4.0 MANAGEMENT PLAN

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4.0 MANAGEMENT PLAN

4.1 INTRODUCTION

The successful design, construction, and operation of the synfuels project will require a management plan which addresses each phase of the project in detail so that efficient utilization of resources can be obtained while adhering to the project schedule and budget. The plan presented in this study is an overview of a more detailed plan that will be developed as the project progresses. Each phase of the project is discussed starting with the overall project description which describes the project philosophy. In addition, the plan identifies a proposed partnership organization and aspects of owner-contractor interface; and provides an overview of the engineering, procurement, and construction organization and key activities; and an overview of startup and operation.

Because the project spans more than six years from release of preliminary engineering to commercial startup, developing an organization and project management system that is flexible is necessary to ensure the project's success. This plan reflects systems that have proven successful on projects of similar magnitude. However, although this plan has been formulated from the best information now available, there will be further modifications to the organization and project systems. Also, the organization and systems will vary depending on the phase of the project.

4.2 SUMMARY

A preliminary management plan for implementing the synfuels project has been prepared which describes the philosophy and general approach to overall project management, engineering, materials management, construction, and operations of the facility. Primary emphasis is given to minimizing project risk at each point of development. The plan is based on results of a similar feasibility study previously completed. However,

4.2 (Continued)

because of the projects magnitude and lengthy construction period, financial risk is such that government participation is mandatory for the project to proceed.

An application to the U.S. Synthetic Fuels Corporation (SFC) for loan guarantees and/or price supports is part of the plan. The preliminary engineering phase concentrates on four areas - environmental baseline monitoring, large scale coal testing, preliminary engineering to support the application for all major permits and the preparation of a financial plan including the arranging of financing for the initial phases of the project. Less than 2 percent of the estimated project costs will have been expended at the completion of this phase ($35 million).

The second phase is the detailed engineering and is triggered by the obtaining of the major permits. During this phase detailed engineering and the initial phases of procurement are performed. The primary objective is to obtain a detailed cost of the project and complete the financial arrangements prior to the procurement of any equipment. A final decision on proceeding with the project is made during the last quarter of 1985 at which time 30 percent of the engineering will have been completed and expenditures will be approximately 4.5 percent of total plant costs ($90 million).

The final phase is procurement and construction which is scheduled over a three year period with operations starting in 1989.

The plan is based on the project being directed by an Owners' Management Committee with Pacific Coal Gasification Company the manager. The engineering, procurement, and construction would be awarded to a prime contractor who would perform the overall engineering materials management and construction. A proposed organization and general execution plan are included.

4.2 (Continued)

Operations would commence in 1989 under the management of Pacific. A preliminary operations organization is presented.

4.3 SCOPE OF WORK

The management plan is based on the synfuels facility as defined in the Crow Synfuels Project Feasibility Study. An overall project Master Schedule is developed which defines the activities to be performed during each year of the project. The phases listed include: (1) the feasibility study, (2) preliminary engineering, (3) detailed engineering, (4) material management (procurement) and construction, and (5) startup. Management review takes place after detailed engineering.

After the master schedule is defined, the next activity is to determine the necessary project organization. The Owners' proposed organization along with their major responsibilities is presented. This is followed by an overview of the contractor's organization proposed for the engineering, material management and construction. Tasks are described for each discipline. Finally, the startup and operations of the plant are described including a preliminary organization and operating philosophy.

4.4 WORK PLAN

4.4.1 Project Overview

The synfuels project is a coal-to-SNG gasification plant in which subbituminous coal on the Crow Reservation is gasified in a Lurgi process producing pipeline quality gas (SNG) for marketing in California. Participants in the project include the Crow Indians who own the coal, land and water resources and affiliates (Pacific) who have the marketing network for the SNG product. Pacific has license agreements with Lurgi and SASOL which provides the project with the needed gasification

4.4.1 (Continued)

technology experience in engineering and operations. Pacific is the proposed operator of the plant and related facilities after construction. Additional partners still to be identified will be required to make the project feasible. Potential participants include a power company who would market the export power, coal companies interested in marketing their coal resource and companies interested in obtaining coal conversion technology know-how experience along with making a financial investment.

Work performed to date is defined in the feasibility study to which this management plan is included. The feasibility study was funded by a Department of Energy Grant. If the project were to continue it will be necessary that financial support in the form of loan guarantees and price supports be obtained from the U.S. Government. The work plan presented summarizes this in a later section. Financing options for a project of this magnitude are discussed in more detail in Volume III, "Financial and Legal Analysis", of the feasibility study. Also included in the report is a legal assessment of the project including a discussion of jurisdictional issues. This work was performed by the legal counsels for the Crow Indians and for Pacific. The financial analysis was performed by Lehman Brothers, Kuhn, Loeb, Inc.

Preliminary engineering, design, and cost estimating of the project were performed by Fluor Engineers and Constructors, Inc. The proposed facility is defined in Volume II, "Engineering and Cost Analysis" of this study. The work plan for the engineering, material management and construction reflect their proposed organization, management systems and overall management for the project.

Environmental and socioeconomic activities for the feasibility study were performed by the Council of Energy Resource Tribes (CERT) and detailed tasks and scheduling projected for the Crow Synfuels Project are presented in Volume IV, "Environmental, Health and Safety. Socioeconomic"

4.4.1 (Continued)L

of this study. Special studies are presented in Volume V of the feasibility study and include the marketing and transportation of products and byproducts performed by Pacific.

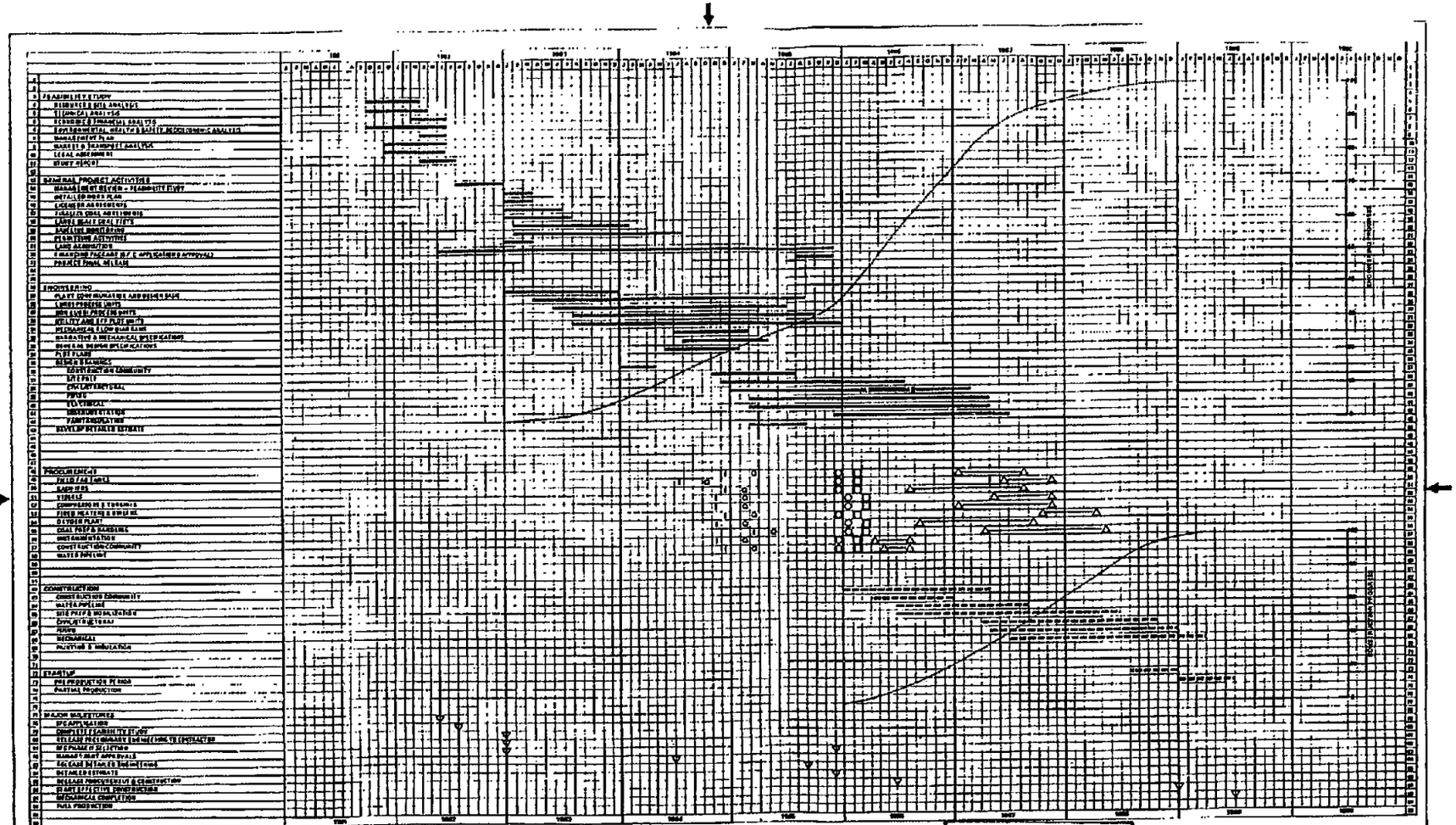
4.4.2 Project Phases

4.4.2.1 Feasibility Study

The project schedule defining the various phases of the project is presented in drawing 835704-00-001. It assumes approximately an 8-year period commencing with the feasibility study in mid-1981. The feasibility report is issued August, 1982. This is followed by a management review period during which certain key activities take place. Initially, the economics of the project are reviewed and the various interested parties are identified. The next activity is the formation of the partnership organization (Owners). This is described in detail in Section 4.4.3. The Owners first major activity is to prepare an application for loan guarantee and price supports to the Synthetic Fuels Corporation (SFC). Finally, contractual arrangements with the prime engineering, materials management and construction contractor are initiated.

4.4.2.2 Preliminary Engineering

The project engineering is assumed initiated January 1, 1983 with the release of the preliminary engineering contract. The primary objective of this phase of work will be to perform sufficient engineering to support the permitting activities. A one year environmental baseline monitoring program will be initiated at the start of this period on the proposed plant site. Land options are secured to ensure that the data collected are on the selected plant sites.



