U.S. DEPARTMENT OF ENERGY
PITTSBURGH ENERGY TECHNOLOGY CENTER

DIRECT COAL LIQUEFACTION BASELINE DESIGN AND SYSTEM ANALYSIS

CONTRACT NO. DEAC22 90 PC89857

PROJECT MANAGEMENT PLAN

AMOCO

BECHTEL

AUGUST 1990
PITTSBURG, PENNSYLVANIA

Bechtel

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August 24, 1990

U. S. Department of Energy/PETC
P. O. Box 10940, Mail Stop 922-H
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Attention: Mr. Swenam Lee
Project Manager

Subject: D.O.E. Direct Coal Liquefaction
Baseline Design & System Analysis
Contract No. DEAC22 90PC89857
Bechtel Job No. 20952
Project Management Plan
Letter No. BLD-15

Dear Mr. Lee:

Attached for your approval are four copies of the final Project Management Plan. This report incorporates all DOE/PETC comments as discussed in our meeting in Houston on August 9, 1990.

As requested, three copies are for your personal use and distribution. The fourth copy is the approval copy which we request that you sign on the approval line provided below, and return for our files.

Your approval of this document brings Task I to a 100% completion. As agreed in Pittsburgh in the Kickoff Meeting of June 12/13, 1990, no other topical/task reports are required for Task I.

We thank you for your cooperation and timely approval of this important document.

Sincerely yours,

S N Habash

S. N. Habash
Project Manager

Approved: _____
Swenam Lee, Project Manager

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File: 7.12-26

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MANAGEMENT PLAN

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EXECUTIVE SUMMARY

1. EXECUTIVE SUMMARY

Introduction:

This study is an assignment of Bechtel from the U. S. Department of Energy (DOE)'s Pittsburgh Energy Technology Center (PETC) to develop a computer model for a baseline direct coal liquefaction design based on two stage direct coupled catalytic reactors. Bechtel initiated the study on May 16, 1990 (for a period of 18 months) with an approved total budget of $2MM. The Bechtel and Amoco managements have assembled a highly experienced and talented team to execute this Project as herein presented in this Project Management Plan.

Scope and Technical approach:

The scope of the study and the technical approach to accomplish the overall objective of the study include:

- a baseline design based on previous DOE/PETC results from Wilsonville pilot plant and other engineering evaluations,
- a cost estimate and economic analysis,
- a computer model incorporating the above two steps over a wide range of capabilities and selected process alternatives,
- a comprehensive training program for USDOE/PETC staff to understand and use the computer model,
- a thorough documentation of all underlying assumptions for baseline design and baseline economics, and
- a user manual and training material which will facilitate updating of the model for the future.

Management Philosophy:

The project is managed via the concept of Configuration Management. The concept of Configuration Management is tailored to this study and condensed into two fundamental control mechanisms, i.e., 1) Trend control and 2) Change control. Trend control is the system/procedure to identify and document potential changes (Trends). Scope changes are the approved outcome of Trend control. By Change control procedure, the scope change with associated cost and schedule impacts is incorporated in the project.

Execution Philosophy:

In order to carry out the study efficiently, the study has been divided into seven major tasks with each tasks having several identifiable subtasks. In Task I the study is defined. The baseline design is developed in Task II. The capital, operating and maintenance costs are developed in Task III. Mathematical models for computer simulation is developed in Task IV. Development and validation of the model is conducted in Task V. Documentation of the process simulation and training program are conducted in Task VI. Whereas, the above mentioned six tasks are functional tasks, the remaining task, Task VII, is a level of effort task for project management, technical coordination and other miscellaneous support functions. Functional tasks (Tasks II through VI) are accomplished by a part time functional group while the project management and technical coordination are accomplished by a full time core management group (Task VII).

The sequence and inter-relationships of these major tasks with their respective subtasks are shown in the critical path monitoring diagram.

A set of procedures as prescribed by PETC together with relevant Bechtel's project procedures customized for this project are employed to achieve the project goals.

Deliverables:

Deliverables to PETC are grouped as follows:

- Reports

  Reports are issued monthly, quarterly, semi-annually and topically for each task (at the completion of each task) as well as a final report upon completion of the study. The format of the individual reports is as per PETC's requirement.

- Process simulation Documentation and Operating Manual.

  A thorough documentation including basic assumptions for the process simulation and an operating manual will be prepared.

- Comprehensive Training Program

  A comprehensive training program for the PETC/USDOE's staff is planned so that they understand the model and gain knowledge of how to use it.

- Process Simulation Software

  The developed process software is another deliverable to PETC.

Conclusion:

The study involves developing a computer model for a baseline direct coal liquefaction design based on two stage catalytic reactors for PETC. A comprehensive project management plan has been developed in cooperation with Amoco (the prime subcontractor) to execute this project utilizing a combination of DOE and Bechtel procedures tailored for this project.

BACKGROUND/INTRODUCTION

2. BACKGROUND/INTRODUCTION

The U. S. Department of Energy (DOE) has established a program to "foster an adequate supply of energy at a reasonable cost," in accordance with the National Energy Policy Plan IV (NEPP IV). A cost effective direct coal liquefaction program sponsored by the Pittsburgh Energy Technology Center (PETC) is an integral part of NEPP IV.

The overall goal of the coal liquefaction program is "to develop the scientific and engineering knowledge base with which industry can bring economically competitive and environmentally acceptable advanced technology for the manufacture of synthetic liquid fuels from coal.

The present assignment from PETC is undertaken by Bechtel (in collaboration with Amoco as the main subcontractor) to develop a computer model for a baseline coal liquefaction design based on two stage direct coupled catalytic reactors. Specifically, the scope of work calls for the development of:

1) a baseline design based on previous DOE/PETC results from Wilsonville pilot plant and other engineering evaluations,

2) a cost estimate and economic analysis, and

3) a computer model incorporating the above two steps over a wide range of capacities and select process alternatives.

This report presents the Bechtel/Amoco Management Plan (Task I) for executing this 18 month study. The effective date of this contract is May 16, 1990 and this Management Plan is submitted approximately 60 days hence in accordance with the provision of the contract.

STUDY OBJECTIVE

3. STUDY OBJECTIVE

The current baseline process configuration as based on the Wilsonville facility is a two-stage catalytic-catalytic close-coupled reactor system with ash recycle and ROSE^{SR} deashing with no residium product. This configuration is significantly different from the earlier (1981) baseline configuration of the Breckinridge Study.

The objective of this study is to develop a baseline design for a two-stage direct liquefaction configuration as described above with certain alternate processing options as described herein. This design will consist of PFD's, heat and material balances, capital cost estimates with major equipment lists, operating cost estimate and a process simulation model to enable PETC to evaluate future coal technology advances. The computer (PC-based) model will be designed for a wide range of plant capacities to maximize the utilization of the model to conduct economic evaluations.

OVERALL SCOPE OF WORK

4. OVERALL SCOPE OF WORK

4.1 Process Scope

The conceptual baseline design shown in the Block Flow Diagram Figure 4-2 shall be for a plant with a capacity of roughly 60,000 barrels per day of liquid products plus propane and butanes. Plant capacity will be based on the following procedure.

a. Bechtel/Amoco in consultation with HRI will establish the maximum size coal liquefaction train based on reactor design/fabrication/shipping limitations. This is estimated to be between 15,000 to 20,000 BPSD of equivalent coal liquids, or 4000 -5000 TPSD of moisture free (MF) coal feed based on expected yield.

b. Maximum plant capacity will then be based on several maximum size trains' production in the range of approximately 60,000 BPSD of coal liquids, or 15,000 - 20,000 TPSD of moisture free (MF) coal based on expected yield.

c. Coal throughput will float to match the above output, depending on the design basis yield.

Reactor feed coal particle size: Instead of the particle size currently specified in the RFP (70% thru 200 mesh from ROM coal < 8 in), Bechtel/Amoco coal experts and HRI will recommend optimum particle size for coal grinding/handling and downstream processing.

The final capacity shall be determined based on the maximum commercial size of the liquefaction reactors. The battery limits for the design are as follows:

- Coal received from mine by conveyor belt
- Coal storage for 30 days
- Coal grinding, jig cleaning, and drying
- Ash concentrate/coal/coke gasification for hydrogen production using Texaco or Shell technology
- Combined cycle cogeneration for steam and electric power generation

- Two HRI ebulated bed reactors in series per reactor train
- Recycle hydrogen gas clean up
- Product recovery and treating including:

  LPG

  Naphtha (C_5 to 350°F)

  Light Distillate (350°F to 450°F)

  Atmospheric Gas Oil (450°F to 650°F)

  Light Vacuum Gas Oil (650°F to 850°F)
- ROSE^{SR} solids and liquid separation
- Syngas shift
- Acid gas removal
- Sulfur recovery
- Ammonia recovery
- Phenol recovery from waste water
- Naphtha stabilization
- Solids waste disposal

The unit operations should be those most suitable for the overall baseline design. After the baseline design is completed, a study shall be done for alternate process units or configuration. The process units to be investigated include first-stage thermal reactor, vent gas separation between reactors, coal cleaning by heavy media and/or spherical agglomeration, delayed coking, and/or fluid bed coking of vacuum bottoms, low ash coal with no vacuum bottoms deashing, (inclusion or exclusion of this option will be decided at a later date), and hydrogen production using steam reforming of natural gas.

The basis for the operating and capital cost is a plant located at a generic midwestern U. S. location at the mouth of an Illinois #6 coal mine. Feedstock will be Burning Star No. 2 mine Illinois #6 run-of-mine coal. The plant will meet all U. S. Federal and State environmental requirements and appropriate good practices.

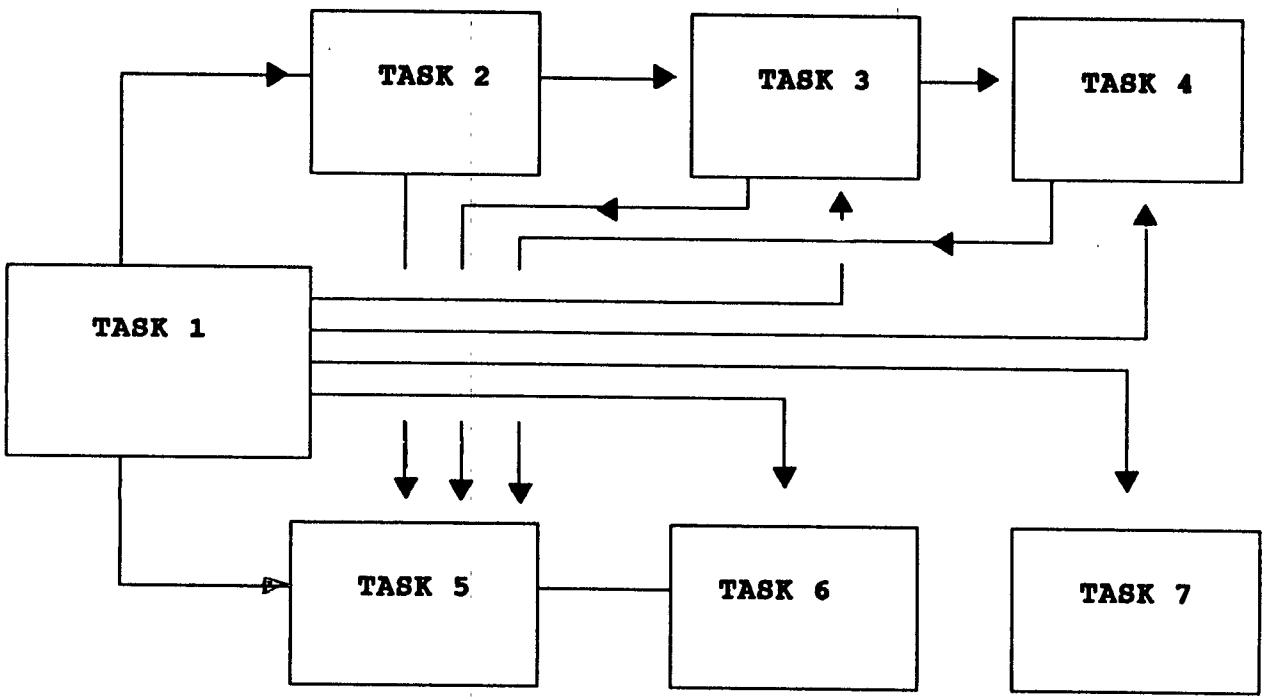
The process simulation model shall be a suitable software for the operation on an IBM compatible PC. The software selected must be able to be operated on either a VMS, DOS, or OS/2. The delivered software shall be suitable for installation on one of the previously described systems. The software shall be delivered to PETC and except for the modules developed for this contract shall be commercially available.

The project is divided into seven (7) tasks. Task I defines the project. Task II develops the baseline design. Task III develops the capital, operating and maintenance costs. Task IV develops the mathematical model necessary for the process computer simulation model. Task V develops the process simulation model and verifies the model. Task VI documents the process simulation model and training. Task VII is a level of effort task for project management, technical coordination and other miscellaneous support functions.

The inter-relationship of the above tasks is shown in the attached Block Flow Diagram of Tasks, Figure 4-1.

FIGURE 4-1

BLOCK FLOW DIAGRAM OF REQUIRED TASKS



LEGEND TASK NO.	TASK DESCRIPTION
1	MGMT PLAN
2	BASE LINE DESIGN DEVELOPMENT
3	CAPITAL COST
4	MATHEMATICAL MODEL DEVELOPMENT
5	PROCESS SIMULATION MODEL DEVELOPMENT VERIFICATION
6	DOCUMENTATION OF PROCESS SIMULATION MODEL & TRAINING OF DOE STAFF
7	OVERALL PROJECT MGMT & TECHNICAL COORDINATION (LEVEL OF EFFORT ACTIVITY).

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4.1.1 Overall Plant Block Flow Diagram and Description - BaseLine Design

As shown in Figure 4-2, Run-of-mine (ROM) coal will be received at the plant fence line. The coal is then fed to Plant 1 (Coal Cleaning/Preparation) by conveyer, where the coal is cleaned by jigging, crushed, and dried. Clean coal of the required particle size is fed into Plant 2, (Coal Liquefaction). The coal is slurried with the recycle solvent from the liquefaction plant, ashy recycle (a portion of the vacuum fractionator bottoms), and extract recycle from the Solids/Liquid Extraction Plant. Make-up/recycle hydrogen and the coal slurry are combined and heated before entering the two-stage catalytic coal liquefaction reactor system.

The off gas from Plant 2 is sent to Plant 3 (gas plant) where the gas stream is separated into a) an acid gas stream, b) fuel gas, c) propane LPG product and d) mixed butanes LPG product. The heavier reactor products are fractionated in atmospheric and vacuum distillation towers into various boiling range cuts.

These are C_5 - 350°F, 350 - 450°F, 450 - 650°F, 650 - 850°F, 850 - 1000°F and 1000°F+. The C_5 - 350°F fraction is charged to Plant 4 (naphtha hydrotreater) to stabilize the naphtha product. The 350 - 450°F fraction enters Plant 5 (Distillate Hydrotreater) to produce a stable light distillate product. Plant 6 (Atmospheric Gas Oil Hydrotreater) treats the 450 - 650°F fraction to produce a heavy distillate. The 650 - 850 F fraction is sent to Plant 7 (Light VGO Hydrotreater) to produce a stable light gas oil. None of the main liquid products will be considered to be finished or fungible.

The 850 - 1000°F heavy vacuum gas oil fraction is recycled back to the reactor system as part of the ashy recycle stream. The 100°F+ vacuum bottom fraction is charged to Plant 8-1 (Solids/Liquid Extraction ("ROSE-SR")). This plant uses a hydrocarbon solvent to remove heavy hydrocarbon molecules from the feed to produce an ash concentrate, consisting mostly of ash, fixed carbon, unreacted coal, and asphaltenes. The extract from this plant is recycled to Plant 2. The ash concentrate from Plant 8-1 is sent to Plant 9 where hydrogen is produced by coal gasification. Middling coal from Plant 1 and oxygen from Plant 10 (Air Separation) are also feeds to Plant 9. Two coal gasification technologies, will be evaluated for synthesis gas production in Plant 9. The selected technology (TEXACO or SHELL) will be included in the

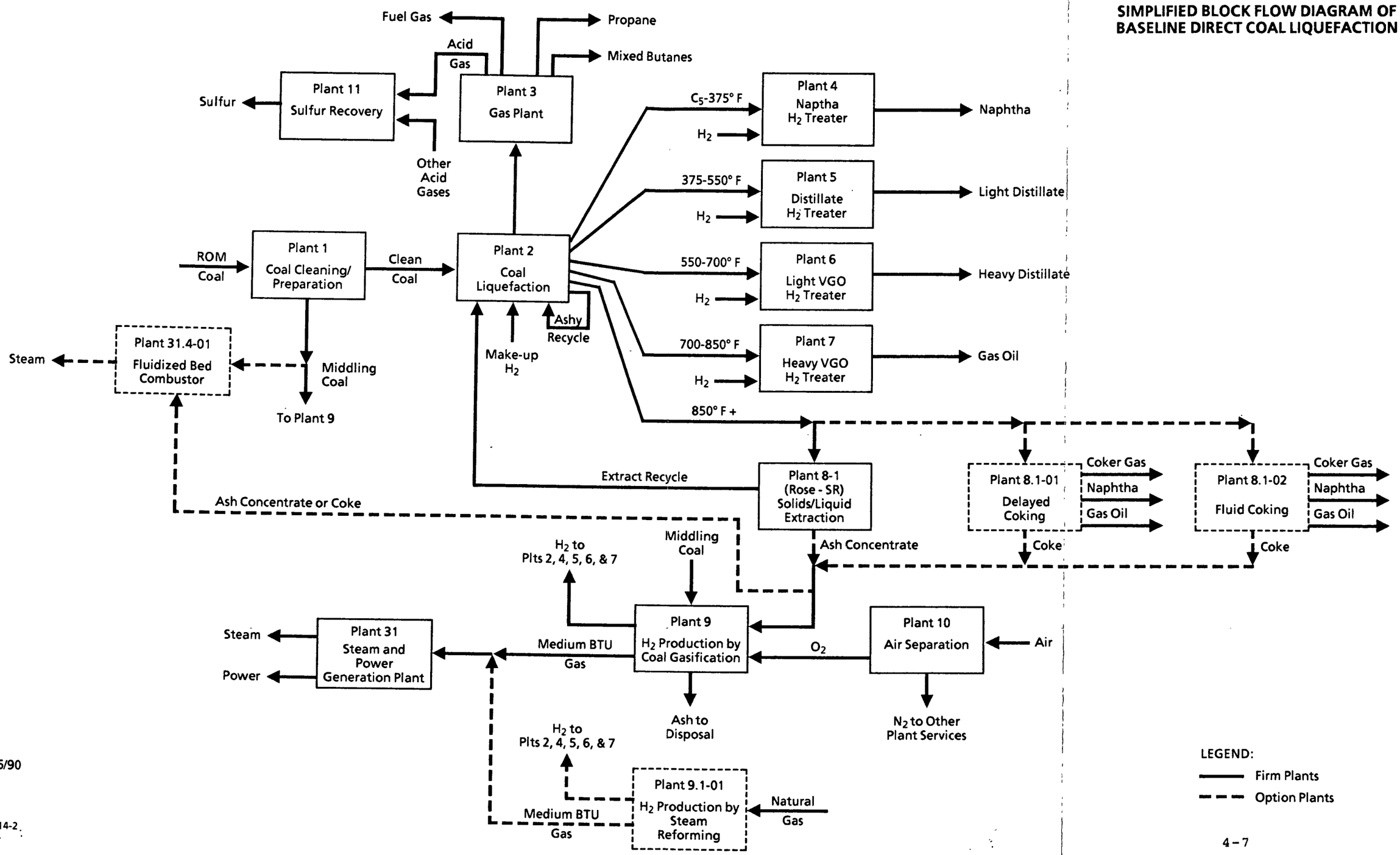
base line design. Hydrogen produced from the coal gasification process is purified in shift reactors, amine treating, and a hydrogen purification unit (pressure swing adsorption, PSA). The purified hydrogen goes to the liquefaction plant, the naphtha diene hydrogenation unit, and the three hydrotreaters as makeup hydrogen. The medium BTU gas from Plant 9 is used as fuel in the cogeneration facilities of Plant 31 (Steam and Power Generation).

Plant 10 (Air Separation) cryogenically fractionates air into oxygen and nitrogen streams. The oxygen stream (95.0%) is fed to Plant 9 whereas nitrogen (99.9.%) is supplied to the coal liquefaction complex for various uses.

Acid gases generated from various plants are sent to Plant 11, (Sulfur Recovery) to produce by-product sulfur using the Claus process. The Sulfur Recovery Plant contains a tail gas treater to increase the conversion of acid gas to elemental sulfur and reduce atmospheric release of sulfur compounds.

Figure No. 4.2

SIMPLIFIED BLOCK FLOW DIAGRAM OF BASELINE DIRECT COAL LIQUEFACTION



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4.1.2 Primary Facility Alternates

The process alternates to the baseline design which are included in the study are:

1. Two alternates to the main process configuration of two catalytic reactors in series for the liquefaction plant include:

   a. A first-stage thermal reactor and a second-stage catalytic reactor in series (Plant 2.3-01)

   b. Two catalytic reactors in series with a separator between the two stages to remove cracked gases from the feed to the second reactor and thus improve its hydrogen partial pressure (Plant 2.3-02)

2. Two coking alternates to the Solids/Liquid Separation ("ROSE-SR") Plant are included.

   a. The $1000^{\circ}F^{+}$ fraction would be processed in a delayed coker, using Conoco technology (Plant 8.1-01).

   b. The same fraction would alternately be processed in a FLUID COKER, using Exxon technology (Plant 8.1-02).

   The primary products from either of these coking alternates are coker gas, naphtha, gas oil, and coke. Liquid products are combined with the liquefaction plant products for upgrading. The coker gases are treated with the gases from Plant 2 and end up in fuel gas and LPG. The coke from the coker has the same disposition as the ash concentrate from the "ROSE-SR" plant.

3. Steam reforming of natural gas (Plant 9.1 - 03) to produce hydrogen instead of coal gasification. The products from this plant are hydrogen and medium BTU gas. Hydrogen is sent to Plants 2, 4, 5, 6 and 7, whereas medium BTU gas is used as plant fuel. This alternate must be combined with fluid bed combustion for steam production in order to process the solid products from the Solids/Liquids Separation Plant or from either of the two coking options.

4.1.3 Support Facilities Alternates

The Support Facilities Alternates to the baseline design which are included in the study are:

1. Two alternates to the main support facility configuration of Coal Preparation (Plant 1) - grinding, jig cleaning, and drying - for the liquefaction plant are:

   a. Heavy Medium Separation

   b. Spherical Agglomeration

2. One alternate to the steam and electric power generation systems for the liquefaction complex is:

   a. Fluidized Bed Combustor (Plant 31.4-01) for steam production in order to process the solid products from the solids/liquids separation process (Plant 8-1) or from either of the two coking options (Plant 8-1-01 or Plant 8.1-02). The alternate is utilized when steam reforming of natural gas (Plant 9.1-03) is used to produce hydrogen instead of Coal Gasification (Plant 9).

4.1.4 Block Flow Diagram for Process Simulation Model

Figure 4-2 (Simplified Block Flow Diagram of Baseline Direct Coal Liquefaction) shows the various plants and the main process flows. Plants 3,4,5,6,7, 10, and 11 will be modeled as blocks in the process simulation model as shown in the figure. Plants 8,9 and 31, which are shown with separate main and optional plants, will be modeled so that each main or optional plant will be modeled as a separate block. Plants 1 and 2 will be modeled with each sub-plant as a block as shown on the separate simplified block flow diagram for each of these plants, Figures 4-3 and 4-4 respectively. For example, Plant 1, will be modeled with five firm plant blocks and two optional plant blocks.

Heat and mass balances, elemental balances and a utility balance will be reported for each main plant block and for most of the sub-plant blocks shown on the three figures. For example, elemental balances on the fresh and spent catalyst plants, Plants 2.9 and 2.10, seem unnecessary since these sub-plants are only physical transfer operations which are being modeled to estimate their capital and operating costs.

Capital and operating costs will be generated for each plant. In addition, for each plant and sub-plant a table of the major process equipment and outline specs will be generated.

The process simulation model will be developed with sufficient flexibility to allow PETC to:

a. use the model for case studies to examine effects of various processing options and operating conditions,

b. modify the model for cases not included in the scope of the current project.

The capability of the simulation model are summarized in Table 4.1.

Figure 4-3

SIMPLIFIED BLOCK FLOW DIAGRAM OF PLANT 1 PROCESS SIMULATION MODEL

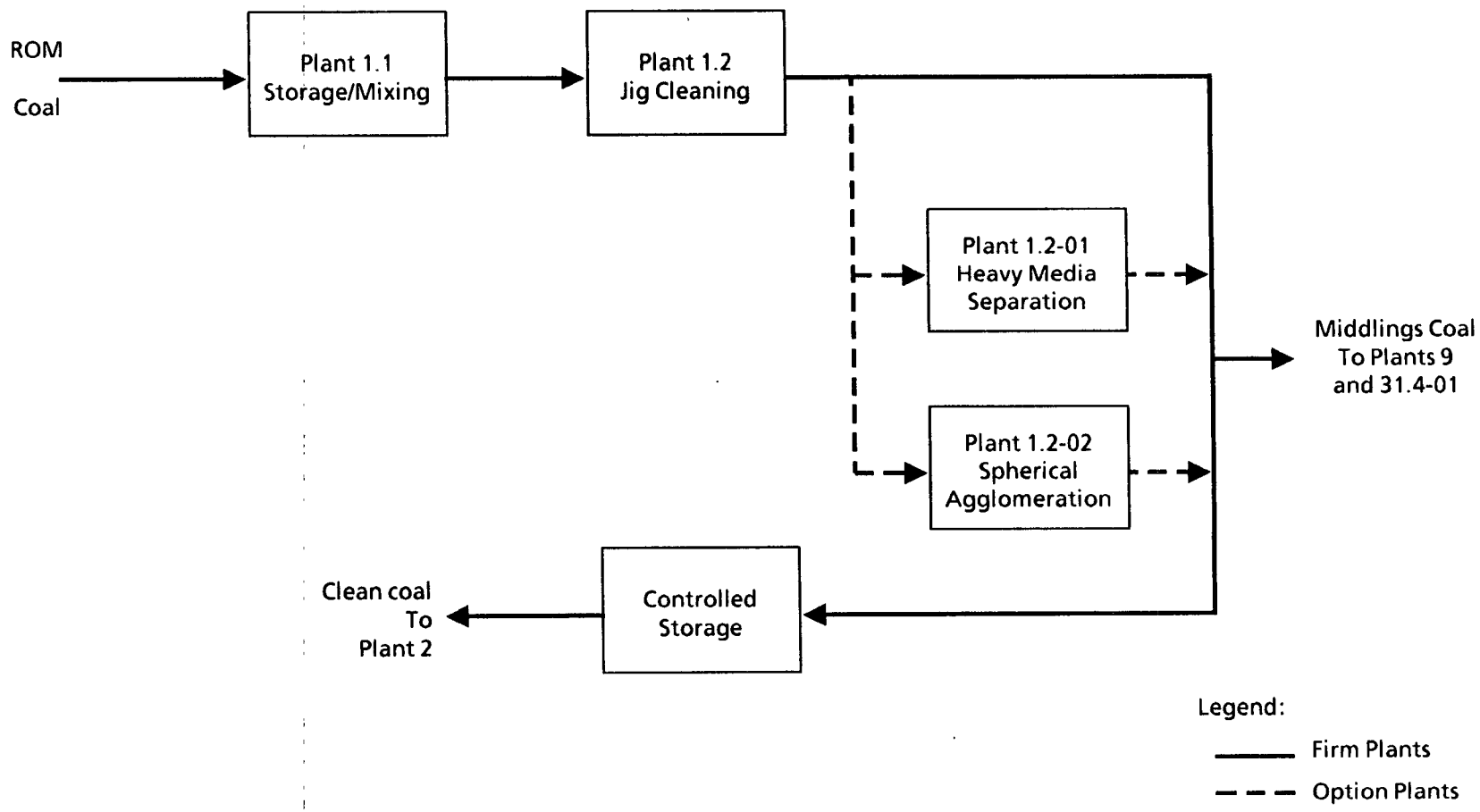

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Figure 4-4

SIMPLIFIED BLOCK FLOW DIAGRAM OF PLANT 2 PROCESS SIMULATION MODEL

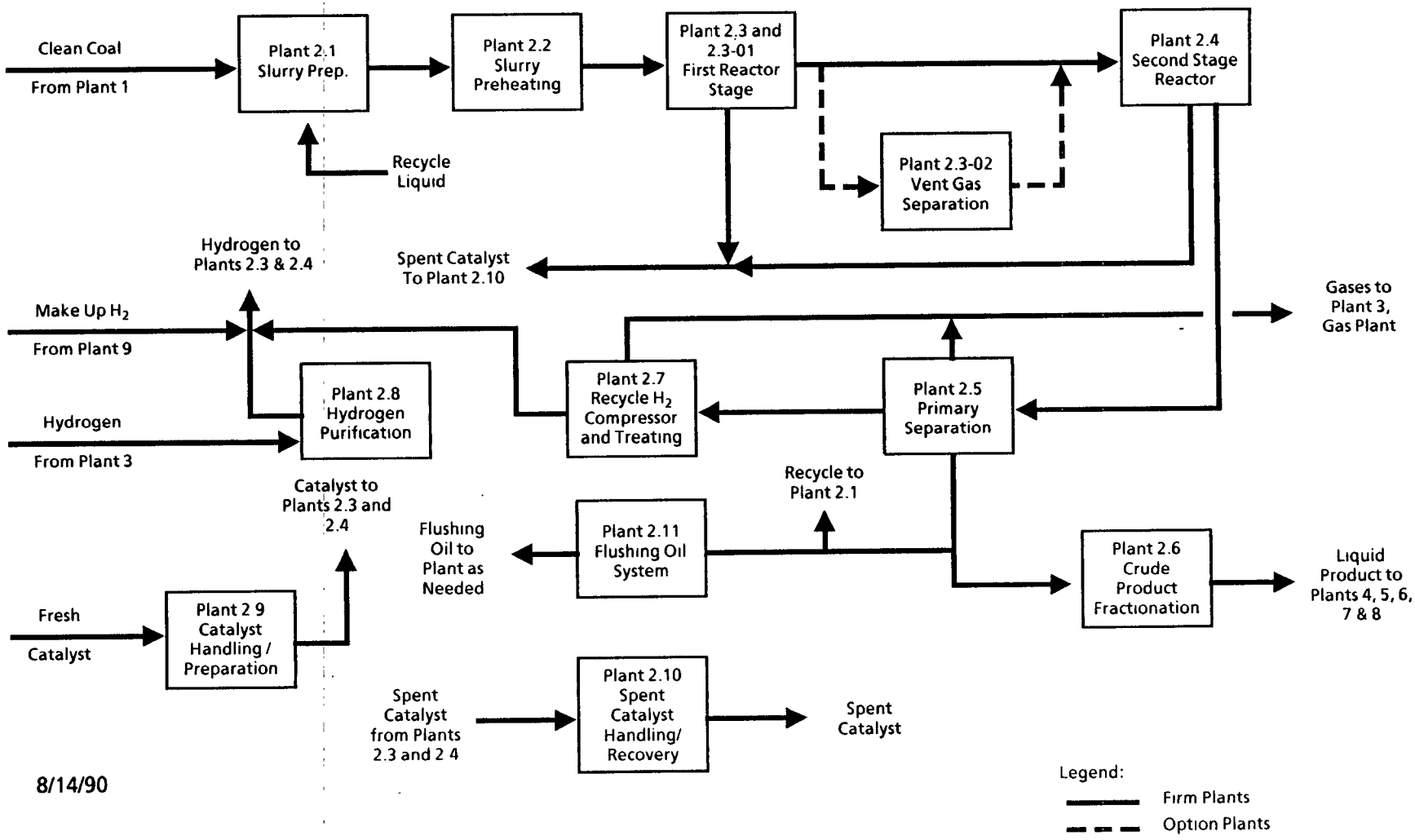

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TABLE 4-1
Simulation Model Capability Summary

Plant Capital No. Modeled	Single Block Model (a)	Detailed Model (b)	Heat/Mass Balance (c)	Elemental Balance (d)	Utility Balance (e)	Major Equipment List (f)	Cost (g)	Key Parameters
1. Coal Cleaning/ Preparation		x	x	x	x		x	Coal quality size distribution and moisture content
2. Liquefaction		x	x	x	x	x	x	Coal Conversion Yields by boiling range Liquid product qualities (gravity, S, N, O) Heteroatom removal (S, N, O), H2 consumption Correct response to variable changes temperature, space velocity, recycle rates
3. Gas Plant	x		x	x	x		x	Gas yields and H2S to sulfur plant
4. Naphtha Treater	x		x	x	x		x	Hydrogen consumption, heteroatom removal
5. Distillate Treat	x		x	x	x		x	Hydrogen consumption, heteroatom removal
6. Light VGO Treater	x		x	x	x		x	Hydrogen consumption, heteroatom removal
7. Heavy VGO Treater	x		x	x	x		x	Hydrogen consumption, heteroatom removal
8. Solid/Liquid Separation	x		x	x	x	x	x	Ash concentration, recycle rate/quality
Delayed coking	x		x	x	x		x	Liquid yields, coke production
Fluid Coking	x		x	x	x		x	Liquid yields, coke production
9. Hydrogen Generation	x		x	x	x		x	Hydrogen yield, compression, oxygen input Modeled as a block with yields per licensor package plus yield and utility correctors for delayed and fluid coke feed options Steam reforming option also modeled as block
10. Air Separation	x		x	x	x		x	Oxygen and nitrogen yields Compression
11. Sulfur Recovery	x		x	x	x		x	Sulfur yield
	x		x	x	x		x	Steam Production
31. Steam/Power Plant	x		x	x	x		x	Steam production, power generation
Fluid Bed Combustor Alternate	x		x	x	x		x	Steam production

Notes:
(a) Only one simulation block for this plant
(b) Multiple plant sections within a block
(c) Report lbs/hr, lb moles/hr, barrels/day MMSCFD, temperature and pressure of all input and output streams
(d) Carbon, hydrogen, oxygen, nitrogen, sulfur
(e) Fuel gas, steam, power, cooling water
(f) Output will list major equipment per baseline design and provide outline equipment specifications
(g) Capital cost scaled by block

4.2 Execution Philosophy

The Effective Project start date is May 16, 1990 (the day the contract was signed).

