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MASTER

ANG COAL GASIFICATION PROJECT MANAGEMENT CONTROL
SYSTEM REPORT

Work Performed Under Contract No. FC03-79RA20225

ANG Coal Gasification Company
Detroit, Michigan

U. S. DEPARTMENT OF ENERGY

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ANG COAL GASIFICATION
PROJECT MANAGEMENT
CONTROL SYSTEM REPORT

DOE/RA/20225--T2

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PROJECT MANAGEMENT CONTROL SYSTEM REPORT

SECTION I

INTRODUCTION

Project Management establishes the targets and procedures for accomplishing the task of mechanical completion in the necessary and selected sequence for complete plant start-up in proper steps. Significant objectives of the ANG Project Management Control System include:

1. Effective and proper interface between ANG-Lummus-Kaiser Project Controls departments and senior project management.
2. Supply of responsive information.
3. Accurate and timely analysis of all Cost and Schedule activities in the project as well as effective reporting of such analyses in a timely manner.
4. High degree of management influence on all project related decisions in order for the project to be constructed within the approved budget and become productive within the specified time frame.

The Project Management System for GPGA has been designed under the guidance of ANG to provide a combination of organizational structures, procedures, programs, (both manual and computer oriented) and proven industrial techniques that focus the attention of senior project management on actual status and potential problems relating to the ultimate cost and time of completion of the project. These systems relate primarily to four major areas of control:

1. Cost Control
2. Schedule Control

3. Resource (Manhour) Control

4. Physical Progress Control

Each of these four major areas is provided with separate functions, procedures and programs that develop and maintain detail status information and provide trends as compared against a defined baseline. The initial approved project control estimate is used in developing a baseline for each of four control areas. The management of changes to the control estimate is a primary responsibility of ANG's Project Controls Department.

The basic detail project control functions for the project are shared according to the extent of involvement by our two contractors: Kaiser Engineers, Inc. (KE) and the CE Lummus Company. The CE Lummus Company has the overall project management responsibility, with Kaiser providing construction management and off-site design. All the Project Controls procedures established by ANG, Lummus and Kaiser emphasize the need for a strong information analysis function in order to identify problems, initiate corrective actions and verify effectiveness of corrective actions.

Included in the Project Controls System are the following procedures:

Job Instructions

Cost Procedures

Schedule Procedures

The Job Instructions, included as Annex I, outline the procedures to be followed during the project, and define responsibilities and work relationships between ANG, Lummus and Kaiser. The Job Instructions are used as the guideline and basic direction from which all job related information flows.

The Cost Procedures define the control system to be used. Included in this procedure are the types of reports to be generated, the philosophies and guidelines to be followed, along with the Deviation and Change Order Procedures established for the project. The Deviation and Change Order

Procedures have been included as Annexes III and IV.

The Scheduling Coordination Procedures have been developed jointly by ANG, Lummus and Kaiser. This procedure establishes the formats and defines the overall complex plan, the master project network schedule, the engineering, procurement and construction schedules, the monthly progress reports and the material coordination plan.

The role of ANG's Project Controls Department includes, but is not limited to, the issue and maintenance of project administration and control procedures; the review and approval of contractor's budgetary estimates; schedules and monthly progress reports; the implementation and management of the project's Change Order Control System; the chairing and/or participation in various weekly, monthly and semi-annual cost, schedule, progress review or action task force meetings; and the coordination, consultation, supervision or direction, as required of all contractor, subcontractor or supplier activities which relate to and/or affect the cost or schedule of the project. Primary emphasis is placed on ANG's Project Controls Department for monthly and quarterly analytical projections of total expected end costs and recommendations to executive management for assuring the end cost remains within budget.

ANG has worked with both Lummus and Kaiser to utilize existing and proven computer programs and avoid program development, cost and experimental uncertainties. Accordingly, ANG has adopted the Kaiser Cost Control Program as well as their Scheduling Control Programs for both procurement and field construction. Additionally, ANG accepted the Lummus Schedule Control Program for all engineering activities. In summary:

- . Cost Control System - KE Proprietary Program
- . Schedule Control System:

Engineering - Lummus PMS IV

Procurement - KE PSSR

Construction - KE CPM 9

Computer centers in Oakland, Windsor, Connecticut, Detroit and the job-site will be linked together through dial-up type lines of a tieline dedicated 100% to the ANG project.

IMPLEMENTATION OF PROJECT CONTROLS

SECTION II

GENERAL

As in the beginning of all extremely large projects, engineering, design and procurement define the project design criteria which consists of items such as equipment lists, drawings, plot plans, specifications, etc. As the definition is being established, Project Management establishes the scope of this design criteria, such as timing (schedule) and the budgetary constraints, along with the tracking mechanism "work breakdown structure"--in other words, how Project Management is going to control the project. At this point, interfaces with Construction and Field Procurement are also taking place so that there is an intergration of all parties involved. It is also at this point when procedures for cost and schedule control are formulated which encompass the monitoring and reporting functions for Lummus/Kaiser as well as the ANG management team.

After more of the above planning definition and integrative work definition were created, ANG project management directed Lummus and Kaiser to submit a very detailed control estimate for the coal gasification project.

CONTROL ESTIMATE PLAN

A "Control Estimate Plan" was developed and outlined the basis of the estimate, the type of quantity take-off used, how the cost estimate was developed, the type of estimate evaluation given and how the area estimates would be reviewed.

The plan established an estimate volume reflecting the total installed cost of the plant to be presented to ANG. The estimate volume included an overall plant summary of costs, as well as summary of costs by areas

and the estimate detail work-sheets.

Other volumes submitted include all engineering documents, basic pricing data and other scope definitions used in the preparation of the control estimate.

The control estimate is extremely important, since it serves as the budget for the project and is used to measure project changes, whether they be engineering, procurement, or construction. It is used for cost control and cost containment on the project. The control estimate allows for bulk ordering of commodities as determined from the estimate. Also, it helps to finalize the construction plan and establish economic priorities.

The format of the estimate was designed to facilitate reporting and control. The format was established under the direction of ANG, and is structured as the ANG Coal Gasification Project Code of Accounts, Annex II.

PROJECT CODE OF ACCOUNTS

The Project Code of Accounts is based on a custom-designed work break-down structure which is used to segregate all manhours and costs appearing in the control estimate. As the system is designed to report on any of the work break-down accounts, this flexibility allows detailed reports for monitoring and analyzing construction, as well as general management and summary reports to be generated using one system.

The work breakdown structure is a computerized system and is depicted as twelve digits: XX XX XXXX X XXX. The first two digits (area number) divide the ANG project into "plot limit" areas. Each area is a definable plant facility.

The digits appearing second are referred to as the area detail number. The area detail number is an unstructured number and is unique to its specific area. It is used to give the specific area better definition or separate the area into "sub-areas" for construction.

The next four digits are referred to as "elements of work". These digits

further define the area into discrete classes of construction. Listed below are the major elements of work:

1000 - Civil	5000 - Instruments, Insulation, Painting, Fireproofing & Test
2000 - Structural & Architectural	6000 - Piping
3000 - Equipment	8000 - Electrical
4000 - Equipment	

9000 - General Conditions

- The detail designator X has been used as an additional digit for the elements of work. The control estimate utilized this position to identify individual equipment pieces.

The last three digits are termed elements of cost. This series of numbers defines the corporate entity and the basic elements of cost such as labor, materials, construction equipment, etc.

The above described work breakdown structure allows the construction activities to be analyzed with respect to cost experienced to-date, cost experienced for the reporting period, the estimated cost to complete, physical progress to-date, estimated time to complete and the scheduled completion date.

As construction progresses, the quantity of work is measured through an earned value method to develop the physical progress and performance evaluations. Weighting based on manhour allocation is used as a common denominator to summarize actual installed quantities as actual physical progress, and to provide a basis for measuring productivity. This facilitates effective monitoring of related cost and progress.

Reports showing costs and comparisons to the control estimate, schedules, progress, progress productivity and unit cost are the primary tools used to manage the project, and are a result of the work breakdown structure.

PROJECT SCHEDULE

As the work breakdown structure is developed and implemented, development of a Project Schedule for the overall project as well as by area is also being established. The Master E-P-C (Engineering, Procurement and Construction) Schedule, Exhibit A, is the basis for all of the Area E-P-C Schedules, Exhibit B, and computerized CPM network schedules developed for the project.

The Master E-P-C Schedule, developed coincident with engineering, procurement, construction and start-up requirements, serves as the overall "Major Milestone" approach to the scheduling effort of the project. Much coordination is needed between all of the parties involved. Once the Master E-P-C Schedule is established and the overall picture of the project is apparent, detail Area E-P-C Schedules are formed.

Identical in format to the Master E-P-C Schedule, an Area E-P-C Schedule details the work to be performed in that area according to the work breakdown structure established by the Code of Accounts. Each item to be performed for that specific area from engineering start through procurement, construction completion, and start-up is registered. Detailed computerized CPM network diagram schedules are then prepared for each area. ANG chose to use Lummus' PMS IV system for engineering tracking and monitoring, Kaiser's PSSR (Procurement, Scheduling and Status Report) for procurement and Kaiser's CPM 9 for construction.

PMS IV

The basis for Lummus' scheduling system is the IBM PMS-IV program. This computer program combined with Lummus developed computer routines, and the input data taken from the Area E-P-C Schedules, performs the calculations necessary to forecast critical path start and completion dates for all project activities through completion.

PSSR

Using the PMS-IV schedules as a base, procurement schedules are prepared for each portion of work. The system used for equipment and selected commodities is Kaiser's Procurement Scheduling and Status Reporting (PSSR) system, Exhibit C. Application of PSSR to the scheduling of activities allows project management to exert control. This control takes the form of decisive action by project management when delays in scheduled activity either from original schedules or current forecasted schedules are encountered. Project management obtains the information with which to control and monitor project activities through selective PSSR reports which:

1. Present the original and current schedules for all items of equipment, from release of design through shipment to the jobsite.
2. Indicate those items of equipment where schedules have extended from either the original or current forecasted schedule, and calculate the number of days extension for each activity.
3. Highlight those items for which activities have not extended from the original schedule, but, if not improved or current schedule maintained, may become critical to field construction activity.

Early recognition of a delay allows for corrective action before the overall project schedule is jeopardized.

The PSSR is composed of two distinct sections, identity and quantification. A project equipment list is used as the control base for the PSSR. Each item of equipment or material is assigned an equipment piece number and subsequently correlated with all other descriptive data and source information.

Examples of identity information are:

Equipment Description	Purchase Order Number
Cost Code Number	Vendor or Sub-vendor
Requisition Number	Factory Location of Vendor or Sub-vendor

Specification Number

Installing Contractor

Identity information remains fixed in PSSR reports until modified or deleted.

The quantification section of the PSSR is designed to calculate the effect of current activities against original or revised schedules and forecast the subsequent impact on requirements in the form of positive or negative float days. Quantification functions by intergrating four program characteristics:

Activity Dates

Methods of Scheduling

Schedule Class

Delivery/CPM Float

ENGINEERING MANPOWER

Manpower schedules for contractor home office, Exhibit D, engineering, Exhibit E, and construction, Exhibit F, are developed using the information indicated by the Master Project E-P-C Schedules. Manhours are developed for each discipline or activity of work thereby developing a base plan for manpower for the control estimate. The control document used for recording the engineering and home office planned, actual and forecasted manhours is developed manually and updated on a monthly basis. The control document is designed to record:

Total Manhours - Control Estimate

Total Manhours spent for the Period

Total Manhours - Current

Total Manhours spent to-date

Manhours Planned/Actual/Forecasted by Month

Total Manhours Forecast

The manhour control document used for contractor home office is divided into the following activities for monitoring:

Engineering, Design & Drafting

Cost

Procurement

Scheduling

Administration

Project Management

Steno

Computer System & Control

Accounting

Initial Operations

Office Services

Construction

The manhour control document used for contractor engineering monitoring is divided into the following disciplines:

Project	Civil & Structural
Process	Vessels
Instrumentation	Electrical
Rotating Machine	Piping - Engineering
Mechanical Plant Utilities	Piping B /M
Engineering Specialist	Piping
HTD (Heat Transfer Division)	Model
Architectural & HVAC	Design Administration

CONSTRUCTION MANPOWER

Manhours were developed for construction using the Kaiser CPM-9 computer program. The program uses precedence diagramming techniques to represent the scheduling logic.

The CPM-9 scheduling program established critical milestones for each area; compares the planned construction activities to the required set with critical milestones; reports by criticality to produce a concise report on the problem areas; produces a time scaled bar chart for various reports and levels and summarizes planned construction manpower by area and craft each month.

During the development of CPM logic, manhours are assigned to each activity on the construction network. The manpower planning portion of the program then sums up all these manhours by construction standard and reports the number of manhours planned per month per construction standard. Thus, for any month on the project the total number of craft are known. These totals are reported by month and also cumulative from month to month.

MANPOWER CURVES

Using the above mentioned scheduling tools to develop and monitor the

home office, engineering and construction manpower, "S" curves (Exhibits G and H) are then developed for Home Office, Engineering and Construction. The Home Office and Engineering Manhour documents are used to plot cumulative curves indicating the planned, spent and forecasted manhours.

The actual cumulative curve is plotted once a month indicating what has been spent in accordance with the time designated on the Area E-P-C Schedules.

The trend forecast manhours are plotted using the following formula. This formula is based on the performance index found on the Engineering Progress Analysis document.

$$\frac{\text{ACTUAL PERFORMANCE INDEX}}{\text{PLANNED PERFORMANCE INDEX}} \times \frac{\text{REMAINING CONTROL}}{\text{ESTIMATE MANHOURS}}$$

Manhours forecasted to complete the work combined with manhours actually spent provide the current estimate of manhours at completion.

The Engineering Progress Analysis Chart, Exhibit I, is used to monitor the planned, actual and forecasted physical progress along with the planned actual performance index of engineering for detail design.

A planned "S" curve is constructed using the time span indicating AFC documents shown on the Area E-P-C Schedules multiplied by the assigned weight given to the document indicated on the Physical Progress Engineering Activity table, Exhibit J, plotted in accordance with the resulting percentage.

Once detail design begins and physical progress occurs, actual percent physical progress, as calculated on the physical progress by engineering activity is plotted. The physical progress by engineering document is used by the contractors in planning and recording the total number of documents/drawings necessary for the project. Credit for physical progress is given only when a document is signed by ANG and issued AFC (Approved For Construction) or is issued AFC in accordance with direction from ANG Engineering Managers.

DEVIATION AND CHANGE ORDER PROCEDURES, ANNEXES III AND IV

Procedures which provide methods of control for scope, cost and schedule changes also act as rigid guidelines for the ANG project. Once a change is recognized by either contractor or ANG, a deviation notice is issued which outlines in very broad terms the type of change, purpose and an "Order of Magnituded" estimate of effect on cost and schedule. After management review of the deviation, if it is deemed necessary, the deviation is prepared as a change order. If the deviation needs more consideration or a decision is not readily available, the deviation is reported as a trend and will appear forecasted as a trend until the decision is finalized.

In defining the deviation as a change order, information is gathered in the following manner. The contractor responsible for the area prepares the change order form and issues it to estimating for the purpose of calculating the manhours required to process the change through engineering. Engineering is responsible for describing the change, stating the reason for the change and preparing the backup documentation. Estimating is responsible for developing the total installed cost difference based on the scope definition presented by engineering. The information is then forwarded to the scheduling department. Scheduling is responsible for developing the time impact on the work plan and effect, if any, on the project completion date.

Once the change order is complete, the contractors are required to review, approve and sign the change order and release it to ANG for review and approval.

The deviations and change orders are presented and reviewed with ANG at the monthly cost meetings.

A major part of cost control centers around a document titled "Incurred Cost Schedule" which constitutes the basic budget planning vehicle for commitment of owner capital and financial management. This projection of periodic costs covering the entire project life is required initially to establish the

expenditure pattern and thereafter updated quarterly to indicate the projections for the upcoming months. This schedule is prepared in a manner to identify line item budget dollars with like identities appearing in the cost control system as well as the invoices received from the contractors. This requirement is for the purpose of increasing the effectiveness of the monthly invoice reviews performed by ANG.

CONCLUSION

In conclusion, much time, money and effort has been spent in the forefront of this project for project controls. The work breakdown structure for the systems has been custom designed for this project. The systems, both manual and computerized, have been will scrutinized and chosen by ANG and represent the most cost effective and efficient way of controlling a project the magnitude of \$1.5 billion. These systems have been developed in a manner so that information can be gathered as detailed or as summarized as necessary, and in the most timely and expeditious ways.

[illegible]

[illegible]

[illegible]

BASE YR= 000
 USAGE = ANG COAL GASIFICATION
 REPORT = SORT BY AREA/TIME/SEQUENCE

K A I S E R E N G I N E E R S
 PROCUREMENT SCHEDULING & STATUS REPORT
 STANDARD FORMAT

RUN DATE PAR2
 CUR DATE 03/11/87
 PAGE 137

EQUIPMENT NO. RESPONSIBILITY	P. D. SPEC NO. /	CD & REF AREA/REG	DESCRIPTION & QUANTITY CUST CODE VENDOR/ORIGIN/COMMENTS	SCHED CLASS	ST SPEC TO CLNT	CLNT AP REQ'N	ISS RFO BID R/C	RFP DTE CLNT A	PU AWRO DNG SUB	FAB RLS SHIP	ARRIVE NEEDED	CRIT FLY.
GD-1801-C X- -A	- 4412	1800	TAR SEPARATOR RAKING DRIVE VENDOR SUPPLIED WITH FA-1802C PITTSBURGH-DES MOINES, IA	446	A15FEB0	A15APRO A20JUN0		A28MAY1 A11AUG1	A12UCT1 A18DEC1	A22JAN2 F15MAY2	30MAY2 01JUL2	32
GD-1802-A X- -A	- 4412	1800	TAR SEPARATOR RAKING DRIVE VENDOR SUPPLIED WITH FA-1802A PITTSBURGH-DES MOINES, IA	446	A15FEB0	A15APRO A20JUN0		A28MAY1 A11AUG1	A12UCT1 A18DEC1	A22JAN2 F15MAY2	30MAY2 01JUL2	32
GD-1802-B X- -A	- 4412	1800	TAR SEPARATOR RAKING DRIVE VENDOR SUPPLIED WITH FA-1802B PITTSBURGH-DES MOINES, IA	446	A15FEB0	A15APRO A20JUN0		A28MAY1 A11AUG1	A12UCT1 A18DEC1	A22JAN2 F15MAY2	30MAY2 01JUL2	32
GD-1802-C X- -A	- 4412	1800	TAR SEPARATOR RAKING DRIVE VENDOR SUPPLIED WITH FA-1802C PITTSBURGH-DES MOINES, IA	446	A15FEB0	A15APRO A20JUN0		A28MAY1 A11AUG1	A12UCT1 A18DEC1	A22JAN2 F15MAY2	30MAY2 01JUL2	32
GD-1827- - -L	8302- 3020502A	0502A	GRINDER AT FA-1802A 1800-37407-261 HOELSCHER TECNIC-GORATOR GMBH HERNE 1, W. GERMANY	642	A01APRO A07APRO 15-	A23APRO	A08MAY0 A03JUL0	A09JUN1 A12AUG1	A09UCT1 A11NOV1	A05JAN2 F08APR2	F04JUN2 15AUG2	72
18 GD-1827-CX - -L	8302- 3020502B	0502B	FLEX DISC TYPE COUPLING REXNORD MECH. POWER DIV.- WARREN, PA	742		A11JAN2			A29JAN2	F28FEB2	14MAR2 15AUG2	154
GD-1828- - -L	8302- 3020502A	0502A	GRINDER AT FA-1802B 1800-37408-261 HOELSCHER TECNIC-GORATOR GMBH HERNE 1, W. GERMANY	642	A01APRO A07APRO 15-	A23APRO	A08MAY0 A03JUL0	A09JUN1 A12AUG1	A09UCT1 A11NOV1	A05JAN2 F08APR2	F04JUN2 15AUG2	72
GD-1828-CX - -L	8302- 3020502B	0502B	FLEX DISC TYPE COUPLING REXNORD MECH. POWER DIV.- WARREN, PA	742		A11JAN2			A29JAN2	F28FEB2	14MAR2 15AUG2	154
GD-1829- - -L	8302- 3020502A	0502A	GRINDER AT FA-1802C 1800-37409-261 HOELSCHER TECNIC-GORATOR GMBH HERNE 1, W. GERMANY	642	A01APRO 15-	A23APRO	A08MAY0 A03JUL0	A09JUN1 A12AUG1	A09UCT1 A11NOV1	A05JAN2 F08APR2	F04JUN2 15AUG2	72
GD-1829-CX - -L	8302- 3020502B	0502B	FLEX DISC TYPE COUPLING REXNORD MECH. POWER DIV.- WARREN, PA	742		A11JAN2			A29JAN2	F28FEB2	14MAR2 15AUG2	154

(Control Estimate Manhours = _____
Conversion 1 Manmonth = 100 Manhours)

PCM Review.

19

(Control Estimate Manhours - _____
Conversion 1 Manmonth = 168 Manhours)

PCM Review _____ Date _____

[illegible]

Forecast Date: _____

Month Ending Date_____

By _____ Date _____

PCM _____ Date _____

REV 1/1/80 CP-1007

Forecast Date _____

Month Ending Date_____

By _____ Date _____

Review _____ Date _____

Man Months

REV 1-1/80 CM-1001

22

Area _____
 Contractor _____

DETAILED ENGINEERING MANMONTHS SUMMARY

(Control Estimate Manhours = _____)
 (Conversion 1 Manmonth = 160 Manhours)

Month Ending Date _____
 Forecast Date _____
 Forecast Manhours _____
 Forecast Manmonths _____

Month Ending Date _____

Forecast Date _____

Forecast Manhours _____

Forecast Manmonths _____

(Control Estimate Manhours = _____)
(Conversion 1 Manmonth = 160 Manhours)

REV. 11-2-79 P-1004

EXHIBIT H

Area _____
 Contractor _____

DETAILED ENGINEERING PROGRESS ANALYSIS

Month Ending Date _____
 Forecast Date _____
 Forecast Productivity _____

EXHIBIT J

PHYSICAL PROGRESS BY ENGINEERING ACTIVITY

Area _____
 Contractor _____
 Total Project _____

PERCENT OF TOTAL GAS PLANT ENGINEERING = _____

DATE _____

ACTIVITY	①	②	③	④	⑤	⑥	⑦	⑧
	TOTALS PLANNED	TOTALS COMPLETE THIS MONTH	TOTALS COMPLETE TO DATE	ASSIGNED WEIGHT	SCHEDULED PERCENT COMPLETE TO DATE	ACTUAL PERCENT COMPLETE TO DATE ③ ÷ ①	PERCENT COMPLETE THIS FACILITY WEIGHTED PERCENT COMPLETE ④ X ⑥	PERCENT COMPLETE TOTAL PROJECT WEIGHTED PERCENT COMPLETE ⑦ X ② FACTOR
DRAWINGS								
REVISIONS								
P & ID'S & PFD'S								
ISO'S								
INSTRUMENT DATA SHEETS								
SPEC'S								
MODEL TABLES								
M/R-Q								
M/R-P								
VENDOR PRINTS								
TOTALS				26				

JOB INSTRUCTIONS

ANG REVISION 2

November 1, 1980

J O B I N S T R U C T I O N S

ANG COAL GASIFICATION COMPANY
GREAT PLAINS GASIFICATION ASSOCIATES PROJECT

LUMMUS JOB 7102

KAISER JOB 7381

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 - 5.2.2 Address, Telephone and Telex
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 - 5.3.2 Address, Telephone and Telex
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 - 9.3.3 Aboveground Piping
 - 9.3.4 Construction Equipment Rental
 - 9.3.5 Purchasing Details
- 9.4 Standardization
- 9.5 Purchasing Forms (Excluding Field Purchase)
- 9.6 Bidders List
 - 9.6.1 Approved Bidders List
 - 9.6.2 Subcontract Bidders Lists
 - 9.6.3 Additions and Deletions

9.0 PURCHASING (cont'd)

- 9.6.3.1 Additions
 - 9.6.3.2 Deletions
 - 9.6.3.3 Emergency
- 9.7 Competitive Bidding
- 9.8 Written Bid Requirement (Lummus/Kaiser Home Office)
- 9.9 Sealed Bids
 - 9.9.1 Sealed Bid Requirements
 - 9.9.2 Validity of Sealed Bids
 - 9.9.3 Sealed Bid Acceptance/Rejection
 - 9.9.4 Communication with Bidders
 - 9.9.5 "No Bid" Replies
 - 9.9.6 Sealed Bid Opening
 - 9.9.7 Deviation from Sealed Bid Requirement
- 9.10 Instruction
- 9.11 Progress Payments
- 9.12 Supervising Engineers
- 9.13 Spare Parts
- 9.14 Requisition Preparation
- 9.15 Requisition Distribution
- 9.16 Instructions to Bidders
- 9.17 Inquiry Number
- 9.18 Contents of Inquiry Package
 - 9.18.1 Exceptions
- 9.19 Inquiry Distribution
- 9.20 Bid Clarification Meetings/Major Equipment
- 9.21 Quotations
- 9.22 Preparation and Internal Approvals Required on Bid Tabulation
- 9.23 Bid Tabulation for Commodity Items
- 9.24 Subcontract Bidders List
- 9.25 Selection of Type of Subcontract
- 9.26 Subcontract Inquiries
- 9.27 Bid Tabulation Document
- 9.28 Approvals Required to Purchase
- 9.29 Distribution of Approved Bid Tabulation
- 9.30 Authorization to Purchase/Purchase Order Requisition (POR)
- 9.31 Purchase Order Requisition (POR) Number
- 9.32 Purchase Orders
- 9.33 Purchase Order Distribution
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- 9.39 Revisions in Total Price
- 9.40 Purchase Order Supplement
- 9.41 Pre-Award Meetings
- 9.42 Procurement Scheduling and Status Reporting System (PSSR)
- 9.43 Repetitive Purchasing
- 9.44 Distribution of Documents, Drawings, Specifications and Vendor Prints
- 9.45 Freight/Taxes/Duty
- 9.46 Freight Allowed
- 9.47 Foreign Freight Cost
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- 9.49 Insurance/Material In Transit, Etc.

- 9.49.1 Domestic Shipments
- 9.49.2 Foreign Shipments
- 9.49.3 Claim Reporting

9.50 Task-Force Procurement

- 9.50.1 Task Force Composition/Lummus, Bloomfield
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10.0 FOREIGN (OUTSIDE U.S.A.) PROCUREMENT INSTRUCTIONS

- 10.1 Introduction
- 10.2 Predetermined European and Japanese Marketplace
- 10.3 Selection of Vendors
- 10.4 Requisitions
- 10.5 Sealed Bids
- 10.6 Inquiries
- 10.7 Quotations
- 10.8 Tabulations
- 10.9 Purchase Order
- 10.10 Expediting
- 10.11 Inspection
- 10.12 Traffic

11.0 EXPEDITING AND INSPECTION

- 11.1 Introduction
- 11.2 Functions
- 11.3 Scope of Vendor Orientation
- 11.4 Scope of Expediting
 - 11.4.1 Lummus
 - 11.4.1.1 Office Expediting
 - 11.4.1.2 Field Expediting
 - 11.4.2 Kaiser
 - 11.4.2.1 Project Expeditor
 - 11.4.2.2 Office Expeditors
 - 11.4.2.3 Field Expeditors

11.5 Scope of Inspection

11.5.1 Items Subject to Inspection

- 11.5.1.1 Inspection by the Inspection Department
- 11.5.1.2 Inspection Jointly by Inspection and
Engineering Department
- 11.5.1.3 Division of Responsibility

- 11.5.2 Mill Certificates
- 11.5.3 Final Inspection at Seller's Plant
- 11.5.4 Rejection of Material
- 11.5.5 Final Inspection/Receipt at Jobsite

12.0 TRAFFIC

- 12.1 Domestic
- 12.2 Export and Import

13.0 REPORTS AND CONTROLS

13.1 Reports

- 13.1.1 General
- 13.1.2 Master Project Schedule
- 13.1.3 Progress Reports
- 13.1.4 Cost Control and Reporting

13.2 Controls

- 13.2.1 General
- 13.2.2 Equipment List
- 13.2.3 Equipment Control Index
- 13.2.4 Material Control Index
- 13.2.5 Material Coordination Plan
- 13.2.6 Engineering Specification Index
- 13.2.7 Drawing Control
- 13.2.8 Change Control
- 13.2.9 Vendor Print Index
- 13.2.10 Procurement Controls (Major Equipment)
- 13.2.11 Subcontract Control Index
- 13.2.12 Procurement Controls (Commodities)

13.3 Field Reports

14.0 ACCOUNTING

- 14.1 General
- 14.2 Policies and Procedures
- 14.3 Project Accounting Procedures Manual
- 14.4 Field Accounting Procedures Manual
- 14.5 Billing
- 14.6 Allocation of Cost

15.0 CHANGE ORDERS

16.0 FIELD CONSTRUCTION PROCEDURE

17.0 JOB PROGRESS PHOTOGRAPHS

18.0 OPERATING MANUAL AND START-UP REQUIREMENTS

18.1 Operating Manual Preparation

18.1.1 Operating Instruction Book Outline

18.2 Start-up Planning

19.0 JOB CLOSE OUT

18.1 Technical Data Books (Maintenance Manuals)

18.2 Mechanical Catalogues (Equipment Data Books)

18.3 Lummus and Kaiser Drawings

20.0 LICENSOR APPROVALS

21.0 QUALITY CONTROLS

22.0 PUBLIC RELATIONS

22.1 General

22.2 Coordination

22.3 Procedures to be Followed When Inquiries are Received
 at the Lummus Home Office.

22.4 Procedures to be Followed When Inquiries are Received by
 Kaiser Engineers

22.4.1 General Policy

22.4.2 Inquiries Received at Kaiser Home Office

22.4.3 Inquiries Received at the Jobsite

22.5 Procedures to be Followed When Inquiries are Received
 at the Job Site

22.5.1 No Publicity Without Prior Consent of ANG

22.5.2 No Publicity by Subcontractors or Vendor
 Without Consent of ANG

PGC SUPPLEMENT

The purpose of this supplement is to provide assurance that PGC Coal Gasification Company will directly receive from Lummus/Kaiser all correspondence pertaining to Engineering, Procurement and Construction, from the period April 30, 1980 until execution of the Project Administration Agreement between ANG Coal Gasification Company and the Great Plains Gasification Associates. Upon execution of the Project Administration Agreement, this supplement to the Job Instructions will no longer be in effect.

PGC shall not originate any verbal or written communication directly to Lummus or Kaiser Engineers.

All correspondence pertaining to Engineering, Procurement and Construction, as well as transmittal letters only of drawings, data sheets, specifications etc., shall be forwarded and addressed to:

A.W. Hilley
Project Manager - Coal Development
Natural Gas Pipelines Company
America - (NGPL) (Peoples)
122 South Michigan Avenue
Chicago, Illinois 60603

PGC shall receive a microfilm of all approved for construction drawings and a copy of all specifications and other engineering data as referenced on the Distribution of Documents, Exhibit V.

The purpose of these Job Instructions is to outline the procedures to be followed during the project and the working relationship between ANG Coal Gasification Company, Lummus and Kaiser Engineers.

These procedures are incorporated by reference into the contract between ANG and Lummus/Kaiser.

PROJECT NUMBER, JOB NUMBERS, TITLES, AREA DESIGNATIONS

Client	ANG Coal Gasification Company
Project	GPGA Coal Gasification Project
Job Site	Mercer County, North Dakota
Lummus Project Number	B-7102
	B-7163 (Kaiser Portion)
Kaiser Project Number	7381

The following is a detailed list of areas in the plant. The contractor with the lead responsibility for each area is shown to the right (L for Lummus and K for Kaiser).

<u>Area</u>	<u>Lummus Job Number</u>		
0100	8290	General	
0200	8291	Site Development	(K)
0300	8292	Off-Site Development	(K)
0400	8293	Buildings	(K)
0600	8294	Site Development	(L)
0700	8295	Buildings	(L)
1100	8296	Gasification and Lock Gas Compression	(L)
1200	8297	Shift Conversion	(L)
1300	8298	Gas Cooling and Rectisol Off-Gas Compression	(L)
1400	8299	Rectisol and Refrigeration	(L)
1600	8300	Phenosolvan	(L)
1700	8301	Methanation	(L)
1800	8302	Gas Liquor Separation	(L)
1900	8303	Product Gas Compression and Glycol Drying Unit	(L)
2000	8304	Coal Preparation and Handling Systems	(K)
3000	8305	Oxygen Plant	(K)
4000	8306	Sulfur Recovery, Storage and Loading (Perform Construction Services Only)	(K)
4600	8307	Ammonia Recovery	(L)
4900	8308	Methanol Manufacturing (Perform Construction Services Only)	(K)
5000	8309	Steam Supply	(L)
5100	8310	Steam Supply, and Plant and Instrument Air Supply	(K)
5200	8311	Electrical Distribution	(L)
5300	8312	Electrical Supply and Distribution	(K)
5400	8313	Secondary Water Treatment, Storage and Deep Well, and Fire Water Supply	(K)
5500	8314	Cooling Water Supply	(L)
6000	8315	Process Storage Facilities	(L)
7000	8316	Interconnecting Piping	(K)
7100	8317	Interconnecting Piping	(L)

<u>Area</u>	<u>Lummus Job Number</u>		
8100	8318	Waste Effluent Treatment System	(L)
8200	8319	Ash Disposal	(K)
8300	8320	Flare System	(L)
8400	8321	Sanitary Treatment	(K)
8500	8322	Raw Water Pumps	(K)
8600	8937	Deep Well Pretreatment	(L)
9000	8323	General Indirect	
9100	8324	Field Office	
9191		Craft Related Cost	
9192		Contractor Field Supervision	
9193		Construction Plant	
9194		Construction Camp	
9195		Construction Equipment Purchase	
9196		Field Inventory	
9200	8325	Home Office	
9297		Home Office Costs	(L/K)
9300	8326	Escalation	(L/K)
9400	8327	Contingency	(L/K)
9500	8328	GPGA Owner Cost	
9600	8329	Open	
9700	8330	Open	
9800	8331	Open	
9900	8332	Open	
9900	8333	Kaiser Home Office -	
		Not part of Coal Gasification Project TIC	
		such as: Mine Haul Road Study	
		Coal Beneficiation Study	
		Basin Electric Power Study	
	8334	Kaiser Home Office - Basin Reimbursable Work	
	8335	Lummus Home Office - AGC Litigation	
	8336	Lummus Planning for 1980 Construction Start	
	8337	Kaiser Planning for 1980 Construction Start	
	8938	Lummus Planning 9/12/79	
	8939	Kaiser Planning 9/12/79	
	8940-8951	Reserved for Future Use	

3.0 CONTRACT DATA

The work is proceeding based on a contract between ANG Coal Gasification Company, the Lummus Company and Kaiser Engineers for the furnishing of engineering, procurement and construction services.

Certain confidential job information disclosed to Lummus and/or Kaiser by Lurgi Mineralötechnik GmbH is subject to a non-disclosure agreement executed between Lurgi, Lummus and Kaiser. All Lummus and Kaiser personnel working on this job are required to abide by these agreements.

It is anticipated that other non-disclosure agreements may also be incorporated (e.g. Sasol) during the course of the work. These will be incorporated as they are executed.

4.0 SCOPE OF WORK

4.1 Phase II Work

The major tasks accomplished during this period were as follows:

- Assist ANG in establishing the process design parameters to be followed by Lurgi during Phase II.
- Review process design data released by Lurgi for completeness, accuracy and adequacy of design.
- Perform process design of non-Lurgi supporting facilities.
- Prepare engineering specifications for the project and issue to ANG for comments and approval.
- Complete development of process Piping and Instrument Diagrams after their release from Lurgi.
- Prepare equipment specifications on critical delivery equipment and release for competitive quotations.
- Continue work on overall plot plans and prepare site preparation drawings.
- Perform conceptual design of all non-process on-site and off-site facilities.
- Commence planning and design of temporary construction facilities.
- Prepare requisition packages to perform plant site and water intake soil investigations, including soil bearing data and plant site and vicinity topographical surveys.
- Commence work on plant utility and auxiliary systems including preparation of utility balances, piping and instrument diagrams and equipment specifications.
- Coordinate with process licensors on licensed processes such as Stretford, Phosam, etc.
- Prepare permit applications and assist ANG at governmental hearings on engineering related matters.
- Prepare a project control estimate.

4.1 Phase II Work (cont'd.)

- Provide economic evaluations as required.
- Provide planning and scheduling activities as required.
- Develop detailed work plans between Lummus and Kaiser.

4.2 Lummus Responsibilities and Services

Overall project management responsibility for, and supervision of, the engineering, procurement and construction of the plant as defined in the contract. Lummus has the overall responsibility for proper engineering, procurement, scheduling, cost and construction performed by Lummus and Kaiser. Lummus has the prime responsibility for work done by Lummus and Kaiser in all plant areas as defined in the contracts.

Lummus shall complete the process engineering, design engineering, and procurement of equipment and materials, (excluding proprietary equipment and materials provided by others) for the following areas of the plant:

<u>Area Designation</u>	<u>Plant Operating Unit</u>
0600	Site Development
0700	Buildings
1100	*Gasification
1200	*Shift Conversion
1300	*Gas Cooling
1400	*Rectisol
1600	*Phenosolvan
1700	*Methanation
1800	*Gas Liquor Separation
1900	Product Compression
4600	**Ammonia Recovery
5000	Steam Generation
5200	Electrical Distribution
5400	Water Treatment - (Basic Process Only)
5500	Cooling Water Supply
6000	Storage
7100	Interconnecting Piping
8100	Waste Effluent Treatment
8300	Flare System
8600	Deepwell Pretreatment

Provided, however, that ANG shall have the right to direct the sub-contracting of any engineering, procurement and construction to another firm in the event ANG shall determine, in its sole discretion, that such is advisable.

* Design engineering based on Lurgi process design.

** Black book design by UEC.

4.2 Lummus Responsibilities and Services (cont'd.)

Prepare feasibility studies.

Prepare required technical and economic evaluations.

Preparation of and supervising the preparation of preliminary estimates, control estimates and definitive estimates.

Review the process design package prepared by Lurgi and make recommendations in connection with the following:

- Heat and material balances and utility requirements to assure degree of accuracy required for proper process and equipment design.
- Process flow sheets to assume reasonableness of flow scheme, stream compositions and equipment selection and agreement of such flow sheets with design basis.
- Piping and Instrumentation Diagrams to assume correct line sizing, accurate calculation of exchanger heat duties, correct valve and instrumentation selection and proper equipment loading.
- Instrument, machinery, equipment and catalyst, and chemical specification sheets to assure proper dimensions, flow pressure and temperature ratings, special design features and corrosion protection to meet all applicable process and code requirements.
- Lurgi recommendations for layout, construction materials, and overall control scheme to assure reasonableness within scope of United States chemical process industry practice.

Responsibility for managing and supervising the procurement function and providing all equipment and materials required to build the plant in conformance with the project specifications, purchasing as agent for ANG all equipment and materials required to construct the areas of the plant for which Lummus is responsible for design engineering and all other equipment, not purchased by Kaiser pursuant to the contract, which is necessary to complete the plant according to project specifications. Responsibility for purchasing shall include, without limitation, expediting, inspection and equipment testing, monitoring vendor shop progress and quality control, with timely reporting of such to ANG.

Furnish an advisory start-up manager, advisory operators, and instrument technicians during hydro-testing, check out, and commissioning of the plant as ANG may request.

Responsible for accounting support, policies, procedures and systems as provided for in the contract and further defined in Sec. 14.0 (Accounting).

4.2 Lummus Responsibilities and Services (cont'd.)

Furnish ANG five (5) copies of operation instruction manuals for the plant, microfilm and full-sized mylar reproducibles of the plant drawings approved for construction, certain plant drawings as the plant has been constructed "as built" (which will include, but not be limited to, all P&ID drawings, electrical and instrumentation schematics, underground piping, plot plans, and corrections to the plant model), plus sets of prints, bulletins, and data furnished by vendors or subcontractors; all as defined in Section 8.0 of the Job Instructions.

Obtain or supervise the obtaining of, all permits and licenses necessary for the performance of Lummus' services, except those which are the responsibility of ANG as provided in Appendix VI of the contract.

Furnish plant operator training as ANG may request.

Lummus and Kaiser to make recommendations to ANG regarding quantity and type of spare parts required for the plant operation.