NOTES:

1. IT IS ASSUMED THAT NO COMMITMENTS TO VENDORS WILL BE MADE UNTIL PROJECT FINANCING HAS BEEN OBTAINED AND THAT SOME VENDOR QUOTES WILL NEED TO BE RENEGOTIATED.
2. THE ENQUIRY, RECEIVED QUOTATION, PURCHASE ORDER, AND VENDOR DRAWING SUBMISSIONS (△,○,□,□) REFLECT THE FIRST INFORMATION ISSUED OR RECEIVED.

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CONTRACT ENGRS

P.K. Beck
K.H. Beck

CROW TRIBE OF INDIANS
CROW INDIAN RESERVATION, MONTANA

SYNFUELS FEASIBILITY STUDY
PROJECT DIRECTIVE SCHEDULE
SITE #1 BNG 40% FINES (BASE CASE)

835704-00-001 | 1

4.4.2.2 (Continued)

To support the permitting activity, preliminary engineering of the process and utility units is performed. The design bases are the results of a large scale coal test performed at Sasol in South Africa on the selected coal. Negotiations progress to where a coal supply agreement for the life of the project is finalized. Licensor agreements with Lurgi and Sasol are completed prior to the coal test so that data from the test are given to Lurgi and their engineering of the Lurgi process units for this project can commence. Data from Lurgi and the coal test are the basis for the contractor's design of the non-Lurgi units, the utility units and offsites. Engineering proceeds to the point necessary to provide support for the permitting phase. Permits critical to proceeding to the next phase include the following:

(1) Approval for Obstruction of Air Space

(2) Prevention of Significant Deterioration (PSD) of Air Quality

(3) Air Quality Control Permit to Construct

(4) Air Quality Control Permit to Operate

(5) Permit to Construct Waste Supply and Sewage Treatment Systems

(6) National Pollutant Discharge Elimination System (NPDES) Permit

(7) Permit for Raw Water Reservoir and Other Water Reservoirs

(8) Solid Waste Disposal Permit

(9) Spill Prevention Control and Countermeasure Plan (SPCC)

(10) Local Permits as Required

4.4.2.2 (Continued)

The financing of the project is contingent on receiving favorable response from the SFC with regard to loan guarantee and/or price supports. Engineering is approximately 12 percent complete and capital expenditures approximately 1.8 percent of total project costs ($35 million) at the completion of this phase.

4.4.2.3 Detailed Engineering

Having obtained the necessary permits, release of detailed engineering takes place. During this phase the process, mechanical, utility, and offsite system flow diagrams are completed and issued "approved for construction". Narrative specifications, data sheets, plot plans, utility summaries, line sizing, electrical diagrams, motor lists and civil/structural design drawings are some of the major activities performed during this period. The objective is to prepare the necessary engineering to support the procurement activities during this phase. Requests for quotation (RFQ) for all major equipment are issued. Also preliminary bulk material takeoffs are made. All of the cost information is used to support a cost estimate of the project which is issued in the third quarter of 1985. Engineering is approximately 30 percent completed and capital expenditures are approximately 4.5 percent of total project costs at this time ($90 million).

4.4.2.4 Management Review

After the detailed engineering, the management reviews take place. The detailed cost estimate is evaluated to determine the project economics prior to procuring any equipment. The cost estimate reflects quoted equipment costs, construction plans are complete, all required permits are issued and outside impacts have been assessed so that the project costs are well defined. Assuming the economics of the project are favorable and project

4.4.2.4 (Continued)

financing is obtained, purchase orders are released and the final phase of the project commences.

4.4.2.5 Procurement and Construction

At the release of the project for procurement and construction, the home office staff increases reaching a maximum of 700 personnel in the third quarter of 1986.

The first purchase orders to be released are for long delivery items including the gasifiers, large compressors, boilers, oxygen plant, construction camp and pipe for the water pipeline. Worldwide procurement procedures will be employed for major items. The most critical items are the water pipeline and a construction camp, if needed. Final determination of a camp requirement will be based on site location and the ability to attract a sufficient number of construction personnel to the area. The water pipeline is operational by the fall of 1986 so water can be supplied for the construction. The camp (if required) is operational by mid-1986 and expands to its ultimate size by the spring of 1987.

Construction takes place over a three year period with mechanical completion scheduled for December 31, 1988 and the final cleanup and project closeout by the spring of 1989. Construction is scheduled to continue through the winter with activities limited to work not adversely affected by the weather conditions typical of Montana. The construction man-hour estimate is 17.5 million man-hours and the workforce peaks at approximately 4000 in the fourth quarter of 1987.

4.4.2.6 Startup

Plant startup begins with the starting of utility units including the boilers. Each of the units is commissioned according to the startup plan

4.4.2.6 (Continued)

eventually leading to the startup of the gas production units. First gas production which meets pipeline specifications is scheduled for January 1, 1989 for input into the pipeline system. The startup proceeds with an increase in production reaching full production by mid-1989.

4.4.3 Owners Organization and Responsibilities

The Crow Tribe of Indians has at its disposal a highly qualified team to carry this project to completion. Key members of this team will be Pacific Coal Gasification Co. (PCG) and Fluor Engineers and Constructors, Inc. (Fluor). These two companies acting in concert, and using special outside assistance where necessary, will act on behalf of the Crow Tribe under a Management Committee to engineer, design, procure materials, and construct the synfuels facility.

The Management Committee will consist of the equity owners including an official from the Crow Development Corporation, an official from PCG, and one from each of the other equity owners.

PCG is a subsidiary of Pacific Lighting Corporation (Pacific) of Los Angeles, California. Pacific is the parent company of Southern California Gas Company, the nation's largest natural gas distribution system with over 3.8 million customers plus supplying gas at wholesale to San Diego Gas and Electric Company and the City of Long Beach. Other subsidiaries are also engaged in oil and gas exploration and development, real estate development, and operation of central energy generation and distribution plants.

PCG has available a core group of people experienced in planning, engineering and managing synfuels development. On an as-needed basis, PCG can also draw upon Pacific for advice, assistance and support in legal, financial, public affairs, engineering, materials procurement, regulatory

4.4.3 (Continued)

and governmental affairs, administrative, industrial relations, environmental affairs, construction inspection, and manpower development and training areas.

PCG currently has in force previously executed license, engineering and guarantee agreements with Lurgi Mineraloeltechnik of West Germany, and a technical assistance agreement with South African Coal, Oil and Gas Corporation (Sasol). These two organizations are ready to provide process and plant technical assistance to PCG whenever requested.

4.4.3.1 Management Philosophy

The design, construction, and operation of the synfuels facility (excluding the pipeline and the mine) will be undertaken for the equity owners by PCG working with various contractors who will be selected as the project proceeds.

A Project Management Plan will be prepared in which specific policies, practices and procedures will be outlined for use in directing and controlling all of the activities necessary to plan, design, engineer, procure materials, and equipment, and construct the synfuels facility. In addition, a Job Procedure Manual will be prepared and implemented which will provide the administrative base for an orderly systematic manner of project control.

It is the intent of PCG to maintain the staffing levels necessary to achieve effective project control. A comprehensive organizational planning effort will be undertaken to establish specific organizational responsibilities, relationships, and general staffing requirements for the engineering, construction, and operation of the synfuels plant. PCG will maintain an organization that will be flexible and adaptable to the various phases and needs of the project. The project phases will include financing, and

4.4.3.1 (Continued)

permitting, design, engineering, and procurement, construction and startup operations. As the emphasis moves forward from one phase to the next, the organization will be expanded as needed to manage and control the project.

PCG will utilize the services of qualified contractors to perform the project design, engineering, procurement and construction activities. Qualified contractors and consultants will also be used to perform necessary environmental, health, safety, and socioeconomic studies. Continued use of specialized technical consultants is also planned, as necessary, to monitor and review the work performed by the engineering and construction contractors.

Good communications are vital to the success of every project. Public acceptance both on and off the reservation will be increasingly necessary in the next project phase at which time the applications will be made for the necessary project permits and approvals. PCG will further develop an action plan to communicate information concerning the synfuels project. Inherent in this plan will be an overall strategy to recognize the need to provide key decision makers with as much information, negative as well as positive, to justify support or minimize opposition to the synfuels plant.

To assure that all personnel connected with the project receive all of the communications necessary to perform their assigned task, procedures will be established to show the requirements and distribution of all project documents. All communications will be prepared, identified, and distributed according to the procedures set down in the appropriate Job Procedure Manual.

PCG will establish an information and documentation center to provide a centralized location for recording and filing of all project documents as the project advances through the various project phases.

4.4.3.1 (Continued)

Information which is to be considered confidential for this project will be described in the various contracts and licensor agreements. The detailed procedures for handling confidential information, documents, knowledge, or facility exposure will be described in the appropriate Job Procedure Manual. Confidential documents will be recorded and distribution controlled so only people who need the classified information will receive it.

4.4.3.2 Organization Chart

The proposed owners organization for the design and construction phase of the project is shown in Figure 4.4-1. Duties and responsibilities of the various areas of responsibility follow.

4.4.3.3 Duties and Responsibilities

This section describes PCG plans to direct and control the overall project effort. Project management involves controlling the quality, schedule and costs of the project while meeting basic project objectives and requirements through effective planning, leadership, and control. PCG will accomplish this through continuous planning, directing, and controlling of the contract work. Actual or potential problems will be dealt with promptly at the appropriate management level as they become known. This approach will be followed whether the work is related to design, engineering, procurement, or field construction.