Project Execution is on Task Force Basis. The Project team is composed of a small full time core management group with part time functional groups.

Project schedule gaps mean manhour expenditure to the Project. The current Project schedule contains one month gap between Tasks 1 and 2. We recommend bridging the one month DOE approval gap between Tasks 1 and 2. This is most effectively done by initiating Tasks 2, 4, and 5 activities prior to final approval of Task 1.

Single task budgets (manhours and ODC's) could be slightly off-target as long as overall budget is not exceeded.

Technical concurrence of PETC on any contract items to be reviewed is requested to be done on an expeditious basis. Such concurrence could be obtained verbally by Bechtel by calling the PETC Project Manager, or his designate. Any issue requiring contract change, however, will follow the contract procedure.

Task #7 is a new task. It includes all Project Administration and Technical Coordination functions. These are Program Management, Technical Coordination, Secretarial, Cost/Scheduling and Legal/Contracts/Controller. It is a level of effort activity. Reporting on this task will be on a Summary basis in various Monthly and Quarterly Reports (primarily in early stages of the project). There will be no separate report issued on this task.

4.3 TASK AND SUBTASK DESCRIPTION

4.3.1 TASK I

Task 1: Project Management Plan

a. Bechtel/Amoco has prepared and submitted to PETC's COTR within sixty (60) calendar days after contract award, five copies of this Draft Project Management Plan covering the entire period of performance of the contract. The Project Management Plan shall provide details for, but not be limited to, the following information:

- Understanding of the Statement of Work
- Project management methods to complete the Statement of Work
- Project organization chart listing key personnel, their functions and percent of their time spent on the tasks
- Consultants and subcontractors if needed be used
- Detailed project schedule and methods to be used to maintain schedule
- Cost plan detailed by task and by month
- Project cost control methods
- Process model simulation verification methods
- Configuration management and control
- Reporting and documentation
- Cost estimating procedures.

b. Upon receipt of the PETC's written approval of the Project Management Plan, Bechtel shall issue the Final Plan and shall initiate its implementation immediately. Moreover, as agreed in the Bechtel/Amoco/PETC kickoff meeting of June 12/13, 1990, verbal approval

of the Draft Plan will be granted in a short period of time to allow the initiation of other tasks and conserve manhour expenditure.

c. Bechtel/Amoco may submit written recommended revisions to the Project Management Plan whenever Bechtel deems such revisions to be desirable for optimum achievement of contractual objectives. Incorporation of any Bechtel-recommended changes in the original Project Management Plan must be approved by PETC prior to implementation.

d. The subtask description of the activities in this task are shown below and then sequence depicted pictorially on the Critical Path Monitoring Diagram (Figure 4-5).

SUBTASK DESCRIPTION

Subtask Number	Subtask Title	Description
1010	Study Team	A qualified Bechtel/Amoco team has been assembled and approved by PETC
1020	Kickoff Meetings	Meeting with Amoco was held on June 5, 1990 and with PETC on June 12/13, 1990
1021	Statement of Work (SOW)	SOW is per contract. It will be modified by discussions and clarifications presented elsewhere in this report
1022	Establishing Project Management Procedure	The Project Management procedure is established following PETC requirement per contract (as shown in Section 6.3 of this report) and

		utilizing Bechtel's Project Managment procedure. Such procedure booklet is included in the project planning report as an appendix (Section 9)
1023	Project Organization scheme	The project organization scheme has been updated and included in report (Sections 6.1 and 6.2)
1024	Licensors and third parties	Generally one source per technology is being considered. Per June 12-13, 1990 Kickoff Meeting with PETC, contact with the various licensors and third parties has been initiated.
1025	Project Schedule updating	Project schedule has been divided into seven tasks as opposed to six tasks as proposed in the proposal. concept of the new task task (Task #7) was presented and approved by PETC during the June 12-13, 1990 Kickoff Meeting. This has been documented herein (Section 4.2). Interrelationship of the various tasks is shown as a Block Flow Diagram in Figure 4-1.
1026	Detailed Cost	The detailed Cost Plan has been worked out utilizing the agreed upon schedule and budget. This is presented here Section 6.5.

1027	Cost Control	The Cost Control Procedure Procedure has been completed and is included in Section 6.3.1
1028	Process Model Simulation	Process Model Simulation verification methods are for the liquefaction model only utilizing Wilsonville Plant data. parameters and verification basis are listed on page 16.
1029	Configuration Management and Control procedure	The management concept as applicable to the project has been defined and included in Section 5 and the procedure is listed in 6.3.2
1030	Reporting and documentation requirement	Per contract, the various reporting and documentation requirements are established. These are listed in Section 7.
1035	Updated cost	Following Bechtel's procedure, the capital cost estimating procedure has been developed for the project. This will allow Bechtel to estimate the capital cost on ± 30% accuracy basis. This is included in 6.3.3 of the report.
1040	Process Design Basis	The design basis reflects the changes recommended by PETC during June 12-13, 1990 meeting. This is included in the process scope (Section 4.1) of the report.
1041	Pre-selection of Technology	During the above mentioned meeting PETC's approval has been obtained. The preselection list agreed upon is included in Section 4.6.

1042	Initiation of Contractual	Per Bechtel's contracting procedure, this has been discussion with initiated. Licensors
1050	Draft Project Management Plan (DPMP)	Project Management Plan, the scope of which has been defined in the contract, is completed and being sent to PETC for review and approval.
1060	DPMP Review by by PETC	-
1070	Final Project Management Plan (FPMP)	Upon approval by PETC, the FPMP will be issued. As discussed and agreed by PETC during the June 12-13, 1990 meeting, several tasks will be initiated even before the issuance of the FPMP.
1080	Monthly Reports	The monthly reports will include the status and accomplishment of each task. The format is discussed in Section 7.1.1 of the report. This activity, although shown in Task 1, will be carried out under Task 7 throughout the duration of the project.
1090	Quarterly Reports	The quarterly reports will include the status and accomplishments for each task. The format is presented in Section 7.1.2 of this report. This activity, although shown in Task 1, will be carried out under Task 7 throughout the duration of the project.

4.3 TASK AND SUBTASK DESCRIPTION

4.3.2 Task II

Task Description

Task II concerns the development of the baseline design of the coal liquefaction facility. This part of the study includes the acquisition of process licensor information, incorporation of various processing options into the design, and developing the design of the onsite processing units and offsite facilities (including storage and loading, utilities, and waste handling).

In this task certain plants are handled as packaged plants (or blocks) with an overall heat and material balance only.

Subtask Description

Subtask Number	Subtask Title	Description
2010	Obtain reactor design bases and other design data from COTR	Obtain from DOE which Wilsonville runs form the basis for the design and model. Obtain the data developed from those runs (257 and 250).
2020	Develop design bases	Determine the coal feed or product rate basis for the plant capacity, the site conditions, and other factors which form a basis for the plant design.
2030	Develop preliminary BFD and overall material balance	Use information from the public domain and from the Breckinridge Project files to establish a preliminary base line plant configuration and material balance

2100	Prepare licensor inquiries	Contact selected licensors of proprietary technology. Develop feed data and product specifications for each licensed process. Prepare and send letters requesting information on their processes specific to the direct coal liquefaction plant
2110	Develop preliminary process packages by licensors	Continue dialogue with selected licensors of proprietary technology. Receive and evaluate information received. Make technology selection for the coal gasification unit
2120	Conduct material and balances for licensed units	Receive material and energy balances for the liquefaction train from Amoco. Incorporate information from licensors and develop into a spreadsheet material and energy balance summaries for the entire process block
2130 M.E. LIST	Perform equipment sizing for licensed units	From licensor information and material and energy balances, determine size of major pieces of equipment (reactors, towers, vessels, exchangers, fired heaters, compressors, and pumps). Develop an equipment summary for the baseline design
2140 M.E. LIST	Prepare PFD's for licensed units	From licensor information develop process flow diagrams for each of the proprietary processes

Subtask Number	Subtask Title	Description
2150	Prepare material selection guide for licensed units	Using the material balances and licensor information, determine the material and metallurgical requirements for the various components and systems of the proprietary process units
2160	Prepare process equipment specifications for licensed units	Using the equipment sizing information (subtask 2130) and the material selection guide (subtask 2150), prepare process data summary sheets for the major equipment (reactors, towers, vessels, exchangers, fired heaters, compressors, and pumps) for the proprietary process units
2200	Perform simulation and develop material and energy balances for open art units (OAU)	Develop process configurations for the OAU. Develop models of the processes using Simulation Science's PROCESS simulation software. Incorporate the material and energy balances for these units from the simulations into the overall material and energy balance spreadsheet
2210 M.E. LIST	Size equipment for OAU	From the output of the simulations for the OAU, determine size of major pieces of equipment (reactors, towers, vessels, exchangers, fired heaters, compressors, and pumps). Develop an equipment summary for the baseline design
2220 M.E. LIST	Complete PFD's for OAU	From the process configurations for the OAU (subtask 2200), develop process flow diagrams for each of the process units

Subtask Number	Subtask Title	Description
2230	Prepare material selection guide for OAU	Using the material balances, determine the material and metallurgical requirements for the various components and systems of the OAU
2240	Prepare process equipment specifications for OAU	Using the equipment sizing information (subtask 2210) and the material selection guide (subtask 2230), complete process data summary sheets for the major equipment (reactors, towers, vessels, exchangers, fired heaters, compressors, and pumps) for the OAU
2300	Perform instrumentation scoping study	Develop an instrument summary by unit for the process units, utilities, and offsites. Develop an overall control philosophy. Determine requirements for a digital control system (DCS) and for control centers
2310	Identify maximum liquefaction reactor capacity	Obtain from HRI
2320	Identify other critical equipment limitations	Determine constructibility of critical equipment (shop fabrication and shipping versus field erection). Determine if the required equipment size can be met by vendors
2330	Finalize BFD and overall material balance	Update the overall BFD and material balance from work completed to date on the baseline design

Subtask Number	Subtask Title	Description
2340	Estimate catalyst and chemical requirements	From licensor information and from the development of the OAU, prepare a summary of the catalyst and chemical requirements by unit. Include requirements from utilities and offsite units as they become available (iterative process)
2400	Develop utility balances and BFD's	Develop an utility summary by unit for each of the process units. Prepare an overall plant utility balance and summary. Develop an overall BFD for utilities and BFD's for individual utility systems
2410 M.E. LIST	Define utility facilities	Set pressure levels in the steam system, define waste heat and gas fired steam facilities. Define electrical generating system, waste water treatment system, water treatment systems, etc. for base line plant configuration. Sparing and operating philosophy to be recommended.
2420	Develop electrical one-line diagrams	Establish voltage levels and listing of major electrical energy consuming areas and equipment. Include transformer requirements.
2500	Identify typical generic site	Site selection will take into consideration the availability of resources, acceptable soil strength and identify earthquake zone rating.

Subtask Number	Subtask Title	Description
2510	Obtain site data	Contact several communities in southern Illinois and obtain general site data on available industrial land.
2520	Define storage and shipping requirements	Liquid and solid product storage facilities will be sized based on an approved inventory requirement. Shipping facilities will be sized based on an approved product shipping schedules.
2530	Define other offsite facilities M.E. List	Coal handling, storage, cleaning and grinding facilities will be defined. Other facilities like storm water treatment, firewater system, building, roads, etc. will be defined.
2540	Develop preliminary plot plan	The layout of the complex is not constrained by availability and/or topography of the land.
2550	Define site preparation	Estimate site work for the construction and operating of the complex. Site preparation to assume a clear level site with an acceptable soil strength and identifiable earthquake zone rating.
2600	Characterize waste streams	Utilize licensor, Wilsonville and Public domain data to estimate the containments and their levels in the waste streams.

Subtask Number	Subtask Title	Description
2610	Define air emission control facilities	Define facilities to meet Federal and State of Illinois air emission standards as applicable in 1990.
2620 / Mic. List	Define wastewater treating facilities	Define facilities to meet Federal and State of Illinois water quality standards as applicable in 1990.
2630	Define solid waste management plan	a) Solid Waste Management Plan will be divided into four categories: (1) coal ash, (2) spent catalyst, (3) hazardous wastes, and (4) non hazardous wastes. b) Develop a plan to meet the Federal and State of Illinois solid waste disposal standards as applicable in 1990.
2640	Develop permitting strategy	Develop a permitting strategy per 1990 rules and regulations.
2700	Perform reliability/ availability analysis for the coal liquefaction complex	Analyze the reliability and availability of each of the process units and for each of the offsite and utility systems. Determine the reliability and availability for the entire complex
2710	Estimate onstream factors for the coal liquefaction complex	Using information from licensors and reported typical onstream factors from OAU, offsites and utilities, estimate the onstream factor for each plant in the complex and for the entire coal liquefaction complex

Subtask Number	Subtask Title	Description
2800 M.E. LISS	Develop two coal cleaning options	Two cleaning options to be studied are: (1) heavy medium separation, and (2) spherical agglomeration. Assume no change in coal reactivity due to cleaning technologies.
2810 M.E. LISS	Develop thermal reactor option	Using Wilsonville run 250, determine the material and energy balance for the option to convert the first stage catalytic reactor to a thermal reactor. Develop equipment sizing, PFD's, and utility requirements for the system. Prepare a BFD, material and utility balances for total complex.
2820 M.E. LISS	Develop the vent gas separation option	Using Wilsonville data and the process configuration provided by PETC, determine the material and energy balance for the option to add a vent gas separator between the two catalytic reactors. Develop equipment sizing, PFD's, and utility requirement for the system. Prepare a BFD, material and utility balances for total complex.
2830 M.E. LISS	Develop the delayed coking option	Using data obtained from Conoco, determine the material and energy balance for the option to change from the solvent deashing process to a delayed coker for processing the vacuum bottoms. Develop equipment sizing, PFD's, and utility requirement for the system. Prepare a BFD, material and utility balances for total complex.

Subtask Number	Subtask Title	Description
2840	Develop the FLUID COKING option	Using data obtained from Exxon, determine the material and energy balance for the option to change from the solvent deashing process to a FLUID COKER for processing the vacuum bottoms. Develop equipment sizing, PFD's, and utility requirement for the system. Prepare a BFD, material and utility balances for total complex.
2850	Develop the low ash feedstock option (without bottoms processing)	Using data obtained from the coal cleaning options (subtask 2800), develop the option to bypass any processing steps for the vacuum bottoms. A deeper vacuum tower cut is made and the vacuum bottoms are sent directly to the coal gasification unit or the fluidized bed combustor. Develop equipment sizing, PFD's, and utility requirement for the system. Prepare a BFD, material and utility balances for total complex. (The decision on whether or not to include this option will be made at a later date.)
2860	Develop hydrogen manufacture option by steam reforming of natural gas	Using data obtained from KTI, determine the material and energy balance for the option to change from the hydrogen manufacturing from coal gasification to steam reforming. The steam production option of a fluidized bed combustor instead of a combined cycle plant is included in this option in order to dispose of the middling coal, if any, and either the ashy concentrate from the solvent deashing plant or coke

Subtask Number	Subtask Title	Description
		from either of the two coking options. Develop equipment sizing, PFD's, and utility requirement for the system. Prepare a BFD, material and utility balances for total complex.
2890	Compile cost estimate input	Bring together all information developed in the previous subtasks of Task 2 as input to cost estimating. This includes estimates provided by the licensors of proprietary processes, equipment summaries for OAU, equipment summaries for offsite and utilities systems, and equipment summaries from the option studies.
2900	Draft topical report for Task 2	--
2910	Review Task 2 topical report with PETC	--
2920	Issue topical report for Task 2	--

4.3 TASKS AND SUBTASKS DESCRIPTION

4.3.3 Task III

Task Description

Task III concerns the development of the cost estimate and economics for the base-line design and the alternates for the coal liquefaction facility. This part of the study includes the compilation of equipment lists and utilities summary, development of scaling factors for equipment size and plant cost, and development of the estimates for capital equipment, working capital, and owner's costs. Work to perform the economic analyses includes the workup of the manpower requirements and operating costs for the baseline design and for the alternates and the completion of sensitivity studies.

In this task plants are handled as packaged plants or blocks for the purposes of capital investment, and operating costs as well as overall capacity scale-up.

Subtask Description

Subtask Number	Subtask Title	Description
3010	Compilation of the major equipment list	Summarize from work performed in Task 2 (subtasks 2130, 2140, 2210, 2220, 2410, 2530, 2620, and 2800 - 2860)
3020	Development of utility summary	Summarize from work performed in Task 2 (subtask 2400)

Subtask Number	Subtask Title	Description
3100	Development of scaling factors	For the liquefaction plant, the train will be scaled from 50% to 100% of maximum train size. The number of trains will be calculated as the plant size divided by the maximum train size, rounded to the next highest integer. Scaling factors will be developed for equipment size, plant capital cost, utility requirements, manpower requirements, chemical and catalyst cost, and working capital. DOE will review and approve the scaling factors.
3110	Vendor quotes for critical equipment.	Critical equipment may include compressors, certain pumps and the DCS, etc. as required by cost estimators.
3120	Estimating of other major equipment cost	Other major equipment cost will be estimated using Bechtel's inhouse information.
3130	Estimating of bulk material costs	Bulk materials cost will be estimated using Bechtel's inhouse information.
3140	Estimating of direct labor manhours and costs	Direct labor manhours will be estimated using Bechtel's inhouse information. Labor costs will be developed by surveying recent Bechtel projects in the area.
3150	Estimating of major subcontracts	Major subcontracts (e.g.; field erection of storage tanks, cooling towers, boilers, large vessels; paving; major earthwork; refractory installation; painting and insulation) will be estimated using Bechtel's inhouse information.

Subtask Number	Subtask Title	Description
3160	Estimating of total direct costs	Use Bechtel's cost procedures
3170	Estimating of indirect field cost	Indirect field cost will be estimated using Bechtel's inhouse information
3180	Estimating of home office costs	Home office costs will be estimated using Bechtel's inhouse information
3190	Computing of total cost of facilities for the baseline design	Use Bechtel's cost procedures
3200	Estimating of owner's costs	Use Bechtel's cost procedures
3300	Estimating of working capital	Use Bechtel's cost procedures
3400	Development of appropriate contingency	Use Bechtel's cost procedures
3410	Computation of total capital cost	Use Bechtel's cost procedures. Investment cost basis will be the second quarter of 1991 and ± 30% accuracy.
3500	Development of operating manpower requirements	Manpower requirements will be developed by unit, system, and facility for operating, maintenance, support, technical, and administrative personnel. Bechtel will assume that all personnel will be direct hire and non-union.
3510	Estimating of operating costs	Wage rates used will be those typical for a hydrocarbon process facility in that area. Utilities will be summarized and balanced down to the common materials (coal, water,

Subtask Number	Subtask Title	Description
		and natural gas). Cost of coal and utilities(water and natural gas) available at the plant fence will be assumed to be purchased at industrial rates consistent with the site location.
3550	Development of project schedule	The engineering schedule will be based on Bechtel's experience in performing the work on the most efficient basis. The schedule for procurement of material and equipment will be based on recent experience. A fixed construction period will be set based on Bechtel's experience.
3600	Development of baseline economics	Using the information developed previously (subtasks 3190, 3200, 3300, 3400, 3410, 3510, and 3550) and an estimate of escalation for construction and operating costs, the economics and a DCF rate of return for the baseline design will be calculated.
3610	Sensitivity studies	Sensitivity studies versus the baseline economics will be performed by varying the capital cost, and escalation on raw material costs and product costs.
3800	Estimating of costs and develop economics and sensitivity of alternates	Develop cost estimates for the alternates for the baseline process units and utilities. Develop operating costs and economics for each alternate. Perform sensitivity studies similar to subtask 3610 on each alternate.

Subtask Number	Subtask Title	Description
3900	Drafting of topical reports for Task 3	
3910	Task 3 report review with PETC	
3920	Final topical report for Task 3	
3930	Drafting of final project report	
3940	Final project report	

4.3.4 TASK IV

Task Description

Task 4 concerns the development of mathematical algorithms and models for equipment sizing, scaleup, costing, train duplication for incorporation into the Task 5 ASPEN simulation program. This task will be done in parallel with Task 5.

Subtask Description

Subtask Number	Subtask Title	Description
4010	Review ASPEN equations	Review of existing ASPEN equipment sizing equations for major equipment.
4020	Develop supplementary scale up equations	Develop equations and algorithms, as required, to scale major equipment items.
4030	Incorporate equipment size limitations	Incorporate major equipment size limits (reactor diameter, etc.) into scale up equations.
4040	Incorporate multiple train requirements.	Incorporate into equipment scaling equations a means to handle multiple trains within a process unit. Philosophy may vary with process unit.
4050	Draft topical report for Task 4	Report covering development of equations for equipment sizing, scaling, size limitations and train requirements will be prepared.
4060	Review of draft topical report for Task 4	The draft topical report for Task 4 will be reviewed with PETC prior to issue.

4.3.5 TASK V

Task Description

Task 5 concerns the development of an ASPEN process simulation model of the baseline design. The model will produce complete heat and material balances, elemental balances around each plant and the entire process complex, a major equipment list and outline specifications for Plants 1 through 11, utility requirements, capital cost for all plants, and a discounted cash flow economics model for the total complex. The model will be suitable for studying technology advances and options in a case study approach. The model will not feature optimization capabilities. Additional detail is provided in Figures 4-2, 4-3 and 4-4, and Table 4-1.

Subtask Description

Subtask Number	Subtask Title	Description
5010	Set up Aspen files and procedures	This task deals with preliminaries such as standardizing component and pseuodocomponents, enthalpy and K-Value options, ASPEN file numbering etc. PETC will review and comment.
5020	Simple ASPEN base case model	A simple ASPEN base case model will be developed, analagous to the preliminary BFD of subtask 2030. Preliminary overall block material and energy balances will be developed in this task and improved in subsequent tasks.
5030	Report material and energy balances	The material and energy balance output of the simple base case model will be standardized to a format agreed upon by Bechtel and PETC.
5040	Compare model output with data	The internal consistency of the model will be verified against key parameters in the baseline design and/or Wilsonville data. (For example, heteroatoms removal in hydrotreaters versus the baseline design, or coal conversion in the liquefaction

		plant versus Wilsonville data). PETC will review and comment.
5050	Assemble data on alternate process conditions	Data for alternative process options are gathered in this subtask preparatory to modeling these options. e.g., ash agglomeration, first-stage thermal reactor, vent gas separation and others per contract.
5060	Improve process block modules	Process blocks of the simple base case will be improved iteratively and in parallel with development of the baseline design. Material and energy balances will be improved and a kinetic model of the coal liquefaction plant will be substituted for the simple block module. Major equipment list and outline specifications reporting capability will be added.
5070	Assemble simulation model from modules	All plant modules will be assembled to complete the total plant simulation model.
5110	Add elemental balance capabilities	Stream elemental balances (carbon, hydrogen, nitrogen, oxygen and sulfur) across each plant as well as the total plant will be added.
5210	Model alternative process options	Data gathered in subtask 5050 will be used to model alternative process options in a case study approach.
5310	Develop interface for capital cost algorithms	Capital cost algorithms developed in Task 4 will be implemented in ASPEN algorithms via Fortran blocks.
5320	Complete capital Cost Module	Testing of the capital cost predictions module (versus algorithms, minimum train size etc.) as well as standardizing the output format will be done in this subtask.

5410	Develop economic report module	An economic module will be developed to provide complete project economics. A discounted cash flow basis will be utilized to determine the project IRR (Internal Rate Of Return) based on economic assumptions specified in the RFP. The economic report format will be reviewed with PETC.
5420	Interface with capital and operating cost algorithms	This task integrates capital and operating cost information into the cost algorithms economic module to provide a working economic module within the process simulation module.
5900	Draft topical report	A topical report covering development of the entire simulation module will be prepared.
5910	Review Task topical	Draft topical report for Task 5 will be reviewed with PETC.
5920	Finalize and issue Task 5 topical report	The final topical report for Task 5 will be issued.

4.3.6 TASK VI

Task Description

Task 6 concerns the development of a training manual and a training course for the process simulation model. The training course will include an overview of the system, modification of the reporting system, interfacing user models, modification of chemical properties, use of the cost and economic modules, specifying flowsheets, streams, components, properties, and convergence. Trainees will be instructed through the use of case study example problems.

Subtask Number	Subtask Title	Description
6010	Schedule training resources	Schedule training facilities, equipment and personel. Training will be for one week at the Amoco Training Center site and will be limited to six people.
6020	Develop training manual	A training manual will be developed covering the items mentioned in the above Task description. If trainees have prior ASPEN training (recommended) then the course content will be adjusted to focus more time on case study examples. PETC will be consulted regarding emphasis of course content.
6030	Draft Topical Report for Task 6, the training manual	The training manual will be reviewed and available prior to the training course.
6040	Review Task 6	The draft topical report for Task 6 will be reviewed with PETC.
6050	Finalize and issue Task 6 topical report	The finalized topical report for Task 6 will be issued.
6060	Conduct training	The training session, as described above, will be conducted.

4.3.7 TASK VII

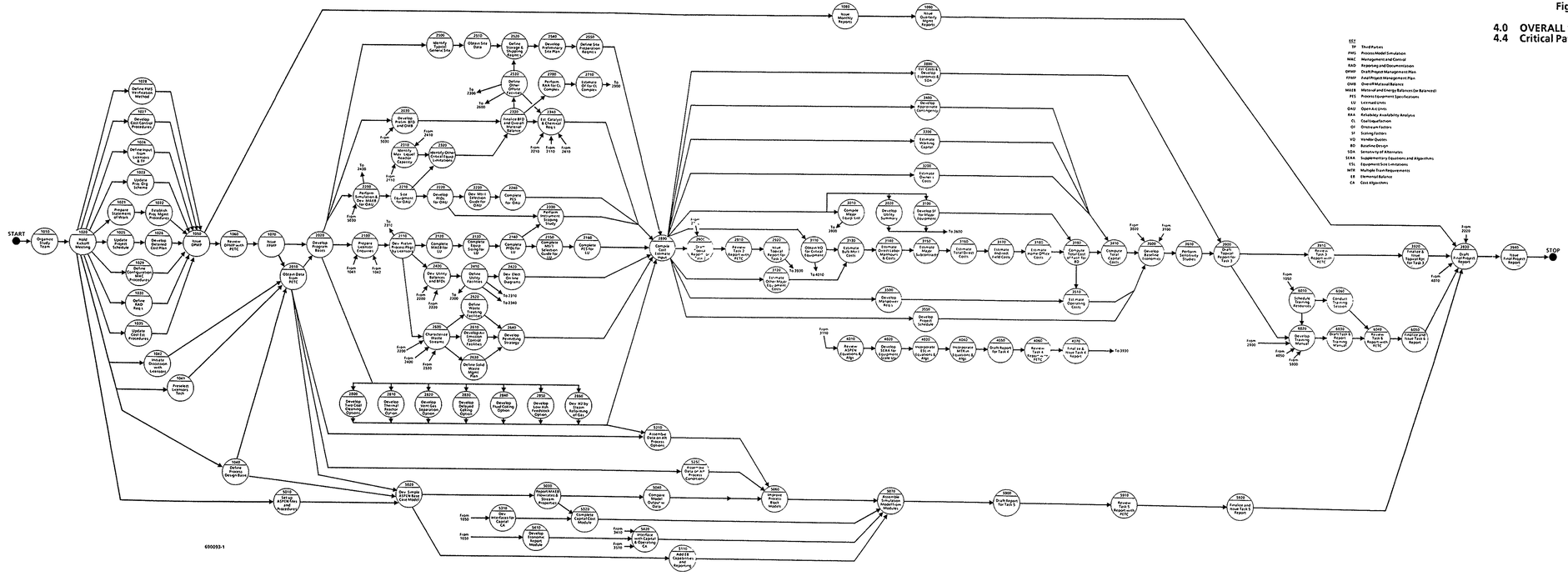
Task Description

Task 7 is a new task formally introduced during the June 12-13, 1990 Kickoff Meeting and accepted by PETC. This has been subsequently included in the execution philosophy of the project and is included in Section 4.2 of this report.

As discussed in 4.1 above, Task 7 is the overall Management and Technical Coordination function. It also included all the support functions such as Project Control (Cost & Scheduling), Legal, Contracts, Secretarial and Accounting. It is a level of effort activity with no subtasks. All engineering functions are on part-time and as-needed basis for maximum cost-effective execution of this study.