4.3 Kaiser Responsibilities and Services

Kaiser shall have the responsibilities herein designated subject to the overall project management responsibilities of Lummus.

Perform the process engineering, design engineering and procurement of equipment and materials for the following areas of the coal gasification plant, as well as construction and construction management for the overall plant as developed in the construction plan.

<u>Area Designation</u>	<u>Plant Operating Unit</u>
0100	General
0200	Site Development
0300	**Off-Site Development
0400	Buildings
2000	Coal Preparation and Handling
3000	Oxygen Plant
4000	*Sulphur Recovery
4900	*Methanol Production
5100	Steam Generation
5300	Electrical Supply and Distribution
5400	Water Treatment - (Basic Process by Lummus)
7000	Interconnection Piping
8200	Ash Disposal
8400	Sanitary Treatment
8500	Raw Water Pump

Provided, however, that ANG shall have the right to direct the sub-contracting of engineering, procurement and construction to another firm in the event ANG shall determine, in its sole discretion, that such is advisable.

*Design Engineering based on Lurgi process design.

**Interconnect with Basin Electric facilities plus install other off-site facilities as needed.

In connection with areas tabulated, Kaiser shall have the following responsibilities:

- Prepare feasibility studies.
- Prepare required technical and economic evaluations.

Responsible for scheduling, cost monitoring and control of procurement activities, using the systems and procedures established for use on the work. Kaiser shall also be responsible for cost monitoring and control and reporting construction progress, utilizing Kaiser's systems and personnel.

Construction management, including such subcontracting as may be required to complete the construction of the entire plant and off-sites, including the sulfur recovery unit and methanol production unit.

Purchase, as agent for ANG, equipment and commodities for the areas of the plant for which Kaiser is responsible for detailed design. Responsibility for purchasing shall include, without limitation, expediting, inspection and equipment testing, monitoring vendor shop progress and quality control and timely reporting of such to ANG.

Provide supervisors, engineers, mechanics, labor force and construction aids necessary for the construction of the plant.

Responsible for labor relations related to construction utilizing Kaiser personnel including the administration of the Labor Stabilization Agreement.

Security.

Safety and first aid.

Construction camp and catering.

Test and qualifying of welders subject to approval of ANG.

Construction equipment allocation and control.

Erection of temporary construction buildings and permanent buildings.

Inspection and supervision of the construction for compliance with plant drawings, and specifications.

Testing of plant systems, for conformance with plant drawings and specifications.

Temporary construction utilities and service.

Responsible for accounting support, policies, procedures and systems as provided for in the contract and further defined in Sec. 14.0 (Accounting).

Material receiving, warehousing and control at the job site for all material purchased for the plant by Lummus, Parsons, Lurgi-Eastern Operations, ANG or other agents for the partnership.

Provide field office personnel as required to support the construction activities.

Provide planning and design services for the community planning activity as requested by ANG.

Obtain all permits and licenses necessary for the performance of Kaiser's services except those for which ANG is responsible, as provided in Appendix VI of the contract.

Construction manpower training.

Responsible for all waste disposal associated with the construction program.

Responsible for developing a construction plan of execution which will be presented to ANG for review and approval.

Obtain comprehensive soil services including all necessary core testing, soil data, topographical survey and proper bench marks for design and construction. Kaiser is not responsible for the soils consultant's data and recommendations.

Furnish ANG five (5) copies of operation instruction manuals for the plant, microfilm and full sized mylar reproducibles of the plant drawings approved for construction, certain plant drawings as the plant has been constructed "as built" (which will include, but not be limited to all P&ID drawings, electrical and instrumentation schematics, underground piping, plot plans, and corrections to the plant model), plus sets of prints, bulletins and data furnished by vendors, or subcontractors, all as defined in Section 8.0 of the Job Instructions.

Lummus and Kaiser to make recommendations to ANG regarding quantity and type of spare parts required for the plant operation.

Kaiser to assume responsibility as Engineer of Record for the drainage ditch, water intake, water pipeline and railroad and as such to provide engineering and construction inspection services.

Procure all necessary know-how agreements, patents, licenses, certificates of public convenience and necessity, water permits and other permits required of a owner under state, local or federal law for the construction of the plant. ANG has the responsibility thru Lurgi-Eastern Operations

to procure all PEPA and special equipment for the project. This purchasing responsibility shall include without limitation expediting, inspection, monitoring vendor progress, quality control and erecting engineering services at the jobsite.

Provide any information necessary for, and otherwise cooperate in, obtaining all other permits required for the construction of the plant.

Provide by contract with Lurgi Mineralötechnik GmbH (Lurgi) for the following:

- Complete process engineering design of the Lurgi process for the production of the pipeline quality synthetic gas, synthesized from Beulah-Hazen area North Dakota lignite.
- Detailed engineering for, and consultation for the erection of the following equipment:
 - The gasifiers with all internals and accessories within the following battery limits:
 - coal feed into the coal lock chambers including the bottom part of the coal bin;
 - ash discharge into an ash bin including the top part of the ash bin;
 - entrance of the mixing vessel for the gasification agent;
 - gas outlet of the scrubber;
 - hydraulic system for the operation of various mechanism is included;
 - jacket steam knockout drum;
 - controls, electrical, hydraulics and lubrication system interfaces for the above equipment will be as developed and shown on the appropriate Lurgi drawings.
 - The mixer-settler of the phenosolvan plant.
 - Naphtha extractor.
 - Methanation tubular reactor.

Design and procurement related to the Stretford and methanol units for the gasification plant.

4.4 Responsibilities of ANG Coal Gasification Company (cont'd)

ANG shall have the overall responsibility for providing spare parts and provide and install any chemicals, catalysts and raw materials for the plant although ANG may request Lummus/Kaiser to order special spare parts from the manufacturers such as rotors, at the time of the original equipment order.

ANG shall have the responsibility for commissioning of the plant.

Assume care, custody and control of the plant, or portions of the plant, systems or individual units thereof, as said are ready for commissioning.

Provide process design for ammonia recovery system.

5.0 COMPANY REPRESENTATIVE

5.1 ANG Coal Gasification

5.1.1 Personnel

A. E. Browning	Vice President, Synthetic Fuels
D. L. Imler	Director, Gasification Engineering, Construction Operations
J. W. Parker	Manager, Special Projects
M. J. Mujadin	Manager, Process Engineering and Operation Planning
A. K. Kuhn	Manager, Process Engineering
D. W. Katz	Manager, Design Engineering and Project Engineering
W. J. Biss	Manager, Project Engineering
W. A. Cole	Manager, Cost Engineering, Scheduling and Project Controls
T. E. Vanderheiden	Manager, Cost Engineering
J. G. Morris	Manager, Construction and Technical Services
D. R. Sosnoski	Controller
J. B. Conrad	Director General Accounting
R. E. Middleton	Manager, Field Accounting
W. A. Bernhard	Manager, Contract and Property Accounting
K. C. Yessian	Manager, Project Procurement

5.1.2 Address, Telephone and Telex

ANG COAL GASIFICATION COMPANY
One Woodward Avenue
Detroit, Michigan 48226

Telephone	(313) 965-8300
Telex	(810) 221-9434
Telecopier	(313) 965-7262

5.2 Lummus

5.2.1 Personnel

R. H. Tauskey	Vice President, Executive Project Director
J. C. Parker	Construction Advisor
H. B. Berman	Project Director
M. S. Gottlieb	Material Control Manager
K. Torster	Engineering Manager
R. Margolis	Project Engineering Manager - Process Operating Manual Engineer
G. Arabea	Lummus Resident Engineer at Kaiser
H. Wang	Kaiser Interface Engineer
R. Russell	Project Engineering Manager, Utilities
P. Gerbino	Procurement Manager
E. K. Rieff	Procurement Coordinator
R. C. Brown	Administrative Services Supervisor
E. L. Kraft	Project Controller
C. H. Meyer	Accounts Receivable Supervisor

5.2.1 Personnel cont'd.

J. C. Parker	Deputy Project Director - Controls
E. Hauser	Project Controls Manager - Scheduling
J. F. Hubert	Project Controls Manager - Cost
J. M. Leonard	Controls Manager - Lummus
	Start-Up Manager

5.2.2 Address, Telephone and Telex

C-E Lummus
1515 Broad Street
Bloomfield, New Jersey 07003

Telephone	(201) 893-1515	Confirmation #2493
Telex	138198	Confirmation #2007
Telecopier	(201) 893-3422 (Project)	(Main Telex Room)
Telecopier	(201) 893-2029	
Telecopier	(201) 893-2000 (Main)	

5.3 Kaiser

5.3.1 Personnel

W. R. Deeths	Deputy Project Director, Engineering and Procurement
C. M. Mandell	Controls Manager
W. R. Manis	Project Administration Manager
M. Palkowitz	Project Engineering Manager
B. W. Morgan	Project Procurement Manager
D. E. Carderelle	Manager of Field Operations
P. M. Rivard	Manager - Accounting
M. E. Hibbard	Document Control Supervisor

5.3.2 Address, Telephone and Telex

Kaiser Engineers, Inc.	Send all mail to P. O. Box 23210
One Kaiser Plaza	Oakland, California 94623
Oakland, California 94612	

Telephone	(415) 271-2211
Telex	335-236
Telecopier	(415) 271-4789 (General)
	(415) 271-4780 (Project)
	(701) 873-2345 (Field)

5.4 Lurgi

5.4.1 Personnel

Dr. Hans Eichwald	Project Manager
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5.4.2 Address, Telephone and Telex

Lurgi Mineralstechnik GmbH
6000 Frankfurt/Main 2
Postfach, 11 91 81
West Germany

Telephone (0611) 7119 264
Telex 0411643

5.5 Lurgi - Eastern Operations

Geoffrey L. Mahon - Project Manager
Lurgi Corporation
Eastern Operations
377 Route 17
Hasbrouck Heights, NJ 07604

Telephone (201) 288-6450

5.6 Project Site

Henry J. Kaiser Company
Beulah, North Dakota 58523

Telephone (701) 873-2345
Telex
Telecopier (701) 873-2345

Send all mail to:

P. O. Box 819
Beulah, North Dakota 58523

5.7 ANG Jobsite

ANG Coal Gasification Company: Construction
Beulah, North Dakota 58523

Telephone (701) 873-2626
Telex
Telecopier

Send all mail to:

P.O. Box 638
Beulah, North Dakota 58523

6.0 REVIEW AND APPROVALS BY ANG

6.1 General

Under the terms of the contract, ANG has the right to review and approve certain management, engineering and procurement actions. These shall be submitted to ANG for formal approval and sign-off, review and comments, or for information. This section of the Job Instructions sets forth what must be submitted to ANG, and the type of review and/or approval required before Lummus and Kaiser implement such matters in connection with the work. To avoid duplication, where these are covered in other functional areas, they are so noted. In order to simplify the listings, the following codes will be used:

- A - Items to be submitted to ANG for approval and sign-off. This will, where possible, be accomplished through the ANG resident.
- R - Items to be submitted to ANG for review and comments. Comments will need to be resolved, but no sign-off will be required. ANG resident will also be used to do this where possible.
- I - Items to be submitted to ANG for information purposes only.

6.2 Drawings, Specifications and Equipment Data

Those items to be submitted to ANG are set forth in section 8.0.

6.3 Procurement

Those items to be submitted to ANG are set forth in section 9.0, 10.0 11.0 and 12.0.

6.4 Other Matters to be Submitted to ANG

- A - Plans for staffing the management of the project.
- A - Changes in work.
- A - Engineering, procurement and construction schedules.
- A - Candidates for key project and construction positions.
- A - Major decisions which have an impact on the project costs and/or schedules, including those related to the following:
 - Home Office Manpower Schedules
 - Manpower Schedules for Construction Labor and Craftsmen
 - Field Non-Manual Manpower Schedules
 - Subcontractor Manpower Schedules
 - Project Work Schedules
 - Project Work Rules
 - Labor Relations Policies
 - Field Procurement

6.4 Other Matters to be Submitted to ANG (cont'd)

- Purchase or Rental of Construction Aids
- Project Management Systems for all Phases of Project Controls
- The Approved Vendor List and the Approved Subcontractor List for the Project
- Accounting Systems, Policies, Procedures and Controls

6.5 Approval or Comment by ANG (Exclusive of Major Project Decisions)

Submittals must be returned to the Executive Project Director with ANG approval or comment within ten (10) working days of its receipt by ANG. The project completion date may, if necessary, be extended by the amount of any additional delay. ANG requested changes shall be clearly indicated on the returned documents. Changes which involve control change orders will be processed in accordance with Section 15.0.

6.6 Major Project Decisions

All major project decisions which involve the Great Plains Gasification Associates will be handled per article 22.4 of the contract between Lummus/Kaiser and ANG. ANG shall exercise the best effort to expedite approval of major project decisions by the partnership.

7.0 CORRESPONDENCE

7.1 General

The procedure outline in this section has been in effect since the commencement of Phase II.

As far as practical each letter or telex shall be limited to one subject, which shall appear in the upper heading of the letter or telex as follows:

Lummus project 7102 (or Kaiser Project 7381)

Subject: _____

All letters and telexes shall be dated, numbered and recorded. The number registers shall be kept by the originator's project secretary or the document control clerk.

All correspondence shall be addressed and numbered as directed in the subsequent subdivision in this section.

All correspondence and transmittals shall be by air mail, air parcel post or air freight.

Conference notes of meeting or telephone calls between ANG and/or Lummus and/or Kaiser shall be prepared by Lummus or Kaiser and transmitted by letter to ANG immediately following the meeting or telephone call. ANG shall promptly advise should they have any comments to the notes.

Correspondence between Lummus and Lurgi will be through ANG. However, Lurgi will transmit directly to Lummus copies of engineering and design correspondence, minutes of meetings, progress reports, schedules and drawings as outlined in Lurgi "Project Coordination Procedures", latest revision.

7.2 From ANG to Lummus

All correspondence shall be consecutively numbered and shall be prefixed AL-:

All correspondence, except that pertaining to engineering, cost, schedule and project controls, accounting, and procurement and transmittals and technical drawings, data sheets etc., shall be addressed to:

R.H. Tauskey

Vice President Executive Project Director

One copy to:

W.R. Deeths

Deputy Project Director Engineering and
Procurement - Kaiser

Engineering correspondence shall be addressed to:

K. Torster

Engineering Manager

One copy to:

H. B. Berman

Project Director - Lummus

M. Falkowitz

Project Engineering Manager - Kaiser

7.2 From ANG to Lummus (cont'd)

Cost, Scheduling and Project Controls correspondence shall be addressed to:

J.C. Parker Deputy Project Director Controls

One copy to:

J. Leonard Controls Manager-Lummus
C.M. Mandell Controls Manager-Kaiser

Accounting correspondence shall be addressed to:

E.L. Kraft Project Controller

One copy to:

C.H. Meyer Accounts Receivable Supervisor-Lummus
P.M. Rivard Manager, Accounting-Kaiser

Procurement correspondence shall be addressed to:

P. Gerbino Procurement Manager

One copy to:

H.B. Berman Project Director-Lummus
B.W. Morgan Project Procurement Manager-Kaiser

7.3 From ANG to Kaiser

All correspondence shall be consecutively numbered and shall be prefixed AK-.

All correspondence, except that pertaining to engineering, cost, schedule and project controls, accounting and procurement and transmittals and technical drawings, data sheets, etc., shall be addressed to:

W.R. Deeths Deputy Project Director Engineering
 and Procurement

One copy to:

R.H. Tauskey Vice President Executive Project
 Director-Lummus
D.E. Carderelle Manager Field Operations

7.3 From ANG to Kaiser (cont'd)

Engineering correspondence shall be addressed to:

M. Palkowitz	Project Engineering Manager
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One copy to:

W.R. Deeths	Deputy Project Director Engineering and Procurement
D.E. Carderelle	Manager, Field Operations
K. Torster	Engineering Manager-Lummus
H.B. Berman	Project Director

Cost, Scheduling and Project Controls correspondence shall be addressed to:

C.M. Mandell	Project Controls Manager
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One copy to:

W.R. Deeths	Deputy Project Director
D.E. Carderelle	Manager, Field Operations
J.C. Parker	Deputy Project Director Controls-Lummus

Accounting correspondence shall be addressed to:

P.M. Rivard	Manager of Accounting
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One copy to:

W.R. Deeths	Deputy Project Director
D.E. Carderelle	Manager, Field Operations
E.L. Kraft	Project Controller - Lummus

Procurement correspondence shall be addressed to:

B.W. Morgan	Project Procurement Manager
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One copy to:

W.R. Deeths	Deputy Project Director
D.E. Carderelle	Manager, Field Operations
P. Gerbino	Procurement Manager-Lummus

Transmittals of technical drawings, data sheets, vendor prints, etc., will be directed to:

Scotty Hibbard	Document Control Supervisor
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One copy of transmittal letter only should be directed to:

W.R. Deeths	Deputy Project Director
M. Palkowitz	Engineering Manager

7.4 From ANG to Kaiser Jobsite

All correspondence shall be consecutively numbered and shall be prefixed AB- and shall be addressed to:

D.E. Carderelle Manager, Field Operations*

One copy to:

W.R. Deeths Deputy Project Director-Kaiser
R.H. Tauskey Vice President Executive Project
Director-Lummus

Accounting correspondence shall be addressed the same as above with additional copies to:

W.A. Bennett Field Administration Manager

One copy to:

W.R. Deeths Deputy Project Director, Engineering
and Procurement

Procurement correspondence shall be addressed same as above with additional copies to:

S. Spangenberg Field Procurement Manager

One copy to:

B.W. Morgan Project Procurement Manager

7.5 From Lummus to ANG and Kaiser and Jobsite

Correspondence from Lummus to ANG and Lummus to Kaiser shall include letters, telexes, and transmittals. The Vice President Executive Project Director must receive copies of all correspondence.

7.6 From Lummus to ANG

All correspondence except transmittals of technical drawings, data sheets, vendor prints, original documents for cost, scheduling and project controls and that pertaining to contract and accounting shall be addressed to:

D.L. Imler Director

With copies to the following appropriate Managers:

D.W. Katz Engineering Design
J.G. Morris Construction

*Additional Kaiser field distribution will be made in accordance with distribution exhibits contained in the Field Construction Procedures Manual.

7.6 From Lummus to ANG (cont'd)

M.J. Mujadin	Process Engineering, Environmental, Operations and all Lurgi, Parsons, and U.E.C.
J.W. Parker	Special Projects
K.C. Yessian	Procurement
W.A. Cole	Cost and Schedule and Project Controls

Transmittals (excluding letter correspondence) of technical drawings, data sheets, vendor prints and spec's will be directed to:

Joseph Palmer	Document Controls
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One copy of the transmittal letter only should be directed to:

D.L. Imler	Director
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Transmittals of original documents for cost, scheduling and project controls will be directed to:

J.L. Davidson	Project Controls Administrator
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One copy of the transmittal letter only should be directed to:

D.L. Imler	Director
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Contract correspondence shall be addressed to:

A.E. Browning	Vice President, Synthetic Fuels
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Accounting correspondence shall be addressed to:

D.R. Sosnoski	Controller
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One copy to:

D.L. Imler	Director
W.A. Cole	Manager - Project Controls

Invoice transmittals:

D.R. Sosnoski	Controller (original and 2 support copies)
D.L. Imler	Director (transmittal <u>only</u>)
J.L. Davidson	Project Controls Administrator (one support copy)

Bid Tabulations:

K.C. Yessian	Procurement (Bid Tabulation originals)
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All letters and telexes shall be prefixed LA- and shall be consecutively number and signed as shown below:

Type	Number Series	Signed by
Contract	00001	Project Director
General Project	00001	Project Director
Cost and Schedule	00001	Project Director, Deputy Project Director, or Project Controls Manager
Quality Control	00001	Project Director, Deputy Project Director, or Quality Control.

7.6

From Lummus to ANG (cont'd)

<u>Type</u>	<u>Number Series</u>	<u>Signed by</u>
Construction	00001	Project Director or Construction Advisor
Procurement	20001	Project Director, Deputy Project Director, Engineering and Procurement-Lummus, or Project Procurement Manager
Accounting	30001	Project Director or Project Controller
Engineering	00001	Project Director, Deputy Project Director, Engineering and Procurement-Lummus or Engineering Manager

All transmittals shall be prefixed LA- and shall be consecutively numbered and signed as shown below:

<u>Type</u>	<u>Number Series</u>	<u>Signed by</u>
Engineering Drawings	10001	Engineering Manager
Engineering Data Sheets and Spec's	15001	Engineering Manager
Procurement	40001	Procurement Coordinator plus sender
Accounting	30001	Project Controller
Vendor Prints	50001	Manager of Vendor Print Control

7.7

From Lummus to Kaiser

All correspondence, except that pertaining to engineering, accounting, procurement, project controls, construction and transmittals of technical drawings, data sheets, vendor prints, etc., shall be addressed to:

W.R. Deeths Deputy Project Director

One copy to:

D.E. Carderelle Manager, Field Operations

Engineering correspondence shall be addressed to:

M. Palkowitz Engineering Manager

One copy to:

W.R. Deeths Deputy Project Director
D.E. Carerelle Manager, Field Operations

7.7 From Lummus to Kaiser (cont'd)

Accounting correspondence shall be addressed to:

P.M. Rivard Manager of Accounting

One copy to:

W.R. Deeths Deputy Project Director
D.E. Carderelle Manager, Field Operations

Procurement correspondence shall be address to:

B. Morgan Project Procurement Manager

One copy to:

W.R. Deeths Deputy Project Director
D.E. Carderelle Manager Field Operations

Project Controls correspondence shall be addressed to:

C.M. Mandell Project Controls Manager

One copy to:

D.E. Carderelle Manager, Field Operations
W.R. Deeths Deputy Project Director

Transmittals of technical drawings, data sheets, vendor prints, etc., will be addressed to:

Scotty Hibbard Document Control Supervisor

One copy to:

W.R. Deeths Deputy Project Director
(transmittal letter only)

All letters and telexes shall be prefixed LK- and shall be consecutively numbered and signed as shown below:

<u>Type</u>	<u>Number Series</u>	<u>Signed by</u>
Contract	00001	Project Director
General Project	00001	Project Director
Cost and Schedule	00001	Project Director, Deputy Project Director, or Project Controls Manager
Quality Control	00001	Project Director, Deputy Project Director, or Quality Control Manager
Procurement	20001	Project Director, Deputy Project Director, Engineering and Procurement-Lummus, or Project Procurement Manager

7.7 From Lummus to Kaiser (Cont'd)

<u>Type</u>	<u>Number Series</u>	<u>Signed by</u>
Accounting	30001	Project Director or Project Controller
Engineering	00001	Project Director, Deputy Project Director, Engineering and Procurement-Lummus, or Engineering Manager

All transmittals shall be prefixed LK- and shall be consecutively numbered as shown below:

<u>Type</u>	<u>Number Series</u>	<u>Signed by</u>
Engineering	10001	Engineering Manager
Procurement	40001	Procurement Coordinator plus Sender
Accounting	30001	Project Controller
Vendor Prints	50001	Manager of Vendor Print Control

Selected correspondence between contractors will be mailed to ANG at the discretion of the Project Director and Deputy-Project Director.

7.8 From Lummus to Kaiser Jobsite

All correspondence shall be consecutively numbered and shall be prefixed LB- and shall be addressed to:

D.E. Carderelle	Manager, Field Operations*
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One copy to:

W.R. Deeths	Deputy Project Director
J.G. Morris	Construction Manager - ANG

Accounting correspondence shall be addressed same as above with additional copies to:

W.A. Bennett	Field Administration Manager
W.R. Deeths	Deputy Project Director

Procurement correspondence shall be addressed the same as above with additional copies to:

S. Spangenberg	Field Procurement Manager
B.W. Morgan	Project Procurement Manager

*Additional Kaiser field distribution will be made in accordance with distribution exhibits contained in the Field Construction Procedures Manuals.

General

Correspondence from Kaiser to Lummus and ANG shall include letters, telex and transmittals. The Kaiser Deputy Project Director must receive copies of all correspondence.

From Kaiser to Lummus

All correspondence except that pertaining to engineering, accounting, procurement, cost, scheduling and project controls shall be addressed to:

R.H. Tauskey

Vice President Executive Project
Director

Engineering correspondence shall be addressed to:

K. Torster

Engineering Manager

One copy to:

H.B. Berman

Project Director

Accounting correspondence shall be addressed to:

E.L. Kraft

Project Controller

One copy to:

R.H. Tauskey

Vice President Executive Project
Director

Procurement correspondence shall be addressed to:

P. Gerbino

Procurement Manager

One copy to:

H.B. Berman

Project Director

Cost, Scheduling and Project Controls correspondence shall be addressed to:

J.C. Parker

Deputy Project Director Controls

7.10 From Kaiser to Lummus (cont'd)

One copy to:

R.H. Tauskey

Vice President Executive Project
Director

All correspondence shall be prefixed KL- and shall be consecutively numbered and signed as shown below:

<u>Type</u>	<u>Number Series</u>	<u>Signed by</u>
Contract, General	00001	Deputy Project Director
Project, Design and Engineering		Engineering and Procurement-Kaiser
Engineering and Design Transmittals	10001	Project Engineering Manager
Procurement Correspondence and Transmittals	20001	Project Procurement Manager
Accounting Correspondence and Transmittals	30001	Project Accountant
Cost and Scheduling	00001	Project Control Manager*

*When ANG is copied, the Deputy Project Director must sign.

Selected correspondence between contractors will be mailed to ANG at the discretion of the Project Director and Deputy-Project Director.

7.11 From Kaiser to ANG

All correspondence except transmittals of technical drawings, data sheets, vendor prints, documents for cost, scheduling, and project controls and that pertaining to contract and accounting shall be addressed to:

D.L. Imler

Director

With copies to the following appropriate managers:

M.J. Mujadin

Process Engineering, Environmental
Operations and all Lurgi, Parsons,
and U.E.C.

D.W. Katz

Engineering Design
Construction

J.G. Morris

J.W. Parker

Special Projects, Procurement
Procurement

K.C. Yessian

W.A. Cole

Cost and Schedule and Project Controls

7.11 From Kaiser to ANG (cont'd)

Transmittals (excluding letter correspondence) of technical drawings, data sheets, vendor prints and spec's will be directed to:

Joseph Palmer Document Controls

Transmittals of original documents for cost, scheduling and project controls will be directed to:

J.L. Davidson Project Control Administrator

One copy of the transmittal letter only should be directed to:

D.L. Imler Director

Contract correspondence shall be addressed to:

A.E. Browning Vice President, Synthetic Fuels

Accounting correspondence shall be addressed to:

D.R. Sosnoski Controller

One copy to:

D.L. Imler Director
W.A. Cole Manager, Cost, Scheduling and
Project Controls

Invoice transmittals:

D.R. Sosnoski Controller
(original and 2 support copies)
D.L. Imler Director
(transmittal only)
J.L. Davidson Project Controls Administrator
(one support copy)
E.L. Kraft Project Controller-Lummus

Bid Tabulations:

K.C. Yessian Bid Tab Originals

All correspondence shall be prefixed KA- and shall be consecutively numbered and signed as shown below:

<u>Type</u>	<u>Number Series</u>	<u>Signed by</u>
General Project Design & Engineering	00001	Deputy Project Director Engineering and Procurement Project Manager-Kaiser
Engineering & Design Transmittal**	10001	Project Engineering Manager
Procurement** ***	20001	Deputy Project Director, Engineering and Procurement - Kaiser, or Project Procurement Manager
Accounting Corres- pondence	30001	Manager of Accounting
Vendor Prints(**)(***)	40001	Document Control Supervisor

**With one copy to K. Torster
***With one copy to P. Gerbino

7.12 Kaiser to Kaiser Jobsite

All correspondence shall be consecutively numbered and shall be prefixed KB- and shall be addressed to:

D.E. Carderelle Manager Field Operation*

One copy to:

W.R. Deeths Deputy Project Director
J.G. Morris Construction Manager - ANG

Accounting correspondence shall be addressed the same as above with additional copies to:

W.A. Bennett Field Administration Manager

Procurement correspondence shall be addressed same as above with additional copies to:

S. Spangenberg Field Procurement Manager

7.13 Kaiser Jobsite to Lummus, Kaiser and ANG

All correspondence shall be consecutively numbered and prefixed as follows:

BA- Jobsite to ANG
BL- Jobsite to Lummus
BK- Jobsite to Kaiser

Correspondence from the jobsite to Lummus, Kaiser and ANG will be sent to:

R.H. Tauskey Vice President Executive Project
Director - Lummus
W.R. Deeths Deputy Project Director - Kaiser
D.L. Imler Director - ANG

One copy to:

J.G. Morris Construction Manager - ANG

*Additional Kaiser field distribution will be made in accordance with distribution exhibits contained in the Field Construction Procedures Manuals.

7.14

From ANG Jobsite to Lummus, Kaiser, and ANG Home Office

All correspondence shall be consecutively numbered and prefixed as follows:

JL	ANG Jobsite to Lummus
JK	ANG Jobsite to Kaiser
JA	ANG Jobsite to ANG-Home Office
JB	ANG Jobsite to Kaiser Jobsite

Correspondence from the ANG Jobsite to Lummus, Kaiser, and ANG Home Office will be sent to:

R.H. Tauskey	Vice President Executive Project Director - Lummus
W.R. Deeths	Deputy Project Director - Kaiser
D.L. Imler	Director - ANG

One copy to:

D.E. Carderelle	Manager, Field Operations - Kaiser
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7.15

From Lummus, Kaiser, and ANG Home Office to ANG Jobsite

All correspondence shall be addressed to:

J.G. Morris	Construction Manager - ANG
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and shall be consecutively numbered and prefixed as follows:

AJ	ANG Home Office to ANG Jobsite
LJ	Lummus to ANG Jobsite
KJ	Kaiser to ANG Jobsite
BJ	Kaiser Jobsite to ANG Jobsite

One copy to:

D.L. Imler	Director -ANG
W.A. Cole	Manager, Project Controls - ANG

- A - For Approval
- R - Review
- I - For Information

Items to be Submitted to ANG for Review/Approval

- A - Process flow diagrams
- A - Piping and Instrument Flow Diagrams
- *R - Plot plan
- *R - Single line electrical diagrams
- R - Equipment arrangement drawings
- *R - Equipment specifications
- R - Mechanical specifications
- R - Engineering specifications (A for AFC issue only)
- R - Equipment Data Sheets (AFD issue, all others R)
- *R - Construction specifications
- R - Plant model
- A - Other critical design documents, engineering, procurement and construction decisions including operating manuals
- I - Intermediate and final issue of all vendor drawings
- A - Control house and panel control function and layout (first issue only, R for all others)
- R - Technical documents and drawings other than those listed here that are attached to requisitions (Equipment and S/C)
- R - Building layout
- I - Isometric Drawings
- *R - Area hazard classification drawing
- I - Orthographic Drawings
- A - Technical Bid Package

*Indicates first issue upon restart of detailed engineering in November 1979, to be approved with sign off, subsequent issues for review and comment only. 66

8.1

Items to be Submitted to ANG for Review/Approval (cont'd)

R - The first issue of vendor drawings for equipment packages where the vendor has a system design responsibility or where equipment items are very complex or expensive

A - Accounting policies, procedures, systems and controls

Lummus or Kaiser will transmit number of prints or copies as noted in Exhibits III through VIII of above documents to ANG.

All engineering documents issued by Lummus/Kaiser will bear the signature of the Lummus or Kaiser Project Engineering Manager or his representative.

Approval with or without comments will be indicated by the signature of the ANG representative on the copy of the drawing or document returned to Lummus or Kaiser.

Upon receipt by Lummus or Kaiser the required changes, if any, will be made by Lummus or Kaiser as applicable whereupon the ANG representative will give approval by signing the original of the document.

The document with ANG's approval and comments, if any, must be returned to Lummus or Kaiser within ten (10) working days of its receipt by ANG. The project completion date may, if necessary, be extended by the amount of any additional delay.

Any requested changes shall be clearly indicated on the return marked-up documents. Changes will be processed in accordance with Section 15.0 However, major project decisions will be handled in accordance with Sec. 6.6.

8.2

"Approved for Construction" Issue

Drawings for field construction facilities may require ANG formal approval. Comments on these documents will be returned within fifteen (15) working days.

Lummus will transmit number of prints or copies as noted in Exhibits VI, VII and VIII of all documents issued "AFC" by Lummus to ANG for information and records.

Kaiser will transmit number of prints or copies, as noted in Exhibits VI, VII and VIII of all documents issued "AFC" by Kaiser directly to ANG for information and records.

In development reviews of drawings will be held by ANG's representatives in Lummus-Bloomfield and Kaiser-Oakland as required.

8.3 Equipment Data Sheets

Equipment data sheets will be issued:

- "For Inquiry", and will become part of a requisition
- "For Purchase", and will become part of a purchase order requisition

Lummus and Kaiser will each use their own standard data sheet forms respectively.

8.4 Distribution of Drawings, Specifications, Equipment Data Sheets and Equipment Schedules

Distribution of Lummus drawings and equipment data sheets will be in accordance with the "Lummus Distribution of Drawings", Exhibit VI and distribution of specifications in accordance with the "Lummus Distribution of Specifications", Exhibit IX and Exhibit XI.

Distribution of Kaiser drawings and equipment data sheets will be in accordance with the "Kaiser Distribution of Drawings", Exhibit VII and distribution of specifications in accordance with the "Kaiser Distribution of Specifications", Exhibit X and Exhibit XI.

Standard Lummus and Kaiser transmittal forms shall be used to transmit drawings, sketches, specifications, equipment data sheets and schedules, and all other engineering documents for information, review and comment or approval to ANG both ways between Lummus and Kaiser. Transmittals shall be addressed and numbered in accordance with Section 7.0.

8.5 Drawing Format

Mylar film shall be used for design drawing tracings, having standard sizes as follows:

- "A" - 8 1/2" x 11"
- "B" - 11" x 17"
- "C" - 17" x 22"
- "D" - 22" x 34"
- "E" - 30" x 42"

All Piping and Instrument Flow Diagrams shall be drawn on "E" size sheets in order to maintain overall uniformity. Legend, symbology, line designation, equipment numbering and instrument numbering shall be in accordance with Lummus practice. For the "Project Equipment Numbering Procedure" see Exhibit XII.

In respect to design drawings, standard Lummus and Kaiser practices will be followed as to lettering, drawing numbering systems and title blocks. The title block shall include the area designation number of the process unit or support facility involved.

The purchase order shall define the type of drawings and data the vendor must furnish and date required. In general, reproducible sepia for each item of equipment, including auxiliaries, complete with all pertinent arrangement and detail drawings, manufacturer's contractors data sheets and performance curves where applicable will be required for each item of equipment. This shall also include Mill Test Manufacturer's Data and Test Reports.

All prints and data sheets shall be identified with Lummus or Kaiser job number, purchase order number and equipment number.

Vendor prints and data will be expedited, received, reviewed and returned to vendors by Lummus for purchase orders issued by Lummus; and by Kaiser for purchase orders issued by Kaiser. For bulk material purchase orders or blanket orders covering equipment in both Kaiser and Lummus areas of responsibility, the responsible party shall issue requisitions for material in his area. The requisitioner will be responsible for review of vendor prints, and this shall be stated on the requisition.

In respect to vendor prints and data in Lummus' scope, vendor prints and data will be received, reviewed and returned to vendors using the standard Lummus vendor print procedure. All information relating to vendor prints will be entered on Vendor's Drawing Index which will be distributed according to "Lummus Distribution of Documents", Exhibit III.

Initial issues of selected vendor prints as defined in 8.1 and all final vendor prints and data handled by Lummus will be transmitted to ANG and distributed internally in accordance with "Lummus Distribution of Vendor Prints", Exhibit XII, and Exhibit XIV.

In respect to vendor prints and data in Kaisers' scope, vendor prints and data will be received, reviewed and returned to vendors using the standard Kaiser vendor print procedure. All information relating to vendor prints will be entered on Vendor's Drawing Index which will be distributed according to "Kaiser Distribution of Documents", Exhibit IV.

Final vendor prints and data handled by Kaiser will be transmitted to ANG and distributed internally in accordance with "Kaiser Distribution of Vendor Prints", Exhibit XII, and Exhibit XIV.

Lummus and Kaiser will obtain and incorporate ANG's comments to the vendor prints and data sheets as required.

Detailed piping models will be prepared for all areas for the plant containing large amounts of piping or process equipment. Facilities, such as, coal handling and process cooling towers will be block modeled only. By-product storage (Area 6000) and holding ponds will not be modeled. For areas comprised of multiple trains of equipment only one train will be completely modeled provided that all other trains are identical (not mirror images) to the modeled train. Block models will be prepared for each remaining train with detailed piping

shown only for tie-ins to the main headers. If however the multiple trains are mirror images then they must be completely modeled. In general, interconnecting pipe racks will not be modeled except at tie-ins to individual process units.

Lummus will be responsible for modeling all the Lurgi process units and certain support units as listed in 4.2 except as noted above. These models will be used to prepare piping isometrics using the "Piping Isometric Computer System", (PICS).

Kaiser will be responsible for modeling the process units including the oxygen plant, boilers, and water treatment areas as listed in 4.3 except as noted above. Information derived from these models will be used to manually prepare piping isometrics.

A series of reviews by ANG will be scheduled at major milestones in the development of the models. The first will take place where all major equipment and pipe racks have been located. The next when all equipment and major process and utility lines have been completed. The final review will take place after the model has been completed (with all lines, instruments, values and equipment complete with log numbers shown). Any major requested changes during these reviews will be recorded in writing and will be screened for their effect on the scope of work, completion date, cost guarantees and will be processed as outlined in Section 15.0.

The distribution of model photographs will be determined by the Lummus Project Director and an ANG representative.

ANG shall have access to specific calculations during the detailed phase on an as required basis. In addition Lummus and Kaiser are to provide ANG with copies of certain calculations, computer data and other information to support existing designs and equipment sizing but not alternate design cases. This would include, but not be limited to, control valve sizing, relief device sizing (relief valves, conservation vents, rupture discs, etc.), hydraulic pump calculations, drum hold ups and sizing, tower and tray loadings, critical line sizing, foundation calculations, vessel thickness calculations, structural steel loading calculations, etc. These calculations are for information and ANG does not intend to review or approve them. However, due to the large quantity of information involved it should be submitted to ANG as it is finalized rather than at the time of job close out.

9.0 PURCHASING

9.1 Introduction

It has been agreed that Lummus/Kaiser will act as AGENTS FOR AND ON BEHALF OF ANG COAL GASIFICATION COMPANY. This section therefore, defines procedures to be followed by Lummus and Kaiser home offices in requisitioning and purchasing materials and services, including subcontracts involving field labor for the ANG Coal Gasification Company. Refer to Field Construction Procedures for field purchasing.

9.2 Terminology and Abbreviations

<u>Name</u>	<u>Designation</u>
ANG Coal Gasification	ANG
Project Procurement Manager	PPM-ANG
The Lummus Company-Bloomfield	Lummus
Kaiser Engineers-Oakland	Kaiser
Henry J. Kaiser	Site
Lummus and Kaiser	L & K
Lurgi Mineralötechnik GmbH (or)	
Lurgi-Eastern Operations	Lurgi
Project Director	PD
Project Manager	PM
Project Engineering Manager	PEM
Procurement Coordinator	PC
Requisition Originator	RO
Manager of Field Operations	MFO
Materials Manager	MM
Construction Manager	CM-Kaiser
Project Procurement Manager	PPM
Requisition	REQ.
Purchase Order Requisition	POR
Purchase Order	PO
Subcontract	SC

9.3 Division of Purchasing

9.3.1 Proprietary Equipment

Lurgi proprietary equipment will be purchased for ANG by Lurgi. ANG will arrange to supply data required by Lummus to complete the design engineering, and enable the field to do the erection.

Field purchases will be handled by Kaiser:

9.3.2 Major Equipment

9.3.2.1 Lummus

As specified in the Material Coordination Plan, in general, Lummus will purchase major equipment and commodities for the following areas.

0700	1100	1400	1800	5000
	1200	1600	1900	6000
	1300	1700	4600	8100
			5500	8300
				7000
				7100

Lummus will also purchase all field mounted analog instrumentation for the Lummus/Kaiser areas, except for instrumentation included with equipment packages or subcontracts.

9.3.2.2 Kaiser

As specified in the Material Coordination Plan, in general, Kaiser will purchase major equipment and commodities for the following areas.