The project manager (PCG) reporting directly to the management committee will be responsible for all aspects of the project. The manager will have reported to him a project management staff made up of personnel from affiliated companies to PCG and the contractor's organization (see Figure 4.4-2). PCG will provide a task force consisting of operating managers, supervisors, and technical service engineers to monitor the design of the plant from the operations viewpoint and coordinate

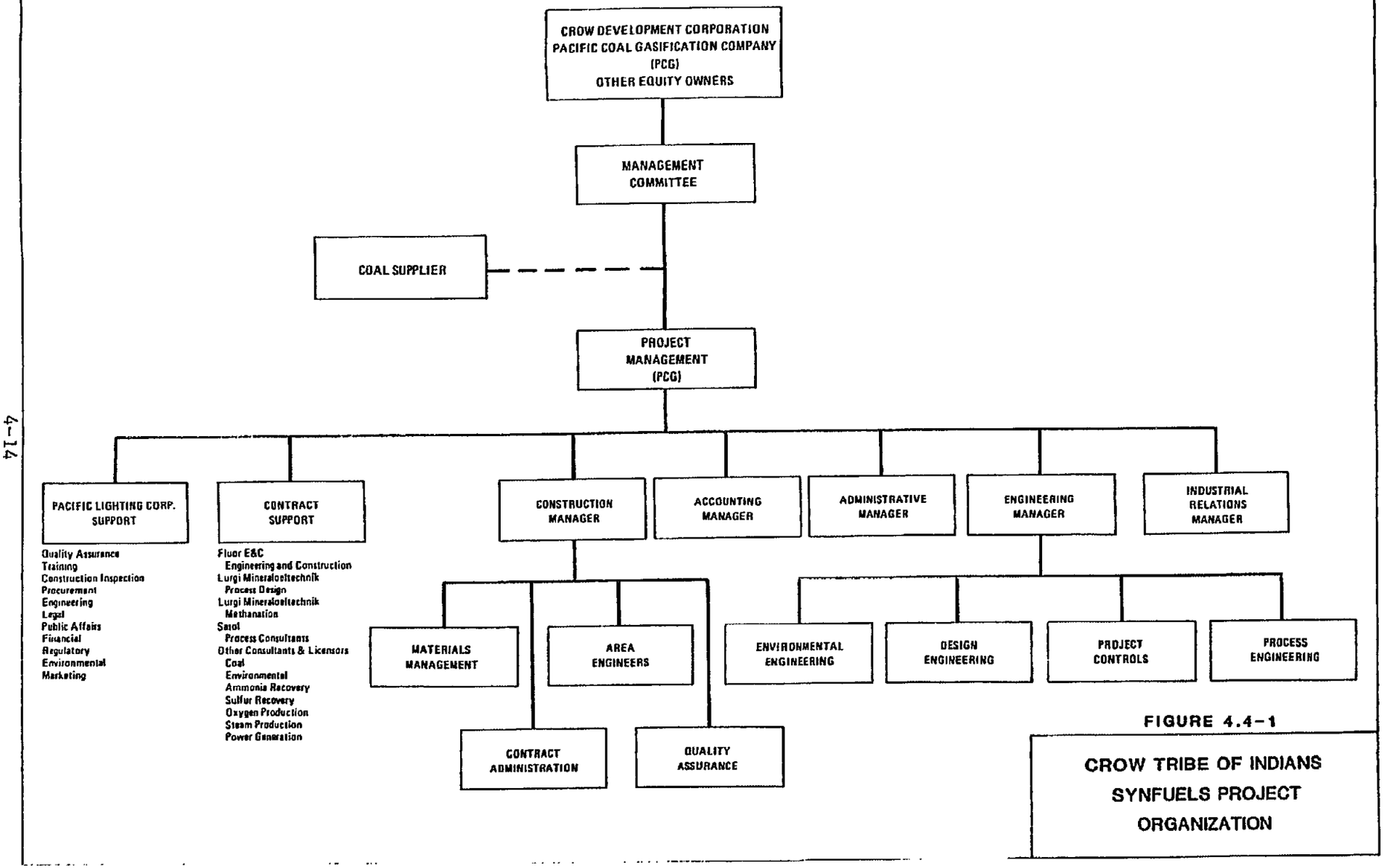

FIGURE 4.4-1

CROW TRIBE OF INDIANS
SYNFUELS PROJECT
ORGANIZATION

4.4.3.3 (Continued)

development of a detailed unit-by-unit startup plan with Fluor. The master construction schedule will be checked against the startup plan to ensure proper assignment of priorities. As a part of the overall startup plan, operators will be hired and trained in advance of startup. The nucleus of the maintenance force will also be formed to review maintenance aspects of the plant design and to ensure there are adequate spares and trained maintenance labor at startup.

Design and Engineering

PCG's Engineering Task Force will have direct functional responsibility for the preparation of designs, engineering, and initial procurement activities performed by the engineering contractors.

Offices for a staff of PCG engineers will be maintained at Fluor and at other appropriate engineering contractor's facilities to facilitate communications with the contractor's management and supervisory personnel and consultants during the monitoring, review, and approval of the technical aspects of the design and engineering work being performed.

Principal control objectives will be the preparation of plans, budgets, schedules, and facility and component designs to meet PCG's operating requirements in a safe, reliable and cost effective manner. To achieve this, PCG will specify as appropriate, the facility's basic operating, safety, and reliability objectives and requirements to be met by those working on the project. PCG will continuously monitor, review, and approve the step-by-step development of specific plans and designs to meet these requirements. PCG's resident engineering staff will have the day-to-day responsibility of assuring that project requirements are met and for referring situations requiring policy direction or decisions to the Management Committee.

4.4.3.3 (Continued)

Design specifications will be developed by the engineering contractor's complying to the applicable codes and standards in addition to any of the owners special requirements. These design specifications will be, in turn, reviewed and approved by PCG.

Plot plans, process flow diagrams, mechanical flow diagrams, design drawings, mechanical specifications and vendor drawings will be reviewed by PCG's engineering staff, and consultants as necessary, to verify that the owners requirements have been met and that the design and equipment, etc., conform to applicable codes and standards and approved design specifications.

Procurement and Subcontracts

All material, equipment, and services required for the synfuels facility will be purchased or supplied from sources that provide the most economical cost, taking into consideration quality, purchase and operating costs, delivery, reliability, experience, and service capabilities. Purchases will be made only from financially sound, reputable firms capable of satisfying the project needs.

Procedures and practices will be established as appropriate by PCG to assure that purchased items and services, whether purchased directly, or through subcontractors, conform to the procurement package requirements. These procedures will include provisions, as appropriate, for source evaluation and selection; review of procurement requirements; Safety and Quality Assurance and/or Engineering Department review of vendor documents; appropriate evidence of quality furnished by the vendor; audit, surveillance or inspection at the source; and acceptance testing or other examination of items upon delivery. Measures for evaluation of procurement sources will include the use of historical safety and quality performance data, source surveys, review and approval of the vendor's

4.4.3.3 (Continued)

Quality Assurance Program, or source qualification programs where appropriate.

The primary procurement function will be managed by the project prime contractor as agent for the owners. This function has four major activities: purchasing, subcontract administration, expediting, and traffic. Detailed plans and procedures for performing each function will be prepared by the prime contractor and approved by PCG.

PCG will maintain control of the procurement and subcontracting activities through review and approval of:

(1) Bidder's List

(2) Bid Summaries of all Engineered Equipment and Construction Proposals

(3) Major Purchases

(4) Major Subcontracts

PCG will participate in the preparation, and have final approval, of the job bidder and vendor lists for material and equipment purchases and subcontractors. PCG will have the right to participate in any pre-award conferences with selected from vendors or subcontractors. Vendors or subcontractors will only be selected from the approved list. Any deviations from this procedure will require approval by PCG.

As an equity participant and the operator of the synfuels facility, with the ultimate responsibility for safety and reliability, PCG will develop and implement a Safety and Quality Assurance Program to assure the integrity and safety of the completed facilities. The Safety and Quality Assurance

staff will have functional responsibility for developing, documenting, and administering the implementation of this program. This Task Force will have the authority and organizational freedom to identify potential safety or quality problems; to initiate, recommend, or provide solutions; and to verify implementation of the solution. This work will be performed by its staff, supplemented as required by outside consultants.

Cost Effectiveness

Effective cost management begins at contract signing and continues through engineering, construction, and the operation planning phases where the potential for cost reductions are the greatest. Such cost effectiveness is achieved by planning and engineering the facility for optimum construction and operating costs in the following manner:

(1) Process Review

The projects process designs will be reviewed by PCG's staff and by independent consultants for ways to optimize the process and equipment requirements while maintaining compliance to design requirements and considering cost effectiveness from the construction, operating, and reliability standpoints.

(2) Flow Diagrams

Flow diagrams will be reviewed by PCG's staff and by independent consultants for ways to minimize standby equipment, optimize equipment and pipe sizes, etc., yet maintain safety and reliability objectives.

4.4.3.3 (Continued)

(3) Plot Plans

Plot plans will be reviewed with the objective of optimizing locations and position of equipment with a view toward minimizing earth moving, shortening pipe runs, etc.

(4) Specifications

Specifications will be reviewed in order to identify conditions that are in excess of design requirements without compromising safety, reliability, quality, or operational requirements.

(5) Project Development Study

As the flow diagrams, design drawings and scale models progress, alternative ways of proceeding will be evaluated as necessary. In order to determine the most cost effective alternative, special feasibility studies of alternatives will be made by the engineering contractors. These will, in turn, be reviewed by PCG for a selection of the best alternative.

(6) Drawings and Models

The design drawings and three dimensional scale models developed by the engineering contractors will be reviewed by PCG and, as required, by its consultants, to optimize the design for safety, adequacy, and cost effectiveness.

PCG's resident engineering staff has the day-to-day responsibility of assuring that the project is cost effective by monitoring and reviewing the design for construction planning.

4.4.3.3 (Continued)

Cost Control

Effective cost control includes the following:

(1) Establishment of a project control budget and work plan

(2) Providing a change-order control procedure to minimize cost increases

(3) Providing an accounting and financial reporting and forecasting system

(4) Prompt remedial action to deal with potential overruns

The project Control Budget encompasses the complete project work plan. This plan integrates schedule and cost information for all of the design, engineering, procurement, and construction activities.