Figure 4-5

4.0 OVERALL SCOPE OF WORK
4.4 Critical Path Monitoring Diagram



4.5 NUMBERING SYSTEM

4.5.1 Philosophy

Numbering For Plants:

The total coal liquefaction complex is comprised of a group of Plants. These plants are divided into two categories:

1) Primary Process facilities, and 2) Support facilities.

Each plant in either of these two facilities is individually numbered. For example: coal cleaning and preparation is Plant number 1, coal liquefaction is Plant 2, etc.

Numbering For Parallel Trains:

Parallel trains are numbered by adding suffix A, B, C, etc. to the plant number. (For example if there are three parallel trains for coal liquefaction plant (Plant 2) it will be numbered as 2A, 2B and 2C).

Numbering For Sections:

Numbers for each plant are listed in Block Flow Diagram Figure 4-2. Each plant is subdivided into various identifiable sections. Such sections are listed as the subclassification. Refer to pages 4-45 through 4-49 for process facilities and pages 4-51 through 4-56 for support facilities. For example, sections for Plant 1 are numbered as 1.1, 1.2, etc; for Plant 2, the sections are numbered as 2.1, 2.2, etc.

Numbering For Alternates:

The alternates are numbered by adding hyphenated suffix to the plant number, or plant section number (For example; 9.1 is the plant number of hydrogen production). The numbering for alternate technology option of hydrogen production by coal gasification is 9.1 - 01. Similarly, the numbering for the alternate option for hydrogen production by steam reforming is 9.1 - 02.

Numbering of Individual Equipment at a particular location:

Consider an example of numbering one heat exchanger located in area 100 for liquefaction reactor with the option of first stage reactor being thermal. From plant listing in page 4-46 the plant no. is 2 and section number is 3 with option 1. From Bechtel's equipment letter code listed in page 4-58, heat exchanger's group letter is E.

The numbering for the above heat exchanger will be:

2.3 - 01 - E101

plant no.	section no.	option no.	letter code for equipment	Location number of the equipment

If there are three exchangers instead of one in the above example, they will be numbered as:

2.3 - 01 - E101	for first exchanger
2.3 - 01 - E102	for 2nd exchanger
2.3 - 01 - E103	for 3rd exchanger.

4.5.2 Primary Process Plants Numbering System

The main process plants numbers and description are shown in Table 4-2. However, the section numbers of these plants along with any alternate section numbers are shown on pages 4-46 through 4-49.

TABLE 4-2

Process Facilities Identification Code for Baseline Direct Coal Liquefaction

Process Plant No.	Primary Process Plants
1	Coal Cleaning and Preparation
1.2 - 01	Coal Cleaning Option of Heavy Medium Separation
1.2 - 02	Coal Cleaning Option of Spherical Agglomeration
2	Two Stages Coal Liquefaction
2.3 - 01	Thermal Reactor
2.3 - 02	Vent Gas Separation
3	Gas Separation Plant
4	Naphtha Diene H_2 Treating & Merox
5	Distillate Hydrotreater
6	Atmospheric Gas Oil Hydrotreater
7	Light Vacuum Gas Oil Hydrotreater
8.1	Solids/Liquids Separation (ROSE - SR)
8.1-01	Delayed Coker
8.1-02	Fluid Bed Coker
9.1-01	Hydrogen Production By Coal Gasification (Texaco)
9.1-02	Hydrogen Production By Coal Gasification (Shell)
9.1-03	Hydrogen Production By Steam Reforming
10	Air Separation
11.1	Sulfur Recovery Unit
11.2	Tail Gas Treater

COAL CLEANING AND PREPARATION PLT 1

1.1 - Storage/Mixing

1.2 - Jig Cleaning

1.2 - 01 Coal Cleaning by Heavy Medium

1.2 - 02 Coal Cleaning by Spherical Agglomeration

1.3 - Controlled Storage

COAL LIQEFACTION PLT 2

2.0 - Coal Grinding and Drying Operation

2.1 - Coal Slurry Preparation

2.2 - Slurry Preheating

2.3 - 1st Stage Reaction

2.3 - 01 Thermal Reactor

2.3 - 02 Vent gas separation

2.4 - 2nd Stage Reaction

2.5 - Primary Separation includes Single Stage Led Down

2.6 - Crude Product Fractionation

2.7 - Recycle Hydrogen Compression and Treating (Amine Treatment)

2.8 - Hydrogen Purification

2.9 - Fresh Catalyst Handling/Preparation

2.10- Spent Catalyst Handling/Recovery

2.11- Flushing Oil System

GAS PLANT SEPARATION PLT. 3	NAPHTHA HYDROTREATER PLT. 4
3.1 - Deethanizer	4.1 - Hydrotreating
3.2 - Depropanizer	
3.3 - Debutanizer	
3.4 - Amine Treating	
3.5 - Merox (C_4 and C_3)	
3.6 - Compression	

DISTILLATE HYDROTREATER

PLT. 5

5.1 - Hydrotreating

GAS OIL HYDROTREATER

PLT. 6

6.1 - Hydrotreating

LIGHT VACUUM GAS OIL HYDROTREATER

PLT. 7

7.1 - Hydrotreating

SOLIDS/ LIQUIDS SEPARATION

PLT. 8

8.1 - Solvent Deashing (ROSE - SR)
8.1-01 - Delayed Coker (Conoco)
8.1-02 - Fluid Bed Coker (Exxon FLUID COKING)

HYDROGEN PRODUCTION

PLT. 9

*9.1 - SYN Gas Production via TEXACO or SHELL Coal Gasification
9.1-01 - Steam Reforming
9.2 - Shift Convertion
9.3 - Acid Gas Removal
9.4 - Compression
9.5 - Hydrogen Purification (PSA)

AIR SEPARATION

PLT. 10

10.1 - Air Separation Unit
10.2 - Oxygen Storage & Vaporization (95%)
10.3 - Nitrogen Storage & Vaporization (99.9%)

BY-PRODUCT SULFUR RECOVERY

PLT. 11

11.1 - Claus Plant
11.2 - Tail Gas Treater
11.3 - Incinerator
11.4 - Storage & Loading (Includes sulfur degassing)

* Both technolgies will be evaluated and one will be selected and incorporated in baseline design

4.5.3 Support Facilities Numbering System

The main support facility plant numbers and description are shown on Table 4-3. However, the sections numbers of these plants above with any alternate section numbers are shown on pages 4-52 through 4-56.

TABLE 4-3

Support Facilities Identification Code for Baseline Direct Coal Liquefaction

Support Facilities No.	Support Facilities
19	Relief and Blowdown
20	Raw Material Receiving Storage and Product Tonnage
21	Interconnecting Piping Systems
22	Product Shipping
23	Tank Car/Tank Truck Loading
24	Ash Disposal
25	Chemical and Catalyst Handling
30	Electrical Distribution System
31	Steam and Power Generation
31.1	Co-Generation System
31.4-01	Fluidized Bed Combustor
32	Raw, Cooling and Potable Water Systems
33	Fire Protection Systems
34	Waste Water Treatment Systems
36	Instrument & Plant Air Systems
37	Solid Waste Disposal System
40	General Site Systems
41	Buildings
42	Telecommunications Systems

OFFSITE STORAGE AND DISTRIBUTION FACILITIES

RELIEF AND BLOWDOWN FACILITIES PLT. 19	RAW MATERIAL RECEIVING STORAGE AND PRODUCT TANKAGE PLT. 20	INTERCONNECTIONS PIPING SYSTEMS PLT. 21
	20.1 - ROM Coal Handling & Storage 20.2 - Intermediate Liquid Products Storage 20.3 - Final Products Storage	21.1 - Steam 21.2 - Condensate 21.3 - Air (Plant and Instrument) 21.4 - Nitrogen 21.5 - Sour Water 21.6 - Acid Gas 21.7 - Process Lines(Inter Units and Run Downs) 21.8 - Flushing Oil 21.9 - Fuel Gas 21.10- Hydrogen 21.11- Pipe Supports 21.12- By Products

OFFSITE STORAGE AND DISTRIBUTION FACILITIES CONTINUED'

PRODUCT SHIPPING

PLT. 22

22.1 - Pipeline Connections/ Pumps

TANK CAR TANK TRUCK/ LOADING

PLT. 23

23.1 - LPG (C_3's & C_4's)
23.2 - Sulfur (Molten)
23.3 - Ammonia
23.4 - Phenol

ASH DISPOSAL FACILITY

PLT. 24

CHEMICAL AND CATALYST HANDLING

PLT. 25

25.1 - Fresh Catalyst
25.2 - Spent Catalyst

UTILITIES & SERVICE

ELECTRICAL DISTRIBUTION FACILITIES

PLT. 30

30.1 - Primary Distribution
30.2 - Secondary Distribution

STEAM & POWER GENERATION

PLT. 31

31.1 - Gas Turbine/Waste Heat Boilers/Steam Turbine Generator
31.2 - Boiler Feed Water Treating(include Demin)
31.3 - Condensate Recovery
31.4-01 - Fluidized Bed Combustor

RAW, COOLING & SERVICE WATER

PLT. 32

32.1 - Raw Water Treating
32.2 - Treated Water Distribution
32.3 - Cooling Water Distribution
32.4 - Potable Water Distribution Systems

UTILITIES & SERVICES CONTINUED

FIRE PROTECTION

PLT. 33

33.1 - Fire Water Supply & Pumping
33.2 - Fire Water Distribution
33.3 - Foam Systems
33.4 - Mobil Fire Equipment
33.5 - Onsite Fire Monitors/ Hydrants

SEWAGE & EFFLUCENT TREATMENT

PLT. 34

34.1 - Sewers (Oily Water)
34.2 - Oily Water Separators
34.3 - Storm Water Sewers
34.4 - Sanitary Sewer System
34.5 - Waste Water Treatment
34.6 - Phenol Removal
34.7 - Ammonia Removal
34.8 - Coal Prep Water

INSTRUMENT & PLANT AIR FACILITIES

PLT. 35

35.1 - Compression
35.2 - Instrument Air Dryers

FLUSHING OIL PREPARATION

PLT. 36

SOLID WASTE DISPOSAL

PLT. 37

GENERAL SITE WORK

GENERAL SITE PREPARATION	BUILDINGS	TELECOMMUNICATIONS SYSTEMS
PLT. 40	PLT. 41	PLT. 42

40.1 - Site Preparation
40.2 - Roads
40.3 - Rail Spur

41.1 - Administration
41.2 - Control House
41.3 - Warehouse
41.4 - Central Labs
41.5 - Shops/Maintenance
41.6 - Operator Facilities
Shower/Change Rooms
41.7 - Cafeteria

4.5.4 Bechtel Equipment Letter Code

Bechtel Equipment Letter Code System is presented in Table 4-4.

TABLE 4-4

Equipment Letter Code

Group L tter	Equipment Group
C	Columns and Pressure Vessels
D	Tanks (Ex. ASME Code Vessels)
E	Exchangers (Heat Transfer Equipment)
F	Fired Heaters
G	Pumps and Drivers
H	Vaccum Equipment
J	Instruments
K	Compressors & Drivers
L	Piping
M	Structures
N	Insulation
P	Electrical
R	Building
S	Site Improvements
T	Material Handling Equipment
U	Expendables (Chemicals, Catalysts, Refrigerants, etc.)
V	Package Units
Y	Processing
Z	Water & Waste Treatment

4.6 LIST OF TECHNOLOGIES

4.6.1 Licensed Technologies and Licensors

The proposed licensors for the licensed technologies are shown in Table 4-5. Except for coal gasification and hydrogen purification (each of which has two technologies for evaluation), all other technologies are assumed to come from the single licensor.

4.6.2 Open Art Units

These are shown in Table 4-6 on 4-61.

TABLE 4-5
TECHNOLOGY/LICENSOR LISTS

TECHNOLOGY	LICENSOR	PROCESS
Coal Liquefaction	HRI*	H Coal
Vacuum Bottoms (Solid Liquid Separations)	Kerr McGee	ROSE[SR]
	Conoco*	Delayed Coking
	Exxon	Fluid Coking
Hydrogen Manufacture from natural gas	KTI*	Steam Reforming
Coal Gasification or Hydrogen	Texaco	Coal
	Shell	Gasification
Hydrogen Purification	UOP	PSA/Membrane
LPG Treating	UOP	Merox
Ammonia Removal	Chevron	Phosam-W
Phenol Removal	Lurgi	Phenolsolvan

* Suggested Sole Licensor

TABLE 4-6
LIST OF OPEN ART UNITS

Hydrotreating

Sulfur Plant

Tail Gas Treating

Amine Treating

Fractionation

* Waste Water Treatment

Combined Cycle

Air Separation

Sour Water Stripping

Coal Preparation and Handling

Fluid Bed Combustion

* Wilsonville Data is being requested

4.7 RECOMMENDATIONS AND ASSUMPTIONS

1. Design basis is recommended to be Wilsonville run 257E as supplied by MITRE and run 250 for thermal stage.

2. a. Coal Feed Stock Composition - one only.
   b. For coal cleaning two alternate methods e.g.

      1) Heavy medium separation.
      2) Spherical agglomeration,

3. Products are non-fungible with defined composition, except for LPG which is fungible. Fungible products are those which meet industry standard specifications and can be comingled with products from other sources in a pipeline and/or tankage.

4. Make-up water required for the plant is available at the Plant Fence at $1.00 per 1000 gallons.

5. Natural gas requirement for the plant, if needed, is available at the Plant Fence at $3.80 dollars per MM BTU.

6. a. The plant is not a zero discharge plant (water).
   b. Solid waste is treated within battery limits and disposed of as non-hazardous waste.
   c. Gaseous by-products (C_1 & C_2's) will be treated and burned as fuel.

7. Extent of Scope:
   a. Licensed technology selection (see attached list),
   b. Technology options (Process Units),
   c. Block Flow diagram.

8. Operating factor of 88% and capacity basis is 15,000 to 20,000 tons/day (M.F.) coal with minimum of 1 maximum size train.

9. Use combination of air and water cooling for heat exchangers.

10. Liquid products are piped from the plant to plant fence and by-products via rail or trucks.

11. PETC approves starting of Tasks II and V prior to formal approval of task 1 report. Bechtel assures that this will not cause any project cost increase.

12. Diene hydrogenation is required for naphtha stabilization.

13. The alternates for 'ROSE^{SR}' are (1) Delayed coking (Conoco) and (2) Fluid bed coking (Exxon). Coke from either alternate is sent to the coal gasifier.

14.* Boiling point range for flushing oil is as per the Wilsonville design basis run. DOE will direct Bechtel to this source. If there are multiple flushing oil, Bechtel needs to know that. For the flushing oil used for catalyst preparation, HRI may be the source and not Wilsonville.

15. Make up solvent for 'ROSE^{SR}' is (C_5^+) from the gas plant.

16. PSA and Membrane are the technologies considered for hydrogen purification.

17. O_2 purity is 95% and N_2 purity is 99.9%.

18. Site preparation to assume a clear level site with 2,500 lbs/in^2 soil bearing strength and in earthquake in zone 2A.

19. Bechtel will recommend catalyst/chemical inventory requirement for DOE approval.

20. Bechtel will recommend feed stock, products and fence line utility prices. (subtask #3600)

21. Sensitivity studies (referred in subtasks #3610 and #3800) will include variations of 10% on capital, 10% on coal price, and product price escalation.

22. Bechtel will have access to non-proprietary design and operating data of Wilsonville Pilot plant, as needed.

* Contact Tim Pinkston at Wilsonville
Telephone: (205) 877-7042

23. The Ultimate deliverable model is a single program combining process schemes (including heat/material balance and equipment sizing) and process economics.

24. CO specs on recycle H_2 is required. Bechtel/Amoco will look into that in cooperation with DOE.

25. In calculating plant economics, appropriate credit for ammonia and sulfur by-products will be taken.

CONFIGURATION MANAGEMENT

5. CONFIGURATION MANAGEMENT

5.1 Definition And Relevancy To This Study

The traditional role of Configuration Management is to orient the Technical Management of the project to Program Management through the use of standardized documentation. It is the framework on which the Project Manager for both Government and Contractor will run the project. This framework must provide for:

1. Specification definition and maintenance,
2. Identification and documentation of any potential change,
3. A procedure for controlling changes; and
4. A documented record of incorporation of changes to close the loop.

The scope and detail of Configuration Management of a manufactured product or item is tailored to the item's or product's complexity, life cycle phase and quantity, and generally, involves the following functions:

1. Identification and Documentation,
2. Audit,
3. Status Accounting, and
4. Change Control.

The relevant activities for a developmental program such as this study (with no discrete manufactured products or items) are:

1. Program Management,
2. Systems Engineering (Technical Management), and
3. Resource Management (People, Budget, Schedule, and Reports).

We therefore interpret Configuration Management as the body of procedures required to utilize an orderly, well documented path, from the first baseline through the last.

Changes will always be measurable back to the latest baseline. The interface of Configuration Management with the other relevant functions discussed above is shown in Figure 5.1.

The four functions of Configuration Management as applied to this study are condensed into the following two control mechanisms:

1. Trend Control
2. Change Control

The sequential flow of logical events encompassing these two control mechanisms are shown as a logic flow diagram in Figure 5.2.

5.2 Trend Control

Trend Control is the system/procedure for identifying and documenting a potential change (Trend) in a timely advanced manner. This Trend Notice brings the potential change to the attention of the Bechtel Program Manager. If the Bechtel Program Manager deems the potential change justifiable, he with the Bechtel Contract Manager then brings it to the attention of the PETC Program and Contract Managers for a preliminary review. If PETC upon reviewing the Trend concurs with Bechtel recommendation, then the trend becomes a Change Order and is processed under the Change Control Program. The Change Control Program identifies the associated scope, cost, and schedule changes. The procedure for Trend Control is given in section 6.3.2.1 of this plan.

5.3 Change Control

The approved change after documentation with a contract change, will be incorporated in the project in accordance with a change control procedure which is described in section 6.3.2.2 of this plan.

INTERFACE OF CONFIGURATION MANAGEMENT WITH OTHER RELEVANT FUNCTIONS

FIGURE 5-1

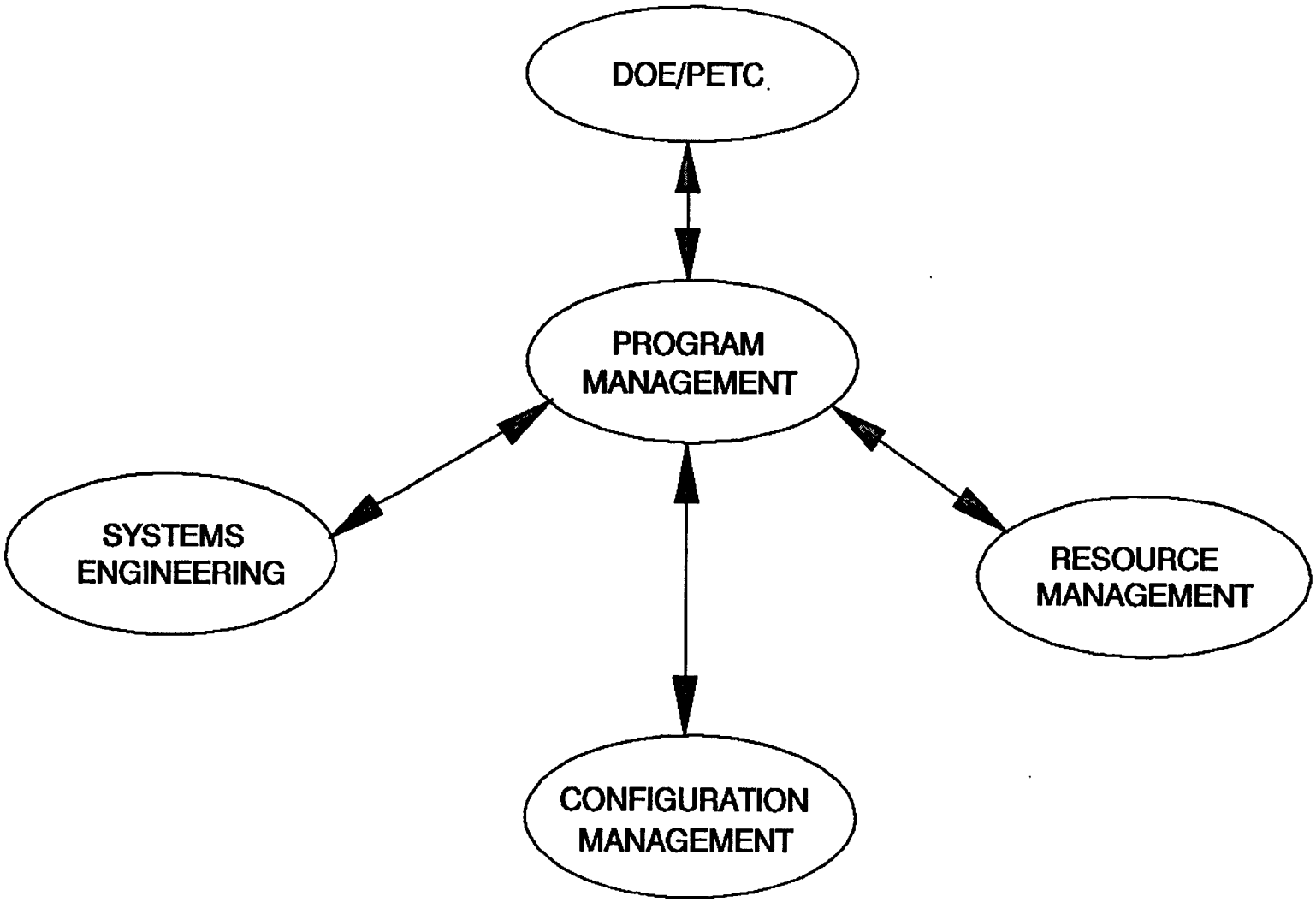
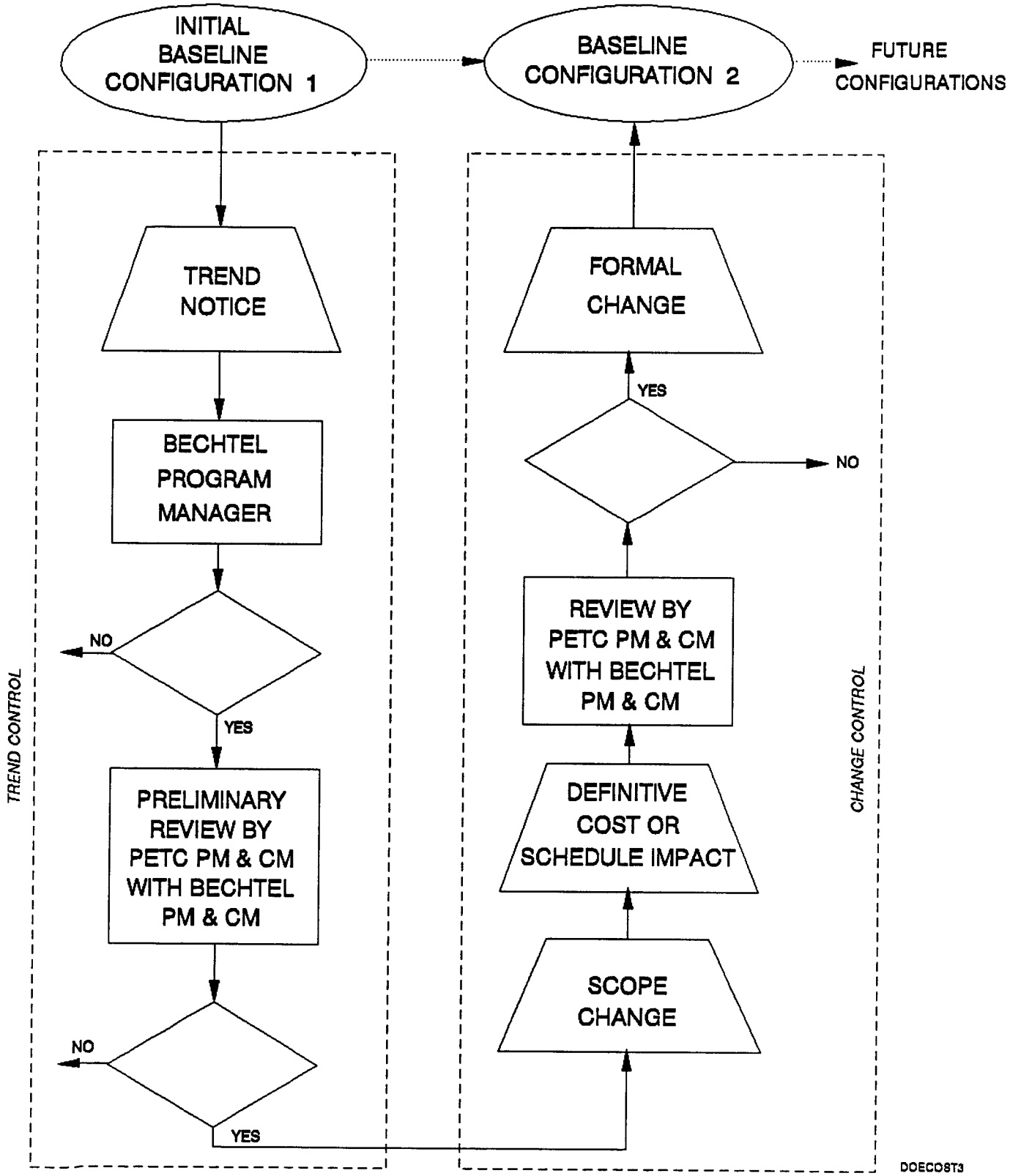


FIG5_1_1

FIGURE 5-2

LOGIC FLOW DIAGRAM FOR

CONFIGURATION MANAGEMENT AS APPLIED TO THIS STUDY



PROGRAM ADMINISTRATION

6. PROGRAM ADMINISTRATION

This section presents the organizational charts of PETC, Bechtel and Amoco. It also includes the percent time allocation to Bechtel and Amoco key personnel dedicated to this program.

Additionally, this section describes the control procedures as stipulated in the contract. The complete list of procedures are appended to this plan (Section 9) and are compiled as a free-standing booklet for easy reference. One copy of this booklet is transmitted to PETC separately.

6.1 PETC's Organization

The general organization chart for the Division of PETC responsible for this program is given in Figure 6-1. This chart also shows the inter-relationship of this Division with Bechtel and the other two PETC contractors assisting PETC in this program.

6.2 Bechtel/Amoco Organization Chart

The Bechtel/Amoco overall project organization for this study is shown in Figure 6-2. Also named on this chart are the Bechtel and Amoco executive sponsors for this project.

FIGURE 6-1
ORGANIZATIONAL CHART OF PETC

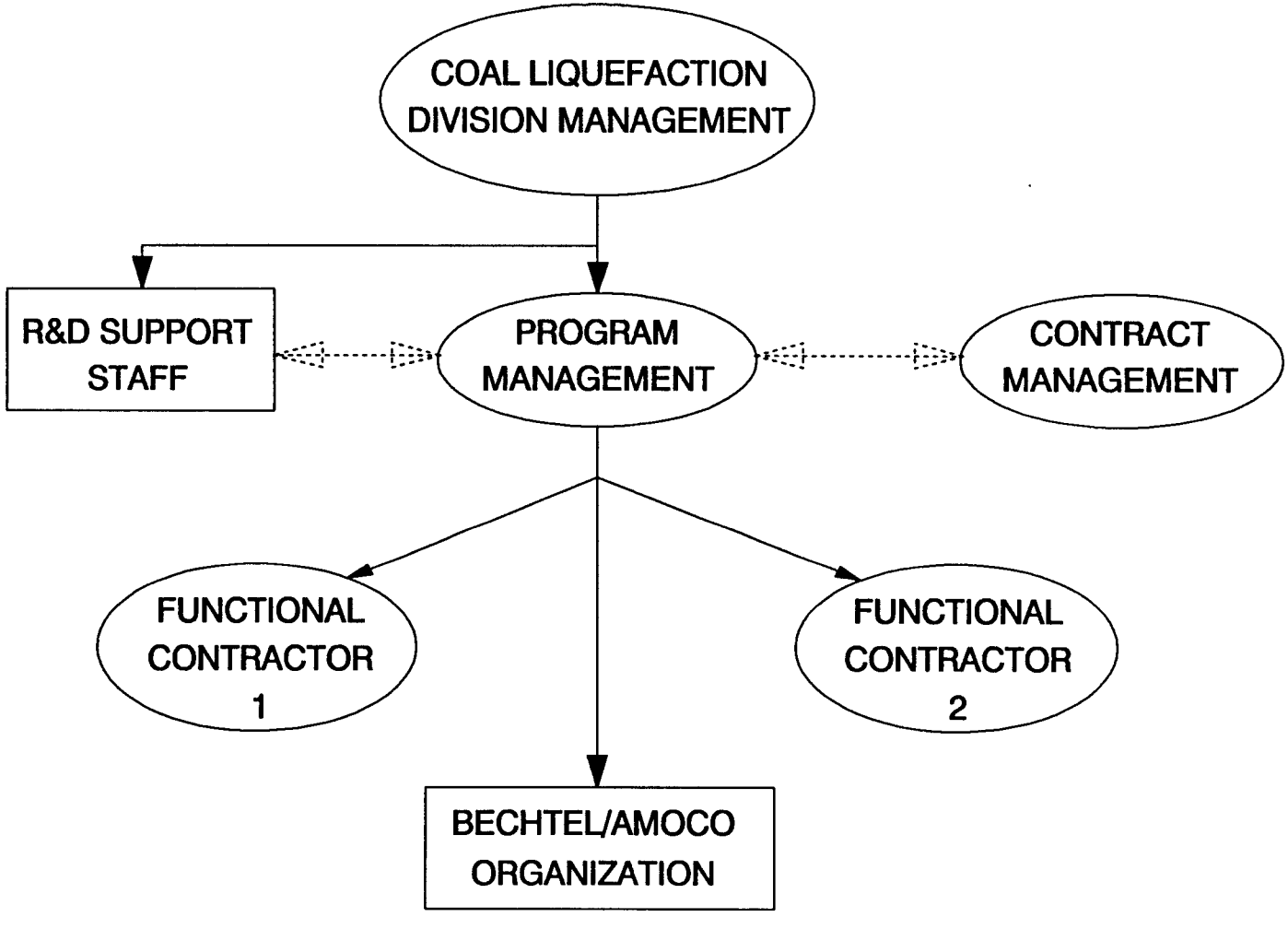


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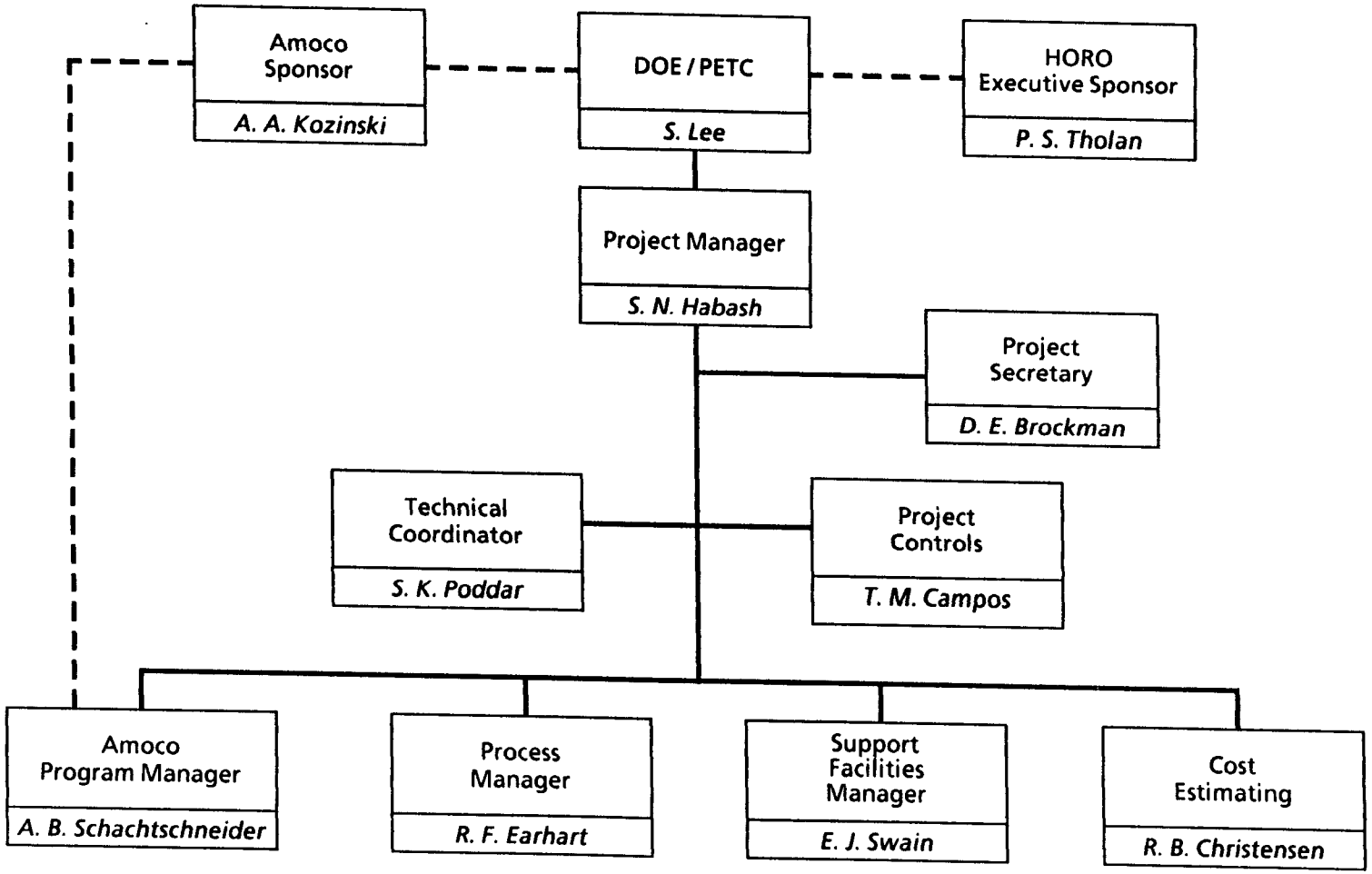
FIGURE 6-2

BECHTEL / AMOCO ORGANIZATION CHART

06/09/90



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6.2.1 Time Allocation of Key Bechtel Personnel

TABLE 6.1

Key Person	Function	Task Number	% Time *
S. N. Habash	Project Manager	7	100
S. K. Poddar	Technical Coordinator	7	100
D. E. Brockman	Project Secretary	7	100
R. F. Earhart	Process Manager	1	48 **
		2	31
		3	17
		4	1
		5	3
		6	-
E. J. Swain	Support Facilities Manager	1	48 **
		2	58
		3	19
		4	2
		5	2
		6	-

* % Time is defined as (number of hours spent by the individual key person on any particular task/duration of the task in hours) X 100.