0400	2000	3000	5100	8200
		4900	5200	8400
			5300	8500
			5400	

Kaiser will also purchase:

- Temporary jobsite facilities and services
- Small tools
- Bachelor quarters and facilities
- Underground piping
- Miscellaneous civil materials
- Subcontracts

9.3.3 Aboveground Piping

Aboveground piping will be procured by Lummus, Kaiser, and/or others as developed by an overall piping plan.

9.3.4 Construction Equipment Rental

All Kaiser construction equipment rental contracts to be awarded on a competitive basis.

9.3.5 Purchasing Details

A detailed division of purchasing work between Kaiser and Lummus is shown on the Materials Coordination Plan.

9.4 Standardization

Insofar as possible, Lummus and Kaiser will coordinate the standardization of equipment and instruments, in order to keep spare parts' inventories to a minimum.

9.5 Purchasing Forms (Excluding Field Purchase)

Kaiser purchases will be on Kaiser forms, AGENT FOR AND ON BEHALF OF ANG COAL GASIFICATION COMPANY.

Lummus purchases will be on Lummus forms, AGENT FOR AND ON BEHALF OF ANG COAL GASIFICATION COMPANY.

Kaiser will use the Lummus requisition/purchase order numbering system, and the approved project code of accounts as shown in its separate volume.

All purchase orders must be coded according to the Project Code of Accounts and the Control Estimate. The codes are required to be complete 12 digit codes and to be assigned by the Cost Control Group on the material requisition prepared by engineering. Invoices from vendors are to carry the same identical codes as that on the purchase order.

<u>Requisition/Purchase Order Numerical Description</u>	<u>Requisition/Purchase Order Numerical Series</u>	<u>Numbers Assigned to K.E. for use</u>
Foundations and Civil	1- 99	0050-0099
Heaters and Boilers	100-199	0150-0199
Stacks	200-299	0250-0299
Towers and Tanks	300-399	0350-0399
Heat Exchanger Equipment	400-499	0450-0499
Pumps and Compressors	500-599	0550-0599
Piping (Underground)	600-899	0750-0899
Structural and Buildings	900-999	0950-0999
Instruments	1000-1199	1100-1199
Electrical	1200-1299	1250-1299
Construction Aids & Early Start-Up	1300-1599	1300-1599
Field Office Supplies and Rental	1600-1699	
Special Equipment, Paint, Fire-proofing, Outside Engineering		1650-1699
Insulation Material	1700-1799	1750-1799
Subcontracts	2500-2599	2500-up
Master Construction Specifications		5000-5999
Piping (Aboveground only)	6000-6199	6100-6199
Pipe	6000-6124	
Pipe Fabrication	6125-6149	
Supports	6150-6199	
Valves	6200-6399	
Fittings	6400-6599	
Flanges	6600-6849	
Specials (spec. items not material)	6700-6799	
Gaskets	6800-6849	
Bolts and Nuts	6850-6899	
Instrument Piping	6900-6999	
Special Project Requirements	7000-8999	

9.5 Purchasing Forms (cont'd)

For Kaiser Mechanical equipment and similar items not included in list of descriptions, they have started numbering 7000-8999, as they expect to need more than 1,000 numbers in this category.

7000-8999

Special Codes

8000-8999

Field Office purchasing

10000-up

9.6 Bidders Lists

9.6.1 Approved Bidders List

Lummus and Kaiser will prepare a list of reputable bidders, who are recommended for the supply of major equipment and commodities on the entire project. The list will be submitted to ANG for final review and approval. The approved list will then be issued and maintained as the Approved Bidders List/Mercer County Project. Thereafter quotations shall only be solicited from vendors on the approved list.

VENDORS WHO DO NOT APPEAR IN THIS LIST, HAVE NOT BEEN ACCREDITED, AND THEREFORE CANNOT BE USED ON THIS PROJECT.

9.6.2 Subcontract Bidders Lists

Bidders will be proposed by Lummus and/or Kaiser and will be presented to ANG for approval thirty (30) days before the subcontract requisition is being prepared for bid. ANG is to advise their approval in writing fifteen (15) days after receipt.

9.6.3 Additions and Deletions

9.6.3.1 Additions

In order to continue the open door policies of The Lummus Company and Kaiser Engineers to all legitimate suppliers, additions may be made by directing a request to the Project Procurement Manager in a letter. A formal investigation of the vendor will be initiated. New additions must have the full written approval of The Lummus Company, Kaiser Engineers and ANG Project Procurement Manager before they can be included on the list.

9.6.3.2 Deletions

Failure by the vendor to perform in any respect (quality, price, delivery, etc.) could result in temporary or permanent suspension, pending an investigation of the reasons therefore. Buyers are to direct their request to the Project Procurement Manager in a letter and fully state their reasons. Deletion of any vendor from the list must have the written approval of ANG, Lummus and Kaiser parties before becoming final.

9.6.3.3 Emergency

Should an emergency develop which would require the use of a vendor not on the accredited list, a telephone call to the Project Procurement Manager should be made prior to any transactions with the vendor. Thereafter, actions should be in accordance with 9.6.3.1.

9.7 Competitive Bidding

Bids are to be solicited so as to obtain, wherever possible, at least three (3) competitive bids. Lummus/Kaiser shall assure themselves, to the greatest extent possible, that all solicited bidders will quote.

Competitive bids will be waived in those instances where the item to be bid has only one known source, or is a single source purchase which has been so designated, and approved as such by ANG provided that the purchased items are within the limits of the control estimate and provided that no additional costs be incurred by Lummus and Kaiser by reason thereof.

9.8 Written Bid Requirement (Lummus/Kaiser Home Office)

On purchases of less than \$25,000, the Purchasing Department will obtain written bids in all instances, unless for valid reasons (emergency, short lead time, etc.) and with the prior annotated approval of the Project Procurement Manager or project management, verbal bids are more appropriate. All verbal bids obtained must be confirmed in writing, either by individual confirmation of price or by price - identifying blanket purchase order. Bids which are anticipated to be in excess of the above amount will be processed in accordance with the Sealed Bid Requirements listed in paragraph 9.9.1.

Lummus and Kaiser shall establish and strictly adhere to a bid due date on all formal inquiries.

9.9 Sealed Bids

9.9.1 Sealed Bid Requirements

Sealed bids will be required from at least three (3) qualified bidders in the following instances:

- On all construction contracts.
- On all purchases at or in excess of \$25,000. This financial determination will be made by the Project Cost Engineer. In no instance will budget information be revealed to the buying group prior to completion of bidding. The Project Cost Engineer, after determining that the purchase will probably be at or in excess of \$25,000, will mark the note to procurement page with the notation "Sealed Bid Required", prior to forwarding the requisition package to the Procurement Department for bid action.

9.9.2 Validity of Sealed Bids

- All quotations received must be considered confidential.
- In order to be considered valid, unopened sealed bid must be in the possession of the Purchasing Department not later than the date listed for a reply. This practice must be strictly adhered to.

9.9.3 Sealed Bid Acceptance/Rejection

Sealed bids received and date/time stamped on or before the close of the business day of the due date shall be considered valid. Bids received unsealed, (or) sealed bids received after the closing date will be returned unopened to the bidder. However, late bids dealing with critical material (short lead time, etc.) will be referred to the Project Procurement Manager and/or project management, and the ANG resident engineer before being returned. Bidder is to be cautioned that bids received after the bid due date will be unopened and returned to the bidder.

If circumstances dictate and there is an extension to the bid due date, all bidders will be notified by telex. This will have the approval of ANG.

9.9.4 Communication with Bidders

Any discussion with vendors while in the bidding process and prior to the bid due date, shall be limited to specifications and/or technical requirements, terms and conditions only.

9.9.5 "No Bid" Replies

If, during the bidding period and prior to the closing date, a vendor indicates a "no bid", the matter will be referred to the Project Procurement Manager who will take the following action. However, this action will only be taken in those instances where bid replies of remaining vendors quoting will result in fewer than three (3) bids, as follows:

- Determine, in conjunction with project management, that additional bid-time is available.
- Extend the bid-due date by notifying all current bidders (by telex) of the time extension.
- Issue additional Request(s) for Quotation to compensate for the "no bid", and thus ensure adequate replies.
(or)
- If project management advises that time does not permit additional solicitations, the original bid-due dates will remain in effect, and the bid-closing processed on the reduced number of bidders.

9.9.6 Sealed Bid Opening

All bid openings will all be at the same time and in the presence of witnesses. There will be two (2) witnesses plus the ANG Project Procurement Manager as follows:

- Applicable Buyer
 and
- Project Purchasing Manager

Upon opening, all bids will be dated/time stamped on the reverse side of the last bid-page, and all witnesses are to sign the bid immediately below the stamp to indicate their presence, and concurrence that the bids observed has been sealed under the sealed bid guidelines.

9.9.7 Deviation from Sealed Bid Requirement

No deviation from the above sealed bid requirement will be allowed except at the written direction of the Project Director, the appropriate Deputy Project Director and the Project Procurement Manager, who in turn will obtain written approval from ANG-Project Procurement Manager.

9.10 Instruction

Firm prices are to be requested in all inquiries. Exception to this firm policy must be reviewed by ANG on a case by case basis. Lummus/ Kaiser must obtain ANG approval on all exceptions. Exceptions should be directed to the ANG PPM. Bid Tabulations shall include the expected bids, labor contract expiration date and affiliated union organizations.

Escalation for Equipment Codes B-G and escalation deviations will be handled on an individual basis. Escalation information from the vendors will be obtained only after bid opening. This may take place in a Clarification meeting - Pre-Award meeting with prior approval of ANG. Further exceptions are to be handled on an individual basis.

9.11 Progress Payments

Progress payments must not be requested.

9.12 Supervising Engineers

Inquiries for special equipment and/or machinery shall require the bidders to quote individual charges and terms for field services/ erection assistance, start-up services, and operator training, unless such services are normally included in the quotation.

A priced list of recommended spare parts for start-up and one year operation, which may be purchased by ANG, shall be requested with the quotations.

9.14 Requisition Preparation

Lummus and Kaiser engineering will originate requisitions for purchase on an individual company basis. Both companies will prepare their own requisition packages.

The abbreviation, "REQ.", will describe a requisition with attachments (if any), and will include but not be limited to equipment data sheets, drawings distribution instructions, bills of material, engineering drawings, standard and reference drawings, technical specifications and data.

9.15 Requisition Distribution

Distribution of requisitions and their attachments will be made by the Project Engineering Manager of each company in accordance with Exhibit III and IV of the Job Instructions. The Procurement Departments will process all inquiries to the vendors.

9.16 Instructions to Bidders

A set of instructions will accompany all inquiries, and will state in detail all special requirements for this project. Such information as equipment warranties, tax requirements, protection of equipment for possible long-term storage, shipping and handling problems will be included.

9.17 Inquiry Number

The inquiry number is the same as the requisition number.

9.18 Contents of Inquiry Package

The inquiry package will consist of, but not be limited to, the following:

- Request for Quotations Form
- Instructions to Bidders
- Inquiry Acknowledgement Card
- Requisition (including any inspection and/or quality control requirements)
- Specifications (if any)
- Drawings (if any)
- Terms and Conditions
- Packing, Marking, Shipping, and Invoicing Instructions
- Erection Engineer Agreement (if applicable)
- Sealed Bid Instructions

9.18 Contents of Inquiry Package (cont'd)

Inquiries will also state that bidders are required to furnish with the quotation a summary level, milestone type shop fabrication schedule. This document will be expanded into a detailed shop fabrication schedule by the successful bidder, who will be required to furnish such detailed schedule within thirty (30) days after notification of award. Schedule is to be updated once each calendar month to clearly show actual progress to date for each line item on the schedule, together with a total percent complete for the entire job. This progress schedule is to be submitted each month to the Project Controls Manager (Lummus) under cover of a transmittal letter prepared on vendor's stationary which specifically points out any problem area and containing vendor's statement of remedial action taken, or to be taken, to maintain quoted delivery. Copies of this schedule will be furnished to the Project Procurement Managers of Lummus and Kaiser. The Project Procurement Manager of Lummus/Kaiser will send directly (without review) copies of the schedule to the ANG Project Scheduling Engineer and ANG Project Procurement Manager.

9.18.1 Exceptions

Quotations shall be for the exact conditions set forth in the bid request and attachments thereto. If bidder's proposal differs in any way, he shall itemize the difference in his quotation under a separate heading titled, "Exception to Inquiry". Bidders are encouraged to submit alternate proposals when they consider the alternate to be an improvement or more economical, but these proposals must meet specifications.

9.19 Inquiry Distribution

In addition to normal internal distribution, an information copy of the worksheet showing vendors solicited, including addresses, will be forwarded to ANG Project Procurement Manager at the same time the inquiry is processed to the vendors for bid.

9.20 Bid Clarification Meetings/Major Equipment

Prior to submission of bids for major equipment, or other highly technical bids, all bidders may be asked to meet with Lummus and/or Kaiser to be sure that their bids will reflect an understanding of all requirements. ANG will, at their option, attend these meetings.

9.21 Quotations

Necessary internal distribution, as well as ANG requirements, must be taken into consideration for the total copies of quotations requested from the bidder. Any departments outside of Procurement will receive unpriced quotations with exceptions to be approved by the ANG PPM.

Upon receipt of quotations, the buyer will prepare a Bid Tabulation comparing commercial terms, and pointing out alternates, exceptions, and/or omissions. All bidders requested to bid are to be shown on the Bid Tabulation, including the "no bid" and "no reply" responses. Buyer will select the most capable bidder, based on the best commercial offer, including engineering evaluation (where applicable), and state his reasons for the selection. A formal letter of recommendation is to be accompanied with the Bid Tabulation.

Before completion of the Bid Tabulation, the buyer is to contact the Procurement Coordinator who will obtain from the Project Cost Engineer the budgeted amount allocated for the item(s) to be purchased. This amount will be entered in the Bid Tabulation. The total price of the recommended bid will also be entered in the appropriate box, and the over/under budget amount shown. Budget amounts, which will be made available to the Procurement Coordinator by the Project Cost Engineer, must be considered confidential information, and will not be released to the buyer until all bids have been received and are ready for tabulation.

Buyer is to contact the Procurement Coordinator, who will obtain the Project Scheduler's concurrence that bidder's quoted delivery is the same (or better) than the project schedule requirements. In the event that the low bidder's delivery date is beyond that required, a full review is to be made in order to assess the impact on the project schedule and a recommendation made "for" or "against" the award. The project schedule will govern this recommendation.

The buyer, in conjunction with the Procurement Coordinator will obtain the required Procurement Department signatures, and where necessary, contact the requisition originator to obtain a technical evaluation, and the necessary engineering approval signatures. Approval signature is also required from the Project Controls Managers.

The Bid Tabulation, bearing procurement and project management approval signatures, and with one (1) copy of each bid, pertinent literature, and significant correspondence attached, will be forwarded by the Procurement Coordinator for any final higher authority approval signatures required. If and as required, procurement will participate in recommendation discussions with the PD, PM, and PPM, PEM, and the ANG Project Procurement manager prior to obtaining these signatures.

No Bid Tabulation will be approved by ANG in those instances where the recommended bidder's price exceeds the allocated budget dollars, unless accompanied by a justification for the over run. All justifications of this type must be reviewed with, and bear the final approval signature of the Executive Project Director prior to submission to ANG.

Letter of credit transactions may involve some additional processing for control of bank lines of credit. Detail procedures covering this aspect of purchases must be consulted for direction.

9.23 Bid Tabulation for Commodity Items

The buyer will follow the above approval procedure, with the exception that engineering approvals are not required. However, if alternates are offered, or exceptions taken by the bidders, the buyer will obtain the requisition originators' approval on the Bid Tabulation. In any event, the buyer will forward a copy of the recommended bidder's proposal to the requisition originator after approval.

9.24 Subcontract Bidders List

Bidders will be proposed by Lummus and/or Kaiser, and will be presented to ANG for approval ninety (90) days before the subcontract requisition is being prepared for bid. ANG is to advise their approval within thirty (30) days of receipt of the proposed bidders list.

9.25 Selection of Type of Subcontract

On subcontract requisitions, provided the engineering is sufficiently completed and the scope of work clearly defined and/or the quantities established, the bidders will be asked to furnish a lump sum price plus unit prices for additions or deletions provided the changes can be evaluated in unit-price terms.

9.26 Subcontract Inquiries

Lummus and/or Kaiser subcontract inquiries are to be processed within the same guidelines as material and equipment requirements. In addition to the normal distribution, an information copy of the inquiry with attachments is to be sent to:

- Lummus PD
- Lummus PPM
- Jobsite-Manager of Field Operations
- Kaiser PPM (for initial Kaiser distribution)
- ANG PPM

9.27 Bid Tabulation Document

A document titled Bid Tabulation shall be prepared for all purchases of major engineered equipment, special items of material and significant bulk materials.

This document shall record all pertinent pricing and delivery data for the item as contained in the project control estimate as well as those data contained in each vendor quotation. These data are to be displayed

in such a manner as to clearly show similarities and dissimilarities between the project control estimate and each vendor quotation.

Format for the Bid Tabulation shall be that common format as approved for use by ANG.

Bid Tabulations submitted to ANG by Lummus-Kaiser shall be accompanied by a letter of recommendation for the recommended award and contain the approval signature of the Executive Project Director, Deputy Project Director and Project Controls Manager. The letter of recommendation will include a detailed narrative of the recommendation which will depict the rationale for the proposed selected source.

Approvals Required to Purchase

Lummus and Kaiser shall submit all Bid Tabulations to ANG for final approval prior to purchasing. All Bid Tabulation (not including commodities, see Paragraph 9.23 above) will be forwarded directly to ANG Project Procurement Manager with a copy of the transmittal letter forward to the attention of Mr. D.L. Imler, Director. ANG Project Procurement Manager shall approve all Bid Tabulations.

REQUIRED APPROVAL LEVELS WITHIN THE ANG ORGANIZATION

<u>Amount of Purchase</u>	<u>Manager Level Approval-Cost, Procurement & Design Groups</u>	<u>Director of Engineering & Construction</u>	<u>V.P.</u>
\$0 to 100,000	X		
\$100,000 to 250,000	X	X	
\$250,000 to 500,000	X	X	
Over \$500,000	X	X	X

Lummus and Kaiser Bid Tabulations for "commodity items" (i.e. pipe, valves and fittings) shall be approved by ANG's Detroit office designee or the resident engineer in the individual Lummus and Kaiser offices. ANG's resident engineer shall be authorized to approve purchasing documents for commodity items only if:

- The low bidder has been selected;
- The successful bidder is on the approved bidders list;
- The proposed expenditure for the item is within the budgeted amount;
- The total proposed price shall not exceed \$50,000;
- The delivery quoted meets the schedule requirements as determined by the Lummus and Kaiser Project Scheduler.

If any of the five (5) conditions are not met, then the purchasing documents must be forwarded to ANG as outlined above.

The Lummus internal approvals of Bid Tabulations will be in accordance with the following:

<u>Dollar Value</u>	<u>Approvals Signatures Required</u>
Under \$25,000	Sr. Buyer (Applicable Office)
\$25,000 to \$99,999	Manager of Purchasing - Blfd.
\$100,000 to \$299,999	Manager of Procurement - Blfd.
\$300,000 to \$599,999	Manager of Operations & General Manager
\$600,000 and over	Vice President

The Kaiser internal approvals will be accordance with the following:

PURCHASES AND SUBCONTRACTS

<u>Oakland Office Position</u>	<u>APPROVAL TO AWARD</u>		<u>EXECUTION</u>	
	<u>Engineering Review Required</u>	<u>Engineering Review Not Required</u>	<u>Purchase Orders</u>	<u>Subcontracts</u>
Project Engineer	\$ 10,000	\$ -	\$ -	\$ -
Engineering Mgr. or Chief Proj. Engineer	50,000	-	-	-
Project Mgr.	200,000	-	-	-
Depart. or Div. Mgr.	500,000	-	-	-
Proj. Purchasing Agent	-	10,000	200,000	100,000
Proj. Procurement Mgr.	-	20,000	1,000,000	500,000
Purchasing Mgr.	-	50,000	2,000,000	1,000,000
Director of Procurement	1,000,000	1,000,000	Unlimited	Unlimited
Vice President- Project	1,000,000	1,000,000	-	-
Vice President- Field Operations	1,000,000	1,000,000	-	-
Vice President- Engr. Design	1,000,000	1,000,000	-	-
Executive, Senior, Group & Profit Center Vice Pres.	Unlimited	Unlimited	Unlimited	Unlimited

Both Lummus and Kaiser will use their own normal procedures for soliciting ANG approval and signatures on Bid Tabulations. Kaiser will also send a copy of the transmittal letter to:

- Lummus PD
- Lummus PPM

Distribution of Approved Bid Tabulation

As soon as ANG approves the Bid Tabulation for purchase, Lummus and Kaiser will make their normal internal distribution. Kaiser will also forward copies of the approved Bid Tabulation to:

- Lummus PD
- Lummus PPM

In the case of Lummus-issued/ANG-approved Bid Tabulations dealing with a subcontract, normal internal distribution will be made, with an additional copy being furnished to:

- Kaiser PM (for Field Distribution)

All original Bid Tabulations will be maintained by ANG-Detroit. The copies will be then forwarded to the appropriate location for final disposition.

Authorization to Purchase/Purchase Order Requisition (POR)

Receipt of a copy of the ANG approved Bid Tabulation is authorization for the Lummus and/or Kaiser requisition originator to release the purchase order requisition (POR) to the buyer, for use in the preparation and issuing of a formal purchase order.

In case of emergency requirements, ANG will telex the appropriate Lummus/Kaiser office, referencing the requisition number, and indicating that their approval to purchase has been given. The buyer will then use a copy of the telex as his authority to purchase. The formally approved Bid Tabulation will be returned in a routine manner.

Purchase Order Requisition (POR) Number

The POR number is the same as the requisition number except when an order is split. The prefix "REQ." is deleted from the appropriate box in the requisition, and the designation "POR" is inserted.

Purchase Orders

The purchase order number will be the same as the original requisition and subsequent POR.

Split purchase orders will bear the alphabetical designation "A", "B", etc. In order to avoid the necessity for cross-reference files, numerical splits (new numbers) will not be allowed.

9.32 Purchase Orders (cont'd)

The purchase order for the seller will consist of the following:

- Original of Order
- Acceptance Copy
- Purchase Order Requisition (POR)
- Specifications and drawings (as required)
- Engineering Standards (as required)
- Applicable Terms and Conditions
- Packing, Marketing, Shipping and Invoicing
- Instruction (Domestic or Foreign)

Purchase orders will be signed, depending upon the dollar amount, by the respective signatories authorized to do so within the Lummus or Kaiser organizations.

9.33 Purchase Order Distribution

<u>No. of Copies</u>	<u>Color</u>	<u>Recipient</u>	<u>Location</u>
1 Priced	White	Seller (Original)	As Applicable
1 Priced	White	Seller (Acceptance)	As Applicable
1 Priced	Blue	Procurement Department	Lummus-Bloomfield
1 Priced	Pink	Accounting Department	Lummus-Bloomfield
1 Priced	Yellow	Project Manager	Lummus-Bloomfield
1 Priced	Mustard	Estimating Department	Lummus-Bloomfield
1 Priced	White	Project Engineering Manager	Lummus-Bloomfield
1 Priced	White	Requisition Originator	Lummus-Bloomfield
1 Priced	White	Procurement Coordinator	Lummus-Bloomfield
1 Unpriced	White	Project Lead Scheduling Engineer	Lummus-Bloomfield
3 Priced	White	Inspection/Expediting	Lummus-Bloomfield
1 Unpriced	White	Manager of Field Operations	Field
1 Priced	White	Materials Control Department	Field
1 Priced	White	Accounting Department	Field
3 Priced	White	ANG Coal Ccification	Detroit
1 Priced	White	Kaiser	Oakland

9.34 Telex Orders

Telex orders are permissible under the following circumstances:

- On advice by telex from ANG that a Bid Tabulation has been approved, and is being returned for purchase and validity is about to expire.

Telex Orders (cont'd)

- If an approved Bid Tabulation has been returned, and a delay beyond the schedule time in processing is anticipated before receipt of the POR by the Procurement Department.

- Emergency

If the purchase is designated as "emergency" by the PD, the PM, the PEM, the PPM, or ANG, the Procurement Coordinator will initiate telex action to purchase after determining, with competent authority, that an emergency does exist, and that required approvals to purchase have been obtained.

All notifications of ANG approval of Bid Tabulations will be channeled through the Procurement Coordinator. After all internal approvals of Lummus/Kaiser, on the Bid Tabulations it will be channeled directly to the ANG PPM. Emergency conditions will be handled via telecopier.

The buyer will include all commercial terms in the telex order such as PO number, item numbers, equipment tag numbers (if applicable) and accounts, quantities, description of item(s), price, total price, escalation conditions (or the notation the price is firm), F.O.B. information, terms of payment, firm dates for material, advance drawing and final drawing deliveries, and shipping instructions.

All telex information relative to deliveries must specify dates. A notation will also be made in the telex order as follows:

"This telex is your authority to proceed with this purchase order. A formal purchase order is being processed, and will be forwarded to you as soon as possible. Do Not Delay in processing this order, and acknowledge receipt by return telex." The formal purchase order when issued, will in turn be marked. "Confirming our telex of (date)", and the notation: "Do not duplicate."

Distribution of telex orders will be the same as purchase order distribution.

Letter and Verbal Orders

Verbal orders are not permitted.

Letter orders are not permitted.

If a vendor requires advance notification and confirmation that a purchase order is to be awarded, a telex order will suffice. However, both Lummus and Kaiser will use their best effort to issue the formal order in accordance with the schedule time frame allotted for this activity after issuance of the telex order.

Technical Revisions and/or Engineering Changes, which encompass revised drawings or new issues of drawings, will be forwarded to the Procurement Department by means of a revision to the POR. The extent of the change will be clearly indicated on the POR including any technical literature necessary.

The buyer, in order to obtain revised and/or additional cost information, will then forward the POR supplement to the seller. Copies of the POR supplement will simultaneously be distributed in accordance with the purchase order distribution.

The Procurement Coordinator, in conjunction with the requisitioner and/or the engineering personnel initiating the change, will obtain a budget-estimate of the cost increase/decrease from the Estimating Department. This will be done in advance of a reply from the seller, and in all cases where the increase is considered either major or over-budget, and as such, will require ANG and Project Director approvals.

If the seller indicates no price change is involved, a formal PO supplement will be issued immediately accompanied by the POR supplement.

If a price change is minor (those which do not exceed \$5,000.00), or is based on quantity or size changes in commodities that can be estimated with reasonable accuracy, then the changes can be committed by a telex authorizing the seller to proceed, provided such change is within the budget allocation. Upon formal receipt and verification of the corrected information from the seller, and approval of the ANG resident engineer, a confirming PO supplement is then to be issued, accompanied by the POR supplement.

For major changes involving large increases/decreases affecting work already committed or in process, the seller will be asked for a price review, verification that the change can be made, and the effect on delivery schedules. Unreasonable prices will require further negotiation between the buyer and seller. Any discussion shall be so approved by ANG, prior to any discussion with the seller. This precaution is taken in order to reduce the price to an acceptable level. The necessary ANG project approvals must then be obtained by Bid Tabulation Supplement, prior to commitment. Major changes are all changes in excess of \$5,000.00. Upon receipt of the required approvals a PO supplement is then to be issued, accompanied by the POR supplement.

Any extra or claim submitted by a seller must be properly documented and broken down in detail, in order to permit a proper review and verification. The buyer is responsible for obtaining data from the seller necessary to process the claim. Settlement of any and all claims and extras shall have the prior approval of ANG.

Fully documented claims/extras must be submitted by Lummus/Kaiser to the resident ANG Project Procurement Manager, who will in turn obtain the necessary ANG approvals within the structure as listed below.

<u>Dollar Value</u>	<u>Approval Required</u>
Up to \$5000	Buyer (Applicable Office)/ and ANG resident engineer
\$5000 to \$25,000	Sr. Buyer (Applicable Office)/ and ANG
\$25,000 to \$99,999	Manager of Purchasing-Blfd/ and ANG
\$300,000 to \$599,999	Manager of Operations, General Manager/and ANG
\$600,000 and over	Vice President/and ANG

All cases concerning claims/extras are to be referred to the Project Procurement Manager for action; and/or resolution.

Kaiser internal approval signatures will be in accordance with their currently accepted fiscal practice, however, settlement of all claims shall have the prior approval of ANG.

9.38

Backcharges

9.38.1

Field

Upon locating a vendor error or damage, the field shall immediately notify the Procurement Coordinator at Lummus/Kaiser and the ANG field representative, that an error or damage exists and the probable extent. If necessary and feasible or practical, documented evidence will be obtained. The Procurement Coordinator will assure that all concerned parties have been advised of the error and the probable implications, if known at that time. All verbal notifications of this type must be confirmed, either by hand-delivered letter, or by telex, within twenty-four (24) hours after the verbal notification, and must explicitly detail all conversations and findings.

Therefore, it is the responsibility of the buyer with the collaboration of the appropriate engineering and/or inspection representative, to ascertain that the following actions are (or have already been) taken:

- The vendor must be given the opportunity to review his drawings, specifications, and/or the purchase requirements.
- The vendor will also be afforded the opportunity of visiting the jobsite or location of the rejected material. His visit must be within a reasonable time, and he is to be accompanied by representatives of the Inspection Department, the Engineering Department (if required), and ANG, if they so request.

- The vendor may elect to have the defective material returned to his shop at his own expense, for repairs. However, such return must be consistent with delivery requirements originally set forth.
- or
- The vendor may authorize field-repair by his own personnel, or by a qualified contractor of his choice; however, such contractor must be approved as "authorized for field-repairs", by the Lummus/Kaiser/ANG representatives, in order not to violate field (union) labor agreements. Lummus/Kaiser and ANG personnel must be in agreement that such repairs are feasible, will correct the error, and can be made within the time period necessary.

If it is the general consensus that the questionable material cannot be salvaged, the vendor will be afforded the opportunity of furnishing a replacement; however, this is with the provision that all parties are in agreement regarding the vendor's capabilities for adequate replacement, and that the replacement is within the delivery schedule originally asked for, or the revised schedule for the replacement has the approval of all parties.

If the vendor cannot or will not replace the defective material, then alternate purchasing action should immediately be taken with another source of supply, in order to obtain the part/material within, or as close to, the original schedule as possible. It is then important that discussions and negotiations be conducted between the buyer, the original vendor, and all internal interested parties, as well as ANG Project Procurement Manager, in order to indemnify and absolve the purchaser from any price-increase caused or occasioned in obtaining a replacement within the desirable schedule.

A Status Report detailing all claims, extras and backcharges, and also including any defective and/or rejected material delivered to the jobsite, is to be kept current at all times. This Status Report will be submitted by Kaiser field on a monthly basis in accordance with the distribution of documents Exhibits. All claims, extras, backcharges are to be shown on, and will remain in the Status Report for claims while they are current, and prior to a final settlement satisfactory to all parties. Thereafter, they will be dropped from the report unless, for substantial reasons, it is required that they remain current for statistical and/or historical data. A copy goes to ANG Project Procurement Manager.

9.39 Revisions in Total Price

All purchase order supplements for price changes are to show a summary of the new price, tabulated at the end of the supplement as follows:

Previous Total	:	\$	_____
Addition/Deduction	:	\$	_____
New Total Price	:	\$	_____

If there is no price change, the single statement: "No Price Change" will suffice.

9.40 Purchase Order Supplement Distribution

Supplements will have the same distribution as purchase orders.

9.41 Pre-Award Meetings

For large purchases, or items critical to job completion a pre-award meeting should be held with the selected seller, in order to ascertain that the seller completely understands all aspects of his commitment, and to verify his ability to deliver on schedule. Meetings are to be attended by appropriate representatives of seller, procurement, engineering, construction and ANG. Minutes of these meetings are to be prepared and distributed by the representative of the Purchasing Department.

9.42 Procurement Scheduling and Status Reporting System (PSSR)

The PSSR System of Procurement Scheduling and Status Reporting will be utilized by Lummus and Kaiser for all engineered equipment procurement performed on this project. Major responsibility for implementation and maintenance of this scheduling instrument is with the Project Controls Department.

All procurement information is to be fed into a Central Data-Bank Control Point. Composite reports will then be available to all project control points in:

- ANG/Detroit
- C-E Lummus/Bloomfield
- Kaiser Engineers/Oakland
- C-E Lummus/European Offices (to and from as required)
- C-E Tokyo (to and from as required)
- Jobsite/North Dakota
- Resident Project Procurement Manager-ANG

The frequency and distribution of the reports to be furnished will be outlined in Exhibits III and IV.

Basically, the reports furnished will consist of but will not necessarily be limited to the following:

Master List

A record, of all engineered equipment/material items to be purchased for the project, sorted by the end-use facility/area, and then by equipment number sequence. This record is used by project management for advance scheduling of engineering (preparation of specifications and drawings), and also as a master reference for all parties associated with the project.

Cost Code Record

A record, of all items carried on the "Master List", sorted by cost code number. This record provides the cost engineer with information on the status of all items.

Requisition Record

Record, of all items which have been requisitioned, sorted by the requisition number. This record is of value to all departments who use the requisition numbers for project control.

Requisitions/Open

Record, of only those items which have not yet been requisitioned, sorted chronologically by the dates scheduled for release of requisitions. This record is used by the engineering manager and project engineers to schedule the preparation of specifications and drawings for timely release of requisitions, and for the Procurement Department to monitor receipt of requisitions.

Purchase Order Number

Record, of all items which have been purchased, sorted by the purchase order number. This record is used/as a procurement reference, by traffic for logistics purposes and by receiving as a check list against incoming shipments.

Purchase Order List/Open Items

Records, of only those purchased items which have not yet been shipped, sorted by purchase order number. Used for expediting and traffic control departments.

Critical Listing

Record, of only those items which are behind schedule (showing negative float), sorted by descending number of days float

(27 etc.). This record is to be used by project management, purchasing and expediting to identify the critical items in order to take corrective action.

Arrive Job-Next 90 Days

Record, of items scheduled to arrive at jobsite during the next ninety (90) day period, sorted chronologically by arrive job dates. This record is used by the Construction Manager for more precise scheduling of construction work, and also for procurement, expediting and traffic.

Repetitive Purchasing

Once a seller has been selected and approved by ANG on commodity items such as valves, piping, electrical materials, tools, etc., purchase orders for additional quantities may be placed with the same supplier without further competitive bidding, provided:

- The price structure remains the same as the original bid.
- The amount of the additional or repetitive purchase has been given all approval signatures required by the dollar amount involved, prior to the purchase being made.
- Delivery schedule is acceptable.
- Quantities or changed market conditions do not warrant rebidding.

Blanket Orders

Lummus, Kaiser, and field will be purchasing items that are classified as "immediate use items." It is pertinent that items of this nature be identified to ascertain a volume blanket order that will be established under the competitive guidelines as reflected in the Job Instructions. Once an item(s) has been established in a blanket order with a supplier, a field purchase order will be utilized to authorize shipments. The blanket order shall be referenced on all field purchase orders (where applicable).

Prior to a blanket order being consummated, distribution and approval shall be in accordance with Section 9.28 and 9.29.

The duration of the blanket order will be based on the firm pricing structure allowed for those items and the supplier. In most cases, the duration will be a 12-24 month period.

9.44 Distribution of Documents, Drawings, Specifications and
Vendor Prints

Distribution will be made in accordance with the applicable Exhibits in these Job Instruction.

9.45 Freight/Taxes/Duty

All bids requested from vendors must inform the bidder(s) that charges for freight and/or taxes must be clearly shown as separate items, and cannot be absorbed in the overall cost of the equipment or material. This will apply to import duty as well as state, federal, and local taxes, and any applicable freight (inland) as well as ocean transportation. Taxes, in this case, refers to any and all taxes for which the purchaser (ANG) would be liable, and is not intended to imply the purchaser's (ANG's) assumption of taxes normally chargeable to, and paid for by the bidder/vendor. State taxes are chargeable on freight cost, unless title does not pass at the point-of-origin. (When title passes at point-of-origin no taxes are applicable on freight.)

ANG has obtained a North Dakota State Tax Exemption Certificate, therefore all State Taxes must be paid directly to the State of North Dakota, except for local purchases of certain materials and supplies as defined in the descriptive Chart of Accounts for Elements of Cost, specifically elements X34, X71, X73, X74, X77 and X88. Payment for these elements will be paid directly by the seller.

9.46 Freight Allowed

If a vendor allows freight from the point of manufacture to the jobsite, it is only with the understanding that the equipment/material is still subject to inspection upon arrival at destination, and will be rejected if found defective. Therefore, when title is passed to the owner (ANG) at point-of-origin, it is only with the clear understanding that the equipment/material is subject to final inspection, and acceptance or rejection.

9.47 Foreign Freight Cost

ANG/Lummus/Kaiser will need to undergo a comparative evaluation using a 3% sales/use tax ratio in comparison to the evaluated terms of payment on freight, i.e., cost of monies on freight, firm freight cost and risk factions attributed to possible change in tariffs, surcharges, etc. Each foreign bid tab will be handled on an individual basis.

9.48 Domestic Freight Cost

All items shall be purchased ex works, with title passing ex works.

9.49 Insurance/Material In Transit, Etc.

9.49.1 Domestic Shipments

For shipments originating within states of the United States of America, the District of Columbia and Canada, insurance coverage will be automatically provided by ANR under the Builders Risk form up to a limit of \$20 million per loss. However, shipments originating in Alaska or Hawaii should be handled as foreign shipments since the materials will be transported beyond the territorial limits of such states. This "All Risk Coverage" applies to material, equipment, machinery, appurtenance and other property in transit to the jobsite or placed in temporary storage from the time the risk attaches at point of places of shipment i.e. (F.O.B) vendors works, or plant). The insurance allows for a shipment to be made under released value bill of lading. In case of temporary storage of major equipment away from the manufacturer shops or jobsite, then this will be reported to ANR, Risk and Insurance Department, One Woodward Avenue, Detroit, Michigan 48226.

9.49.2 Foreign Shipments

Shipments originating outside states of the United States of America, (except for shipments from Alaska or Hawaii), the District of Columbia and Canada, will be handled as follows. Provisions for insurance on materials in transit will be provided by ANG on each shipment and will be based on the following procedure.

Materials from overseas suppliers will be purchased F.O.B. vendors works or plant. The in transit insurance coverage will commence at the vendors plant gate on an all risk basis, including war, strikes, riots, and civil commotion. Owners to provide \$5 million coverage per occurrence with additional coverage available as needed.

Declarations of shipments with the amount of duty, if any, indicated separately are to be completed and all declarations are to be forwarded to American Natural Resources, Risk and Insurance Department, Detroit, in care of Mr. J. Imesch, with a copy directed to Mr. J.W. Parker, Manager of Special Projects. Once the shipping instructions have been determined, this document if possible, should be received by ANG prior to the actual shipment taking place.

All shipments must be made on approved vessels over 1,000 net tons. The vessel must be under twenty (20) years of age and approved by a recognized classification society such as Lloyds Register, or the American Bureau of Shipping. If the value of the property on any one vessel or conveyance exceed \$5 million, or if shipment is to be on a non-approved vessel, notice prior to shipment is to be furnished to American Natural Resources, Risk and Insurance Department. One Woodward Avenue, Detroit, Michigan 48226 (USA).

9.49.3 Claim Reporting

In the event of loss or damage of any material in transit, either domestic or foreign, notice shall be provided to the ANR, Risk and Insurance Department, One Woodward Avenue, Detroit, Michigan 48226, in care of Mr. J. Imesch. This notice shall be in accordance with the sample property loss notice, for domestic shipments and the ocean cargo claims computation form, for foreign shipments. Additionally as is the custom, timely notification shall be given to the common carrier to protect the rights of the consignee and the shipper.

Where serious loss or damage has occurred in shipment to a major piece of equipment which could impact the project schedule, ANG shall also be notified immediately by telex message, in care of Messrs. D.L. Imler, or J.W. Parker, and the ANG Project Procurement Manager.

9.50 Task-Force Procurement

Procurement on this project will be accomplished by task-force method of procurement.

9.50.1 Task-Force Composition/Lummus Bloomfield

The nucleus of the Lummus/Bloomfield Task Force will be assembled, segregated and similar in structure to the general Procurement Department.