During the initial phases of the project, budget estimates will be prepared using analytical estimating techniques. The initial budget estimates will be continuously updated to reflect the most current information regarding design and construction plans. As project planning and engineering progresses, material quantities and firm equipment pricing will become known allowing a Definitive Estimate to be prepared for ultimate budget control purposes. The engineering contractor (s), as part of their responsibility for preparation of the project work and budget plans, will prepare the Definitive Estimate (s) for PCG's review and approval. The approved Definitive Estimate (s) will be the basis for the project Control Budget.

4.4.3.3 (Continued)

Accounting and Financial Reporting, Forecasting and Control Systems

PCG will have a comprehensive accounting and financial management system. The objectives of the functions will be to:

(1) Develop policies, practices, and procedures that provide clear lines of communication and responsibility; appropriate limitations of authority; and such separation of authority necessary to guarantee checks and balances and reliable financial accountability.

(2) Develop an accounting and financial management system which secures the maximum benefit of systematic verifications; adequately protects owners resources; and provides that such resources are accounted for in compliance with the requirements of regulatory bodies and governmental agencies.

(3) Provide for the recording, reporting, and forecasting, and controlling of funds in accordance with sound financial management policies.

(4) Administer insurance programs, policies for the performance bonding of contractors, and other programs for safeguarding partnership assets.

Reporting and Measuring Progress

Routine contractor reports to PCG, relative to the status and progress of the project, will be combined by PCG to produce a single composite management report to be issued on a monthly and quarterly basis. Essentially, these reports will combine all pertinent and required information from Engineering, Home Officer, and Field Construction Reports to produce

an all-inclusive report for use by the management committee, the corporate partners, and others as necessary. All reports will have a uniform format and contain sufficient data to indicate the impact on the status of cost and schedule.

Licensors of Technology

There will be included in the overall synfuels plant design a number of licensed process units such as gasification, boiler flue gas clean-up, sulfur recovery, methanol production, ammonia recovery, and methanation. Agreements will be negotiated between PCG and each licensor setting down specific conditions as necessary such as royalties, engineering fees, process and engineering design, secrecy agreements, performance guarantee and test runs. These agreements will be the basis on which PCG will monitor and control any deviations from specifications and performance.

Environmental

One of PCG's objective is to construct and operate the synfuels plant with minimum impact on the surrounding environment. To accomplish this task, PCG will meet and/or better the required goals set by all regulatory agencies by the use of the best available control technology which is available at the time the design is finalized. The engineering contractor and the licensors will be instructed to design the synfuels plant with sufficient margin to meet all environmental regulations. To assure adherence to these principles, PCG will require the contractor to produce the necessary documentation, develop the quantities and disposition of pollutants in each effluent stream, report any proposed design changes which would alter the expected emission rates, and select emission control systems on the basis of the best available control technology.

4.4.3.3 (Continued)

Plant Security and First Air

Plant security is a critical area requiring careful planning and organization. Prior to the start of construction, a qualified person will be assigned the responsibility to develop and implement a plant site security program. The program will include the protection and security of personnel, material, tools, and equipment at the plant site.

The plant site facilities and offsite storage areas, used for in-transit storage and assembly of material and equipment, will be secured with all gates either guarded or locked. Gate passes requiring authorized signatures will be used to document all movement of material and personnel in and out of the plant. The entire jobsite will be reasonable well lighted with special attention to fence lines and areas where high value equipment and materials are stored.

It will be a project policy to assure that necessary first aid, ambulance and medical services are provided. A properly equipped first aid station with qualified medical personnel will be provided at the jobsite as one of the first facilities of the construction move-in operations. Because of the remote location of the plant site, this station will be staffed and equipped to cope with any type of emergency until such a time as the injured person can be moved to a hospital. Emergency medical services in Billings, Montana or Sheridan, Wyoming will be expected to provide ambulance service, emergency air service, first aid stations, doctors and nurses on a contract basis. The objective will be to utilize the available emergency medical services to the best advantage.

Fire Protection

The project's design philosophy will be to prevent potentially dangerous situations form occuring during plant operations; to provide the capability

4.4.3.3 (Continued)

of restoring the plant from an upset condition to normal operation with minimum danger to plant personnel, and with minimum loss of production; to provide for the confinement of unforeseen incidents to small localized areas; and to extinguish any fires quickly and automatically, with minimum danger to operating personnel and with minimum damage to the facilities. The protection systems and concepts which the contractor will be directed to design into the plant will equal or better those. The best thinking of nationally recognized leaders in the plant safety, fire protection, and loss prevention will be solicited, and their suggestions will be incorporated into the design wherever practicable.

During the construction phase, PCG intends to provide adequate fire protection during the incremental installation of all facilities. Fire protection equipment, systems, and personnel will be provided during all phases of construction, to suit the immediate requirements. Each portion of the plant fire protection system will be incorporated and placed in operation as portions become available. Such concepts will be incorporated into the early planning for all design and construction activities. During the operational phase, project management will monitor, direct and implement a comprehensive safety, loss prevention and fire protection plan.

Project's philosophy will be to train personnel to prevent and control incidents, to monitor operations and equipment, to detect any gradual creep towards unsafe conditions, to rectify such conditions as rapidly as possible, and to create a team approach to a total safety and loss prevention program.

Construction

PCG's Construction Task Force will have the functional responsibility for verifying the acceptability of material, equipment, fabricated items and field construction of the synfuels facility. Detail organizational plans and

4.4.3.3 (Continued)

staffing levels to monitor and control this effort will be developed by PCG to meet requirements of PCG's Safety and Quality Assurance Program, and cost and schedule management objectives. PCG will participate and monitor as appropriate the construction planning effort which begins during the design and engineering phase, and will approve the overall construction plan. During construction PCG will maintain its own field staff, supplemented as required by consultants and contractors, to assist in the monitoring and audit of the field construction effort.

Completion and Acceptance

Plant operators will be thoroughly trained and ready to assume the duties of startup and operation prior to facility completion and acceptance by the owners. Initial startup activities will begin even before the synfuels facility has been completed. Advisory personnel from the contractors and vendors will be present to assure orderly plant startup and to monitor initial operations.

After completion of startup and initial operations, appropriate tests will be conducted to demonstrate that the plant will process the design quantities and operate as planned. The construction management contract will specify when custody and control of the facility passes to the owners.

4.4.4 Contractor Organization

The experience of leading managing contractors for engineering and construction of complex process facilities has shown that the highest quality, least cost and shortest schedules can be achieved most reliably with competent personnel working within a Task Force organization tailored to the requirements of the specific project. This method of operation assembles management and the support people who will work on the project in one location under the leadership of the Contractors Project Director.

4.4.4 (Continued)

This approach to project execution is in itself a system for control. It provides the following:

(1) A single responsibility center for decisions

(2) Personnel with demonstrated capabilities to plan, execute, and follow through the designated tasks

(3) Continuity of leadership

(4) Effective communications

(5) Control of quality, schedule, and cost

(6) Identification and tracking of key project milestones

(7) Top management participation on a planned and regular basis

(8) Accountability

The organization is tailored to meet the requirements of the Crow Synfuels Project, closely interfacing with the Owners and providing for a step-by-step build-up to meet the requirements of each phase of work. The organization chart, Figure 4.4-2 shown on the following page, depicts the key members of the task force during the period of peak activity.

The Project Director is responsible and accountable to both the contractor and the Owners' management, and is actively engaged in the development of the project scope, project budget, the overall schedule, milestone dates, control techniques, project procedures, and organizing and staffing the project team. The Project Director provides direct management and

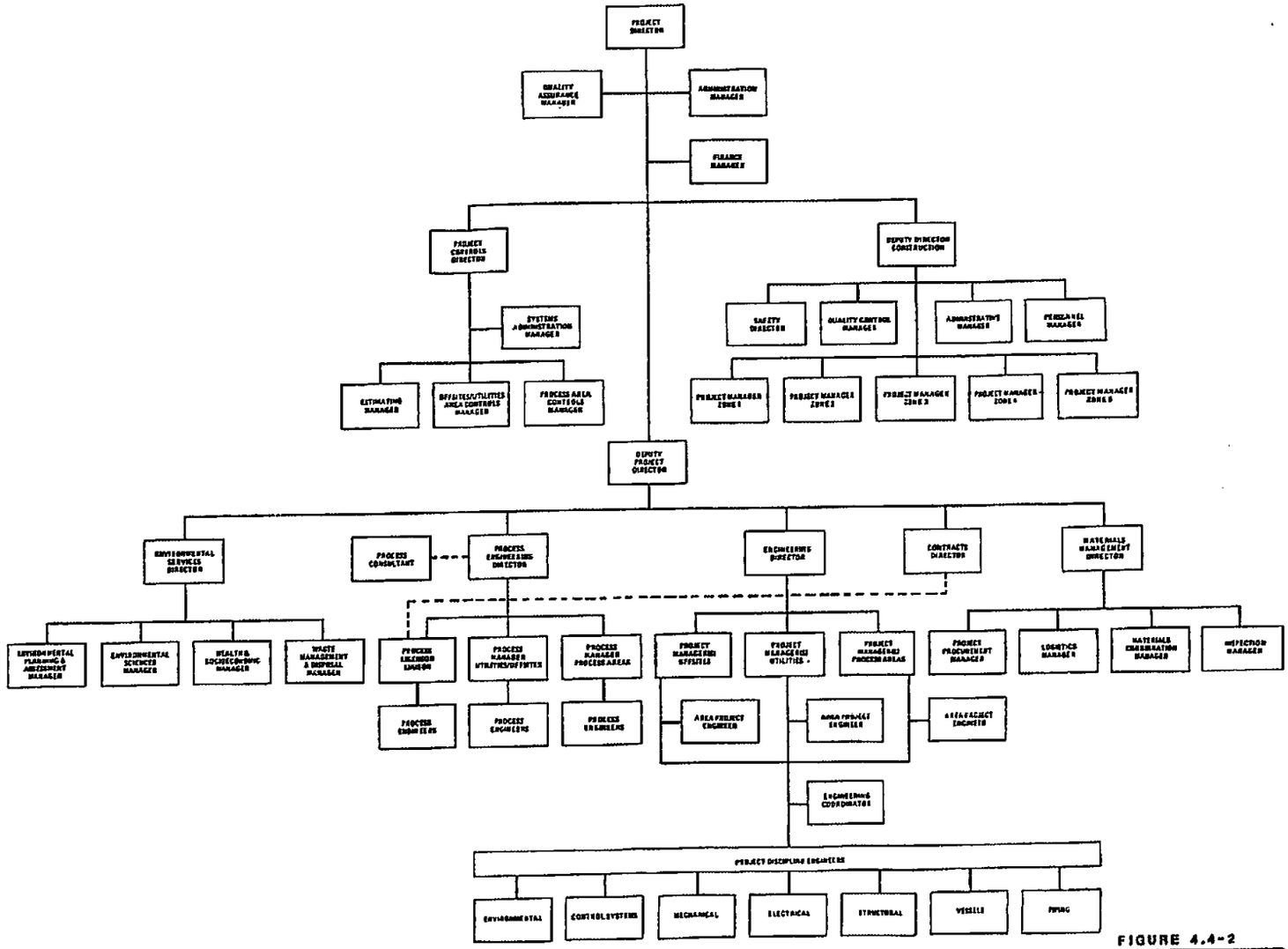

FIGURE 4.4-2

ENGINEERING, MATERIALS MANAGEMENT & CONSTRUCTION ORGANIZATION

leadership from the outset of the work through completion and startup of the project.