** These numbers are on the basis of 2 calendar months of the duration of Task 1, although Task 1 continues for 3 calendar months.

6.2.2 Time Allocation of Key Amoco Personn 1

TABLE 6.2

K y Person	Function	Task Number	% Time *
A.B.Schachtschneider	Amoco/ Project Manager	1	18
		4	1
		5	12
		6	3
S.J.Kramer	Principal Investigator	2	10
		4	3
		5	42
		6	13
A. Basu	Principal Investigator	2	10
		4	2
		5	24
J. Fox	Principal	4	3
		5	28
		6	22

* % Time is defined as (number of hours spent by the individual key person on any particular task/duration of the task in hours) x 100.

** These numbers are on the basis of 2 calendar months of the duration of Task I, although Task I continues for 3 calendar months.

6.3 PETC PROJECT PROCEDURES

6.3.1 Cost and Schedule Control

PURPOSE

To provide a program and process to: plan, schedule and monitor cost on D.O.E. Coal Liquefaction Tasks.

SCOPE

The reporting process contained in the monitoring program provides for the tracking of schedule progress and the monitoring of cost expenditures in accordance with the contract documents.

DEFINITIONS

Task: A separate discrete scope of work that is identified, and authorized by the D.O.E.-PETC.

Subtask: A detailed schedule activity within a task.

Deliverable: A physical piece of work (e.g.-calc or dwg) or the completion of a step (e.g.-review specification)

RESPONSIBILITIES

The overall administration of the Cost and Schedule Control Program is the responsibility of the Project Control Supervisor under the direction of the Project Manager. Process and Facilities Support Managers, Process Engineers, Subcontractors, and other support groups are responsible to assist the Project Controls Engineer in statusing the project plan.

PROCEDURE

PLAN

SCHEDULE

Process Manager, Facilities Support Manager, Estimating Manager, and Subcontractor will identify and provide manhour and schedule durations for each applicable subtask within each task.

Project Manager, Technical Coordinator, and other support groups under Task 7 will have their manhours

allocated over the scheduled duration for each applicable department or support group.

Project Controls Engineer will compile all schedule information, review it with Project Management and issue a Milestone Schedule Plan.

The deliverables are the Detailed Schedule showing subtasks and The Milestone Schedule Plan, Government form 1332.3 (Attachment A) which is a summary bar chart of the detailed schedule by task.

D.O.E.-PETC approved Change Orders processed via the Change Control Program (see procedure 6.3.2.2) will be incorporated in the Milestone Schedule Plan in the following reporting period.

COST

The allocation of the "not-to-exceed" contract value in the Cost Plan which incorporates all labor, material, and subcontract costs, is based on the Milestone Schedule Plan.

Project Controls Engineer will compile all cost information, review it with Project Management and issue a Cost Plan.

The deliverables are the Cost Plan by task, Government form 1332.7 (Attachment B) and a Total Project Cost Summary by Task for each calendar year which includes labor, material, and subcontract planned costs.

D.O.E.-PETC approved Change Orders processed via the Change Control Program (see procedure 6.3.2.2) will be incorporated in the Cost Plan in the following reporting period.

STATUS

SCHEDULE

Process Manager, Facilities Support Manager, Estimating Manager, and Subcontractor will status each applicable subtask for each task.

Project Manager, Technical Coordinator, and other support groups under Task 7 schedule will be statused as a "level of effort".

Project Controls Engineer will compile all schedule

information, review it with Project Management and issue a Milestone Schedule Status Report.

The deliverable is the Milestone Schedule Status Report, Government form 1332.3 (Attachment C) which is an updated summary bar chart of the detailed schedule by task.

D.O.E.-PETC approved Change Orders processed via the Change Control Program (see procedure 6.3.2.2) will be incorporated in the Milestone Schedule Status Report in the following reporting period.

COST

The Cost Management Report plan information is based on the Cost Plan. Each month, actual manhours and costs are obtained from the Controller's Financial Information System (CFIS-Accounting System) (Attachment D-flow chart).

Subcontract costs for the current reporting period (month) are received approximately (15) calendar days after the start of the subsequent month. This one month lag in reporting the subcontractor's incurred costs is reflected in the cost plan. Occasionally, however, these costs are not processed in CFIS until two months following the current reporting period. When this occurs, the cost management report for that reporting period will include estimated subcontract costs which are not in the CFIS accounting system. The estimated subcontract costs will be reconciled with the actual cost and reported in the subsequent reporting period.

Project Controls Engineer will compile all cost information, review it with the Controller's group and Project Management and issue a Cost Management Report.

The monthly deliverable is the Cost Management Report by task, Government form 1332.9 (Attachment E).

D.O.E.-PETC approved Change Orders processed via the Change Control Program (see procedure 6.3.2.2) will be incorporated in the Cost Management Report in the following reporting period.

6.3.2 Configuration and Control Management

6.3.2.1 Trend Control

PURPOSE

To provide a mechanism to document, evaluate, control, and track the agreed upon project scope and plan.

SCOPE

The reporting and approval process (including D.O.E./PETC participation) contained in this procedure provides the Project Manager with advance notification of any changes in the current project scope and/or the current plan. Such a change (trend) may or may not result in a change order (see procedure 6.3.2.2 - Change Control) affecting budget and/or schedule.

DEFINITIONS

Project Scope: The work to be performed in accordance with the contractual documents.

Plan: The way in which the team intends to perform the required project scope. The plan is developed by the project team and is reflected in the project plan, the project budget and their supporting documents.

Budget Adjustment: A change in work from task to task which does not change the project scope but does change the manner in which the project is budgeted.

Contract Change: A scope change either an amendment to the contract or processing in accordance with the changes clause of the contract.

RESPONSIBILITIES

The coordination of the trend program is the responsibility of the Project Manager or his designee. The identification, preparation, and definition of the scope of a trend is the responsibility of the Process and Facilities Support Engineers under the overall direction of the Project Manager. The administration and implementation of the trend program is the responsibility

of the Project Controls supervisor. Project Controls/Estimating is the program sponsor.

PROCEDURE

General - Trends represent changes to the project scope, cost, or plan reflected in the original estimate (baseline).

Trends identified as changes in contract scope will be processed via the Change Control program (see procedure 6.3.2.2).

Identification of Trends - Any project team member may initiate a Trend Notice (see Attachment F). Trends arise from reviews, discussions, and evaluations of project scope and plan, and the analysis of performance. The recognition of trends early in the project provides the most significant control capability, since corrective action is still possible without disruption of the project's major milestones.

When a change is observed, a Trend Notice shall be filled out immediately and transmitted to Project Controls. Trends may also be identified during weekly staff meeting. Upon receipt of a Trend Notice, Cost Engineer records the trend in the Trend Log (Attachment G) and forwards the Notice to Project Manager.

The Trend Log will show current status of all trends, including the value of the most current estimate and approval date. The log will be updated on a weekly basis and distributed at the weekly staff meeting.

Project Manager reviews the Trend Notice and indicates what actions are to be implemented. A preliminary review between the Bechtel Project and Contracts Manager and D.O.E.-PETC Program and Contracts Manager will take place to determine subsequent actions.

Estimates - When authorized by the Project Manager, Project Controls Engineering (minor changes) or the Estimator (major changes) will prepare an "order-of-magnitude" estimate for each trend with the support of engineering, subcontractors, and other departments.

6.3.2.2 Change Control

PURPOSE

To document a change in project scope, cost, and/or schedule from the contract or scope definition document.

SCOPE

The reporting and approval process (including D.O.E./PETC participation) contained in this procedure provides the Project Manager with advance notification of changes in the current project scope and/or the current plan. Such changes will require a budget and/or schedule change which will result in a contract change.

DEFINITIONS

Project Scope: The work to be performed in accordance with the contractual documents.

Plan: The way in which the team intends to perform the required project scope. The plan is developed by the project team and is reflected in the project plan, the project budget and their supporting documents.

Budget Adjustment: A change in work from task to task which does not change the project scope but does change the manner in which the project is budgeted.

Contract Change: A scope change either an amendment to the contract or processing in accordance with the changes clause of the contract.

RESPONSIBILITIES

The coordination of the Change Control program is the responsibility of the Project Manager or his designee. The identification, preparation, and definition of the scope of a Change Control is the responsibility of the Process and Facilities Support Engineers under the overall direction of the Project Manager. The administration and implementation of the Change control program is the responsibility of the Project Controls

supervisor. Project Controls/Estimating is the program sponsor.

PROCEDURE

General - Trends identified as changes in contract scope will be handled via the Change Control program.

The Change Control program protects D.O.E.-PETC from unauthorized changes by Bechtel and assures Bechtel compensation for additional work performed.

Identification of Changes in scope - Once preliminary authorization to proceed with a scope change identified in the Trend Control program is issued (6.3.2.1 Management Plan), a Change Order (Attachment H) is initiated and a definitive estimate is developed. The Change Order is sent to Project Controls to be incorporated into Change Order Register (Attachment I). Each Change Order is assigned a unique number for tracking purposes. The completed Change Order is sent to the Project Manager for review and approval.

Upon Bechtel Project Manager's approval, a letter and attached Change Order is sent to Bechtel Contracts Manager for approval. The Change Order is then forwarded to D.O.E.-PETC for Program and Contracts Manager review and approval.

Upon D.O.E.-PETC approval, the Change Order is incorporated into the contract documents.

Estimates - When authorized by the Project Manager, the Project Controls Engineer (minor changes) or the Estimator (major changes) will prepare definitive estimates for each Change Order with the support of engineering, subcontractors, and other departments.

ATTACHMENT A

U.S. DEPARTMENT OF ENERGY

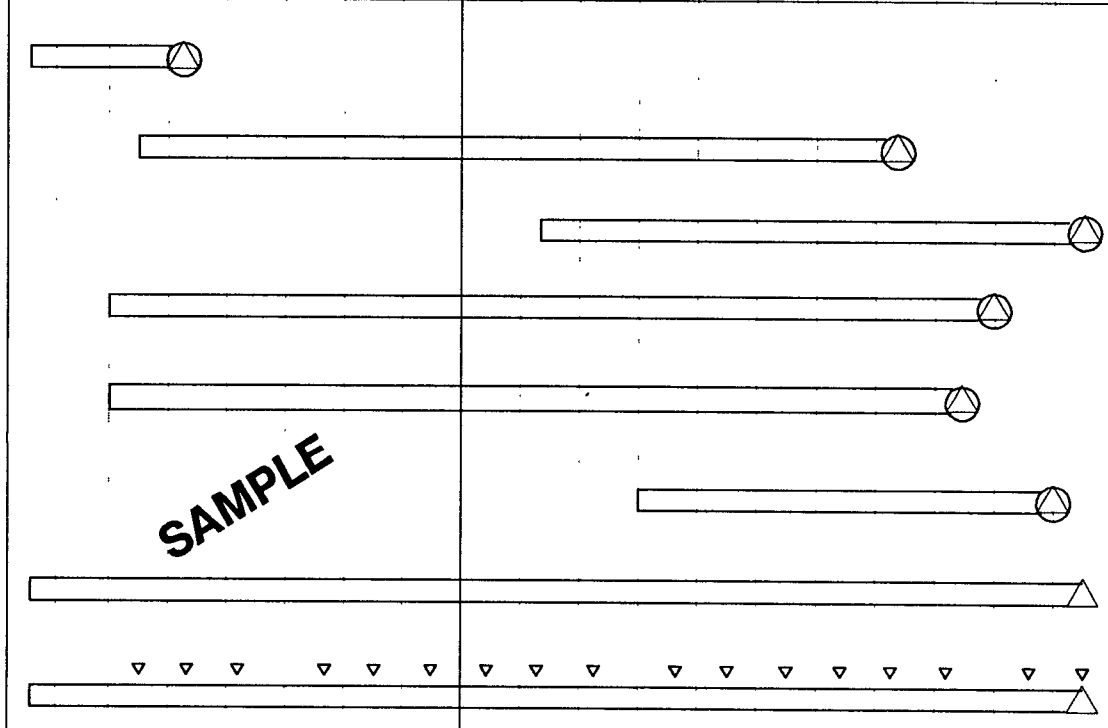
MILESTONE SCHEDULE ☒ PLAN ☐ STATUS REPORT

DOE F1332.3

TITLE	REPORTING PERIOD	IDENTIFICATION NUMBER
Baseline Design and System Analysis	N/A	DE-AC22-90PC89857

PARTICIPANT NAME AND ADDRESS	START DATE
Bechtel Corporation P.O. Box 2166 Houston, Texas 77252-2166	May 1990
	COMPLETION DATE November 1991

ELEMENT CODE (TASK NO.)	REPORTING ELEMENT (DESCRIPTION)	DURATION FY '90 M J J A S O N D	FY '91 J F M A M J J A S O N	PERCENT COMPLETE PLAN	PERCENT COMPLETE ACTUAL
Task #1	Project Management Plan				
Task #2	Baseline Design				
Task #3	Baseline Economics				
Task #4	Mathematical Model				
Task #5	Simulation Model				
Task #6	Documentation and Training				
Task #7	Project Management and other support				
	SUMMARY				



SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE

LEGEND: ▭ ACTIVITY BAR ▽ MONTHLY/QUARTERLY REPORTS △ COMPLETION OF TASK ⊿ COMPLETION OF TASK (CRITICAL PATH) (INCL. TOPICAL REPORTS)

F1332_3P

ATTACHMENT B

U.S. DEPARTMENT OF ENERGY

COST PLAN

SAMPLE

DOE F1332.7

TITLE	*IDENTIFICATION NUMBER*
Baseline Design and System Analysis	DE-AC22-90PC89857

PARTICIPANT NAME AND ADDRESS	*COST PLAN DATE*	*START DATE*
Bechtel Corporation P.O. Box 2166 Houston, Texas 77252-2166	JULY 1990	May 1990
		COMPLETION DATE
		November 1991

ELEMENT CODE (TASK NO.)	*REPORTING ELEMENT (DESCRIPTION)*	*PLAN PRIOR YEAR*	*ACTUAL PRIOR YEAR*	*CURRENT YEAR '90*									*'91*	*TOTAL*
				M	*J*	*J*	*A*	*S*	*O*	*N*	*D*	*TOTAL*		
Task #1	Project Management Plan	---		2.3	13.1	11.1	7.9					34.4	0.0	34.4
Task #2	Baseline Design	---				2.0	40.9	103.3	99.3	127.2	51.4	424.1	270.0	694.1
Task #3	Baseline Economics	---										0.0	94.1	94.1
Task #4	Mathematical Model	---				0.2	0.3	0.5	2.0	1.8	1.5	6.3	15.6	21.9
Task #5	Simulation Model	---					18.0	22.0	40.0	40.0	31.5	151.5	184.3	335.8
Task #6	Documentation and Training	---										0.0	50.7	50.7
Task #7	Project Management and other support	---		11.2	47.8	36.3	40.6	42.5	37.0	38.9	56.2	310.5	458.9	769.4
TOTAL				13.5	60.9	49.6	107.7	168.3	178.3	207.9	140.6	926.8	1073.6	2000.4

DOLLARS EXPRESSED IN	*SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE*	*SIGNATURE OF PARTICIPANT'S AUTHORIZED FINANCIAL REPRESENTATIVE AND DATE*
Thousands		

ATTACHMENT C

U.S. DEPARTMENT OF ENERGY

MILESTONE SCHEDULE ☐ PLAN ☒ STATUS REPORT

DOE F1332.3

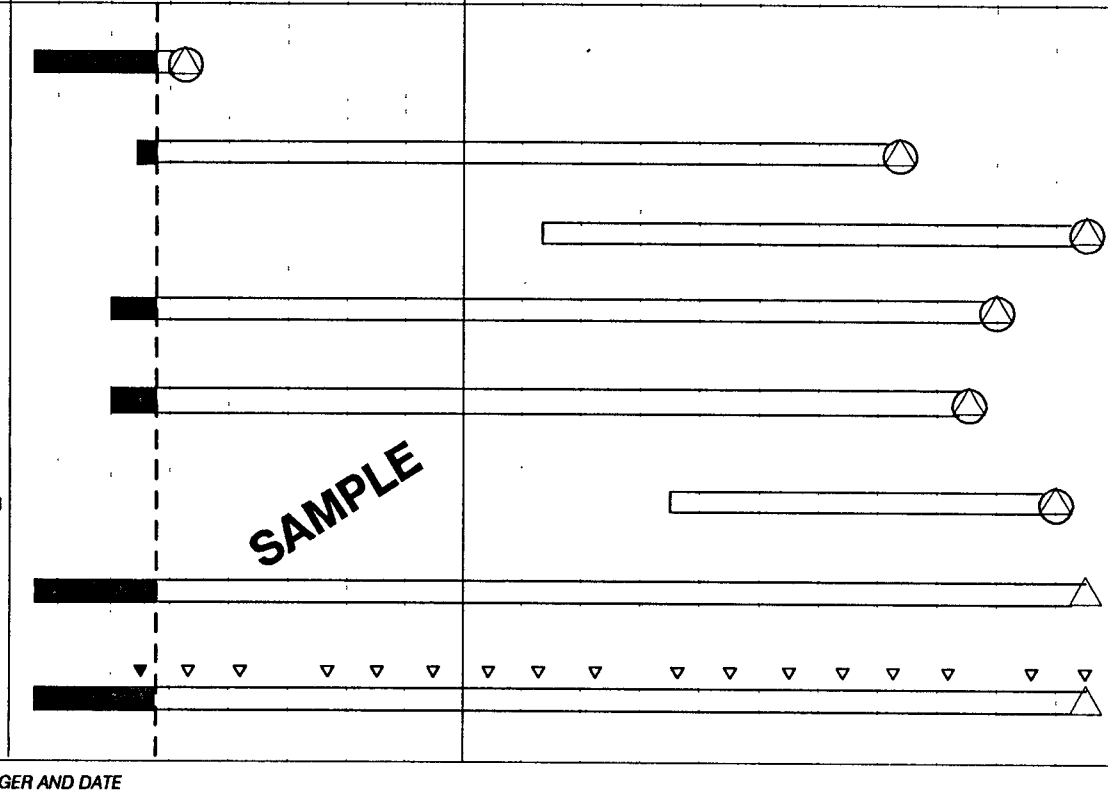
TITLE	*REPORTING PERIOD*	*IDENTIFICATION NUMBER*
Baseline Design and System Analysis	6/24/90 THRU 7/22/90	DE-AC22-90PC89857

PARTICIPANT NAME AND ADDRESS
Bechtel Corporation
P.O. Box 2166
Houston, Texas 77252-2166

START DATE May 1990

COMPLETION DATE November 1991

ELEMENT CODE (TASK NO.)	*REPORTING ELEMENT (DESCRIPTION)*	*PERCENT COMPLETE* PLAN	*PERCENT COMPLETE* ACTUAL
Task #1	Project Management Plan	95	95
Task #2	Baseline Design	1	1
Task #3	Baseline Economics	0	0
Task #4	Mathematical Model	1	1
Task #5	Simulation Model	6	6
Task #6	Documentation and Training	0	0
Task #7	Project Management and other support	16	16
	SUMMARY	9	9



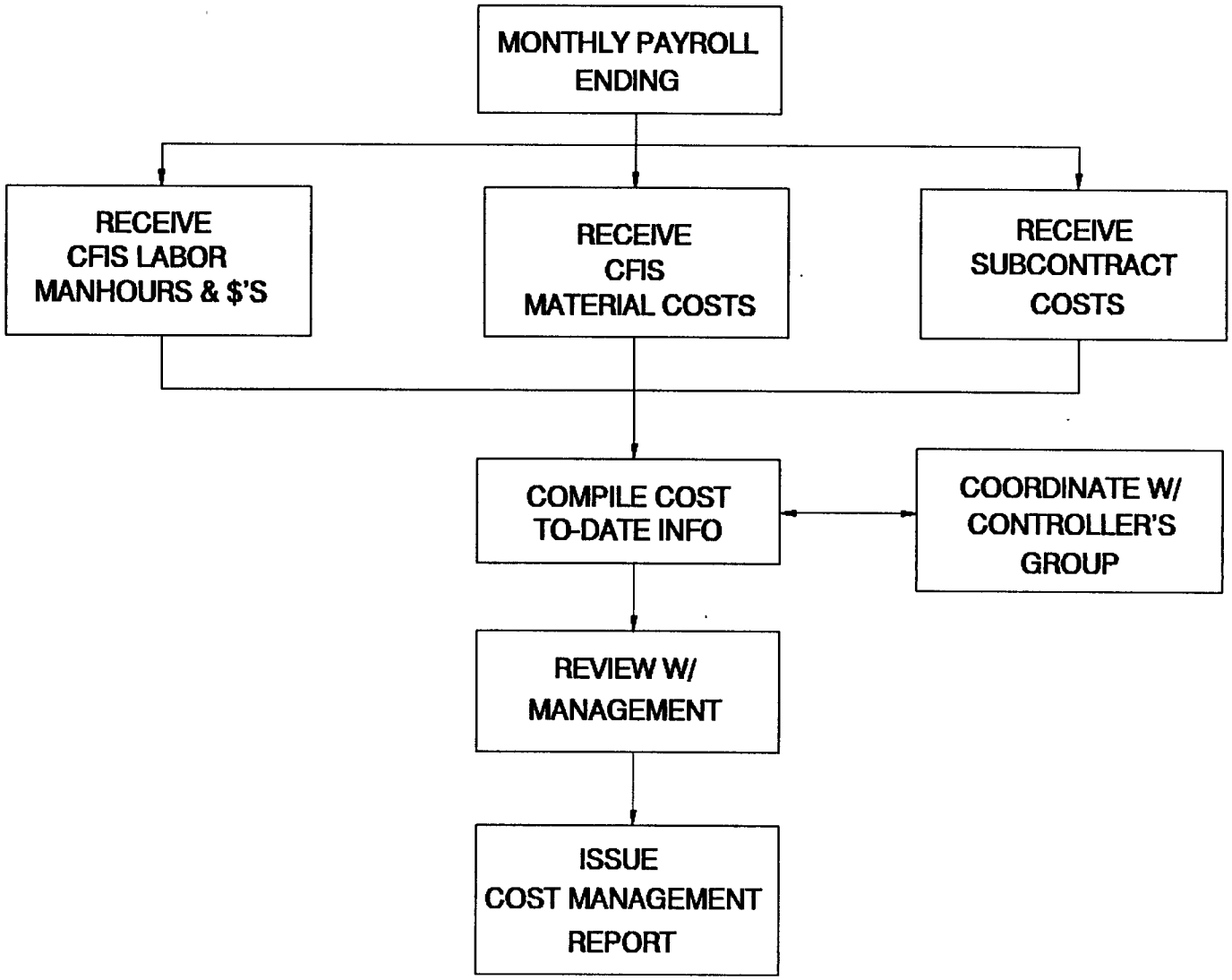
SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE

LEGEND: STATUS LINE | SCHEDULE | ACTUAL | ▽ MONTHLY/QUARTERLY REPORTS | △ COMPLETION OF TASK | COMPLETION OF TASK (CRITICAL PATH) (INCL. TOPICAL REPORTS)

F1332_3S

ATTACHMENT D

D.O.E.-COAL LIQUEFACTION
JOB # 20952
MONTHLY COST MANAGEMENT REPORT FLOW CHART



DOECOST1

ATTACHMENT E

U.S. DEPARTMENT OF ENERGY

COST MANAGEMENT REPORT

SAMPLE

DOE F1332.9

TITLE Baseline Design and System Analysis	*REPORTING PERIOD* 5/16/90 THRU 6/24/90	*IDENTIFICATION NUMBER* DE-AC22-90PC89857
PARTICIPANT NAME AND ADDRESS Bechtel Corporation P.O. Box 2166 Houston, Texas 77252-2166	*COST PLAN DATE* JULY 1990	*START DATE* May 1990 *COMPLETION DATE* November 1991

ELEMENT CODE (TASK NO.)	*REPORTING ELEMENT (DESCRIPTION)*	*ACCRUED COSTS*				*ESTIMATED ACCRUED COSTS*				*TOTAL CONTRACT VALUE*	*VARIANCE*
		REPORTING PERIOD		*CUMULATIVE TO DATE*		*SUBSE-QUENT REPORTING PERIOD*	*BALANCE OF CURRENT YEAR*	*SUBSE-QUENT CALENDER YEAR*	*TOTAL*		
		ACTUAL	*PLAN*	*ACTUAL*	*PLAN*						
Task #1	Project Management Plan										
Task #2	Baseline Design										
Task #3	Baseline Economics										
Task #4	Mathematical Model										
Task #5	Simulation Model										
Task #6	Documentation and Training										
Task #7	Project Management and other support										
TOTAL											

DOLLARS EXPRESSED IN Thousands	*SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE*	*SIGNATURE OF PARTICIPANT'S AUTHORIZED FINANCIAL REPRESENTATIVE AND DATE*

ATTACHMENT F

TREND NOTICE
D.O.E. - COAL LIQUEFACTION
JOB NO. 20952

TREND NO:

TREND TITLE:

REFERENCE DOCUMENTS:

SCHEDULE IMPACT:

SCOPE DESCRIPTION:

SCOPE JUSTIFICATION:

PROJECT COST IMPACT:	Manhours	LABOR $'S	MAT'L $'S	TOTAL $'S
TREND COST				
OVERHEAD/BURDEN				
G&A EXPENSES				
TOTAL TREND				

APPROVALS:

COST/SCHEDULE _____ _____ date

PROCESS/FAC SPPT MGR _____ _____ date

PROJECT MANAGER _____ _____ date

ATTACHMENT G

TREND LOG

STATUS AS OF :_____

TREND NO.	DESCRIPTION	REFERENCE NO.	STATUS	BECHTEL APPROVAL DATE	TYPE OF CHANGE	TREND COST $ X 1000	DOE-PETC AUTH	COMMENTS	ORIGINATOR NAME/DATE
TOTAL									

TYPE OF CHANGE:

SC = SCOPE CHANGE

BA = BUDGET ADJUSTMENT

TRENDLOG

ATTACHMENT H

CHANGE ORDER
D.O.E. - COAL LIQUEFACTION
JOB NO. 20952

CHANGE ORDER NO:

CHANGE ORDER TITLE:

REFERENCE DOCUMENTS:

SCOPE DESCRIPTION:

SCHEDULE IMPACT:

PROJECT COST IMPACT:	Manhours	LABOR $'S	MAT'L $'S	TOTAL $'S

APPROVALS:

BECHTEL

PROJECT MANAGER _____ _____ date

CONTRACTS MANAGER _____ _____ date

D.O.E.-PETC

PROGRAM MANAGER _____ _____ date

CONTRACTS MANAGER _____ _____ date

ATTACHMENT I

CHANGE ORDER REGISTER

STATUS AS OF: _____

CHANGE ORDER NO.	DESCRIPTION	REFERENCE NO.	TREND NO.	STATUS	BECHTEL APPROVAL DATE	CHANGE ORDER COST $ X 1000	DOE APPROVAL DATE	COMMENTS	ORIGINATOR NAME/DATE
TOTAL									

COREGIST

6.3.3 Cost Estimating Procedure

The capital cost estimate for the facilities included in the baseline design (including alternate processes) will be of the accuracy of -30% to +30%. The level of effort and the accuracy of the cost estimates in this study come under the definition of a preliminary estimate.

A preliminary estimate is typically prepared when design engineering is less than 10% complete. Effort is focused on the scope and pricing of major equipment. All remaining costs are "factored". This type of estimate incorporates the engineering design, site productivity, labor wage rate, escalation, fee and other factors which influence the job costs. Bulk material take-offs are not made for this type of estimate. When completed, the preliminary estimate will provide an estimate of total costs, manual labor manhours, non-manual labor manhours, bulk quantities, construction duration, home office manhours, range of risk, and other parameters necessary to provide a meaningful estimate.

The data in this section are directed toward engineering-procurement-construction types of projects. Accuracies are provided to indicate a reasonable range of deviation for the estimator.