The initial task force, which will obtain Control Estimate prices, will consist of:

- Procurement Coordinator
- Buyers
- Traffic Supervisor (Oversized and Overweight)
- Buyers Assistance
- Clerical

Thereafter, the task force will be gradually expanded, as work-flow dictates, and at the height of the program, will consist of:

- Project Procurement Manager
- Procurement Coordinator
- PSSR Coordinator
- Buyers - Mechanical
- Buyers - Fabrication
- Buyers - Piping
- Buyers - Instrumentation
- Buyers - Subcontract
- Specialist - Corporate Piping System
- Expediting Coordinator
- Mechanical Expeditors (Inside)
- Fabrication Expeditors (Inside)
- Piping Expeditors (Inside)
- Instrumentation Expeditors (Inside)

9.50.1

Task-Force Composition/Lummus Bloomfield (cont'd)

- Traffic Supervisor
- Traffic Coordinator
- Inspection Coordinator (Inside)
- Buyers Assistance
- Clerical

Outside expeditors and inspectors will not be part of the task force but will consist of personnel already assigned to, and familiar with the manufacturing or supply facilities within their assigned geographic areas. The outside force consists of seven (7) expeditors, and twenty-five (25) inspectors, plus supervision; this group is strategically located around the U.S., and immediately reports the results of any vendor contact or visit to a telephone transcription center, located at Lummus/Bloomfield. It is envisioned that Kaiser Engineers may, where necessary and expedient, take full advantage of these services. Lummus may, in turn, utilize the Kaiser facilities for outside inspection and/or expediting wherever necessary or practical.

After the peak work-load period, the task force will be reduced, starting with buyer reduction, and gradually extending to full buyer and partial expediting and traffic elimination. Thereafter, the entire task force would be phased out, as their particular talents are no longer required.

9.50.2

Task Force Composition/Kaiser, OaklandNucleus/For Control Estimate Purposes:

- Project Procurement Manager
- Buyer
- Traffic Supervisor

Thereafter, the task force will be expanded to meet procurement schedule requirements as follows:

- Project Procurement Manager
- Purchasing Agent - Equipment and Materials
- Buyers - Equipment and Materials
- Purchasing Agent - Subcontracts
- Buyers - Subcontracts
- Project Expeditors
- Oakland Expeditors
- Traffic Supervisor
- Traffic Coordinator
- Project Inspectors

In addition to the above task force personnel, district expeditors and inspectors will provide services from various U.S., and foreign offices. Such outside services will be made available to Lummus.

10.0 FOREIGN (OUTSIDE U.S.A.) PROCUREMENT INSTRUCTIONS

10.1 Introduction

The following Procurement Instructions outline the procedures necessary to accomplish worldwide competitive bidding and supplement Sections 8.0 and 9.0 in the Job Instructions.

With the benefit of obtaining worldwide competitive bidding, this Project will enjoy the benefits of the best prices and delivery afforded to us.

In discharge of procurement responsibilities on this Project, Lummus Project Procurement personnel shall consult with, and make use of the capabilities and expertise of Lummus worldwide procurement network to assure maximum contribution of all available skills to the procurement decision process.

Project Procurement, in Bloomfield, New Jersey, shall have the overall responsibility for the selection of vendors and all clarification and negotiation of prices and commercial terms of the purchases, as well as coordination of technical clarification with Lummus' Bloomfield Engineering. All purchases of materials, equipment, and services made in a foreign market shall only be made by Project Procurement, Bloomfield, New Jersey.

10.2 Predetermined European and Japanese Marketplace

Prior to issuing any inquiries in Europe and/or Japan, a review will be made to determine the marketplaces and sources from an analysis of the following information:

- Equipment list including major dimensions, material specifications.
- Commodity breakdown including major quantities, material specifications, sizes.

Based on the results of this review, a purchasing plan will be developed by listing the equipment and commodity reflecting the marketplace conditions with respect to price and delivery in each of the countries in Europe, U.K., and Japan.

The recommended vendors will be qualified to do work on this project and their names submitted to ANG for approval to be incorporated on the Approved Vendor List. Prior to selecting a vendor for inquiry, Bloomfield Project Procurement will contact Lummus' foreign offices and ask them to suggest vendors from the list in order to assure the best foreign vendor selection at the time of inquiry.

10.3 Selection of Vendors

Upon selecting the countries in which the equipment and commodities will be solicited for bids, the responsible Lummus Procurement Office will provide a list of vendors to whom the inquiries should be issued. This shall be immediately forwarded to the Project Procurement Manager.

This list shall be screened by the Project Procurement Manager and request approval from ANG of all those vendors selected that have not been previously approved by ANG.

10.4 Requisitions

All requisitions received for inquiry shall be checked to determine in which marketplace the requisition will be directed for inquiry.

The requisition should be reviewed to be certain that U.S. specifications can be complied with in Europe.

While there are many fabricators in Europe that can fabricate to ASME code specifications, not all of them can supply the required ASME code stamps.

It must be determined early in the requisitioning stage if ASME code stamps are required in order that requisitions can be directed to fabricators who can provide the ASME code stamp.

10.5 Sealed Bids

Sealed bids shall be required from all bidders inclusive of foreign bidders for purchases in the excess of \$25,000.

Cost Engineering shall indicate in the Note to Procurement that such a bid package requires a sealed bid.

10.6 Inquiries

Inquiries being directed to Europe, U.K., or Japan will be issued directly to each of the selected bidders from Bloomfield Procurement.

The inquiries shall be clearly noted that sealed bids are required and they shall be directed only to the Project Procurement Manager in the Bloomfield, N.J. office.

Vendors shall be specifically instructed that no copies of quotations shall be distributed to the Lummus Division offices in Europe, U.K., Japan, and to do so, will immediately make the quotation invalid and the quotation will be returned to the vendor unopened.

One complete set of the inquiry, with the list of all the bidders, shall be forwarded to the responsible Procurement Office in Europe, U.K. or Japan.

The responsibility of the Division Procurement Office will only be to assist in expediting the quotation to the USA where needed. They shall not instruct the vendors to forward packages directly to them. Vendors will be instructed by the Lummus Division Procurement Offices that they must send their quotations directly to the Project Procurement Manager in Bloomfield, N.J., USA.

The Project Procurement Manager immediately upon placing the inquiries in the mail to the vendors and to the responsible Lummus Division Office, shall telex the responsible Lummus Division Office, advising them the inquiry number, a brief description of the equipment and material, a list of vendors being solicited, and the date the inquiry was mailed. The Lummus Division Office will immediately, upon receipt of the inquiry, begin to expedite the vendor to submit their quotation to Bloomfield, N.J., USA.

10.6 Inquiries (cont'd)

The responsible Division Office must acknowledge receipt of the telex immediately and also acknowledge receipt of their copy of the inquiries immediately upon receipt. These acknowledgements shall be directed to the Project Procurement Manager.

Under no circumstances are bid due dates to be extended without the approval of the Project Procurement Manager.

If an extension of the bid due date is granted to one vendor, the same extension must be granted to all vendors solicited.

10.7 Quotations

Upon review of the quotations received, questions may be required of the vendor by Procurement and/or Engineering. In such cases, a contact will be made directly with the vendor by the Project Procurement Manager by telexing directly to the vendor with a telex copy to the responsible Lummus Division Office. It is expected that the Lummus Division Procurement Office expedite the required information from the vendors by having the information directly transmitted by the vendor to the Project Procurement Manager in Bloomfield, N.J., USA.

Sealed quotations must be in the possession of the Bloomfield Division Procurement Department not later than the date listed for reply. It is Bidders' responsibility to assure delivery of their proposal by the quotation due date, transmittal by door-to-door air courier service, if appropriate, may be necessary. Bidders will be notified that quotations received after the bid due date or quotations received unsealed, will be unopened and returned to the bidders. It is mandatory that the acknowledgement card, included with this inquiry, be completed and returned upon receipt of this inquiry.

10.8 Tabulation

Bid tabulations shall be prepared in Bloomfield, tabulating all vendors solicited.

Negotiations shall be held in the Bloomfield office conducted by the Task Force Project Procurement Manager. The client will, at his discretion, be a principle in the negotiations. Foreign office procurement personnel will participate subject to ANC approval.

10.9 Purchase Order

All purchase orders shall be issued from the Bloomfield Procurement Office directly to the vendor with a copy to the responsible Lummus Division Office (unpriced copy of P.O.).

The Lummus Division Office, in addition to the formal transmittal letters, shall telex to the responsible Division Office the basic information such as P.O. number, vendor and brief description of the equipment, advising them the purchase order has been placed with that vendor.

10.9 Purchase Order (cont'd)

Acknowledgement of receipt of telexes by the responsible Lummus Division Office is required.

10.10 Expediting

The responsible Lummus Division Office shall perform expediting services, both in-house expediting and field (shop) expediting, on all purchase orders received.

Expediting services shall include, in addition to expediting materials from vendor's shops, expediting the required vendor data, documents required for shipping purposes, and any other documentation required of the vendor.

The required documentation shall be in accordance with purchase order instructions and attachments thereto and shall be directed to the office and individuals so noted on the purchase order and/or attachments to the purchase order.

In the event that there are problems developing, or have developed, it is required that the Lummus Division Office either telephone, confirm by telex, or telex immediately to the Project Procurement Manager advising the specifics of the problem encountered. This should also include a recommendation by the Expeditor as to what he believes should be done either by the fabricator or Lummus to rectify and/or correct the problem.

The responsible Lummus Division Office will inform Bloomfield in the above-prescribed manner whenever there is a problem anticipated or a problem encountered. They are not to rely only upon normal Expediting Reports to report the problem or normal mail. Telephone calls confirming by telex, and telex direct to the Project Procurement Manager are the only acceptable means of communication when problems arise.

A Material Status Report shall be prepared by the responsible Lummus Division Procurement Office, as well as individual Field Expediting Reports.

The Material Status Report shall be issued on a monthly basis or as frequent as requested by the Project Procurement Manager, and directed to the Project Manager Logistics.

The overall effort pertaining to Expediting shall be determined by the specific purchase order and milestone schedule as submitted by the manufacturer. ANG reserves the right to approve field expediting (shop) as individual occurrences.

10.11 Inspection

Inspection services shall be provided by the Lummus Division Procurement Office. All Field Inspection Reports shall be forwarded to the Project Chief Inspector.

In the event that there are problems developing or have developed, it is required that the Lummus Division Office either telephone, confirm by

10.11 Inspection (cont'd)

telex, or telex immediately to the Project Procurement Manager advising the specifics of the problem encountered. This should also include a recommendation by the Inspector as to what he believes should be done either by the fabricator or Lummus to rectify the problem.

Lummus-Japan shall assist the Bloomfield Office in obtaining reliable third party expediting agencies to complement their monitoring of inspection of Japanese vendors. Lummus-Japan shall act as coordinator of all Japanese inspection efforts and shall act as liaison between vendors and Project Procurement. ANG shall have prior approval to utilizing third parties.

Any third party inspection work performed for items procured in Japan shall be fully monitored by Lummus-Japan who shall ensure that all pertinent information is immediately communicated by telex to Project Procurement in Bloomfield.

10.12 Traffic

Lummus Division Office Traffic will investigate service between the foreign port involved and any East, West, or Gulf Ports. Traffic will also investigate Conference Carriers in order to obtain the lowest ocean-freight rate. Any analyses shall be conducted at the time of bid evaluation and the associate cost be included within the recommendation for purchase.

Lummus, Bloomfield, N.J. Traffic Coordinator and Kaiser Engineers jointly shall select a common customhouse broker where feasible to handle the forwarding in Europe, U.K., and Japan to a USA port and arrange for import permits and duties to be paid. Lummus, Bloomfield, N.J. Traffic Coordinator will coordinate with the Customhouse broker and arrange for inland transportation to the jobsite after clearance through customs.

The responsible Lummus Division Office shall have the responsibility to see to it that materials move from the vendor's shop to the designated port of exit and that proper documentation required in accordance with purchase order and purchase order attachments are obtained and distributed immediately.

A telex shall immediately be dispatched to the Traffic Coordinator in Bloomfield, as a sign that material has left the shop, listing the P.O. number, item number, equipment number, quantity, size and weight of the shipment, the port of exit, name of vessel, ETD, ETA, and port of entry USA. This information shall be telexed directly to the Traffic Coordinator, with a telex copy to the jobsite.

Upon receipt of written verification of inspection approval or waiver thereof, Lummus, Bloomfield, N.J. Traffic Coordinator shall release the shipment from the vendor and notify the freight forwarder to move the equipment and/or materials of the designated port of exit and arrange to have the cargo placed upon the nominated vessel for shipment to the designated port in the USA.

Tracing of shipments in route to the jobsite will be monitored by Lummus, Bloomfield, Traffic Coordinator until they arrive at the prescribed location. Any claims against the steamship company or inland carriers,

10.12 Traffic (cont'd)

covering damages and shortages in transit, will be instituted and processed to settlement by the Traffic Coordinator in Bloomfield.

Lummus, Bloomfield Traffic will declare all foreign shipments to ANR Risk and Insurance Department. In the event of loss or damage of any material in transit, notice shall immediately be provided to the ANR Risk and Insurance Department as well as to the common carrier. Where serious loss or damage has occurred in shipment to a major piece of equipment which could impact the Project Schedule, ANG shall be immediately notified by telex.

11.0 EXPEDITING AND INSPECTION

11.1 Introduction

The Expediting and Inspection Departments, which perform completely different functions, nevertheless are closely integrated. There is a free-flow of information exchanged between these groups, which has the primary purpose of increasing their efficiency, while at the same time avoiding duplication of effort in the field.

11.2 Functions

ANG or its authorized representatives, Lummus and/or Kaiser, reserve the right to expedite and inspect any or all material and equipment in seller's plant, or at the location of its subcontractor's or supplier's works, prior to shipment.

Expediting will be performed so as to assure that materials and equipment are supplied in accordance with commercial requirements of the purchase order and delivered as necessary to meet construction schedules.

Inspection will be performed in order to assure that materials and equipment supplied comply with technical requirements of the purchase order and supplements, including all drawings, specifications, industry standards, applicable codes and delivered as necessary to meet construction schedules.

Expediting and inspection will be performed by personnel of either Lummus or Kaiser, depending upon the purchase order origination point and the geographic location of the material to be inspected. ANG Inspectors will have the same rights as the Lummus/Kaiser Expeditors and Inspectors.

Raw material will not normally be inspected. For further information on this subject, see Section 11.5.5 entitled: "Mill Certificates".

Expediting and inspection in seller's plant is at the discretion of the Project Manager of Logistics. It does not diminish to any extent the seller's responsibility for delivery in compliance with the purchase order, drawings, specifications, standards and codes, and can in no way prejudice the purchaser's right to inspect material either at the seller's plant, the location of his subcontractor, or upon arrival of same at destination.

Seller shall maintain a file in his office containing the latest purchase orders, drawings, and related documents for use by the Lummus/Kaiser Expeditor and Inspectors.

The delivery status of all equipment and material on order is reported on the Procurement Scheduling and Status Reporting System (PSSR). These reports indicate the purchase order number, the equipment number, and a short description of the required versus the latest confirmed delivery dates. Shipping details, as available, are also indicated to confirm that specific Traffic Department's instructions have been complied with.

Expediting and/or inspection reports for each inspection visit will be prepared and distributed in accordance with Exhibits III, IV, and V.

Nevertheless, in order to assure a proper balance between inspection/expediting effort, and cost containment, travel authorization for office expeditors shall be routed through ANG-PPM*. In addition, the estimated number of plant visits for field expediting and field inspectors shall be furnished to the ANG-PPM for each purchase order.

* Under emergency situations deviation from this procedure may develop.

11.3 Scope of Vendor Orientation

As soon as a purchase order is placed, depending upon the material to be inspected, an Inspector will pay an initial visit to the seller to acquaint him with all particulars regarding inspection procedures. Each of the following points will be discussed:

- Checking of all commercial and technical documents in the hands of the seller to be sure that all work to be performed at their facilities will meet the purchaser's requirements.
- Return of the acceptance (acknowledgement) copy of order to the purchaser.
- A schedule is to be established and issued by the seller for furnishing of drawings, shop bills of materials, material procurement, fabrication and shipment, as described in the original inquiry package. This schedule should be mailed to the attention of the applicable Purchasing and Expediting/Inspection Departments.
- Material sub-orders for which expediting and inspection by purchaser is necessary. A copy of these orders is to be furnished to the expediting and/or inspection representative upon request.

11.3 Scope of Vendor Orientation (cont'd.)

- The Expeditor and/or Inspector will review with the seller all questions regarding packing, marking, and shipping and invoicing instructions, to be sure that the work to be performed or documents to be issued are in compliance with the purchaser's requirements. Any questions with regard to these subjects will be referred to the purchaser's Procurement Department for resolution. Also to be established are tentative schedules for critical point, stage or periodic inspections as required by the purchasing documents. (Refer to the following paragraph). A schedule of the specific stages of fabrication, the type of each test to be made during the fabrication, different fabrication operations at which point a check by the Expeditor and/or Inspector is necessary, will follow:
 - Scope of each inspection
 - Type and quantity of each Test Certificate required by the Inspection Department
- During succeeding visits, the Expeditor and/or Inspector will reaffirm the status of the above points, including the updating of the detailed shop fabrication schedule which, if applicable, is required monthly.
- Any special quality control requirements for equipment and piping will be provided by ANG.

11.4 Scope of Expediting

11.4.1 Lummus

Expediting work is to be carried out by two inter-related groups of personnel:

- Office Expeditors
- Field Expeditors

In order to carry out the expediting function, Lummus will assign specific personnel to the extent required. This will also include Lummus personnel from the appropriate foreign offices as, and when required, by such purchase.

11.4.1.1 Office Expediting

Office Expeditors are assigned on a project basis. The Office Expeditors have the prime responsibility for the overall expediting function in close contact with the buyers or their assistants. They make the initial contact with the seller in order to establish liaison and ensure that the purchase order acceptance copy has been properly signed and returned to the purchaser in accordance with the preceding paragraph 11.1. This liaison is then continued on a regular basis by telephone, telex, or letter on a level of seller responsibility sufficient to ensure reliable information. For each equipment purchase order issued, the seller is to submit a monthly Raw Material Progress Report in order to enable Field Expeditors to visit seller's sub-suppliers in case of impending bottlenecks.

Office Expeditors are completely responsible for the flow of seller's drawings in strict accordance with the predetermined schedules. This includes both incoming and the return of these drawings to the seller.

The Office Expeditors are also to keep aware of, and in turn refer, all questions regarding shipment of material to the appropriate purchaser's Traffic Department.

11.4.1.2 Field Expediting

The Field Expeditors are to visit the seller's plant selectively and at regular intervals, the frequency of which will be dictated by the complexity or critical nature of the equipment or material being purchased.

The Field Expeditors and Inspectors liaison with the Office Expeditors are to visibly check the drawing status and the sub-order status on raw materials, and ascertain via the vendor's shop fabrication schedule beyond any question the production progress being made in seller's plant. They are to initiate action on technical problems by referring the matter to their home office, and assuring that a complete and expeditious reply has been made to the seller. They also satisfactorily verify delivery schedule of the seller and his sub-suppliers and immediately report any prospective delinquency in delivery to the home office purchasing group.

When necessary to retain the agreed to delivery schedules, the Field Expeditors will alert their home office purchasing in instances where a seller may need assistance in locating or ordering critical material.

The Field Expeditor will prepare a written expediting report detailing the results of every shop visit. Distribution of reports to be the same as described in Exhibit III, IV and V.

11.4.2 Kaiser

Expediting work is to be carried out by three interrelated groups of Personnel:

- Project Expeditor
- Office Expeditors
- Field Expeditors

11.4.2.1 Project Expeditor

The Project Expeditor will serve as liaison between Lummus/Kaiser engineering, purchasing, traffic, construction personnel and Office/Field Expeditors. In this role, the Project Expeditor will be a catalyst to resolution of problems discovered internally or externally which may have a potential of adversely affecting material and equipment delivery schedules. Major functions of the Project Expeditor will be as follows:

- Assignment of purchase orders to the responsible expeditors and inspectors.
- Forward copies of all relevant commercial and technical correspondence to the Expeditors and Inspectors.
- Coordinate receipt and return of seller's approval drawings.
- Receive expediting and inspection reports and transmit to interested parties.
- Develop and issue on a regular basis a Project Material Status Report.

11.4.2.2 Office Expeditors

Office Expeditors are assigned on a project basis. They make the initial contact with sellers in order to establish liaison, develop factory reference numbers, contacts, and ensure that the purchase order acknowledgement copy has been properly signed and returned to the purchaser. This liaison is then continued on a regular basis by telephone, telex, or letter at the level of responsibility sufficient to ensure reliable information. In the event an Office Expeditor ascertains that a seller is suspect, troublesome or otherwise unreliable, the order shall be reassigned to a Field Expeditor for personal contact.

11.4.2.3 Field Expeditors

Field Expeditors are assigned on a territorial basis to visit the seller's plant at regular intervals, the frequency of which will be dictated by the complexity or critical nature of the equipment or material being purchased, or as dictated by the Project Expeditor. Field Expeditors will perform the following general functions:

- Visibly check the drawing status, the raw material status and ascertain via the vendor's shop fabrication schedule beyond any question that production progress is being made in the seller's plant.
- Initiate action on technical problems by referring the matter to the Project Expeditor, and assuring that a complete and expeditious reply is made to the seller.
- Satisfactorily verify delivery schedules of the seller and its sub-suppliers and immediately report any prospective delinquency in delivery to the Project Expeditor.
- When necessary to retain the agreed delivery schedules, Field Expeditors will alert home office purchasing in instances where a seller may need assistance in locating or ordering critical material.
- The Field Expeditor will prepare a written expediting report detailing the results of every shop visit.

11.5 Scope of Inspection

The seller is to notify the purchaser's Inspection Department twelve (12) calendar days in advance of the actual date a scheduled or final inspection is to be made. Lummus and Kaiser's Inspection Department(s) will in turn notify ANG ten (10) calendar days, if possible, in advance of pending inspections of items predesignated by ANG as requiring their inspection. These "pre-designated items" are to be advised by ANG.

The seller (and any applicable subcontractor or vendor) will mail or telex the request for inspection to the following addresses, as they apply:

- For Purchases by Lummus-Bloomfield:

The Lummus Company
Attention: Inspection Department
1515 Broad Street
Bloomfield, New Jersey 07003

Telex: 138198

11.5 Scope of Inspection (cont'd)

- For Purchases by Kaiser/Oakland:

Kaiser Engineers
300 Lakeside Drive
Oakland, California 94666
Attn: B.W. Morgan

Telex: 335-326

A request for an inspection must contain the following particulars:

- Lummus or Kaiser Purchase Order number
- Date and place of inspection
- Details of the item to be inspected, and/or the test to be carried out.

In all instances, with regard to fabricated items such as pressure vessels, heaters, boilers, etc., the seller shall notify the purchaser's Inspection Department in advance of the actual date fabrication will commence, so that a coordinated inspection progress sequence can be established in accordance with the shop fabrication schedule.

The request for an inspection of such items as pipes, flanges, valves, and those not subject to regular and constant inspection, will be made in accordance with the foregoing (paragraph 10.4) and at least eight (8) calendar days in advance of the actual date inspection is required. This will apply to partial as well as complete purchase order requirements.

ANG shall have the right to have a representative present during all shop inspections being conducted by Lummus/Kaiser or one of their subcontractors. ANG will provide Lummus/Kaiser with a list of major equipment items to be inspected by ANG. ANG shall be notified ten (10) days prior to such inspection dates.

11.5.1 Items Subject to Inspection

Generally speaking, inspection should be conducted at the place of manufacture of any items that have a significant bearing on erection costs, progress, or proper and safe operation.

It would be prohibitive, both financially and logistically, to inspect every item on all subjects. The following outlines the items normally subject to inspection and responsibility for inspection. Certain contracts or customs within a geographical location may possibly add, but not detract, from the groups.

11.5.1.1 Inspection by the Inspection Department

- Heater Coils and Piping
- Cast Alloy and Stainless Heater Fittings
- Stacks
- Packaged Heaters
- Towers
- Tower Internals
- Pressure Tanks and Drums, includes Filters, Mixers, etc.
- Shell and Tube Heat Exchangers
- Tube Bundles, Air Cooled Exchangers
- Surface Condensers
- Double Pipe Exchangers of Alloy or High Pressure Design
- Expansion Joints over 24" or of a custom-made design of any size
- Special Valves, (Switch, Slide, Block, Relief)
- Shop fabricated Piping: Carbon Steel, Spot Inspection; Alloy Steel, Full Inspection
- Structural Steel, when special paint or galvanizing is involved
- High Pressure Special Alloy Valves

11.5.1.2 Inspection Jointly by Inspection and Engineering Department

- Centrifugal Compressors
- Centrifugal Compressor Drivers
- Lube - Seal Oil Consoles
- Refrigeration Units, Large
- Packaged Boilers
- Packaged Water Treatment Units
- Packaged Clarifiers

11.5.1.3 Division of Responsibility

Inspection Department witnesses hydro-static tests, reviews material certifications, checks base and piping mounting dimensions, reviews or witnesses specified non-destructive quality control measures (radiographs, magnetic particles, etc.).

Engineering Department witnesses running or performance tests, assembly when special design requirements are involved, checks for assurance that control and other instrument devices are incorporated and function properly.

Air or gas tests for shaft seals and compressor split lines may be inspected by either or both. The required test pressure should be shown on the data sheets.

11.5.1.4 The following items are inspected by the Engineering Department when of a special nature or under special circumstances as designated by the Project Manager or the Design Engineer.

- Pumps and Drivers
- Compressors other than Centrifugal
- Expanders
- Gears, Reduction or Increasing
- Panel Boards
- Switchgears
- Transformers
- Motor Control Centers
- Special Instruments and Control Apparatus
- Inspection features and various tests are determined by the respective Engineer

11.5.2 Mill Certificates

Lummus or Kaiser will not normally inspect raw material such as steel, bar-stock, etc., either at the mill or at the plant of the sub-vendor supplying components. The seller must assume responsibility for inspection of this type of material. Such inspection must be carried out in sufficient time so that raw material delivery will be completely in accordance with the manufacturing schedules agreed upon.

By exception, however, the ANG, Lummus or Kaiser Inspection Departments reserve the right to witness the acceptance testing of raw materials and will at their discretion notify the seller accordingly. Lummus and/or Kaiser reserve the right to inspect either with, or in the absence of ANG Inspectors after proper notification has been made.

11.5.2 Mill Certificates (cont'd.)

In all cases, raw material purchases by the seller must be accompanied with Mill Certificates showing:

- Purchase Order Number
- Purchase Order Issuing Office Location
- Heat Number
- Chemical Analysis
- Results of Mechanical Tests

These certificates shall be given to the purchaser's Inspector in order to permit verification at the seller's plant of the quality of raw materials to be used in fabrication.

However, for special raw material such as heavy wall plates, clad plates, killed steel, heat resisting steel, certain steel castings (when specified in the requisition) and all raw material for which a low temperature impact test is required, inspection at the mill by an independent official inspection organization is required. This inspection will be performed at seller's expense.

Selection of the independent and official inspection organization retained by the seller must be submitted to, and approved by the applicable Lummus or Kaiser Inspection Department, prior to any inspection being made.

11.5.3 Final Inspection at Seller's Plant

Equipment or vessels shall be inspected before any painting or packing is done.

Before final inspection, the seller shall furnish the Inspector with all of the following certificates:

- Raw Material Chemical Analysis Certificate
- Raw Material Mechanical Test Certificate
- Certificate regarding Preliminary Tests carried out by vendor
- Certificate of Guarantee and/or Conformity
- Final Test Certificate
- As Built Manufacturer's Data
- All other Certificates or Test Data required by the Purchase Order

Each piece of equipment or vessel accepted after inspection is to be stamped by the Inspector.

Final inspection reports and release notes to be distributed in accordance with Exhibits III, IV and V.

11.5.4 Rejection of Material

The inspector is fully authorized to reject any material which is not strictly in accordance with requirements of the purchase order and its attendant documents.

Seller, at his own expense shall promptly repair or replace any material found to be defective and shall present it again for inspection prior to shipment.

11.5.5 Final Inspection/Receipt at Jobsite

All material is subject to final inspection upon receipt at jobsite.

12.0 TRAFFIC

The assigned Traffic Supervisor and/or Coordinator is completely responsible for the coordination of domestic and export and import freight movements, documentation, freight forwarders, etc.

12.1 Domestic

Establish with the seller adequate inner and outer packing consistent with materials to be shipped.

Arrange for the routing and handling of critical, heavy lift or over dimensional loads.

Where called upon, trace shipments of equipment and/or materials which require special attention or are lost in transit.

The Traffic Coordinator, when directed, will check the freight rates on large shipments to determine if the best rates possible have been obtained. This will apply only when freight costs are for purchaser's account.

Make necessary arrangements to air freight items on emergency shipments.

When equipment and/or materials are lost or damaged in transit the Traffic Coordinator will file claims, provided it is the purchaser's responsibility to do so. This is outlined by the terms of the purchase order.

12.2 Export and Import

Special packing, marking, shipping and involving information will be prepared for purchases of foreign material/equipment requiring same. This must contain complete and detailed instructions as required for the expedient and efficient handling of this type of purchase.

Where required, negotiate contracts with packing crating, warehousing, container and freight consolidating firms.

Prepare estimates of shipping costs by the various means of transportation when directed to do so.

Select the most advantageous shipping methods consistent with equipment utilized routes, frequency of departures, transit time and costs.

Jointly with the purchaser and the selected freight forwarder, negotiate or participate in negotiations for the best conference tariff or special project shipping rates.

12.2 Export and Import (cont'd)

Negotiate and effect contracts for export freight forwarders and customhouse brokers service.

Secure or participate in obtaining individual validated export and import licenses.

Establish shipping insurance coverage, of a type to be advised by ANG.

Coordinate the preparation and processing of export shipping documents.

Coordinate customs entry clearances and transshipments of imported materials from ports of entry to jobsite.

Audit freight and other shipping bills with tariff classifications, established rates, and fees, where costs are for the purchaser's account.

File and process loss and damage claims against the carriers.

Coordinate the preparation and processing of all other shipping documentation required.

Continuous contact must be maintained with the following organizations in order to function properly and to keep abreast of current changes.

- Transportation Service Companies
- Marine Insurance Underwriters
- Chambers of Commerce
- Offices of Foreign Consulates
- Trade Associations
- U.S. Customs Authority
- Bank Institutions (if necessary)
- Export Freight Forwarders
- Customhouse Brokers
- Regulatory and Trade Publications

The Traffic Supervisor and/or Coordinator must maintain necessary records on traffic, transportation, export and import regulations, freight forwarders, customhouse brokers services, and other services that are involved in his work.

13.0 REPORTS AND CONTROLS

13.1 Reports

13.1.1 General

Lummus/Kaiser will issue periodic reports to provide the means of appraising the progress of the project. Distribution of reports shall be in accordance with Exhibits III, IV and V.

The reports will be prepared and issued under the direction of the Deputy Project Director-Controls with the assistance of the Project Controls Managers. Periodic meetings will be held between key members of the Lummus and Kaiser task-force to convey information for the preparation of reports and controls. In general, these will be prepared and issued in accordance with the Project Scheduling Coordination Procedure and the Project Cost Reporting Coordination Procedure.

13.1.2 Master Project Schedule

The Master Project Schedule will be issued by ANG, showing specific milestone dates for engineering issues, critical equipment, procurement and delivery, time spans for non-critical equipment, procurement and delivery, time spans for non-critical equipment, procurement and delivery of materials and schedules for major construction activities.

13.1.3 Progress Reports

A Progress Report shall be prepared and issued monthly and will cover estimating and cost control, planning and scheduling, engineering, procurement and construction. This report will include the following items:

- Introduction
Summary and significant development and critical items
- Organization
Project Organization Chart
Field Organization Chart

Progress Reports (cont'd)

- Cost

Cost Control Report (See Project Cost Report)

- Schedules

Project Summary EPC Schedule - Plant Area Summaries-
Engineering, Procurement, Construction

- Physical Progress and Productivity

- Engineering - Progress Summary Report

- Total Project
 - Total Lummus
 - Total Kaiser

- Engineering Manhour Usage

- Total Project
 - Total Lummus
 - Total Kaiser

- Engineering Progress Analysis

- Total Project
 - Total Lummus
 - Total Kaiser

- Home Office Manhour Usage

- Total Project
 - Total Lummus
 - Total Kaiser

- Equipment Purchasing and Delivery Progress

- Total Project
 - Total Lummus
 - Total Kaiser

- Commodity Purchasing Progress

- Total Project

13.1.3

Progress Reports (cont'd)

- Construction Progress Summary
 - Total Project
 - Field Manual
 - Field Non-Manual
- Construction Progress Analysis
- Manpower
 - Total Home Office (Bell Curve)
 - Summary Schedule
 - Manloading Requirements
 - Physical Progress
- Status Report
 - Major Project Milestones
 - Project Data
 - Milestones Trend Chart
- Start-up
 - Start-up Schedule

13.1.4

Cost Control and Reporting

Detailed procedures are included in the Project Cost Control Procedure Manual.

One of the most important documents required is the "INCURRED COST SCHEDULE" prepared on a monthly basis presenting a profile of expected expenditures over the entire life of the project. This document is to be completely coordinated and compatible with the display of actual monthly costs as appearing on monthly invoices submitted by Lummus and Kaiser.

Use of computers and computer programs are required to have prior approval of ANG before actual utilization of either one. A complete forecast of expected expenditures is required in the profile of the projection for incurred costs.

All coordination and accumulation of data relating to cost control will be the responsibility of the Deputy Project Director-Controls.

13.1.4 Cost Control and Reporting (cont'd)

Major emphasis in the cost control area is required to be on forecasting. No report of any nature will be acceptable to ANG which omits a forecast of end cost of the entire facility.

13.2 Controls

13.2.1 General

Lummus/Kaiser is required to design, implement and maintain a complete Project Management Control System in accordance with instructions, procedures and agreements detailed in other project documents. The Deputy Project Director-Controls for Lummus/Kaiser is responsible for the systems related to any and all cost and schedule matters for engineering procurement and construction on the project.

13.2.2 Equipment List

The PSSR program is to be utilized in scheduling and monitoring the Project Equipment List. This requirement is detailed in the Scheduling Procedures and is the responsibility of the Lummus/Kaiser Project Scheduling Engineers.

13.2.3 Equipment Control Index

An Equipment Control Index normally prepared and maintained as an internal document, will not be used on this project. The controls afforded by this index will be included within the PSSR system, which will also include:

- HA Vessel Items
- JC Elevators (passenger and freight), bucket elevators, conveyors, installed cranes
- NB Transformers, switchgear, motor control centers

Other major equipment that is normally purchased as a complete or essentially complete manufacture ready for installation.

The PSSR report shall be issued every month during the period of requisitioning and procurement activity and at less frequent intervals as directed by the Vice President Executive Project Director when activity has subsided.

13.2.4 Material Control Index

A Material Control Index normally prepared and maintained as an internal document, will not be used on this project. The controls afforded by this index will be included within a Materials Control System, which will be issued as a monthly report. The preparation, maintenance and issue of this report is the responsibility of the Lummus and Kaiser Project Scheduling Engineers.

13.2.5 Material Coordination Plan

The Material Coordination Plan (included in the Cost Control Procedures) is the plan for requisitioning, procurement and construction of all materials and sub-contracts for the project.

The purpose of the plan is to provide fundamental information to all individuals working on the project regarding the basic responsibilities for requisitioning, procurement and construction of the materials, equipment and prefabricated components required to complete this project.

A Material Coordination Plan covering the total project shall be prepared and issued under the direction of the Material Control Manager.

13.2.6 Engineering Specification Index

An Engineering Specification Index shall be prepared for the total project using the Lummus form entitled "Specification Control". This index shall be issued every four weeks until all specifications are issued and approved by ANG. The remarks column shall show date each specification is issued to ANG for approval and date approval is received. The preparation, maintenance and issue of this control is the joint responsibility of the Lummus and Kaiser Project Engineering Managers.

13.2.7 Drawing Control

It is the responsibility of the Lummus and Kaiser Project Engineering Managers respectively to see that the Lummus and Kaiser drawing controls are prepared, maintained and issued every month. Project Controls Manager is responsible for coordination of information contained in this report insofar as its impact on cost and schedule status.

13.2.8 Change Control

Job changes shall be recorded and processed for the total project in accordance with the project Change Order Procedure. The Change Order Register Summary on which change orders are recorded shall be issued monthly. The preparation, maintenance and issue of this control is the responsibility of the Project Controls Manager.

13.2.9 Vendor Print Index

Vendor Print Indices will be maintained by the Lummus and Kaiser vendor print sections respectively and shall be issued in accordance with Exhibits XII, XIII and XIV.

13.2.10 Procurement Controls (Major Equipment)

The Procurement Scheduling and Status Reporting System (PSSR) gives the progress of each item of engineered equipment monthly from the time of initiation of specifications by engineering to delivery at the site.

13.2.11 Subcontract Control Index

On this project this index will be included within the PSSR System, and will be maintained and issued on a monthly basis by Lummus and Kaiser.

13.2.12 Procurement Controls (Commodities)

(To be developed).

13.3 Field Reports

(See Field Procedures.)

14.0

ACCOUNTING

14.1

General

Lummus/Kaiser shall keep full and accurate records of all expenditures for Engineering manhours, materials, equipment, Field costs and all reimbursable accounts, as outlined in the contract.

14.2

Policies & Procedures

As provided by the contract, Lummus/Kaiser shall develop and employ such accounting policies, procedures and systems as shall be directed by ANG in connection with costs incurred by Contractors and reimbursed by ANG. Accounting for Lummus/Kaiser Home Office Costs shall be in accordance with Lummus/Kaiser Corporate Accounting Policies and Procedures, unless otherwise provided by the contract or directed by ANG.

14.3

Project Accounting Procedures Manual

Accounting for Lummus Controlled Costs, other than Home Office Costs, shall be in accordance with the Lummus Project Accounting Procedures, as approved by ANG's Controller, which are incorporated herein by reference. No changes, additions or deletions are to be made to such procedures without the specific written approval of ANG's Controller.

14.4

Field Accounting Procedures Manual

Accounting for Kaiser Controlled Costs, other than Home Office Costs, shall be in accordance with the Kaiser Field Accounting Procedures, as approved by ANG's Controller, which are incorporated herein by reference. No changes, additions, or deletions are to be made to such procedures without the specific approval of ANG's Controller.

14.5

Billings

Invoices to ANG for Lummus/Kaiser Home Office Costs, fee and Kaiser Field Costs paid out of Oakland, are to be issued monthly in accordance with Article #6.0 of the Contract and the fee payment schedule contained therein. Salary data shall be considered confidential and such information is to be sent only to:

D.L. Imler

Director

The actual invoices, related correspondence and full support for such invoices is to be directed to:

D.R. Sosnoski

Controller

With one copy of correspondence only to:

D.L. Imler

Director

W.A. Cole

Manager, Cost, Scheduling and Project Controls

All other reimbursable costs are to be processed using the Zero Balance Checking Account System as provided by Appendix XV of the contract.

14.6 Allocation of Cost

As soon as possible after completion of the job and before final payment is made, Lummus/Kaiser shall assist ANG in development of accurate allocation of contracted cost to the individual items of equipment and facilities erected and installed. If ANG shall so request, such allocation shall be provided to ANG by Lummus/Kaiser consistent with the above paragraph.

ANG shall have the right at any time to order any changes in the work.

Lummus/Kaiser shall furnish ANG a written estimate, in such detail as ANG may require, of the number of manhours and cost of change, effect on completion date, addition or deletion of equipment, and the respective changes in construction cost involved in effecting a change in the work.

If ANG agrees on manhours and cost set forth in the written statement referred to in the above paragraph, ANG shall approve the change in writing, whereupon the change in the work shall be incorporated in the scope of work.

Instructions from ANG pertaining to changes in the work and involving extras shall be addressed to the Executive Project Director.

No extra work shall be initiated until written approval has been obtained from ANG.

All changes to Lummus/Kaiser work and/or contract obligations which are initiated by ANG shall be acted upon only by written authorization of ANG and approval of the Executive Project Director.

The procedure for initiating, processing, and obtaining approval of change orders is detailed in the Project Change Order Procedure, issued December 9, 1976 with Letter No. LA-427 dated December 14, 1976.

Kaiser will furnish all supervision, engineers, labor and construction tools for construction and will construct the plant.

The Manager of Field Operations shall be responsible for the performance of all functions relating to the construction of the plant in accordance with the "Field Procedure Manual".

The "Field Procedure Manual" has been developed jointly by Lummus/Kaiser during Phase II of the project and will be reviewed and approved by ANG.

Photographs will be taken at the construction site at periodic intervals to show job progress. The frequency and distribution of these shall be in accordance with the "Field Procedure Manual".