The Project Director's staff is organized to ensure that: the front-end design activities progress in a unified manner; good, solid designs are produced; purchased equipment and materials meet specifications; the plant is erected in accordance with drawings and specifications; and the intent and needs of the project are fully considered during the entire work execution period. His staff provides the tools, manpower and control documents to ensure that these functions are performed within the established schedule and budget, and provides the Owners with periodic project status reports.

Engineering forces are organized in a manner that promotes a common philosophy in plant designs. This is accomplished by placing all engineering activities under the responsibility of an Engineering Director. Common design criteria and standards are used by each participating entity insofar as practical. Experienced personnel are assigned from each major discipline to ensure that quality designs are produced.

The following discussions are intended to provide an understanding of duties and responsibilities of key project organization personnel envisioned for assignment and shown on the organization chart.

4.4.4.1 Project Director

The Project Director has overall responsibility to the Owners for project execution. He brings to the Project Task Force project execution guidance and senior management representation. He has full authority on behalf of the managing contractor for all matters related to the project.

4.4.4.1 (Continued)

He is responsible for execution of the project to obtain anticipated job quality, effective cost control, and compliance with job schedule and is accountable to the Owners and the managing contractor for the entire project.

4.4.4.2 Deputy Director Construction

The Deputy Director Construction directs and supervises the performance of all contractor operations at the site that are required to complete the work in accordance with the contract documents. He reports to the Project Director to assure proper coordination with the other project groups for timely flow of all information, material and equipment, and the obtaining of management approvals. He develops and implements an effective construction safety program, field cost and quality control programs, and obtains necessary home office services. He directs the construction planning and scheduling efforts in accordance with the master project schedule to ensure effective control and sequencing of construction and engineering activities and interfaces.

Prior to effective start of construction the Deputy Director Construction is in the engineering office with responsibility for the preconstruction activities.

In the field, the field administrative manager, the personnel manager, the safety director and the quality control manager, report to the Deputy Director Construction. Others, as required, reporting to Deputy Director Construction include a contracts manager, controls manager, materials manager, industrial relations manager, and field construction manager. The field instruction activities are not detailed in this volume.

4.4.4.3 Deputy Project Director

The Deputy Project Director assumes overall project responsibility in the Project Director's absence.

He is responsible to the Project Director for performance of all activities to meet the criteria of anticipated job quality, effective cost control, compliance with project schedule, and the uniformity and coordination of contracts and materials requirements.

He is responsible for the adherence to the engineering standards as adopted for this project.

He coordinates and directs the engineering, materials management and design personnel on the project.

Reporting to the Deputy Project Director are the Environmental Services Director, Process Engineering Director, Engineering Director, Contracts Director and Materials Management Director.

4.4.4.4 Project Controls Director

The Project Controls Director reports to the Project Director and is responsible for applying the systems that assist management in planning and control of the project. The principal product of these systems is timely and meaningful reports. The project system integrates planning, estimating, scheduling, trends, forecasting, analyses, and reporting to identify potential deviations from the project plan. This ensures that management can control the work by responding to deviations in a timely and effective manner.

4.4.4.4 (Continued)

The project planning and control system utilized on this project are drawn from an extensive array of manual and computerized systems that have been proven to accomplish the following objectives:

(1) Planning - Define what has to be done and when

(2) Reporting - Report what has been done and when

(3) Forecasting - Measure what remains to be done and when

(4) Analyzing - Know what is wrong early and why

(5) Controlling - Provide a basis for corrective action.

The project control systems selected are flexible enough to be used during the early stages of the project and later evolve smoothly into support for the detailed engineering, procurement, and construction.

4.4.4.5 Administrative Manager

The Administration Manager is responsible to the Project Director for the overall coordination and control of various support functions associated with the project. He is authorized to act on behalf of the Project Director in those matters relating to the coordination of these support functions.

4.4.4.6 Finance Manager

The Finance Manager, in conjunction with the Finance Department, is responsible for the following functions:

(1) The issuance and coordination of all forecasts of cash requirements, advance billings, and project invoices, as well as the adjustments of advance billings

(2) The coordination of the functions of all accounts payable departments as these functions are related to this project

(3) The preparation and review of a monthly project cost summary and other reports in conjunction with the project engineering and cost engineering departments.

4.4.4.7 Quality Assurance Manager

The Quality Assurance Manager reports to the Project Director on matters related tc project schedules and project coordination. Quality Assurance (QA) policy and standards are established independent of the project. QA policy and standards are different from those of Quality Control.

The project Quality Assurance Manager's principal responsibilities include:

(1) Preparing and maintaining the Project Quality Assurance Manual

(2) Establishing and documenting the QA program

(3) Providing orientation for project organization personnel

(4) Assisting with establishing the project Quality Records program

4.4.4.7 (Continued)

(5) Establishing a program of independent audits of all entities participating in the project. (QA audits are made of project management, engineering, procurement, vendor, subcontractor, and construction efforts to assure that the completed project conforms to the agreed upon standards).

4.4.4.8 Environmental Services Director

Environmental services for the project are performed under the direction of the Environmental Services Director who reports to the Deputy Project Director. He coordinates the environmental planning and assessment, environmental sciences, health and socioeconomics, and waste management and disposal services performed by the Contractor. He will identify the necessary monitoring programs needed to support the permitting process and is instrumental in identifying and selecting outside service contractors to support the environmental program. Reporting to him are the environmental planning and assessment manager, environmental sciences manager, the health and socioeconomics manager and the waste management, and disposal manager.

4.4.4.9 Process Engineering Director

The Process Engineering Director who reports to the Deputy Project Director is responsible for the final overall process design, and coordinates contractor's activities with all licensors.

Reporting to the Process Engineering Director are the process managers in charge of the process areas and utilities and offsites.

4.4.4.10 Engineering Director

The Engineering Director has overall responsibility for the completion of engineering and design of schedule and within the budget.

The project area managers and the engineering coordination manager report to the Engineering Director. The engineering director reports to the Deputy Project Director.

4.4.4.11 Contracts Director

Contracts administration in the project team is under the direction of the Contracts Director. Contracts engineers of appropriate skill levels are assigned as needed to meet project requirements.

The Contracts Director, reporting to the Deputy Project Director, is responsible for contract related matters, such as:

(1) Contract administration and control

(2) Communications with contractors and Owners' counterpart

(3) Supervision of contract engineers and clerical assistants as required

(4) Reporting on contract status.

4.4.4.12 Materials Management Director

The Materials Management Director reports directly to the Deputy Project Director and has responsibility for the planning, organizing and managing the procurement, inspection, logistics, and transportation form the source to the point of intended use.

4.4.4.12 (Continued)

Reporting to the Materials Management Director is the project procurement manager, logistics manager, materials coordination manager, and inspection manager.

4.4.4.13 Project Procurement Manager

The project procurement manager is responsible for the purchasing and expediting activity. His duties include the following major activities:

(1) Preparation of detailed purchasing and expediting procedures

(2) Development of bidders list

(3) Development, monitoring, reporting, and control of procurement schedules

(4) Maintenance of the procurement document tracking data base

(5) Arrangement for and coordinating of expediting

(6) Maintenance of the data base for material status and report distribution

(7) Monitoring all expediting reports to ensure assignment dates are met and reports are complete and responsive to needs.

4.4.4.14 Logistics Manager

The logistics manager is responsible for the planning and implementation of a logistics system that supports the plant construction with timely flow of materials in a manner which is efficient and cost effective.

4.4.4.14 (Continued)

The primary functions of the logistics manager are:

(1) Preparation and management of the project logistics plan and procedures

(2) Participation in area resource surveys

(3) Scope development and administration for transport and marshalling subcontracts

(4) Maintenance of the data base on status of material in transit.

4.4.4.15 Materials Coordination Manager

The materials coordination manager reporting directly to the Materials Management Director has responsibility for liaison between the construction organization, process contractors and home office on material related matters. His principal duty is to ensure that the material needs are coordinated to minimize schedule upsets. This involves the monitoring of purchasing, delivery, preassembly, and construction schedules to ensure continuity.

4.4.4.16 Inspection Manager

The inspection manager is responsible for the management and coordination of the inspection and quality control of project materials at the source of supply. His primary duties include the following activities:

(1) Development of inspection procedures

(2) Coordination and control of all inspection efforts

4.4.4.16 (Continued)

(3) Reviewing procurement documents to ensure inspection and quality control requirements are adequately defined

(4) Arranging inspection coordination meetings with fabricators

(5) Reviewing fabricator quality assurance programs.

4.4.4.17 Project Area Managers

The Project Area Managers for process areas, offsites, utilities, and materials handling report to the Engineering Director. Each is provided with area project engineers to provide the required project management coverage.

The authority of the project area manager, as delegated by the Engineering Director, covers the execution of all engineering, design and the coordination of procurement in his areas. As a result, the project area manager is the normal authority for engineering matters in his area.