Components of a preliminary estimate are:

Major Equipment	-	Priced
Bulk Material	-	Factored
Labor Manhours	-	Factored
Distributables	-	Factored
Home Office/Fees	-	Percentage
Contingency	-	Percentage

The scope required for the preparation of a preliminary estimate includes:

- Preliminary process flow diagrams
- Detailed equipment list with sizing (weights, square feet, horsepower, barrels, etc.)
- Actual plant location
- Labor costs (craft wages of area)

The estimate is prepared by pricing out the major equipment by item from cost curves or from recent cost history if available. Budget quotes are often obtained for significant cost items and/or unusual items.

Upon completion of the major equipment costs, the bulk material costs are factored from the major equipment costs. These factors can be a single one for all bulks or specific percentages for each commodity. The latter method allows for adjustments to be made to specific accounts to accommodate unique site conditions or unit layouts.

Labor manhours for major equipment can be detailed to each piece/type of equipment or estimated as the number of manhours per $1000 of material costs.

Labor manhours for bulk materials are estimated as manhours per $1000 of material costs only. These can be done at a total level or by commodity.

The total manhours are to be adjusted for productivity in the area to complete the estimate of manhours required. Using the current area craft rates, the direct labor dollars can be calculated.

The distributable costs are estimated as a percentage of direct labor costs after taking into consideration site requirements, execution of work, etc.

Home office/fees are calculated as a percentage of total field costs.

Contingency is estimated as a percentage and reflects how accurate the major equipment pricing, bulk material factors, manhour derivation, distributables and home office/fee are estimated.

Example: Preliminary Estimate

	Method	$
Major Equipment Material/Subcontracts	Priced	40
Bulk Materials/Subcontracts -75%	Factored	30
Direct Labor - Manhours	Factored	
- Cost - Manhours @ $20.00	Priced	18
Distributables - 80%	Percentage	14
Total Field Costs		102
Home Office/Fees	Percentage	15
Contingency-Round Off	Percentage	23
Total		140

The validity of the estimate is dependent primarily upon the accuracy of the major equipment costs. Therefore, a preliminary capital estimate prepared as described above contains sufficiently high uncertainty. Consequently, its accuracy can be described with a high enough confidence level only when it falls within the ± 30% accuracy envelope.

The cost estimate obtained by utilizing the above procedure is presented in a format as shown in Table 6.3 (Estimated Direct Field Costs) and Table 6.4 (Overall Cost Summary).

TABLE 6-3

FORMAT OF
ESTIMATED DIRECT FIELD COSTS
FOR COAL LIQUEFACTION COMPLEX
(2ND QUARTER 1990 $MILLION)

PLANT NO.	PROCESS UNITS	MAJOR EQUIPMENT	BULK MATERIALS	SUB-CONTRACTS	DIRECT LABOR	DIRECT COSTS
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
TOTAL PROCESS AREA		-	-	-	-	-
OFFSITE FACILITIES						
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
TOTAL OFFSITE FACILITIES		-	-	-	-	-
TOTAL DIRECT FIELD COST		-	-	-	-	-

TABLE 6-4

FORMAT OF
ESTIMATED OVERALL COST SUMMARY
FOR COAL LIQUEFACTION COMPLEX
(2ND QUARTER, 1991 $MILLION)

ITEM	$MILLION
FIELD COST	
DIRECT COST	
MAJOR EQUIPMENT	-
BULK MATERIALS	-
SUBCONTRACTS	-
DIRECT HIRE LABOR	-
SUBTOTAL DIRECT COST	-
INDIRECT COST	
DISTRIBUTABLE COST	-
SUBTOTAL INDIRECT COST	-
TOTAL FIELD COST	-
HOME OFFICE & FEE	-
LICENSING FEES	-
INITIAL CATALYST & CHEMICALS	-
SPARE PARTS	-
SALES TAX	-
CONTINGENCY	-
TOTAL PLANT COST	-
OTHER COSTS	-
PRESTARTUP & STARTUP COSTS	-
WORKING CAPITAL	-
TOTAL PROJECT COST	-

6.3.4 Correspondence

D.O.E. COAL LIQUEFACTION
BASE LINE DESIGN AND SYSTEM ANALYSIS
CONTRACT NO. DEAC22 90pc89857
BECHTEL JOB NO. 20952

Purpose

To establish a uniform communication system between PETC or Amoco and Bechtel's Project Team.

Scope

This procedure covers project correspondence.

Procedure

General

Correspondence will be limited to a single subject and shall be identified as follows:

1st Letter Series - Type of correspondence
2nd Letter Series - Sending company
3rd Letter Series - Recipient company
4th Letter - Serial Number

Correspondence serial numbers will be assigned prior to typing.

Type of Correspondence

L - Letters
TL - Transmittal Letter
CN - Conference Notes

Company Identification

PETC - Client
AMOCO - Subcontracter
BL - Bechtel Letter

Example: Letter Bechtel Project Team Houston
to PETC: BLD or,
to AMOCO: BLA

PETC To and From Bechtel

Logs shall be established for each type of correspondence to register incoming and outgoing communications including letters, transmittals and teletypes and facsimiles. It will be the responsibility of the Project Secretary to assign communications numbers and to maintain logs.

All correspondence pertaining to Home Office matters originating from PETC and Amoco, shall be addressed to Bechtel, Attention: Sam N. Habash, Project Manager.

Letters originating from the Bechtel Project Team to PETC shall be addressed to the PETC, Attention: Swenam R. Lee, Project Manager; with copy to Martin Byrnes, Contract Officer, if the letter relates to a contractual matter. Refer to Exhibit 1 for letter format, and Exhibit 2 for addresses and Fax numbers.

Transmittals

Transmittal letters and FAX shall be used for routine transmittals of documents and data to and from the Project Team to PETC, Bechtel Project Team members and Amoco (see Exhibit 3). For Fax transmittal, (see Exhibit 4).

Signature Authorizations - Bechtel

All correspondence shall be signed by the Bechtel Project Manager, S. N. Habash, except as required by PETC procedure to be signed by Neal M. Harlan, Contract Officer.

Distribution

The originator of each piece of correspondence shall determine its distribution. Specific distribution and frequency for distribution of Bechtel-generated correspondence is per the Project Manager.

RESPONSIBILITY

It is the originator's responsibility to ensure that the correspondence procedure as outlined in this instruction is followed.

The Project Secretary shall assign serial numbers and maintain correspondence logs.

BECHTEL: _____ _____
Approved Date

Bechtel

3000 Post Oak Boulevard
Houston, Texas 77056-6503
Mailing address: P.O. Box 2166
Houston, Texas 77252-2166

Exhibit 1
TYPICAL LETTER FORMAT

July 5, 1990

U. S. Department of Energy
Pittsburgh Energy Technology Ctr.
Mail Stop 922-H
P. O. Box 10940
Pittsburgh, PA 15236

Attention: Mr. Swenam Lee
Project Manager

Subject: D.O.E. Coal Liquefaction
Base Line Design and System Analysis
Contract No. DE-AC22 90PC89857
Bechtel Job No. 20952
Letter No. BLD - _____

Dear Sir:

TEXT

Very truly yours,

Sam N. Habash
Project Manager

SNH:deb
cc: Martin Byrnes, Contract Officer (when applicable)
File 7.12
Note: Response (is/is not) requested by (Date).

Exhibit 2
PETC PROJECT TEAM
ADDRESSES AND FAX NUMBERS

PETC PROJECT TEAM:

A.* Swenam Lee
Project Manager
Mail Stop 922-H-Wallis Rd.
U. S. Department of Energy
Pittsburgh Energy Tech Ctr.
P. O. Box 10940
Pittsburgh, PA 15236
Telephone: 412-892-4606

B. Martin Byrnes
Contract Specialist
Mail Stop 921-165/921 Wallis Rd.
U. S. Department of Energy
Pittsburgh Energy Tech Ctr.
P. O. Box 10940
Pittsburgh, PA 15236

C. Robert Hamilton
FE-231, E-155/GTN
U.S. Department of Energy
19901 Germantown Rd.
Germantown, MD 20585

D. Office of Patent Counsel
Chicago Operations Office
U. S. Department of Energy
9800 South Cass Avenue
Argonne, IL 60439

E. U. S. Department of Energy
Office of Technology Transfer
Mail Stop 58-M210
U. S. Department of Energy
Pittsburgh Energy Technology Ctr.
P. O. Box 10904
Pittsburgh, PA 15236
(3 - 1st Quality Reproducible Copies)

F. Budget & Financial Mgmt.
Mail Stop 921-232
U. S. Department of Energy
Pittsburgh Energy Tech Ctr.
P. O. Box 10940
Pittsburgh, PA 15236

G. Joanne Wastek
Mail Stop 920-L
920-L Wallis Rd.
U. S. Department of Energy.
Pittsburgh Energy Tech Ctr.
P. O. Box 10940
Pittsburg, PA 15236

H. Gilbert V. McGurl
Mail Stop 920-L Wallis Rd.
U. S. Department of Energy
Pittsburgh Energy Tech Ctr.
P. O. Box 10940
Pittsburgh, PA 15236

I. Property Administration
Mail Stop 921-165
U. S. Department of Energy
Pittsburgh Energy Tech Ctr.
P. O. Box 10940
Pittsburgh, PA 15236

FAX No.'s 412-892-4604

* Shipping Address: Receiving Dept. Bldg.166, Cochran Mill Rd., Pittsburgh, PA 15236

Exhibit 3
BECHTEL PROJECT TEAM
ADDRESSES AND FAX NUMBERS

BECHTEL PROJECT TEAM:

Houston: Mr. Sam N. Habash, Project Manager
3000 Post Oak Boulevard, Suite 7E860
Houston, TX 77056-6503
Telephone: (713) 235-3201

P. O. Box 2166
Houston, TX 77252-2166
FAX: (713) 235-3037

San Francisco: Mr. Neal Harlan, Contracts Manager
Research and Development
Fifty Beale Street
San Francisco, CA 94105-1895
Telephone: (415) 747-7487

P. O. Box 193965
San Francisco, CA 94119-3965

FAX: (415) 768-0503

Exhibit 3
AMOCO PROJECT TEAM
ADDRESSES AND FAX NUMBERS

AMOCO PROJECT TEAM:

Naperville, IL	A.B. Schachtschneider, Project Manager DOE Coal Liquefaction Project Research and Development 305 East Shuman Blvd., Suite 600 Post Office Box 400 Naperville, Illinois 60563-8408 Telephone: 708-420-4362
Naperville, IL	Mr. Al Couper, Contracts Manager Research and Development 305 East Shuman Blvd., Suite 600 Post Office Box 400 Naperville, Illinois 60563-8408 Telephone: 708-420-4843

FAX: (708) 420-3698

Exhibit 4

SHIPPING MEMORANDUM

BECHTEL
ENGINEERS - CONSTRUCTORS
REFINERY & CHEMICAL DIV
P O BOX 2166
HOUSTON, TEXAS 77001

TRANS. NO. _____

TO:

JOB: _____

DATE: _____

FROM: _____
Drawing Service Section

NOTE: Attached are the following listed documents. Please receipt one copy of this form and return immediately. This is our record of your having received the referenced documents.

Received By _____ Date _____

COMMENTS: _____

- [ ] FILMS
- [ ] PRINTS
- [ ] VELLUM
- [ ] SEPIA
- [ ] APP'D FOR CONST.
- [ ] APP'D FOR PURCHASE
- [ ] FOR APPROVAL
- [ ] PRELIMINARY
- [ ] OTHER

QTY.	DRAWING/SPECIFICATION NO.	REV.	QTY.	DRAWING SPECIFICATION NO.

LETTER NO.	PRINTING REF. NO.

FORM HSC 2 73

Exhibit 5

TYPICAL TRANSMITTAL FORMAT

D.O.E. COAL LIQUEFACTION
BASE LINE DESIGN AND SYSTEM ANALYSIS
CONTRACT NO. DE-AC22 90PC89857
BECHTEL JOB NO. 20952

DATE: _____

F A X

TO: _____

OFFICE: _____

FAX NO.: _____

FROM: _____

PAGES _____ OF _____.

MESSAGE: _____

_____

_____

_____

FAX NO. 713-235-3037 HOUSTON

REV 1
08.14.90

6.3.5 Invoicing, Forms and Procedures

Invoicing, Forms (vouchers) and Procedures shall be in accordance with DOE Billing Instructions, in the Contract.

SF 1034 voucher will be used for invoicing. The invoicing frequency is in accordance with the attached schedule (Attachment J). The billing instructions procedure is included as Attachment K.

ATTACHMENT J

BECHTEL'S BILLING SCHEDULE

DOEBILL.wk1

REPORTING MONTH	PAYROLL CLOSING DATE	RECEIVE LABOR DATA	RECEIVE OTHER DATA	INVOICE TRANSMITTAL DATE
MAY & JUN '90	06/24/90	06/28/90	07/06/90	--------
JUL '90	07/22/90	07/26/90	08/03/90	08/27/90
AUG '90	08/19/90	08/23/90	08/31/90	09/20/90
SEP '90	09/16/90	09/20/90	09/28/90	10/29/90
OCT '90	10/28/90	11/01/90	11/09/90	11/28/90
NOV '90	11/25/90	11/29/90	12/07/90	12/27/90
DEC '90	12/23/90	12/27/90	01/04/91	01/30/91
JAN '91	01/20/91	01/24/91	02/01/91	02/27/91
FEB '91	02/17/91	02/21/91	03/01/91	03/27/91
MAR '91	03/17/91	03/21/91	03/29/91	04/30/91
APR '91	04/28/91	05/02/91	05/10/91	05/29/91
MAY '91	05/26/91	05/30/91	06/07/91	06/26/91
JUN '91	06/23/91	06/27/91	07/05/91	07/31/91
JUL '91	07/21/91	07/25/91	08/02/91	08/27/91
AUG '91	08/18/91	08/22/91	08/30/91	09/25/91
SEP '91	09/15/91	09/19/91	09/27/91	10/30/91
OCT '91	10/27/91	10/31/91	11/08/91	11/27/91

ATTACHMENT K

BILLING INSTRUCTIONS
(Cost-Reimbursement Type Contracts)

I. **Introduction.** These instructions are provided for use by Contractors in the preparation and submission of vouchers requesting reimbursement for work performed under cost-reimbursement type contracts. Compliance with these instructions will reduce correspondence, and other causes for delay, to a minimum and will thus promote prompt payments to the Contractor.

II. **Voucher Form.** In requesting reimbursement, Contractors shall use Standard Form 1034 (Public Voucher for Purchases and Services Other Than Personal) (see Exhibit A), supported by a Statement of Cost (see Exhibit B). An acceptable substitute (which provides the same necessary information as found in Exhibit A and B of these instructions) may be used provided the written consent of the Contracting Officer is first obtained.

III. **Preparation. Standard Form 1034** shall be completed in accordance with the following instructional notations (see counterpart notations on Exhibit A):

(1) Leave blank.

(2) Enter voucher number (number consecutively, commencing with "1").

(3) Enter date voucher prepared.

(4) Enter contract number and date of contract award.

(5) Enter contractor's name, mailing address, and telephone number of office responsible for submitting voucher.

(6) If a task order or project agreement is involved in the billing, enter the number and date of thereof, otherwise leave blank.

(7) Identify the period the billing covers (e.g., "Jan. 19__" or "Jan-Mar. 19__").

(8) Enter the dollar amount of this billing. The among claimed must agree with the amount reflected in the attached Statement of Cost (see Exhibit 3).

(9) Place an "X" in the appropriate block for the type of payment for which reimbursement is requested.

The Statement of Cost shall be completed substantially as shown in Exhibit 3, making due allowance for the Contractor's cost accounting system. Costs claimed shall be only those recorded costs authorized for billing by the payment provisions on the contract. Indirect costs claimed shall reflect

experience, but in no event shall exceed those approved for billing purposes by the Contracting Officer. Additional supporting data for claimed costs shall be provided in such form and reasonable detail as an authorized representative of the Contracting Office may require.

IV. **Billing Period.** Voucher shall be submitted no more frequently than monthly (unless prior written consent of the Contracting Officer for more frequent billing is obtained). The period of performance covered by vouchers should be the same as covered by an required monthly technical progress reports.

V. **Submission.** Submit original voucher and three copies (each supported by a copy of the Statement of Cost) to the address prescribed by the contract (normally shown on Block 10 of Standard Form 26, the cover page of the contract). The Certification of the Statement of Cost attached to the original must be signed by a responsible official of the Contractor.

6.3.6 Notice of Energy R D & D Project

This notice is required to be completed 30 days after contract award by the contract officer of the successful contractor. The DOE form 536 (1332.1 A) is being separately completed by Bechtel's Contract Manager, Mr. Neal M. Harlan.

FORM DOE 538
(Rev 10-80)

U.S. DEPARTMENT OF ENERGY

NOTICE OF ENERGY R&D PROJECT

APPROVED FOR USE BY
SMITHSONIAN SCIENCE INFORMATION EXCHANGE

1. Descriptive title of work: Design, Develop, and Construct Energistic Pilot Unit

2. Performing organization control number ____ Work status: ☐ New ☒ Continuing ☐ Terminated

3. Contract or grant number: DE-AC01-82HQ21347

4. Contractor's principal investigator, project manager and address where work is performed
   A. Name (Last, First, MI): Doe, Charles M.
   B. Phone: FTS- ____
   C. Research organization business address: Street: 3000 Construction Boulevard; Com.- (703)-196-3222; City: Anyplace; State: VA; Zip: 22299

5. A. Name of performing organization: BKCS, Incorporated (Organization); Construction (Department)
   B. Mailing address (If different from 4C)
   C. Circle only one code for TYPE OF ORGANIZATION PERFORMING R&D (See instructions): CU FF (IN) NP ST TA US XX EG
   D. Location where the work is being performed
   E. Country sponsoring research

6. Supporting organization
   A. Program division or office (Full name): Assistant Secretary for Energistic Programs
   B. Technical monitor (Last, First, MI): Walsh, M.A.
   C. Phone: FTS- 489-2505; Com.- (703)-399-2505
   D. Address (If different from DOE Hqs.)
   E. Administrative monitor (Last, First, MI): Smith, J.A.

7. Project schedule
   A. Start date: October (Month) 1981 (Year)
   B. Expected completion date: June (Month) 1985 (Year)

8. Funding in thousands of dollars (Funds represent budget obligations for operating and capital equipment)

	Funding organizations	Current FY 85	Next FY 86
A.	DOE Energistic Programs	5656	7828
B.	DOE Energy Research	3770	5219
C.			

   D. For DOE projects, enter budgeting and reporting classification code: EC 03 04; EC 05 08
   E. Interagency agreement (Specify funding agency)
   F. Agency in-house effort (Check if applicable) ☐
   G. EPA "pass-thru" funding (Check if applicable) ☐

Note: Funding Section utilization is optional on Federal Financial Assistance Programs grants, direct payments, cooperative agreements, loan guarantees and other related programs.

9. Descriptive summary of work (Limit to 200 words, include objective, approach, results to date and their significance and expected product. Quantify where possible).

OBJECTIVE: Design and construct a pilot plant to provide power for heavy industrial and commercial use with residual available for residential use. The system is to generate electricity in the megawatt range with backup energy sources.

APPROACH: Devise an energistic unit which converts, stores, and recirculates power through a step-up system which is connected through the grid to a fuel driven generator for no-break capability, together with controls, checkpoints, outlets, relays, and distributors. The plant is expected to be self-sufficient for heating, air conditioning, power, and lighting.

RESULTS TO DATE: Basic plant design complete. Surveys and excavation complete including principal substructures with grid bases, drains, filters, storage facilities, etc. "Off the shelf" procurements complete, stockpiles begun, piers and slabs for ground level emplaced, templates for first story in position.

INSTRUCTIONS

NOTICE OF ENERGY R&D PROJECT

NOTICE

If in the past six months you have completed an inventory of Federal Energy, Fossil, Environment and Safety Research or programmatic office project description, complete only the new data element on this form and send it and a copy of the form completed earlier to Department of Energy, Technical Information Center, Post Office Box 62, Oak Ridge, TN 37830.

1. DESCRIPTIVE TITLE OF WORK

Be as specific as possible. Since an index in the published inventory is generated from words in the titles, use words that are descriptive of the work done. Please limit the length to a maximum of 100 characters plus spaces.

Example: "Design of a Better Mousetrap" not "Pest Control"

2. PERFORMING ORGANIZATION CONTROL NUMBER

A unique internal identification number that is used by the performing organization to facilitate project control. If the organization uses no number, this space will be left blank. PROJECT STATUS: Check status of project.

3. CONTRACT OR GRANT NUMBER

The DOE contract or grant number under which the work is being performed. For WPAS-type projects, the master contract number should be inserted. Inter-agency agreements use the IAA number.

4. CONTRACTOR'S PRINCIPAL INVESTIGATOR/PROJECT MANAGER AND MAILING ADDRESS WHERE WORK IS PERFORMED

Name of person chiefly responsible for the performance of the project or who is most familiar with this project. Persons should be permanently employed by organization (not summer employees or graduate students). Give telephone number, including area code and extension (if you have FTS number please include it) at which the principal investigator can be reached. The address should be for the person at the specific facility doing the work.

5. A. NAME OF ORGANIZATION

In large organizations that have several levels of subdivision or subsidiaries, include the name of the smallest autonomous unit performing the research. For universities, include the name of the specific school, department, etc. where the research is being done.

Examples: "Halliburton Company, Oil Engineering" "University of Maryland, Institute of Fluid Dynamics and Applied Mathematics" "U.S. Department of Defense, Air Force Cambridge Research Laboratory"

B. MAILING ADDRESS

Provide the mailing address if different from that given in item 4.

C. TYPE OF ORGANIZATION PERFORMING THE WORK

From the following list, select the description that best characterizes the research organization doing this study and circle the two-letter code on the form.

IN – Private industry
NP – Foundation or laboratory not operated for profit
TA – Trade or professional organization
US – Federal agency
CU – College, university, or trade school
S – Regional, state or local government facility
ES – Electric or gas utility
FF – Federally funded R&D centers or laboratory operated for an agency of the U.S. Government
OS – Other (define on questionnaire)

6. SUPPORTING ORGANIZATION

List the DOE Assistant Secretary and office sponsoring the work, the technical representative (including phone number) who directly monitors the contracted work, his address if different from DOE Headquarters, and the specific person administering the grant or contract.

7. PROJECT SCHEDULE

If current activity is a continuation of a previous project, the start date should indicate the inception of the major work. The expected completion date should also be entered. If the project is a continuing activity with no set completion date, enter N/A for not applicable.

8. FUNDING

Provide funding in DOLLARS. If funding is received from more than one organization, list each agency separately in the space provided. Funding should indicate budget obligations (funding level) per year. For example, if budget obligation is $20,000 for 2 years, state the funding level as $10,000 per year. If Applicable, fill in parts D, E, F, or G. Use of this Section is optional on Federal Financial Assistance Programs, grants, direct payments, cooperative agreements, loan guarantees, and other related programs.

9. SUMMARY OF WORK

Enter a Project Summary (limit 200 words) covering the following:

Objectives: State project objectives, quantifying where possible (e.g., "Demonstrate 95% recovery of sulphur from raw gas with molten salt recycling at a rate of one gallon per minute")

Approach: Describe the technical approach to the project, i.e., how the work is to be done.

Expected Product/Results: Describe the final products or results expected from the project and their importance and relevance.

over

10. List the five most descriptive publications in the last year that are available to the public which have resulted from the project (Please give a complete bibliographic citation. Use additional sheets if necessary):

NONE

11. General technology categories (Enter applicable code of codes from instructions).

D 1 | D 2 | D 3 | D 5 | E 2 | E 3 | E 4 | F 1 | | | | | | |

12. Type of research activity (Check applicable activities)

- A. [ ] Basic research
- B. [ ] Applied research
- C. [ ] Laboratory scale R&D
- D. [X] Technology development
- E. [ ] Field study
- F. [X] Pilot plant scale R&D
- G. [ ] Full scale demonstration
- H. [ ] Mathematical model development
- I. [ ] Data analysis/assessments
- J. [ ] Information systems management
- K. [ ] Policy analysis
- L. [ ] Socioeconomic
- M. [ ] Other (Specify) _____
- N. [ ] Not applicable

13. Keywords (Please list 5 keywords).

14. Is this research project solely an ANALYTICAL/PAPER STUDY? (Non-experimental, paper and pencil, computer analysis, etc.). YES _____ NO X

15. Respondent's Name: C. N. Doe Phone No. (703)-196-1212 Date: October 1982

Street: 3000 Construction Boulevard

City: Anyplace State: VA Zip: 22299

10. PUBLICATIONS AVAILABLE TO THE PUBLIC

List publications available to the public that have resulted directly from this project. List only the publications for the last 12 months. Give author(s), title, journal reference or report number, and source from which report or publication may be secured if different from author (e.g., GPO, NTIS, TIC, etc.).

11. GENERAL TECHNOLOGY CATEGORY

Enter the letter and number for the general technology category supported by your project as shown below. Multiple numbers may be entered when the project supports more than one category.

The Multi-Technology category (Item F1) should be used only if your project has a pervasive application or influence on all or nearly all, technology areas. Examples: R&D on instrumentation, materials research, meteorological research.

The General Science category (Item F2) should be used only if your project, or some portion of it, is basic in nature and not directly related to any specific energy technology.

Insert one or more of the following category codes.

Fossil Fuels (including synfuel)	Geothermal	Conservation
A1 – Fossil Fuels (general)	C1 – Geothermal (general)	E1 – Conservation (general)
A2 – Coal Conversion – Liquefaction	C2 – Hydrothermal	E2 – End Use
A3 – Coal Conversion – Gasification	C3 – Geopressurized	E3 – Improved Conversion Efficiency
A4 – Oil and Gas	C4 – Hot Dry Rock	E4 – Energy Storage
A5 – Oil Shale		
A6 – Biomass – Pyrolysis		

Nuclear	Solar	Other
B1 – Nuclear (general)	D1 – Solar (general)	F1 – Multi-Technology
B2 – Fission – Converters	D2 – Direct Heat/Cool	F2 – General or Basic Science
B3 – Fission – Breeders	D3 – Electric	F3 – Medical Application of Nuclear Technology
B4 – Fusion – Magnetic	D4 – Ocean, Wind	F4 – Hydroelectric
B5 – Fusion – Laser	D5 – Biomass	F5 – Other (specify on the form)

12. TYPE OF RESEARCH ACTIVITY

Check the types of research activity that are most applicable to this project.

13. KEYWORDS

List the five terms describing the technical aspects of the project. List specific chemicals and CAS number, if applicable.

14. ANALYTICAL/PAPER STUDY

Identify the project as being a paper or non-experimental study.

15. RESPONDENT

Name and address of person filling out the questionnaire. Give telephone number, including extension. If you have FTS number, please include it at which person can be reached. Record the date the form was completed. The information in Item 15 will not be published.

6.4 Milestone Schedule Plan (Tasks and Subtasks)

The Study with an estimated as sold budget of $2.0 MM is for a duration of eighteen calendar months. In order to accomplish all objectives in a timely and orderly fashion, a detailed schedule is prepared, ending the complete study in six functional tasks and one management task. The interaction among these various tasks is described in Section 4.1 and shown as a Block Flow Diagram in Figure 4-1.

Significant consideration has been given in planning these six tasks (which is discussed in Section 6.4.1) so that a smooth flow of identifiable events and exchange of information take place among PETC, Bechtel and Amoco. The effective date of this contract is May 16, 1990 (Wednesday). The schedule software, however, always dates every week, interval back to the first working day of that week, i.e. Monday. Hence, initial starting date is labelled May 14, 1990.

6.4.1 Overall Study Schedule

The Milestone Schedule discussed in the earlier page is comprised of six functional tasks together with a level of effort type of task, Task VII. This task's main activity is management and coordination of all activities of the Study. Each of the functional tasks, Tasks I through VI are sequentially planned into an overall Study Schedule as shown on the next page using Form DOE F 1332.3 as required by the contract.

