Industrial Fuel Gas Demonstration Plant Program

Prepared For
The Department of Energy
Under Contract ET-77-C-01-2582

MEMPHIS LIGHT, GAS AND WATER DIVISION
P.O. BOX 430, MEMPHIS, TENNESSEE 38145

In Association with
FOSTER WHEELER ENERGY CORPORATION
INSTITUTE OF GAS TECHNOLOGY
DELTA REFINING COMPANY

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Industrial Fuel Gas Demonstration Plant Program

DOE/ET/13046 --T69

STAFFING PLAN

DELIVERABLE NO. 34

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Prepared For
The Department of Energy
Under Contract DE-AC02-77ET13046

MASTER

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MEMPHIS INDUSTRIAL FUEL GAS
DEMONSTRATION PLANT PROJECT

STAFFING PLAN
(Deliverable #34)

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PREPARED FOR THE
U. S. DEPARTMENT OF ENERGY
ASSISTANT SECRETARY OF FOSSIL ENERGY

UNDER CONTRACT DE-AC02-77ET13406
(FORMERLY CONTRACT ET-77-C-01-2582)

MEMPHIS LIGHT, GAS AND WATER DIVISION

May 2, 1980

Letter No.: ME-125

U. S. Department of Energy
Projects Management Division, Dr. R. W. Laza
9800 S. Cass Avenue
Argonne, IL 60439

ATTN: Dr. Peter Lui

SUBJECT: MLGW Reference No. 8802
DOE Reference No. 2582
STAFFING PLAN
DELIVERABLE NO. 34

Gentlemen:

Enclosed is Deliverable No. 34, "Staffing Plan", which
has been prepared as part of our Phase I work.

We request your approval.

Very truly yours,

R. W. Gray
Program Manager

RWG:sd

Enclosure

cc: J. Gannon (6)

STAFFING PLAN

DELIVERABLE NO. 34

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Section 1.0

INTRODUCTION

The United States Department of Energy (DOE) awarded a contract to Memphis Light, Gas and Water Division (MLGW) which requires MLGW to perform process analysis, design, procurement, construction, testing, operation and evaluation of a plant which will demonstrate the feasibility of converting high sulfur bituminous coal to industrial fuel gas with a heating value of 300 ± 30 Btu per standard cubic foot (SCF). The demonstration plant is to be based on the U-Gas process, with its product gas to be used in commercial applications in Memphis, Tennessee.

In order to perform this work, MLGW has established an industrial team, which includes:

- MLGW - Memphis Light, Gas and Water Division, Memphis, Tennessee.
The prime contractor and distributor of the industrial fuel gas.
- FWEC - Foster Wheeler Energy Corporation, Livingston, New Jersey.
The engineer-construction manager.
- IGT - Institute of Gas Technology, Chicago, Illinois.
The process developer.
- DRC - Delta Refining Company, Memphis, Tennessee.
To provide operating experience.

The contract specifies that the work is to be conducted in three phases. The phases are:

- Phase I - Program Development and Conceptual Design
- Phase II - Demonstration Plant Final Design, Procurement and Construction
- Phase III - Demonstration Plant Operation

Included within Task VII (Planning for Final Design, Construction and Operation) of Phase I activities, is the preparation of a Staffing Plan.

Section 2.0

FINAL DESIGN, CONSTRUCTION STAFFING PLAN

This section describes the staffing plans of each industrial team member during final design and construction of the IFGDP. The internal organization of each team member, including the delegation of authority and responsibility within the structure, is discussed. The primary functions of the various organizational units are also identified. In addition, a brief summary of the Phase II role of each industrial partner is included. The overall Phase II organization chart (Figure 2-1) is attached.

Phase III staffing plans follow in the next section.

FIGURE 2-1
PHASE II ORGANIZATION CHART

Section 2.1

MEMPHIS LIGHT, GAS AND WATER DIVISION

2.1.1 PROJECT ROLE

As prime contractor, MLGW is responsible to the Department of Energy for the management of the overall project. This includes monitoring detail design, procurement, and construction of the IFGDP, controlling costs and schedules, evaluating the pilot plant test program, and, in general, coordinating the work of the industrial team to achieve project goals. In addition, MLGW is also responsible for the design and construction of the IFG distribution system and acquisition of the gas storage field.

2.1.2 ORGANIZATION

The MLGW Phase II organization chart (Figure 2-2) is attached. A narrative summary of the organizational structure follows.

Program Management

The program manager has overall responsibility for the detailed design, procurement, and construction of the IFGDP during Phase II. In order to effectively accomplish this work, the program manager is delegated the responsibility to administer the prime contract with DOE, major subcontracts with FWEC, IGT, and DRC, as well as subcontracts with other organizations and consultants. The program manager will also have the authority to schedule and coordinate the work of the MLGW staff with subcontractors, consultants, and other MLGW departments. Also of importance will be establishing and maintaining a liaison with various governmental regulatory agencies to obtain necessary permits and approvals.

Engineering Section

The Engineering Section consists of three groups with responsibility for engineering input in the detailed design, procurement, and construction of the IFGDP; process engineering, project design, and project control. These groups will work closely together to review and approve engineering designs, specifications, materials, and equipment for the IFGDP; to supervise construction of the plant and related facilities, and maintain schedules; to follow construction progress and make progress reports; and to provide technical information or assistance to consultants, contractors, and DOE representatives.

The Engineering Section will be headed by the engineering manager who reports directly to the program manager. Chief project design and project control engineers and the process engineering consultant will head the individual groups within the Engineering Section.

