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PIPELINE GAS DEMONSTRATION PLANT
PHASE I

QUARTERLY TECHNICAL PROGRESS REPORT
FOR
SEPTEMBER 1980 - NOVEMBER 1980

ROBERT J. EBY

ILLINOIS COAL GASIFICATION GROUP
Room 3734
55 E. Monroe Street
Chicago, Illinois 60603

Date Published - December 1980

PREPARED FOR THE
UNITED STATES DEPARTMENT OF ENERGY
UNDER CONTRACT NO. EF-77-C-01-2012

U. S. DEPARTMENT OF ENERGY

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LIST OF ACRONYMS

CCP	-	Cost Change Proposal
CDC	-	COGAS Development Company
CE	-	U.S. Army Corps of Engineers
CURL	-	Coal Utilisation Research Laboratory (Leatherhead, England)
DOE	-	U.S. Department of Energy
DPPD	-	Demonstration Plant Process Design Report
EA	-	Econergy Associates
ECP	-	Engineering Change Proposal
EIS	-	Environmental Impact Statement
EPA	-	Environmental Protection Agency
EVT	-	Energie-und Verfahrenstechnik Gmbh
FGO	-	Flue Gas Oxidizer
FMC	-	FMC Corporation
FMEA	-	Failure Mode and Effects Analysis
G&H	-	Gibbs & Hill
HRI	-	Hydrocarbon Research, Inc.
HVAC	-	Heating Ventilating and Air Conditioning
ICGG	-	Illinois Coal Gasification Group
METC	-	Morgantown Energy Technology Center
MOUND	-	Mound Laboratory - Monsanto Research Corporation
MSS/DSS	-	Material Status System/Document Status System
ORNL	-	Oak Ridge National Laboratory
Parsons	-	The Ralph M. Parsons Company
PETC	-	Pittsburgh Energy Technology Center
PFD	-	Process Flow Diagram
P&ID	-	Piping and Instrumentation Diagram
PMN	-	Premanufacturing Notice
PRC	-	Power Recovery Corporation
P&T	-	Pressure and Temperature
PSD	-	Prevention of Significant Deterioration
R/QA	-	Reliability and Quality Assurance
RCRA	-	Resources Conservation & Recovery Act
SARS	-	Safety Analysis and Review System
TSCA	-	Toxic Substances Control Act
UOP/SDC	-	Universal Oil Products/System Development Corporation
USEPA	-	United States Environmental Protection Agency

DEMONSTRATION PLANT AREAS

<u>PLANT AREA</u>	<u>DESCRIPTION</u>
201	Coal Unloading and Handling
202	Coal Preparation
203	Pyrolysis and Gasification
204A	Oil Recovery
204B	Oil Treatment
205	Gas Purification
206	Hydrogen Generation
207	Shift and Methanation
208	Bulk CO ₂ Removal and Gas Compression
209	Gas Dehydration
210	Flue Gas Power Recovery
211	SO ₂ Removal
212	Sulfur Recovery
213	Ammonia Recovery
214	Thermal Oxidizer and Flare
215	Utilities
216	Water Supply
217	Water Treatment Systems
218	Waste Treatment and Disposal
219	Fire Protection System
220	Facilities

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ABSTRACT

In the past quarter work was performed in the following tasks in Phase I of the Pipeline Gas Demonstration Plant Program:

- Task III - Site Evaluation and Selection
- Task IV - Demonstration Plant Environmental Analysis
- Task V - Feedstock Plans, Licenses, Permits and Easements
- Task VI - Demonstration Plant Definitive Design
- Task VII - Construction Planning
- Task VIII - Economic Reassessment
- Task IX - Technical Support
- Task X - Long Lead Procurement List
- Task XI - Project Management

The Preliminary Construction Schedule was delivered to the Government on October 3, 1980, constituting an early delivery of the construction schedule called for in the scope of work for Task VI.

The major work activity continues to be the effort in Task VI, Demonstration Plant Definitive Design, with two 30% Design Review meetings being held with the Government. Work in Task VII, "Construction Planning", was initiated in this quarter.

Work has progressed satisfactorily in the other tasks in support of the Demonstration Plant Program.

A Cost Change Proposal was submitted to the Government in September because of an increase in the scope of work and an extension of the schedule for Phase I to 47 months.

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OBJECTIVE AND SCOPE OF WORK

The major objective of the ICGG Pipeline Gas Demonstration Plant Program is to demonstrate the commercial feasibility and economic attractiveness of a chemical process for conversion of high sulfur coal to clean pipeline gas. The comprehensive program includes the following specific objectives:

- To engineer, design, construct, operate and manage an integrated synthetic pipeline gas demonstration plant.
- To confirm design criteria, demonstrate technology and obtain experience which will yield those characteristics required to establish and/or define plant investment and operating costs for future clean pipeline gas commercial production plants.
- To project plant investment, operating and end-product costs for full-scale commercial production plants.
- To provide technology, performance, reliability and maintenance characteristics which will permit the design of a full-scale clean pipeline gas commercial production facility.
- To investigate the general applicability and limits of the selected process and plant design for a variety of coal types.
- To determine scaling parameters (with respect to the commercial production of the primary product) and sizing of major process components, such as those for gasification, hydrogenation, etc.
- To provide finished marketable clean pipeline gas in quantities sufficient for end-use evaluations.

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- To determine the general characteristics, composition and quality of the end-product(s).
- To assess and/or evaluate characteristics and suitability of the product in actual representative end-use applications.
- To establish guidelines for by-product use and/or disposal.
- To obtain data which will permit design of an environmentally acceptable commercial plant.
- To establish the design compatibility with Occupational Safety and Health Administration requirements.

ICGG will supply personnel, equipment, facilities, material and other services necessary to perform the work which has been divided into three distinct Phases. These are:

Phase I - Development and Engineering

- Stage 1 Conceptual Design
- Stage 2 Final Engineering Design

Phase II - Demonstration Plant Construction

Phase III - Demonstration Plant Test, Evaluation and Operation

The following provides a brief description, by Phase, of the total program.

Phase I - Development and Engineering

Stage 1 - Conceptual Design

A conceptual design for a Commercial Plant has been prepared. The design is based on the maximum use of proven, commercially-available components and equipment. The capital and operating cost estimates, as well as the economic analysis, have considered various process trade-off and design studies. Based upon this conceptual design for a Commercial Plant, a conceptual process design for the Demonstration Plant was developed. A site evaluation study and an environmental analysis, as well as preliminary plans for resources (coal, water, etc.) and water pipeline right-of-way acquisition, were also prepared. A design analysis for the Demonstration Plant was also submitted to DOE at the end of Stage 1.

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Stage 2 - Final Engineering Design

During Stage 2, bid packages, construction plans and an economic reassessment will be prepared. In addition to the possible procurement of long lead time equipment, plans for procuring raw materials, permits and easements will be finalized.

Before proceeding with Phase II, DOE and ICGG must mutually agree that the program should continue.

Phase II - Demonstration Plant Construction

Phase II encompasses the actual construction of the Demonstration Plant. ICGG will finalize the site acquisition and agreements related to feedstocks, product transportation, by-products sale, wastes, permits, licenses, easements and rights-of-way. After competitive bidding, the construction sub-contract(s) will be awarded. ICGG will be responsible for procurement of equipment and facilities, preparation of the site, inspection of the work, and construction management.

Operation, training and maintenance manuals required for the start-up, testing and operating during Phase III will be developed. Training programs will be implemented with the specific objective of developing the necessary skills required for the operation and maintenance of the Demonstration Plant. The training program will emphasize both the safety features and the hazards of the equipment. A final economic reassessment of the investment and the operating costs of both the Demonstration Plant and a Commercial Plant will be performed.

Updated "as-built" drawings will be submitted to DOE. After the approval by DOE of a check-out and acceptance plan, ICGG will perform necessary mechanical testing of the plant prior to start-up.

Phase III - Demonstration Plant Test, Evaluation and Operation

A plant shakedown test plan will be submitted to DOE for approval before ICGG tests the plant components. A detailed report summarizing the six months of testing will be submitted to DOE. Two months are planned for establishing the operating conditions and operating variables for the primary coal type, after which the plant will be operated for twelve months to demonstrate the long term operating characteristics of the plant. At the conclusion of the testing of

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the primary coal type, DOE may direct ICGG to test one or both of the alternate coals for a period of six months each. At the end of Phase III, DOE has the option to extend the period of performance for a period not to exceed eighteen months in accordance with terms and conditions mutually agreed upon by ICGG and DOE.

As a result of the experience gained from constructing and operating the Demonstration Plant, ICGG will conduct process trade-off studies and an economic reanalysis for the optimization of the design, construction and operation of a commercial plant.

DETAILED DESCRIPTION OF TECHNICAL PROGRESS

1.3 Site Evaluation and Selection

Work Accomplished

ICGG Crawford and Whiteside completed planning and profiling the 1-mile length of Trico Road which lies on the west side of the Demonstration Plant site. All drawings were completed on September 24, 1980, and sent to ICGG and Dravo.

J. D. Turner Construction Company conducted a transportation survey covering the route between the Demonstration Plant site and various Mississippi River barge unloading facilities near Chester, IL. The survey found that there are no bridges or other structures to pass under along the route, although there are approximately 100 electrical and telephone wires overhead. With proper procedures, including lifting wires and timing the moves so that they are conducted between the morning and evening "rush hours", ICGG will be able to transport equipment of substantial size over-the-road from the Mississippi River to the site. Details are available in the Transportation Survey Report, which was finalized during October 1980. Because of this survey, it has been concluded that the Combustor, a critical, large equipment item, can be entirely shop fabricated and transported to the Demonstration site in one piece.

The results of the Transportation Survey Report are being used for construction planning purposes. Delivery of large and heavy equipment will be possible both by rail or by barge on the Mississippi River.

Dravo (G&H) A bid package was prepared and issued to prospective bidders for additional Segment II geotechnical investigations. Based on the subsequent evaluation of bids,

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A&H Engineering, Inc. of Carbondale, IL was selected to perform the additional geotechnical investigations, which are required to obtain information necessary for design of the River Water Lift Station and Raw Water Booster Pump House, and to provide data for use in the design of the railroad spur connecting the Demonstration Plant with the existing Illinois Central Gulf Railroad line.

Discussions were held with A&H Engineering, Inc. relative to the fieldwork schedule. Investigations of the river water intake will begin December 1, 1980, and will be monitored by a representative from the G&H office.

Work Forecast

Dravo Monitor the initiation and work in progress of
(G&H) geotechnical investigations to be conducted by A&H Engineering, Inc.

1.4 Demonstration Plant Environmental Analysis

Work Accomplished

Dravo Prepared responses to questions posed by the United
(G&H) States Fish and Wildlife Service to clarify investigations made of rare and endangered species at the site, along the water pipeline right-of-way and at the river water intake location.

Began updating information presented in the Record EAR, FE-2012-077, September 1979, for incorporation into possible addenda to this report.

Analyzed current groundwater level readings and precipitation data received from the field, and incorporated these data into hydrographs being prepared to show site hydrological trends from November 1977 to the present.

Work Forecast

Dravo Continue to update information presented in the
(G&H) Record EAR and prepare hydrographs depicting site hydrological trends.

1.5 Feedstock Plans, Licenses, Permits and Easements

Work Accomplished

ICGG During September 1980, ICGG forwarded ORNL's interim report on leachates from COGAS slag/Demonstration

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Plant soil mixtures to the Illinois EPA for their information. In ORNL's work, sulfates were leached from the Demonstration Plant soil, while the COGAS slag was essentially nonleachable. The soil at the ICGG Demonstration Plant site is unusually high in sulfates.

On October 9, 1980 met with the Illinois EPA to discuss the complexities of the particulate baseline data collection and atmospheric modeling work, and to clarify the answers which ICGG had given to the Illinois EPA's questions on ICGG's PSD Permit Application. At this meeting, ICGG also received the Illinois EPA's acceptance of the Water Pollution Control Data to be submitted with ICGG's Project Plan, which is required under the Illinois EPA's Coordinated Permit Review Procedure.