Sets of photographs will cover the overall site and each unit/area. The number of photographs in a set will depend upon the activity and complexity of the construction work at the time.

One set will be retained in the field construction office files for record purposes, with the balance of the sets of job progress photographs forwarded to the Executive Project Director.

Sets will be distributed to Lummus and Kaiser for internal use, and to ANG as an attachment to the Monthly Progress Report.

18.0 OPERATING MANUAL AND START-UP REQUIREMENTS

18.1 Operating Manual Preparation

Lummus/Kaiser is responsible for the preparation of Supervisory Operating Manuals for the plant as authorized by ANG.

ANG will review and approve the Supervisory Operating Manuals prior to final issue - not later than one year prior to scheduled completion date of the affected unit.

18.1.1 Operating Instruction Book Outline

- Preface

Describe the objectives of the unit and instruction book.

- Unit Specifications

- Unit Elements

- Process Description* (to be provided by Lurgi for Lurgi units).

- Design consideration (defines the general scope and orients the unit or units with the remainder of the plant).

*Process descriptions will also be provided by Licensor to the NH₃ Recovery (Phosam).

- Operating Variables and Control

- Normal operating conditions (a tabulation of normal conditions at full throughput throughout the unit).

- Process control (critical operating specifications such as temperatures, pressures, flows and compositions that must be maintained to achieve efficient operation are summarized in this section).

- Special Equipment

(Description of the functional use of special items of equipment such as analyzers, computers alarm and automatic shutdown systems, special heaters, special rotating equipment).

- Start-up Procedures

- Pre-operation Preparation (description of necessary testing, flushing, run-in, calibration, safety check, purging immediately prior to introduction of charge stocks).
 - Start-up (description of the sequence and operations to be carried out for placing the various items in the unit into operation).

- Shutdown Procedures

- Planned shutdown (description of the operations and sequence for normal, orderly, safe shutdown of the plant).
 - Emergency shutdown (description in sequence of the operational steps required for the emergencies that may be foreseen; each emergency will be covered in separate subsections and will include utility failures, instrument air failure, flow stoppages, run away reaction, etc.).

- Special Procedures

- This section will describe procedures which are special or intermittent or infrequently needed, such as catalyst regeneration or catalyst reduction.

- Safety

- This section will point out the precautions that must be taken for the particular process and the hazards involved with the substances utilized or being processed. Also, safety features of the design, such as flare systems and deluge or sprinkler systems are described.

- Appendix

Includes drawings and equipment schedules

- Process flow diagrams
 - Material balances
 - Utility balances
 - Equipment schedule
 - P & I diagrams
 - Plot Plan

Start-up Planning

As requested by ANG, Lummus shall furnish the following people during hydro-testing, checkout, and commissioning of the plant:

- An Advisory Start-Up Manager
- Advisory Operators
- Instrument Technicians

Lummus/Kaiser shall provide five copies of the operation instruction manuals on a timely basis to permit ANG's development of detailed operating instructions for operator training per the Master Start-up Schedule.

Lummus will establish the time schedule for the services of process licensor's advisory operators in accordance with the scheduled start-up sequence. ANG will review and approve the schedule.

Lummus will prepare a pre-commissioning plan which will outline procedures and schedules for:

- Line by line check
- Hydrostatic/pneumatic testing by systems or sections thereof
- Vessel internal checking
- Non-operating adjustments
- Electrical installation checking
- Instrument installation checking

The above will be performed jointly by the appropriate ANG, Kaiser, and Lummus personnel.

Lummus will provide operator training as ANG may request.

On completion of the project, a final progress report will be prepared summarizing all of the progress reports issued throughout the job and providing overall statistics covering the main aspects of engineering, procurement, material delivery and construction. A Table of Contents for this document will be developed towards completion of the project, but the intent is to provide a single summarizing reference report which will illustrate the project statistics in terms of dollars, manhours, items of equipment, numbers of drawings, numbers of requisitions, etc. and relate these to the schedules and actual performance.

19.1

Technical Data Books (Maintenance Manuals)

Lummus will provide ANG with seven (7) copies of Technical Data Books containing the following:

- Title and Index Page
- Process Flow Diagrams
- Piping and Instrument Diagrams
- Utility Flow Diagrams
- Plot Plans
- Index of Lummus and Kaiser Drawings
- Index of Lummus and Kaiser Vendors Drawings
- General Engineering Specifications
- Index of Lummus and Kaiser Purchase Orders
- Process Specifications
- Vessel Data Sheets
- Exchanger Data Sheets
- Pump and Compressor Data Sheets
- Other Major Equipment Data Sheets
- Instrument Hook-up Drawings
- Instrument and Relief Valve Schedules
- Single Line Electrical Drawings

19.2

Mechanical Catalogues (Equipment Data Books)

For equipment, Lummus and Kaiser will provide seven (7) copies in purchase order pouches to ANG containing (as applicable) the following:

- Dimensioned and Working Drawings (including Exchanger Setting Plans)
- Parts List and Recommended Spare Parts List
- Installation and Operating Instructions
- Electrical and Instrument Schematics
- Operational Flow Sheets
- Performance Curves
- Copies of mill test reports, material certificates and pressure vessel inspection certificates

Note:

Operating and maintenance manuals from equipment suppliers must be reviewed and approved by ANG for content and completeness before becoming part of the mechanical catalogues.

Upon completion of the project, all original engineering and technical data included, but not limited to, drawings, plans, spec's, bills of materials, flow diagrams, calculations, operative instruction and layout details shall be provided to and become the property of ANG per Article 20.2 of the contract between Lummus, Kaiser and ANG.

There is a requirement for "as built" drawings, that is to say, ANG does require that "certain" drawings issued for construction be revised to reflect minor changes or modifications which may be introduced during the construction phase. Other construction drawings that are not "as built" shall be annotated to indicate where there are changes of scope, or significant changes between the drawings and the "as built" state. Here it is not necessary to revise the drawing, merely to add a suitable note to the drawing to indicate that it does not exactly reflect the "as built" state.

Key drawings which will be required for ongoing operational purposes should be maintained in an up-to-date state to reflect the project as actually constructed. Such drawings to be revised "as built" are:

- Process Flow Diagrams
- All Piping and Instrument Diagrams
- Single Line Electrical Diagrams
- Plot Plans
- Major Equipment Arrangement Drawings
- Other Documents appearing in the Technical Data Books (Item 19.1)
- Underground Piping Drawings
- Corrections to the Plant Model

ANG will be responsible for the negotiation and obtaining of rights and agreements for the use of process licenses, process knowhow, process patents, etc., as may be necessary for the construction and operation of the GPGA Coal Gasification Project.

The licensed processes with their respective licensors are:

<u>Process</u>	<u>Licensor</u>
Coal Gasification Sulfur Recovery (Stretford)	Lurgi/ Parsons
Ammonia Recovery (Phosam)	U.S. Steel
Methanol Production (Low Pressure Technique)	Open

21.0

QUALITY CONTROL

(To be provided later.)

22.0 PUBLIC RELATIONS

22.1 General

Because this is the first commercial scale Coal Gasification Project in the United States, a significant amount of interest from all forms of the media, both local and national will take place. Inquiries may be expected at the job site and at the home offices of ANG, Lummus and Kaiser.

22.2 Coordination

ANG will coordinate and approve all releases to the media and all responses to inquiries from the media.

22.3 Procedures To Be Followed When Inquiries Are Received At The Lummus Home Office

The procedures set forth in the C-E Engineering Group "Press Relations Guidelines" of April, 1979 will be followed in inquiries are received by any member of the task-force at the Lummus home office.

22.4 Procedures to be Followed When Inquiries are Received by Kaiser Engineers

22.4.1 General Policy

Unless otherwise required by law and with the exception noted below, Kaiser shall not issue, without the prior consent of ANG, any public statement, press release, publicity handout, photograph or other material relating to or disclosing in any way whatsoever to any person other than a prospective Subcontractor or Vendor, the scope, extent or value of the work to be performed or any details as to materials and equipment to be used or installed, or anything whatsoever relating to the work or any part thereof. In addition, except as noted, Kaiser shall not invite or permit any reporter, photographer, television camera crew, commercial radio broadcaster or any other such person to enter upon the jobsite without the express prior consent of ANG.

Information and photographs previously approved for release by ANG need not be recleared as long as the basic context for use is not changed.

22.4.2 Inquiries Received at Kaiser Home Office

All media inquiries received at the Kaiser Engineers Home Office will be referred to the Kaiser Engineers Director of Corporate Affairs who will coordinate client approval and the distribution of news releases in accordance with Kaiser Communications Policy No. C.3.4.

22.4.3 Inquiries Received at the Jobsite

The jobsite contact for local inquiries will be the local Industrial Relations Manager. Construction-related inquiries will be directed to the Kaiser Field Operations Manager and the ANG Manager of Construction and Technical Services for response. All media inquiries will be reviewed by the ANG Director of Public Affairs, and all responses approved by the Kaiser Director of Corporate Affairs.

Periodic reports on job progress will be released to the community through the media. The ANG Director of Public Affairs will detail categories of data required. Such data will be developed and issued by the Kaiser Field Operations Manager and the ANG Manager of Construction. Major stories and announcements will be coordinated with the Kaiser Director of Corporate Affairs.

Detailed communications procedures concerning an emergency or disaster situation are being developed and will be incorporated into the Field Procedures Manual. Basically, this policy provides for the timely release of factual information to appropriate parties such as law enforcement agencies, employees, major contractors, the news media, various external agencies, and the general public, consistent with the confidential, competitive and legal aspects of the information released and the protection of the rights and sensitivities of employees and their families who might be involved.

Release of information concerning an emergency or disaster situation at the jobsite will be made by the Kaiser Corporate Affairs Department (or its designated jobsite representative) after coordination and review with the ANG Manager of Construction and/or the ANG Director of Public Affairs.

22.5 Procedures To Be Followed When Inquiries Are Received At The Job Site

22.5.1 No Publicity Without Prior Consent of ANG

Unless otherwise required by law, Lummus/Kaiser shall not issue, without the prior written consent of ANG, any public statement, press release, publicity handout, photograph or other material relating to or disclosing in any way whatsoever to any Person other than a prospective Subcontractor or Vendor, the scope, extent or value of the work to be performed or any details as to materials and equipment to be used or installed, or anything whatsoever relating to the work or any part thereof. In addition Lummus/Kaiser shall not invite or permit any reporter, photographer, television camera crew, commercial radio broadcaster or any other such person to enter upon the Jobsite without the express prior consent of the ANG Manager of Construction.

- 22.5 Procedures To Be Followed When Inquiries Are Received
 At The Job Site (cont'd)
- 22.5.2 No Publicity by Subcontractors or Vendor Without Consent
 of ANG

Lummus/Kaiser shall not consent to have their Subcontractors' taking any action otherwise prohibited by the Terms and Conditions of Subcontracts without the prior written consent of the ANG Manager of Construction.

INDEX OF EXHIBITS

EXHIBIT

TITLE

I	Lummus-Kaiser Project Organization Chart
II	Field Organization Chart
III	Lummus Distribution of Documents
IV	Kaiser Distribution of Documents
V	ANG Distribution of Documents
VI	Lummus Distribution of Drawings
VII	Kaiser Distribution of Drawings
VIII	ANG Distribution of Drawings
IX	Lummus Distribution of Specifications
X	Kaiser Distribution of Specifications
XI	ANG Distribution of Specifications
XII	Lummus Distribution of Vendor Prints
XIII	Kaiser Distribution of Vendor Prints
XIV	ANG Distribution of Vendor Prints
XV	Project Code of Accounts
XVI	Project Equipment Numbering Procedure

EXHIBIT I

1) POSITIONS WITHIN SPINNED LINES: BODIES NEARBY UNDER GUIDES LINES ESTABLISHED FROM WITHIN DEPARTMENT DRAWING NO. 247-101 AND 247-102 SUPERVISED ON 10/21/70 BY POST BY THE RESIDENT AREA MANAGER. 2) MANAGER IN LINGERED RIGHT HAND CORNER OF BOX TWO (ATES THE PREVIOUS) NUMBER OF PERSONS IS THAT POST ON. 3) "H" INDICATES NON EXEMPT POSITION. 4) TOTAL EXEMPT PERSONNEL: 112 TOTAL NON EXEMPT PERSONNEL: 208 TOTAL NON MINOR PERSONNEL: 148										CONSTRUCTION APPROVAL: APPROVAL: <i>[Signature]</i> DATE: <i>[Date]</i> SCALE: NONE D-T/E: <i>[Date]</i> PROFESSIONAL SEAL: <i>[Seal]</i> REGISTERED: D. C. CROWELL EXPIRATION: 1971 EXPIRATION: 1971 EXPIRATION: 1971										KAISER ENGINEERS 14000 INTERNATIONAL BLVD. SAN JOSE, CALIFORNIA 95131 (415) 261-1000 (415) 261-1001 (415) 261-1002 (415) 261-1003 (415) 261-1004 (415) 261-1005 (415) 261-1006 (415) 261-1007 (415) 261-1008 (415) 261-1009 (415) 261-1010 (415) 261-1011 (415) 261-1012 (415) 261-1013 (415) 261-1014 (415) 261-1015 (415) 261-1016 (415) 261-1017 (415) 261-1018 (415) 261-1019 (415) 261-1020 (415) 261-1021 (415) 261-1022 (415) 261-1023 (415) 261-1024 (415) 261-1025 (415) 261-1026 (415) 261-1027 (415) 261-1028 (415) 261-1029 (415) 261-1030 (415) 261-1031 (415) 261-1032 (415) 261-1033 (415) 261-1034 (415) 261-1035 (415) 261-1036 (415) 261-1037 (415) 261-1038 (415) 261-1039 (415) 261-1040 (415) 261-1041 (415) 261-1042 (415) 261-1043 (415) 261-1044 (415) 261-1045 (415) 261-1046 (415) 261-1047 (415) 261-1048 (415) 261-1049 (415) 261-1050 (415) 261-1051 (415) 261-1052 (415) 261-1053 (415) 261-1054 (415) 261-1055 (415) 261-1056 (415) 261-1057 (415) 261-1058 (415) 261-1059 (415) 261-1060 (415) 261-1061 (415) 261-1062 (415) 261-1063 (415) 261-1064 (415) 261-1065 (415) 261-1066 (415) 261-1067 (415) 261-1068 (415) 261-1069 (415) 261-1070 (415) 261-1071 (415) 261-1072 (415) 261-1073 (415) 261-1074 (415) 261-1075 (415) 261-1076 (415) 261-1077 (415) 261-1078 (415) 261-1079 (415) 261-1080 (415) 261-1081 (415) 261-1082 (415) 261-1083 (415) 261-1084 (415) 261-1085 (415) 261-1086 (415) 261-1087 (415) 261-1088 (415) 261-1089 (415) 261-1090 (415) 261-1091 (415) 261-1092 (415) 261-1093 (415) 261-1094 (415) 261-1095 (415) 261-1096 (415) 261-1097 (415) 261-1098 (415) 261-1099 (415) 261-1100 (415) 261-1101 (415) 261-1102 (415) 261-1103 (415) 261-1104 (415) 261-1105 (415) 261-1106 (415) 261-1107 (415) 261-1108 (415) 261-1109 (415) 261-1110 (415) 261-1111 (415) 261-1112 (415) 261-1113 (415) 261-1114 (415) 261-1115 (415) 261-1116 (415) 261-1117 (415) 261-1118 (415) 261-1119 (415) 261-1120 (415) 261-1121 (415) 261-1122 (415) 261-1123 (415) 261-1124 (415) 261-1125 (415) 261-1126 (415) 261-1127 (415) 261-1128 (415) 261-1129 (415) 261-1130 (415) 261-1131 (415) 261-1132 (415) 261-1133 (415) 261-1134 (415) 261-1135 (415) 261-1136 (415) 261-1137 (415) 261-1138 (415) 261-1139 (415) 261-1140 (415) 261-1141 (415) 261-1142 (415) 261-1143 (415) 261-1144 (415) 261-1145 (415) 261-1146 (415) 261-1147 (415) 261-1148 (415) 261-1149 (415) 261-1150 (415) 261-1151 (415) 261-1152 (415) 261-1153 (415) 261-1154 (415) 261-1155 (415) 261-1156 (415) 261-1157 (415) 261-1158 (415) 261-1159 (415) 261-1160 (415) 261-1161 (415) 261-1162 (415) 261-1163 (415) 261-1164 (415) 261-1165 (415) 261-1166 (415) 261-1167 (415) 261-1168 (415) 261-1169 (415) 261-1170 (415) 261-1171 (415) 261-1172 (415) 261-1173 (415) 261-1174 (415) 261-1175 (415) 261-1176 (415) 261-1177 (415) 261-1178 (415) 261-1179 (415) 261-1180 (415) 261-1181 (415) 261-1182 (415) 261-1183 (415) 261-1184 (415) 261-1185 (415) 261-1186 (415) 261-1187 (415) 261-1188 (415) 261-1189 (415) 261-1190 (415) 261-1191 (415) 261-1192 (415) 261-1193 (415) 261-1194 (415) 261-1195 (415) 261-1196 (415) 261-1197 (415) 261-1198 (415) 261-1199 (415) 261-1200 (415) 261-1201 (415) 261-1202 (415) 261-1203 (415) 261-1204 (415) 261-12									
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B105 01 1176-E4.1-4

KAISER ENGINEERS, INC.

KAISER DISTRIBUTION OF DOCUMENTS

PROJECT GREAT PLAINS COAL GASIFICATION

DATE JULY 31, 1980

[illegible]

(TO BE DETERMINED)

SHEET _____ OF _____

[illegible]

143

EXHIBIT VI

DISTRIBUTION OF DRAWINGS

THE LUMMUS COMPANY
Bloomfield N. J.

JCB NO. 7102

PROJECT: ANG

DATE 2/22/80

[illegible]

DATE JULY 31, 1980

* INCLUDES PGC UNTIL FURTHER NOTICE (2X)

EXHIBIT VIII

ANG COAL GASIFICATION COMPANY
DISTRIBUTION OF DOCUMENTS
DRAWINGS

DATE 11-26-80

PREPARED BY _____

SHEET _____ OF _____

S — REPRODUCIBLE SEPIA
P — FULL SIZED PRINT
X — REDUCED PRINT
A — APERTURE CARD (35 mm)
T — TRANSMITTAL ONLY

INITIAL ISSUE ONLY

ISSUE — — AFC

IF NO DIAGONAL, AFC ISSUE ONLY
AFD — SAME AS AFC
NO REPRO. SEPIA FOR 8½" X 11"

[illegible]

NOTE: TRANSMITTAL INCLUDED FOR ALL DOCUMENTS

EXHIBIT IX

LUMMUS DISTRIBUTION OF ENGINEERING SPECIFICATIONS

THE LUMMUS COMPANY
Bloomfield, N. J.JOB NO. 7102
PROJECT ANG
DATE 2/22/80

LUMMUS CODE OF ACCOUNTS		GEN	A & J	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	ALL	INDEX
TITLE	NAME																					
1 Proj. Director																						
2 Dep PD-EP Lum.																					T	1
2 Dep PD-EP K																					2	2
4 Engr. Mgr.																					1	1
5 Pess																					1	1
6 Lead Proj. Engr																					1	1
7 Lead Area Engr																					1	1
8 Lead Process En				1	1	1	1	1	1	1		1	1	1	1	1		1		1	1	1
9 Lead Cost Engr.																					1	1
10 Proj. Des. Supvr P. Breiterman																					1	2
11 Plant Des. Supvr F. Diamond										10		2	10							1		2
12 Piping Spec En J. Todor										1												1
13 Pipe Support En S. Belonos		1	2	1	1	1	1	1	1	3	1		3	3		3	1	1	1	3		1
14 Pipe Stress An. S. Belonos																						-
15 Piping BM R. Robie										5		1	2			1						1
16 Civil Des Supvr T. Broderick			4								4			4		4				1		4
17 Elec Des Supvr E. Reis									1		1	1	1	5		1				5		2
18 Vessels Des Sup A. Brajuha					1		1			1			1	1		1			1	1		1
19 Heat Exchr Eng				1			1	1					1			1						1
20 Ht Xch (HTD)				1			1						1			1						-
21 Rotary Eq Eng									1						1					1		1
22 Util Engr				1	1	1	1	1	1	1	1	1	1	1	1	1		1		1		1
23 Instr. Des. Supvr J. Canova										1		1										1
24 Instr. Engr. W. Mani				1	1	1	1	1	1	1	1	1	1	1	1	1		1		1		1
25 Cons. Adv.																					1	1**
26 Mgr. Field Ops																					1	1**
27 Proc Coord.																					1	1**
28 Specs Mgr.																					1	1**
29 Proj. File																					1	1**
30 Kaiser Int. Eng.																					1	1
31 ReEngr. Kaiser																					1	
32 Civil Asst Gr Mgr J. Olivier		1									1			1		1						1
33 Project Mgr Pining										1												1
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47

FOR APPROVAL
FOR CONSTRUCTIONNOTE: WHEN DIAGONAL OMITTED
AFC ISSUE ONLY.A - IF APPLICABLE
M - MASTER & NO. OF COPIES (e.g. M2)
T - TRANSMITTAL ONLY

** AFC Specification Control Index

KAISER DISTRIBUTION OF ENGINEERING SPECIFICATIONS

PROJECT GREAT PLAINS COAL GASIFICATION

DATE JULY 31, 1980

148

* INCLUDES PGC UNTIL FURTHER NOTICE
** FOR FIELD DISTRIBUTION

*** FOR LUMMUS DISTRIBUTION

SHEET _____ OF _____

NOTE: WHEN DIAGONAL OMITTED
AFC ISSUE ONLY.

[illegible]

NOTE: TRANSMITTAL INCLUDED FOR ALL DOCUMENTS

EXHIBIT XII

THE LUMMUS COMPANY
Blomfield N. J.

JOB NO. 7102

PROJECT _____ ANG

DATE 2/22/80

DISTRIBUTION OF VENDOR DATA AND PRINTS

UNIT _____ AREA _____

[illegible]

JOB NO. 7381-330

PROJECT GREAT PLAINS COAL GASIFICATION

DATE AUGUST 31, 1980

KAISER ENGINEERS, INC.

EXHIBIT XIII

KAISER DISTRIBUTION OF VENDOR DATA

LEGEND:															
A = APPLICABLE AREA ONLY															
R = REPRODUCIBLE + 1															
M = MICROFILM AND/OR MYLAR															
T = TRANSMITTAL ONLY															
O = ORIGINAL AS RECEIVED FROM VENDOR

For Approval

For Construction

NOTE: If no diagonal, construction issue only.

NOTES:

- 1) This is distribution for vendor data which has been reviewed and marked-up, or approved, by Kaiser.
- 2) Incoming vendor prints are addressed to Area Project Engineer who delivers to the Vendor Print Clerk for circulation in accordance with Kaiser Engineers' Internal and Project Procedures.
- 3) Design engineers will obtain additional certified prints as required.
- 4) Equipment arrangements will be sent to Lummus to aid in interface coordination.

JOB NO. 7381-330

PROJECT GREAT PLAINS COAL GASIFICATION

DATE AUGUST 31, 1980

KAISER ENGINEERS, INC.

EXHIBIT XIII

KAISER DISTRIBUTION OF VENDOR DATA

LEGEND:												
	PROJ. PROCUREMENT MGR.	EXPEDITING/INSPECTION	PROJ. CONTROL MANAGER	PROJ. ADMINISTRATIVE MGR.	PROJ. ENGINEERING MGR.	AREA P.E.'S (A)	PRIN. DESIGN ENGR.	VENDOR DWG. CONTROL	PROJ. DIRECTOR - L (4)	LUMMUS RES. ENGR. (A)	FIELD OPERATIONS MGR.	VENDOR - DWG. RETURN
A = APPLICABLE AREA ONLY												
R = REPRODUCIBLE + 1												
M = MICROFILM AND/OR MYLAR												
T = TRANSMITTAL ONLY												
O = ORIGINAL AS RECEIVED FROM VENDOR												
VENDOR SCHEDULE	T	1	1	1	T	1/1	1	0	1		2	0
DRAWING LIST	1	1	1	1		1	2	0			1	0
FOUNDATION/ RAWINGS						1/1	1	0			R	
REBAR PLACEMENT DWGS.							1	0			R	0
BAR BENDING LIST							1	0			R	0
LOAD DIAGRAMS						1/12/1	0					0
DIM. OUTLINE DRAWINGS						1/12/1	0				R	0
PIPING DIAGRAMS						1/12/1	0				R	0
WIRING DIAGRAMS						1/12/1	0				R	0
ELEC. DWGS. & DIAGRAMS						1/12/1	0				R	0
P&ID'S						1	2/1	0			R	
ASSEMBLY DRAWINGS						1	1	0				0
ERECTION DRAWINGS						1	1	0			R	0
SHOP DETAIL DRAWINGS						1/12/1	0					0
FIELD FABRICATION DWGS.						1/12/1	0				R	0
CROSS SECTIONAL DWGS.						1	1	0			R	0
PLAN, SECTIONS & ELEVS.						1	2	0			R	0
CALCULATIONS						1/12/1	0				1	0
MILL TEST CERTIFICATES						1	1	0			1	0
PERFORMANCE CURVES						1	1	0			1	0
WELDING QUALIFICATIONS						1	1	0			R	0
WELDING PROCEDURES						1/12/1	0				1	0
BILLS OF MATERIALS						1	0				1	0
INSTALLATION INSTRS.						1	0				2	0
OPER./MAINT. MANUALS						1	0				2	0
PRICED RECOM. SPARE PARTS	1	1				1	1	0			1	0
CERTIFIED DWGS. & DATA	T	T	T	T	T				T		1

For Approval

For Construction

NOTE: If no diagonal, construction issue only.

NOTES:

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- 3) Design engineers will obtain additional certified prints as required.
- 4) Equipment arrangements will be sent to Lummus to aid in interface coordination.

JOB NO. 7381-330

PROJECT GREAT PLAINS COAL GASIFICATION

DATE AUGUST 31, 1980

KAISER ENGINEERS, INC.

EXHIBIT XIII

KAISER DISTRIBUTION OF VENDOR DATA

LEGEND:														
	PROJ. PROCUREMENT MGR. EXPEDITING/INSPECTION PROJ. CONTROL MANAGER PROJ. ADMINISTRATIVE MGR. PROJ. ENGINEERING MGR. AREA P.E.'S (A) PRIN. DESIGN ENGR. VENDOR DWG. CONTROL PROJ. DIRECTOR - L (4) LUMMUS RES. ENGR. (A) FIELD OPERATIONS MGR. VENDOR - DWG. RETURN													
A = APPLICABLE AREA ONLY														
R = REPRODUCIBLE + 1														
M = MICROFILM AND/OR MYLAR														
T = TRANSMITTAL ONLY														
O = ORIGINAL AS RECEIVED FROM VENDOR														
VENDOR SCHEDULE			T	1	1	1	T	1	1	1	0	1	2	0
DRAWING LIST			1	1	1	1		1	2	0			1	0
FOUNDATION/ RAWINGS								1	1	0			R	
REBAR PLACEMENT DWGS.									1	0			R	0
BAR BENDING LIST									1	0			R	0
LOAD DIAGRAMS								1	12	1	0			0
DIM. OUTLINE DRAWINGS								1	12	1	0		R	0
PIPING DIAGRAMS								1	12	1	0		R	0
WIRING DIAGRAMS								1	12	1	0		R	0
ELEC. DWGS. & DIAGRAMS								1	12	1	0		R	0
P&ID'S								1	2	1	0		R	
ASSEMBLY DRAWINGS								1	1	0			0	
ERECTION DRAWINGS								1	1	0			R	0
SHOP DETAIL DRAWINGS								1	12	1	0			0
FIELD FABRICATION DWGS.								1	12	1	0		R	0
CROSS SECTIONAL DWGS.								1	1	0			R	0
PLAN, SECTIONS & ELEVS.								1	2	0			R	0
CALCULATIONS								1	12	1	0		1	0
MILL TEST CERTIFICATES								1	1	0			1	0
PERFORMANCE CURVES								1	1	0			1	0
WELDING QUALIFICATIONS								1	1	0			R	0
WELDING PROCEDURES								1	12	1	0		1	0
BILLS OF MATERIALS								1		0			1	0
INSTALLATION INSTRS.								1		0			2	0
OPER./MAINT. MANUALS								1		0			2	0
PRICED RECOM. SPARE PARTS			1	1				1	1	0			1	0
CERTIFIED DWGS. & DATA			T	T	T	T	T					T	1

For Approval
For Construction
 NOTE: If no diagonal, construction issue only.

- NOTES:
- 1) This is distribution for vendor data which has been reviewed and marked-up, or approved, by Kaiser.
 - 2) Incoming vendor prints are addressed to Area Project Engineer who delivers to the Vendor Print Clerk for circulation in accordance with Kaiser Engineers' Internal AEC Project Procedures.
 - 3) Design engineers will obtain additional certified prints as required.
 - 4) Equipment arrangements will be sent to Lummus to aid in interface coordination.

**ANG COAL GASIFICATION COMPANY
DISTRIBUTION OF DOCUMENTS
VENDER DATA AND PRINTS**

DATE 11-26-80

PREPARED BY

SHEET _____ **OF** _____

S — REPRODUCIBLE SEPIA
P — FULL SIZED PRINT
X — REDUCED PRINT
A — APERTURE CARD (35 mm)
T — TRANSMITTAL ONLY

INITIAL ISSUE

IF NO DIAGONAL AFC ONLY
AFD — SAME ISSUE AS AFC
NO REPRODUCIBLE 8 1/2" X 11"

[illegible]

NOTE: TRANSMITTAL INCLUDED FOR ALL DOCUMENTS

EXHIBIT XV

PROJECT CODE OF ACCOUNTS

<u>I N D E X</u>	<u>PAGE</u>
Introduction	156
Description of Basic Numbering System	157
Area Number	158
Area Detail Number	160
Elements of Work	161
Detail Designator	162
Elements of Costs	163

EXHIBIT XV

PROJECT CODE OF ACCOUNTS

INTRODUCTION

It is essential that a standard and formal cost numbering system be established for projects prior to commencing the work. It serves many purposes:

1. Organizes work items into usable grouping for cost, scheduling and progress;
2. Develops cost entities that can be capitalized and used for production cost analysis, depreciation, taxes, etc.;
3. Acts as a common language specifically addressing itself to easy understanding by many people;
4. Outlines, as well, spare parts, engineering, procurement, etc. activities.

The cost numbering system outlined here is specifically for the American Natural Gas Service Company, Coal Gasification Plant in North Dakota. It does not vary significantly from other systems used for other plants in other areas. It does, however, attempt to combine owners', engineers' and constructors' individual requirements into a homogeneous, simple, clear and complete system.

The standard numbering system must be used and applied to each portion of the job with prudence and consistency when developing the "Code of Cost Accounts" for the Coal Gasification Plant. As each area becomes sufficiently defined, a specific Code of Cost Accounts should be developed for the area by applying the "standard" principles recognizing owners' requirements, control requirements and method of construction.

The end product of applying the uniform system of cost numbering to all phases of the project is called the "Project Code of Cost Accounts".

EXHIBIT XV

DESCRIPTION OF BASIC NUMBERING SYSTEM

The entire numbering system is depicted as follows:

A brief description of the use of each group of numbers is as follows:

Area - Divides the project into "Plot Limits" areas. Each area, except the infrastructure, is a definable plant facility. The area numbers have been assigned for this project. It is reasonable to assume minor changes throughout the life of the job.

Area Detail - Each area is unique unto itself so formal structuring of this series of numbers is not defined here. Examples of area variations are:

- a. The area for building could include many buildings. A number could be assigned to each building.
- b. The area could include many major items of equipment - each could be identified by a unique number.
- c. The basic area could be divided and separated geographically - a series of area detail numbers (10 thru 29) could be assigned to one portion and another series of area detail numbers (30 thru 59) could be assigned to the other portion.

Elements of Work - Defines the type of work being performed i.e., civil work, structural and architectural work, engineered equipment (purchase and install), piping, electrical, etc.

Detail Designator - This permits further identification and reference to the elements of work. Examples of the use of these references are: responsibility, subcontractors, specifications, systems, equipment tag number, etc.

Elements of Cost - These are the basic natural elements, of all cost classifications such as labor (including fringe benefits and statutory labor costs), construction equipment, material, equipment and subcontract, and also the party originating the cost.

EXHIBIT XV

AREA NUMBER

XX . XX . XXXX . X . XXX

The project has been divided into clearly definable areas (a current listing follows). These areas are easily defined by geographic limitations.

They should be maintained with a minimum of changes as other documents (drawing numbers, equipment numbers, etc.) key to them. However, necessary changes for clarity and better definition as engineering develops must be made but hopefully held to a minimum.

CONSTRUCTION COSTS

DIRECT COSTS

0100	General
0200	Site Development (KE)
0300	Off Site Development (KE)
0400	Buildings (KE)
0600	Site Development (Lummus)
0700	Buildings (Lummus)
1100	Gasification
1200	Shift Conversion
1300	Gas Cooling
1400	Rectisol and Refrigeration
1600	Phenosolvan
1700	Methanation
1800	Gas Liquor Separation
1900	Product Gas Compression
2000	Coal Preparation and Handling Systems
3000	Oxygen Plant
4000	Sulfur Recovery, Storage and Loading
4600	Ammonia Recovery
4900	Methanol Manufacturing
5000	Steam Supply (Lummus)
5100	Steam Supply, and Plant and Instrument Air Supply (KE)
5200	Electrical Distribution (Lummus)
5300	Electrical Supply and Distribution (KE)
5400	Water Treatment and Fire Water Supply
5500	Cooling Water Supply
6000	Process Storage Facilities
7000	Interconnecting Piping (KE)
7100	Interconnecting Piping (Lummus)
8100	Waste Effluent Treatment System
8200	Ash Disposal
8300	Flare System
8400	Sanitary Treatment
8500	Raw Water Pumps
8600	Deepwell Pretreatment

EXHIBIT XV

AREA NUMBER

(Cont'd)

<u>Area No.</u>	<u>Area Detail No.</u>	
91	00	FIELD OFFICE COSTS
	91	General Field Expenses
	92	Contractor's Field Supervision
	93	Construction Plant
	94	Construction Camp
	95	Construction Equipment Operations
	96	Field Inventory
	97	Overtime and Location Bonus
92	00	HOME OFFICE COSTS - LUMMUS/KAISER
	97	Engineering, Supervision & Procurement
	98	Engineer-Contractor Fee
93	00	ESCALATION - LUMMUS/KAISER
94	00	UNALLOCATED COST - LUMMUS/KAISER
95	00	OWNERS' COST - ANG
96	00	ESCALATION - ANG
97	00	FREIGHT
98	00	OPEN
99	00	DEVIATIONS

EXHIBIT XV

AREA DETAIL NUMBER

XX . XX . XXXX . X . XXX

The area detail number is an unstructured number as flexibility must be maintained and its application to each area thoughtfully considered when the area code of accounts is prepared.

Examples of its flexibility may be as follows:

- a. The area "Buildings" may have 10 or 15 or more definable buildings and/or structures - each building could be given a unique area detail number.
- b. A process area could have many definable "stand alone" items of equipment - each could be identified by a unique area detail number.
- c. An area 18 for example may be separated geographically into two areas. A group of area detail numbers (e.g. 10 thru 29) could be assigned to one sub area and another group of area detail numbers (e.g. 30 thru 59) could be assigned to the other sub area.
- d. Any combination of the above could properly be used if the occasion is justified.
- e. As a general rule the area detail numbers should be (if possible) structured along the following general lines:

- 10 to 19 - Area Site Development & Improvements
- 20 to 29 - Buildings & Structures
- 30 to 39 - Building Auxiliaries and General Equipment
- 40 to 49 - Process Equipment
- 50 to 59 - Piping
- 60 to 69 - Electrical
- 70 to 79 - Instrumentation

The individuality of each area must be considered when preparing the master code of accounts.

EXHIBIT XV

ELEMENTS OF WORK

XX . XX . XXXX . X . XXX

The elements of work series of numbers further define the area detail number into discreet classes of construction. The first three digits (from left to right) have been identified in the following pages, except for piping. The fourth digit has been left open for future use when required.

Listed below are the major elements of work and following this page are the matrixes and description of the elements of work.

1000	Civil
2000	Structural and Architectural
3000	Equipment
4000	Equipment
5000	Instruments, Insul., Painting, Fireproofing, & Test
6000	Piping
7000	Open
8000	Electrical
9000	General Conditions

Notation on the matrix is as follows:

LUMMUS ALPHA NOTATION

UNITS OF MEASURE

It should be pointed out that the "header" numbers may be used if the detail is not required. An example is if an equipment foundation is too small to justify detailing to earthwork, concrete work, forms, etc., the header number "2200" may be used.

EXHIBIT XV

PROJECT CODE OF ACCOUNTS
DETAIL DESIGNATOR

XX . XX . XXXX . X . XXX

The detail designator may be used as an additional digit for the elements of work, such as identifying individual equipment pieces or for other detailed identification.

EXHIBIT XV

ELEMENTS OF COST

XX . . XX . XXXX . X . XXX

The elements of cost series of numbers define the corporate entity and the basic elements of cost such as labor (including fringe benefits and statutory requirements), construction equipment (rent, fuel, repairs, oil and grease), materials, etc.

The elements of cost may not be changed or altered without prior approval.

The first digit defines the corporate entity as follows:

1XX - ANG
2XX - Lummus
3XX - Kaiser
4XX - Lurgi

The remaining two digits define the element of cost and are shown as follows:

LABOR

X01 Straight Time
X02 Premium Time
X03 On Loan Personnel
X04 Job Shoppers
X07 Owner Furnished
X09 Clearing and Transfer

BURDEN

X12 Craft Welfare Program
X13 Craft Travel & Subsistence
X14 Non Manual Benefits
X15 Overhead
X16 Payroll Taxes and Insurance
X17 Owner Furnished
X19 Payroll Burden Allocation

EQUIPMENT USAGE

X21 Construction Equipment Rental - Operated and Maintained
X22 Construction Equipment Rental - Bare
X23 Construction Equipment Purchase
X24 Depreciation and Amortization
X27 Owner Furnished
X29 Allocation Rates

EXHIBIT XV

ELEMENTS OF COST
(Continued)

MATERIAL

X31 Material Purchase
X32 Freight
X37 Owner Furnished
X39 Shop & Inventory Allocation

SUBCONTRACT LABOR

X41 Subcontract Labor
X43 Purchased Service & Consultants
X44 Escalation
X47 Owner Furnished

SUBCONTRACT MATERIAL

X51 Subcontract Material
X52 Freight

ENGINEERED EQUIPMENT PURCHASE

X61 Equipment Purchase
X62 Freight
X63 Spare Parts
X64 Escalation
X67 Owner Furnished

GENERAL

X71 Office Supplies and Expenses
X72 Reproduction
X73 Communications
X74 Travel and Expense
X75 Miscellaneous Taxes, Licenses, and Permits
X76 Space Rental and Utilities
X77 Employee Relocation
X78 Furniture and Fixtures
X79 Reproduction Transfers
X81 General Insurance
X82 Dues, Donations and Memberships
X83 Contributions
X84 Other Home and Branch Office Costs
X85 Sales and Use Tax
X86 Legal
X87 Audit
X89 Clearing and Transfer
X91 Field Cost Recovery
X92 Miscellaneous Freight

EXHIBIT XV

ELEMENTS OF COST
(Continued)

GENERAL (Cont'd)

X94	Overhead Recovery
X97	Committed Costs
X98	Committed Liabilities
X99	Clearing and Transfer

EXHIBIT XVI

EQUIPMENT NUMBERING PROCEDURE

INDEX

- 1.0 PURPOSE
- 2.0 EQUIPMENT NUMBER
- 3.0 PREFIX
- 4.0 NUMERIC IDENTITY
- 5.0 SUFFIX
- 6.0 EXAMPLES
- 7.0 OTHER EQUIPMENT COMPONENTS

EXHIBIT XVI

EQUIPMENT NUMBERING PROCEDURE

1.0 Purpose

For ease of identification, all equipment on a project is numbered. The prefixes, suffixes and numbers used have specific meaning as defined below.

2.0 Equipment Number

3.0 Prefix

Two letter prefixes are used to identify a specific category in accordance with the Lummus Standard Code of Accounts. See Engineering Procedure, Project Execution Tab E 2.17* attached which gives the two letter prefixes to be used for equipment numbering.

4.0 Numeric Identity

Specific areas of a plant are usually identified by a numeric area number (such as Area 1000 - Reaction Section). Specific equipment within each area is numbered consecutively within each Code of Account. Numbers can vary from one to four digits.