Project Design Group

The function of the project design group is to assist in reviewing and approving engineering designs, specifications, materials, and equipment and to supervise and coordinate construction of on-site project facilities. The project design group is also responsible for the design and development of the IFG distribution system.

The chief project design engineer, who reports to the engineering manager, will head this group. Directly under the chief engineer are six project engineers with responsibility over individual areas (i.e., civil, electrical, instrumentation, structural, mechanical, and distribution system). One design engineer, three junior engineers, and two draftsmen will assist the project engineers as necessary.

Project Control Group

The project control group performs a wide range of necessary ancilliary engineering functions which facilitates controlling the

project in a smooth, efficient manner. The functions performed under the auspices of this group include: safety and hygiene, quality control, property management and security, plant energy management, the environmental program, industrial customer services, and gathering cost and schedule data.

The chief project control engineer heads this group and reports directly to the engineering manager. A technical staff of eight engineers with responsibility over the individual project support areas report to the chief engineer.

Process Engineering Group

The function of the process engineering group is to assist in reviewing and approving engineering designs, specifications, materials, and equipment and to supervise and coordinate construction of the IFGDP process units. The process engineering group is also responsible for monitoring and evaluating the pilot plant test program.

The process engineering consultant, an independent consultant working for and on behalf of MLGW under the direction of the engineering manager, is responsible for coordinating the activities of this group. The technical staff consists of two process engineers; one assigned to the pilot plant and one stationed at the FWEC office.

Project Administration Section

The Project Administration Section consists of two groups responsible for developing and implementing systems for project procurement and cost controls which meet Federal guidelines, developing departmental budgets and schedules, and assuring subcontractor compliance with contracts; procurement coordination and contract administration. These groups will work closely with

the Engineering Section to interview prospective bidders, negotiate contracts for supply and construction, approve bid packages submitted by FWEC, authorize changes in contracts as specification changes occur, and approve invoices for payment.

The project administrator, who reports directly to the program manager, will head this section. The contract administrator and procurement coordinator will head the individual groups within the Project Administration Section.

Procurement Coordination Group

The function of the procurement coordination group is to assist in planning and control of procurement functions, to assist in securing government approval of procurement actions, and to determine vendors compliance with contracts. This group is also responsible for maintaining records on items purchased, costs and delivery schedules and product performance, recommending approval of bid packages submitted by FWEC, recommending approval of contract specification changes, assisting in interviews with prospective bidders, reviewing and recommending approval of vendor bid proposals and invoices, and participating in negotiation of vendor contracts.

The procurement coordinator has a technical staff of two procurement engineers and two procurement specialists.

Contract Administration Group

The primary responsibility of the contract administration group is to administer contracts and subcontracts in the detailed design and construction of the IFGDP and related facilities. Other responsibilities of this group include analyzing vendor proposals and financial reports to determine acceptability; examining estimates, performance requirements, and delivery schedules to insure completeness and accuracy;

assisting in the review and recommendation of bid packages submitted by FWEC; assisting in contract negotiations with vendors; acting as a liaison between MLGW and subcontractors; and reviewing and recommending approval or rejection of deviation from contract specifications and delivery schedules.

The contract administrator has a technical staff of one cost accountant and one plant accountant, each assisted by two accounting clerks.

Section 2.2

FOSTER WHEELER ENERGY CORPORATION

2.2.1 PROJECT ROLE

During Phase II, FWEC's role is that of architect-engineer and construction manager. FWEC is responsible to MLGW for the detail design of all on-site process and support facilities, procurement of all materials and equipment, and management of the IFGDP construction. FWEC also has the responsibility for administering the environmental program during Phase II.

2.2.2 ORGANIZATION

The FWEC Phase II organization chart (Figure 2-3) is attached. A narrative summary of the organizational structure follows.

Project Management

The FWEC project director has primary responsibility for the project execution within approved schedules and budgets and to the satisfaction of MLGW. He directs and supervises key members of the FWEC project team with respect to scope, schedule, and cost guidelines. Other major responsibilities of the FWEC project director include requiring timely preparation of, reviewing, and approving all schedules, work scope documents, budgets, and reports for the project; arranging for adequate staffing and utilizing the services of other FWEC departments as necessary for proper project execution; functioning as the primary contact between FWEC and MLGW, as well as, other industrial team members; requiring execution of engineering functions, procurement and construction activities, and project administration through the managers of these respective sections; and monitoring the FWEC project team performance against their respective responsibilities.

FIGURE 2-3
PHASE II ORGANIZATION CHART
FOSTER WHEELER ENERGY CORPORATION

Engineering Section

The Engineering Section is responsible for the execution of all engineering functions in Phase II including the detailed design of all on-site process and support facilities, the preparation of all equipment and material specifications, and coordination of the environmental effort. The engineering manager, who heads this section, is a member of the FWEC Project Management Team reporting to the project director and is responsible for the management, administration, and direction of all engineering activities. Other duties of the engineering manager include directing the efforts of the process engineering, project engineering and design, estimating, and environmental groups within this section through the managers of each group and coordinating the engineering efforts with MLGW and other members of the industrial team.

Process Engineering Group

The Process Engineering Group, headed by the process manager, is responsible for the administration, scheduling, and coordination of process design work as required for Phase II of the project. The process manager, who reports to the engineering manager, is also responsible for the preparation, review, and updating of process schedules; the selection, utilization, and control of process manpower for this project; the preparation, review, and updating of process design criteria; the preparation of process engineering progress reports; and the coordination of the efforts of the process supervisors (offsites and onsites) with other groups within the Engineering Section.