U.S. DEPARTMENT OF ENERGY

MILESTONE SCHEDULE ☒ PLAN ☐ STATUS REPORT

DOE F1332.3

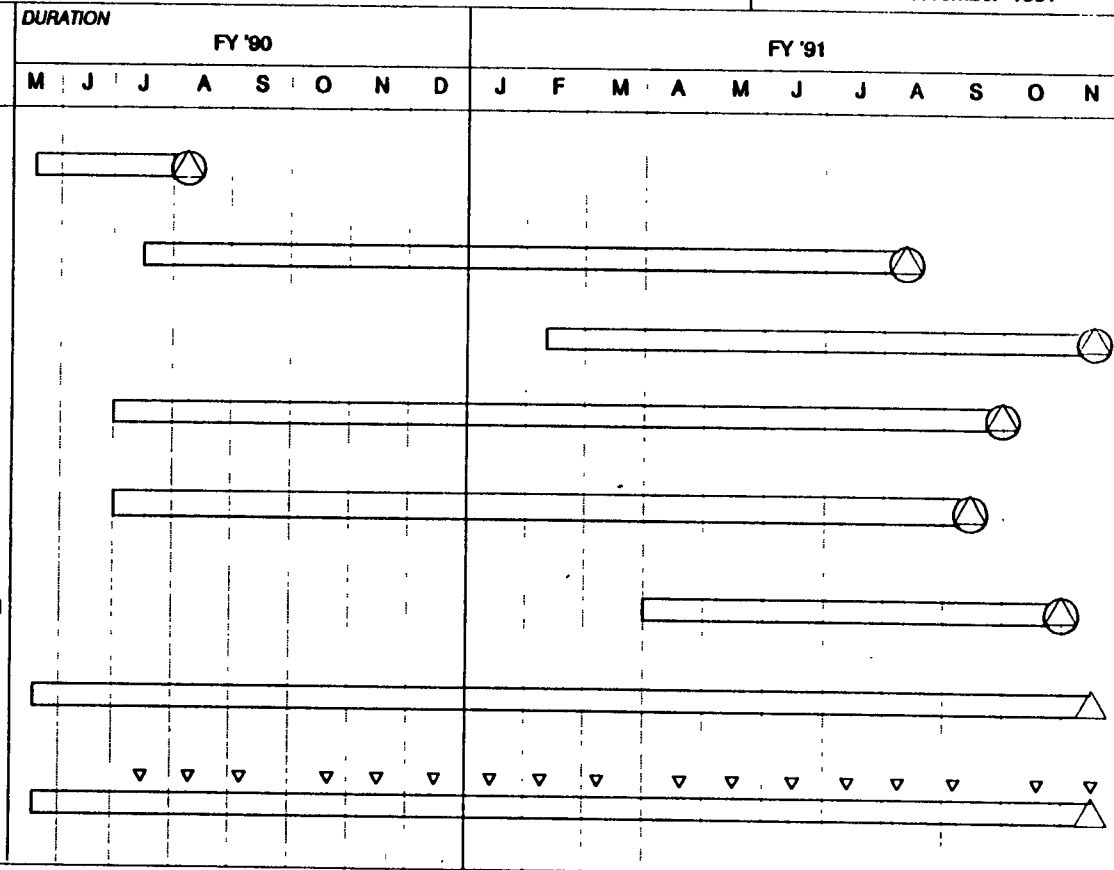
TITLE	REPORTING PERIOD	IDENTIFICATION NUMBER
Baseline Design and System Analysis	N/A	DE-AC22-90PC89857

PARTICIPANT NAME AND ADDRESS
Bechtel Corporation
P.O. Box 2166
Houston, Texas 77252-2166

START DATE: May 1990

COMPLETION DATE: November 1991

ELEMENT CODE (TASK NO.)	REPORTING ELEMENT (DESCRIPTION)	PERCENT COMPLETE PLAN	PERCENT COMPLETE ACTUAL
Task #1	Project Management Plan		
Task #2	Baseline Design		
Task #3	Baseline Economics		
Task #4	Mathematical Model		
Task #5	Simulation Model		
Task #6	Documentation and Training		
Task #7	Project Management and other support		
	SUMMARY		



SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE

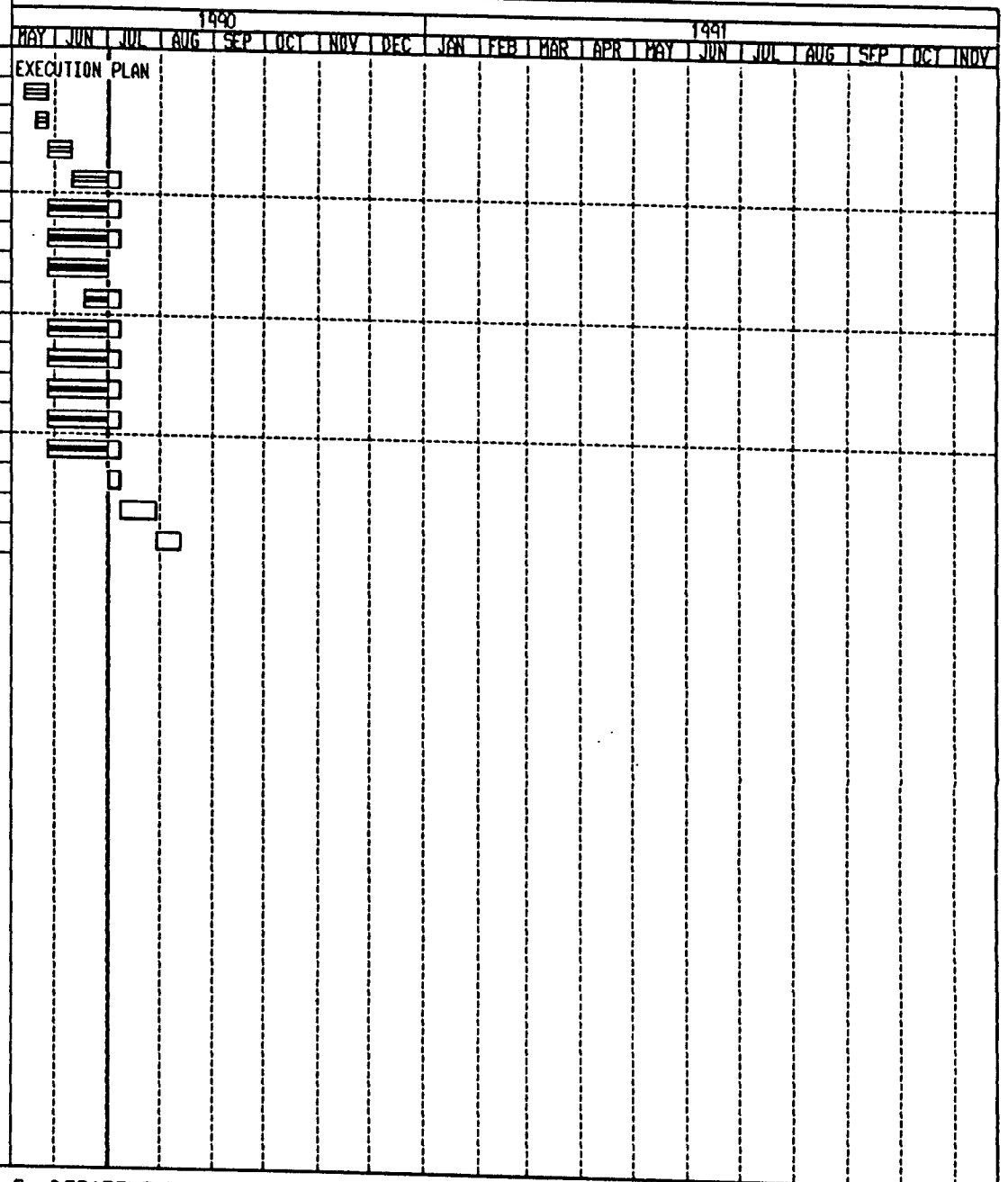
LEGEND: ▭ ACTIVITY BAR ▽ MONTHLY/QUARTERLY REPORTS △ COMPLETION OF TASK ⊘ COMPLETION OF TASK (CRITICAL PATH) (INCL. TOPICAL REPORTS)

F1332_3P

6.4.2 Task I Subtask Schedule

The Task I schedule along with its subtasks culminate in the issuance of this Draft Management Plan. This is a sixty day task which will lapse as soon as the Management Plan is approved by PETC. This schedule is shown on the next page as (Figure 6-3).

ACTIVITY ID	ACTIVITY DESCRIPTION
1010	ORGANIZE STUDY TEAM
1020	HOLD KICKOFF MEETING
1021	PREPARE STATEMENT OF WORK
1022	ESTABLISH PROJECT MANAGEMENT PROCEDURES
1023	UPDATE PROJECT ORGANIZATION SCHEME
1024	DEFINE INPUT FROM LICENSORS AND THIRD PARTIES
1025	UPDATE PROJECT SCHEDULE
1026	DEVELOP DETAILED COST PLAN
1027	DEVELOP COST CONTROL PROCEDURES
1028	DEFINE PROCESS MODEL SIMULATION VERIF. METHODS
1029	DEFINE CONFIGURATION MNGMT & CONTROL PROCEDURES
1030	DEFINE REPORTING & DOCUMENTATION REQUIREMENTS
1035	UPDATE COST ESTIMATING PROCEDURES
1050	ISSUE DRAFT PROJECT MANAGMENENT PLAN (DPMP)
1060	REVIEW DPMP WITH PETC
1070	ISSUE FINAL PROJECT MANAGEMENT PLAN



Activity Bar/Early Dates
Critical Activity
Progress Bar

Primavera Systems, Inc 1984-1989

Planning Unit : Week

Project Start : 14MAY90
Project Finish: 17NOV91

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
TASK 1 SCHEDULE

Sheet 1 of 1

Data Date: 2JUL90
Plot Date: 11JUL90

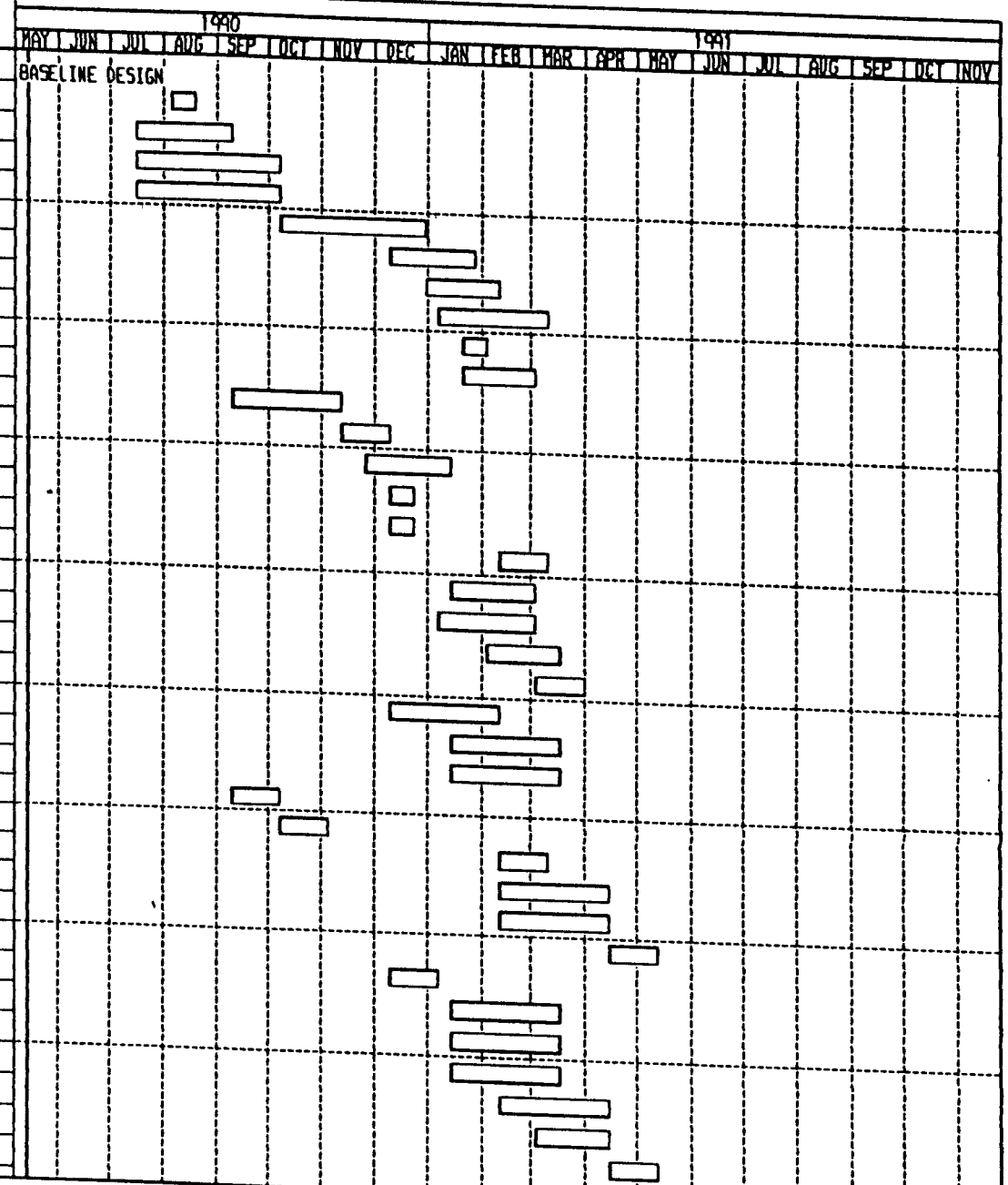
PROJECT SCHEDULE			
Date	Revision	Checked	Approved

Figure 6-3

6.4.3 Task II Subtask Schedule

The 47 subtask schedule for Task II (Development of Baseline Design) is shown on the next two pages as Figure 6-4.

ACTIVITY ID	ACTIVITY DESCRIPTION
2010	OBTAIN REACTOR DESIGN BASIS & OTHR DATA FROM COT
2020	DEVELOP DESIGN BASIS
2030	DEVELOP PRELIMINARY BFD & OVERALL MAT'L BALANCE
2100	PREPARE LICENSOR INQUIRIES
2110	DEVELOP PRELIM PROCESS PACKAGES BY LICENSORS
2120	COMPLETE MAT'L & ENERGY BAL FOR LICENSED UNITS
2130	COMPLETE EQUIPMENT SIZING FOR LICENSED UNITS
2140	COMPLETE PFDs FOR LICENSED UNITS
2150	COMPLETE MAT'L SELECT. GUIDE FOR LICENSED UNITS
2160	COMPLETE PROCESS EQUIP SPECS FOR LICENSED UNITS
2200	PERF. SIMUL AND DEV. MAT'L & ENERGY BAL FOR DAU
2210	SIZE EQUIPMENT FOR DAU
2220	DEVELOP PFDs FOR DAU
2230	DEVELOP MAT'L SELECTION GUIDE FOR DAU
2240	COMPLETE PROCESS EQUIP SPECS FOR DAU
2300	PERFORM INSTRUMENTATION SCOPING STUDY
2310	IDENTIFY MAXIMUM LIQUEFACTION REACTOR CAPACITY
2320	IDENTIFY OTHER CRITICAL EQUIP LIMITATIONS
2330	FINALIZE BFD AND OVERALL MATERIAL BALANCE
2340	ESTIMATE CATALYST AND CHEMICAL REQUIREMENTS
2400	DEVELOP UTILITY BALANCES AND BFDs
2410	DEFINE UTILTIY FACILITIES
2420	DEVELOP ELECTRICAL ONE-LINE DIAGRAMS
2500	IDENTIFY TYPICAL GENERIC SITE
2510	OBTAIN SITE DATA
2520	DEFINE STORAGE AND SHIPPING REQUIREMENTS
2530	DEFINE OTHER OFFSITE FACILITIES
2540	DEVELOP PRELIMINARY SITE PLAN
2550	DEFINE STIE PREPARATION REQUIREMENTS
2600	CHARACTERIZE WASTE STREAMS
2610	DEFINE AIR EMISSION CONTROL FACILITIES
2620	DEFINE WASTEWATER TREATING FACILITIES
2630	DEFINE SOLID WASTE MANAGEMENT PLAN
2640	DEVELOP PERMITTING STRATEGY
2700	PERF. RELIAB/AVAIL ANAL. FOR COAL LIQUEF COMPLEX
2710	EST. ONSTREAM FACTORS FOR COAL LIQUEF. COMPLEX



Activity Bar/Early Dates
Critical Activity
Progress Bar

Primavera Systems, Inc 1984-1989

Planning Unit : Week

Project Start : 14MAY90
Project Finish: 17NOV91

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
TASK 2

Sheet 1 of 2

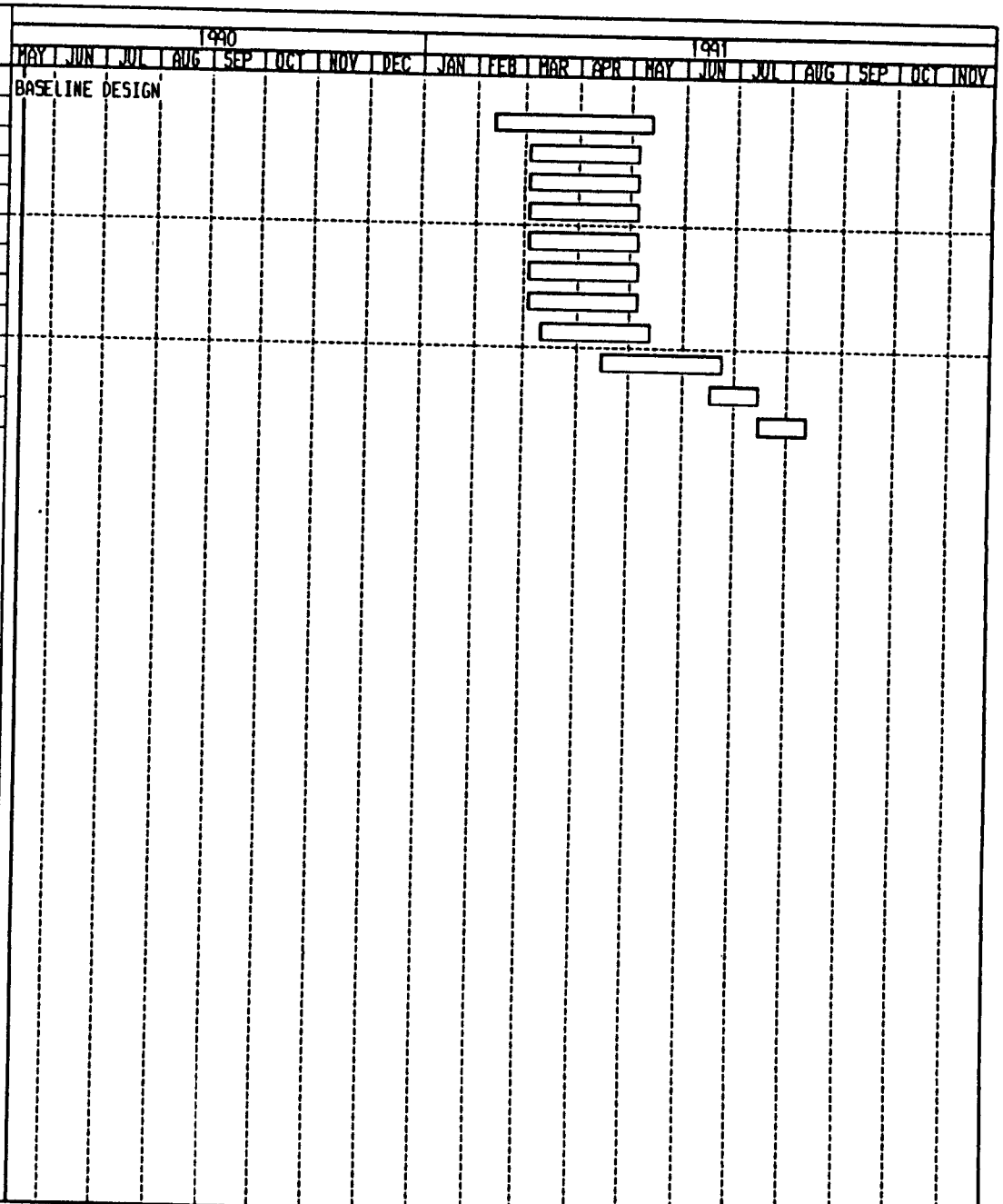
Data Date: 14MAY90
Plot Date: 7JUL90

PROJECT SCHEDULE

Date	Revision	Checked	Approved

Figure 6-4

ACTIVITY ID	ACTIVITY DESCRIPTION
2800	DEVELOP TWO COAL CLEANING OPTIONS
2810	DEVELOP THERMAL REACTOR OPTION
2820	DEVELOP VENT GAS SEPARATION OPTION
2830	DEVELOP DELAYED COKING OPTION
2840	DEVELOP FLUID COKING OPTION
2850	DEVELOP LOW ASH FEEDSTOCK OPTION
2860	DEVLP HYDRGN MANUF OPT (STEAM REFORM OF NAT GAS)
2890	COMPILE COST ESTIMATE INPUT
2900	DRAFT TOPICAL REPORT FOR TASK 2
2910	REVIEW TASK 2 REPORT WITH PETC
2920	ISSUE TOPICAL REPORT FOR TASK 2



Activity Bar/Early Dates
Critical Activity
Progress Bar

Primavera Systems, Inc 1984-1989

Planning Unit : Week

Project Start : 14MAY90
Project Finish: 17NOV91

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
TASK 2

Sheet 2 of 2

Data Date: 14MAY90
Plot Date: 7JUL90

PROJECT SCHEDULE

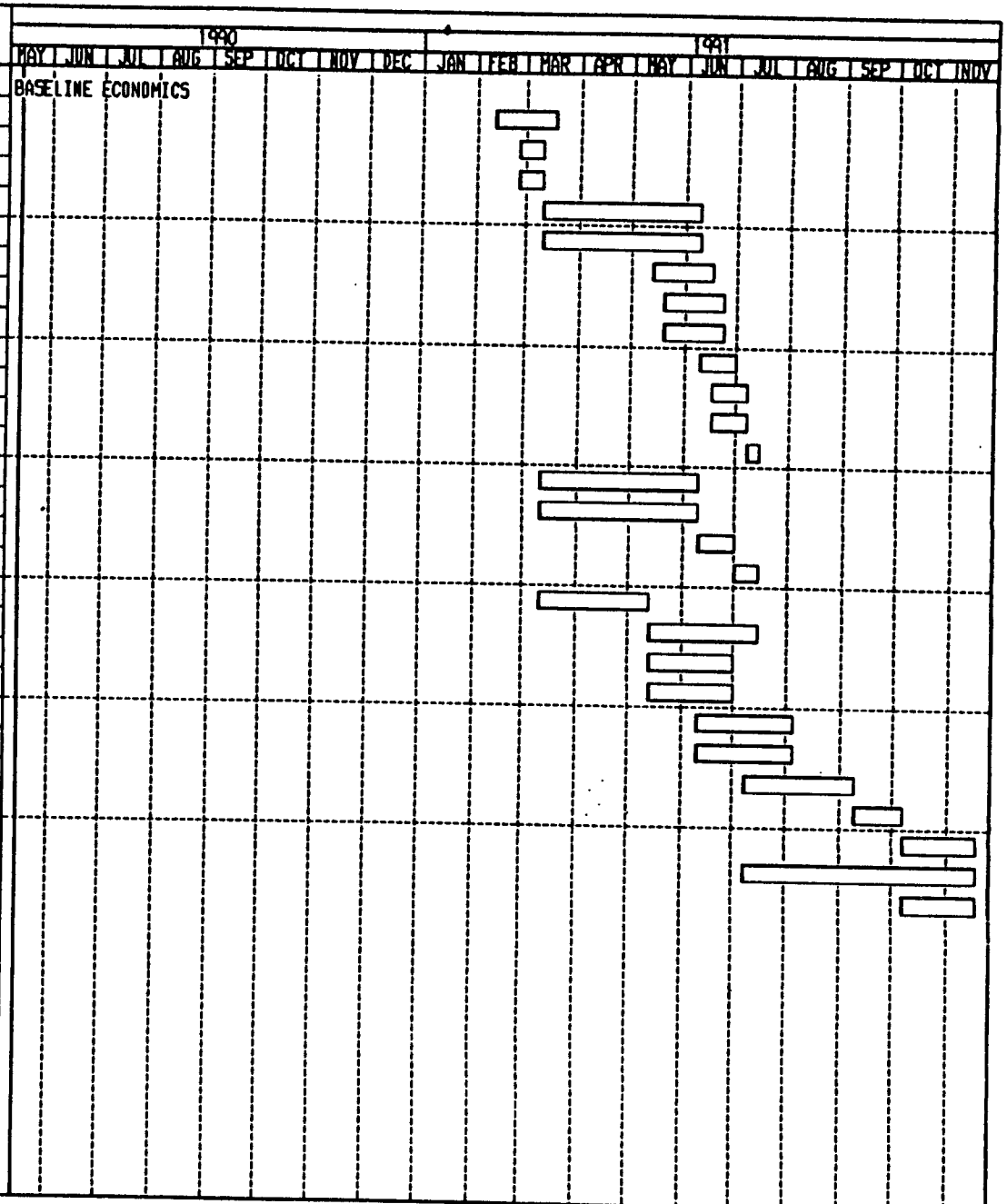
Date	Revision	Checked	Approved

Figure 6-4
(Cont'd)

6.4.4 Task III Subtask Schedule

The 27 subtask schedule for Task III (Capital Cost & Economics) is shown on the next page as Figure 6-5.

ACTIVITY ID	ACTIVITY DESCRIPTION
3010	COMPILE MAJOR EQUIPMENT LIST
3020	DEVELOP UTILITY SUMMARY
3100	DEVELOP SCALING FACTORS FOR MAJOR EQUIPMENT
3110	OBTAIN VENDOR QUOTES FOR CRITICAL EQUIPMENT
3120	ESTIMATE OTHER MAJOR EQUIPMENT COSTS
3130	ESTIMATE BULK MATERIAL COSTS
3140	ESTIMATE DIRECT LABOR MANHOURS AND COSTS
3150	ESTIMATE MAJOR SUBCONTRACTS
3160	ESTIMATE TOTAL DIRECT COSTS
3170	ESTIMATE INDIRECT FIELD COSTS
3180	ESTIMATE HOME OFFICE COSTS
3190	COMP. TTL COST OF FACILITIES FOR BASELINE DESIGN
3200	ESTIMATE OWNER'S COSTS
3300	ESTIMATE WORKING CAPITAL
3400	DEVELOP APPROPRIATE CONTINGENCY
3410	COMPUTE TOTAL CAPITAL COST
3500	DEVELOP MANPOWER REQUIREMENTS
3510	ESTIMATE OPERATING COSTS
3550	DEVELOP PROJECT SCHEDULE
3600	DEVELOP BASELINE ECONOMICS
3610	PERFORM SENSITIVITY STUDIES
3800	EST. COSTS & DEVLP ECON & SENSTVTY OF ALTERNATES
3900	DRAFT TOPICAL REPORTS FOR TASK 3
3910	REVIEW TASK 3 REPORT WITH PETC
3920	FINALIZE AND ISSUE TOPICAL REPORT FOR TASK 3
3930	DRAFT FINAL REPORT
3940	ISSUE FINAL REPORT



Activity Bar/Early Dates
Critical Activity
Progress Bar

Primavera Systems, Inc. 1984-1989

Planning Unit : Week

Project Start : 14MAY90
Project Finish: 17NOV91

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
TASK 3

Sheet 1 of 1

Data Date: 14MAY90
Plot Date: 7JUL90

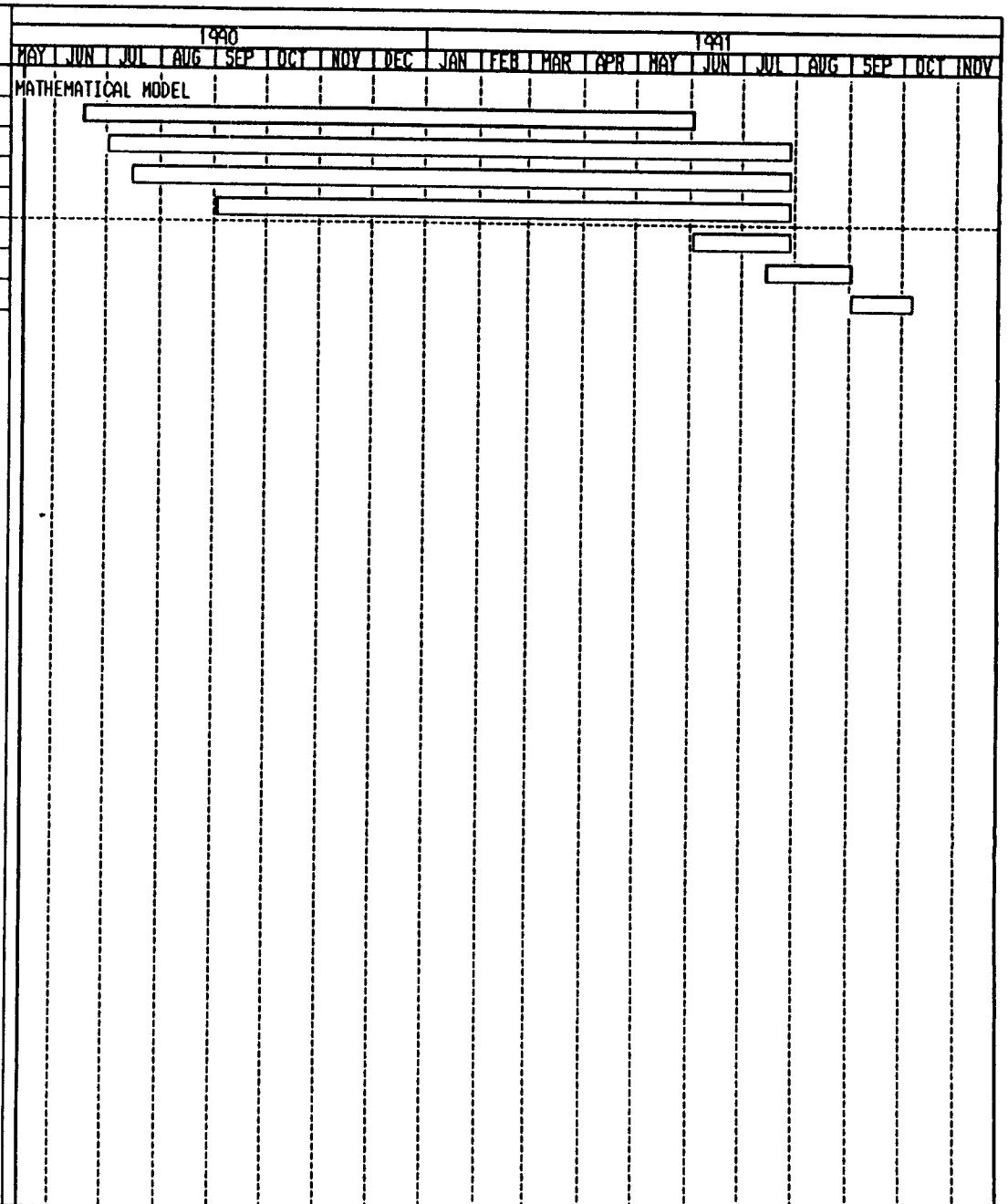
PROJECT SCHEDULE			
Date	Revision	Checked	Approved

Figure 6-5

6.4.5 Task IV Subtask Schedule

The 7 subtask schedule for Task IV (Mathematical Model) is shown on the next page as Figure 6-6.

ACTIVITY ID	ACTIVITY DESCRIPTION
4010	REVIEW ASPEN EQUATIONS AND ALGORITHMS
4020	SUPPL. EQUATIONS & ALGORITHMS FOR EQUIP SCALE UP
4030	INCORPORATE EQUIP SIZE LIMIT. IN EQ & ALGORITHMS
4040	INC. MULT. TRAIN REQUIRMENTS IN EQ & ALGORITHMS
4050	DRAFT REPORT FOR TASK 4
4060	REVIEW TASK 4 WITH PETC
4070	FINALIZE AND ISSUE TASK 4 REPORT



Activity Bar/Early Dates
Critical Activity
Progress Bar

Primavera Systems, Inc 1984-1989

Planning Unit : Week

Project Start : 14MAY90
Project Finish: 17NOV91

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
TASK 4

Sheet 1 of 1

Data Date: 14MAY90
Plot Date: 7JUL90

PROJECT SCHEDULE

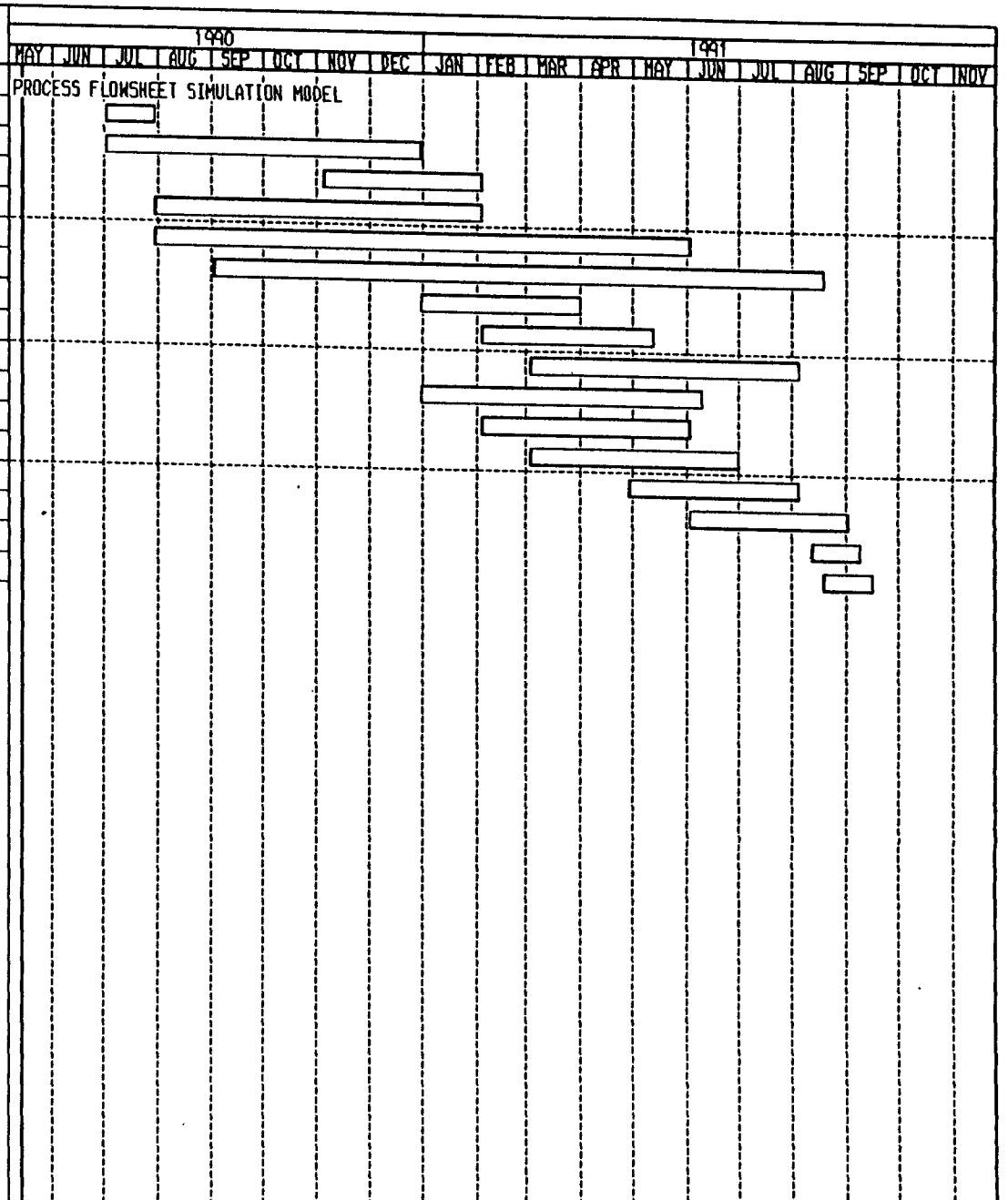
Date	Revision	Checked	Approved

Figure 6-6

6.4.6 Task V Subtask Schedule

The 16 subtask schedule for Task V (Development and Validation of Model) is shown on the next page as Figure 6.7.