5.0 Suffix

Suffixes are used for further identification as follows:

- X - denotes equipment furnished as part of an order for equipment identified by different prefix.
- S - denotes installed spare equipment.
- A,B,C, etc. - denotes identical parallel flow units.

EXHIBIT XVI
EQUIPMENT NUMBERING PROCEDURE (cont'd)

6.0 Examples

Single Items

GA - 1000	Product Pump and Motor Driver
GA - 1000S	Spares GA - 1000
GB - 201	Forced Draft Fan and Steam Turbine Driver

Package Items or Single Items with Accessory Equipment

PA - 2101	Amine Filter Package consisting of:
GA - 2101X	Amine Feed Pump and Motor Driver
GA - 2101SX	Spares GA - 2101X
GA - 2102X	Admix Pump
FD - 2101X	Pressure Leaf Amine Filter
GD - 2105X	Precoat Tank Mixer and Motor Driver
FA - 2107X	Precoat Tank
GB - 201	Charge Gas Compressor and Steam Turbine Driver
EA - 203X	Intercooler with GB - 201
FD - 201X	Inlet Filter Silencer with GB - 201
PA - 202X	Seal and Lube Oil Console with GB - 201

7.0 Other Equipment Components

Equipment identified by Codes of Account other than PA could contain major accessory equipment which should be identified as with Package Equipment.

<u>Account</u>	<u>Possible Accessory Equipment</u>
BE	Blowers and Drivers, Coolers, Absorbers, Regeneration Systems, etc.
BF	Induced and Forced Draft Fans, etc.
BG	Vessels, Filters, Chlorination Equipment, Exchangers, etc.
EE	Condensers, etc.
FD	Tanks, Mixers, Pumps and Drivers, etc.
GB	Coolers, Receivers, Seal and Lube Oil Systems, Pulsation Bottles, etc.
GC	Condensers, Exchangers, Pumps and Drivers Receivers, Compressors and Drivers, etc.

EXHIBIT XVI

LUMMUS STANDARD CODE OF ACCOUNTS

EQUIPMENT, MATERIAL AND FACILITIES

These costs are reported as material (including freight but not ocean freight), direct labor (laborers, craftsmen and craft foreman) and sub-contract (all charges for material, labor, overhead, etc.).

AA	Foundations - Major	BK	Kilns - Rotary & Shaft
AB	Foundations - Minor	BL	Roasters - Fluid Bed, Hearth, Etc.
AC	Yard Paving & Final Surfacing	BM	Sintering Machines
AD	Trenches, Sumps, Firewalls, Separators, Basins, Pits Flumes and Spillways	BN	Burners
AE	Roads	BO	Retorts
AF	Railroad Siding - Permanent	CA	Stack - Heaters and Boilers
AG	Dikes - Earth	CB	Stack - (Flare and Vent and Suction)
AH	Fences	CC	Flues - Furnace, Etc.
AI	Clearing Site & Rough Grading	CD	Dust and Fume Collectors
AJ	Piling	DA	Towers - Shell
AK	Earthwork	DB	Towers - Trays and Internals
AL	Culverts and Crossings	DC	Reactors and Coke Drums
AM	Storage Tank Foundations	DD	Towers - Leaching (Incl. Pachucas)
AP	Area Craft Superintendent	EA	Heat Exchange Equipment - Shell and Tube
BA	Oil Heaters	EB	Heat Exchange Equipment - Submerged Bundles and Coils and boxes
BB	Thermofoor Kilns and Regenerators	EC	Heat Exchange Equipment - Special
BC	Air Heaters	ED	Double Pipe Chillers and Exchangers - Scraper Type
BD	Air Ducts, Flutriators and Dampers	EE	Vacuum Jets and Barometrics
BE	Inert Gas Generators	EF	Cooling Towers
BF	Steam Boilers and Superheaters	EG	Deaerators and Eductors
BG	Water Treating Equipment	EH	Crystallizers & Vacuum Evaporators
BH	Steam Line Separators and Misc. Steam Specialties	FA	Process Tanks and Accumulators
BI	Furnaces, Reverberatory, Flash Electric and Other	FB	Storage Tanks, Silos & Gas Holders
BJ	Furnaces, Rotating (Incl. Converters)	FC	Classifiers (Incl. Cyclones)
		FD	Filters, Screens & Clarifiers
		FE	Bins, Hoppers & Chutes
		FF	Dryers (Except Inst. Air Dryers)
		FG	Line Filters and Silencers
		FH	Feeders

EXHIBIT XVI

LUMMUS STANDARD CODE OF ACCOUNTS (Cont'd)

FI	Flotation Machines	IA	Buildings
FJ	Magentic & High Intensity Separators	IB	Buildings - Heat -Air Conditioning
FK	Gravity Concentration Machines	JA	Structures and Pipe Supports - Rein. Concrete
FL	Screens & Grizzlies	JB	Structures and Pipe Supports - Steel
FM	Thickeners & Hydroseparators	JC	Elevators - Passenger & Freight
FN	Amalgamators	JD	Elevators & Conveyors - Materials
FO	Ion Exchange Equipment	JE	Hoists and Cranes
FP	Solvent Extraction Equipment	JF	Loading, Unloading & Reclaiming Equipment
FQ	Pelletizers, Balling Drums, Compactors & Briquetting Machines	JG	Bagging and Packaging Equipment
FR	Distributors and Splitters	JH	Ladles, Pots and Slag Cars
FS	Electrolytic Cells	JI	Launders
GA	Pumps and Drivers	KA	Instruments
GB	Compressors, Blowers, Vacuum Pumps, Fans and Drivers	KB	Instrument Boards
GC	Refrigeration Equipment & Accessories	KC	Measuring, Detection and Sampling Equipment (Ex. Weightometers)
GD	Mixers & Agitators (Incl. Pug Mills)	LA	Insulation - Equipment & Vessels
GE	Generators Electric, with Drivers	LB	Insulation - Piping
GF	Centrifugal Separators	LC	Refractories
GG	Engines - Diesel, Gasoline and Steam	MA	Fireproofing
GM	Special D.C. Electric Motors	ME	Pilot Plant Erection
HA	Piping - C.S. - Process Over 2"	MO	Pilot Plant Operation
HB	Piping - Alloy - Process Over 2"	NA	Electrical - Lighting
HD	Piping - Process & Utilities 2" and under	NB	Electrical - Power, Sub-station & Distribution
HE	Piping - Underground - Sewers & Drains	NC	Electrical - Instruments
HF	Piping - Instruments	ND	Rectifiers
HG	Piping - Hangers	OA	Painting
HH	Piping - Catalyst	OB	Coating - Plastic
HI	Piping - Line - Field Fab.- Welded	OC	Coatings - Other than Plastic
HJ	Special Piping - Jacketed, Plastic, Glass, Lined	PA	Special Equipment not covered by above
HK	Hose - Material Conducting & Other	PS	Crushers
HL	Chutes & Ducts	PT	Impactors & Hammermills
HQ	Welder Testing & Qualifications	PU	Grinding Mills - Rod, Ball & Pebble
		PV	Grinding Mills - Autogenous
		PW	Pulverizers
		PX	Casing Machines
		PY	Weighing Equipment

COAL GASIFICATION PLANT
BEULAH, NORTH DAKOTA
STANDARD COST NUMBERING SYSTEM
for
ANG COAL GASIFICATION COMPANY

INDEX

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<u>(White Tabs)</u>		
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3000 Equipment	3000	3-1 thru 7
4000 Equipment	4000	4-1 thru 6
5000 Instruments, Insulation, Painting, Fireproofing and Testing	5000	5-1 thru 3
6000 Piping	6000	6-1 & 2
7000 ANG Consultants, Legal, and General	Area 9500	
8000 Electrical	8000	8-1 thru 7
9000 General Conditions		
General Field Expense	Area 9191	9191-1 thru 5
Contractor's Field Supervision	Area 9192	9192-1 thru 6
Construction Plant	Area 9193	9193-1 thru 3
Construction Camp	Area 9194	9194-1
(8000) Construction Equipment Purchase	Area 9195	9195-1 & 2
Construction Equipment Operation	Area 9195	9195-3 & 4
Field Inventory	Area 9196	9196-1 & 2
Overtime & Relocation Bonus		9197-1
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INTRODUCTION

It is essential that a standard and formal cost numbering system be established for projects prior to commencing the work. It serves many purposes (1) organizes work items into usable groupings for cost, scheduling and progress, (2) develops cost entities that can be capitalized and used for production cost analysis, depreciation, taxes, etc., (3) acts as a common language specifically addressing itself to easy understanding by many people, (4) outlines a method for identifying major and minor capital assets as well as spare parts, engineering, procurement, etc. activities.

The cost numbering system outlined here is specifically for the American Natural Gas Service Company, Coal Gasification Plant in North Dakota. It does not vary significantly from other systems used for other plants in other areas. It does, however, attempt to combine Owners, engineers and constructors individual requirements into a homogeneous, simple, clear and complete system.

The standard numbering system must be used and applied to each portion of the job with prudence and consistency when developing the "Code of Cost Accounts" for The Coal Gasification Plant. As each area becomes sufficiently defined a specific code of cost accounts should be developed for the area by applying the "Standard" principles recognizing Owners' requirements, control requirements and method of construction.

The end product of applying the uniform system of cost numbering to all phases of the project is called the "Project Code of Cost Accounts".

DESCRIPTION OF BASIC NUMBERING SYSTEM

The entire numbering system is depicted as follows:

A brief description of the use of each group of numbers is as follows:

Area - Divides the project into "Plot Limits" areas. Each area, except the infrastructure, is a definable plant facility. The area numbers have been assigned for this project. It is reasonable to assume minor changes throughout the life of the job.

Area Detail - Each area is unique unto itself so formal structuring of this series of numbers is not defined here. Examples of area variations are:

- a. The area for building could include many buildings. A number could be assigned to each building.
- b. The area could include many major items of equipment - each could be identified by a unique number.
- c. The basic area could be divided and separated geographically - a series of area detail numbers (10 thru 29) could be assigned to one portion and another series of area detail numbers (30 thru 59) could be assigned to the other portion.

Elements of Work - Defines the type of work being performed i.e., civil work, structural and architectural work, engineered equipment (purchase and install), piping, electrical, etc.

Detail Designator - This permits further identification and reference to the elements of work. Examples of the use of these references are: responsibility, subcontractors, specifications, systems, equipment tag number, etc.

Elements of Cost - These are the basic natural elements, of all cost classifications such as labor (including fringe benefits and statutory labor costs), construction equipment, material, equipment and subcontract, and also the party originating the cost.

AREA NUMBER

XX . XX . XXXX . X . XXX

The project has been divided into clearly definable areas (a current listing follows). These areas are easily defined by geographic limitations.

They should be maintained with a minimum of changes as other documents (drawing numbers, equipment numbers, etc.) key to them. However, necessary changes for clarity and better definition as engineering develops must be made but hopefully held to a minimum.

CONSTRUCTION COSTS

DIRECT COSTS

0100	General
0200	Site Development (KE)
0300	Off Site Development (KE)
0400	Buildings (KE)
0600	Site Development (Lummus)
0700	Buildings (Lummus)
1100	Gasification
1200	Shift Conversion
1300	Gas Cooling
1400	Rectisol and Refrigeration
1600	Phenosolvan
1700	Methanation
1800	Gas Liquor Separation
1900	Product Gas Compression
2000	Coal Preparation and Handling Systems
3000	Oxygen Plant
4000	Sulfur Recovery, Storage and Loading
4600	Ammonia Recovery
4900	Methanol Manufacturing
5000	Steam Supply (Lummus)
5100	Steam Supply, and Plant and Instrument Air Supply (KE)
5200	Electrical Distribution (Lummus)
5300	Electrical Supply and Distribution (KE)
5400	Water Treatment, and Fire Water Supply
5500	Cooling Water Supply
6000	Process Storage Facilities
7000	Interconnecting Piping (KE)
7100	Interconnecting Piping (Lummus)
8100	Waste Effluent Treatment System
8200	Ash Disposal
8300	Flare System
8400	Sanitary Treatment
8500	Raw Water Pumps
8600	Deepwell Pretreatment

AREA NUMBER

(Cont'd)

<u>Area No.</u>	<u>Area Detail No.</u>	
91	00	FIELD OFFICE COSTS
	91	General Field Expenses
	92	Contractor's Field Supervision
	93	Construction Plant
	94	Construction Camp
	95	Construction Equipment Operations
	96	Field Inventory
	97	Overtime and Location Bonus
92	00	HOME OFFICE COSTS - LUMMUS/KAISER
	97	Engineering, Supervision & Procurement
	98	Engineer-Contractor Fee
93	00	ESCALATION - LUMMUS/KAISER
94	00	UNALLOCATED COST - LUMMUS/KAISER
95	00	OWNERS' COST - ANG
96	00	ESCALATION - ANG
97	00	FREIGHT
98	00	OPEN
99	00	DEVIATIONS

AREA DETAIL NUMBER

XX . XX . XXXX . X . XXX

The area detail number is an unstructured number as flexibility must be maintained and its application to each area thoughtfully considered when the area code of accounts is prepared.

Examples of its flexibility may be as follows:

- a. The area "Buildings" may have 10 or 15 or more definable buildings and/or structures - each building could be given a unique area detail number.
- b. A process area could have many definable "stand alone" items of equipment - each could be identified by a unique area detail number.
- c. An area 18 for example may be separated geographically into two areas. A group of area detail numbers (e.g. 10 thru 29) could be assigned to one sub area and another group of area detail numbers (e.g. 30 thru 59) could be assigned to the other sub area.
- d. Any combination of the above could properly be used if the occasion is justified.
- e. As a general rule the area detail numbers should be (if possible) structured along the following general lines:

- 10 to 19 - Area Site Development & Improvements
- 20 to 29 - Buildings & Structures
- 30 to 39 - Building Auxiliaries and General Equipment
- 40 to 49 - Process Equipment
- 50 to 59 - Piping
- 60 to 69 - Electrical
- 70 to 79 - Instrumentation

The individuality of each area must be considered when preparing the master code of accounts.

AREA DETAIL NUMBER

XX . XX . XXXX . X . XXX

The area detail number is an unstructured number as flexibility must be maintained and its application to each area thoughtfully considered when the area code of accounts is prepared.

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- 70 to 79 - Instrumentation

The individuality of each area must be considered when preparing the master code of accounts.

ELEMENTS OF WORK

XX . XX . XXXX . X . XXX

The elements of work series of numbers further define the area detail number into discreet classes of construction. The first three digits (from left to right) have been identified in the following pages, except for piping. The fourth digit has been left open for future use when required.

Listed below are the major elements of work and following this page are the matrixes and description of the elements of work.

1000	Civil
2000	Structural and Architectural
3000	Equipment
4000	Equipment
5000	Instruments, Insul., Painting, Fireproofing, & Test
6000	Piping
7000	Open
8000	Electrical
9000	General Conditions

Notation on the matrix is as follows:

LUMMUS ALPHA NOTATION

It should be pointed out that the "header" numbers may be used if the detail is not required. An example is if an equipment foundation is too small to justify detailing to earthwork, concrete work, forms, etc., the header number "2200" may be used.

1000 - CIVIL

July 1, 1977
 Revised: August 29, 1977
 Revised: September 19, 1977
 Revised: March 17, 1980

Header No. Detail No.	1100	1200	1300	1400	1500	1600	1700	1800	1900
	General LS	Demolition, Removal, Relocation LS	Earthwork (Non Structural) BCY	Yard Improvements LS	Roads, Parking & Paving SF	Railroads LTF	Piling/Caissons LF	Environmental Sitework EA	Open
1X10	YD Exploration LS	AI Demolition LS	AI Excavation Rock BCY	AI Fencing Including Gates LF	AI Earthwork (Grading) CY	AF Earthwork (Grading) CY	AJ Piling LF	AK Deepwell EA	
1X20	AI Clear and Grub AC		AI Excavation Common BCY	AL Drainage and Culverts LF			AJ Shoring SF		
1X30	YD Soil Testing LS	AI Removal LS	AI Excavation Unclassified BCY		AE Roads (Paving) SF	AF Trackwork Including Ballast LTF			
1X40	AA/AB Dewatering LS		AI Backfill CY		AE Parking Lots SF	AF Switches and Turnouts EA	AJ Caissons LF		
1X50		AI Relocation LS	AI Embankment CY	AC Landscaping LS	AC General Paving SF	AL Railroad Structures LS			
1X60			AK Fine Grading SY		AC Walks SF				
1X70			AI Dredging CY						
1X80									
1X90									

1000 - CIVIL

July 1, 1977
 Revised: August 29, 1977
 Revised: September 19, 1977

Header No. Detail No.	1100	1200	1300	1400	1500	1600	1700	1800	1900
	General LS	Demolition, Removal, Relocation LS	Earthwork (Non Structural) BCY	Yard Improvements LS	Roads, Parking & Paving SF	Railroads LTF	Piling/Caissons LF	Environmental Open- Site Work	Open
XX10	YD Exploration LS	AI Demolition LS	AI Excavation Rock BCY	AH Fencing Including Gates LF	AI Earthwork (Grading) CY	AF Earthwork (Grading) CY	AJ Piling LF	Only Water Pond	
XX20	AI Clear and Grub AC		AI Excavation Common BCY	AL Drainage and Culverts LF			AJ Shoring SF	Deepwell	
XX30	YD Soil Testing LS	AI Removal LS	AI Excavation Unclassified BCY		AE Roads (Paving) SF	AF Trackwork Including Ballast LTF			
180 XX40	AA/AB Dewatering LS		AI Backfill CY		AE Parking Lots SF	AF Switches and Turnouts EA	AJ Caissons LF		
XX50		AI Relocation LS	AG Embankment CY	AC Landscaping LS	AC General Paving SF	AL Railroad Structures LS			
XX60			Fine Grading		walks				
XX70			AI Dredging CY						
XX80									
XX90									

1000 - CIVIL

1000 CIVIL

Includes all demolition, earthwork, piling, paving, railroads and yard improvements.

1100 GENERAL

Includes costs related to site exploration, soils testing, clearing of the site, the removal of groundwater and the lowering of the water table.

1110 Exploration YD
Includes all costs for exploratory surveys, test holes, soils test, etc.

1120 Clear and Grub AI
Includes all costs for clearing the site of trees, underbrush, vegetation, etc.

1130 Soil Testing YD
Includes all costs for soil compaction testing related to backfill operations.

1140 Dewatering AA/AB
Includes all costs for drilling holes, installing pipe, installing and maintaining pumps for effectively lowering the water table at the site.

1000 CIVIL

(Cont'd)

- 1200 DEMOLITION, REMOVAL, RELOCATION
Includes costs for the removing or relocating of man-made structures, whether below or aboveground, required during rough grading.
- 1210 Demolition AI
Includes all costs for wrecking and dismantling man-made structures such as buildings, paving, sidewalks, fences, etc.
- 1230 Removal AI
Includes all costs for removing man-made structures such as buildings, paving, sidewalks, fences, etc.
- 1250 Relocation AI
Includes all costs for the capping of existing utilities and/or the removing and relocating of existing utilities.

1000 CIVIL

(Cont'd)

<u>1300</u>	<u>EARTHWORK (NON STRUCTURAL)</u>	
1310	Excavation - Rock Includes all costs for blasting, ripping, digging and transporting the excavated material.	AI
1320	Excavation - Common Includes all costs for ripping, digging, trans- porting and stockpiling the excavated material.	AI
1330	Excavation - Unclassified Includes all costs for ripping, digging, and transporting the excavated material off site.	AI
1340	Backfill Includes all costs for placing, watering and compacting of excavation and/or imported fill material in and/or around structures.	AI
1350	Embankment Includes all costs for placing, watering and compacting of excavated and/or imported fill material around the perimeter of structures and roads.	AG
1360	Fine Grading Includes all costs for finish grading of general plant areas to final contours.	AK
1370	Dredging Includes all costs for excavating underwater and transporting the excavated materials.	AI

1000 CIVIL

(Cont'd)

1400 YARD IMPROVEMENTS

Includes costs for water drainage, landscaping and fencing.

1410 Fencing Including Gates

AF

Includes all costs for post hole drilling, concreting, and installing fencing and gates.

1420 Drainage and Culverts

AL

Includes all costs for excavating, backfill, culverts, connections, bedding material, box culverts including grating and frame for a drainage system.

1450 Landscaping

AC

Includes all costs for placing topsoil, trees, plants, ground cover, sod and irrigation system.

1000 CIVIL

(Cont'd)

<u>1500</u>	<u>ROADS, PARKING AND PAVING</u>	
	Includes costs for placement of paving with related grading and proper drainage.	
1510	Earthwork (Grading)	AI
	Includes all costs for rough grading and compacting subgrade in paved areas.	
1530	Roads (Paving)	AE
	Includes all costs for fine grading, aggregate base, priming, fog seal and asphaltic concrete.	
1540	Parking Lots	AE
	Includes all costs for fine grading, aggregate base, priming, fog seal, asphaltic concrete, pre-cast bumpers, stripping, redwood headers, stakes and curbs.	
1550	General Paving	AC
	Includes fine grading, sand cushion, moisture seal, formwork, expansion joints, reinforcing, pouring plus normal finishing or any other yard paving; for example broom, float or with pour.	
1560	Walks	AC
	Includes all costs for fine grading, sand cushion, moisture seal, formwork, expansion joints, reinforcing, concrete placement and finishing for all walkways	

1000 CIVIL

(Cont'd)

1600 RAILROADS

Includes costs for complete railroad installation and tie-in to existing railroad.

1610	Earthwork (Grading)	AF
	Includes all costs for fine grading and compacting subgrade in railroad areas.	
1630	Trackwork Including Ballast	AF
	Includes all costs for ballast material, railroad ties and track.	
1640	Switches & Turnouts	AF
	Includes all costs for items such as switches, turnouts, car stops, etc.	
1650	Railroad Structures	AL
	Includes all costs for drainage structures and cattle underpasses.	

1000 CIVIL

(Cont'd)

1700 PILING/CAISSONS

Includes costs for structural foundation work and earth retention systems.

1710 Piling

AJ

Includes all costs for mobilization, drive, cut-off, load tests, demobilize, surveying if required, and associated clean-up for timber or prestressed precast piling and the reinforcing of concrete for cast-in-place piles.

1720 Shoring

AJ

Includes all costs for installing and removing soldier piles, sheet piles, bracing, lagging, tie-backs and cribbing to prevent excavation movement or cave-ins.

1740 Caissons (Cast-in-Place)

AJ

Includes all costs for drilling, metal sleeves, concrete, rebar cages, belling and excavated spoil removal. Rebar is usually supplied under a separate account and installed in this account.

1800 ENVIRONMENTAL SITE WORK

1810 Deep Well

AK

Includes all costs for civil work associated with the pretreatment deep well (i.e., earthwork, concrete, etc.)

2000 - STRUCTURAL AND ARCHITECTURAL

Revised: March 17, 1980
 July 1, 1977
 Revised: August 29, 1977
 Revised: September 19, 1977
 Revised: October 25, 1977

Reader No. Detail No.	2100	2200	2300	2400	2500	2600	2700	2800	2900
	CONCRETE								
	Buildings & Structures Foundations CY	Equipment Foundations CY	Other Concrete CY	Metal TN	Buildings SF	Grouting CY	Complete Building or Structure	Miscellaneous Concrete	Open
2X10	AK Structural Earthwork CY	AK Structural Earthwork CY	AK Structural Earthwork CY	IA Structural Building Steel TN	IA Roofing BQ	AN Equipment CF	IA Building Complete Including Plumbing, HVAC, Fire Protection EA	AM Storage Tank Foundations LS	
2X20	AA/AB Forms SFCA	AA/AB Forms SFCA	AA/AB/AD Forms SFCA	JB Structural Support Steel TN	IA Siding SF	AN Structural Steel CY	IA Prefabricated Buildings EA	JA Concrete Structure EA	
2X30	AA/AB Rebar LB	AA/AB Rebar LB	AA/AB/AD Rebar LB	JB Structural Steel Pipe Racks LB	IA Masonry EA			AD Concrete Pits & Sumps EA	
188 2X40	AA/AB Embedded Metals LB	AA/AB Embedded Metals LB	AA/AB/AD Embedded Metals LB	JB Miscellaneous Steel TN	IA HVAC TN			AD Flumes & Spillways EA	
2X50	AA/AB Concrete CY	AA/AB Concrete CY	AA/AB/AD Concrete CY	BD/HD Steel Ductwork TN	IA Plumbing FDT			AD Concrete Ponds EA	
2X60	AA/AB Special Finishes EF	AA/AB Special Finishes SF	AA/AB/AD Special Finishes SF	JB Conveyor Steel & Galleries TF	IA Fire Protection SF			AD Splitter Boxes EA	
2X70	AA/AB Winter Protection CT	AA/AB Winter Protection CY	AA/AB/AD Winter Protection CY		IA Miscellaneous LS			AD API Separator EA	
2X80	AA/AB/AD Moisture Protection SF		AA/AB/AD Precast Concrete SF,EA		IA Flooring SF				
2X90									

2000 - STRUCTURAL AND ARCHITECTURAL

Revised: March 17, 1980

July 1, 1977
 Revised: August 29, 1977
 Revised: September 19, 1977
 Revised: October 25, 1977

Header No. Detail No.	2100	2200	2300	2400	2500	2600	2700	2800	2900
	CONCRETE								
	Buildings & Structures Foundations CY	Equipment Foundations CY	Other Concrete CY	Metal TN	Buildings SF	Grouting CF	Complete Building or Structure	Miscellaneous Concrete	Open
2X10	AK Structural Earthwork CY	AK Structural Earthwork CY	AK Structural Earthwork CY	IA Structural Building Steel TN	IA Roofing SQ	AN Equipment CF	IA Building Complete Including Plumbing, HVAC, Fire Protection EA	AM Storage Tank Foundations LS	
2X20	AA/AB Forms SFCA	AA/AB Forms SFCA	AA/AB/AD Forms SFCA	JB Structural Support Steel TN	IA Siding SF	AN Structural Steel CF	IA Prefabricated Buildings EA	JA Concrete Structure EA	
2X30	AA/AB Rebar LB	AA/AB Rebar LB	AA/AB/AD Rebar LB	JB Structural Steel Pipe Racks LB	IA Masonry EA			AD Concrete Pits & Sumps EA	
189 2X40	AA/AB Embedded Metals LB	AA/AB Embedded Metals LB	AA/AB/AD Embedded Metals LB	JB Miscellaneous Steel TN	IA HVAC TN			AD Flumes & Spillways EA	
2X50	AA/AB Concrete CY	AA/AB Concrete CY	AA/AB/AD Concrete CY	BD/HL Steel Ductwork TN	IA Plumbing FIXT			AD Concrete Ponds EA	
2X60	AA/AB Special Finishes SF	AA/AB Special Finishes SF	AA/AB/AD Special Finishes SF	JB Conveyor Steel & Galleries TN	IA Fire Protection SF			AD Splitter Boxes EA	
2X70	AA/AB Winter Protection CY	AA/AB Winter Protection CY	AA/AB/AD Winter Protection CY		IA Miscellaneous LS			AD API Separator EA	
2X80	AA/AB/AE Moisture Protection SF		AA/AB/AD Precast Concrete SF, EA		IA Flooring SF				
2X90									

2000 STRUCTURAL & ARCHITECTURAL

Includes costs for equipment foundations, buildings and structures.

2100	<u>CONCRETE BUILDINGS & STRUCTURES FOUNDATIONS</u> Includes costs for structural excavation, formwork, rebar and concrete in place complete.	
2110	Structural Earthwork Includes all costs for machine or hand excavation for footings, trenches, etc., including structural backfill and disposal.	AK
2120	Forms Includes all costs for layout, fabrication, erect, brace, strip, oil and cleaning of forms.	AA/AB
2130	Rebar Includes all costs for reinforcing steel, woven wire mesh, caisson cage and related accessories.	AA/AB
2140	Embedded Metals Includes all costs for layout, fabricate, erect and strip supports for anchor bolts, dowels, angles, channels, plates, etc.	AA/AB
2150	Concrete Includes all costs for pump, place, tamp, vibrate, and screed for foundation concrete.	AA/AB
2160	Special Finishes Includes all costs for point and patch, sack, rub, sandblast and cure vertical concrete and float, trowel, broom and cure horizontal concrete.	AA/AB
2170	Winter Protection Includes all costs for heating, protective covers, etc.	AA/AB
2180	Moisture Protection Includes all costs for purchase and installation of moisture protection placed under concrete pours and water proofing applied to concrete walls after concrete placement.	AA/AB/AD

2000 STRUCTURAL & ARCHITECTURAL

(Cont'd)

<u>2200</u>	<u>CONCRETE EQUIPMENT FOUNDATIONS</u>	
	Includes costs for structural excavation, formwork, rebar and concrete in place complete.	
2210	Structural Earthwork	AK
	Includes all costs for machine or hand excavation for foundations including structural backfill and disposal.	
2220	Forms	AA/AB
	Includes all costs for layout, fabrication, erect, brace, strip, oil and cleaning of forms.	
2230	Rebar	AA/AB
	Includes all costs for reinforcing steel, woven wire mesh, caisson cage and related accessories.	
2240	Embedded Metals	AA/AR
	Includes all costs for layout, fabricate, erect and strip supports for anchor bolts, dowels, angles, channels, plates, etc.	
2250	Concrete	AA/AB
	Includes all costs for pump, place, tamp, vibrate, and screed for foundation concrete.	
2260	Special Finishes	AA/AR
	Includes all costs for point and patch, sack, rub, sandblast and cure vertical concrete and float, trowel, broom and cure horizontal concrete.	
2270	Winter Protection	AA/AB
	Includes all costs for heating, protective covers, etc.	

2000 STRUCTURAL & ARCHITECTURAL

(Cont'd)

2300	<u>OTHER CONCRETE</u>	
	Includes all costs for formwork, rebar & concrete for slabs, walls, & minor concrete.	
2310	Structural Earthwork	AK
	Includes all costs for structural excavation, fine grading, and compacting prior to placement of structural concrete, and backfill and compaction after concrete placement.	
2320	Forms	AA/AB/AD
	Includes all costs for layout, fabrication, erect, brace, strip, oil and cleaning of forms.	
2330	Rebar	AA/AB/AD
	Includes all costs for reinforcing steel, woven wire mesh and related accessories.	
2340	Embedded Metals	AA/AB/AD
	Includes all costs for layout, fabricate, erect and strip supports for anchor bolts, dowels, angles, channels, plates, etc.	
2350	Concrete	AA/AB/AD
	Includes all costs for pump, place, tamp, vibrate, and screed for all concrete.	
2360	Special Finishes	AA/AB/AD
	Includes all costs for point and patch, sack, rub, sandblast and cure vertical concrete and float, trowel, broom and cure horizontal concrete.	
2370	Winter Protection	AA/AB/AD
	Includes all costs for heating, protective covers, etc.	
2380	Precast Concrete	AA/AB/AD
	Includes all costs for purchase (or fabrication) and installation of precast concrete items such as wall panels, and roof trusses and slabs.	

2000 STRUCTURAL & ARCHITECTURAL

(Cont'd)

2400 METAL

Includes costs for structural steel, miscellaneous steel, ductwork, chutes, hoppers, bins and tanks, but not embedded items, electrical and mechanical related items and rebar.

2410 Structural Building Steel IA
Includes all costs for structural steel including crane rails, grouting of steel, etc.

2420 Structural Support Steel JB
Includes all costs for support of mechanical equipment not mentioned elsewhere.

2430 Structural Steel Pipe Racks JB
Includes all costs for structural steel associated with steel pipe racks.

2440 Miscellaneous Steel JB
Includes all costs for steel that is not of the structural steel framing such as handrail, stairs, guardrails, ladders, etc.

2450 Steel Ductwork BD/HL
Includes all costs for ductwork, supports, expansion joints, dampers, etc.

2460 Conveyors Steel/Gallerys JB
Includes all costs for steel work related to conveyor supports, bents, trusses, galleries, head frames, etc.

2000 STRUCTURAL & ARCHITECTURAL

(Cont'd)

2500 BUILDINGS

Includes costs for metal siding, metal roofing, metal swing type doors, roll-up doors, roof ventilators, roof accessories, etc.

2510	Roofing	IA
	Includes all costs for metal roofing, flashing, trim, etc.	
2520	Siding	IA
	Includes all costs for metal siding, fasteners, stiffeners, joint treatment, etc.	
2530	Masonry	IA
	Includes all costs for blockwork, scaffold, clean-up, placement of rebar that is supplied in another account.	
2540	HVAC	IA
	Includes all piping, ductwork, equipment foundations, insulation, controls, and balancing for heating, ventilating and air conditioning system in place to 5 feet outside building line. Door louvers, curbs, frames, etc. for roof penetrations included in architectural sections.	
2550	Plumbing	IA
	Includes all fixtures and trim, water heaters and piping in place to 5 feet outside building line.	
2560	Fire Protection	IA
	Includes foundations, sprinkler system, hose cabinets, pumps, fire extinguishers, detectors and alarms all to 5 feet outside building line.	
2570	Miscellaneous	IA
	Doors, trim, partitions, etc.	
2580	Flooring	IA
	Includes all costs for purchase and installation of special floor covering materials such as ceramic tile, vitrified asbestos tile, quarry tile, carpeting, etc.	

2000 STRUCTURAL & ARCHITECTURAL

(Cont'd)

2600 GROUTING

Includes all costs for purchase and installation of grouting materials.

2610 Equipment Grouting

AN

Includes costs of all grouting pertaining to setting of equipment.

2620 Grouting Structural Steel

AN

Includes all costs of grouting pertaining to Structural Steel.

2000 STRUCTURAL & ARCHITECTURAL

(Cont'd)

<u>2700</u>	<u>COMPLETE BUILDING OR STRUCTURE</u>	
	Includes all costs for prefabricated metal structure that can also include concrete work and interior finishes.	
2710	Building Complete Complete building, including foundations, structure, finish lighting, HVAC, plumbing and fire protection.	IA
2720	Prefabricated Buildings Includes all costs associated with purchased buildings.	IA
<u>2800</u>	<u>MISCELLANEOUS</u>	
2810	Storage Tank Foundations Includes crushed rockpile, other subsurfacing, concrete ring, cushion, surface, concrete, bitumen, or other.	AM
2820	Concrete Structure Includes all costs associated with reinforced concrete structures, such as pedestals, table-tops, pipe racks, etc.	JA
2830	Concrete Pits and Sumps Included all costs associated with reinforced concrete collecting pits and sumps.	AD
2840	Flumes and Spillways	AD
2850	Concrete Ponds	AD
2860	Splitter Boxes	AD
2870	ADI Separator	AD

3000 - EQUIPMENT

July 1, 1977

Revised: August 29, 1977

Revised: September 19, 1977

Revised: October 25, 1977

Revised: March 17, 1980

Header No. Detail No.	3100	3200	3300	3400	3500	3600	3700	3800	3900
	Building Auxiliaries	Open	Utility	Quarry & Mine Equipment	Material Processing and Handling		Rotating Equipment	Environmental Equipment	Open
3X10	JE Cranes EA		RF Steam Boilers LS	PA Shovels & Other Quarry Equipment Purchase LS	JF Loading, Unloading & Reclaim LS	JD Belt Conveyors & Trippers LF	CH Compressors, Fans & Blowers EA	PA Electrostatic Precipitators EA	
3X20	JE Hoists/Libs & Winches EA		GE Electrical Generators and Drives EA	PA Mining Equipment LS	FL Sizers, Screens and Grizzlies LS	JD Screw Conveyors LF	CA Pumps & Drives EA	CD Baghouses EA	
3X30	JE/JB Monorails EA		RH Desuperheaters LT	PA Trucks LS	PT Impactors & Hammermills LS	JD Other Conveyors LS	CA Sump Pumps w/Drives EA	CD Dust Collectors EA	
197 3X40	JF Plant Mobile Equipment EA		GD Mixers & Agitators (Incl. Pug Mills) EA	PA R.R. Rolling Stock LS	PW Pulverizers LS	PY Belt Scales EA	CB Vacuum Pumps w/Drives EA	RG Water Treating Equipment LS	
3X50	JC Freight/Man Lift Elevators EA		BI/PA Incinerators EA	PA Maintenance & Service Equipment LS	PS Crushers LS	FJ Magnetic Separators EA		RG Sewage Treating Equipment LS	
3X60	IA Lab, Office & Shop Equipment LS				PH Feeders (Vibrating, Rotary Flow, etc.) LS	PM Thickeners and Clarifiers EA		CB Stacks (Flare, Vent & Suction) EA	
3X70	IC Overhead Doors EF				PA Stackers LS			CA Stacks for Heaters & Boilers EA	
3X80					FE Bins, Hoppers and Chutes TW		FI Line Filters or Silencers EA	PA Evaporators EA	
3X90								PA Dust Support Systems LS	

3000 - EQUIPMENT

3000 EQUIPMENT

The equipment element of work standard is intended to include the purchase and installation of mechanical equipment including the purchase and installation of associated rotating electrical equipment. In general, installation includes the unloading, setting, aligning and adjustment of the equipment.

3100 BUILDING AUXILIARIES

3110	Cranes Purchase, assembly and erection of traveling bridge cranes. Does not include crane rail or electric collector rails.	JE
3120	Hoists/Jibs & Winches Purchase, assembly and erection of hoists, jibs, chain falls and trolleys. Excludes rails.	JE
3130	Monorails Purchase, assembly and erection of monorail hoists including rails.	JE/JD
3140	Plant Mobile Equipment Purchase, assembly and commissioning of mobile equipment purchased for plant operation.	JF
3150	Freight/Man Lift Elevators Elevators complete in place including elevator housing and machine room.	JC
3160	Lab, Office & Shop Equipment Purchase, uncrating, handling and installation of all permanent lab, office and shop equipment.	IA
3170	Overhead Doors Purchase, assemble and install telescoping and roll-up doors.	IC

3000 EQUIPMENT

(Cont'd)

3300 Utility

3310	Steam Boilers	BF
	Boilers in place including refractories, insulation, instruments, painting, casing, etc.	
3320	Electrical Generators and Drives	GE
	Installed cost of complete power generating plants.	
3330	Desuperheaters	BH
	Purchase and install desuperheaters.	
3340	Mixers & Agitators (Incl. Pug Mills)	GD
	Purchase, handling, weather protection, moving, cribbing, installing assemblies, cleaning and lubricating.	
3350	Incinerators	BI
	Purchase and install incinerators.	