Project Engineering and Design Group

The Project Engineering and Design Group is under the leadership of the project engineering manager who reports to the engineering manager. The primary responsibility of the project engineering manager is the management, administration, and direction of all project engineering activities in Phase II. Other duties include assigning work and supervising the execution of work by individual project engineers; monitoring engineering progress against schedule requirements; reviewing work for completeness and compliance with project engineering standards and contractual obligations; and coordinating project engineering efforts with other FWEC departments involved in the project.

Estimating Group

During Phase II, the Estimating Group will be responsible for preparing estimates for the cost of engineering, materials, and construction related to contemplated design changes. Other responsibilities of the Estimating Group include providing cost estimate input for trade-off studies and reviewing, analyzing, and evaluating certain estimates submitted by vendors and contractors for materials, equipment, and services necessary for the construction of the IFGDP. This group will be headed by the estimating coordinator who reports to the engineering manager. The estimating coordinator's duties include coordinating the activities of specialty estimators in the preparation and review of individual estimates; providing a liaison with other members of the FWEC project team on matters relating to the estimate; and reviewing estimates to determine compliance with definition, MLGW's requirements, reasonable technical assumptions, and minimum cost design.

Environmental Coordination Group

The Environmental Coordination Group has primary responsibility for the coordination, management, and administration of the Phase II environmental program. The environmental coordinator, who reports to the engineering manager, will head this group. The environmental coordinator will be responsible for directing and evaluating the work of FWEC's environmental consultant which will include preparing applications for and securing regulatory permits, evaluating the environmental effects of proposed design changes, and monitoring construction practices to assure compliance with stated mitigating measures. The environmental coordinator will also serve as a liaison between FWEC, the environmental consultant, MLGW, and the other industrial partners in the gathering of data necessary for the permitting effort.

Procurement and Construction Section

The Procurement and Construction Section will be primarily responsible for the execution of all procurement and construction activities associated with the IFGDP project. This work will include procurement of all construction materials, equipment, and supplies; scheduling and planning the construction effort; setting up construction camp and storage facilities; and organizing, managing, and inspecting the construction of the IFGDP. This section will be headed by the manager of procurement and construction who is a member of the FWEC Project Management Team reporting to the project director. The duties of the manager of procurement and construction include directing the efforts of the procurement, home office construction, and field construction groups within this section through the appropriate group manager and coordinating the procurement and construction efforts with other FWEC departments, MLGW and other industrial team members, and vendors and contractors.

Procurement Group

The Procurement Group is primarily responsible for the procurement of all client approved materials, equipment, supplies, and services necessary for the construction of the IFGDP. This involves reviewing, analyzing, evaluating, and recommending vendor bid proposals for MLGW review and approval; formulating bid tabulations for MLGW review and approval; participating in interviews of bidders and negotiation of vendor contracts as requested by MLGW; and assuring that delivery schedules are met and product performance is satisfactory. The procurement coordinator, who reports to the manager of Procurement and construction, heads this group. He will assure that established procurement procedures are followed by FWEC and will act as a liaison with other FWEC departments, MLGW and other industrial team members, and vendors on procurement matters.

Home Office Construction Group

Early in Phase II, the Home Office Construction Group will be responsible for making preparations for the construction of the IFGDP. This will involve planning, scheduling, and organizing the construction effort, laying out construction camp and storage facilities, and making preparations for site security and utility service during construction. As Phase II progresses, the Home Office Construction Group will act primarily as a liaison between the field construction group and other FWEC departments in matters related to the IFGDP construction. This group will be headed by the Home office construction coordinator who reports to the manager of Procurement and construction.

Field Construction Group

The Field Construction Group will be primarily responsible for organizing, managing, and inspecting the construction of the IFGDP. The field construction coordinator, who reports to the manager of procurement and construction, will head this group.

He will be responsible for directing the activities of the FWEC Field Construction Group and attending to day-to-day construction problems as they arise; communicating with the FWEC home office as necessary; maintaining schedules and justifying slippages; preparing reports on construction progress; acting as a point of contact for MLGW and other industrial team members regarding construction aspects of the project; and acting as a liason between FWEC and construction contractors and vendors.

Project Administration Section

The Project Administration Section will be headed by the project administrator, a member of the FWEC Project Management Team who reports to the project director. The project administrator is primarily responsible for the control of all cost, schedule, accounting and general administrative functions for the project. Other duties of the project administrator include monitoring schedules and costs for consistency to project budgets and schedules; reviewing and approving schedules, plans, and reports prior to submission; monitoring accounting functions relating to the project; directing the efforts of the cost control coordinator, schedule coordinator, contract accountant, and the reports, files, and messages center; acting as the contact point for all constructural business between FWEC and MLGW; interpreting contract requirements and preparing appropriate direction for project execution; preparing economic analysis required on the project; preparing proposals, negotiating scope of work and cost, preparing memorandum of agreement, and providing direction to the project for proper implementation; and coordinating the activities of the Project Administration Section with those of the other FWEC departments, MLGW, and other team members.

Cost Control Group

The Cost Control Group is primarily responsible for the coordination, preparation and periodic update of all cost reports for the FWEC portion of the project. The duties of the cost control coordinator, who heads this group, include developing and implementing cost controls systems at FWEC which meet Federal guidelines; preparation and update of all project control plans; forecasting of cost for the

project, in consideration of trends in past and current expenditures; and coordinating with other project team members to insure consolidated and consistent cost report.

Scheduling Group

The Scheduling Group, headed by the schedule coordinator, is responsible for the coordination, preparation and periodic update of all detailed design, procurement and construction schedules. The work of the schedule coordinator includes evaluation of progress achieved during a reporting period, in comparison to progress planned; rescheduling of remaining work, in consideration of deviations on meeting work completion dates; and coordinating the work of the Scheduling Group with other project team members to insure consolidated and consistent schedule reports.