During November 1980, ICGG, G&H and CDC representatives met with the USEPA in Washington, D.C. to ascertain what data the USEPA will require in the PMN's for ICGG Demonstration Plant Oil Products. As expected by ICGG, the USEPA stated that they would require further chemical characterizations of the oil products and the results of toxicological testing before they would rule on ICGG's PMN's and approve sale and distribution of the oil products. All of the data the USEPA requires will soon be collected through lower tier subcontracts, administered by CDC, toxicological testing of the Naphtha, #2 Fuel Oil and #6 Fuel Oil samples produced from Pittsburgh coal-derived COED raw oil prepared by HRI.

Dravo PMN Applications (G&H)

Meetings were held with representatives from ICGG to discuss and review the requirements and status of preparation of PMN Forms for Nos. 2 and 6 fuel oils and naphtha. Draft PMN Applications were prepared, and a meeting was held October 6, 1980 at the FMC office in Philadelphia, PA which included a review by representatives from FMC and CDC. Based on this discussion, the draft PMN Applications were revised and resubmitted by the G&H office to ICGG, CDC, FMC and the Dravo Pittsburgh office for review. These drafts were also issued for review to the USEPA, whose comments were obtained during a meeting held November 24, 1980 in Washington, D.C. In attendance at this meeting were representatives from the USEPA, ICGG, CDC, FMC and G&H. Further revisions to the drafts of the PMN will be required.

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PSD Permit Application

Reviewed the PSD Permit Application with ICGG and the Illinois EPA in Springfield, IL. At the request of the Illinois EPA, estimated the impact of fugitive emissions (particulate matter) for normal plant operations using the Point Area Line source computer program and other techniques. The "worst case" meteorological data for input into the Point Area Line source program were determined. Using these data, the 24-hour impact of fugitive dust from sources other than the plant road, e.g., the coal pile and transfer points, was estimated.

The Illinois EPA issued a letter stating that the PSD Permit Application, entitled "Application to the Illinois Environmental Protection Agency for a Permit for Prevention of Significant Deterioration of Air Quality", can be considered complete as of July 14, 1980. A public hearing is required and will be scheduled in January 1981.

Preparation of responses was initiated on comments made by the Illinois EPA relative to the PSD Permit Application. Draft responses are now being prepared.

Studied the impacts on air quality which might result from reducing the height of the Sulfur Removal Stack in Area 211 and from the malfunctioning of the Area 212 Claus Plant. Normal atmospheric releases through the Sulfur Removal Stack were modeled using stack heights of 400, 450 and 500 feet. The 500 foot stack has a slight advantage over the 400 or 450 foot stack in that the maximum ground level concentrations of SO_x total suspended particulates and NO_x decrease, by a small amount, with the increasing stack height. Regulatory requirements, however, are met by any stack height within the 400 to 500 foot range.

In the study of the impact on the environment due to the Claus Plant malfunction, the following alternate methods of disposing of the feed gas were examined:

- Combustion of the feed gas and its release at the Dirty Gas Flare
- Combustion of the feed gas in the Thermal Oxidizer and its release from the Sulfur Removal Stack

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Results of this study, based on data obtained from the stack height study, indicated that the burning and release of the feed gas at the Dirty Gas Flare can cause ground level concentrations that are many times greater than those permitted by the National Ambient Air Quality Standards. However, release from the Sulfur Removal Stack, within the height range of 400 to 500 feet, is environmentally acceptable.

Evaluated new sulfur discharge data furnished by FMC. The impact of ambient SO_x emissions from the Area 212 Sulfur Removal Stack was assessed for stack heights of 400, 450 and 500 feet. Results of the analysis, including computer modeling using the Point Area Line source program, showed the emission levels to be acceptable to the National Ambient Air Quality Standards and PSD requirements.

Illinois EPA Coordinated Permit Review

Meetings were held with representatives from ICGG to discuss status of the permit application and Project Plan being prepared for the Illinois EPA Coordinated Permit Review. The Illinois EPA Coordinated Permit Review requires that a Project Plan be submitted to describe all pollution control measures being incorporated into the Demonstration Plant design. Preparation of this Project Plan is in progress, with work being done on the development of air pollution control systems, water pollution control systems and solids waste disposal systems. Draft sections of this Plan are currently being written. Various sections of the permit applications for the water pollution control systems and solids waste disposal systems are also in preparation.

Dravo's Pittsburgh office prepared a package for use by the G&H office in the development of the Project Plan required by the Illinois EPA for the Coordinated Permit Review. Preparation of this package involved the compiling and/or adapting of existing design information to fulfill the purpose of the proposed Project Plan. Included in the package were the PFD's, P&ID's, Design Basis, process description and layout drawings developed for Area 218, Waste Treatment and Disposal. The Plot Plan and Rough Grading Plans were also included.

Resource Conservation and Recovery Act

Submitted an application for a hazardous waste permit to the Region V office for the USEPA on November 18, 1980. This application outlines those wastes which might be judged hazardous. The Dravo Pittsburgh, PA

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office worked in conjunction with the G&H office for preparation of this application, submitting a package describing the nature of potentially hazardous wastes and the treatment and handling of those wastes.

Work Forecast

ICGG Review the current status of the PMN's prepared by G&H, and decide either to submit the PMN's now with the toxicological data to follow as addenda, or to submit the PMN's later, after the toxicological data have been incorporated.

Review and submit the Project Plan prepared by G&H to the Illinois EPA. The Project Plan represents a composite application for the various construction permits required for the Demonstration Plant, and is the document which initiates the Illinois EPA's Coordinated Permit Review Procedure. Demonstration Plant construction cannot commence before the permits covered by this procedure are granted.

Continue to work with the Illinois EPA to expedite the PSD Permit Application approval.

Continue to assemble data required for the PMN's to be submitted to the USEPA, as required by TSCA permitting regulations.

Dravo Prepared responses to the Illinois EPA's questions (G&H) concerning the PSD Permit Application.

Submit the Project Plan required for the Illinois EPA Coordinated Permit Review and continue preparation of the permit applications for air pollution control systems, water pollution control systems and solids waste disposal systems.

1.9 Technical Support

Work Accomplished

ICGG The program for bench-scale testing of Pittsburgh coal-derived pyrolysis oil continued throughout the quarter at the HRI Research and Development Center in Lawrenceville, N.J.

Analysis of the results of Task I, the 30-day bench scale H-Oil® run which ended on July 30, 1980, was completed. During September 1980, preliminary yield information was interpreted by the HRI Engineering Group in Miami, FL, who determined cut points for the Vacuum Tower Bottoms and No. 6 Fuel Oil. It was

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determined that Pittsburgh pyrolysis oil is a lighter feedstock and easier to crack than previously predicted. Therefore, the Pittsburgh coal case will produce more No. 2 Fuel Oil and Naphtha and less No. 6 Fuel Oil than predicted. This will have a positive effect on Demonstration Plant economics because the Fractionator Light Feed Heater can be eliminated.

The Vapor-Phase Hydrotreating Study began during the last week of October 1980, and was completed early in November 1980. HRI then used the effluents from this bench-scale study and the 30-day H-Oil[®] run completed in July 1980, to formulate 1-gallon samples of Naphtha, #2 Fuel Oil and #6 Fuel Oil, which very closely simulate the oil products to be produced by the ICGG Demonstration Plant. These 1-gallon samples were delivered at the end of November 1980 under ICGG's authority, to CDC for use in the Toxicological Screening Program to develop data required for PMN preparation, a TSCA requirement.

During October 1980 HRI conducted experimental work under the HRI Laboratory Program, which consisted of developing viscosity correlations for Pittsburgh Coal Case Vacuum Tower Bottoms, as functions of temperature, solids content and storage time duration.

CDC. In mid-November, the Fuller Company submitted its second proposal for additional Fuller-Kinyon pump tests. These tests are designed to answer questions which were not resolved in the earlier study. The latest proposal is being reviewed internally. Revision of the Fuller-Kinyon pump study report was inactive.

The Carrier Company Particulate Erosion Test program was begun. Two catalyst dust samples unexpectedly produced deposits at 1200°F and a high particle velocity. Deposits were not found in prior Carrier Corporation catalyst studies at these conditions. The evaluation of the fly ash at 1200°F was completed. Metal loss due to fly ash erosion was low. The apparatus is being readied for testing the char dust at 1200°F in a nitrogen atmosphere. The inert atmosphere is needed to prevent combustion of the carbon in the char.

Samples of naphtha, No. 2 fuel oil and No. 6 fuel oil from several petroleum refiners were analyzed to provide the data for selection of the petroleum products to be tested along with COGAS oil samples, in the Toxicological Screening Program. Based on the analyses, two of each of the petroleum products were selected for testing. Five gallon samples of each of the six selected products have been ordered. Samples of COGAS naphtha

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and No. 2 and No. 6 fuel oils produced from Pittsburgh seam coal are being prepared by HRI.

Work Forecast

ICGG HRI will initiate the last two tasks remaining in the Laboratory Program: the long-term stability test on stored Vacuum Tower Bottoms and the test to confirm the stability, against coking, of the feed to the Vacuum Tower Feed Heater. Results of these two tests should not have any impact on the design.

CDC Complete the cold model data analysis and issue the report.

Discuss the Fuller Company proposal with Fuller personnel and finalize the program to recommend to ICGG. Complete the Fuller-Kinyon Pump Test report.

Complete the particulate erosion testing by determining the erosivity of char at 1200°F and fly ash at room temperature. Analyze the data and prepare the report.

Analyze the five gallon samples of petroleum products on receipt, receive the COGAS oil samples and initiate the toxicological screening program.

1.10 Long Lead Procurement List

Work Accomplished

Dravo Issued a revised Long Lead Item Schedule, which included the revised Long Lead Item List, to ICGG.

In anticipation of CE approval of the Power Recovery Unit (210-42102) as a long lead item, a definitive scope of work for use in the solicitation document was prepared and submitted to ICGG and CDC for review.

Work Forecast

Dravo Incorporate the ICGG and CDC review comments into the Power Recovery Unit specification, and issue the specification in its approved form to ICGG in anticipation of long lead item approval.

2.6 Demonstration Plant Definitive Design

Work Accomplished

ICGG Representatives of EVT met with ICGG, Dravo, CDC, EA and CURL on September 9, 10 and 11, 1980, in

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Pittsburgh, PA. This was kick-off meeting for the Combustor Design Subcontract with EVT. Topics discussed were numerous and mainly involved technical design details, such as pressure shell size and clearance, water wall cooling system, support points, etc. Also discussed were R&QA and Codes and Standards requirements for EVT's work.

Representatives of ICGG, Dravo and CDC met with EVT in Stuttgart, West Germany during the week of October 14-17, 1980, to discuss EVT's first month of progress on the Combustor Design. The discussions were predominantly technical, and included such subjects as burner configurations and details, means for injection of quench steam, steam generation system details and interfacing piping requirements. EVT's progress was satisfactory and no special design problems were encountered.

On November 18-20, 1980, EVT met with ICGG, CDC and EA representatives in Pittsburgh, PA to discuss EVT's first Deliverable under their subcontract to design the Demonstration Plant Combustor. EVT has prepared conceptual designs for most Combustor design features, including char and oil burners, water wall tube design, and the Combustor pressure shell. EVT briefed Government and Contractor representatives on EVT's work to date at the November 20, 1980 Oral Briefing.

Data analysis from the HRI Laboratory Program was far enough advanced that on November 28, 1980, the HRI Engineering Division in Miami, FL initiated work on revising the Area 204B Material Balance for the Pittsburgh Coal case. This work is intended only to produce a more accurate material balance for the Pittsburgh case, incorporating the laboratory yields and heteroatom removal results. No equipment changes will result except for deletion of the one heater, previously mentioned, and minor capacity readjustments for the Vacuum Tower and associated equipment. This will not delay the Task VI schedule, nor will any changes result for the Illinois or Western coal cases.

Throughout the quarter, HRI responded to written comments and questions pertaining to their Task VI work in Area 204B, through letters and phone calls to ICGG. These comments and questions pertained to vessel details, heat exchanger details, instrumentation system details, the specification for the Ebullating Pump Speed Control and the effects of a total electrical power outage during operation on the H-Oil[®] Reactor System. No major problems arose, and none of the questions remained unresolved.