4.4.4.18 Environmental Planning and Assessment Manager

The environmental planning and assessment manager, reporting to the Environmental Services Directo is responsible for regulatory compliance assistance in the areas of environmental permitting, preparation of environmental impact reports, and management of environmental subcontractors associated with the project.

4.4.4.19 Environmental Sciences Manager

The environmental sciences manager is responsible for developing and implementing baseline monitoring programs, field studies, laboratory analyses, and resource management practices for the project.

4.4.4.20 Health and Socioeconomics Manager

The health and socioeconomics manager coordinates programs in the areas of public and occupational health, safety, socioeconomics and archaeology/ anthropology.

4.4.4.21 Waste Management Disposal Manager

The waste management and disposal manager implements programs dealing with hazardous waste, solid waste, and wastewater management.

4.4.5 Engineering

The following describes engineering activities (Process Engineering, Design Engineering, and Environmental Services) performed by the contractor during the various phases of the project. The tasks are not defined by phase but are representative of overall responsibilities of the contractor.

4.4.5.1 Processing Engineering

The process engineering is divided into three areas of responsibility: Process, Utilities/Offsites/Environmental, and Licensor Liaison.

Specific process engineering tasks include the following:

(1) Issue approved unit design basis - design bases developed during the feasibility study for all process utility and offsite units are updated and issued

(2) Issue process design criteria manual - A process design criteria manual is the basis for a consistent design approach among the various organizations performing work on the project

4.4.5.1 (Continued)

(3) Conduct Studies - Complete any outstanding engineering studies and evaluations affecting overall scheme and unit optimizations not resolved or fully developed during the feasibility study

(4) Prepare material balance - Finalize the overall material balances

(5) Develop flow diagrams - Complete, review with owners and issue "Approved for Construction" (AFC) process flow diagrams (PFD's), mechanical flow diagrams (MFD's), utility and offsite system diagrams

(6) Issue interface diagrams - These diagrams are transmitted to all contractors doing detailed engineering to aid development of the piping and control interfaces

(7) Issue process equipment Data Sheets - Develop process data sheets for all engineered vessels and mechanical equipment items

(8) Issue utility summaries - Prepare utility summaries for all units. These summaries reflect normal and maximum flows for utilities and are used to develop final overall utility summaries and system designs

(9) Issue line sizing - Prepare and issue line sizing calculation data for all process and utility lines

(10) Issue instrument data sheets - Develop process data for sizing control valves, safety relief valves, orifices, and other control systems engineered items

4.4.5.1 (Continued)

(11) Issue metallurgical flow diagrams - Issue a PFD marked with design conditions and an indication of corrosive compounds for review and comments by corrosion engineers

(12) Issue catalyst and chemicals requirements - Prepare catalyst and chemicals requirements for all units. Prepare overall catalyst and chemical summaries.

The basic working documents for all process licensors is the process criteria and an approved design basis.

These documents set forth the necessary information to allow the licensors to develop their design packages in a timely and orderly manner. The basis for the process criteria is the large scale coal tests.

Lurgi provides engineering for some of the onsite process units. To further the Lurgi design efforts, narrative general specifications for equipment, piping, and instrumentation as well as standard drawings are provided. A resident staff may be established in Lurgi's offices to coordinate and expedite work.

The licensors providing detailed engineering will prepare packages of deliverables. The packages contain the following basic process design information:

(1) Unit material balance

(2) Feed, product, byproduct and effluent flow, composition, and specifications

(3) Equipment data sheets

4.4.5.1 (Continued)

(4) Mechanical flow diagrams

(5) Utility requirements

(6) Block plot plan and area requirements

(7) Process flow diagram and process description

(8) Catalyst and chemicals requirements.

The Lurgi data along with similar data obtained from the other process licensors allow detailed work on the offsite and utility requirements to commence.

The following activities are performed after the release of procurement and construction:

(1) Update and revise "Approved for Construction" mechanical flow diagrams to include vendor information.

(2) Maintain surveillance on various design details to assure compatibility with process requirements.

(3) Provide consultation service for other engineering disciplines and other engineering contractors on process related matters.

(4) Write operating manuals and startup instructions.

(5) Provide field checkout as each unit reaches mechanical completion.

(6) Assist with operator training.

4.4.5.2 Design Engineering

Design engineering includes all disciplines and the prescribed activities presented in this section.

(1) Control Systems

The control systems work includes the following:

Develop of instrumentation depicted on process flow diagrams and mechanical flow diagrams.

Prepare standard specifications and details.

Prepare detailed instrument specifications and drawings.

Initiation of quotation and purchase requests for instruments, instrument systems and instrument piping materials.

Review instrumentation proposed for engineered (package) equipment.

Assist the field instrument specialists.

(2) Mechanical

Mechanical engineering performs the following tasks for the project:

Develop general mechanical system specifications.

Develop and approve detailed specifications for mechanical equipment based on process duty specifications and

4.4.5.2 (Continued)

incorporate characteristics required by other design disciplines.

Prepare technical and administrative specifications for mechanical equipment installation subcontracts.

Perform conceptual engineering design of special or critical equipment and review critical phases, including stress analysis, welding, refractory, sealing, lubrication, power, and other related mechanical considerations.

Prepare and initiate requests for quotation for mechanical equipment, to ensure receipt of complete and comparable quotations.

Perform a total technical and commercial review of quotations and select vendors to assure specifications compliance and best buy.

Evaluate and specify shop test procedures, witness special performance tests and monitor quality assurance programs.

Review and approve machinery and equipment vendor documents.

Assist construction in setting standards for field installation and provide technical assistance when necessary.

Provide technical assistance during shop fabrication and field construction.

4.4.5.2 (Continued)

Perform complete spare parts program including standardization, selection, and purchase of spare parts.

(3) Electrical

The Project Electrical Engineer has responsibility for the following electrical engineering activities:

Review existing studies and criteria and establish a basis for design. This entails a detailed review of site conditions and applicable codes and standards.

Review and finalize unit and plant load data and develop an electrical distribution system. As part of the system development, establish voltage levels, determine quantity and size of substations, and investigate methods of distribution.

Review and finalize power source for construction phase and plant operation. The power company which provides service in the vicinity of the plant site is contacted to establish details of construction and plant operational power supply. A rate structure, voltage level, number of lines, location and definition of interfaces, metering and relaying requirements is established. Temporary diesel generator units are provided for all or a part of construction power.

Design drawings are developed in sufficient detail for procurement and installation of equipment and material. They define interface of the system with the utility and with the various process units.

4.4.5.2 (Continued)

(4) Civil-Structural-Architectural

The Civil-Structural group performs the work described below:

Preliminary site surveys - Assist in the orientation of the plant-site from the standpoint of soil characteristics, accessibility, earthwork, hydrology, drainage, and other related factors.

Soils criteria - Select a soils consultant for the comprehensive soils investigation and participate in the formulation of earthwork and foundation criteria.

Maps - Obtain aerial photos and topographic or other types of maps as required for the project.

Ponds - Provide detailed engineering design of lining systems for all liquid containment.

Solids disposal facility - Provide engineering support for solid waste disposal.

Property plan - Select surveyors and participate in the legal surveying and establishment of bench marks, elevations and coordinate system for the property line and construction base lines.

The Architectural activities include the following:

Provide final design of plant buildings.

Prepare building specifications and drawings.

4.4.5.2 (Continued)

Prepare computations, drawings, and specifications for heating, ventilating, air conditioning, and plumbing systems.

Prepare building material requisitions and subcontracts.

Monitor and approve vendor engineering drawings and schedule any required reviews.

Assist in the inspection during construction of the buildings.

(5) Vessels

The vessel engineering tasks include the following:

Prepare vessel design drawings.

Coordinate with construction rigging specialists.

Prepare bid analysis and purchase requisitions for vessels.

Conduct shipping studies, i.e., shop vs. field fabrication.

Provide construction support for field fabricated vessels.

(6) Piping

The piping activities include the following:

Establish requirements for piping materials and develop and issue detailed material specifications.

4.4.5.2 (Continued)

Produce the piping line list to identify systems and commodities and pertinent line data. Produce field pressure testing data. Prepare summary of wall thickness calculations.

Determine bulk piping material requirements, initiate bid and purchase order requests, and produce bills of material for purchase of bulk materials.

Develop piping systems to ensure safety in operation and economy of installation. Considered are forces, stresses, and strains on piping systems and equipment due to thermal expansion, vibrations, pulsations, and loads from all sources. Also establish Piping Stress Specification.

Establish requirements for insulation, painting, coating and wrapping materials, cathodic protection, and develop detailed material and application specifications.

Prepare plot development layout design models.

(7) Environmental Engineering

Environmental Engineering provides consulting and engineering design services to the other engineering disciplines for all environmental treatment and control systems to ensure compliance with federal, state, local and tribal requirements.

4.4.5.3 Environmental Services

Applications for required permits commence immediately upon release of preliminary engineering. The engineering contractor coordinates the effort to obtain environmental permits and acts as project manager for environmental consultants on the project. The following specific activities are performed in each of the major environmental areas.

(1) Environmental Planning and Assessment

Regulatory reconnaissance studies

Identification of applicable environmental control

Technologies and design criteria

Permit applications

Public participation programs

Environmental reconnaissance studies

Environmental Assessments/Environmental Impact

Reports/Environmental Impact Statements

Urban and regional planning studies

(2) Environmental Sciences

Provide scientific support for the evaluation and/or mitgation of environmental impacts including air emissions, wastewater effluents, land reclamation and revegetation, and development of standards and compliance criteria.

4.4.5.3 (Continued)

(3) Health and Socioeconomics

Baseline socioeconomic studies

Assessment of Toxic and hazardous substances

Analysis of occupational health and safety regulatory requirements

Develop health and safety plan

Archaeological, anthropology, and human resource analysis

(4) Waste Management and Disposal

Characterization of hazardous wastes

Disposal site assessment

Development of disposal plan for solid and liquid wastes

Support design of disposal system

4.4.6 Materials Management

Materials management encompasses the complete spectrum of material related activity from the formation of initial strategic planning through development of project specifications and quantities, purchasing, quality control, preassembly, transport, receipt, and release for installation into the plant.