Accounting Group

The Accounting Group is responsible for all accounting requirements, including billing and audits. The duties of the contract accountant, who heads this section, include coordinating FWEC efforts in preparation for audits and surveys, assisting in the preparation of proposals and cost/fee estimates as required and preparing monthly billings to MLGW.

Reports, Files, Messages Center

The Reports, Files and Messages Center is a clerical oriented group responsible for assisting the project administrator in handling the flow of paperwork through FWEC during Phase II. The duties of this group include assembling the required copies of FWEC deliverables and other reports, transmitting same to DOE and members of the industrial team as directed, developing, implementing and maintaining comprehensive project files and performing other administrative duties as directed by the project administrator.

Section 2.3

INSTITUTE OF GAS TECHNOLOGY

2.3.1 PROJECT ROLE

As developer of the U-GAS^R Process, IGT will provide technical support during the detail engineering design and construction of the IFGDP. IGT will be responsible to MLGW for executing the Phase II pilot plant test program, providing technical input to the gasifier design, performing combustion gas utilization tests, and assisting in the review of engineering designs, specifications, materials and equipment.

2.3.2 ORGANIZATION

The IGT Phase II organization chart (Figure 2-4) is attached. A narrative summary of the organizational structure follows.

Project Management

The IGT project manager will have primary responsibility for the technical and administrative performance of all work under the contract to the satisfaction of MLGW. He will be the point of contact between IGT and MLGW, as well as, other members of the program. Within IGT, the project manager will report directly to the executive program advisor who is the vice-president of Process Research.

Other responsibilities of the project manager include assuring the timely completion of tasks and reports within approved schedules and budgets; directing and supervising key project team members and assuring adequate staffing and utilization of IGT support services for proper execution of the project; and directing and monitoring the pilot plant operations, gasifier design and process design review activities, and the combustion retrofit analysis and IFG combustion tests.

FIGURE 2-4
PHASE II ORGANIZATION CHART
INSTITUTE OF GAS TECHNOLOGY

Gasifier and Process Engineering Section

The Gasifier and Process Engineering Section is responsible for the IGT effort in gasifier and grid design, demonstration plant design review, and miscellaneous support studies such as fluidization and physical properties of solids, bench-scale reactor work, and the cold model program. Other duties of this section include reviewing and monitoring the progress and content of the detailed design from the process developer's viewpoint, coordinating the IGT input into trade-off studies, and determining the necessity for and gathering the process data required for the demonstration plant detailed design.

This work will be accomplished through the coordinated activities of three groups within the Gasifier and Process Engineering Section; the gasifier design group, the process engineering group, and the technical support group. This section will be headed by the gasifier design and process engineering manager who reports to the project manager.

Pilot Plant Program Section

The Pilot Plant Program Section consists of three groups with responsibility for coordinating, executing, and reviewing the pilot plant test program and reporting pilot plant data to meet demonstration plant project goals; the pilot plant operating group, the environmental analysis group, and the pilot plant data analysis group. Other duties of this section include coordinating pilot plant input to the IFGDP detail design, coordinating the pilot plant test plan to acquire missing design data, monitoring and coordinating the pilot plant data analysis, coordinating environmental data acquisition and analysis, and acting as a liaison between the pilot plant monitors and IGT.

The pilot plant program manager, who reports to the project manager, will head this section and will be assisted by the pilot plant operations manager, environmental analysis manager, and pilot plant data analysis manager.

Pilot Plant Operations Group

The Pilot Plant Operations Group, headed by the operations manager, will be responsible for the day-to-day operation of the pilot plant. The duties of this group include planning the candidate coal testing program to obtain demonstration plant gasifier process design data; obtaining the necessary raw materials and supplies required for operating the pilot plant; coordinating the work of maintenance and craft personnel for changes and modifications to the pilot plant equipment; supervising and directing the operating crew to achieve specified test objectives; and assuring proper test data collection, logging, and tabulation.

Environmental Analysis Group

The primary responsibility of the Environmental Analysis Group is the acquisition (sampling) of and analysis of environmental data. The environmental analysis manager will coordinate the preliminary design and development of analytical sampling devices at the Pilot Plant, prepare final environmental data reports and coordinate these with the Pilot Plant Data Analysis Group and act as an internal consultant on environmental and regulatory matters.

Pilot Plant Data Analysis Group

The Pilot Plant Data Analysis Group will be responsible for the proper collection, logging, tabulation and analysis of pilot plant test data. This group will be headed by the data analysis manager.

Combustion Systems and Gas Utilization Section

The Combustion Systems and Gas Utilization Section will be responsible for testing industrial fuel gas combustion characteristics and obtaining data for retrofitting MLGW customers' burner systems to the plant fuel gas. The Combustion Systems and Gas Utilization Section manager, who reports to the program manager, will coordinate the activities of the Combustion Research Group at IGT, plan experimental programs for IFG combustion characteristics evaluation, and act as an in-house consultant on matters pertaining to gas utilization.

Contract Administration

The Contract Administrator will be responsible for all IGT contractual matters related to the execution of the project. He will assure that all IGT purchases and subcontract activities satisfy the requirements of the contract provisions. Any changes in IGT's scope of work, schedule, or costs will have to be negotiated, reviewed, and approved by the contract administrator. He will also ensure proper accounting and billing procedures are followed throughout the project. The contract administrator will not be assigned full time to the IGT project team, but will be available as required.