ACTIVITY ID	ACTIVITY DESCRIPTION
5010	SET UP ASPEN FILES AND PROCEDURES
5020	DEVELOP SIMPLE ASPEN BASE CASE MODEL
5030	REPORT MAT & ENERGY BAL FLOWRATES & STREAM PROP.
5040	COMPARE MODEL OUTPUT WITH DATA
5050	ASSEMBLE DATA ON ALTERNATE PROCESS CONDITIONS
5060	IMPROVE PROCESS BLOCK MODULES
5070	ASSEMBLE SIMULATION MODEL FROM MODULES
5110	ADD ELEMENTAL BALANCE CAPABILITIES AND REPORTING
5210	ASSEMBLE DATA ON ALTERNATIVE PROCESS OPTIONS
5310	DEVELOP INTERFACE FOR CAPITAL COST ALORITHMS
5320	COMPLETE CAPITAL COST MODULE
5410	DEVELOP ECONOMIC REPORT MODULE
5420	INTERFACE W/ CAPITAL & OPERATING COST ALGORITHMS
5900	DRAFT REPORT FOR TASK 5
5910	REVIEW TASK 5 REPORT WITH PETC
5920	FINALIZE AND ISSUE TASK 5 REPORT



Activity Bar/Early Dates
Critical Activity
Progress Bar

Primavera Systems, Inc 1984-1989

Planning Unit : Week

Project Start : 14MAY90
Project Finish: 17NOV91

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
TASK 5

Sheet 1 of 1

Data Date: 14MAY90
Plot Date: 7JUL90

PROJECT SCHEDULE

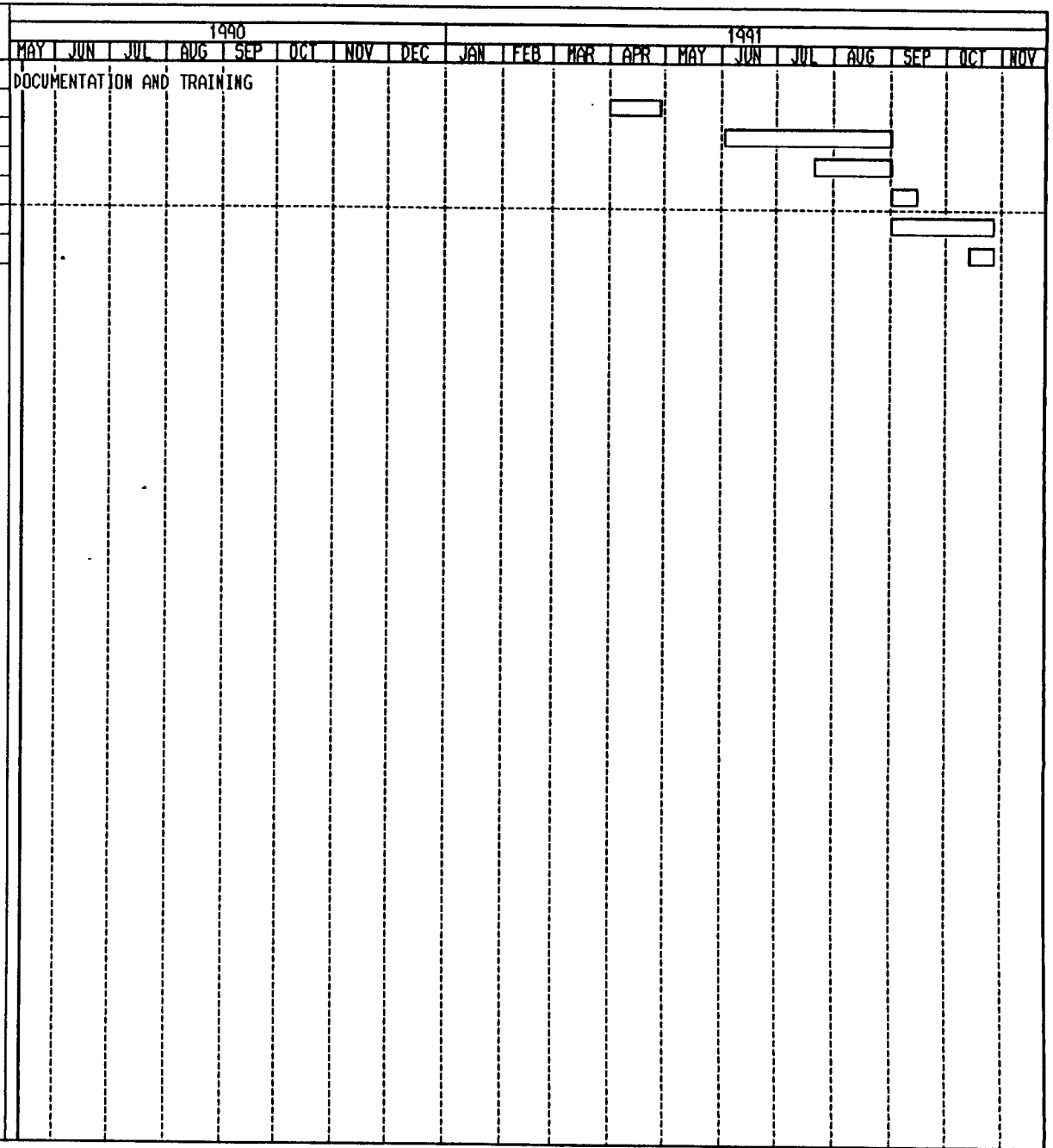
Date	Revision	Checked	Approved

Figure 6-7

6.4.7 Task VI Subtask Schedule

The 6 subtask schedule for Task VI (Documentation of Simulation and Training) is shown on the next page as Figure 6-8.

ACTIVITY ID	ACTIVITY DESCRIPTION
	DOCUMENTATION AND TRAINING
6010	SCHEDULE TRAINING RESOURCES
6020	DEVELOP TRAINING MANUAL
6030	DRAFT TASK 6 REPORT - TRAINING MANUAL
6040	REVIEW TASK 6 REPORT WITH PETC
6050	FINALIZE AND ISSUE TASK 6 REPORT
6060	CONDUCT TRAINING SESSION



Activity Bar/Early Dates
Critical Activity
Progress Bar

Primavera Systems, Inc 1984-1989

Planning Unit : Week

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
TASK 6

Sheet 1 of 1

Project Start : 14MAY90
Project Finish: 17NOV91

Data Date: 14MAY90
Plot Date: 7JUL90

PROJECT SCHEDULE			
Date	Revision	Checked	Approved

Figure 6.8

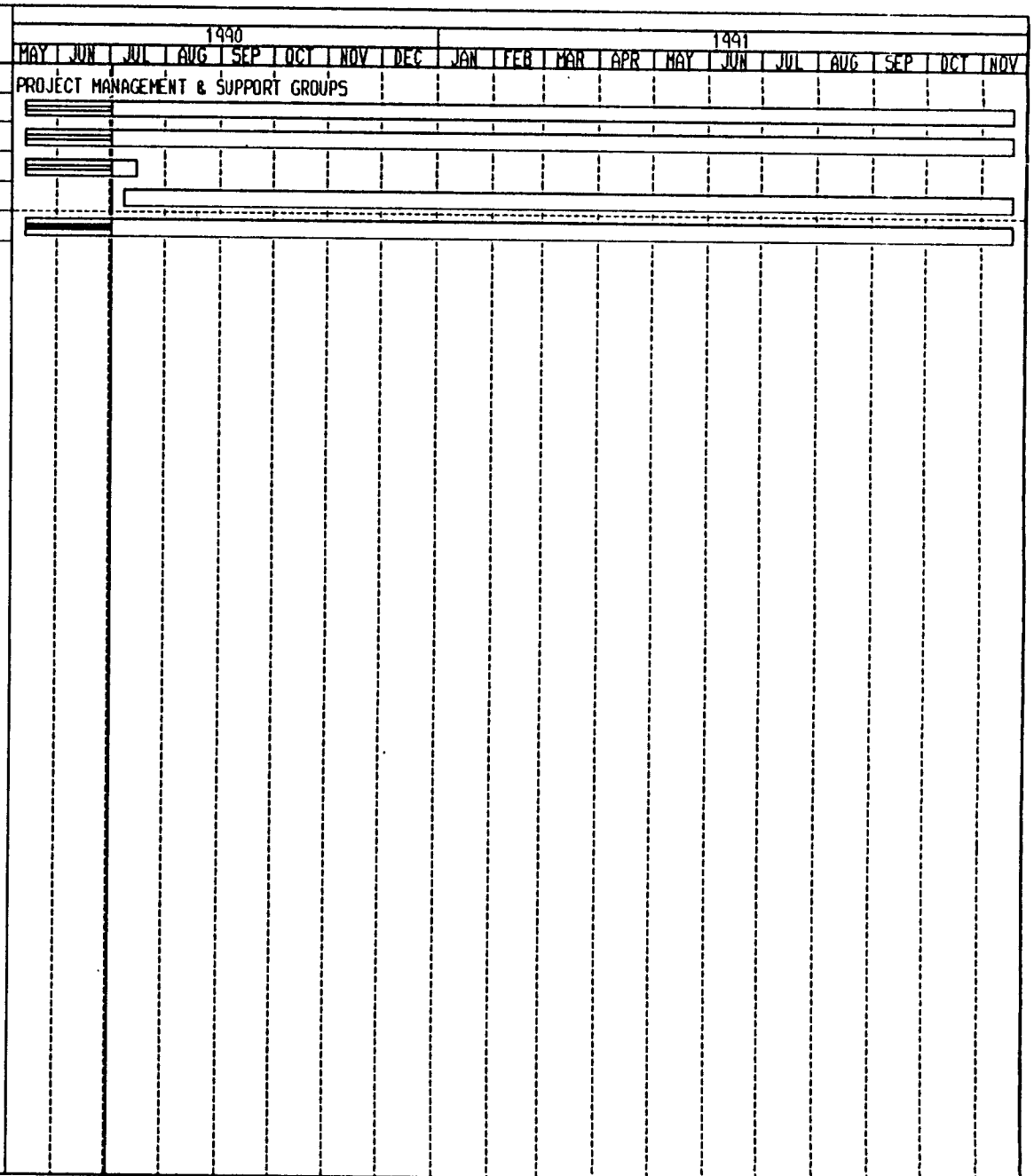
6.4.8 Task VII Subtask Schedule

This task as a level of effort task does not have actual subtasks. It is the Project Management and Coordination task and includes the following five components:

- Project Management/Technical Coordination
- Project Administration (Secretarial)
- Cost/Schedule - Project Start-up
- Cost/Schedule - Monitoring
- Miscellaneous Support

The subtask schedule for the above activities is shown in Figure 6-9.

ACTIVITY ID	ACTIVITY DESCRIPTION
7010	PROJECT MANAGEMENT/TECHNICAL COORDINATION
7020	PROJECT ADMINISTRATION (SECRETARY)
7030	COST/SCHEDULE STARTUP
7035	COST/SCHEDULE MONITORING
7040	ACCOUNTING, LEGAL, AND OTHER SUPPORT GROUPS



Activity Bar/Early Dates
Critical Activity
Progress Bar

Primavera Systems, Inc 1984-1989

Planning Unit : Week

Project Start : 14MAY90
Project Finish: 17NOV91

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
TASK 7 SCHEDULE

Sheet 1 of 1

Data Date: 2JUL90
Plot Date: 11JUL90

PROJECT SCHEDULE			
Date	Revision	Checked	Approved

Figure 6-9

6.5 Cost Plan and Basis

6.5.1 Cost Plan

The Cost Plan for the initial baseline configuration of this project is shown in the DOE Form F 1332.7 (see attached overleaf).

This plan is updated every time the baseline process or project configuration changes or as dictated by any contract or configuration management changes.

The task-by-task breakdown of the Cost Plan for 1990 and 1991 are shown in Tables 6.5 and 6.6 consecutively.

U.S. DEPARTMENT OF ENERGY

COST PLAN

DOE F1332.7

TITLE	IDENTIFICATION NUMBER
Baseline Design and System Analysis	DE-AC22-90PC89857

PARTICIPANT NAME AND ADDRESS	COST PLAN DATE	START DATE
Bechtel Corporation P.O. Box 2166 Houston, Texas 77252-2166	JULY 1990	May 1990
		COMPLETION DATE November 1991

ELEMENT CODE (TASK NO.)	REPORTING ELEMENT (DESCRIPTION)	PLAN PRIOR YEAR	ACTUAL PRIOR YEAR	CURRENT YEAR '90									'91	TOTAL
				M	J	J	A	S	O	N	D	TOTAL		
Task #1	Project Management Plan	---		2.3	13.1	11.1	7.9					34.4	0.0	34.4
Task #2	Baseline Design	---				2.0	40.9	103.3	99.3	127.2	51.4	424.1	270.0	694.1
Task #3	Baseline Economics	---										0.0	94.1	94.1
Task #4	Mathematical Model	---				0.2	0.3	0.5	2.0	1.8	1.5	6.3	15.6	21.9
Task #5	Simulation Model	---					18.0	22.0	40.0	40.0	31.5	151.5	184.3	335.8
Task #6	Documentation and Training	---										0.0	50.7	50.7
Task #7	Project Management and other support	---		11.2	47.8	36.3	40.6	42.5	37.0	38.9	56.2	310.5	458.9	769.4
TOTAL				13.5	60.9	49.6	107.7	168.3	178.3	207.9	140.6	926.8	1073.6	2000.4

DOLLARS EXPRESSED IN	SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE	SIGNATURE OF PARTICIPANT'S AUTHORIZED FINANCIAL REPRESENTATIVE AND DATE
Thousands		

TABLE 6-5

DOETOT6.WK1
11-Jul-90

DIRECT COAL LIQUEFACTION
BASELINE DESIGN AND SYSTEMS ANALYSIS
TOTAL PROJECT COST SUMMARY FOR 1990 - JOB NO. 20952

		1990															
		TASK 1		TASK 2		TASK 3		TASK 4		TASK 5		TASK 6		TASK 7		SUBTOTAL	
		BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL
JOBHOURS		304		3,211		0		30		20		0		3,974		7,539	
AVERAGE WAGE RATE		33.87		29.02		0.00		33.87		33.87		0.00		27.72			
WAGES (INCL. ESCALATION)	2.71%	10,576		95,708		0		1,044		696		0		113,152		221,175	
P/R ADDS	38.20%	4,040		36,561		0		399		266		0		43,224		84,489	
TOTAL LABOR FOR O/H CALC BASE:		14,615	0	132,269	0	0	0	1,442	0	962	0	0	0	156,376	0	305,664	0
OVERHEAD/BURDEN BPC&I	33.73%													20,796		20,796	
PROCUREMENT	21.33%													451		451	
R&D	45.97%	6,719		60,804		0		663		442		0		42,571		111,199	
O/H FCCM BPC&I	0.75%													462		462	
R&D	1.76%	257		2,328		0		25		17		0		1,630		4,257	
TOTAL LABOR WITH OVERHEAD:		21,591	0	195,401	0	0	0	2,131	0	1,420	0	0	0	222,286	0	442,829	0
SF P/R TAX														104		104	
REPRODUCTION,REPORTS														11,309		11,309	
ENGR'G SUPPLIES & MAT'L														302		302	
COMMUNICATIONS														4,523		4,523	
COMPUTER/AUTOMATION SUPPORT														11,685		11,685	
TRAVEL & SUBSISTENCE														24,127		24,127	
COMPUTER AIDED DESIGN & DRAFTING														12,650		12,650	
ASPEN SOFTWARE														3,750		3,750	
CLIENT OFFICE SPACE RENTAL														3,040		3,040	
LICENSE SUBCONTRACT				200,000										0		200,000	
AMOCO SUBCONTRACT		11,140		13,000				4,000		150,000				0		178,140	
TOTAL O.D.C.		11,140	0	213,000	0	0	0	4,000	0	150,000	0	0	0	71,489	0	449,629	0
TOTAL DIRECT COST WITH O/H:		32,731	0	408,401	0	0	0	6,131	0	151,420	0	0	0	293,775	0	892,458	0
G & A CALCULATION BASE:		21,334	0	193,073	0	0	0	2,105	0	1,404	0	0	0	206,366	0	424,282	0
G & A EXPENSES	8.00%	1,707		15,446		0		168		112		0		16,509		33,943	
G&A FCCM	0.10%	21		193		0		2		1		0		206		424	
TOTAL ESTIMATED COST W/O FEE:		34,459	0	424,040	0	0	0	6,301	0	151,534	0	0	0	310,492	0	926,827	0
FEE CALCULATION BASE		34,181	0	421,519	0	0	0	6,274	0	151,516	0	0	0	308,194	0	921,683	0
FEE		0		0		0		0		0		0		0		0	
TOTAL COST WITH FEE		34,459	0	424,040	0	0	0	6,301	0	151,534	0	0	0	310,492	0	926,827	0
COST SHARING/CONTRIBUTION		0		0		0		0		0		0		0		0	
TOTAL ESTIMATED COSTS		34,459	0	424,040	0	0	0	6,301	0	151,534	0	0	0	310,492	0	926,827	0

- LABOR BARE RATES ARE BASED ON CURRENT RATES FOR PROJECT PERSONNEL ASSIGNED AS OF MAY 1990
- LABOR ESCALATION IS 2.71% FOR THE DURATION OF THE PROJECT

TABLE 6-6

DOETOT6.WK1
11-Jul-90

DIRECT COAL LIQUEFACTION
BASELINE DESIGN AND SYSTEMS ANALYSIS
TOTAL PROJECT COST SUMMARY 1991 – JOB NO. 20952

		1991															
		TASK 1		TASK 2		TASK 3		TASK 4		TASK 5		TASK 6		TASK 7		GRAND TOTAL	
		BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL	BUDGET	ACTUAL
JOBHOURS		0		3,590		1,371		55		90		40		5,140		17,825	
AVERAGE WAGE RATE		0.00		29.16		30.32		33.67		34.58		36.00		27.69			
WAGES (INCL. ESCALATION)	2.71%	0		107,521		42,695		1,902		3,197		1,479		146,201		524,170	
P/R ADDS	38.20%	0		41,073		16,310		727		1,221		565		55,849		200,233	
TOTAL LABOR FOR O/H CALC BASE:		0	0	148,595	0	59,005	0	2,629	0	4,418	0	2,044	0	202,050	0	724,404	0
OVERHEAD/BURDEN BPC&I	33.73%													28,585		49,381	
PROCUREMENT	21.33%													0		451	
R&D	45.97%	0		68,309		27,125		1,208		2,031		940		53,924		264,735	
O/H FCCM BPC&I	0.75%													636		1,098	
R&D	1.76%	0		2,615		1,038		46		78		36		2,065		10,136	
TOTAL LABOR WITH OVERHEAD:		0	0	219,519	0	87,168	0	3,883	0	6,526	0	3,020	0	287,259	0	1,050,204	0
SF P/R TAX														105		209	
REPRODUCTION,REPORTS														24,254		35,563	0
ENGR'G SUPPLIES & MAT'L														411		713	
COMMUNICATIONS														16,972		21,495	
COMPUTER/AUTOMATION SUPPORT														15,943		27,628	
TRAVEL & SUBSISTENCE														35,854		59,981	
COMPUTER AIDED DESIGN & DRAFTING														32,060		44,710	
ASPEN SOFTWARE														11,250		15,000	
CLIENT OFFICE SPACE RENTAL														9,115		12,155	
LICENSE SUBCONTRACT														0		200,000	
AMOCO SUBCONTRACT				32,950				11,450		177,230		47,430		0		447,200	
TOTAL O.D.C.		0	0	32,950	0	0	0	11,450	0	177,230	0	47,430	0	145,964	0	864,654	0
TOTAL DIRECT COST WITH O/H:		0	0	252,469	0	87,168	0	15,333	0	183,756	0	50,450	0	433,224	0	1,914,857	0
G & A CALCULATION BASE:		0	0	216,903	0	86,129	0	3,837	0	6,448	0	2,984	0	316,781		1,057,365	
G & A EXPENSES	8.00%	0		17,352		6,890		307		516		239		25,342	0	84,589	0
G&A FCCM	0.10%	0		217		86		4		6		3		317	0	1,057	0
TOTAL ESTIMATED COST W/O FEE:		0	0	270,038	0	94,144	0	15,644	0	184,278	0	50,691	0	458,883	0	2,000,506	0
FEE CALCULATION BASE		0	0	267,206	0	93,020	0	15,594	0	184,194	0	50,652	0	455,865	0	1,988,214	0
FEE		0		0		0		0		0		0		0		0	
TOTAL COST WITH FEE		0	0	270,038	0	94,144	0	15,644	0	184,278	0	50,691	0	458,883	0	2,000,506	0
COST SHARING/CONTRIBUTION		0		0		0		0		0		0		0		0	
TOTAL ESTIMATED COSTS		0	0	270,038	0	94,144	0	15,644	0	184,278	0	50,691	0	458,883	0	2,000,506	0

6.5 Cost Plan and Basis

6.5.1 Cost Plan

The Cost Plan for the initial baseline configuration of this project is shown in the DOE Form F 1332.7 (see attached overleaf).

This plan is updated every time the baseline process or project configuration changes or as dictated by any contract or configuration management changes.

The task-by-task breakdown of the Cost Plan for 1990 and 1991 are shown in Tables 6.5 and 6.6 consecutively.

Table 6-7

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
BASELINE DESIGN AND SYSTEM ANALYSIS
BECHTEL JOB NO. 20952

PROJECT CONTROLS ASSUMPTIONS FOR COST PLAN DEVELOPMENT

1) The annual cost plan for 1990 & 1991 is based on a calender year breakdown (Jan–Dec), rather than a fiscal year.

2) The average wage rate for each task is based on actual wages as of May, 1990 for personnel already assigned to the project, as well as the Estimating Department's assumption for Project Controls, Controller's organization and other unstaffed positions.

3) Labor escalation is assumed to be 2.71% for the duration of the project.

4) Payroll additives are based on 1990 figures of 38.2% of bare wages for the duration of the project. However, this rate is established by the Controller's organization and is subject to change in 1991.

5) The cost plan is based on an Automation Technology rate of $1.55/hr as originally estimated in the proposal; however, the AT rate is currently $2.16/hr for the Houston Regional Office.

6) An allowance of $44,710 was included in the original proposal for Computer Aided Design & Drafting. This allowance includes costs for 45 drawings performed on a PC–Based 2D AUTOCAD, 20 CADD operator hours per drawing, and rates of approximately $20/hr for computer time, $25/hr for operator time, and $5/hr for supplies (the total estimated hours of 17,825 exclude CADD operator manhours).

7) Amoco's cost plan reflects a one month lag from actual costs due to different reporting cut–off dates.

8) The total cost plan for 1990 is approximately $927,000. This is $114,000 less than the "as sold budget" for 1990 due to: 1) Amoco's redistribution of its cost plan, 2) transferring some manhours in Task 7 from 1990 to 1991, and 3) reallocating material costs such as travel & subsistence, computer, Aspen software, and client office rental costs to 1991.

9) Project Controls as well as the Controller's organization budgeted hours are based on what was originally assumed in the proposal (548 hours for Project Controls and 225 hours for Controller's organization). The project forecast is approximately 800 hours for Project Controls, and 1,100 hours for the Controller's organization.

DOEAS4.WK1

Table 6-8

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
BASELINE DESIGN AND SYSTEM ANALYSIS
BECHTEL JOB NO. 20952

MANHOUR BUDGET BY DISCIPLINE FOR THE INITIAL COST PLAN

DISCIPLINE	BUDGET		
	1990	1991	TOTAL
ENGINEERING AND PROJECT MANAGEMENT			
PROJECT MANAGEMENT	1,068	1,468	2,536
TECHNICAL COORDINATION	1,130	1,572	2,702
PROJECT ADMINISTRATION	1,130	1,572	2,702
PROCESS GROUP	1,870	2,375	4,245
FACILITIES GROUP	1,695	2,165	3,860
OTHER SUPPORT GROUPS			
PROJECT CONTROLS	310	238	548
ESTIMATING	0	606	606
CONTRACTS/LEGAL	130	105	235
CONTROLLER'S ORGANIZATION	106	119	225
PROCUREMENT	60	0	60
TECHNICAL REVIEWER	40	66	106
TOTAL	7,539	10,286	17,825

DOEAS3.WK1

TABLE 6-9

U.S. DEPARTMENT OF ENERGY (PETC)
DIRECT COAL LIQUEFACTION
BASELINE DESIGN AND SYSTEM ANALYSIS
BECHTEL JOB NO. 20952

POTENTIAL CHANGES TO INITIAL COST PLAN

BASIS FOR INITIAL COST PLAN	POTENTIAL CHANGES	IMPACT
1) Payroll Additives @ 38.2% of bare wages for the duration of the project	Payroll additives may increase to 39.9% in 1991	Increase in Payroll additives as established by the Controller's Organization
2) The Automation Technology rate is $1.55/hr for the duration of the project	The AT rate is currently $2.16/hr for the Houston Regional Office, and may increase to $2.50/hr in 1991	Increase in the Automation Technology rate as established by the AT Department
3) Labor escalation is assumed to be 2.71% for the duration of the project	The escalation rate for HORO is 8% per year, therefore a total escalation factor of 12% should be applied over the duration of the project	The yearly escalation rate is established based on raises in salaries to current HORO employees
4) Total Computer Aided Design/Drafting cost is $44,710 based on using a PC-Based 2D AUTOCAD for 45 drawings, 20 CADD operator hours per drawing, and rates of approximately $20/hr for computer time, $25/hr for operator time, and $5/hr for supplies	The number of drawings, the complexity of each drawing, operator's labor costs and type of computer hardware (PC-Based 2D Workstations versus main frame charges) are all subject to change	20-35% increase in total CADD costs
5) The budget for Project Controls is 548 hours over the duration of the project	Project Controls estimate of their reimbursable budget is 800 hours based on the deliverables required by DOE	Minimal increase in total Project Controls costs
6) The budget for the Controller's Organization is 225 hours over the duration of the project	Controller's Organization estimate of its own budget is approximately 1,100 manhours	An increase of approximately $15,000 in total Controller's Organization costs

DOEAS2 WK1

6.6 R porting and Invoicing Schedul

The Bechtel/Amoco Reporting Schedule is shown on the next page as Table 6-10. Note that Amoco lags Bechtel by one month due to different reporting cut-off dates of the two corporations.

The Cost Plan in section 6.5 is based on these reporting cut-off periods.

The invoices of both companies may follow a different schedule, but will always be for the same reporting periods as shown in Table 6-10.

Table 6-10

BECHTEL/AMOCO REPORTING SCHEDULE

DOEASPEN.wk1 REV. 1

	PAYROLL CLOSING DATE	RECEIVE LABOR DATA	RECEIVE OTHER DATA	AMOCO DATA SUBMITTAL (*)	SUBMIT MONTHLY REPORTS
MAY & JUN '90	06/24/90	06/28/90	07/06/90	N/A	07/13/90
JUL '90	07/22/90	07/26/90	08/03/90	07/17/90	08/10/90
AUG '90	08/19/90	08/23/90	08/31/90	(May/Jun'90) 08/15/90	09/07/90
SEP '90	09/16/90	09/20/90	09/28/90	(Jul'90) 09/17/90	10/05/90
OCT '90	10/28/90	11/01/90	11/09/90	(Aug'90) 10/15/90	11/16/90
NOV '90	11/25/90	11/29/90	12/07/90	(Sep'90) 11/15/90	12/14/90
DEC '90	12/23/90	12/27/90	01/04/91	(Oct'90) 12/15/90	01/11/91
JAN '91	01/20/91	01/24/91	02/01/91	(Nov'90) 01/16/91	02/08/91
FEB '91	02/17/91	02/21/91	03/01/91	(Dec'90) 02/15/91	03/08/91
MAR '91	03/17/91	03/21/91	03/29/91	(Jan'91) 03/15/91	04/05/91
APR '91	04/28/91	05/02/91	05/10/91	(Feb'91) 04/15/91	05/17/91
MAY '91	05/26/91	05/30/91	06/07/91	(Mar'91) 05/15/91	06/14/91
JUN '91	06/23/91	06/27/91	07/05/91	(Apr'91) 06/17/91	07/12/91
JUL '91	07/21/91	07/25/91	08/02/91	(May'91) 07/16/91	08/09/91
AUG '91	08/18/91	08/22/91	08/30/91	(Jun'91) 08/15/91	09/06/91
SEP '91	09/15/91	09/19/91	09/27/91	(Jul'91) 09/17/91	10/04/91
OCT '91	10/27/91	10/31/91	11/08/91	(Aug'91) 11/13/91 (Sep/Oct'90)	11/15/91

(*) – Cost data will lag Bechtel by one month due to different reporting cut-off dates. Therefore, Project Cost Plan will reflect this deviation. However, Technical and Schedule information will be synchronous with Bechtel's Reporting Schedule.

DELIVERABLES

7. DELIVERABLES

7.1 Monthly Reports

This report consists of the following three sections:

- Management Status Report
- Milestone Schedule Status Report
- Cost Management Report

As agreed in the Kickoff Meeting, the Monthly Report is internal to DOE and it's contractors, and will not be a part of the public domain. As a result, the confidential material, if any, will not be shown separately in the report and will be protected by DOE and it's contractors.

7.1.1 Management Status Report

The Management Status Report for a developmental study of this type consists of a discussion of Program Activities by task. Such discussion for each task will include the accomplishments, plans for next month, areas of concern/action taken, and any configuration changes with or without any resultant scope changes.

7.1.2 Milestone Status Report

This report simply involves completing the form (DOE F 1332.3) as required by the contract. A copy of the completed form for the May/June reporting period is included herein as a sample.

7.1.3 Cost Management Report

This report also involves completing the required form (DOE F 1332.9) as per contract. A copy of the completed form for the May/June reporting period is included herein as a sample.

7.1.4 Monthly Report Format

The format of this report including typical contents of the report is shown in Table 7-1.