Integrated computerized material systems are used for the execution of this project. These systems provide control mechanisms that generate prompt

4.4.6 (Continued)

feedback and exception reports. They are tailored to this project with the built-in flexibility to accommodate conditions, such as marshalling yards, subassembly points and other component fabrication before delivery to the jobsite. The systems are capable of monitoring the status of materials furnished by subcontractors engaged in the construction effort as well as the status of those purchased by the other process engineering contractors.

Other features of the system provide for the control of material at preassembly locations such as a pipe fabrication shops and modular assembly yards. The system must also be capable of allocating bulk material in a priority sequence based on the construction schedule. In addition, comprehensive data outputs are required for use in formulating statistical correlations and projections for use in project material management and progress reporting.

The following addresses some of the specific material management areas and activities performed.

4.4.6.1 Logistics

One of the early objectives is to formulate a logistics plan covering the flow of materials from the source to the point of installation at the jobsite. The logistics plan comprises a basis for design, procurement and delivery of project materials to the construction work force. The plan addresses the following:

(1) Prefabrication of equipment and materials into optimum size modules

(2) Location of subassembly facilities

4.4.6.1 (Continued)

(3) Location of shop fabrication facilities for piping and steel work

(4) Location of freight marshalling and/or staging areas

(5) Resource survey of area surrounding the construction site to establish capability of local fabricators and vendors

(6) Optimum source locations to minimize material handling and transport costs

(7) Rail and road access to construction site

(8) Modes of transport for specific items of equipment and types

(9) Procedure and controls required to accomplish the logistics plan

(10) A transportation survey of viable routes from vendors plants and/or from inland waterway points to the job site.

4.4.6.2 Materials Coordination

Careful planning and execution is carried out to ensure materials are identified, purchased, delivered, and erected with a minimum of schedule interruptions. Comparison of material need dates with design and procurement schedule are a continuous activity during the life of the project.

The materials coordination function utilizes information extracted from various material control and status reporting systems to determine and minimize schedule conflicts. It ensures the two-way communication of material needs and availability between the construction forces, process

4.4.6.2 (Continued)

contractors, fabrication and preassembly yards, and the home office project management.

4.4.6.3 Procurement

A procurement plan is prepared during the design of the project and will contain the following elements as a minimum:

(1) A statement on the role of procurement as related to overall materials management, logistics, and procurement philosophy for project execution

(2) A procurement procedure including standard documentation

(3) A flowchart showing routing of procurement documentation

(4) Recommended vendors list

(5) A system for the scheduling, monitoring, and control of requisitions for equipment and bulk materials

(6) A system for monitoring and control of vendor progress and deliveries

(7) A procedure for field procurement

(8) A backcharge procedure.

4.4.6.3 (Continued)

Purchasing activities include the following:

(1) Requests for Quotations - Generally, all equipment and material purchases are based on competitive bids from three or more acceptable vendors

(2) Local vendors - An effort is maintained to maximize the use and involvement of companies located in the area surrounding the plant site

(3) Bid summaries - Bid summaries are prepared for all purchases. Each summary includes technical, commercial, budget, and other factors and the recommendation

(4) Purchase orders - Purchase orders are issued after receipt of bid summaries and corresponding requisitions for purchase. Purchase orders include commercial and technical detail developed for the project.

When quotations are solicitied or purchase orders are placed with companies in the United Kingdom, Continental Europe, or Japan, the Contractor utilizes the services of an affiliate procurement office located in the vendor's geographical area. The affiliate provides assistance in the:

(1) Development of acceptable qualified bidders

(2) Issuance of inquiries

(3) Handling vendor queries and relaying information during the bidding stage

4.4.6.3 (Continued)

(4) Expediting and forwarding vendor's quotation via courier mail service

(5) Handling queries with vendor during the evaluation stage

(6) Placement, issuance, and administration of purchase orders

(7) Expediting, inspection, and traffic coordination.

Other procurement activities performed as part of the procurement plan include the following:

(1) A purchasing group is set up at or near the construction site to develop quotations, summarize quotations, and place purchase orders for field originated requisistions. Personnel experienced in field procurement are assigned to this operation

(2) The field procurement effort includes the management and coordination of backcharges against suppliers for correction, rework and repair of damages causing extra work by construction forces

(3) Expediting, monitoring, and status reporting on all materials and equipment purchased for the project are done by the expediting group, with project direction by an expediting coordinator

(4) Source inspection procedures are developed and used uniformly by all entities engaged on this project. The reporting systems, forms and structure is identical worldwide. Agencies, when employed, also utilize the project procedures and reporting systems.

4.4.6.3 (Continued)

(5) Source inspection activities commence with vendor surveys and the review of project specifications for inspectable materials. Purchase orders for inspectable materials trigger detailed inspection activity, which begins with contact to establish source location, status of raw materials, status of drawing and welding procedure approvals, and verification of start of fabrication dates. At the appropriate time, a formal inspection assignment is generated and sent to the inspection office located in the geographical area of supply.

4.4.6 4 Systems

On-line computerized systems are utilized to provide surveillance and control over material related events. All materials used in the project are included regardless of the material source or the entity originating the material requirement.

A system or systems is required to aid in management of:

(1) Civil/structural/architectural commodities

(2) Machinery and equipment

(3) Piping bulk materials

(4) Electrical bulk materials

(5) Instrument materials

(6) Procurement documents

(7) Warehouse inventories

4.4.6.4 (Continued)

(8) Design engineering documents

(9) Vendor drawings and other information.

4.4.6.5 Contracts

Contracting as required to meet project requirements are developed in consultation with the Owners to meet the requirements of the prime contract.

The initial activities of the contracts group include the establishment of project contracting procedures, identification and prequalification of bidders, and formulation of a bidders list for approval by the Owners.

Emphasis is placed upon the early identification of qualified contractors who ultimately are selected to bid on construction contracts. In addition contracts are written and awarded, as required, to support engineering and project activities.

A preliminary examination of requirements indicates that the contracts listed below may be required during the engineering phase.

(1) Coal sampling and testing program

(2) Solid waste disposal plan

(3) Coal processing

(4) Soil investigation

(5) Site preparation

4.4.6.5 (Continued)

(6) Railroad spur inquiry

(7) Fencing

(8) Access roads

(9) Surveying inquiry

(10) Camp construction

(11) Camp catering, housekeeping, and management

(12) Cooling towers

(13) Tankage

(14) Air separation plant

(15) Freight forwarding

(16) Preassembly yard inquiry.

Other contracts may be initiated to facilitate planning and development of permit applications.

Contracts administration is required in the field, prior to start of effective construction, on the following contracts awarded from the engineering office:

(1) Site preparation

(2) Soil investigation

4.4.6.5 (Continued)

(3) Fencing

(4) Roads

(5) Utilities supply

(6) Camp construction

(7) Camp management.

During effective construction, field administration is required for several contracts which are initiated in the engineering office, but may be awarded in the field. Examples of these are:

(1) Railroad spurs

(2) Roads

(3) Camp management renewal

(4) Surveying

(5) Cooling towers

(6) Oxygen plant

(7) Buildings.

Depending upon prime contractual arrangements, contracts which will be initiated, awarded, and managed at the site may include:

(1) Tankage

4.4.6.5 (Continued)

(2) Insulation

(3) Painting

(4) Final grading and paving of roads

(5) Fencing

(6) Field support services.

4.4.7 Construction

The purpose of this section is to present a preliminary plan for construction management of the project. A candidate plant site, Site 1, is situated about 16 miles west of Hardin, Montana on the Crow Indian Reservation. An alternate location, Site 23, also on the Crow Indian Reservation, is about 16 miles east of US Highway 87 and three miles north of the Montana-Wyoming border. It is estimated that the project will require thirty-six months and seventeen million total field man-hours from the start of site work until mechanical completion of the facility for either site. At this preliminary stage, prior to any detailed engineering being accomplished, construction planning is properly limited to ascertaining general management requirements and investigating areas which may impact project feasibility.

4.4.7.1 Construction Services

Typically the construction contractor provides the following general services:

(1) Preconstruction services during the formative stages of the project as part of the engineering task force team (covered in more detail in the following paragraph)

(2) Requirements for temporary constructing facilities such as offices, warehouses, storage yards, construction shops, construction tools and equipment, and construction consumable supplies

(3) Requirements for the construction camp community and related facilities

(4) Preliminary work schedules and budgets consistent with the engineering and procurement plan

(5) Schedules and cost controls for the construction effort within the framework established for the project

(6) Construction management and supervisory personnel, and craft labor, as needed for construction of the plant and related temporary facilities

(7) Construction progress and cost monitoring and report system

(8) Construction consumables, supplies, tools, and construction equipment for direct hire labor

(9) Facilities and systems to maintain and control construction tools, equipment, fuel supplies, utilities, and communication systems

4.4.7.1 (Continued)

(10) Jobsite procurement and accounting requirements

(11) Recruiting and training procedures for direct hire labor

(12) Onsite transportation and medical facilities for construction personnel

(13) A system of material control that includes jobsite receiving, identification, storage, distribution, and utilization

(14) Preparation (awarding, monitoring, and coordinating) of construction contracts.

(15) Personnel an systems to control the quality of the work

(16) Interface with local community organizations.