Section 2.4

DELTA REFINING COMPANY

2.4.1 PROJECT ROLE

As the ultimate IFGDP operator, DRC will assist MLGW in monitoring detail design, procurement, and construction and provide input relative to their process plant operating experience in Phase II. DRC will also assist in the review of engineering designs, specifications, materials and equipment and, later in Phase II, begin developing and training the initial plant staff.

2.4.2 ORGANIZATION

The DRC Phase II organization chart (Figure 2-5) is attached. A narrative summary of the organizational structure follows.

Project Management

The project manager will provide overall direction for the DRC project team. He will be responsible for channeling the results of DRC's studies and evaluations to MLGW and other members of the industrial team. The project manager will also be responsible for the initial staffing of the plant and overseeing the preparation of the staff to operate the plant facility.

Process Engineering Section

The Process Engineering Section, headed by the process specialist, will be responsible for studying engineering designs, specifications, materials and equipment for the processing trains from a standpoint of continuity. The process specialist will report to the project manager discrepancies, potential

DELTA REFINING COMPANY
ORGANIZATION CHART FOR PHASE II
FIGURE 2-5

FIGURE 2-5
PHASE II ORGANIZATION CHART
DELTA REFINING COMPANY

processing problems, and evaluations of the different processing units. The process specialist will also have the responsibility of exploring possible uses of by-products for future processing inside the demonstration plant facility.

The process specialist will have a general purpose project engineer available for calculations, routine information searches and organizing project data and information into manuals and books for the eventual use by the plant technical staff.

Project Engineering Section

The Project Engineering Section will be responsible for review of piping and instrument drawings, hydraulic evaluation of process units, review of emergency shutdown situations, evaluation of equipment, inter-plant tie-ins for continuity, and review of process piping and equipment in light of special start-up procedures.

The design coordinator, who manages this section, will be assisted by two project engineers; one specializing in mechanical equipment and one in electrical and instrumentation.

Project Engineer - Mechanical Equipment

The mechanical project engineer will be specialized in rotating equipment. His responsibility will be to review all rotating equipment specifications and evaluate vendors' bids on the basis of mechanical design and meeting process requirements. This project engineer will notify the design coordinator of potential equipment limitations, follow up on vendors' designs, and witness shop test of key pieces of rotating equipment.

Project Engineer - Electrical and Instrumentation

The electrical and instrumentation project engineer will be specialized in power systems and knowledgeable of electrical motors.

He will be expected to evaluate the overall plant power distribution system and make sure that motor control gear and transfers are properly sized and designed for starting loads. This project engineer's responsibility will include evaluation of electrical switch gear, transformers, cable routing, substations, process computer installations and interfacing with plant instrumentation, and witnessing shop test of various electrical equipment.

Project Accounting

The project accountant will fill the role of contract administrator at DRC. His responsibility would be to keep track of expenditures of the DRC project team, prepare financial reports as required, establish accounting procedures based on adopted standards, and interface accounting reports with other project teams.

Section 3.0

OPERATION STAFFING PLAN

A description of the Phase III operational staffing plan is given in this section. The organizational structure of the IFGDP operating staff including the delegation of authority and responsibility is discussed. A synopsis of the primary functions of each group within the structure is also included. In addition, the Phase III role of the plant owner, MLGW, and the remaining industrial partners is discussed.

In this section, emphasis is placed on the Demonstration Plant operating staff. Therefore, only the organizational structure of DRC, the plant operator, is discussed. Detailed Phase III organization charts for MLGW and the remaining industrial partners will be developed at a later date.

Section 3.1

MEMPHIS LIGHT, GAS AND WATER DIVISION

3.1.1 PROJECT ROLE

As plant owner, MLGW will be primarily responsible for monitoring the plant operation, marketing the product gas, operating and maintaining the IFG distribution system and gas storage field, and coordinating the interchange of credit gas between the IFG plant and the natural gas system. Other important tasks of the plant owner during Phase III and throughout the operational life of the plant include approving capital and operating expenditures, controlling costs and schedules, performing high level plant accounting and executing government payback, and coordinating public relations activities and the dissemination of technical data.

Section 3.2

DELTA REFINING COMPANY

3.2.1 PROJECT ROLE

During Phase III and throughout the operational life of the plant, DRC will be primarily responsible for the safe, reliable and efficient operation and maintenance of the IFGDP. Other duties of the plant operator include working closely with onsite personnel from other organizations interested in data collection and experimentation, maintaining a satisfactory warehouse inventory, procuring supplies and making approved capital purchases, performing day to day plant accounting, marketing plant by-products, assisting the plant owner in marketing the product gas, publishing technical papers on the operational aspects of the plant, and assisting the plant owner in public relations activities.

3.2.2 ORGANIZATION

The organizational structure for the IFGDP operation (Figure 3-1) is attached. A narrative summary of the operational staffing plan follows.

Plant Management

The plant manager has overall responsibility to the plant owners for the safe, reliable, and efficient operation of the facility. Obviously, development of safe and reliable operating procedures will be the highest priority. Also of importance will be the development of close cooperation and satisfactory working relationship between the plant operating group and on-site personnel from other organizations who are primarily interested in data collection and experimentation. The plant manager should have broad and in-depth experience in process plants.

FIGURE 3-1

OPERATIONAL STAFFING PLAN

TOTAL SALARIED PERSONNEL = 74

TOTAL HOURLY PERSONNEL = 163

TOTAL PLANT = 237

Operations Department

The Operations Department consists of three groups with responsibility for daily plant operation; operations, laboratory, and process engineering. These three groups must work closely together to insure safe, reliable, and efficient operation. The Operations Department will be headed by an individual well versed in plant operations, hopefully, in gasification or related facilities. Of primary importance will be a thorough knowledge of the plant and the ability to develop and maintain organizational unity.