U.S. DEPARTMENT OF ENERGY

DOE F1332.3

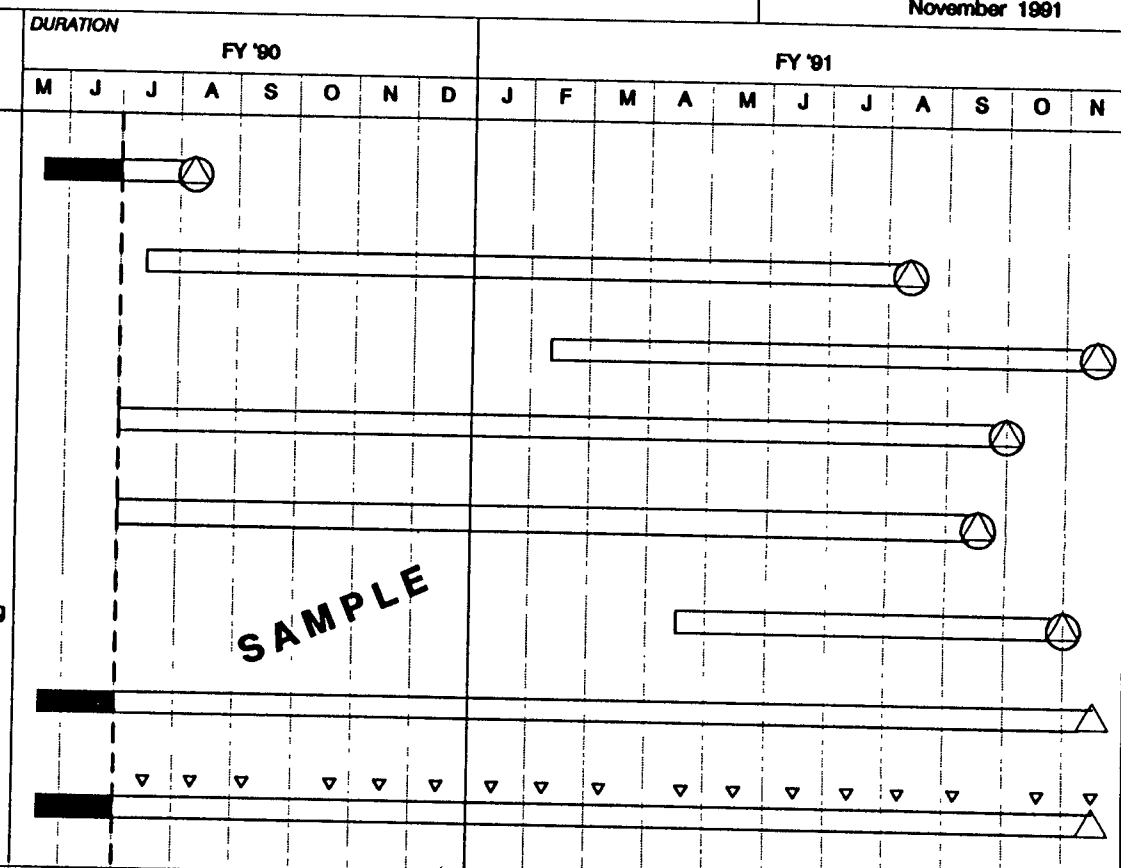
MILESTONE SCHEDULE ☐ PLAN ☒ STATUS REPORT

TITLE	REPORTING PERIOD	IDENTIFICATION NUMBER
Baseline Design and System Analysis	5/16/90 THRU 6/30/90	DE-AC22-90PC89857

PARTICIPANT NAME AND ADDRESS
Bechtel Corporation
P.O. Box 2166
Houston, Texas 77252-2166

START DATE: May 1990

COMPLETION DATE: November 1991



ELEMENT CODE (TASK NO.)	REPORTING ELEMENT (DESCRIPTION)	PERCENT COMPLETE PLAN	PERCENT COMPLETE ACTUAL
Task #1	Project Management Plan	67	67
Task #2	Baseline Design	0	0
Task #3	Baseline Economics	0	0
Task #4	Mathematical Model	0	0
Task #5	Simulation Model	0	0
Task #6	Documentation and Training	0	0
Task #7	Project Management and other support	10	10
	SUMMARY	6	6

SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE

LEGEND: STATUS LINE | SCHEDULE | ACTUAL | MONTHLY/QUARTERLY REPORTS | COMPLETION OF TASK | COMPLETION OF TASK (CRITICAL PATH) (INCL. TOPICAL REPORTS)

F1332_3S

SAMPLE

DOE F1332.9

U.S. DEPARTMENT OF ENERGY
COST MANAGEMENT REPORT

TITLE	REPORTING PERIOD	IDENTIFICATION NUMBER
Baseline Design and System Analysis	5/16/90 THRU 6/24/90	DE-AC22-90PC89857

PARTICIPANT NAME AND ADDRESS	COST PLAN DATE	START DATE
Bechtel Corporation P.O. Box 2166 Houston, Texas 77252-2166	JULY 1990	May 1990
		COMPLETION DATE November 1991

ELEMENT CODE (TASK NO.)	REPORTING ELEMENT (DESCRIPTION)	ACCRUED COSTS				ESTIMATED ACCRUED COSTS				TOTAL CONTRACT VALUE	VARIANCE
		REPORTING PERIOD		CUMULATIVE TO DATE		SUBSE-QUENT REPORTING PERIOD	BALANCE OF CURRENT YEAR	SUBSE-QUENT CALENDER YEAR	TOTAL		
		ACTUAL	PLAN	ACTUAL	PLAN						
Task #1	Project Management Plan	15.7	15.4	15.7	15.4	11.1	7.9	0.0	34.7	34.4	(0.3)
Task #2	Baseline Design	0.0	0.0	0.0	0.0	2.0	422.1	270.0	694.1	694.1	0.0
Task #3	Baseline Economics	0.0	0.0	0.0	0.0	0.0	0.0	94.1	94.1	94.1	0.0
Task #4	Mathematical Model	0.0	0.0	0.0	0.0	0.2	6.1	15.6	21.9	21.9	0.0
Task #5	Simulation Model	0.0	0.0	0.0	0.0	0.0	151.5	184.3	335.8	335.8	0.0
Task #6	Documentation and Training	0.0	0.0	0.0	0.0	0.0	0.0	50.7	50.7	50.7	0.0
Task #7	Project Management and other support	51.1	59.0	51.1	59.0	36.3	215.2	458.9	761.5	769.4	7.9
TOTAL		66.8	74.4	66.8	74.4	49.6	802.8	1073.6	1992.8	2000.4	7.6

DOLLARS EXPRESSED IN	SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE	SIGNATURE OF PARTICIPANT'S AUTHORIZED FINANCIAL REPRESENTATIVE AND DATE
Thousands		

TABLE 7-1
MONTHLY REPORT FORMAT

- Introduction
- Summary
- Management Status Report
- Program Activities By Task

  Task Number

  - Accomplishments Last Months
  - Plans for Next Month
  - Areas of Concern/Action Taken
  - Scope Changes
- Milestone Schedule Status Report - (Form F 1332.3)
  - Discussion
  - Recommendation
- Cost Management Report - (Form F 1332.9)
  - Discussion
  - Recommendation

7.2 Quarterly Reports

This report consist of the following three sections:

- Technical Progress Report
- Key Personnel Staffing Report
- Summary Subcontract Report

As agreed in the Kickoff Meeting of June 12 - 13, 1990, the Quarterly Report will present any confidential information as a separate section under the heading "Confidential". Information included in this Section will be treated confidential by DOE and its contractors.

7.2.1 Technical Progress Report

The reporting of technical progress is done by tasks for all tasks included for the reporting period. This report is, in effect, a summary of the three preceding monthly reports, but with a separate confidential section.

7.2.2 Key Personnel Staffing Report

The updated list of the key Bechtel personnel working on the project during the duration of the reporting quarter will be included. In addition, the percentage of time spent on the project by each individual key person will be reported, the format of which is illustrated in Table 7-2.

7.2.3 Summary Subcontract Report

This report involves completing the form (SF 295) as required by the contract. A copy of the form is included in this section.

7.2.4 Quarterly Report Format

The format of this report is included in this section as Table 7-3.

TABLE 7-2
KEY PERSONNEL STAFFING REPORT FORMAT

Duration of Quarter: From.....To.....

Name of Key Person	Function	% Time Spent
Bechtel:		
S. N. Habash	Project Manager	
S. K. Poddar	Technical Coordinator	
D. E. Brockman	Project Secretary	
R. F. Earhart	Process Manager	
E. J. Swain	Support Facilities Manager	
Amoco:		
A. B. Schachtschneider	Project Manager	
S. J. Kramer	Principal Investigator	
Arun Basu	Principal Investigator	
J. D. Fox	Principal Investigator	

SUMMARY SUBCONTRACT REPORT

(Report to be submitted quarterly. See Instructions on reverse) (Type or Print)

FORM APPROVED OMB NO. 3090-0053

1. CONTRACTING AGENCY		2. ADMINISTERING AGENCY	
3. DATE OF LAST GOVERNMENT REVIEW	4. REVIEWING AGENCY	5. DUNS NO.	6. REPORT SUBMITTED AS: ☐ PRIME CONTRACTOR ☐ SUBCONTRACTOR ☐ BOTH
7. CORPORATION, COMPANY, OR SUBDIVISION COVERED *(Name, Address, ZIP Code)*		8. MAJOR PRODUCTS OR SERVICE LINES: a. b. c.	

CUMULATIVE COMMITMENTS

Subcontract and Purchase Commitments for the Period October 1, 19 ____ through _____, 19 ____

COMMITMENTS	CURRENT FISCAL YEAR *(To date)*		SAME PERIOD LAST YEAR	
	DOLLARS	PERCENT	DOLLARS	PERCENT
9 TOTAL *(Sum of a and b)*		100		100
a. SMALL BUSINESS CONCERNS				
b. LARGE BUSINESS CONCERNS				
10 SMALL DISADVANTAGED BUSINESS CONCERNS *(8 a % of 9)*				
11 LABOR SURPLUS AREA CONCERNS *(8 a % of 9)*				

SUBCONTRACT GOAL ACHIEVEMENT

GOALS	NO OF CONTRACTS	$ VALUE OF SUBCONTRACTS (000)	$ VALUE OF SUBCONTRACT GOALS	ACTUAL GOAL ACHIEVEMENT	
				DOLLARS	%
12. CONTRACTS WITH SMALL BUSINESS SUBCONTRACT GOALS					
a. ACTIVE CONTRACTS					
b. CONTRACTS COMPLETED THIS QUARTER WHICH MET GOALS					
c. CONTRACTS COMPLETED THIS QUARTER NOT MEETING GOALS					
13 CONTRACTS WITH SMALL DISADVANT BUS SUBCONTRACT GOALS					
a. ACTIVE CONTRACTS					
b. CONTRACTS COMPLETED THIS QUARTER WHICH MET GOALS					
c. CONTRACTS COMPLETED THIS QUARTER NOT MEETING GOALS					

14. REMARKS *(Enter a short narrative explanation if: (a) Zero is entered in Blocks 9a or 10 for current fiscal year, (b) the percent entry in Block 9a (for current fiscal year is more than 5 percentage points below the percent reported for same period last year, or (c) the percent entry in Block 10 for current fiscal year is lower than the percent reported for same period last year.)*

15. NAME AND TITLE OF LIAISON OFFICER	SIGNATURE	DATE	TELEPHONE NO. *(and Area Code)*
16. NAME AND TITLE OF APPROVING OFFICIAL	SIGNATURE	DATE	

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295-102

STANDARD FORM 295 (REV. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.219(b)

INSTRUCTIONS

GENERAL INSTRUCTIONS

1. This reporting form is prescribed for use in the collection of subcontract data from Federal contractors and subcontractors which hold one or more contracts over $500,000 ($1 million for construction) and are required to subcontract with small and small disadvantaged business concerns under a subcontract plan as required by the Small Business Act of 1958, as amended by Public Law 95-507. (See Items 9 and 10 of Specific Instructions).

2. The report may be submitted on a corporate, company, or subdivision (e.g., plan or division operating as a separate profit center) basis unless otherwise directed. After submission of the first report on this form, succeeding reports shall be submitted on the same basis.

3. Reports shall be submitted by the 25th day of the month following the close of the reporting period, as follows: (a) quarterly, in accordance with instructions below, or as directed by the contracting activity, or (b) annually for subcontracts covered by an approved company-wide annual subcontracting plan for commercial products. The annual report should summarize all Federal contracts for commercial products performed during the year and should be submitted in addition to required quarterly reports, for other than commercial products, if any. Show in Item 14 or in an attachment to the report, the share of this total attributable to each agency from which contracts for such commercial products were received. Send a copy of this report to each listed agency.

4. If a contractor is performing work for more than one Federal agency, a separate report shall be submitted to each agency covering its contracts. However, for DOD contracts, see paragraph 5, below.

5. (a) For reports covering contracts awarded by the military departments or agencies of the Department of Defense (DOD) or subcontracts awarded by DOD prime contracts, each reporting corporation, company, or subdivision (except contractors involved in maintenance, repair, and construction) shall report its total DOD business on one report (i.e., it shall not segregate subcontracts arising from work for the Army, Navy, Air Force, or Defense Agencies). All contractors shall submit:

(i) The original of each report directly to the Office of the Deputy Secretary of Defense, Attention: Director of Small and Disadvantaged Business Utilization, The Pentagon, Washington, DC 20301.

(ii) A copy of the report to the office listed below whose military activity is responsible for contract administration of the contractor:

ARMY — Director of Small and Disadvantaged Business Utilization, Office of the Secretary of the Army, Washington, DC 20360

NAVY — Director of Small and Disadvantaged Business Utilization, Office of the Secretary of the Navy, Washington, DC 20360

AIR FORCE — Director of Small and Disadvantaged Business Utilization, Office of the Secretary of the Air Force, Washington, DC 20330

DLA — Staff Director of Small and Disadvantaged Business Utilization, HQ Defense Logistics Agency (Attention U) Cameron Station, Alexandria, VA 22314

(iii) A copy of the report, in accordance with instructions contained in the contract or subcontract, to the Federal agency or military department or defense agency, which is administering the prime or subcontractor.

(b) Contractors involved in maintenance, repair and construction shall also submit this report, similarly on a quarterly basis, to the appropriate construction contract administration activity. If a construction contractor is involved with more than one contract administration activity, this report should be submitted to each activity reflecting the contract awards under the supervision of the particular contract administration activity.

6. For NASA contracts forward reports to NASA - Office of Procurement (HM-1) Washington, DC 20546. For Department of Energy, forward reports to DOE - Small Business Division, Washington, DC 20545. For reports covering contracts awarded by other Federal Departments or Agencies and subcontracts placed by prime contractors of such departments or agencies, the original copy shall be sent to the Department or Agency Director of Small and Disadvantaged Business Utilization or as otherwise provided for in instructions issued by the Department or Agency.

7. Only subcontract or purchase commitments involving performance within the U.S., its possessions, Puerto Rico, and the Trust Territory of the Pacific Islands will be included in this report.

8. This report is not required to be submitted by small business concerns.

SPECIFIC INSTRUCTIONS

ITEM 1. Enter the agency which awarded the prime contract (e.g., DOD, HUD, GSA, etc.)

ITEM 2. Enter the department or agency administering the contracts (if different from Item 1). For DOD contracts enter the military department or agency which has responsibility for the subcontracting program of the corporation or plant (i.e., Army, Navy, Air Force, or Defense Logistics Agency), not the "Office of the Deputy Secretary of Defense."

ITEMS 3 & 4. Enter the date of the last formal surveillance review conducted by the cognizant department or agency Small and Disadvantaged Business Specialist or other review personnel. For DOD, also identify the military department or Defense Contract Administration Service, as appropriate, that conducted the review. In those cases where the Small Business Administration conducts its own review, show "SBA" and the date.

ITEM 5. Enter Dun and Bradstreet Universal Numbering System (DUNS) number (if available).

ITEM 6. Check whether reporting business is performing as a prime or subcontractor or both.

ITEM 7. Enter the name and address of the reporting corporation, company, or subdivision thereof (e.g., division or plant) which is covered by the data submitted.

ITEM 8. Identify the major product or service lines of the reporting corporation, company, or subdivision.

ITEMS 9 & 10. Report all commitments and purchase orders, regardless of dollar value, made by the reporting organization under all Federal prime contracts and subcontracts (whether or not prime contracts are over $500,000 ($1 million for construction) and small and small disadvantaged business subcontracting plans and goals are required). Report on a quarterly cumulative basis until the end of the fiscal year on September 30 after which a new quarterly reporting cycle is to be initiated commencing with the first quarter from October 1 through December 31. Dollar amounts reported should include direct awards and the appropriate prorated portion of the prime contractor's indirect awards (see definition below) contracted with small and small disadvantaged business concerns and other than small business concerns. The indirect award portion should be based on the percentages of the Federal department or agency work being performed by the reporting contractor in relation to other work performed for other departments or agencies. Particular care should be taken not to include in quarterly reports purchase commitments made in support of commercial business being performed by the contractor.

ITEM 11. Show dollar amount of commitments valued over $10,000 placed with labor surplus area (LSA) concerns (i.e., those that will perform substantially in labor surplus areas). Prime contractors are also encouraged to include awards valued less than $10,000 if such additional reporting does not impose a burden upon the contractor. LSA's are identified in the Department of Labor (DOL) publication "Labor Surplus Area Listings" which can be obtained from the Federal Agency contracting officer or by writing to Employment and Training Administration, (Attention: TPPL), Department of Labor, 601 "D" Street, NW, Washington, DC 20213.

ITEMS 12 & 13. Enter the information as indicated regarding contracts with small and small disadvantaged business goals. For each item (as applicable), enter the number of contracts, the dollar value of subcontracts, the dollar value of subcontract goals (as expressed in the subcontract plans) and actual goal achievement expressed in dollars and percent of goal. This item does not apply to reports covering commercial products.

ITEM 16. The approving official shall be the chief executive officer or, in the case of a separate division or plant, the senior individual responsible for overall division or plant operations.

DEFINITIONS

1. A Small Business Concern is a concern that meets the pertinent criteria established by the Small Business Administration.

2. (a) A Small Disadvantaged Business means any small business concern—
(i) which is at least 51 per centum owned by one or more socially and economically disadvantaged individuals; or, in the case of any publicly-owned business, at least 51 per centum of the stock of which is owned by one or more socially and economically disadvantaged individuals; and
(ii) whose management and daily business operations are controlled by one or more of such individuals.

(b) The contractor shall presume that socially and economically disadvantaged individuals include Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, and other minorities, or any other individual founds to be disadvantaged by the Small Business Administration pursuant to Section 8(a) of the Small Business Act. "Native Americans" include American Indians, Eskimos, Aleuts, and Native Hawaiians. "Asian-Pacific Americans" include U.S. citizens whose origins are from Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, Trust Territory of the Pacific Islands, Northern Marianas, Laos, Cambodia, and Taiwan.

(c) Contractors acting in good faith may rely on written representations by their subcontractors certifying their status as either a small business concern or a small business concern owned and controlled by socially and economically disadvantaged individuals.

(d) The Office of Minority Small Business and Capital Ownership Development in the Small Business Administration will answer inquiries from prime contractors and others relative to the class of eligibles and has final authority to determine the eligibility of a concern to be designated as a small disadvantaged business.

3. Commercial Products means products sold in substantial quantities to the general public and/or industry at established catalog or market prices.

4. Commitments as used herein is defined as a contract, purchase order, amendment, or other legal obligation executed by the Reporting corporation, company, or subdivision for goods and services to be received by the reporting corporation, company, or subdivision.

5. Direct Commitments are those which are identified with the performance of a specific government contract, including allocable parts of awards for material which is to be incorporated into products under more than one Government contract.

6. Indirect Commitments are those which, because of incurrence for common or joint purposes, are not identified with specific Government contracts; these awards are related to Government contract performance but remain for allocation after direct awards have been determined and identified to specific Government contracts.

7. A contract is considered to be completed when the supplies or services which are required to be delivered under the contract have been provided to the Government.

TABLE 7-3
QUARTERLY REPORT FORMAT

- Introduction
- Summary
- Technical Progress Report (Activities by Task)

  Task Number

  - Accomplishments For The Quarter
  - Plans For Next Quarter
  - Areas of Concern/Action Taken
  - Scope Change
- Key Personnel Staffing Report
- Subcontracting Report For Individual Contracts (Form SF 294)
- Summary Subcontracting Report (Form SF 294)

7.3 Semi-Annual Reports

7.3.1 Subcontracting Report For Individual Contracts (Semi-Annual)

This report involves completing form SF 294 as required by the contract. A copy of the form is included in this section.

SUBCONTRACTING REPORT FOR INDIVIDUAL CONTRACTS

(Report to be submitted semi-annually. See back of form for instructions)

FORM APPROVED OMB NO. 3090-0052

1. REPORTING PERIOD FROM (Date)	TO (Date)	2. REPORT NO.	3. TYPE OF CONTRACT ☐ PRIME CONTRACT ☐ SUBCONTRACT	4. DATE SUBMITTED

GENERAL INFORMATION

5. AGENCY/CONTRACTOR AWARDING CONTRACT (Name & Address)	7. REPORTING CONTRACTOR (Name and Address)

6. PRIME CONTRACT NO. (And Subcontract No., if applicable)	8. BUSINESS CLASS. CODE	9. DUNS NO. (If applicable)

10. ADMINISTERING AGENCY	11. DATE OF LAST GOVERNMENT REVIEW	12. REVIEWING AGENCY

13. DOLLAR VALUE OF PRIME OR SUBCONTRACT.	14. ESTIMATED DOLLAR VALUE OF COMMITMENTS AS IN PLAN.	15. GOALS	DOLLARS	PERCENT
		a. SMALL BUSINESS CONCERNS		
		b. SMALL DISAD. BUSINESS CONCERNS		

SUBCONTRACT AND PURCHASE COMMITMENTS

COMMITMENTS	THIS REPORTING PERIOD DOLLARS	THIS REPORTING PERIOD PERCENT	CUMULATIVE DOLLARS	CUMULATIVE PERCENT
16. TOTAL DIRECT SUBCONTRACT COMMITMENTS (Sum of a & b)		100		100
a. TOTAL SMALL BUSINESS CONCERNS				
(1) SMALL DISADVANTAGED BUSINESS CONCERNS (% of 16)				
(2) OTHER SMALL BUSINESS CONCERNS (% of 16)				
b. LARGE BUSINESS CONCERNS (% of 16)				
17. TOTAL INDIRECT COMMITMENTS (Sum of a & b)				
a. TOTAL SMALL BUSINESS CONCERNS				
(1) SMALL DISADVANTAGED BUSINESS CONCERNS (% of 17)				
(2) OTHER SMALL BUSINESS CONCERNS (% of 17)				
b. LARGE BUSINESS CONCERNS (% of 17)				

18. REMARKS:

19. TYPE THE NAME AND TITLE OF THE INDIVIDUAL ADMINISTERING CONTRACT	SIGNATURE	TELEPHONE NO (and Area Code)
20. TYPE THE NAME AND TITLE OF THE APPROVING OFFICER	SIGNATURE	

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294-102

STANDARD FORM 294 (REV. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.219(c)

INSTRUCTIONS

GENERAL INSTRUCTIONS

1. This reporting form is prescribed for use in the collection of subcontract data from all Federal contractors and subcontractors which, pursuant to the Small Business Act of 1958, as amended by Public Law 95-507, are required to establish plans for subcontracting with small and small disadvantaged business concerns. Reports shall be submitted to the contracting officer semiannually as of March 31 and September 30, as well as at contract completion. This report is due by the 25th day of the month following the close of the reporting periods, in accordance with instructions contained in the contract or subcontract, or as directed by the contracting officer.

2. This report is not required to be submitted by small business concerns.

3. This report is not required for commercial products for which a company-wide annual plan has been approved. The Summary Subcontract Report is required for commercial products in accordance with the instructions on that form.

4. Only subcontract and purchase commitments involving performance within the U.S., its possessions, Puerto Rico, and the Trust Territory of the Pacific Islands will be included in this report.

SPECIFIC INSTRUCTIONS

ITEM 1 – Specify the period covered by this report (e.g., April 1, 1981 - September 30, 1981).

ITEM 2 – Specify the sequential report covering this contract. The initial report shall be identified as Report Number 1. Add "Final Report" for the last report being made.

ITEM 3 – Specify whether this report covers either a Prime Contract awarded by a Federal Department or Agency or a Subcontract awarded by a Federal prime contractor or subcontractor.

ITEM 5 – Enter the name and address of the Federal Department or Agency or Prime Contractor awarding the Prime or Subcontract.

ITEM 6 – Enter the prime contract number. If this report covers a subcontract, enter both the prime contract and subcontract numbers.

ITEM 7 – Enter the name and address of the Prime Contractor or Subcontractor submitting the report.

ITEM 8 – Enter the Business Classification Code as follows:

Code	Definition
LB	Large Business
NP	Non-Profit Organization (including Educational Institutions).

ITEM 9 – Enter Dun and Bradstreet Universal Numbering System (DUNS) number (if available).

ITEM 10 – Identify Federal agency administering the contract. For Department of Defense, identify appropriate military department, i.e., Army, Navy, Air Force, or Defense Logistics Agency. Civilian agencies should be identified as noted in the contract award document; i.e., NASA, DOE, GSA, HHS, SBA, etc.

ITEM 11 & 12 – Enter the date of the last formal surveillance review conducted by the cognizant Department or Agency Small and Disadvantaged Business Specialist or other review personnel. For DOD, also identify the military department or Defense Contract Administration Service, as appropriate, that conducted the review. In those cases where the Small Business Administration conducts its own review, show the date and "SBA".

ITEM 13 – Specify the face value of the Prime or Subcontract covered by this report. If the value changes, the face value shall be adjusted accordingly.

ITEM 14 – Enter the estimated dollar value of subcontract and purchase commitments as set forth in the Subcontract Plan.

ITEM 15 – Specify in the appropriate blocks the dollar amount and percent of the reporting contractor's total subcontract awards contractually agreed upon as goals for subcontracting with Small Business and Small Disadvantaged Business concerns. NOTE Should the original goals agreed upon at contract awards be either increased or decreased as a result of a contract modification, the amount of the revised goals shall be indicated.

ITEM 16 – Specify in the appropriate block the total amount of all direct subcontract commitments and the dollar amount and percentage of the total placed with the subcontractor classification indicated in a and b, both for this period and cumulative. Do not include in this report purchase commitments made in support of commercial business being performed by reporting contractor.

ITEM 17 – Complete Item 17 only if indirect contract commitments were included in establishing the small and small disadvantaged business goals for the contract being reported. Specify in the appropriate block the total allocable dollar amount of indirect commitments and the dollar amount and percentage of the total placed with the subcontractor classifications indicated in a(1), a(2), and b, both for this period and cumulative.

ITEM 18 – Enter any remarks. If the goals were not met, explain why on the final report.

ITEM 19 – Enter name and title of company individual responsible for administering contract.

ITEM 20 – The approving officer shall be the senior official of the company, division, or subdivision (plant or profit center) responsible for contract performance.

DEFINITIONS

1. A Small Business Concern is a concern that meets the pertinent criteria established by the Small Business Administration.

2. (a) A Small Disadvantaged Business means any small business concern.

(1) which is at least 51 per centum owned by one or more socially and economically disadvantaged individuals; or, in the case of any publicly-owned business, at least 51 per centum of the stock of which is owned by one or more socially and economically disadvantaged individuals, and

(2) whose management and daily business operations are controlled by one or more of such individuals.

(b) The contractor shall presume that socially and economically disadvantaged individuals include Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, and other minorities, or any other individual found to be disadvantaged by the Small Business Administration pursuant to Section 8(a) of the Small Business Act. "Native Americans" include American Indians, Eskimos, Aleuts, and native Hawaiians. "Asian-Pacific Americans" include U.S. citizens whose origins are from Japan, China, the Philippines, Vietnam, Korea, Samoa, Guam, the Trust Territory of the Pacific Islands, Northern Marianas, Laos, Cambodia, and Taiwan.

(c) Contractors acting in good faith may rely on written representations by their subcontractors certifying their status as either a small business concern or a small business concern owned and controlled by socially and economically disadvantaged individuals.

(d) The Office of Minority Small Business and Capital Ownership Development in the Small Business Administration will answer inquiries from prime contractors and others relative to the class of eligibles and has final authority to determine the eligibility of a concern to be designated as a small disadvantaged business.

3. Commercial Products means products sold in substantial quantities to the general public and/or industry at established catalog or market prices.

4. Commitments as used herein is defined as a contract, purchase order, amendment, or other legal obligation executed by the reporting corporation, company, or subdivision for goods and services to be received by the reporting corporation, company, or subdivision.

5. Direct Commitments are those which are identified with the performance of a specific government contract, including allocable parts of awards for material which is to be incorporated into products under more than one Government contract.

6. Indirect Commitments are those which, because of incurrence for common or joint purposes, are not identified with specific Government contracts, these awards are related to Government contract performance but remain for allocation after direct awards have been determined and identified to specific Government contracts.

7.4 Topical Task Reports

As agreed in our Kickoff Meeting the topical reports are the same as the final task reports for each task. Hence, the reports will be titled Topical/Task Reports.

These reports will present the deliverable information for each task as described elsewhere in this Management Plan.

7.5 Final Technical Report

This report will be issued at the completion of this study in accordance with the provisions of the contract and as described elsewhere in this Management Plan.

7.6 Process Simulation Documentation and Operating Manual

The documentation of the Process Simulation and Operating Manual will be issued at the completion of the relevant task of the study. This will be done as per contract.

7.7 Process Simulation Software

The process Simulation Model will be developed in such a way that it will be a suitable software for the operation on an IBM compatible personal computer (PC). The software shall be operable on either a VMS, DOS or OS/2. The delivered software shall be suitable for installation on one of the previously described systems. The software shall be delivered to PETC as required by the contract.

BASELINE CONFIGURATION

8. BASELINE CONFIGURATION

8.1 Baseline Configuration

As discussed in Section 5 of this document, and as illucidated in the contract, configuration management is an essential ingredient in program management. The key factor for the successful implementation of this concept is the appropriate definition of the baseline configuration.

The definition of the baseline configuration for this study consists of all the details included in Sections 4 through 7 of this document. Therefore, any deviation from the baseline configuration described in the above sections constitutes a change with possible contract, cost and schedule changes.

APPENDIX

9. APPENDIX

A Project Procedure booklet is being prepared for internal use by the Bechtel Project team. A courtesy copy of this booklet will be issued for PETC's information at the same time as the approved Management Plan.

The preliminary Table of Contents of this booklet is tentatively shown in this appendix.

PRELIMINARY TABLE OF CONTENTS
Project Procedures Booklet

9. **APPENDIX/PROJECT PROCEDURE BOOKLET**

LIST OF CONTENTS

9.1 **General**

.1 Project Procedures

.2 Correspondence

.3 Meeting Notes

.4 Conference Notes

.5 Action List

.6 Distribution of Reports and Documents

.7 Project Files

.8 Weekly Activity Reports

.9 Quarterly Reports

.10 Monthly Reports

.11 Topical/Task Reports

9.2 **Project Controls**

.1 Cost and Schedule Control

.2 Trend Control

.3 Change Control

.4 Bi-weekly Manhour Monitoring

9.3 **Engineering**

.1 Numbering System

Preliminary Table of Contents
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.2 Technology/Information Acquisitions

.3 Cost Estimating

9.4 **Procurement**

.1 Subcontract Report for Individual Controls

.2 Summary Sub-Contract Report

.3 Notice of Energy RD&D (Project Form 538)

9.5 **Project Administration**

.1 Billings

.2 Travel Expense

.3 Reporting Schedule

.4 Invoicing Schedule