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On October 31, 1980, ICGG, Dravo and EA representatives participated in a Licensor Consultation Meeting at HRI's Miami, FL office. The topics discussed included the following:

- EA's comments concerning potential sources of operational problems in Area 204B including the H-Oil® Reactor effluent separator level controls, oil flushes on heat exchangers in the reactor effluent system, and fired heater design.
- Detailed instrumentation and process information needed by Dravo to complete Task VI.
- Possible changes to valve arrangements in the high-pressure liquid letdown system, proposed by Dravo based on investigation of others' experience, including the experience of Ashland Synthetic Fuels, operators of the H-Coal® Pilot Plant. A minor change to the system arrangement was implemented by Dravo, based on actual operational experience at the HYGAS Pilot Plant in Chicago, IL. HRI approved the change.

Representatives of ICGG, Shell, EA and Dravo met in Pittsburgh, PA on October 16, 1980. Shell reviewed the Piping Model, with essentially no comments. Questions asked by Government representatives during the 30% Design Review for Area 205 were discussed with Shell. Shell's responses were incorporated into the minutes of the 30% Design Review Meeting. Also discussed were a few Process, Instrumentation and Vessel questions which arose during Dravo's Task VI work in Area 205.

On September 24, 1980, Parsons met with ICGG and Dravo in Pittsburgh, PA to discuss Dravo's Area 207 definitive design work. The discussion was mainly on selection of equipment design temperatures and pressures, vessel and piping insulation, and considerations on the Piping Model, such as manway and platform locations on methanators, which should be judiciously placed so as to expedite loading and unloading of the methanator catalyst.

A meeting was held at Parsons in Pasadena, CA on, October 30, 1980, at which ICGG, Parsons and Dravo representatives discussed subjects critical to the Task VI completion of Area 207. Discussed were methanation reactor insulation design heat exchanger calculations, mechanical equipment specifications,

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and hot spot detection in externally insulated, refractory lined methanation vessels.

During September 1980, at ICGG's request, FMC attempted to assess the amount of trace components, e.g., SO_3 , NO_x , particulates, etc., which may be removed from the Area 211 Flue Gas by the FMC Double Alkali Flue Gas Desulfurization Process. FMC concluded that no reliable data base existed on which to predict these removal efficiencies. Therefore, for environmental permitting purposes, FMC recommends that ICGG be conservative and assume that all of these components pass through Area 211 to the Flue Gas Stack, unaltered in concentration.

On October 2, 1980, representatives of ICGG, FMC and Dravo met in Pittsburgh, PA to discuss specifications for Area 211 mechanical equipment, materials of construction and the Area 211 Piping Model.

FMC met with ICGG and Dravo in Pittsburgh, PA on November 25, 1980, to review the latest Area 211 P&ID's and equipment specifications issued by Dravo. Because the amount of flue gas to be fed to Area 211 has increased since Task II, primarily due to the substitution of the coal-burning Williams Impact Drier Mill in Area 202, ICGG and FMC discussed updating the Area 211 Material Balance and increasing equipment capacity where necessary.

Dravo Work is in progress on Task VI definitive design engineering activities. The development of design documents by Dravo's respective disciplines continued.

The Process Discipline continued to update and revise on an area by area basis, the design basis, process description, PFD's, P&ID's, material balance calculations, energy balances, equipment specifications, process control descriptions, utility and reagent summaries, utility flow sheets, and solid waste/gaseous emissions/liquid waste characteristics.

The Layout/Piping/Model Makers proceeded to check and issue for approval the remaining layout drawings and piping requisitions, construct the final piping models, and prepare the piping fabrication drawings and piping orthographic drawings. Enlarged Plot Plan drawings are being made, with coordinates set for each area, and work is in progress on the development of the Block Plans (final site development). The study of underground pressure piping and yard service racks continued. Work was initiated on the piping layout around the Area 203 Combustor to interface with

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assembly drawings received from the design subcontractor, EVT. Piping orthographic drawings for the Demonstration Plant facilities are in preparation.

Many of the vessel requisitions prepared by the Vessels Discipline were approved by ICGG and released as "Approved for Engineering". Others are still in preparation or are being checked or revised prior to issue.

Work continued on the preparation of mechanical equipment requisitions and pump head calculations. Many requisitions are being revised and checked by the Mechanical Discipline prior to being issued for approval. Several were approved by ICGG and released as "Approved for Engineering"; others are being revised to incorporate ICGG's review comments.

The HVAC Discipline continued its preparation of calculations and drawings for the Control Room, Personnel Building, Plant Lunchroom and Laboratory. Work is also in progress on the checking of its electrical substation calculations. Upon completion of preparation and checking, HVAC drawings and requisitions are being issued to ICGG for approval. Many have subsequently been released as "Approved for Engineering".

Work is proceeding on structural framing design and drafting and architectural design. The Structural Discipline continued to prepare and check drawings on an area by area basis, and in many instances, e.g., Areas 204, 205, 206, 207, 208, 209, 213 and 214 the majority of the drawings have been submitted to ICGG for approval and subsequently released as "Approved for Engineering". The preparation of plan and profile drawings depicting the routing of the water pipeline from the Mississippi River to the plant site and drawings of the river water intake systems are nearing completion. Preparation of the architectural detail design is proceeding for the Personnel Building, Laboratory, Control Room, Warehouse and Maintenance Building. The architectural drawings for the Plant Lunchroom were approved by ICGG, and the plumbing drawings for the Administration Building and Plant of the railroad spur connecting the plant site to the Illinois Central Gulf Railroad line is in progress. The rough grading drawings were approved by ICGG and released as "Approved for Engineering".

The Instruments Discipline continued its preparation of instrument requisitions and P&T diagrams, with many P&T diagrams being issued to ICGG for approval. Work

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is also proceeding on the development of requisitions for special thermal elements and control valves for equipment items in Areas 203 and 204, and on the design of the utilities control panel in Area 217. The instrumentation in Areas 217 and 218 is being reviewed to coordinate it with process changes and with package units. Preparation of drawings for the Control Center, based on area (local) panel specifications continued. Supplemental instrument diagram or text requirements, and logic diagram requirements, were reviewed. Work was then initiated on preparation of logic diagrams, with diagrams for Areas 207, 211 and 212 being completed and issued for ICGG's approval. Instrument calculations for control valves and relief valves are in preparation, as are analyzer requisitions for process applications and specifications for the Data Logger.

The Electrical Discipline continued its preparation and checking of one line diagrams, elementary diagrams, lighting and grounding layouts, and power and control conduit layouts. As checking of the drawings and layouts is completed, the documents are being issued to ICGG for approval. Equipment layouts, short circuit and load study calculations, and requisitions for major electrical equipment are in preparation in Area 215, Utilities. Electrical room layouts, fire/alarm communication system plans, an equipment list and lighting fixture schedule are also being prepared.

The Electrical and Mechanical Disciplines are contributing input to the Estimating Group for use in producing the definitive estimate which is a part of Task VI.

Two 30% Design Review Meetings were held at the Dravo office in Pittsburgh, PA, with representatives from CE, DOE, METC, UOP/SDC, ICGG, CDC and Dravo in attendance. Discussed at the meetings were the Government team's comments on design documents prepared by Dravo for Areas 201, 205, 206, 207, 208, 209, 210, 211, 212, 216, and 219. Those documents reviewed, including PFD's, P&ID's and equipment specifications, represented the state of the art at 30% completion in the Task VI definitive design activities for the respective areas. Following discussions with the Government team and ICGG, Dravo began incorporating the comments into the design documents for most of these areas. Work is in progress on preparation and compilation of documents for the 30% Design Review of the remaining plant areas. As the documents for each area are completed, Dravo's Process Discipline will issue a set to ICGG for submittal to CE.

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A draft of the Preliminary Construction Schedule was submitted to ICGG for review. ICGG's subsequent comments were then discussed during a review meeting and were incorporated by Dravo into the schedule. The finalized Preliminary Construction Schedule was then issued to ICGG for submittal to the Government.

Meetings were held with prospective vendors and process design licensors to discuss their equipment's design relative to Demonstration Plant operation. The following list highlights some of the meetings of significance with respect to Task VI definitive design engineering activities:

- Area 202 - Coal Preparation

Discussions were held with representatives of Williams Patent Crusher & Pulverizer Company to determine the viability of their Impact Dryer Mill System to the Demonstration Plant design. Upon acceptance of this system, meetings were held to review and discuss the incorporation of the system into the plant design.

Meetings were held with Ducon Corporation representatives to discuss their quote on the lockhopper system.

- Area 203 - Pyrolysis and Gasification

Met with representatives from Buell and CDC to discuss the cyclone design, including items such as size, plenum design, support and materials of construction. The model was also reviewed. Dravo subsequently implemented the recommendations made by Buell to revise the inlet piping to the cyclone.

An Area 203/204A Block Model Review for Government representatives was conducted on September 4, 1980. ICGG and CDC also participated in this review. Representatives of METC, UOP/SDC and CE participated and were solicited for comments, but no comments were offered to ICGG.

- Area 205 - Gas Purification

A meeting was held with Ingersoll-Rand representatives to review the design for the Gas Compressor w/Auxiliaries (205-42201).

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● Area 211 - SO₂ Removal

Double Alkali Review Meetings were held at the Dravo office with representatives from ICGG and FMC. Discussed during these reviews were FMC's designation of proprietary data, emissions, data, materials of construction for the stack liner, and mechanical and process items, such as the impact of the Area 202 change to the Williams Impact Dryer Mill System. FMC also reviewed the block model for the scrubbing section and the detailed model for the regeneration section.

● Area 217 - Water Treatment Systems

Met with representatives from Calgon Corporation to discuss and evaluate various methods for treating and recirculating the Cooling Tower make up water.

The selection of the Williams Impact Dryer Mill System constituted a major design effort in Area 202, Coal Preparation, for this report period. In September, field trips were made to witness the performance of equipment proposed for coal drying and crushing. Dravo visited the Westinghouse plant at Waltz Mills, PA, to observe the Williams mill running on Wyoming subbituminous coal. The coal crushing in this test was done in a 5 ton per hour Williams Impact Dryer Mill. The mill proposed for the ICGG Demonstration Plant will operate at 125 tons per hour. A visit was also made to the Williams office in St. Louis, MO, to observe laboratory tests of Williams' Venturi Impact Dryer System processing Western subbituminous coal. Final tests were run in October to determine the performance of the system processing Western subbituminous and Illinois Nos. 5 & 6 coals. This last in the series of tests was requested by CDC to confirm the ability of the Williams system to crush, dry and classify the coal as required for the gasification process. With completion of this segment of the testing program, all objectives were satisfactorily accomplished and no further testing was required. The data from these tests were used as input in preparation of Dravo's ECP-D-032, a Class I ECP aimed at reducing the capital cost of Area 202. Upon ICGG and CE approval of this ECP, work resumed on preparation of Area 202 drawings and requisitions by the Layout, Vessel, MEchanical, HVAC and Electrical Disciplines, based on data received from Williams. The preparation of these documents had been suspended pending the selection of a coal preparation system. There will be no impact to the project schedule due to the suspension.

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A design resolution was made to burn coal in Area 202 rather than import flue gas from Area 210. The importing of flue gas was rejected due to:

- Potential condensation problems
- The need to have high temperature piping when the expander bypass is used
- Additional fuel oil requirements to generate steam in the Auxiliary Boiler

The firing of coal in Area 202 was selected because it presents a more economical solution and promotes a simpler operation in design. There are, however, the following problems associated with the process:

- The low dew point of the combined gases and SO₂-water condensation
- The oxygen level will be difficult to control because the Williams unit will be run with negative pressure

Work is in progress to implement a water flush system for cleaning the pyrolysis vessels in Area 203, Pyrolysis and Gasification. Details of various system designs are being developed for solids sampling, Gasifier debris removal, Mixing Section debris removal, riser aeration and solids removal.