Operations Group

The operations manager, who reports to the operations director, is responsible for day to day plant operation. He executes the agreed upon operational plan through supervisory personnel and the hourly operations workforce. He will be thoroughly knowledgeable about the plant facilities, unit operations, and safety/health.

Directly under the operations manager are nine first-level supervisors. These individuals furnish around-the-clock supervision of the hourly operations workforce, assure compliance with the operational plan, and furnish the required information to the operators as necessary for their training and plant operation. The hourly operations workforce consists of 94 employees broken down per Inclosure 1A. These employees will operate the plant 24 hours per day - 7 days per week - 52 weeks per year.

Process Engineering Group

The function of the Process Engineering Group is to analyze plant operations and propose improvements to the director of operations and plant manager. The process engineering manager has a technical

staff of four engineers, two technicians, and two draftsmen. This group will have as a primary responsibility in Phase III to collect and analyze process data which will lead to a better understanding of the operational aspects of this coal gasification facility. This group will work closely with the on-site personnel. The engineers in this group will be expected to write and publish technical papers concerning operational aspects of the plant.

Laboratory Group

The purpose of a laboratory is to provide independent quality control testing for the Operations Group. Lab analysis of gas samples, water quality, coal deliveries, sulfur shipments, etc. are necessary to guide the operators in locating and holding desirable set-points. Their analysis will also be invaluable for the Process Engineering Group and on-site personnel as they seek to understand and define processes in the plant. This group consists of a laboratory manager, chemists, technicians, and samplers. It is envisioned that much of the required testing can be done using automatic test equipment. This will allow less stringent requirements for recruiting, however, a decision as to the quality of the laboratory workforce will necessarily await development of test plans and equipment selection.

Maintenance/Technical Services Department

Maintenance Group

The Maintenance Group consists of the hourly craft workforce, first-line supervisors, and a maintenance manager. It is the manager's responsibility to execute all approved work orders in a

timely, thorough, and efficient manner. The first-line supervisors receive daily schedules of planned work and assigned manpower. This work consists of preventive maintenance, routine, and emergency repairs. The Maintenance Group must work closely with all other facilities groups. The maintenance manager and the operations manager must develop and maintain a sound working relationship.

Preventive Maint./Scheduling/Cont. Group

The purpose of the Preventive Maintenance, Scheduling, and Control Group is to provide the necessary support to the Maintenance Group to insure adequate preventive maintenance in the plant and promote productivity by supplying planning and scheduling services. Maintenance work orders, primarily generated by the Operations Group are planned to insure material availability, scheduled to meet operational requirements, and sufficient feedback is provided and analyzed to assess productivity and equipment performance. This group consists of an engineer, two planning technicians, and one scheduler-controller.

Purchasing Group

The Purchasing Group includes an agent, a secretary clerk, warehouse supervisor, and the necessary warehouse hourly workers. The agent's responsibilities include the buying of supplies, storage, protection, and dispensing of supplies primarily to the Maintenance Group. Computerization of inventory records will allow minimization of stock levels, more effective coordination with the maintenance planners/scheduler, and automatic generation of purchase

orders when re-order points are reached. The purchasing agent will also develop the contacts required to assure rapid deliveries of critical materials and contracted services.

Project Engineering Group

The Project Engineering Group is responsible for technical definition, analysis, and specification of required material, parts, or equipment to implement process engineering changes; complex, non-routine maintenance tasks; or other projects requiring engineering evaluation. The group consists of four engineers with requisite specialities, two technicians, two draftsmen, and engineering manager. Each group member must be thoroughly familiar with the equipment and material throughout the plant and knowledgeable of the processes employed. Of particular importance for this group will be the evaluation of materials, parts, and equipment in the facility, and dissemination of this information to the industry through technical papers.

Safety/Health Group

The importance of this group is reflected in its reporting relationship--directly to the plant manager. It will be vitally important in this demonstration facility to ascertain the health effects of working in a synthetic fuels plant. The major emphasis for this group will be health, however, model safety programs will also be established and maintained. The health/safety manager will be responsible as a staff specialist to develop, monitor, and upgrade as necessary all health and safety programs. Included in this group is a full-time nurse and part-time doctor. All safety

programs will be carried out by the first-line supervisors, whose knowledge and training concerning safety will be the responsibility of the safety and health manager.

Employee Relations Group

The employee relations manager will be responsible for the full range of employee/employer services and union/management relations. These services will include recruiting, interviewing, employee records, benefits, training, negotiations, and other related items. The staff will include a secretary/clerk who will handle the routine workload and a specialist who will concentrate on personnel related matters. This group must interface with the entire workforce and therefore, must be able to provide quality service. The continuing expertise of this group will be especially required to assure a harmonious workplace and the recruiting and retention of top-notch employees.

Accounting/EDP Group

The majority of the accounting work required for the facility will be fairly routine. Therefore, the Accounting Section will consist of four clerks to handle payroll, payables, receivables, etc. Billing and other higher level accounting work will be handled by the main office of the plant owner.

The EDP capability will most likely consist of terminal hook-ups to a remote main computer and/or stand alone minis required for process engineering, inventory control, maintenance records, etc. As data requirements are more accurately defined, the final hardware configuration will evolve. The EDP section is expected to be staffed by a systems analyst to assist with programming and two data entry clerks.