3000 EQUIPMENT

(Cont'd)

3400 QUARRY & MINE EQUIPMENT

3410	Shovels & Other Quarry Equipment Purchase Purchase, deliver, assemble and commission shovels, loaders, etc. required for quarry operation.	PA
3420	Mining Equipment Purchase and assemble all necessary mining equip- ment other than surface facilities.	PA
3430	Trucks Purchase, deliver, assemble and commission trucks.	PA
3440	R.R. Rolling Stock Purchase and commission railroad rolling stock.	PA
3450	Maintenance and Service Equipment Purchase and commission all maintenance and service equipment.	PA

3000 EQUIPMENT

(Cont'd)

<u>3500</u>	<u>MATERIAL PROCESSING AND HANDLING</u>	
3510	Loading, Unloading & Reclaim Purchase and installation of all loading, unloading and reclaim equipment including drives.	JF
3520	Sizers, Screens and Grizzlies Purchase and installation of sizers, screens, grizzlies, etc.	FL
3530	Impactors & Hammermills Purchase including drives and installation.	PT
3540	Pulverizers Purchase and installation.	PW
3550	Crushers Purchase and installation.	PS
3560	Feeders (Vibrating, Rotary Plow, etc.) Purchase and installation.	FH
3570	Stackers Stackers including reels, rails, etc. complete in place.	PA
3580	Bins, Hoppers and Chutes Includes all costs for bins, hoppers, chutes supports, stiffeners, etc.	FE

3000 EQUIPMENT

(Cont'd)

<u>3600</u>	<u>MATERIAL PROCESSING AND HANDLING</u>	
3610	Belt Conveyors & Trippers Purchase and installation. Does not include concrete foundations or structural supports.	JD
3620	Screw Conveyors Purchase and install.	JD
3630	Other Conveyors Purchase and installation of bucket elevators, etc.	JD
3640	Belt Scales Purchase and install.	PY
3650	Magnetic Separators Purchase and install.	FJ
3660	Thickeners and Clarifiers Purchase and install mechanical portion, including drives.	FM

3000 EQUIPMENT

(Cont'd)

<u>3700</u>	<u>ROTATING EQUIPMENT</u>	
3710	Compressors, Fans and Blowers Purchase and install.	GB
3720	Pumps and Drives Purchase and install.	GA
3730	Sump Pumps w/Drives Purchase and install.	GA
3740	Vaccum Pumps and Drivers Purchase and install.	GB
3780	Line Filters or Silencers Purchase and install.	FG

3000 EQUIPMENT

(Cont'd)

<u>3800</u>	<u>ENVIRONMENTAL EQUIPMENT</u>	
3810	Electrostatic Precipitators Electrostatic precipitators complete in place excluding civil and structural work.	PA
3820	Baghouses Complete in place excluding civil and structural work.	CD
3830	Dust Collectors Complete in place excluding civil and structural work.	CD
3840	Water Treating Equipment Complete in place including packing, etc.	BC
3850	Sewage Treating Equipment Sewage treating equipment complete in place.	BC
3860	Stacks - (Flare, Vent & Suction) Stacks complete in place.	CB
3870	Stacks for Heaters & Boilers Complete in place.	CA
3880	Evaporators Complete in place.	PA
3890	Dust Support System Complete in place.	PA

4000 - EQUIPMENT

Revised March 17, 1980

July 1, 1977
Revised: August 29, 1977
Revised: September 19, 1977
Revised: October 25, 1977

Header No. Detail No.	4100	4200	4300	4400	4500	4600	4700	4800	4900
	Heaters	Towers, Reactors, Gasifiers, Absorbers	Exchangers	Tanks, Drums, Etc.	Electrical	Miscellaneous Equipment	Miscellaneous Equipment	Open	
4X10	EA Start-up Heaters EA	DA Towers - Shells EA	EA Heat Exchangers (Shell and Tube) EA	FA Process Tanks EA	NB Indoor Electric Room Equipment EA	PA Lube & Seal Oil Consoles EA	EH Crystalliser Package LS		
4X20	EB Tank Heaters EA	DB Towers - Trays & Internals LS	EB Heat Exchanger (Submerged Bundles & Coils & Boxes) EA	FA Drums EA	NB Indoor Equipment EA	PA Separators EA	PA Reverse Osmosis Package LS		
4X30	EC Heaters and Subcoolers EA	DC Reactors & Coke Drums EA	ED Double Pipe Exchangers- Scraper Type EA	FB Storage Tanks EA	NB Outdoor Electrical Equipment EA	FP Extractors EA	PA Isolation Dampers EA		
205 4X40		DC Gasifiers EA	EA Coolers EA	FC Cyclone Separators EA		FR Diverters, Distributors, Splitters and Slide Gates EA	PA Blast Gates EA		
4X50		DC Absorbers EA	EE Ejectors EA	FD Filters & Screens EA		PA Foam System EA	PA Rail Car Pullers EA		
4X60			EF Cooling Towers EA	FF Dryers (Except Instrument Air Dryers) EA		PA Glycol Drying Package EA			
4X70			EG Demerators, Eductors, & Venturi Scrubbers EA	FA Mixing Pipe EA		PA Chemical Treatment Equipment EA			
4X80			FA Condensers EA			PA Ammonia Recovery Unit EA			
4X90			EI Special Exchangers EA						

4000 EQUIPMENT

The equipment element of work standard is intended to include the purchase and installation of mechanical equipment including the purchase and installation of associated rotating electrical equipment. In general, installation includes the unloading, setting, aligning and adjustment of the equipment.

4100 HEATERS

4110	Start-up Heaters
Includes purchase and installation of tubes, fittings, doors, structural steel, roofing, flue, burners, firebrick, insulation, equipment piping, painting, etc.	BA
4120	Tank Heaters
Purchase and installation of steel work, tubes, casing, insulation, etc.	ED
4130	Heaters and Subcoolers
Includes purchase and installation of tubes, cooling coils, kiln steel, lining, insulation, piping shown on kiln drawings, etc.	EC

4000 EQUIPMENT

(Cont'd)

<u>4200</u>	<u>TOWERS, REACTORS, GASIFIERS, ABSORBERS</u>	
4210	Towers - Shells Includes purchase, erection, welding, and stress relieving.	DA
4220	Towers - Trays & Internals Includes the purchase and installation of internal trays, bubble caps, demisters and mist extractors, packing, etc.	DE
4230	Reactors & Coke Drums Includes purchase and erection of reactors, drums, internals, refractory lining, etc.	DC
4240	Gasifiers Purchase and install.	DC
4250	Absorbers Purchase and install.	DC

4000 EQUIPMENT

(Cont'd)

4300 EXCHANGERS

4310	Heat Exchangers (Shell & Tube) Purchase and installation of equipment complete.	EA
4320	Heat Exchangers (Submerged Bundles & Coils & Boxes) Purchase and install including bundles, coils & boxes.	EB
4330	Double Pipe Exchangers - Scraper Type Purchase and install complete including auxiliaries.	ED
4340	Coolers Purchase and install complete.	EA
4350	Ejectors Purchase and install complete.	EE
4360	Cooling Towers Purchase and erection of cooling tower including fans, pumps and drives on foundations and basins included elsewhere.	EF
4370	Deaerators, Eductors and Venturi Scrubbers Purchase and install complete.	EG
4380	Condensers Purchase and installation of condensers complete.	EA
4390	Special Exchangers Purchase and installation of special exchangers complete.	EI

4000 EQUIPMENT

(Cont'd)

4400 TANKS, DRUMS, ETC.

4410	Process Tanks Purchase and erection of tanks including internals and auxiliaries.	FA
4420	Drums Purchase and installation.	FA
4430	Storage Tanks Purchase and erection of shell, nozzles, and auxiliaries.	FB
4440	Cyclone Separators Purchase and erection including lining.	FC
4450	Filters & Screens Purchase and erection including internals and accessories.	FD
4460	Dryers (Except Instrument Air Dryers) Purchase and erection.	FF
4470	Mixing Pipe Purchase and install including necessary hangers and fasteners.	FA

4000 EQUIPMENT

(Cont'd)

4500 ELECTRICAL

4510	Indoor Electrical Room Equipment	NB
	Purchase and installation of basic electrical equipment such as substations, electronic equipment, distribution boards, high and low voltage switches, motor control panels, generators, specialty panels that are mounted or installed within the building area except branch power and lighting panels.	
4520	Indoor Equipment	NB
	Equipment located within the building area but not in the main electric room.	
4530	Outdoor Electrical Equipment	NB
	Purchase and installation of basic electrical equipment such as substations, distribution boards, oil circuit breakers, motor control panels, power, specialty panels that are mounted or installed in outside substation, KVA yards or similar facilities.	

4000 EQUIPMENT

(Cont'd)

4600 MISCELLANEOUS EQUIPMENT

4610	Lube & Seal Oil Consoles Purchase and install.	PA
4620	Separators Purchase and install.	PA
4630	Extractors Purchase and install.	FP
4640	Diverter, Distributors, Splitters & Slide Gates Purchase and install.	FR
4650	Foam System Purchase and install complete system.	PA
4660	Glycol Drying Package Purchase and install complete package.	PA
4670	Chemical Treatment Equipment Purchase and install.	PA
4680	Ammonia Recovery Unit Purchase and install complete unit.	PA

4700 MISCELLANEOUS EQUIPMENT

4710	Crystalizer Package Purchase and install complete package.	EH
4720	Reverse Osmosis Package Purchase and install complete package.	PA
4730	Isolation Damper Purchase and install.	PA
4740	Blast Gate Purchase and install	PA
4750	Rail Car Puller Purchase and install.	PA

September 19, 1977

5000 - INSTRUMENTS, INSULATION, PAINTING, FIREPROOFING, AND TESTING

Revised: March 17, 1980

Header No. Detail No.	5100	5200	5300	5400	5500	5600	5700	5800	5900
	Instrumentation	Open	Insulation	Open	Painting	Open	Fireproofing	Quality Control	Testing
5X10	KA Control Valves & Relief Valves (Purchases Only) EA		LA Equipment SF		OA Equipment SF		MA Equipment SF	HQ Radiographic Inspection EA	QA Equipment EA
5X20	KB Panel Instruments EA		LB Piping LF		OA Piping SF		MA Structures SF	HQ Other Inspection EA	QA Piping EA
5X30	KA Transmitter EA				OA Structures SF				QA Instruments EA
212 5X40	KA Field Direct Connected Instruments EA				OA Buildings SF				QA Other EA
5X50	KB Panel Boards EA								
5X60	KC Analyzers EA								
5X70	KC Other Instruments EA								
5X80	KA Instrument Supports EA								
5X90									

5000 - INSTRUMENTS, INSULATION, PAINTING, FIREPROOFING, AND TESTING

5000 INSTRUMENTS, INSULATION, PAINTING, FIREPROOFING & TESTING

5100 INSTRUMENTATION

This series of element of work is for purchase only.

5110	In-Line Control and Relief Valves
Purchase of valves and motors for motor operated valves.	KA
5120	Panel Instruments
Purchase only of panel instruments from manufacturers other than supplier of panel structure.	KB
5130	Transmitter
Purchase only of transmitter.	KA
5140	Field Direct Connected Instruments
Includes local instruments, such as temperature indicators, thermometer wells, pressure indicators, level controllers, gauge glasses, and flame arrester.	KA
5150	Panel Boards
Covers purchase only of control panel structures, including instrument shelves and installation of instruments purchased under Account 3220, included in this account.	KB
5160	Analyzers
Purchase only of analyzers.	KC
5170	Other Instruments
Purchase only of other instruments, such as orifice plates, orifice restrictions, and in-line totalizers.

Note: Orifice flanges are in Process Piping. | KC |
| 5180 | Instrument Supports | KA |

5000 INSTRUMENTS, INSULATION, PAINTING, FIREPROOFING & TESTING

(Cont'd)

5300 INSULATION

5310	Equipment
All field insulation of equipment.	LA
5320	Piping
All pipe insulation.	LB

5500 PAINTING

5510	Equipment
All field painting and touch-up of equipment.	OA
5520	Piping
All pipe painting.	OA
5530	Structures (other than buildings)
Painting of structures.	OA

5540	Buildings	OA

5700 FIREPROOFING

5710	Equipment
All field fireproofing of equipment.	MA
5720	Structures
All fireproofing of structures	MA

5800 QUALITY CONTROL

5810	Radiographic Inspection
All radiographic inspection.	HQ
5820	Other Inspection
All other inspection	HQ

5000 INSTRUMENTS, INSULATION, PAINTING, FIREPROOFING & TESTING

(Cont'd)

5900 TESTING

5910	Equipment All equipment testing.	QA
5920	Piping All pipe testing.	QA
5930	Instruments All instrument testing.	QA
5940	Other All other testing.	QA

6000 - PIPING

July 1, 1977
 Revised: August 29, 1977
 Revised: September 19, 1977
 Revised: March 17, 1980

Header No. Detail No.	6100	6200	6300	6400	6500	6600	6700	6800	6900
	Shop Fabricated Vendor	Field Fabricated	Rack	Sleeper	Underground	Instrumentation	Pipe Supports	Others	
6X10	HA/HD Carbon Steel LF	HA/HD Carbon Steel LF	HA/HD Carbon Steel LF	HA/HD Carbon Steel LF	HE Carbon Steel LF	HE Instrument Piping LF	HC Field Fabricated EA	HQ Pipe Cleaning LS	
6X20	HB/HD Stainless Steel LF	HB/HD Stainless Steel LF	HB/HD Stainless Steel LF	HB/HD Stainless Steel LF	HE Stainless Steel LF		HC Shop Fabricated EA		
6X30	HB/HD Alloy LF	HB/HD Alloy LF	HB/HD Alloy LF	HB/HD Alloy LF	HE Alloy LF				
216 6X40	HB/HD Copper LF	HB/HD Copper LF	HB/HD Copper LF	HB/HD Copper LF	HE Copper LF				
6X50	HJ Non Metallic LF	HJ Non Metallic LF	HJ Non Metallic LF	HJ Non Metallic LF	HE Non Metallic LF				
6X60	HB/HD Aluminum LF	HB/HD Aluminum LF	HB/HD Aluminum LF	HB/HD Aluminum LF	HE Aluminum LF				
6X70	HJ (1) Special Piping LF	HJ (1) Special Piping LF	HJ (1) Special Piping LF	HJ (1) Special Piping LF	HE (1) Special Piping LF		PIPE SIZE RANGES		
6X80					AK Earthwork CY	5XX1 0" thru 2" 5XX2 2 1/2" thru 8" 5XX3 10" thru 24" 5XX4 24" thru 36" 5XX5 Over 36"	Carbon Steel HA HA HA HA	Stainless Alloy Aluminum Copper HA HA	Non Metallic HA HA HA HA
6X90			Includes - Spools - Stress Relieving - Stress Tracing Excludes - Pipe Cleaning due to size definition.						

(1) SPECIAL PIPING INCLUDES C.I. LINED PIPE, INSULATED PIPE, ETC.

6000 - PIPING

6000 - PIPING

July 1, 1977
 Revised: August 29, 1977
 Revised: September 19, 1977

Header No. Detail No.	6100	6200	6300	6400	6500	6600	6700	6800	6900
	BATTERY LIMITS PIPING Off Site Shop Fabricated On Site Shop Fabricated		Rack	Sleeper	HE Underground	HF Instrumentation	HG Pipe Supports	HQ Others	
6X10	HA/HD Carbon Steel LF	HA/HD Carbon Steel LF	HA/HD Carbon Steel LF	HA/HD Carbon Steel LF	HE Carbon Steel LF	HF Instrument Piping LS	HG Field Fabricated	HQ Pipe Cleaning	Duct Work
6X20	HB/HD Stainless Steel LF	HB/HD Stainless Steel LF	HB/HD Stainless Steel LF	HB/HD Stainless Steel LF	HE Stainless Steel LF		HG Shop Fabricated		
6X30	HB/HD Alloy LF	HB/HD Alloy LF	HB/HD Alloy LF	HB/HD Alloy LF	HE Alloy LF				
217 6X40	HB/HD Copper LF	HB/HD Copper LF	HB/HD Copper LF	HB/HD Copper LF	HE Copper LF				
6X50	HJ Non Metallic LF	HJ Non Metallic LF	HJ Non Metallic LF	HJ Non Metallic LF	HE Non Metallic LF				
6X50	HB/HD Aluminum LF	HB/HD Aluminum LF	HB/HD Aluminum LF	HB/HD Aluminum LF	HE Aluminum LF				
6X70	HJ Special Piping Incl. C.I. LF	HJ Special Piping Incl. C.I. LF	HJ Special Piping Incl. C.I. LF	HJ Special Piping Incl. C.I. LF	HE Special Piping Incl. C.I. LF		PIPE SIZE RANGES		
6X90					AK Earthwork CY		Carbon Steel	Stainless Alloy Aluminum Copper	Non Metallic Under Ground
6X90			Includes - Spools - Stress Relieving - Steam Tracing Excludes - Pipe Cleaning due to size definition.			6XX1 0" thru 2" 6XX2 2 1/2" thru 8" 6XX3 10" thru 24" 6XX4 26" thru 36" 6XX5 Over 36"	HD HA HA HA HA	HD HB HB HB HB	HJ HJ HJ HJ HJ HE HE

6000 PIPING

The piping element of work accounts are to include all craft labor (including fringe benefits and statutory labor costs), construction equipment usage and material necessary to install all piping materials as generally described in the piping specifications including, but not limited to pipe, fittings, valves, spools, specialties, joint materials, etc.

The pipe size range are as follows:

6XX1 ---- 0" thru 2"
6XX2 ---- 2½" thru 8"
6XX3 ---- 10" thru 24"
6XX4 ---- 26" thru 36"
6XX5 ---- over 36"

<u>6100</u>	<u>VENDOR SHOP FABRICATED AND FIELD ERECTED PIPING -</u>	HA
	<u>WITHIN BATTERY LIMITS</u>	HB
	Purchase and erection of pipe spools fabricated off site (pipe fabrication shop) as well as all other associated piping materials (valves, specialties, joint materials, etc.)... (Use last two digits to designate material and size of pipe.)	HD
		HJ
<u>6200</u>	<u>FIELD FABRICATED AND FIELD ERECTED PIPING -</u>	HA
	<u>WITHIN BATTERY LIMITS</u>	HB
	Purchase and erection of field fabricated piping materials such as random length pipe, loose fittings and loose flanges, tracer tubing, valves, joint material, and other associated piping materials. (Use last two digits to designate material and size of pipe.)	HD
		HJ
<u>6300</u>	<u>VENDOR SHOP & FIELD FABRICATED AND ERECTED PIPING - RACK</u>	HA
	Purchase and erection of piping materials, loose fittings, including spools, flanges, valves, joint material, etc. on racks outside battery limits. (Use last two digits to designate material and size of pipe.)	HB
		HD
		HJ

6000 PIPING

(Cont'd)

<u>6400</u>	<u>VENDOR SHOP & FIELD FABRICATED & ERECTED PIPING - SLEEPER</u>	HA HB HD HJ
	Purchase and erection of pipe materials, loose fittings, spools, flanges, valves, joint material, etc. on sleepers outside battery limits. (Use last two digits to designate material and size of pipe.)	
<u>6500</u>	<u>FIELD FABRICATED AND ERECTED PIPING - UNDERGROUND</u>	HE/AK
	Excavation, backfill, purchase and erection of underground piping materials, spools, fittings, valves, etc. in all areas. (Use last two digits to designate material and size of pipe.)	
<u>6600</u>	<u>INSTRUMENTATION</u>	
<u>6610</u>	<u>Instrument Piping</u>	HF
	Purchase and erection of piping materials (pipe, tubing, valves, etc.) associated with instrumentation including pneumatic tubing and instrument air piping.	
<u>6700</u>	<u>PIPE SUPPORTS</u>	
<u>6710</u>	<u>Pipe Supports - Field Fabricated</u>	HG
	Purchase and installation of materials for field fabricated pipe supports.	
<u>6720</u>	<u>Pipe Supports - Shop Fabricated</u>	HG
	Purchase and installation of prefabricated pipe supports including brackets and hangers, clamps, U-bolts, spring hangers, etc.	
<u>6800</u>	<u>OTHERS</u>	
<u>6810</u>	<u>Pipe Cleaning - Field</u>	HQ
	All on site cleaning for all size of pipe in all areas.	

8000 - ELECTRICAL

Revised: March 17, 1980

July 1, 1977
Revised: August 29, 1977
Revised: September 19, 1977

Header No. Detail No.	8100	8200	8300	8400	8500	8600	8700	8800	8900
	Overhead Transmission Lines	Raceways	Wire (Excludes Lighting)	Open	Electrical General Construction	Power & Control Devices	Buildings & Structures	General	Open
8X10	AA Foundations Incl. Earthwork & Piles CT COMC	NF/NC Trays CLP	NB High Voltage Wire 15KV and Above MLF		AA Concrete Pads, Rock Beds, Fencing, Etc. LS	NB Power & Control Devices EA	NB Grounding LF	NB Bus Duct LF	
8X20	JB Structural Steel Towers TCW	NB/NA/NC Conduit-Exposed CLP	NB Medium Voltage 100CV to 3000V MLF		JB Structures LS	NC Finish & Connectors- Special Systems EA	NA Lighting & Receptacles LS	NA Yard. Lighting LS	
8X30	NB Poles EA	NB Conduit-Embedded (Slab) CLP	NB Low Voltage 300V to 60CV MLF			NC Instrumentation & Miscellaneous Connectors LS	NB Collectors Rail LS	NB Lightning Protection LS	
220 8X40	NB Wire MLF	NB Conduit Duct Underground Incl. Earthwork, Concrete, Manholes, Etc. CLP	NC Communication MLF				NB Crane Wiring LS	NB Cathodic Protection LS	
8X50	NB Miscellaneous Equipment LS	NB Exposed Wireway LF	NB Control Cable MLF				NC Mobile Communications LS	NB Electrical Heat Tracing LF	
8X60		NB Embedded Wireway LF	NC Instrumentation Wire MLF						
8X70									
8X80									
8X90									

8000 - ELECTRICAL

8000 - ELECTRICAL

Revised: March 17, 1980

July 1, 1977
Revised: August 29, 1977
Revised: September 19, 1977

Header No. Detail No.	8100	8200	8300	8400	8500	8600	8700	8800	8900
	Overhead Transmission Lines	Raceways	Wire (Excludes Lighting)	Open	Electrical General Construction	Power & Control Devices	Buildings & Structures	General	Open
8X10	AA Foundations Incl. Earthwork & Piles CY CONC CLF	NB/NC Trays CLF	NB High Voltage Wire 15KV and Above MLF		AA Concrete Pads, Rock Beds, Fencing, Etc. LS	NB Power & Control Devices EA	NB Grounding LF	NB Bus Duct LF	
8X20	JB Structural Steel Towers TON	NB/NA/NC Conduit-Exposed CLF	NB Medium Voltage 1000V to 8000V MLF		JB Structures LS	NC Finish & Connections- Special Systems EA	NA Lighting & Receptacles LS	NA Yard Lighting LS	
8X30	NB Poles EA	NB Conduit-Embedded (Slab) CLF	NB Low Voltage 300V to 600V MLF			NC Instrumentation & Miscellaneous Connections LS	NB Collectors Rail LS	NB Lightning Protection LS	
221 8X40	NB Wire LF	NB Conduit Duct Underground Incl. Earthwork, Concrete, Manholes, Etc. CLF	NC Communication MLF				NB Crane Wiring LS	NB Cathodic Protection LS	
8X50	NB Miscellaneous Equipment LS	NB Exposed Wireway LF	NC Control Cable MLF				NC Mobile Communications LS	NB Electrical Heat Tracing LF	
8X60		NB Embedded Wireway LF	NC Instrumentation Wire MLF						
8X70									
8X80									
8X90									

8000 ELECTRICAL

All electrical costs including material, equipment and all labor incurred in the installing, receiving, handling, and furnishing of electrical materials and equipment are to be shown in the "8000 series" of construction standards.

<u>8100</u>	<u>OVERHEAD TRANSMISSION LINES</u>	
	High lines for incoming plant power, intraplant power line distribution and all work and materials related to such lines.	
8110	Foundations Including Earthwork and Piles Tower foundations, excavations, concrete bases, grubbing and related items.	AA
8120	Structural Steel Towers Steel or aluminum towers with all necessary hardware, insulators, guy lines, grounding and extensions.	JB
8130	Poles Treated or untreated wood or metal poles with all attached guy lines, cross arms, grounding insulators and miscellaneous hardware.	NB
8140	Wire All conductors including static line.	NB
8150	Miscellaneous Equipment Transformers, switches, lightning arresters or other equipment to be mounted on poles or towers.	NB

8000 ELECTRICAL

(Cont'd)

8200 RACEWAYS

Any channel for holding wires, cables or bus bars that is designed expressly for this purpose.

8210	Trays
All sizes with hangers, fittings and covers.	NB/NC
8220	Conduit - Exposed
Metallic or non-metallic with supports, fittings, and boxes including that which is in concealed or false ceilings.	NB/NA/NC
8230	Conduit - Embedded (Slab)
Metallic or non-metallic conduit with supports, fittings and boxes embedded in slabs or walls.	NB
8240	Conduit/Duct - Underground, Including Earthwork, Concrete, Manholes, Etc.
Metallic or non-metallic conduit buried in the earth requiring trenching with all related concrete, rebar, trenching, pull boxes, manholes, hardware and fittings.	NB
8250	Exposed Wireway
Gutters, troughs, and wire mold.	NB
8260	Embedded Wireway
Trench duct, header duct and all similar ducts buried in slabs.	NB

8000 ELECTRICAL

(Cont'd)

8300 WIRE (EXCLUDING LIGHTING)

All current carrying conductors. Labor for terminations will not be included under this category but will be included with the equipment or device to which the wire is terminated, i.e. MCC, disconnect, fixture, etc.

8310	High Voltage Wire 15KV and above.	NB
8320	Medium Voltage Wire 1000V to 8000V.	NB
8330	Low Voltage Wire 300V to 600V.	NR
8340	Communication TV, intercom, special paging, and electronic signalling.	NC
8350	Control Cable 600V and less.	NC
8360	Instrumentation Wire Cable, thermocouple, etc. related strictly to instrumentation panels and devices.	NC

8000 ELECTRICAL

(Cont'd)

8500 ELECTRICAL - GENERAL CONSTRUCTION

Civil work for electrical outdoor switch yards.

8510 Concrete Pads, Rock Beds, Fencing, etc.
Transformers and equipment pads, rock beds,
excavation, fencing, etc. for switchyard
facilities.

AA

8520 Structures
Steel or aluminum structures with all hardware
and appurtenances.

JB

8000 ELECTRICAL

(Cont'd)

8600 POWER AND CONTROL DEVICES

8610	Power and Control Devices	NB
	Small electrical devices and apparatus such as disconnects, pushbuttons, welding receptacles, motor connections, equipment connections, or individual starters, excluding materials associated with lighting or general power systems. Labor for terminating any wire to the above is included with each particular item.	
8620	Finish and Connections - Special Systems	NC
	To be used, if necessary, for fire alarm communication, etc. systems.	
8630	Instrumentation & Miscellaneous Connections	NC
	Materials and labor related to connecting of devices, cabinets, panels or equipment including junction boxes with terminal strips.	

8000 ELECTRICAL

(Cont'd)

8700 BUILDINGS & STRUCTURES

Electrical facilities related to general building independent of any process systems.

- 8710 Grounding NB
Basic grounding system or material.
- 8720 Lighting Fixtures & Receptacles & Lighting Panels NA
All work associated with lighting and general building power. The parameters of this work can usually be defined as all the labor and material required from the lighting panel to the last outlet.
- 8730 Collectors Rail NB
All labor and material cost incurred in connection with the furnishing, receiving, handling and installation of crane collectors, including the furnishing and installation of crane collector rails, insulators, supports, disconnect switches, and conduit and wire for feeders from the disconnect switch to the crane rail. (Feeders from the source of power to the crane disconnect switch will be included elsewhere.)
- 8740 Crane Wiring NB
Installation only of electrical equipment and wiring required in connection with the crane erection. All material and equipment to be furnished by others.
- 8750 Mobile Communications NC
Includes all costs for purchase, installation, and testing of mobile communications equipment.

8000 ELECTRICAL

(Cont'd)

<u>8800</u>	<u>GENERAL</u>	
	Miscellaneous categories not covered elsewhere.	
8810	Bus Duct High and low voltage, feeder, lighting or plug-in.	NB
8820	Yard Lighting Poles, bases, trenches, luminaires, conduit, conduit fittings and supports, wire, wiring devices, and all other material required for yard illumination.	NA
8830	Lightning Protection	NB
8840	Cathodic Protection	NB
8850	Electrical Heat Tracing Material and labor related to tracing of all pipes or tanks, including all control devices, supports, wire, tape, conduit, hardware and fittings from the closest source of power.	NB

9000 - GENERAL FIELD EXPENSE

July 1, 1977

Revised: August 29, 1977
Revised: September 19, 1977
Revised: October 25, 1977

This applies to Area 9191

Revised: March 17, 1980

Header No: Detail No.	9100	9200	9300	9400	9500	9600	9700	9800	9900
	CRAFT RELATED COSTS				CLEARING ACCOUNTS				
	← Craft Supervision	Services	Utilities & Expenses	→ Other		← Shop Operation	→		
9X10	A-P Civil MB	U Surveying MB	TK Drinking Water	AQ Craft Tests					
9X20	A-P Structural & Architectural MB	U Material Control MB	TK Small Tools	AA Material Tests					
9X30	A-P Mechanical MB	U Warehousing MB	TK Consumable Supplies	TA Construction Equipment Move In - Move Out Erect & Dismantle					
229 9X40		U Payroll MB	TG Maintenance of Facilities						
9X50	A-P Pipe MB	U Plant Protection MB	TG Maintenance of Utilities						
9X60		U First Aid MB	TG General Clean-Up						
9X70			TF Utility Billings						
9X80	A-P Electrical MB		TF Sanitary Facilities						
9X90									

9000 - GENERAL FIELD EXPENSE

9000 GENERAL FIELD EXPENSES

The construction standards for General Field Expenses are structured to handle costs that cannot be coded to specific direct cost accounts without undue paperwork or cost.

9100 CRAFT SUPERVISION

Craft Supervision

(Note: General Foreman, Foreman and Journeymen are direct cost personnel.)

Craft Supervisors

Assistant Craft Supervisors

Master Mechanics

Stenos/Clerks

Messengers

Drivers

9110	Civil	A-P
9120	Structural & Architectural	A-P
9130	Mechanical	A-P
9140	Open	
9150	Pipe	A-P
9160	Open	
9170	Open	
9180	Electrical	A-P
9190	Open	

9200 SERVICES

9210	Surveying	U
	Chief Surveyors	
	Party Chief	
	Instrumentman	
	Road and Chainmen	
	Drivers	
	Laborers	
	Stenos/Clerks	

9000 GENERAL FIELD EXPENSES

(Cont'd)

9200 SERVICES - (Cont'd)

9220	Material Control	U
	Material Control Engineer	
	Take-Off Personnel	
	Engineers	
	Stenos/Clerks	
9230	Warehousing	U
	Warehouse Superintendent	
	Warehousemen	
	Drivers	
	Stenos/Clerks	
9240	Payroll	U
	Paymaster	
	Timekeepers	
	Stenos/Clerks	
9250	Plant Protection	U
	Chief Guard	
	Guards	
	Fire-Watch	
	Stenos/Clerks	
9260	First Aid	U
	Doctor	
	Registered Nurses	
	Nurses	
	First Aid Personnel	
	Stenos/Clerks	

9300 UTILITIES AND EXPENSES

9310	Drinking Water	TK
	Ice, water, cost of distributing cups and	
	cans and maintaining.	

9000 GENERAL FIELD EXPENSES

(Cont'd)

9300 UTILITIES AND EXPENSES - (Cont'd)

9320 Small Tools TK
Purchase cost of minor equipment items costing from \$0 to \$500 each. (Unless otherwise specified by Prime Contract.)

Typical Small Tool Items are:

Measuring Devices	General Hand Tools
Shovels	Pipe Dies
Wheelbarrows	Etc.
Skill Saws	

9330 Consumable Supplies TK
Items which do not become a part of the finished plant are issued from the warehouse in such small quantities that accounting for them becomes impractical.

Typical examples of consumables are:

Welding Rods	Cleaning Rags
Oxygen	Nails
Acetylene	Snap Ties
Safety Glasses	Emery Cloth
Safety Hats	Shim Stock
Gloves	Form Oil
Slings	Curing Compound
General Craft Supplies	General Hand Tool Parts
Soapstone	Cutting & Welding Tips
Cutting Oil	Ladders
Boots	Etc.

Exceptions:

1. Form lumber, cement, sand, gravel, etc. which are inventoriable.
2. Welding rod, shim stock, etc. when defined as included in direct cost accounts for large equipment installations.

9000 GENERAL FIELD EXPENSES

(Cont'd)

9300 UTILITIES AND EXPENSES - (Cont'd)

9340	Maintenance of Facilities Maintenance of construction roads, buildings, barricades, snow removal, etc.	TG
9350	Maintenance of Utilities Maintenance of construction utilities, such as electrical, water, sanitary (chemical toilets, etc.), etc.	TG
9360	General Clean-up Plant clean-up other than craft clean-up.	TG
9370	Utility Billings Costs associated with gas, electricity, water, telephone, fuel oil, bottle gas, etc.	TF
9380	Sanitary Facilities Sanitary facilities associated with construction personnel.	TF

9400 OTHER

9410	Craft Tests Welders tests, etc.	AQ
9420	Material Tests Compaction tests, concrete tests, etc. when performed by an outside firm.	AA
9430	Construction Equipment Move-In/Move-Out Includes all cost to move construction equipment on and off the jobsite, and all erection and dismantling cost	TA

9000 GENERAL FIELD EXPENSE

(Cont'd)

9600 SHOP OPERATION

All shops are to be operated on a work order basis and are to be cleared to direct cost accounts upon completion of the work order. Allowance for shop overhead should be charged to each work order. The work order system may be used as follows:

Specific work order numbers for each shop job.

Example: Forms for building foundation could be work order number 921-1. (This would indicate work order number one for the "form shop".) After completion of the work order, or on a periodic basis if the work is long in duration, the proper costs would be transferred to direct costs. All shop labor, material, etc., applicable to the work order would be so charged at the shop.

Detail accounts are to be established to accommodate specific jobs.

9000 - CONTRACTOR'S FIELD SUPERVISION

July 1, 1977
 Revised: August 29, 1977
 Revised: September 19, 1977
 Revised: March 17, 1980

This applies to Area 9192

Header No. Detail No.	9100	9200	9300	9400	9500	9600	9700	9800	9900
	Construction Management	Engineering	Services		Expenses	Equipment			
9X10	U Construction Manager's Office MH	U Engineering MH	U Accounting MH		UC Office Expenses	TA Sedans			
9X20	U Construction Supervision MH	U Contracts Engineer MH	U Purchasing, Expediting & Traffic MH			TA Pickups			
9X30	U Area Superintendent MH	U Area Engineers MH	U Personnel Department MH		UA/UB Job Travel Expenses	UC Construction Office Equipment			
235 9X40		U Scheduling MH	U Industrial Relations MH		UA/UB Personnel Move In-Out	TC Survey Equipment			
9X50		U Cost Control MH	U Data Processing MH		VF Insurance & Bonds				
9X60		U Estimating MH	U Reproduction		YD Consultants				
9X70	U Quality Control	U Inspectors MH	U Audit			TC Radios			
9X80		U Piping Engineers MH				TA Buses			Miscellaneous Income
9X90									

9000 - CONTRACTOR'S FIELD SUPERVISION

This applies to Area 9192

9000 CONTRACTOR'S FIELD SUPERVISION

9100 CONSTRUCTION MANAGEMENT

9110	Construction Manager's Office Construction Manager Assistant Construction Manager Administrative Assistant Stenos/Clerks	U
9120	Construction Supervision Construction Superintendents Assistant Construction Superintendent Stenos/Clerks	U
9130	Area Superintendent Area Superintendents Area Clerks	U
9140)		
9150)	Open	
9160)		
9170	Quality Control Quality Control Manager Quality Control Engineers Quality Control Clerks Stenos	U

This applies to Area 9192

9000 CONTRACTOR'S FIELD SUPERVISION

(Cont'd)

<u>9200</u>	<u>ENGINEERING</u>	
9210	Engineering Construction (Chief, Field) Engineer Office Engineer Claims Engineer Engineers Draftsmen Print Boys Messengers Drivers Stenos/Clerks	U
9220	Contracts Engineer Contracts Engineers Clerks/Typists	U
9230	Area Engineers Area Engineers	U
9240	Scheduling Schedule Engineers Technicians Clerks	U
9250	Cost Control Cost Engineers Cost Coder Stenos/Clerks	U
9260	Estimating Chief Field Estimator Estimators Stenos/Clerks	U
9270	Inspectors Chief Inspector Inspectors Stenos/Clerks	U
9280	Piping Engineers	U

9000 CONTRACTOR'S FIELD SUPERVISION

(Cont'd)

9300 SERVICES

9310	Accounting	U
	Office Manager	
	Project Accountant	
	Accountants	
	Cost Accountants	
	Messenger	
	Drivers	
	Stenos/Clerks	
9320	Purchasing, Expediting & Traffic	U
	Procurement Manager	
	Chief Purchasing Agent	
	Purchasing Agent	
	Buyers	
	Messenger	
	Drivers	
	Stenos/Clerks	
	Expediting	U
	Chief Expeditor	
	Expeditors	
	Messenger	
	Drivers	
	Stenos/Clerks	
	Traffic	U
	Traffic Manager	
	Traffic Personnel	
	Customs Clerk	
	Customs Personnel	
	Dock Checkers	
	Messenger	
	Drivers	
	Stenos/Clerks	
9330	Personnel Department	U
	Personnel Manager	
	Personnel	
	Stenos/Clerks	

9000 CONTRACTOR'S FIELD SUPERVISION

(Cont'd)

9300 SERVICES (Cont'd)

9340	Industrial Relations	U
	Industrial Relations Manager	
	Pilots	
	Camp Manager	
	Insurance Manager	
	Industrial Relations Personnel	
	Safety Engineers	
	Stenos/Clerks	
9350	Data Processing	U
	Manager	
	Technicians	
	Clerks	
9360	Reproduction	U
	Reproduction Department Manager	
	Reproduction Personnel	
	Stenos/Clerks	
9370	Audit	U
	Audit Personnel assigned to the field	

9000 CONTRACTOR'S FIELD SUPERVISION

(Cont'd)

9400 OPEN

9500 EXPENSES

9510	Office Expenses	UC
	Office Supplies and Expenses	
	Reproduction Costs and/or Supplies	
	Communications	
	Dues, Donations, Permits and Memberships	
9530	Job Travel Expenses	UA/UB
	Trips, expense, etc. incurred by construction personnel associated with job costs.	
9540	Personnel Move In - Out	UA/UB
	Generally, it is to be assumed that the job will bear the cost of moving personnel to the site. The move off costs should be borne by the next job.	
	Families	
	Single Status Personnel	
	Turnover	
	Medical Expenses	
	Passport Expenses	
	Transportation Costs	
	Relocation Costs	
9550	Insurance & Bonds	VF
	Builders all risk insurance	
	Performance Bonds	
	Etc.	
9560	Consultants	YD
	Cost of consultants required for proper execution of construction.	

This applies to Area 9192

9000 CONTRACTOR'S FIELD SUPERVISION
(Cont'd)

9600 EQUIPMENT

9610	Sedans Cost of renting, maintaining and operating sedans assigned to CFOH Personnel.	TA
9620	Pickups Cost of renting, maintaining and operating pickups assigned to CFOH Personnel.	TA
9630	Construction Office Equipment Desks, chairs, files, calculators, typewriters, reproduction machines, etc.	UC
9640	Survey Equipment	TC
9670	Radios	TC
9680	Buses	TC
9980	Miscellaneous Income	

9000 - CONSTRUCTION PLANT

 July 1, 1977
 Revised: September 19, 1977

This applies to Area 9193

Header Detail No.	9100	9200	9300	9400	9500	9600	9700	9800	9900
	Offices	Office & Engineering Equipment	Warehouse	Shops	Shop Equipment	Other Buildings & Structures	Construction Facilities	Construction Utilities	Open
9X10	TF KE Constr. Main Office	TC Main Office	TF KE Constr. Main Warehouse	TF Carpenter Shop	TA Carpenter	TF Powder Magazine	TG Roads	TG Water Supply	Winter Protection
9X20	TF Owners	TC Owner	TF Temp. Fenced Compound WAREHOUSE	TF Pipe Shop	TA Pipe	TF Miscellaneous Minor Structures	TG Parking Lots	TG Electrical Supply	
9X30	TF Area	TC Area	TF Area Warehouses	TF Constr. Equip. Repair & Maint. Garage	TA Constr. Equip. Repair & Maint.		TG Temporary Railroad Track	Sanitary Disposal	
242 9X40	TF Craft Shacks		TF Tool Crib				TG Temporary Fencing	Temp. Boiler Plant	
9X50			Additional WAREHOUSE		WAREHOUSE Equipment				
9X60									
9X70									
9X80									
9X90									

9000 - CONSTRUCTION PLANT

9000 - CONSTRUCTION PLANT

July 1, 1977
Revised: September 19, 1977
Revised: March 17, 1980

This applies to Area 9193

Header No. Detail No.	9100	9200	9300	9400	9500	9600	9700	9800	9900
	Offices	Office & Engineering Equipment	Warehouse	Shops	Shop Equipment	Other Buildings & Structures	Construction Facilities	Construction Utilities	Winter Protection
9X10	TF KE Construction Main Office	TC Main Office	TF KE Construction Main Warehouse	TF Carpenter Shop	TA Carpenter	TF Powder Magazine	TC Roads	TC Water Supply	TF Winter Protection
9X20	TF Owners	TC Owner	TF Temporary Fenced Compound Warehouse	TF Pipe Shop	TA Pipe	TF Miscellaneous Minor Structures	TC Parking Lots	TC Electrical Supply	
9X30	TF Area	TC Area	TF Area Warehouses.	TF Constr. Equip. Repair & Maint. Garage	TA Constr. Equip. Repair & Maint.		TC Temporary Railroad Track	TC Sanitary Disposal	
243 9X40	TF Craft Shacks		TF Tool Cribs				TC Temporary Fencing	TC Temporary Boiler Plant	
9X50					TA Warehouse Equipment				
9X60									
9X70									
9X80									
9X90									

9000 - CONSTRUCTION PLANT

This applies to Area 9193

9000 CONSTRUCTION PLANT

Construction plant accounts are for the initial cost of the necessary structures and facilities for the construction operation.