Refractory design developments were discussed by representatives from ICGG, CDC, EA and Dravo during Design Review Meetings with the Area 203 design consultants and during Biweekly Review/Coordination Meetings. After CDC presented the impact of the hot wall design on Synthetic Pipeline Gas production, the current hot wall refractory design was deemed unacceptable. Dravo was given a new set of design parameters and asked to develop an alternate refractory design which will reduce heat loss. Design parameters for the alternate designs were developed and recorded in the minutes from a Refractory Design Review Meeting held November 25, 1980 at the Dravo office in Pittsburgh, PA.

In the process of selecting the final refractory design for Area 203, Dravo prepared a Refractory Test Program Proposal. It is the intent of this program to test refractories which are proposed for specific services in certain atmospheres to be present during Demonstration Plant operation and for which no commercial experience is available. There is concern over the possible

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long-term deterioration effect caused by the combined carbon monoxide, water and hydrogen atmosphere on these refractories. This proposal will be submitted for ICGG/CE approval.

An Insurers' Design Review Meeting was held at the Dravo office with representatives from ICGG and its insurance underwriters. The purpose of this meeting was to review the Area 203 and 204A block model, and preliminary mechanical equipment specifications prepared for the Fire Protection System's (Area 219) Fire Truck, Quick Attach Truck and Foam Trailer. As a result of this meeting, Dravo revised the Area 204A block model in accordance with fire protection requirements recommended by the insurance underwriters.

After evaluation by HRI, the Fractionator Light Feed Heater in Area 204B, used in the Pittsburgh case design, was deleted. ICGG approved ECP-D-029, the Class II ECP submitted by Dravo for this item.

Completed a temperature profile study of refractory lined equipment for Area 207, Shift and Methanation.

Representatives from CDC and PRC visited the Dravo office to review the block model for Area 210. Afterwards, Dravo representatives joined them to discuss PRC's resulting comments. ICGG subsequently accepted the block model and work is now in progress by Dravo on the detailed model design.

Completed detailed design work on the Cooling Tower water treatment system.

Investigated the means of controlling emissions in the Area 220 Tank Farm, and prepared a Baseline Design Change Proposal for a vapor recovery system.

Developed process guidelines for the winterization of equipment, vessels and piping.

Prepared the Hazard Specification.

Continued work on the ICARUS computerized cost estimate.

CDC At the request of ICGG, instrumentation in Areas 203, 204A and 210 was reviewed and classified by functional purpose, e.g., test, or startup and normal operation. Those instruments and electrically-driven equipment which must be operable for a safe shutdown were also identified to Dravo. Current issues of P&ID's have been reviewed to insure incorporation of all prior comments and for consistency.

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COAL PREPARATION

The Williams Impact Dryer Mill System, proposed in ECP D-032 as a replacement for the DPPD Area 202 crushing, sizing and drying system was evaluated. A CDC representative witnessed the tests made with Western subbituminous coal in the Williams pilot plant during September and October which established that the unit could satisfy the process requirements.

A review was made and reported which identified the impact of use of the Williams System on other plant areas. This review also confirmed that it was preferable to use a coal-fired furnace, rather than Area 210 flue gas, to supply heat for drying. Review work continues as Williams supplies additional design information.

A trip report was issued covering the CDC visit to Curtis-Wright to inspect a Williams Impact Dryer Mill.

A memorandum was issued reporting the estimated Western coal fines generation to be expected of the DPPD system. Fines generation in the DPPD system and that obtained in the Williams System tests are comparable.

A study was made to determine the differences between pneumatic and mechanical conveying of coal from storage to the lockhoppers in terms of coal particle attrition. The results indicated that a slight increase in size degradation could be expected with pneumatic conveying, but that this small increase in fines is acceptable to the process. A memorandum summarizing these results was issued.

DPPD crushing and screening specifications were revised to accommodate the larger size consist required for Western subbituminous coal dried in the Flash Dryer.

PYROLYSIS AND GASIFICATION

CDC and CURL representatives participated in three meetings with EVT, the Combustor design subcontractor. At the kick-off meeting, held at Dravo in September, CDC provided a Mixing Section design package and additional Combustor information needed by EVT. An initial progress review was held at EVT in Stuttgart, West Germany in October. A list of additional CDC work items was prepared and followup action was taken. EVT completed its Segment I design package, and this design was reviewed in meetings at Dravo's Pittsburgh, PA office in late November. This design was satisfactory

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in nearly all respects, and only a few items remain to be resolved in EVT's Segment II work. However, the EVT burner design required an increase in transport gas for the char fuel fines, and CDC is now preparing an ECP for the necessary modifications to the transport gas system.

Monthly meetings were held with consultants R. Pfeiffer and N. Nassir dealing primarily with the design of vessel internals and refractory linings. Additional recommendations were made relative to vessel details and support work initiated to aid in resolution of the refractory design. Preliminary contacts were made with Exxon Company to explore possible use of their all-welded distributor grid design.

The current refractory lining design, which utilizes a bare shell maintained above the dewpoint, yields a gasification area shell heat loss considerably higher than previous allowances. CDC examined the effects of this heat loss and found a significant reduction in overall thermal efficiency for both the Conceptual Commercial and Demonstration Plants, as well as a significant reduction in Demonstration Plant gas make. These results were reported by memorandum and discussed with ICGG, Dravo, CE and DOE. Dravo is considering alternative ways to reduce the shell heat loss to an acceptable level.

Dravo found it necessary to reduce the size of a Gasifier nozzle for structural and layout reasons. The impact of this change on pressure balance and equipment specifications was assessed and reported.

A memorandum was issued to transmit CURL review comments and CDC recommendations for solids sample size and sample points.

CURL Reports Nos. 2 and 3 were issued with additional CDC comments. These reports address the elutriation of fines, the fines balance, and the effect of fines on flue gas combustibles. Internal review of CURL Report No. 4 revealed some missing data which was requested from CURL.

The study performed to determine the lockhopper reliability requirements for coal feed to pyrolysis and gasification was completed and a memorandum was drafted. The study indicates that Area 203 can be run for a few hours without feed coal with only a small effect on the gas output from Area 203.

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Representatives participated in a Pyrolysis and Gasification model review meeting at Dravo in September with DOE and UOP/SDC. CDC made additional comments to Dravo on the arrangement of equipment and location of vessel supports. Dravo agreed to make only minor changes in the arrangement.

The study on the pressure relief requirements for the Pyrolyzer A and Combustor systems was completed and a memorandum issued.

OIL RECOVERY

A review of alternatives to the Spray Tower in the second stage scrubber of Area 204A was completed. A memorandum was issued providing the results of this review, plus back-up design information for the disc and donut column recommended in ECP C-005. Further meetings were held with ICGG and EA to discuss the proposed design. Cost and arrangement considerations will dictate whether or not a packed column would be preferable.

Additional ECP's were prepared: C-008 modifying the oil dehydrator vessel, C-009 revising make up and blowdown piping, and C-010 converting a scrubber pump from electric to steam turbine drive because of safety considerations.

A review of the piping plan and detail drawing for the Dehydrated Raw Oil Storage Tank was completed and comments were issued. A Dravo requisition for centrifugal pumps in Area 204A was also reviewed and issued.

A memorandum was issued transmitting raw oil flash point data requested by the ICGG insurers.

A minor change in the raw water make up and blowdown streams from Area 204A was recommended as a result of The Task VIII material and energy balance work effort.

A study of the use of Pielkenroad separators for oil decanters was completed and a memorandum issued.

FLUE GAS POWER RECOVERY

The effects of the Area 203 pressure balance revision on the material and energy balances in Area 210 were investigated. These effects were found to be small and will not significantly affect the Area 210 equipment specifications. A memorandum was issued to make corresponding corrections to the Area 210 pressure

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balance. This revised pressure balance will constitute the basis for future material and energy balances.

A review was completed of the revised FGO solicitation prepared by ICGG. CDC comments were transmitted to ICGG by telephone and by memorandum. CDC participated in the Source Selection Board proceedings which selected the preferred vendors for the FGO solicitation. The three vendors selected will prepare design packages which will be the basis of final vendor selection.

CDC, ICGG, DOE and Dravo representatives attended a Power Recovery Seminar on 2-stage expanders presented by the Elliott Company at Jeanette, PA on September 18, 1980. The first 2-stage expander for a Fluidized Catalytic Cracking plant was on the test stand and was inspected. It was also learned that the Elliott Company now has orders for two additional 2-stage FCC expanders. A trip report was issued.

A review was completed of the PRC report on the Induction Generator sizing and comments were transmitted to Dravo and PRC. A review was initiated of the Power Recovery Unit specification prepared by PRC.

Answers were provided to UOP/SDC questions on Area 210 P&ID's, the Power Recovery Unit train controls and the FGO controls.

The Tertiary Separator and Waste Heat Recovery Unit requisitions prepared by Dravo were reviewed and comments were transmitted verbally to Dravo. A memorandum was prepared and is under internal review.

Representatives participated in the 30% design review meetings for Area 210 at Dravo. Two questions required followup action by CDC. These questions related to system heat losses and expander pressure drop under Western coal gas flow conditions. Analyses have been completed and a report is in preparation.

SYSTEMS

Ash fusion temperature data for Pittsburgh seam coal in an oxidizing atmosphere, requested by Dravo for the FGO design studies, was transmitted by memorandum.

Representatives participated in several meetings of the Operating Procedures Committee. Work continued on estimating various utility requirements for the start-up of the plant. A memorandum is being drafted to summarize CDC estimated utility requirements for the start-up. A memorandum was issued to summarize start-

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up air requirements for the Pyrolysis section. A revised start-up procedure prepared by Dravo was reviewed and discussed in an Operating Committee meeting.

Work Forecast

ICGG HRI will complete data analysis from the other Laboratory Program Tasks, and use this data to revise the Area 204B Pittsburgh Case Material Balance. HRI will subsequently issue revised pages for their Detailed Process Design Report incorporating the Material Balance and Vacuum Tower changes.

HRI will review the Area 204B Piping Model and the latest P&ID revisions in a meeting at Dravo's office in Pittsburgh, PA on December 9, 1980.

Benfield is reviewing the latest Area 206 P&ID revisions, and Benfield's comments on the P&ID's and Piping Model will be discussed in a meeting at Dravo's office in Pittsburgh, PA on December 4, 1980.

Parsons will participate in a Consultation Meeting with ICGG and Dravo in Pittsburgh, PA on December 2, 1980. The main topic of discussion will be Parsons' revised recommendations for Area 207 Bulk Methanator materials of construction and insulation.

Benfield will review the new issue of the Area 208 P&ID's and Vessel Specifications, and these will be discussed along with the Area 208 Piping Model in a meeting at Dravo, to be scheduled for the end of December 1980.

FMC will update the Area 211 Material Balance as soon as firm, final Task VI data on the total feed gas to this downstream area have been produced by Dravo. FMC will begin a check of all Area 211 equipment for adequacy during the week of December 9, 1980, when they receive new Area 211 feedstream data (which should be within 0.5% of the final data) from ICGG. If any equipment capacity changes are needed, ICGG will implement them immediately.

Parsons will meet with ICGG and Dravo in Pittsburgh, PA on December 3, 1980, to review Dravo's work, to date, on Task VI Definitive Design in Area 212.

Dravo Continue Demonstration Plant definitive design work essential for preparation of the Construction Bid Package(s), the Task VI deliverable. This includes the development of design documents by the Process,

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Layout/Piping, Vessel, Mechanical, HVAC, Structural, Instruments and Electrical Disciplines.

Incorporate the Government team's comments from the 30% Design Review of Areas 201, 205, 206, 207, 208, 209, 210, 211, 212, 216 and 219 into the PFD's, P&ID's and equipment specifications. The design documents for the remaining plant areas will be submitted to ICGG for presentation to the Government team for the third session of the 30% Design Review, scheduled to be held December 16-18, 1980, at the Dravo Pittsburgh, PA office.

Submit the Refractory Test Program Proposal for ICGG/CE approval.

Finalize the refractory design selection for Area 203, and initiate work on the refractory design for refractory lined nozzles, vessel internals and abrasion-resistant lining for pipe fittings and laterals.

Continue work on the development of a flush system for the pyrolyzers and on details of various system designs for solids sampling, Gasifier debris removal, Mixing Section debris removal, riser aeration and solids removal for Area 203.

Continue work on the ICARUS computerized cost estimate.