Marketing/Supply Specialty

The marketing/supply function can be handled by one person. Responsibilities will include purchase of coal and any other designated major items requiring negotiated contracts and the development of markets and account servicing, for by-products. At this time, identified by-products, include sulfur, ash, and certain industrial gases. This individual will also work with MLGW Gas Division to market IFG to future customers, both in Memphis and potential relocating businesses.

Public Relations Specialist

Although not normally required in an industrial plant, this function is expected to be necessary in this demonstration facility. Responsibilities will include press briefings, news releases, tours, and other related goodwill duties. This function should not be necessary after several years of operation. The incumbent will work closely with the communications group of the plant owner.

APPENDIX I

STAFFING - OPERATIONS HOURLY

This section will describe the basis for determining the number of hourly plant operating personnel. Plant operations staffing will require full around-the-clock coverage. This is usual in the energy/chemical process industries and manpower planning for this coverage is relatively simple.

It is emphasized that this plan has been developed based on best available process information to date. Changes will undoubtedly be required as Phase II progresses, but any changes are expected to be minor in nature.

There are five distinct process control areas in the plant:

- *Coal/Coke Handling Area
- *Utilities Control Area
- *Main Process Control Area
- *"Clean-Up" Control Area
- *Methanation - Air Dilution Control Area

The first control area includes the coal and coke handling equipment used to convey coal from the barge unloader to the silos. This includes conveying, stacking, discharging, crushing, drying, and appropriate sampling. The control room will consist primarily of "running lights" indicating equipment on/off status. One exception will be analog control equipment for operation of the dryer mill furnace. Sufficient audible alarming will be provided to alert outside operators in addition to an annunciator panel for an inside operator.

Three operators per shift will be able to provide adequate coverage for the equipment in this area. Two of the three operators will be expected to spend the majority of their shifts outside the control room making visual equipment checks. All mechanical equipment will be appropriately interlocked and will be capable of being stopped from both the field and control room. Remote starting will be allowed from the control room, but only after visual clearances from outside operators. Similar systems and procedures are used successfully in coal fired power plants.

The Utilities control area will be staffed with two operators per shift. One of these operators will be a licensed boiler fireman, as required by local codes. These operators will be responsible for maintaining steam supply from the boilers to the header, BFW treatment, and associated equipment in the general area. Due to the criticality of steam supply, controls in this area will be specified to allow continued operation of the boilers during power failures.

The main process control room is centrally located in the plant. Basically, the operators in this area control flows into and exiting from the gasifiers. The main process components include air separation, steam flow from header, coal/coke feed from the silos, gasifiers, gas cooling trains, compression, and gas treating. By utilizing distributed control and centralizing the control consoles into one building, more efficient operating control is expected than conventional analog control panels. There will, however, be adequate analog "back-up" type instrumentation to allow safe idle control and shutdown during computer outages and other primary control system failures.

Eight operating personnel per shift are expected to be required for this area. The crew is broken down into four inside and four outside operators. Specific areas of responsibility for these operators are as follows:

<u>INSIDE OPERATORS</u>	<u>OUTSIDE OPERATORS</u>
1. Air Plant	1. Air Plant
2. 2-Gasifiers/Cooling/ Dispatching	2. Gasifiers/Cooling - Ground
3. Compression/Treating	3. Gasifiers/Cooling - Structure
	4. Compression/Treating

In essence, each inside operator has a dedicated outside man to monitor plant equipment and make necessary adjustments. Due to the criticality and size of the gasifier structure, it was decided to have two outside operators; one on the ground, the other on the structure.

Operators in the main control room will be able to monitor the function of all other units/equipment in the plant. These operators will only have operating controls for their own units, thereby avoiding a situation where one operator overrides another. Still under consideration is to allow plant shutdown control from the main control room. If desired, these controls will only be

used in an emergency and will be made accessible by supervisory "key locks".

The third control area is designated "clean-up" since it contains those units and processes required to handle sulfur bearing compounds and wastewater treating. Three operating personnel per shift will be required. One of three will be designated "inside" and will monitor the control console. Another operator will have an outside designation and will visually inspect equipment, flare, wastewater ponds, etc. The third operator will be "swing", and will be used either inside or outside as the work requires. This third operator may also perform some simple field chemical tests on wastewater characteristics, sour water, etc.

The final control area is centered in the methanation-natural gas/air dilution process area. Since these units are distinct from the plant, unique, and somewhat demonstration-type in their own right, they justify a separate control room. Staffing for this area consists of one inside console operator, one outside operator, and one "swing" operator per shift.

The only other section of the plant requiring operational staffing is the coal and coke handling/unloading and truck loading areas. An average of five sulfur trucks per day (five-day week) will need loading assistance. As yet undetermined will be ash loading and movement outside the plant. Fortunately, due to this low loading level, daytime only loading can be specified. At this time, the truck loading requirements include the services of one loader and one scale/gate tender. The scale/gate tender can also control material and goods movements into and out of the plant during normal business hours such as warehouse deliveries, coke deliveries, or garbage pickup. There is a requirement to have two heavy equipment operators per shift. Tasks such as ash to storage trucking, barge unloading, coal/coke pile formation, etc. will comprise the majority of the anticipated workload.

In the laboratory, it is anticipated that there will be approximately one chemist, one tester, and one sampler per shift. Three chemists can handle the majority of any weeks work with assistance from one tester per shift. If required, two testers can be assigned for shifts when a chemist is not available. In this way, the testers can receive OJT for job progression. Similarly, the samplers can be assigned as needed to tester positions.

