -HWX/HMC1172 busbar transition cubicles
2 -HMC1172 Latched Vacuum Contactor Transformer feeder units 1600kVA
6 -HMC1172 electrically held Vacuum Contactor D.O.L. starters 185-400kW
4 -HMC1172 Skeleton cubicles

TOTAL PRICE **£162,231.00**

5 1- DC system for HT12-1 and as detailed in our specification

PRICE **£6603.00**

6 1- DC system for HT12-2 and as detailed in our specification

PRICE **£6603.00**

7 1- DC system for HT13-1 and as detailed in our specification

PRICE **£6603.00**

8 1- DC system for HT13-2 and as detailed in our specification

PRICE **£6603.00**

include ?

9 1- DC system for HT14-1 and as detailed in our specification

PRICE **£6603.00**

10 1- DC system for HT14-2 and as detailed in our specification

PRICE **£6603.00**

11 1- DC system for HT15-1 and as detailed in our specification

PRICE **£6603.00**

12 1- DC system for HT15-2 and as detailed in our specification

PRICE **£6603.00**

13 Unit price to add/delete one 630 amp type HWX Vacuum Circuit Breaker cubicle (Diagram 3)

PRICE **£12074.00**

14 Unit price to add/delete one 800 amp type HWX Vacuum Circuit Breaker cubicle (Diagram 3)

PRICE **£12074.00**

15 Unit price to add/delete one 630 amp type HWX Vacuum Circuit Breaker cubicle (Diagram 5)

PRICE **£10640.00**

16 Unit price to add/delete one 800 amp type HWX Vacuum Circuit Breaker cubicle (Diagram 5)

PRICE **£10640.00**

17 Unit price to/delete one motor feeder cubicle (Diagram 1)

PRICE **£9650.00**

18 Unit price to add/delete one transformer feeder (Diagram 4)

PRICE **£9752.00**

19 Extra for supplying a 'Motor Manager' instead of the P.& B. Golds type

PBSJ 3E5C electronic motor protection relay

THERE WOULD BE NO CHANGE IN PRICE FOR SUPPLYING THIS RELAY

20 Extra for supplying the 'Motor manager'relay in place of the PBSJ 3E5C and a RTD trip amplifiers for winding temperature (3 pase) and single input bearing temperature and cooling air, and one front of panel mounted self reset auxiliary relay, with flag indication,for water detection.

EXTRA PRICE PER STARTER **£1326.00**

21 Extra for fitting mechanical latch mechanism to starters

EXTRA PRICE PER STARTER **£155.00**

22 Extra price to add/delete one skeleton circuit breaker cubicle

PRICE EACH **£4843.00**

23 Extra price to add/delete one skeleton motor starter cubicle

PRICE EACH **£2862.00**

24 Start up spares

TOTAL PRICE **TO FOLLOW**

Notes

1 We regret that we have not been able to obtain prices for the ABB relays and will follow up with any cost impact as quickly as possible.

2 Item 20 is given as an extra to the basic cost of the Motor Starters and covers a Megacon type KTC 3 internally mounted trip amplifier for the winding RTD's and a panel mounted type KPM30 device (total 2) for the bearing RTD and the air temperature RTD. We would also provide a MIDOS type MVAAA11self reset flag relay with volt free contacts to operate from a remote Water Detector device. All of the above devices would provide remote alarm and are self resetting.

3 Item 21 covers the cost of providing a mechanically latched vacuum contactor instead of the usual electrically held device to prevent the contactor dropping out due to momentary voltage dip.If this option is taken up additional multiplying relays will be required on the circuit breakers to provide undervoltage trip signals at the contactors. Price of these devices would be advised when numbers are known.

4 The add in/take out prices given for items 13-18 and 22 & 23 are indicative only and are subject to a maximum reduction in the quantity of 4/5 of any one type of circuits. Dependent upon the final arrangement of the switchboards the prices may be subject to a small adjustment. The prices given cannot be used as a stand alone cost for further calculations outside of this project as they do not include engineering or commercial handling charges.The prices are also subject to any change in the circuit quantities being known at the time of placing the order; changes during the contract may be subject to additional commercial handling charges.