CDC Participate in the Final 30% Design Review meeting.

Issue pending memoranda and continue the work in progress.

Evaluate the Williams Patent Crusher and Pulverizer Company design proposals for the Western Coal Commercial Plant and the three-coal Demonstration Plant.

Answer the remaining questions raised by EVT.

Continue editing and issue the remaining CURL Task IX reports.

Meet with Exxon regarding their all-welded distributor grid design.

Continue to carry-out start-up/shutdown calculations.

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2.7 Construction Planning

Work Accomplished

Dravo Construction Planning efforts were begun in the areas of Change Order Procedures, Staffing, Logistics, Safety and Health and Environmental Control. It is Dravo's objective to prepare a detailed plan for managing all phases of the Phase II Construction program for the Demonstration Plant. Towards this end, the following preliminary items were accomplished during this report period:

- Developed the field staffing requirements for managing Phase II with a construction management organization.
- Completed a study defining the requirements for receiving, handling and storing construction material and equipment.
- Prepared a comprehensive outline of the Safety and Health Plan.

Work has been initiated on the development of Change Order Procedures for use during Phase II and control procedures limiting any detrimental effects to the environment during Demonstration Plant construction.

Work Forecast

Dravo Continue Construction Planning activities, including the development of Change Order Procedures and control procedures to limit detrimental effects to the environment during Demonstration Plant operation. Initiate work on the Waste Disposal Procedures and schedules.

2.8 Economic Reassessment

Work Accomplished

Dravo Initiated work in Task VIII by securing the properties of materials and standards for PFD's. Available utility sources were tabulated and work began on checking the CDC supplied material balances.

CDC The revised Conceptual Commercial Plant material and energy balances for the Illinois coal case and input-output balances for the Western and Pittsburgh coal cases were issued. Work on this subtask is now complete except for the review of Dravo's work.

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Work Forecast

Dravo Continue to check the material balances furnished by CDC and begin calculation of material balances for non-CDC areas.

Begin the drawing of PFD's.

CDC Review the Task VIII material and energy balances by Dravo.

2.11 Project Management

Work Accomplished

ICGG Three Project Engineers were in residence in Pittsburgh, PA, coordinating and monitoring the work of Dravo and the Process Licensors on the Task VI design effort, and maintaining liaison with representatives of CE, METC and UOP/SDC, also in residence at Dravo.

Biweekly Review/Coordination Meetings were held by ICGG, Dravo, CDC and EA representatives on September 17, October 1, October 22 and November 12, 1980, in Pittsburgh, PA. Current project status, work accomplishments, technical items of concern and future work coordination were the main subjects of the discussions. Government site representatives from CE, METC and UOP/SDC attended these meetings, so that the Government site representatives could be kept informed on Task VI progress, and any special technical problems confronting ICGG.

Project Engineers in Pittsburgh and Chicago worked throughout the quarter reviewing and approving Task VI documents submitted by Dravo for ICGG approval, including equipment specifications, vessel drawings, civil/structural drawings, piping specifications, instrumentation specifications, architectural drawings, new issues of P&ID's and PFD's, control logic diagrams and other design documents.

From September 5, 1980, through September 26, 1980, ICGG transmitted documents to the Government representatives, which were the basis of the First and Second Sessions of the 30% Design Review. Demonstration Plant Areas 201, 205, 206, 207, 208, 209, 210, 211, 212, 216 and 219 were covered in these reviews. For each area, documents which were sufficiently complete for review were sent out, and included: PFD's, P&ID's, Layout Drawings, P&T Diagrams, Civil/Structural/Architectural Drawings and Standard Details, Electrical Drawings and Standards, Electrical Hazard Area Classi-

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fication Maps, HVAC Drawings, Vessel Specifications, Mechanical Equipment Requisitions, Utility Flow Diagrams, Piping Material Specifications and Piping Drawings. Besides the above documents, all work done by Dravo in Task VI was also available and subject to review at the 30% Design Review Meetings, including engineering calculations and the Piping Models.

Documents for the Third Session of the 30% Design Review, for Demonstration Plant Areas 203, 204A, 204B, 213, 214, 215, 217, 218 and 220, were mailed to Government representatives on November 14, 1980. Documents for Area 202 followed on November 21, 1980. Each set of materials for the Third Session of the 30% Design Review consisted of well over 1000 separate documents, while the first session covered approximately 400 documents, and the second covered about 700 documents.

On October 7-9, 1980, the First Session of the 30% Design Review Meeting, covering Demonstration Plant Areas 205, 206 and 216, took place at Dravo's office in Pittsburgh, PA. Representatives of CE, DOE, METC, UOP/SDC, ICGG and Dravo participated. The Design Review Meeting was held to discuss Government comments on the documents submitted to CE by ICGG, which represent the state of the Demonstration Plant design at the point where Task VI work is approximately 30% complete. Minutes of this meeting, containing all action responses agreed to by Government and Contractor representatives, were prepared by ICGG and transmitted to CE on October 27, 1980. All Government comments accepted by ICGG at the meeting are being incorporated into the Task VI Design.

On November 5-6, 1980, the Second Session of the 30% Design Review Meeting, for Demonstration Plant Areas 201, 207, 208, 209, 210, 211, 212 and 219 took place at Dravo's office in Pittsburgh, PA. Representatives of CE, DOE, METC, UOP/SDC, ICGG and Dravo participated.

On November 7, 1980, a meeting was held to resolve questions raised by Government representatives in the 30% Design Reviews, regarding Dravo's derivation of design P&T conditions from operating conditions. Representatives of UOP/SDC, ICGG and Dravo participated. All questions were resolved to the satisfaction of UOP/SDC.

On September 3, 1980, ICGG, CDC and Dravo met in Pittsburgh, PA to discuss a plan of action which will assure that Demonstration Plant requirements for

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utilities, equipment and procedures during start-up and shutdown are accurately assessed, and met by Demonstration Plant capabilities. A group from ICGG, CDC and Dravo, called the ICGG Operations Committee, was formed to expedite this work. A secondary responsibility of this group will be to assure the safety of Demonstration Plant personnel and hardware in the event of partial or total electrical supply failure. Government representatives from METC and UOP/SDC also participated in this meeting.

The ICGG Operations Committee, which includes representatives from ICGG experienced in Commercial Liquids Synthetic Natural Gas Plant operations, a representative from Dravo experienced in Oil Refinery Fluidized Catalytic Cracker operation, and a representative from the CDC Process Design Staff, met in Princeton, NJ on October 14 and 28, 1980. The meetings were held to coordinate current work relating to Demonstration Plant Operations, including reviewing the start-up procedure, and calculation of operating parameters during the many pseudo-steady-state conditions through which the Demonstration Plant passes between cold shutdown and full Synthetic Pipeline Gas production.

The ICGG Operations Committee held a formal meeting on November 13, 1980, in Pittsburgh, PA, and held several other ad-hoc meetings during November. They continued the development of updated start-up procedures for the Demonstration Plant, and compared start-up requirements to equipment capabilities. A short-fall in the needed heat input capability during start-up of Area 203 was found, and the problem is currently being addressed.

During September 1980, ICGG completed all followup actions required after the August 6-7, 1980 Design Review Presentation for DOE. A document recording all of the oral questions asked and answered at the Presentation was prepared by ICGG, checked and verified by CDC and Dravo, and submitted to the Government representatives who were in attendance. Answers were also prepared to all written questions submitted, for which DOE had requested that written answers be supplied. These were also sent to all Government representatives who attended the Presentation.

On September 11, 1980, ICGG representatives met with Dravo to discuss Dravo's draft of the Preliminary Construction Schedule Report. This report was edited

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by ICGG and subsequently submitted to the Government during October 1980 as Contract Deliverable FE/2012/Z/80/11, Preliminary Construction Schedule.

ICGG and Dravo met with ICGG's insurance underwriters on September 23, 1980 in Pittsburgh, PA. Topics discussed included specifications for the Demonstration Plant Fire Truck, Quick Attack Truck and Foam Trailer, as well as fire protection requirements for the Area 203/204A Structure. The underwriters had only the following comments on the Area 203/204A structure: bays housing oil-water decanters should have fire-proofing on the structural steel and manually activated water sprays provided; Oil Decantor IV, the Raw Oil Dehydration System, the Area 214 Thermal Oxidizer and the Auxiliary Furnace should be moved out of the structure; and two dry standpipes with booster pumps should be provided at opposite corners of the structure. No other special fire protection considerations are required for the Area 203/204A Structure.

Meetings held in the Demonstration Plant site vicinity included the following:

- A meeting with AMAX Coal Company representatives concerning ICGG locating the Demonstration Plant railroad spur off of a section of the AMAX Leahy Mine spur.
- A meeting with the Perry County Board of Commissioners regarding improving county roads in the site area, that will be required if construction on the Demonstration Plant is initiated.
- Business contacts and job site visits were made with two site area construction firms, Rednour Steel Erection and R&H Builders, two potential local small business bidders on portions of the Demonstration Plant construction package.

Project Engineers attended the October 15-17, 1980 Valve Symposium sponsored by METC in Morgantown, WV, the Symposium on Synfuels and the Environment, sponsored by McGraw-Hill Publications, on October 16-17, 1980 in Washington, D.C. and the DOE sponsored workshop on Industrial Hygiene and Occupational Health in Washington, D.C. in November 1980.

The FGO Source Evaluation Board met on October 23, 1980, in Chicago, IL to work on the prequalification and

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selection of two or more vendors, using a procurement approach approved by CE, whom ICGG will approach to negotiate subcontracts for the initial phase of FGO Design.

On October 23, 1980, representatives of ICGG, Dravo, CDC and Pathway Bellows Expansion Joint Co. met at Dravo for a working session. Pathway has been reviewing Dravo's selections of expansion joints in Area 203, verifying the selections and proposing alternatives in some cases. Pathway will continue to work with Dravo in this endeavor, and no insurmountable problems are seen. The ICGG Demonstration Plant's expansion joint needs are well within the scope of Pathway's prior experience.

Submitted comments on the August 1980 Draft EIS to DOE during September 1980. CDC's comments were forwarded to DOE by ICGG during October 1980.

In September 1980, ICGG furnished DOE and ORNL with the list of endangered species which G&H researchers looked for in the vicinity of the Demonstration Plant site during the environmental baseline surveys. This was to satisfy questions which the Fish and Wildlife Service had pertaining to the endangered Indiana and Grey Bats, whose range is believed to include South-Western Illinois. No Indiana or Grey Bats have ever been observed at the plant site, however.

A briefing on the environmental aspects of the ICGG Demonstration Plant was held at the Chicago, IL office of the USEPA, Region V, on November 3, 1980. Representatives of DOE, ICGG, Dravo and G&H participated in the briefing.

On November 3 and 20, 1980, ICGG met with officials of Illinois Power Company to discuss service to the Demonstration Plant site, through construction and operation. On November 19, 1980, a similar meeting took place with Officials of the Egyptian Electrical Cooperative. It will be determined between the two companies, by the Illinois Commerce Commission, or a court decision, which of these two electrical utilities will service the ICGG Demonstration Plant site.

On November 19, 1980, a meeting was held in Pittsburgh, PA to outline for Government representatives the current status of gasifier insulation design and the various options available to deal with the problem of avoiding Gasifier Shell temperatures below the dew point of the Gasifier contents, while simultaneously avoiding excessively high heat loss. Representatives of ICGG, CDC, Dravo, EA, UOP/SDC, CE, METC and DOE

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attended this meeting. A decision on which option to use in the Demonstration Plant will be made early in December 1980, and the rationale behind the decision will be thoroughly explained to DOE.

The Quarterly Technical Progress Report for June - August 1980 and Monthly Technical Progress Reports for September and October 1980, as well as Financial Reports for August, September and October 1980 were prepared and submitted to DOE.

The Quarterly Oral Briefing for June - August 1980 was conducted for DOE at the Dravo Pittsburgh, PA office on November 20, 1980.

Assisted the DCSAR auditors during the week of October 20 to 28, 1980 to assist them in auditing ICGG's procurement procedures.