The costs for maintenance and upkeep of the plant structures and facilities are not to be charged to this series of accounts but to the proper accounts in the Direct General Field Expense series.

9100 OFFICES

9110	KE Construction Main Office	TF
9120	Owners	TF
9130	Area	TF
9140	Craft Shacks	TF

This applies to Area 9193

9000 CONSTRUCTION PLANT

(Cont'd)

9200 OFFICE & ENGINEERING EQUIPMENT

9210	Main Office	TC
9220	Owner	TC
9230	Area	TC

9300 WAREHOUSE

9310	KE Construction Main Warehouse	TF
9320	Temporary Fenced Compound Warehouse	TF
9330	Area Warehouses	TF
9340	Tool Cribs	TF

9400 SHOPS

9410	Carpenter Shop	TF
9420	Pipe Shop	TF
9430	Construction Equipment Repair & Maintenance Garage	TF

9500 SHOP EQUIPMENT

9510	Carpenter	TA
9520	Pipe	TA
9530	Construction Equipment Repair & Maintenance	TA
9350	Warehouse Equipment	TA

This applies to Area 9193

9000 CONSTRUCTION PLANT

(Cont'd)

9600 OTHER BUILDINGS AND STRUCTURES

9610 Powder Magazine TF

9620 Misc. Minor Structures TF

9700 CONSTRUCTION FACILITIES

9710 Roads TG

9720 Parking Lots TC

9730 Temporary Railroad Track TG

9740 Temporary Fencing TG

9800 CONSTRUCTION UTILITIES

9810 Water Supply TG

9820 Electrical Supply TG

9830 Sanitary Disposal TG

9840 Temporary Boiler Plant TG

9900 WINTER PROTECTION

9910 Winter Protection TF

9000 - CONSTRUCTION CAMP

July 1, 1977
Revised: March 17, 1980

This applies to Area 9194

Header No. Detail No.	9100	9200	9300	9400	9500	9600	9700	9800	9900
	Camp Construction	Camp Equipment	Camp Operation	Camp Maintenance	Camp Utilities	Open	Open	Open	Open
9X10	TF Site Work				TG Water Supply				
9X20	TF Bachelor Quarters	TA Bachelor Quarters Furniture and Equipment			TG Sanitary Sewer				
9X30	TF Recreation Building	TA Recreation Bldg. Furniture & Equipment			TG Storm Drain System				
247 9X40	TF Maintenance Building	TA Maintenance Building Furniture and Appliances			TG Electrical Distribution & Lighting				
9X50	TF Shower Building								
9X60									
9X70									
9X80									
9X90									

9000 - CONSTRUCTION CAMP

9000 CONSTRUCTION CAMP

9100 CAMP CONSTRUCTION

Includes complete construction costs for camp buildings, roads, recreation, etc. Salvage, if any, is to be included as a separate entry within this heading.

9110	Site Work	TF
9120	Bachelor Quarters	TF
9130	Recreation Building	TF
9140	Maintenance Building	TF
9150	Shower Building	TF

9200 CAMP EQUIPMENT

Costs of necessary equipment for camp operation. Salvage, if any, is to be included as a separate entry within this heading.

9220	Bachelor Furniture and Equipment	TA
9230	Recreation Furniture and Equipment	TA
9240	Maintenance Building Furniture & Appliance	TA

9300 CAMP OPERATION

Complete cost for all labor, material, supplies, etc. to properly operate all camp facilities.

9400 CAMP MAINTENANCE

Camp maintenance costs including repair of all plant facilities and utilities.

9500 CAMP UTILITIES

Installation of utility distribution systems to add within the camp area.

9510	Water Supply	TG
9520	Sanitary Sewer	TG
9530	Storm Drain System	TG
9540	Electrical Distribution and Lighting	TG

8000 - CONSTRUCTION EQUIPMENT PURCHASE

October 25, 1977
Revised March 17, 1980

This applies to Area 9195

Header No. Detail No.	8100	8200	8300	8400	8500	8600	8700	8800	8900
	Earthmoving	Material Handling	Vehicular	Welding Machines	Compressors	Miscellaneous	Open	Open	Open
8x10	TC Tractors	TC Cranes		TC 200 AMP Gasoline Engine	TC 150 CFM	TC Men Lifts			
8x20	TC Scrapers	TC Hoists		TC 300 AMP Gasoline Engine	TC 600 CFM				
8x30	TC Dozers	TC Conveyor, Concrete Portable	TC Trucks	TC 300 AMP Electric					
249 8x40	TC Loaders, Shovels, and Backhoes	TC Concrete Pumper	TC Trailers						
8x50	TC Compactors	TC Pumps, Water	TC Fire Trucks						
8x60	TC Grader	TC Forklifts	TC Lube Truck						
8x70									
8x80									
8x90									

8000 - CONSTRUCTION EQUIPMENT PURCHASE

8000 - CONSTRUCTION EQUIPMENT PURCHASE

October 25, 1977

This applies to Area 9195

Header No. Detail No.	8100	8200	8300	8400	8500	8600	8700	8800	8900
	Earthmoving	Material Handling	Vehicular	Welding Machines	Compressors	Miscellaneous	Open	Open	Open
8x10	Tractors	Cranes	Ambulance	200 AMP Gasoline Engine	150 CFM				
8x20	Scrapers	Holsts	Busses	300 AMP Gasoline Engine	600 CFM				
8x30	Dozers	Conveyor, Concrete Portable	Trucks	300 AMP Electric					
250 8x40	Shovels	Concrete Pumper	Trailer						
8x50	Compactors	Pumps, Water							
8x60	Grader								
8x70									
8x80									
8x90									

8000 - CONSTRUCTION EQUIPMENT PURCHASE

This applies to Area 9195

8000 CONSTRUCTION EQUIPMENT PURCHASE

A separate detailed account is to be opened for each piece or class of construction equipment requiring an operator. While not necessarily requiring an operator, compressors and welding machines may be included along with the customary mobile equipment. The purchase price is to be charged to the proper detail account using the natural elements of cost and depreciation is cleared to the operations' account periodically.

Detail accounts are as follows:

8100 EARTHEMOVING

8110	Tractors	TC
8120	Scrapers	TC
8130	Dozers	TC
8140	Loaders, Shovels and Backhoes	TC
8150	Compactors	TC
8160	Graders	TC

8200 MATERIAL HANDLING

8210	Cranes	TC
8220	Hoists	TC
8230	Conveyor, Concrete, Portable	TC
8240	Concrete Pumper	TC
8250	Pumps, Water	TC
8260	Fork Lifts	TC

8300 VEHICULAR

8330	Trucks	TC
8340	Trailer	TC
8350	Fire Trucks	TC
8360	Lube Truck	TC

This applies to Area 9195

8000 CONSTRUCTION EQUIPMENT PRUCHASE

(Cont'd)

<u>8400</u>	<u>WELDING MACHINES</u>	
8410	200 AMP Gasoline Engine	TC
8420	300 AMP Gasoline Engine	TC
8430	300 AMP Electric	TC
<u>8500</u>	<u>COMPRESSORS</u>	
8510	150 CFM	TC
8520	600 CFM	TC
<u>8600</u>	<u>MISCELLANEOUS</u>	
8610	Man Lifts	TC

9000 - CONSTRUCTION EQUIPMENT OPERATIONS

October 25, 1977
Revised: March 17, 1980

This applies to Area 9195

Header No. Detail No.	9100	9200	9300	9400	9500	9600	9700	9800	9900
	Earthmoving	Material Handling	Vehicular	Welding Machines	Compressors	Miscellaneous	Open	Open	Maintenance
9X10	Tractors	Cranes		200 AMP Gasoline Engine	150 CFM	Manlifts			
9X20	Scrapers	Hoists		300 AMP Gasoline Engine	600 CFM				
9X30	Dozers	Conveyor, Concrete Portable	Trucks	300 AMP Electric					
253 9X40	Loaders, Shovels, and Backhoes	Concrete Pumper	Trailer						
9X50	Compactors	Pumps, Water	A Fire Trucks						
9X60	Grader	Fork Lifts	Lube Truck						
9X70									
9X80									
9X90									

9000 - CONSTRUCTION EQUIPMENT OPERATIONS

9000 CONSTRUCTION EQUIPMENT OPERATION

A separate detail account is to be opened for each piece or class of construction equipment requiring an operator. While not necessarily requiring an operator, compressors and welding machines may be included along with the customary mobile equipment. Costs are to be charged to the proper detail account using the natural elements of cost and are to be cleared periodically (preferably daily) to the proper direct, indirect, etc. account.

Detail accounts are as follows:

9100 EARTHEMOVING

9110 Tractors

9120 Scrapers

9130 Dozers

9140 Loaders, Shovels and Backhoes

9150 Compactors

9160 Graders

9200 MATERIAL HANDLING

9210 Cranes

9220 Hoists

9230 Conveyor, Concrete, Portable

9240 Concrete Pumper

9250 Pumps, Water

9260 Fork Lifts

9300 VEHICULAR

9330 Trucks

9340 Trailer

9350 Fire Trucks

9360 Lube Truck

This applies to Area 9195

9000 CONSTRUCTION EQUIPMENT OPERATION

(Cont'd)

9400 WELDING MACHINES

9410 200 AMP Gasoline Engine

9420 300 AMP Gasoline Engine

9430 300 AMP Electric

9500 COMPRESSORS

9510 150 CFM

9520 600 CFM

9600 MISCELLANEOUS

9610 Man Lifts

9000 - FIELD INVENTORY

October 25, 1977

This applies to Area 9196

Header No. Detail No.	9100	9200	9300	9400	9500	9600	9700	9800	9900
	Civil	Steel	Architectural	Mechanical (Piping)	Open	Open	Electrical	Open	Open
9X10	Concrete Aggregate	Structural Steel	Metal Roofing	Piping			Wire		
9X20	Cement	Embedded Metals	Metal Siding	Open			Conduit		
9X30	Lumber	Handrail		Valves			Trays		
256 9X40	Rebar	Grating		Fitting			Fixtures		
9X50				Gaskets					
9X60									
9X70									
9X80									
9X90									

9000 - FIELD INVENTORY

This applies to Area 9196

9000 FIELD INVENTORY

This series of accounts is to be used for inventory items.

Initial purchases of these inventory items will be charged to this series of accounts.

Clearings from these inventory accounts to the appropriate direct accounts will be based on warehouse issues.

9100 CIVIL

9110 Concrete Aggregate

9120 Cement

9130 Lumber

9140 Rebar

9200 STEEL

9210 Structural Steel

9220 Embedded Metals

9230 Handrail

9240 Grating

9300 ARCHITECTURAL

9310 Metal Roofing

9320 Metal Siding

9400 MECHANICAL AND PIPING

9410 Piping

9430 Valves

9440 Fittings

9450 Gaskets

This applies to Area 9196

9000 FIELD INVENTORY

(Cont'd)

9700 ELECTRICAL

9710 Wire

9720 Conduit

9730 Trays

9740 Fixtures

This applies to Area 9197

9000 - OVERTIME & RELOCATION BONUS

This account includes the budgeted amounts for craft overtime and the relocation bonus for field personnel.

The accounting details pertaining to the handling of this account will be determined at a later date.

Added: March 17, 1980

9000 - HOME OFFICE COSTS (LUMMUS/KAISER)

This applies to Area 9297

Header No: Detail No;	9100	9200	9300	9400	9500	9600	9700	9800	9900
	Management and Operations	Engineering	Project Controls	General Office	Payroll Benefits, Overhead, and Prorates	Non-Payroll	Non-Payroll	Computer Charges	Other
9X10	YA Project Management MH	YA Project Engineering MH	YC Estimating MH	YB Procurement MH	WXYV Benefits and Overhead - Lummus	WXY Travel and Expenses	YD Consultant Fees	YY Project Controls	Lummus Costs Prior to 1980
9X20		WA01 Design MH	YM Scheduling MH	YF Expediting MH	WXYV Benefits and Overhead - Kaiser	WXY Communications	YD Subcontracted Engineering	YY Engineering	Misc. Costs Lummus (After 1979)
9X30	XD Construction Management MH	WC01 Engineering -- Utilities, Instrumentation & Special MH	YC Cost Engineering MH	WA05 Administration MH		WXY Reproduction		YY All Other Computer Charges	
260 9X40		WE01 P & I Engineering MH	WXY Data Processing MH	XA1B Accounting MH	XA1B Lummus Accounting Prorates MH	WXY Office Supplies and Expenses			
9X50	YC Initial Operations	YB Process MH	Computer Controls MH	XA1G Industrial Relations MH	XA1C Lummus Office Services Prorates MH	WXY Office Equipment			Kaiser Costs Prior to 1980
9X60		YF Engineering Inspection MH		XA1D Legal MH					Misc. Costs Kaiser (After 1979)
9X70		YK Technical Information MH		WXY Other MH					
9X80		WB HTD MH				WXY Employee Relocation			
9X90		WA06 Job Shoppers MH		XA1A Steno-Clerical MH		WXY Other Costs & Services			

9000 - HOME OFFICE COSTS (LUMMUS/KAISER)

This applies to Area 9297

9000 - HOME OFFICE COSTS (LUMMUS/KAISER)

The accounts in this area are used to segregate and control the home office costs of both Lummus and Kaiser salary costs and overhead and non-payroll(expense) items.

The following series of detail accounts are used to accumulate manhours and base labor costs for the various categories of personnel listed below for the period January 1, 1980, to job completion:

9100 MANAGEMENT AND OPERATIONS

9110	Project Management	YA
9130	Construction Management	XD
9150	Initial Operations	YG

9200 ENGINEERING

9210	Project Engineering	YA
9220	Design	WA01
9230	Engineering - Utilities, Instrumentation, & Special	WC01
9240	P & I Engineering	WE01
9250	Process	YB
9260	Engineering Inspection	YF
9270	Technical Information	YK
9280	Heat Transfer Division (HTD)	WB
9290	Job Shoppers	WA06

9300 PROJECT CONTROLS

9310	Estimating	YC
9320	Scheduling	YM
9330	Cost Engineering	YC
9340	Data Processing	WXY
9350	Computer Controls	

9000 - HOME OFFICE COSTS (LUMMUS/KAISER)

(Cont'd)

9400 GENERAL OFFICE

9410	Procurement	XB
9420	Expediting	YF
9430	Administration	WAO5
9440	Accounting	XAlB
9450	Industrial Relations	XAlC
9460	Legal	XAlD
9470	Other	WXY
9490	Steno/Clerical	XAlA

9500 PAYROLL BENEFITS, OVERHEAD, AND PRORATES

The following two accounts are used to accumulate the costs of the payroll related benefits and overhead for the period January 1, 1980 to job completion.

These accounts temporarily include all Department of Energy add-ons, such as benefits, overhead, G & A, and fee for the same period.

9510	Benefits and Overhead - Lummus	WXYV
9520	Benifits and Overhead - Kaiser	WXYV

The following two accounts are used by Lummus to distribute to direct jobs the costs of the accounting and office services departments for the period January 1, 1980 to job completion. This is done on a monthly basis and includes manhours and base labor costs.

9540	Lummus Accounting Prorates	XAlB
9550	Lummus Office Services Prorates	XAlC

This applies to Area 9297

9000 - HOME OFFICE COSTS (LUMMUS/KAISER)

(Cont'd)

The following series of detail accounts are used to accumulate the costs of non-payroll(expense) items for the various categories for the period January 1, 1980, to job completion:

9600 NON-PAYROLL

9610	Travel and Expenses	WXY
9620	Communications	WXY
9630	Reproduction	WXY
9640	Office Supplies and Expenses	WXY
9650	Office Equipment	WXY
9680	Employee Relocation	WXY
9690	Other Costs and Services	WXY

9700 NON-PAYROLL

9710	Consultants Fees	YD
9720	Subcontracted Engineering	YD

9800 COMPUTER CHARGES

9810	Project Controls	YY
9820	Engineering	YY
9830	All Other Computer Charges	YY

9000 - HOME OFFICE COSTS (LUMMUS/KAISER)

(Cont'd)

9900 OTHER

9910 Lummmus Costs Prior to 1980

This account is used to record the total costs billed by Lummmus from job inception thru December 31, 1980.

9920 Miscellaneous Costs, Lummmus, (after 1979)

This series of accounts is used by Lummmus company to segregate costs not deemed to be covered by current contract (out - of - scope)

9950 Kaiser Costs Prior to 1980

This account is used to record the total costs billed by Kaiser from job inception thru December 31, 1980.

9960 Miscellaneous Costs, Kaiser, (after 1979)

This series of accounts is used by Kaiser company t segregate costs not deemed to be covered by current contract (out-of-scope)

This applies to Area 9298

9000 ENGINEER-CONTRACTOR FEE

The Engineer-Contractor Fee is determined by contractual agreement and is enter in this account as a single line entry.

9000 ESCALATION

All estimates are prepared on labor, material and equipment prices as of the date of the estimate. Future wage increases (even if known), material cost increases and equipment price increases are evaluated separately and included in the estimate as "Escalation".

The handling of escalation is as follows:

1. At the time of preparing the estimate of cost, an evaluation of the probable labor escalation and probable escalation on purchased items and sub-contracted work should be included as a line item.
2. As the estimated cost at completion is adjusted from time to time picking up labor escalation and other escalation, the estimate at completion in the "Labor Escalation" and "Other Escalation" accounts should be reduced accordingly. No attempt should be made to charge or commit escalation costs to this account - all such costs and commitments are to be costed to the direct accounts.
3. A re-evaluation of escalation payments and requirements should be made periodically along with the revised estimated cost at completion and the escalation accounts should be adjusted to reflect at all times the best estimate of remaining escalation requirements.

9000 CONTINGENCY

(Also referred to as: UNALLOCATED COSTS)

Contingency is included as a part of the estimated cost and is for compensating for accidental events, errors and imperfections of estimating methods, quality and quantity of engineering data available and the inevitable oversights. Contingency is not for scope changes.

Contingency is included as a line item in the estimate of cost. As the project progresses the contingency amount should be handled as follows:

As the job progresses and as the estimate to complete is adjusted as more complete data becomes available, the contingency should be re-evaluated in light of the remaining contingent items. No attempt should be made to charge costs to the contingency account numbers.

Costs or committed amounts are not to be charged to contingency.

In order to conform to contractual requirements, the following Element of Work accounts are established:

9100 REIMBURSEABLE

9200 TARGET T.I.C.

This applies to Area 9700

9000 - FREIGHT

This section is to be used to account for all freight on the project under Lummus/Kaiser responsibility.

In order to conform to contractual requirements, the following Element of Work accounts are established:

9100 REIMBURSEABLE

9200 TARGET T. I. C.

This applies to Area 9900

9000 - DEVIATIONS

This section accounts for the total deviations defined at the time the control estimate was prepared. These deviations will be re-allocated to the proper areas as far as the budget is concerned, and no costs will be recorded or committed in this section which will ultimately have a zero budget.

9900-1

ANG CONSULTANTS, LEGAL & GENERAL

04/08/80

[illegible]

DETAIL DESIGNATOR

XX . XX . XXXX . X . XXX

The detail designator may be used as an additional digit for the elements of work, such as identifying individual equipment pieces or for other detailed identification.

ELEMENTS OF COST

XX . XX . XXXX . X . XXX

The elements of cost series of numbers define the corporate entity and the basic elements of cost such as labor (including fringe benefits and statutory requirements), construction equipment (rent, fuel, repairs, oil and grease), materials, etc.

The elements of cost may not be changed or altered without prior approval.

The first digit defines the corporate entity as follows:

1XX - ANG
2XX - Lummus
3XX - Kaiser
4XX - Lurgi

The remaining two digits define the element of cost and are shown as follows:

LABOR

X01 Straight Time
X02 Premium Time
X03 On Loan Personnel
X04 Job Shoppers
X07 Owner Furnished
X09 Clearing and Transfer

BURDEN

X12 Craft Welfare Program
X13 Craft Travel & Subsistence
X14 Non Manual Benefits
X15 Overhead
X16 Payroll Taxes and Insurance
X17 Owner Furnished
X19 Payroll Burden Allocation

EQUIPMENT USAGE

X21 Construction Equipment Rental - Operated and Maintained
X22 Construction Equipment Rental - Bare
X23 Construction Equipment Purchase
X24 Depreciation and Amortization
X27 Owner Furnished
X29 Allocation Rates

ELEMENTS OF COST
(Continued)

MATERIAL

X31 Material Purchase
X32 Freight
X37 Owner Furnished
X39 Shop & Inventory Allocation

SUBCONTRACT LABOR

X41 Subcontract Labor
X43 Purchased Service & Consultants
X44 Escalation
X47 Owner Furnished

SUBCONTRACT MATERIAL

X51 Subcontract Material
X52 Freight

ENGINEERED EQUIPMENT PURCHASE

X61 Equipment Purchase
X62 Freight
X63 Spare Parts
X64 Escalation
X67 Owner Furnished

GENERAL

X71 Office Supplies and Expenses
X72 Reproduction
X73 Communications
X74 Travel and Expense
X75 Miscellaneous Taxes, Licenses, and Permits
X76 Space Rental and Utilities
X77 Employee Relocation
X78 Furniture and Fixtures
X79 Reproduction Transfers
X81 General Insurance
X82 Dues, Donations and Memberships
X83 Contributions
X84 Other Home and Branch Office Costs
X85 Sales and Use Tax
X86 Legal
X87 Audit
X89 Clearing and Transfer
X91 Field Cost Recovery
X92 Miscellaneous Freight

ELEMENTS OF COST
(Continued)

GENERAL (Cont'd)

X94 Overhead Recovery
X97 Committed Costs
X98 Committed Liabilities
X99 Clearing and Transfer

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COST DEVIATION NOTICE PROCEDURE

ANG Coal Gasification Company
137 MM SCFD SNG Plant
North Dakota

Lummus Job 7102

Kaiser Job 7381

Issue Date Rev. 2 Feb. 18, 1981

J. C. Parker

Deputy Project Director -
Controls

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COST DEVIATION NOTICE PROCEDURE

INTRODUCTION

Use this procedure as a means of rapidly conveying expected cost deviations. The intent is to alert all involved parties as early as possible to significant changes in the budget. Detailed technical data is not required, but rather preliminary information should be used. The procedure should be a quick and concise method of conveying cost deviations. All cost deviations should be measured against the current approved budget. This procedure will be used jointly and concurrently by Lummus and Kaiser Engineers.

COST DEVIATION NOTICE PROCEDURE

1.0 PURPOSE

This procedure describes the handling of cost deviations for the ANG Coal Gasification Company 137 MM SCFD SNG Plant in North Dakota. The Cost Deviation Notice Procedure provides a method of identifying anticipated significant cost differences as early as practical. It is an early warning system which should allow time for corrective action where possible. The procedure is intended to precede and/or supplement the Change Order procedure when there is a lack of sufficient detail to process a Change Order.

COST DEVIATION NOTICE PROCEDURE

2.0 DEFINITION

A deviation notice is a document developed with a minimum expenditure of time to briefly state the expected impact on total installed cost of the project for reasons due to suspect changes in scope, schedule, procedure, pricing or other.

COST DEVIATION NOTICE PROCEDURE

3.0 Policy

The Cost Deviation Notice form, "Exhibit A", is to be prepared whenever a cost deviation of greater than $\pm$ \$10,000 is suspected. Following a brief scope definition, and an explanation as to the reason of the deviation a quick order-of-magnitude estimate is to be prepared. In no event will a Deviation Notice be issued any later than five working days after a cost deviation and its reasons are sufficiently defined and added to the Deviation Register. Within the Lummus/Kaiser project task forces, the respective Project Control Managers will hold Deviation Notice Review meetings on Tuesday of each week, attended by their respective Project Engineering Manager, Lead Project Engineers and Cost Engineers. Lummus/Kaiser project cost engineers will review the cost deviations with the ANG resident cost engineers and resident design engineers the following Wednesday of each week. In the weekly review with the ANG residents, the ANG resident cost engineer will agree with Lummus/Kaiser project cost engineers as to which Deviation Notices are ready for submittal to ANG and to the appropriate revisions to the Deviation Notice Register. Deviation Notices will be submitted to ANG on a weekly basis by the respective Project Control Managers, with copies to the Project Control Manager - Costs.

Manager of Cost/Schedule Engineering will provide for an ANG management review of Deviation

COST DEVIATION NOTICE PROCEDURE

3.0 POLICY (Continued)

Notices as issued to ANG on the following Monday of each week. He will notify Lummus/Kaiser within five working days thereafter as to the disposition of the Deviation Notice into one of the following four categories:

Category 1 - Lummus/Kaiser to proceed with the engineering and to process the change order.

Category 2 - Not considered as a change in scope, but Lummus/Kaiser to proceed with the engineering, process the change order and transfer the funds from unallocated cost.

Category 3 - Considered as an engineering revision, therefore, is not to be processed as a change order. To be treated as an overrun or underrun to the expected cost at completion.

Category 4 - Deviation Notice is to be cancelled or requires further study and re-definition. Will not be processed as a change order.

If Lummus/Kaiser do not agree with the categorization by ANG, a management meeting will be held at a later date to negotiate the final disposition of the Deviation Notice in question.

The Deviation Notice will reflect summary costs only in the form of expected total installed cost impact. Backup should be held to a minimum. Trend curves will be prepared for the tracking of Deviation Notices issued/processed as Change Orders and their effect on the Estimate at Completion. This trend curve and a Cost Deviation Register will be prepared and be part of the monthly Cost Report.

COST DEVIATION NOTICE PROCEDURE

4.0 PROCEDURE

For a guide to the sequence of events and information flow required for the preparation and presentation of Deviation Notices, see "Exhibit B Flow Chart".

All project task force members should inform their respective Project Directors of all expected cost deviations; the Controls Managers, in particular, should screen information carefully to uncover suspected changes.

The Construction Field Staff should inform the Deputy Project Director - Controls of expected cost deviations. ANG initiated Cost Deviation Notices will be forwarded to the Deputy Project Director - Controls for action.

The Deputy Project Director - Controls with assistance from the Project Directors and the Cost Engineers/Estimators will determine when a Deviation Notice should be processed as a Change Order.

The Deviation Notice form can be prepared by the person originally suspecting the change, or may be prepared later by the Project Controls Managers. Emphasis should be placed on rapid information flow. The ultimate responsibility of processing deviations

COST DEVIATION NOTICE PROCEDURE

4.0 PROCEDURE (continued)

lies with the Cost Engineering/Estimating Group.

Internally, meetings will be held on Tuesday of each week by the Project Controls Manager, Project Engineering Manager, Lead Project Engineers and Cost Engineers to review the cost deviations and outline future action. Lummus/Kaiser Cost Engineers will review the cost deviations with ANG resident cost engineers and design engineers on the following day to decide which deviations should be added to the Deviation Notice Register and transmitted to ANG. Deviation Notices will be issued to ANG within five working days after being added to the Deviation Notice Register.

Deviations will be transmitted to ANG weekly and reviewed on a weekly basis.

The Project Controls Manager - Cost will develop and keep a register of Deviation Notices presented to ANG.

EXHIBIT "A1"

DEVIATION NOTICE

GREAT PLAINS COAL GASIFICATION PROJECT

KAISER JOB NO. 7381

COST DEVIATION NOTICE NO. _____ REV. _____

AREA _____

INITIATED BY _____ DATE _____

ESTIMATED BY _____ DATE _____

DESCRIPTION

REASON

EXPECTED TOTAL
INSTALLED COST IMPACT
(In Thousands)

\$ _____

SUGGESTED ACTION

CIRCULATE (Upon Completion)

DATE _____

Chief Project Estimator _____

Project Engineering Manager _____

Deputy Project Director _____

Project Controls Manager _____

Deputy Project Director -
Controls _____

Client Cost/Schedule
Resident _____

EXHIBIT "A2"

DEVIATION NOTICE

GREAT PLAINS COAL GASIFICATION PROJECT

LUMMUS JOB NO. 7102

COST DEVIATION NOTICE NO. _____ REV. _____

AREA _____

INITIATED BY _____ DATE _____

ESTIMATED BY _____ DATE _____

DESCRIPTION

REASON

EXPECTED TOTAL
INSTALLED COST IMPACT
(In Thousands)

\$ _____

SUGGESTED ACTION

CIRCULATE (Upon Completion)

DATE

Project Cost Engineer

Project Engineering Manager

Project Director

Project Controls Manager

Deputy Project Director -
Controls

Client Cost/Schedule
Resident

CHANGE ORDER PROCEDURE

ANG Coal Gasification Company
137 MM SCFD SNG Plant
North Dakota

Lummus Job 7102

Kaiser Job 7381

Issue Date Rev. 1, February 18, 1981

✓

R. H. Tauskey

J. C. Parker

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CHANGE ORDER PROCEDURE

INTRODUCTION

This procedure will be used jointly and concurrently by Lummus and Kaiser Engineers to measure changes in scope against the January 1, 1980 Control Estimate. This procedure will be reviewed and revised as necessary.

CHANGE ORDER PROCEDURE

1.0 PURPOSE

This procedure describes the handling of change orders for the 137 MM SCFD SNG Great Plains Coal Gasification Project in North Dakota. The change order procedure is developed to provide a method of control for scope, cost and time changes. Except as stated in 3.0, change orders serve as the official document for increasing or decreasing the January 1, 1980 Control Estimate to allow for approved changes in scope.

CHANGE ORDER PROCEDURE

2.0 DEFINITION

- 2.1 A change order is a document developed to authorize changes in the scope of work and their resultant cost and schedule impact as well as stating the reasons for the changes and the affect of such on guarantees. When approved by the Great Plains Gasification Association, it represents the official approval for Lummus and/or Kaiser to proceed with the work described. A change order may first be developed as a proposal for deviations from the scope of work defined by the January 1, 1980 Control Estimate (see Cost Deviation Notice Procedure, VI C). After due consideration, the change order may either by rejected or approved by ANG. An approved change order directs the contractor to make changes as specified with resulting cost and schedule consequences and initiates a change to the current budget. Such approved change orders will be documented into the Project Cost Program through use of a change order tracking system.
- 2.2 Changes in cost due to force majeure items will be handled as change orders as will all other items, as outlined in Appendix IX of the Contract.
- 2.3 Timely and rapid action on changes is required to maintain project cost control and assure efficient work flow. It is, therefore, established that change orders are to be issued no later than thirty (30) days after an ANG approval of a deviation notice or after ANG is first notified of a desired change.

CHANGE ORDER PROCEDURE

3.0 RESTRICTIONS

No change may be incorporated into the project prior to receiving ANG approval unless ANG has instructed Lummus/Kaiser in writing to proceed with the change prior to preparation of formal change documents and has agreed to accept cost and schedule budget impact. It is important to emphasize that engineering work will not proceed toward implementing a change unless ANG has approved a change order or otherwise directed Lummus/Kaiser to proceed in writing. An ANG approval of a Deviation Notice is considered sufficient and necessary direction for engineering work to proceed.

CHANGE ORDER PROCEDURE

4.0 POLICY

- 4.1 The Change Order Summary form, Exhibit C, approved by both Lummus/Kaiser and GPGA representatives is the document which authorizes Lummus/Kaiser to proceed with the described work. This document serves as the official notification to both Lummus/Kaiser and ANG that the work is to proceed and adjustments are to be incorporated into existing budget and schedule. The only exception to the policy is that described in Items 3.0 under the title heading Restrictions.
- 4.2 Changes occurring whose values are estimated to be $\pm$ \$10,000 or less will not be processed through the change order procedure.
- 4.3 Within Contractor organizations the following approvals of the Cost Estimate portion of the contract change orders are required:

All	Executive Project Director
All	Deputy Project Director - Controls
All	Project Controls Manager - Cost

Lummus Changes

Lummus Project Director
Lummus Project Engr.
Manager
Lummus Cost Engineer/PCM

Kaiser Changes

Kaiser Deputy Project Director
Kaiser Project Engineering
Manager
Kaiser Chief Project Estimator/PCM

CHANGE ORDER PROCEDURE

NORMAL PROCEDURE

5.1 For a guide to the sequence of events and information flow required for the preparation and approval or rejection of the change order, see Exhibit "B" "Flow Chart".

5.2 When a change is requested by ANG, Lummus or Kaiser and the scope has been defined, the Contractor will prepare the change order form, Exhibit C, and issue it to Estimating for the purpose of calculating the manhours required to process the proposed change through Engineering. In the event that more than 100 manhours are required, the Lummus/Kaiser Project Control Managers will notify ANG's Cost Engineering Manager of the estimated home office manhours for preparing this proposed change. ANG's written authorization is required within 3 days of verbal notification for all change orders requiring over 100 manhours.

For change orders requiring 100 manhours or less for processing, Lummus/Kaiser will proceed without prior ANG approval. The cost to prepare all changes will be incorporated in the budget.

CHANGE ORDER PROCEDURE

- 5.3 Change orders will be numbered consecutively with a numeric code beginning with 80-1. The Project Controls Manager-Cost, will maintain an up-to-date Change Order Control Register, (see Exhibit D) and submit a monthly summary report to ANG's Director and Cost Engineering Manager showing the complete status of all proposed and approved changes current to the end of the past month. This report is to be included in the Project's Monthly Cost Report together with a report of major changes. Change Orders will be reviewed in detail with the ANG Manager Cost/Schedule Engineering or his designee within five (5) days after initial issue.
- 5.4 All changes will be measured against the January 1, 1980 Control Estimate.
- 5.5 All change orders will clearly define the areas of work, items of equipment and identifying codes of accounts that are affected. Back-up sheets and documents will be attached for support as needed. All change orders will be priced according to the unit rates for direct costs in the Control Estimate. Construction Expense will be priced at \$5.00 per direct labor manhour when justified by the scope of the change. There will be no cost addition for Construction Camp or Overtime and Location Bonus unless justified by the scope of the change.

CHANGE ORDER PROCEDURE

- 5.6 Changes may be initiated by ANG, Lummus or Kaiser. ANG initiated changes will be forwarded in writing to the Executive Project Director. Lummus and Kaiser initiated changes will be forwarded to the respective Project/Deputy Project Director.
- 5.7 The Lummus/Kaiser Project/Deputy Project Directors are responsible for controlling preparation and internal circulation of the change order. They will insure and coordinate the proper input from engineering, estimating and scheduling.
- 5.8 Engineering, through the Project Engineering Manager, is responsible for describing the change, stating the reason for the change, preparing and/or listing the back-up documentation for the change.
- 5.9 Estimating, through the Lead Project Estimator, Lummus and Chief Project Estimator, Kaiser is responsible for developing the total installed cost difference based on the scope definition presented by engineering. The Lead/Chief Project Estimators will forward the change, which will describe the estimated manhours required, to the Lead/Chief Project Schedulers.

CHANGE ORDER PROCEDURE

- 5.10 Scheduling, through the Lead/Chief Project Scheduler, is responsible for developing the time impact on the work plan and the effect on the Project completion date. When completed, the Lead/Chief Project Scheduler will forward the change to the Lead/Chief Project Estimators. Periodically Scheduling will review a series of change orders to determine the overall impact on the schedule. If a schedule change is required as a result of the review, a change order will be initiated.
- 5.11 The Lummus/Kaiser Project/Deputy Project Directors will keep continuous records for their organization as to title and status of the change orders being processed through their respective Project Control Managers. By the 20th of each month, they will forward this information to the Project Control Manager-Costs.
- 5.12 The Project Control Manager-Costs will be responsible for producing Exhibit D and Maintaining an overall index (see 5.3).
- 5.13 Estimating will be responsible for providing Order of Magnitude Costs for all changes which have not reached a detailed estimate phase. These Order of Magnitude estimates will be used in the Cost Trending Program. These trends will not replace or serve as a change order nor will they serve as a basis for approval or rejection of a change.
- 5.14 Within the Lummus/Kaiser organizations the respective Project Directors have the responsibility for controlling change orders. All project personnel are required to provide assistance to Project Directors by notifying

CHANGE ORDER PROCEDURE

them if a change is suspected. Weekly Change Order/ Deviation Notice meetings will be held separately by the Lummus and Kaiser Project Task Forces. The purpose of these meetings will be to identify potential change orders and deviations, and to provide for their issue as quickly as possible.

- 5.15 Lummus/Kaiser will review change orders initially with ANG's Manager Cost/Schedule Engineering or his designee. Upon agreement of scope and estimate detail, change orders are then presented to ANG at the Monthly Project Cost Meeting for final review and approval.

CHANGE ORDER PROCEDURE

6.0 FEE CALCULATION

Fee will be calculated in accordance with ANG/Lummus/Kaiser Contract, Article 4.3.4 which states as follows:

"The fee specified in Section 4.3 hereof shall also be adjusted by adding thereto or deducting therefrom an amount equal to two and one-half percent (2½%) of the estimated total cost of any Change in Work as defined in Article 9 hereof in which each specific change represents an estimated cost of twenty million dollars (\$20,000,000.00) or more. Such amount shall be deducted from said fee if estimated cost of Change in Work is a decrease in the total cost of Work, and it shall be added to said fee if the estimated cost of such Change is an increase in the total cost of the work."

The Lummus Company
A Subsidiary of
Combustion Engineering Inc
1515 Broad Street
Bloomfield New Jersey 07003

Telex 201-893-1515
Teletype 136196

Exhibit "A"

LUMMUS

DISTRIBUTION

	<u>Lummus</u>	<u>ANG</u>
Date: _____	R.H. Tauskey (LTR)	W.A. Cole (1)
Letter No. LA- _____	J.C. Parker (LTR)	T.E. Vanderheiden (1)
	E.K. Hauser (LTR)	J.L. Davidson (original)
	K. Torster (1)	J. Wang(1)Lummus C.O.
	E.L. Kraft (1)	J. Jimerson(1)Kaiser C.C
	J.M. Leonard (1)	
	J.F. Hubert (1)	<u>Peoples Gas</u>
	H. B. Berman (LTR)	A.W. Hilley (1)
	<u>Kaiser</u>	
	W.R. Deeths (1)	
Mr. D.L. Imler, Director	C.M. Mandell (1)	
ANG Coal Gasification Company		
One Woodward Avenue		
Detroit, Michigan 48226		

Subject: Lummus Job 7102/Kaiser Job 7381
Change Order _____ Description _____

Dear Darell:

Attached is a copy of the subject Change Order. Please note the schedule, cost and guarantee effects.

If you wish Lummus to proceed with this change, please sign and return. Thank you.

THE LUMMUS COMPANY

R.H. Tauskey
Vice President
Executive Project Director

By: J.C. Parker
Deputy Project Director - Controls

CHANGE ORDER SUMMARY

CHANGE ORDER NO. _____ REV. _____ L/K NO. _____

ANG COAL GASIFICATION
Initiated by:Lummus Project No. 7102
Kaiser Project No. 7381DESCRIPTION OF CHANGE

AREA NO. _____

TYPE _____

APPROX. _____

DETAILED _____

REASON FOR CHANGEDOCUMENTS REVIEWED OR ATTACHEDCOST IMPACT SUMMARY (Indicate increase with + decrease (-))

MS

	Reimb.	Target	Total
Material			
Labor			
Subcontract			
Equipment Usage			
Home Office Cost			
Construction Expense			
Freight			
Unallocated Cost			
Escalation			
Total Installed Cost (without Fee)			
Fee			
Total (with Fee)			
Cost to Prepare Change (Incl. in Total Installed Cost)			

TIME IMPACT SUMMARY

S/C MHRS

DIRECT

MHRS

Field Craft
Field Supervisory Staff
Home Office
Time to Prepare Change
Completion Date Change

DAYS

GUARANTEE IMPACT:SIGNATURES

ANG

☐

Approved

☐

Rejected

Vice President _____ Date _____

Director _____ Date _____

Mgr. Project Controls _____ Date _____

Mgr. Plant Des. _____ Date _____

Mgr. - Process _____ Date _____

GREAT PLAINS GASIFICATION ASSOC.

_____ Date _____

_____ Date _____

_____ Date _____

_____ Date _____

CONTRACTOR

Project Director _____ Date _____

Project Controls Dir. _____ Date _____

Mgr. of Project Costs _____ Date _____

LUMMUS

Project Manager _____ Date _____

Project Engr. Mgr. _____ Date _____

Proj. Cost Engr./PCM _____ Date _____

KAISER

Project Manager _____ Date _____

Project Engr. Mgr. _____ Date _____

Proj. Cost Engr./PCM _____ Date _____

137 MM SCFD SNG PLANT

EXHIBIT D

PROJECT CHANGE ORDER CONTROL REGISTER

DATE SENT 7/10/77
BY RECEIVED & FORWARDED

[illegible]