INCLOSURE 1A

OPERATIONS STAFFING SUMMARY

FULL SHIFT OPERATORS

<u>JOB CLASSIFICATION</u>	<u>NUMBER PER SHIFT</u>
Coal/Coke Handling Operators	3
Utility Area Operators	2
Main Control Room Operators	8
Clean-up Area Operators	3
Methanation/Air Dilution Operators	3
Heavy Equipment Operators	<u>2</u>
TOTAL PER SHIFT	<u>21</u>

NON-SHIFT AND LAB OPERATORS*

Scale Attendant (day)	1
Truck Loader (day)	1
Testers	5
Samplers	<u>6</u>
TOTAL NON-SHIFT AND LAB	<u>13</u>

TOTAL OPERATIONS PERSONNEL CALCULATION

$$21 \times 4.4 \text{ (Standard Shift Multiplier)} + 13 = 105.4 \text{ (say } \underline{\underline{105}})$$

*NOTE: This does not include 3 chemists who will, most likely, be salaried personnel.

INCLOSURE 1B

CONTROL LOOP BASIS

For any given operator, depending upon competence or unit criticality, there is a maximum number of control loops and associated indicating and recording loops that he can handle safely. As his experience increases, the number of loops controlled should also increase. A proposed line of progression for the Operations group is attached at Inclosure 1C and taken with the control loop basis provided below, summarizes the control room grouping and operator staffing for those control rooms.

<u>CONTROL AREA</u>	<u>UNITS/PROCESSES</u>	<u>CONTROL LOOPS</u>	<u>OPERATORS</u>	<u>START-UP OPERATORS</u>
Coal/Coke Handling	Conveying	11	1 In	1 In
	Crushing		2 Out	2 Out
	Stacking			
	Drying			
Utilities	Boilers	35	1 In	1 In
	BFW Treating		1 Out	2 Out
	Firewater			
	Plant Air			
	Cooling Tower			
Clean-up	Wastewater Trtg.	12	1 In	2 In
	Sour water Strpg.	8	2 Out	2 Out
	Sulfur Recovery			
	Tail Gas Treating Flare	1		
Credit Generation	Methanation	42	1 In	2 In
	Air Dilution	?	2 Out	2 Out
Main	Gasification (Four Reactors)	152	4 In	6 In
	Air Separation	10	4 Out	6 Out
	Cooling/Scrubbing	17		
	Compression	10		
	Treating	16		
TOTALS			8 In, 11 Out	12 In, 14 Out

INCLOSURE 1C

PROPOSED LINES OF PROGRESSION FOR OPERATIONS

APPENDIX II

STAFFING - MAINTENANCE HOURLY

The size and make-up of the maintenance hourly workforce is highly dependent upon several practical considerations. These considerations include shop capability, extent of outside contracting, preventive maintenance programs, available quality of maintenance workers, etc. Basically, the proper blend of all front-end considerations will allow lowest maintenance cost at specified quality levels. Periodic evaluations are necessary and will be conducted to assure minimization of costs, maintenance work backlog, and plant integrity.

The hourly maintenance workforce consists of three levels; craftsmen (including multi-craft*), apprentices and helpers, and general labor. The basic principle employed in all hiring decisions for maintenance, as well as operations, will be that the potential employee has the ability and desire to progress to the levels of craftsman or operator. Sufficient training will be available to meet the job needs of every hourly employee.

*discussed in separate section

The establishment of this maintenance workforce level is based on the following assumptions:

- 1) Heavy project type work will be contracted out.
- 2) Major electrical and instrument repairs will be contracted out.
- 3) Plant vehicle maintenance, other than oil/air filter changes (or other small jobs) will be part of a lease agreement or be done at the MLGW Service Center.
- 4) Painting and other such periodic, non-critical type jobs will be contracted out.
- 5) Shop work too large for existing shop equipment will be done at MLGW Service Center or contracted out.
- 6) Preventive maintenance programs will be carried out by in-house personnel.
- 7) Maintenance work will be conducted on a 40 hour per week basis using call-outs or hold-overs as necessary. Alternate maintenance scheduling techniques will be used if justified.

Since the amount of regular and preventive maintenance is an unknown quantity at this time, the basis for the size of a maintenance workforce will be per a similar industrial facility in Memphis, Delta Refining Company. A table of job classifications follows at Inclosure 2. Multi-craft designations have been omitted at this time.

INCLOSURE 2

MAINTENANCE STAFFING SUMMARY

<u>JOB CLASSIFICATION</u>	<u>NUMBER - (APPRENTICES)</u>
Instrument Repairman	2 - (1)
Electricians	3 - (1)
Pipefitter/Steamfitter	6 - (2)
Mechanic	
a) Coal/Coke Handling	3 - (1)
b) Plant	6 - (2)
Welder	5 - (2)
Carpenter-Insulator	2 - (1)
Machinist	1
Equipment Operators (back-hoe, winch trucks)	2
Warehousemen	3
Apprentices (designated crafts)	10
Helpers	10
Laborers	<u>5</u>
TOTAL	<u><u>58</u></u>

PROPOSED LINE OF PROGRESSION

Section 3.3

FOSTER WHEELER ENERGY CORPORATION

3.3.1 PROJECT ROLE

As architect-engineer and construction manager, FWEC's responsibilities during Phase III and early operation will include assisting the plant owner in financial analysis of the operating plant and the preparation of certain post-Phase II deliverables and reports concerning various aspects of the IFGDP construction.

Section 3.4

INSTITUTE OF GAS TECHNOLOGY

3.4.1 PROJECT ROLE

During Phase III and early operation, IGT will act as a consultant in the event operational problems occur relative to the gasifier design or if problems develop with combustion or customer utilization of the product gas.