Attended a meeting with Natural Gas Pipeline Company of America to discuss the installation of an 8" product pipeline from the plant site to one of Natural Gas Pipeline Company of Americas interstate pipelines. Transportation charges were also discussed.

Dravo CCP G-2 was submitted to ICGG in August 1980, and the narrative justifying this revised financial baseline was forwarded during the first week of September 1980.

A revised organizational plan for SARS was prepared and submitted to ICGG. Work was then initiated on a conceptual draft of the Preliminary SARS Report, which is being prepared for the Government's review and comment. The development of Safety Relief Systems, Environmental Safety Analysis and Occupational Health and Safety Analysis, all of which are a part of SARS, is in progress. Work also continued on preparation of the subsystem (Level 2) concomitant FMEA's.

At ICGG's request, Dravo reviewed and returned to ICGG Appendix B.0.1 from DOE's August 1980 edition of the Draft EIS.

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The format for health and safety studies was revised to evaluate particular categories of safety and health hazards. This revised format encompasses and goes beyond the format previously utilized. Included in the revised scope for safety analysis are the following categories: fire, thermal/radiation, acute toxicity/pathogenicity, logistics and maintenance, vehicular, mass/gravity/height and moving equipment. An analysis of the fire, acute toxic/pathogenic, thermal/radiation, and logistics and maintenance categories was completed for all twenty plant areas. The format for the analysis of worker health hazards, a study which is now in progress includes categories such as: chronic respiratory, dermal and carcinogenesis, radiation, noise, and heat and cold extremes. Criteria and procedures for siting eyebaths and safety showers were developed and implemented. Sixty specific locations have been sited plantwide for eyebaths and/or safety showers. In the development of a continuous hazardous gas and vapor monitoring plan, the plan was detailed to include sampling parameters, alarm points and sitings. Sitings were finalized for Areas 203/204A, 204B, 205, 206, 207, 208, 209, 212 and 213. Dravo representatives participated in the Industrial Hygiene and Occupational Medicine in Coal Conversion Projects Workshop conducted by DOE in Washington, D.C.

A study is in progress to establish the design basis for the emergency power system. An investigation of the emergency shutdown requirements, critical equipment required to remain functional during emergency shutdown, i.e., valves, rotating equipment, etc. and proper sizing of the battery pack is in progress.

On November 5, 1980, ICGG delivered 254 sheets of CE Session I Design Review Comments to Dravo, this being the first installment of the total comments generated, or to be generated, in the 30% Design Review. The R/QA Group made item-by-item inquiry among the engineering disciplines on the Session I Comments, generating 191 Response Sheets, numbered to correspond to the numbers applied by ICGG to the CE Sheets. (Dravo Response Sheets were fewer in number than the CE Sheets, because many of the latter consisted of copies of handbook information, Commentator's calculations, items by R/QA disclosed that Corrective Action was complete on 168 CE Comments, that record permits had been "flagged for future action" in 219 cases, and that no action had been initiated in 282 cases, all of these being "A" Items.

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An active program of R/QA surveillance, both of current work in the engineering of disciplines and of documents produced by same, is being maintained. ICGG has placed a full time representative in the Allegheny Center office to monitor and report the weekly progress toward the completion of Corrective Action by Dravo on the CE Design Review Comments mentioned above.

Currently, revision of R/QA Procedures is underway; Procedures A4.1 and A4.2 have been forwarded to the Project Manager with letters suggesting approval signatures by the Project Manager and by the Executive in Charge, followed by forwarding of the Dravo approved documents to ICGG. Procedures A4.3 and A4.4 are being consolidated into a single procedure, which will be designated A4.3, and the designation A4.4 will become inactive. Procedures A4.5, A4.7 and A4.8 remain under consideration by Project Management.

The Task VI schedule was refined and updated as required by work in progress, and the Task VI DSS was expanded to define additional documents.

The MSS/DSS was updated to show work initiated and in progress in Tasks VII and VIII.

Preparation of Class I and II ECP's is in progress with preliminary copies of the ECP's being issued to ICGG for review prior to submittal of the finalized document. The DSS is being used to track the progress of all ECP's, from inception through completion or disapproval (voidance).

CDC Memoranda were issued in response to written DOE questions submitted to ICGG following the Design Review held for DOE on August 6 and 7, 1980. CDC revisions to the questions and answers prepared by ICGG as minutes of this same Design Review were also issued to ICGG.

Discussions continued with ICGG in connection with the issuance of the Toxicological Screening Program authorization and funding allotment. Based on ICGG's limited authorization, CDC commenced certain administrative aspects of the Toxicological Screening Program, including mailing solicitations to candidate laboratories for the following test programs:

- Acute Toxicity
- Acute Inhalation Toxicity
- In Vivo Cytogenic
- Mitotic Gene Conversion
- Ames, Bacterial DNA Repair and
 Mouse Lymphoma

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Bids were received and are now under evaluation by CDC. No awards will be made by CDC until ICGG reviews and approves CDC's price analysis and vendor recommendations.

Reviewed the ICGG request for additional information in support of CCP G-2 and prepared an analysis to provide the requested data.

The Contract Pricing Proposal, Optional Form 60 submitted with CCP's G-2 was amended to include supporting attachments and adjusted to change the estimated hour amounts. The cost amounts reported required no adjustment.

Financial analysis assistance was provided to the Defense Contract Auditing Agency representative during his field review of CDC's CCP G-2.

Planning began on the proposed CDC Phase II work program. Management representatives met with Dravo on October 14, 1980 to discuss project coordination relative to Phase I and Phase II work programs. A Phase II program meeting with ICGG was held in Chicago, IL on November 13, 1980.

A memorandum was issued calling Dravo's attention to several instances of inadequate marking Dravo drawings which contain CDC proprietary data. A representative visited Dravo on September 30, 1980 to discuss proper handling of CDC Proprietary Data.

An additional copy of the Babcox and Wilcox FGO Design Report of October 8, 1976 was issued to Dravo at their request.

Chapter 2 of the Preliminary Draft EIS was reviewed and CDC comments forwarded to ICGG.

The final copy of the ICGG Project Status Report paper to be given at the Coal Technology '80 Conference was sent to ICGG. DOE approval was obtained.

A representative participated in meetings at Dravo on November 5 and 6, 1980 concerning SARS, Configuration Management Board approval of ECP's, and the 30% Design Review of Area 210.

Representatives attended a meeting with the USEPA on November 24, to discuss drafts of the PMN's for the three oil products from the Demonstration Plant.

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All technical and financial reports prescribed in the ICGG/CDC contract were submitted to ICGG.

Secrecy agreements were provided to three additional equipment vendors. None of these was executed. Another is being negotiated. One agreement for a consultant, requested by ICGG, was executed.

Work Forecast

ICGG Continue to work with DOE and ORNL to expedite completion of the version of the Draft EIS which will be published for public comment.

Project Engineers will continue to monitor and coordinate the activities of all subcontractors working on the ICGG Project.

Project Engineers will participate in review and approval of Task VI documents issued to ICGG by Dravo.

Project Engineers will maintain liaison with CE, METC and UOP/SDC representatives in residence at Dravo.

Biweekly Review/Coordination Meetings will be held periodically by ICGG, Dravo, CDC and EA. Government site representatives will be invited to attend these meetings.

Minutes of the Second Session of the 30% Plant Design Review Meeting, containing all action responses agreed to by Government and Contractor representatives, are being prepared by ICGG and will be transmitted to CE by December 9, 1980.

The third and final session of the 30% Design Review covering Demonstration Plant Areas 202, 203, 204A, 204B, 213, 214, 215, 217, 218 and 220, will take place on December 16-18, 1980 at Dravo's office in Pittsburgh, PA.

An ICGG Project Engineer will audit Dravo's work of incorporating Government comments received at the 30% Design Review Meetings into the Demonstration Plant Design Documents. This will help ensure that none of the numerous comments received at the 30% Design Reviews gets overlooked by Dravo. It is ICGG's intention that essentially all of these comments will be incorporated into the Design Documents before they are sent to the Government for the 60% Design Review.

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Documents for the 60% Design Review will be sent to the Government in two sets. The first set, covering Demonstration Plant Areas 205, 206, 207, 208, 209, 212 and 216 will be ready to send on December 31, 1980. Documents for the remaining areas will be ready by late January 1981. A single 60% Design Review Meeting Session will be scheduled later by CE and ICGG.

Proposals will be solicited from the three selected FGO vendors and begin negotiations with them after receipt and evaluation of their proposals.

Procedures will be prepared for handling Government-Owned property when approval of the ICGG draft policy is received from CE.

Dravo Prepare the conceptual draft of the preliminary SARS Report for review by Government representatives. Continue work on the development of the Safety Relief Systems, Environmental Safety Analysis, Occupational Health and Safety Analysis, and the Level 2 FMEA's. Initiate work on subsystem (Level 3) FMEA's.

Continue preparations for the Final 30% Design Review Session for Areas 202, 203, 204, 213, 214, 215, 217 and 218, scheduled to be held December 16-18, 1980 at the Dravo office in Pittsburgh, PA.

Continue to perform safety and health studies and to analyze worker health hazards.

Continue the work in progress on establishing the design basis for the emergency power system.

The Dravo R/QA Group will continue to revise the R/QA Procedures. The surveillance and auditing of Task VI definitive design activities will be maintained.

Continue to update and expand the MSS/DSS to show the Task VI, VII and VIII activities, and also update the DSS to show progress in preparation of the ECP's.

CDC Continue to prepare and report technical and financial information in accordance with the subcontract reporting requirements.

Participate in the oral briefings, design reviews and coordination and technical meetings as scheduled.

Resolve outstanding audit questions with ICGG.

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When authorized by ICGG, initiate subcontracts with laboratories supporting the Toxicological Screening Program.

CONCLUSIONS

CCP G-2 was submitted to the Government in September 1980. This CCP was necessitated by cost growth, increased scope of work and an extension of the Phase I schedule from 42 months to 47 months. Several meetings were held with CE to discuss the CCP. Government approval of the CCP is still pending but the differences are expected to be resolved by mid-January.

Although the 30% Design Review meetings held to date have not identified any significant design deficiencies, the quantity of minor changes has required a considerable amount of additional manhours. The third and final 30% Design Review will be held in December 1980.

The ICGG scope of work also requires 60% and Final Design Review meetings. If these reviews are as extensive and time consuming as experienced in the 30% Design Review, various delays in the schedule can be anticipated.

Assuming a reasonable settlement of CCP G-2, no constraints on available funds, and no significant additions to the scope of work, the program should progress in an orderly and effective manner during the next quarter.

The manning on the project will continue at the present level.

U.S. DEPARTMENT OF ENERGY
MILESTONE SCHEDULE AND STATUS REPORT

PAGE 1 OF 1

FORM APPROVED
GSA GEN. REG. NO. 27

1. Contract Identification		PIPELINE GAS DEMONSTRATION PLANT												2. Reporting Period 11/01/80 through 11/30/80				3. Contract Number EF-77-C-01-2012														
4. Contractor (name, address)		ILLINOIS COAL GASIFICATION GROUP ROOM 3734 55 E. MONROE STREET CHICAGO, ILLINOIS 60603												5. Contract Start Date 06/07/77				6. Contract Completion Date 11/30/80														
7. Identification Number	8. Reporting Category (e.g., contract line item or work breakdown structure element)	9. Fiscal Years and Months																												10. Percent Complete		
		FY 77					FY 78					FY 79				FY 80								FY 81								
		77	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	O	N	D	J	F	M	A	M	J	Q4	Q1	Q2	Q3	Q4	a) Planned	b) Actual						
1.0	Conceptual Design																														N.A.	100
1.1	Conceptual Design and Evaluation of Comm Plt																														▲	100
1.2	Demonstration Plant Process Design																															100
1.3	Site Evaluation and Selection																															93
1.4	Demonstration Plant Environmental Analysis																															94
1.5	Materials and Licenses																															57
1.9	Technical Support																															81
1.10	Long Lead Procurement List																															81
1.11	Project Management																															100
2.0	Final Engineering Design																															53
2.6	Demonstration Plant Definitive Design																															54
2.7	Construction Planning																															17
2.8	Economic Reassessment																															16
2.11	Project Management																															58
11. Remarks																																
12. Signature of Contractor's Project Manager and Date R. J. Eby															13. Signature of Government Technical Representative and Date J. E. Malcolm																	

MILESTONE SCHEDULE AND STATUS REPORT

PURPOSE

A dual-purpose format to establish a baseline schedule and indicate status for performing each reporting category identified in the contract/agreement.