An important and often understated portion of the contractor's scope of work is the preconstruction services. The success of the project will be measured in terms of the effectiveness of the total front-end effort. In order for the project to move smoothly into the field, construction participation during the planning and design phase allows the task force to function as a complete team from the onset, so that when the construction team moves into the field, everyone is ready with coordinated engineering, procurement, and construction plans. Key construction team members are assigned to the project as early as possible for this phase. Some of the tasks that are accomplished during this period are:

(1) Select the construction management team and construction contractor candidates

(2) Provide detailed definitions of construction responsibilities

4.4.7.1 (Continued)

(3) Select construction management systems to be used on the project

(4) Prepare preliminary field organization charts

(5) Participate in the preparation of the Project Procedure Manual

(6) Complete the construction facilities and community plan and initiate design and procurement cycles for buildings and equipment

(7) Participate in preparation of detailed estimates

(8) Provide constructibility input to design engineering

(9) Develop field document control procedures

(10) Establish field inspection and quality control procedures for the project

(11) Prepare a detailed industrial relations plan to include a conflict contingency plan

(12) Perform a survey of labor and housing availability and develop recruiting and training programs

(13) Participate in development and preparation of a master project schedule

(14) Participate in development of logistics plans

(15) Set up the field cost control system

4.4.7.1 (Continued)

(16) Participate in the development of a detailed budget for the overall cost system

(17) Define computer-aided system utilization and prepare a system plan

(18) Plan and select jobsite data processing telecommunications equipment and facilities

(19) Develop a site communications plan

(20) Finalize construction equipment and tooling requirements

(21) Update manpower requirements and categorize by work description

(22) Determine specific needs for craft labor training programs

(23) Develop tax and insurance instruction

(24) Prepare accounting journals and ledgers

(25) Develop project billings review and posting procedures

(26) Develop payroll instructions - rates, checks, overtime, etc

(27) Prepare accounts payable procedures

(28) Develop project timekeeping procedures and manpower control

(29) Develop subcontractor's progress billings submittal and posting procedures

4.4.7.1 (Continued)

(30) Establish size and scope of contract packages

(31) Negotiate with contractors for early services

(32) Release orders for early field materials

(33) Establish the safety program and prepare safety manual

(34) Determine the first-aid requirements

(35) Establish site security control plan and procedures.

4.4.7.2 Selection of Management Personnel and Support

The contractor must provide a slate of qualified candidates for both his home and field construction staff. Contractors home office provides technical support in the areas of safety, security, quality control, procurement, personnel, contract management, material control, finance, and cost and scheduling controls.

These personnel are part of the organization developed to manage the project, as previously set forth in the project organization section of the management plan.

4.4.7.3 General Approach

This plan is based on accomplishing site preparation for the entire facility, and installation and activation of the basic construction community beginning early in the first construction season. This allows effective construction to begin during the first season, resulting in a planned mechanical completion of all units by the end of the third calendar year. Using direct hire labor, it is expected that a selective, extended work

4.4.7.3 (Continued)

week will be required during the summer construction period. This plan includes subcontract of specialty tasks such as community management, paint, insulation, tankage, roads, fencing, and the railroad to qualified local contractors.

To provide effective control of a project of this magnitude, the plant is divided into geographical construction zones approximately equal in labor manhours and scope. The zone managers report to the central construction organization responsible for the total project. In principal, each zone management team functions autonomously in its areas of responsibility under the direction of the central construction management. In addition to its responsibilities to the project director, central construction management handles those functions which lend themselves to centralization, and in this sense act as a service center to the zones. Centralized services include items such as personnel, procurement, quality control, safety, security, material control, management reporting, finance, payroll administration, contract management, and common utilities.

It is expected that work requiring costly protection and inefficient labor utilization, such as placement of concrete in cold weather, will be held to a minimum. Considerations for winter work will be reviewed each fall and a determination made of the extent and economics of cold weather construction necessary to assure maintaining schedule.

Work done during the preconstruction period provides the basis for and will result in a more detailed plan. This next level of planning will retain flexibility to allow construction management to cope with unplanned events as they occur.

The construction schedule is based upon mobilization beginning in January of 1986 and initial field move-in to begin site preparation and the installation of construction facilities as soon as weather permits. Start of

4.4.7.3 (Continued)

effective construction is planned for mid-1986 with the first concrete pours and underground piping and drain- age systems. Mechanical completion is anticipated at the end of 1989, however, some construction workers will be on the site until mid-1989 to complete items such as insulation and painting and to assist the plant operations in commissioning and starting up the plant. The construction schedule is graphically shown on the master schedule presented in Section 4.4.2 of the work plan.

4.4.7.4 Construction Facilities and Community (Camp)

Allowances are provided in the estimate to cover the expected requirements for temporary construction facilities including construction equipment and possibly for a single status housing camp to be located adjacent to or near the selected plant site.

Identical construction facilities will be required for either Site 1 or Site 23. Provisions are made in the estimate for:

(1) Central and zone warehousing

(2) Central and zone office buildings

(3) Central pipe shop

(4) Central instrument and electrical shop

(5) Zone craft shops

(6) Central motor pool and equipment repair shop

(7) Central utilities including power generation, water, and sewage

4.4.7.4 (Continued)

(8) First aid stations

(9) Security, ambulance, and fire control equipment and buildings

(10) Area trailers and shelters as required.

Power generation may not be required if arrangements can be made to bring power lines to the site in time to meet construction requirements. If a camp site is needed and located adjacent to the plant site, it will be possible to have central power, water, and sewage systems.

4.4.8 Operations

Operations of the facility commences with the beginning of the startup phase. As units are mechanically completed, the contractor turns the units over to the owners for startup. The systems have been cleaned and are ready for charging the system with the necessary catalysts and chemicals. The contractor has prepared the operating manuals describing the startup procedures for each unit. Operations personnel have received the necessary training at similar type plants and have familiarized themselves with all aspects of the facility and its startup procedures.

Utility units such as water treating, boilers, power generation, air and nitrogen, oxygen plant and the coal and ash handling facilities are started initially. As these units come onstream, the gasifier is tested and the crude gas flared. Subsequently the various process units are commissioned and gas production begins. As soon as the product gas meets specification, the gas is routed to the pipeline for delivery to the market. This period of preproduction is estimated to take approximately six months.

4.4.8 (Continued)

After SNG starts to flow to the market, it is estimated that approximately six additional months will be required to reach full production.

The operations and maintenance of the plant require approximately 850 full time employees. This includes the following breakdown:

	Employees
(1) Staff	- 20
(2) Operating	- 416
(3) Maintenance	- 414

These numbers are based on the Base Case producing export power. It includes personnel for operating the water pipeline system, ash disposal system and the gasification plant. The operations of the gas pipeline facility are not included in these numbers. A preliminary organization chart is presented in Figure 4.4-3 and depicts some of the key positions for the operations phase.

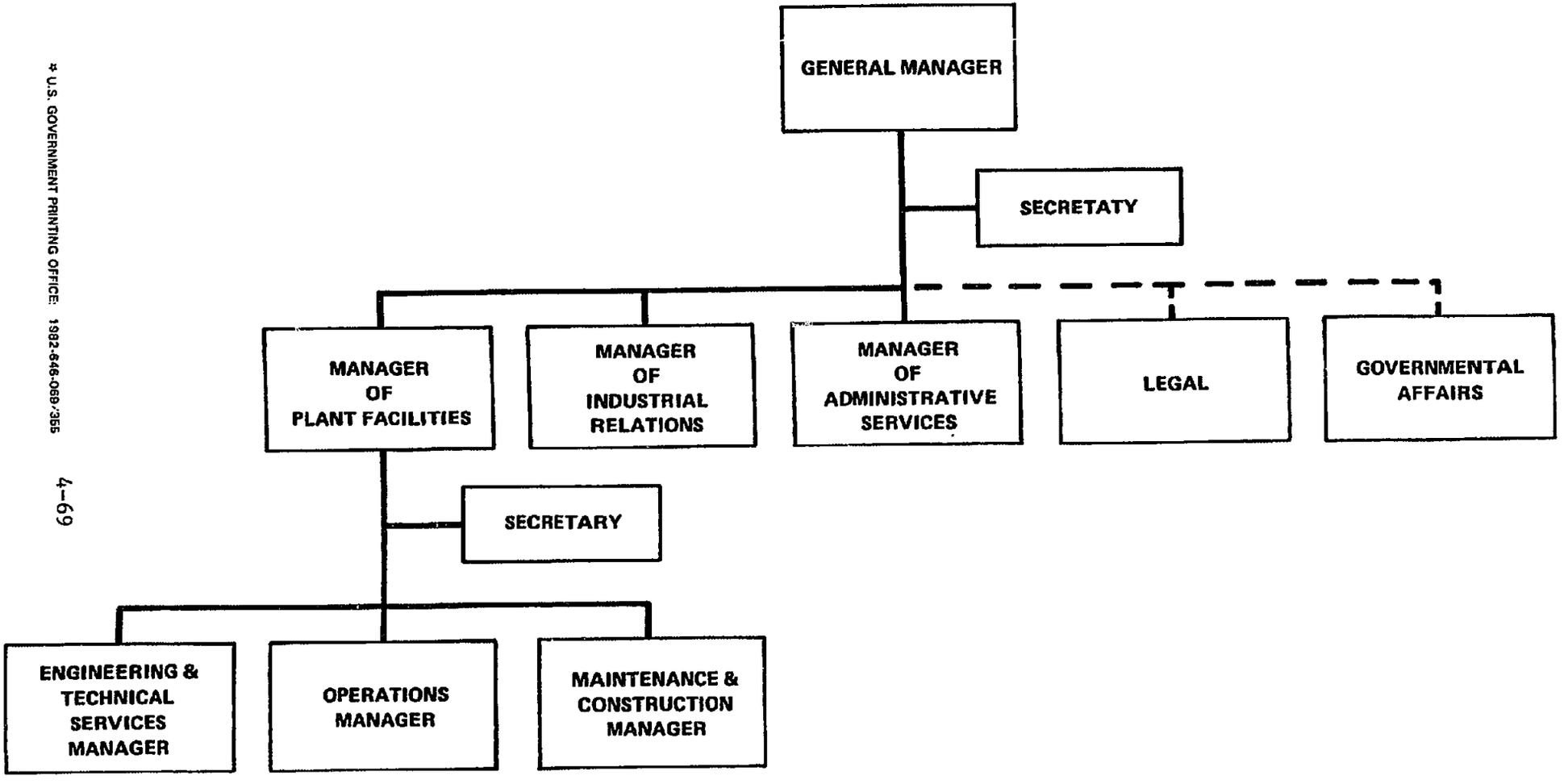

FIGURE 4.4-3

CROW TRIBE OF INDIANS
SYNFUELS PROJECT
OPERATIONS ORGANIZATION