INSTRUCTIONS

- Item 1 — Enter the contract/agreement title as it appears in the official document establishing the contract/agreement.*
- Item 2 — Enter the inclusive start and completion dates for the reporting period for this report.*
- Item 3 — Enter the contract/agreement number as it appears in the official establishing document and append the latest modification number.
- Item 4 — Enter the name and address of the contractor, organization, or agency, as they appear in the contract/agreement.*
- Item 5 — Enter the official start date of the original contract/agreement.*
- Item 6 — Enter the official completion date, as of the latest official modification to the contract/agreement.*
- Item 7 — Enter the identification numbers relating to the contract line items, task, products, or work breakdown structure elements reported in Item 8.
- Item 8 — Enter the same contractually specified reporting categories that are on the associated Cost Plan and Manpower Plan.
- Item 9 — In the lower portion of the space for the item heading, enter the first letter of the month for the first report in the extreme left block. Enter successive months as required. Enter fiscal years in upper portion of the heading space as appropriate for months. Separate fiscal years by extending vertical line between the months of September and October. Enter schedule data below the fiscal year and month headings and to the right of each reporting category listed in Item 8. Use charting information shown at end of these instructions.
- Item 10 — Based on the contractor's best judgment, enter an assessment of actual percent complete toward meeting the objective of each reporting category listed in Item 8. The planned percent complete column is required only for construction contracts.
- Item 11 — Enter any explanatory notes and comments. If more space is required attach additional sheets and so indicate in this block. All schedule variances which exceed established contract thresholds must be explained in the Project Status Report.
- Item 12 — Enter signature of responsible contractor, agency, or organization project manager and date signed verifying the reasonableness of the information furnished, based upon his personal knowledge of the contract's progress and status.
- Item 13 — Signature of DOE Government Technical Representative and date indicating the GTR has reviewed the report. The signature does not constitute a certification of the accuracy of the report nor does it constitute any agreement with the contents of the report, or commit the Government in any way.

*These items need only be entered on the first page of multi-page reports.

CHARTING INFORMATION

SYMBOLS

- △ Major Milestone
- Major Milestone on the Project Critical Path
- ▽ Intermediate Event (Deliverable, Supporting Milestone, or Decision Point)
- ▲ Intermediate Event completed early or late
- Proposed Scheduled Deviation (late or early) for a Major Milestone
- ▬ Activity Bar
- Time Line
- ⋮ Time Now

EXAMPLES

- A. Major milestone with an activity bar
- B. Time now and work done, event on critical path
- C. ○ Schedule Deviation (not yet approved)
- D. First change approved (slippage)
- E. Improvement, not contractually implemented
- F. First change approved (improvement)
- G. Activity ahead of schedule
- H. Activity behind schedule
- I. Late and on time completion of intermediate events A and B, respectively
- J. Same as Example I, above except that here a time line is used in place of an activity bar
- K. Original major milestone date and four subsequent approved changes (all slippages) to that date
- L. Original major milestone date and two subsequent approved changes (one slippage, one improvement to that date)
- M. Intermediate event schedule deviation

CONVENTIONS

- 1 - Blacked-in figures or bars are used to show work done.
- 2 - Open figures or bars show work not done.
- 3 - △ (Major milestone) is twice as large as ▽ or ▲ (Intermediate event).
- 4 - Under no condition should more than one △ (major milestone) be shown on a single horizontal line. (See Examples D and F for a method of denoting a rescheduled major milestone ○; the number "1" indicates the first rescheduling.) Normally the original symbol △ would be shown with the latest rescheduled date (a ○ with an associated number). In certain cases, where it is desired to show a complete history of rescheduling, a series of ○'s with associated frequency numbers might be shown as in Example K. If it is not desirable to retain the rescheduling history DOE may request that only the current approved major milestone be shown.
- 5 - Symbols for milestones may be used alone, with an activity bar, or with a time line as the preparer judges best.
- 6 - Intermediate events may be shown only in association with an activity bar or a time line. These event symbols are placed above the bar or line and each is labeled for identification. A description of each intermediate event should be provided in an attachment to the Milestone Schedule and Status Report. One of the two methods is used to show when intermediate events are completed.
 - a - If the event is completed on time, it is blacked-in as shown above (see Example G Event A).
 - b - If the event is completed early or late, the symbol for the intermediate event is inverted (▲) and shown below the line or activity, identified in the same way as the original. The originally planned completion date above the line is left open (not blacked-in) and the deviation to it (below the line) is blacked-in (see Example H, Event A).

MILESTONE LOG

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CONTRACT NUMBER

IDENTIFICATION NUMBER	DESCRIPTION	PLANNED COMPLETION DATE	CURRENT ESTIMATE OF DELIVERY DATE	ACTUAL COMPLETION DATE	COMMENTS
1.1A	Conceptual Commercial Plt Baseline (Flowsheets)	8-Aug-77		3-Aug-77	
1.1B	Drawings/Diagram (Flowsheet) Documentation	8-Aug-77		3-Aug-77	
	Key				
1.1C	Tabulation of Trade-Off Evaluation	8-Aug-77		3-Aug-77	
1.1D	Design Data Tabulation	8-Aug-77		3-Aug-77	
1.1E	Process Evaluation Report	18-Nov-77		25-Jun-78	
1.1F	Revised Conceptual Commercial Plant Baseline (Flowsheets)	18-Dec-77		28-Aug-78	
1.1G	Conceptual Commercial Plant Design Report	7-Jun-78		28-Sep-78	
1.2A	Demonstration Plant Process Design Tentative Baseline (Flowsheets)	18-Jan-78		28-Dec-78	
1.2B	Demonstration Plant Process Design Report (Baseline Design)	7-Jun-78		3-Jun-80	
1.2C	Demonstration Plant Design Analysis Report	7-Jun-78		8-May-80	
1.2D	Demonstration Plt Economic Considerations Report	7-Jun-78		8-May-80	
1.3A	Initial Real Estate Report	8-Aug-77		3-Aug-77	
1.3B	Comprehensive Real Estate Report	7-Jun-78	Uncertain		Pending Final Decision on Site Acquisition Method
1.3C	Site Master Plan	7-Jun-78		21-Jul-80	
1.3D	Climatological and Meteorological Report	7-Jun-78		26-Sep-78	
1.3E	Preliminary Foundation Investigation and Soil Analysis Report	7-Jun-78		27-Sep-78	
1.3F	Site Survey Report	7-Jun-78		22-Sep-78	
1.3G	Local Resources Survey Report	7-Jun-78		11-Aug-78	
1.3H	Site Transportation Study Report	7-Jun-80		22-Sep-78	
1.3I	Site Water Resources Report	7-Jun-78		26-Sep-78	

MILESTONE LOG

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CONTRACT NUMBER

IDENTIFICATION NUMBER	DESCRIPTION	PLANNED COMPLETION DATE	CURRENT ESTIMATE OF DELIVERY DATE	ACTUAL COMPLETION DATE	COMMENTS
1.3J	Site Environmental Survey Report	7-Jun-78		27-Sep-78	
1.4A	Base Environmental Analysis Report	8-May-78		29-Jun-79	
1.4B	Record Environmental Analysis Report	19-Jun-78		28-Sep-79	
1.5A	Permits and Licenses Plan	TBS		30-Nov-79	
1.5B	PSD Documentation	TBS		18-Jul-80	
1.5C	Final Report and Plans	TBS	31-Mar-81		
1.9A	Tentative Technical Support Plan	8-Aug-77		3-Aug-77	
1.10A	Tentative Long Lead Time Procurement List	18-Jan-78		21-Aug-79	
1.10B	Long Lead Time Equipment Listing (Update)	7-Jun-78	22-Dec-80		
1.11A	Management Plan	8-Aug-77		4-Aug-77	
1.11B	Management Plan Annex (Documentation Change Control)	8-Aug-77		3-Aug-77	
1.11C	Network Analysis Document	7-Apr-78		23-May-78 (Partial)	Update issued 14-Sep-79 Addendum 1 on 1-Oct-79, Addendum 2 on 30-Nov-79 and Addendum 3 on 28-Dec-79
1.11D	R & QA Plan	7-Apr-78		1-Jun-79	Revision 3 issued 10-Jun-80
1.11E	Configuration Management Plan	7-Apr-78		12-Apr-79	Revision 5 issued 20-Jun-80
2.6A	30% Plant Design Review	TBS	15-Dec-80		
2.6B	60% Plant Design Review	TBS	25-Feb-81		
2.6C	Final Plant Design Review	TBS	31-Mar-81		
2.6D	Plant Design and Construction Bid Packages	TBS	6-May-81		
2.11A	Summary Network Analysis Document	As Req.		15-May-80	

Subcontractor		DATES FOR BOTH PLANNED AND ACTUAL ACTIVITY					
ACTIVITY		Master Schedule		Actual Dates (for Past Activities)		Current Outlook (for Future Activity)	
CWBS No.	Name	Start	Complete	Start	Complete	Start	Complete
1.0-x	Conceptual Design	6-7-77	5-31-78	6-7-77	4-30-80		
1.1-x	Conceptual Design and Evaluation of Commercial Plant	6-7-77	5-22-78	6-7-77	9-30-78		
1.2-x	Process Design - Demonstration Plant	11-18-77	5-22-78	12-1-77	7-31-80		
1.2.1-x	Coal Unloading and Handling	11-18-77	5-7-78	9-4-78	5-30-80		
1.2.2-x	Coal Preparation	11-18-77	5-22-78	12-1-77	6-2-80		
1.2.3-x	Pyrolysis and Gasification	11-18-77	5-22-78	12-1-77	5-30-80		
1.2.4-x	Oil Recovery and Treatment	11-18-77	5-22-78	12-1-77	6-17-80		
1.2.5-x	Gas Purification	11-18-77	5-7-78	9-4-78	5-30-80		
1.2.6-x	Hydrogen Generation	11-18-77	5-7-78	8-28-78	5-30-80		
1.2.7-x	Shift and Methanation	11-18-77	5-7-78	9-1-78	5-30-80		
1.2.8-x	Bulk CO ₂ Removal and Gas Compression	11-18-77	5-7-78	9-4-78	5-30-80		
1.2.9-x	Gas Dehydration	11-18-77	5-7-78	9-4-78	4-30-80		
1.2.10-x	Flue Gas Power Recovery	11-18-77	5-22-78	12-1-77	5-30-80		
1.2.11-x	SO ₂ Removal	11-18-77	5-7-78	9-14-78	5-30-80		
1.2.12-x	Sulfur Recovery	11-18-77	5-7-78	9-14-78	5-30-80		
1.2.13-x	Ammonia Recovery	11-18-77	5-7-78	9-14-78	7-31-80		
1.2.14-x	Thermal Oxidizer and Flare	2-7-78	5-22-78	10-2-78	5-30-80		
1.2.15-x	Utilities	11-18-77	5-22-78	9-14-78	5-30-80		
1.2.16-x	Water Supply	1-7-78	4-7-78	9-18-78	4-30-80		
1.2.17-x	Water Treatment Systems	1-7-78	5-7-78	9-18-78	5-30-80		
1.2.18-x	Waste Treatment and Disposal	1-7-78	5-22-78	9-18-78	5-30-80		
1.2.19-x	Fire Protection System	2-7-78	4-7-78	10-9-78	3-31-80		
1.2.20-x	Facilities	2-7-78	5-22-78	9-18-78	5-30-80		
1.2.21-x	Systems	11-18-77	5-22-78	12-1-77	6-30-80		
1.2.22-x	Economic Assessment	11-18-77	5-22-78	3-2-79	4-30-80		
1.2.23-x	Demonstration Plant Design Analysis	11-18-77	5-22-78	9-18-78	5-30-80		
1.3-x	Site Selection and Evaluation	6-7-77	5-22-78	6-7-77			
1.4-x	Environmental Analysis	6-7-77	2-7-79	6-7-77			
1.5-x	Feedstock Plans, Licenses, Permits and Easements	6-7-77	2-7-79	7-5-77			
1.9-x	Technical Support	6-7-77	5-7-78	6-7-77			
1.10-x	Long Lead Procurement List	6-7-77	2-7-79	6-18-79			
1.11-x	Project Management	6-7-77	6-6-78	6-7-77	4-30-80		
2.0-p	Final Engineering Design	6-1-78	3-7-79	5-1-80			

PROGRAM PROGRESS SUMMARY (SCHEDULE UPDATE)

STATUS	MO.	DAY	YR.
ON	11	30	80

 PAGE 2 OF 2

Subcontractor		DATES FOR BOTH PLANNED AND ACTUAL ACTIVITY					
ACTIVITY		Master Schedule		Actual Dates (for Past Activities)		Current Outlook (for Future Activity)	
CWBS No.	Name	Start	Complete	Start	Complete	Start	Complete
2.6-p	Definitive Design - Demonstration Plant	3-7-78	2-7-79	9-4-79			
2.6.1-p	Coal Unloading and Handling	3-7-78	2-7-79	9-17-79			
2.6.2-p	Coal Preparation	3-7-78	2-7-79	6-2-80			
2.6.3-p	Pyrolysis and Gasification	3-7-78	2-7-79	5-7-80			
2.6.4-p	Oil Recovery and Treatment	3-7-78	2-7-79	5-1-80			
2.6.5-p	Gas Purification	3-7-78	2-7-79	4-2-80			
2.6.6-p	Hydrogen Generation	3-7-78	2-7-79	4-2-80			
2.6.7-p	Shift and Methanation	3-7-78	2-7-79	4-7-80			
2.6.8-p	Bulk CO ₂ Removal and Gas Compression	3-7-78	2-7-79	4-2-80			
2.6.9-p	Gas Dehydration	3-7-78	2-7-79	4-7-80			
2.6.10-p	Flue Gas Power Recovery	3-7-78	2-7-79	5-7-80			
2.6.11-p	SO ₂ Removal	3-7-78	2-7-79	6-2-80			
2.6.12-p	Sulfur Recovery	3-7-78	2-7-79	6-2-80			
2.6.13-p	Ammonia Recovery	3-7-78	2-7-79	7-14-80			
2.6.14-p	Thermal Oxidizer and Flare	3-7-78	2-7-79	6-2-80			
2.6.15-p	Utilities	3-7-78	2-7-79	3-3-80			
2.6.16-p	Water Supply	3-7-78	2-7-79	9-4-79			
2.6.17-p	Water Treatment Systems	3-7-78	2-7-79	3-3-80			
2.6.18-p	Waste Treatment and Disposal	3-7-78	2-7-79	6-2-80			
2.6.19-p	Fire Protection System	3-7-78	2-7-79	10-1-79			
2.6.20-p	Facilities	3-7-78	2-7-79	9-4-79			
2.6.21-p	Systems	3-7-78	2-7-79	9-24-79			
2.7-p	Construction Planning	8-7-78	2-7-79	8-25-80			
2.8-x	Economic Reassessment	10-7-78	2-7-79	8-1-80			
2.9-p	Technical Support (As Required)	-	-				
2.10-p	Long Lead Procurement (As Required)	-	-				
2.11-p	Project Management	6-7-78	3-7-79	5-1-80			

ENGINEERING CHARTER PROPOSAL (ECP) SUMMARY FORM

Illinois Coal Gasification Group

Pipeline Gas Demonstration Plant Program

STATUS ON November 30, 1980

ECP NO.	TITLE	STATUS*	DATE SUBMITTED	DATE APPROVED BY CCB	CONTRACT AMENDMENT		IMPACT		SWBS ELEMENTS AFFECTED
					DATE	NO.	ΔCOST \$000	ΔCOMPLETION DATE FOR LEVEL 1	
	Area								
D001**	Gas Purification	205	A	2-21-80	3-5-80	-	-	-	1.2.5
D002**	Oil Treatment	204B	A	2-28-80	3-21-80	-	-	-	1.2.4
D003**	Coal Preparation	202	A	6-19-80	6-25-80	-	-	-	1.2.2
D004**	Hydrogen Generation	206	A	2-26-80	3-5-80	-	-	-	1.2.6
D005**	Bulk CO ₂ Removal and Gas Compression	208	A	2-21-80	3-5-80	-	-	-	1.2.8
D006**	Gas Dehydration	209	A	2-21-80	3-5-80	-	-	-	1.2.9
D007**	Shift and Methanation	207	A	2-26-80	3-5-80	-	-	-	1.2.7
D008**	Pyrolysis and Gasification	203	A	3-21-80	3-21-80	-	-	-	1.2.3
D009**	Oil Recovery	204A	A	6-19-80	6-25-80	-	-	-	1.2.4
D010**	Flue Gas Power Recovery	210	A	3-21-80	3-21-80	-	-	-	1.2.10
D011**	SO ₂ Removal	211	A	6-19-80	6-25-80	-	-	-	1.2.11
D012**	Sulfur Recovery	212	A	6-19-80	6-25-80	-	-	-	1.2.12
D013**	Ammonia Recovery	213	A	7-09-80	8-05-80	-	-	-	1.2.13
D014**	Thermal Oxidizer and Flare	214	A	6-19-80	6-25-80	-	-	-	1.2.14
D015**	Waste Treatment & Disposal	218	A	6-19-80	6-25-80	-	-	-	1.2.18
D016**	Coal Unloading & Handling	201	P						1.2.1
D017**	Utilities	215	P						1.2.15
D018**	Water Supply	216	P						1.2.16
D019**	Water Treatment Systems	217	P						1.2.17
D020**	Fire Protection System	219	P						1.2.19
D021**	Facilities	220	P						1.2.20

*STATUS - ENTER ONE LETTER ** Baseline Document

(I) INCORPORATED BY A
CONTRACT AMENDMENT

(A) APPROVED BY CCB

(S) SUBMITTED

(P) PLANNED

CUMULATIVE COST IMPACTS

-	TOTAL OF ALL ECP'S INCORPORATED
-	INCLUDING THOSE APPROVED BY CCB
-	INCLUDING THOSE SUBMITTED
-	INCLUDING THOSE PLANNED

ENGINEERING CHANGE PROPOSAL (ECP) SUMMARY FORM

Illinois Coal Gasification Group

Pipeline Gas Demonstration Plant Program

STATUS ON November 30, 1980

CLASS

ECP NO.	TITLE	CLASS	STATUS*	DATE SUBMITTED	DATE APPROVED BY CCB	CONTRACT AMENDMENT		IMPACT		SWBS ELEMENTS AFFECTED
						DATE	NO.	ΔCOST \$000	ΔCOMPLETION DATE FOR LEVEL 1	
D022	Hydrogen Gen.	II	A	6-06-80	6-06-80	NA	NA	(20,000)		2.6.6
D023	Regeneration Reboiler	II	A	6-17-80	6-21-80	NA	NA	12,840		2.6.8
D024	Lean Solution Flash Tank	II	A	6-17-80	6-21-80	NA	NA	2,640		2.6.8
D025	Remove Coal Prep Bin	II	A	10-01-80	10-07-80	NA	NA	(27,000)		2.6.2
D026	Clarifications and Corrections Area 205	II	A	7-10-80	7-18-80	NA	NA	--		2.6.5
D027	Clarifications and Corrections Area 205	II	A	7-10-80	7-18-80	NA	NA	1,500		2.6.5
D028	Change Pyrolyser Matl	II	P							2.6.3
D029	Fractionator Feeder	II	A	10-03-80	10-23-80	NA	NA			2.6.4
D030	Add Coal Hopper Convey	II	A	10-01-80	10-07-80	NA	NA	22,400		2.6.2
D031	P & ID Revisions	II	A	7-10-80	7-18-80	NA	NA	--		2.6.9
D032	Coal Handling	I	A	8-18-80	11-06-80	NA	NA	(6,894,000)		2.6.2
I001	Relief Valves	I	D	7-18-80	8-05-80	NA	NA	1,800,000		A11
I002	Eliminate Desulfurizer	I	A	8-11-80	11-06-80	NA	NA	(342,000)		2.6.6
D033	Waste Treatment	I	A	8-19-80	11-12-80	NA	NA	(65,200)		2.6.18
D034	Lime Soda Softening	I	A	8-19-80	11-06-80	NA	NA	(143,000)		2.6.18
C001	Water Wash Pyrolyzer	I	A	8-25-80	11-06-80	NA	NA	215,400		2.6.3
C002	Pyrolyzer D Mat'l	I	D	8-12-80	8-12-80	NA	NA	-		2.6.3
C003	Oil Decanter IV	II	A	8-12-80	8-22-80	NA	NA	40,800		2.6.4
C004	Gasifier Bed	II	A	10-14-80	11-03-80	NA	NA	2,000		2.6.3
D035	P & ID Revisions	II	A	9-22-80	9-22-80	NA	NA	--		2.6.6
D036	P & ID Revisions	II	A	9-22-80	9-22-80	NA	NA	--		2.6.6
D037	P & ID Revisions	II	A	9-29-80	10-01-80	NA	NA	--		2.6.8
D038	Delete Inline Static Mixer	II	A	9-29-80	10-27-80	NA	NA	(5,500)		2.6.18

*STATUS - ENTER ONE LETTER

(I) INCORPORATED BY A
CONTRACT AMENDMENT

(A) APPROVED BY CCB

(S) SUBMITTED

(P) PLANNED

CUMULATIVE COST IMPACTS

-	TOTAL OF ALL ECP'S INCORPORATED
-	INCLUDING THOSE APPROVED BY CCB
-	INCLUDING THOSE SUBMITTED
-	INCLUDING THOSE PLANNED

ENGINEERING CH. E PROPOSAL (ECP) SUMMARY FORM

Illinois Coal Gasification Group

Pipeline Gas Demonstration Plant Program

STATUS ON November 30, 1980

ECP NO.	TITLE	STATUS*	DATE SUBMITTED	DATE APPROVED BY CCB	CONTRACT AMENDMENT		IMPACT		SWBS ELEMENTS AFFECTED
					DATE	NO.	ΔCOST \$000	ΔCOMPLETION DATE FOR LEVEL 1	
D040	Add System Lift-Back Wash Pump	II	A	9-29-80	10-27-80	NA	NA	4,800	2.6.18
D041	Delete Sludge Mixer	II	A	9-29-80	10-27-80	NA	NA	(23,400)	2.6.18
D042	Delete Polymer Drum Pump	II	A	9-29-80	10-27-80	NA	NA	--	2.6.18
D043	Slaked Line Feed Modification	II	A	9-29-80	10-27-80	NA	NA	30,000	2.6.18
D044	Exchange Sulfuric Storage Mod.	II	A	9-29-80	10-27-80	NA	NA	--	2.6.18
D045	Delete Leachate Pump	II	A	9-29-80	10-27-80	NA	NA	(10,800)	2.6.18
D046	Process Flow Dia. Rev.	II	A	9-29-80	10-27-80	NA	NA	--	2.6.18
D026R	P & ID Add & Corr.	II	A	10-02-80	10-24-80	NA	NA	--	2.6.5
D047	P & ID	II	A	10-29-80	10-29-80	NA	NA	--	2.6.18
D048	P & ID	II	A	10-20-80	10-29-80			--	2.6.11
D049	P & ID	II	P					--	2.6.4
D050	P & ID	II	P					--	2.6.7
D051	Storm Water Collection	II	P					(44,100)	2.6.18
D052	PFD Rev.	II	P						2.6.3

*STATUS - ENTER ONE LETTER

(I) INCORPORATED BY A
CONTRACT AMENDMENT

(A) APPROVED BY CCB

(S) SUBMITTED

(P) PLANNED

CUMULATIVE COST IMPACTS

(5,398,520)	TOTAL OF ALL ECP'S INCORPORATED
(7,198,520)	INCLUDING THOSE APPROVED BY CCB
(44,100)	INCLUDING THOSE SUBMITTED
1,800,000	INCLUDING THOSE PLANNED
	" " Disapproved

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