

BC L-MPR--15

TECHNICAL SECTION

of

PROGRESS REPORT NO. 15

on

CONTRACT NO. 14-32-0001-1513

to

OFFICE OF COAL RESEARCH

April 15, 1974

BATTELLE
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

TECHNICAL SECTION
of
PROGRESS REPORT NO. 15
on
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OFFICE OF COAL RESEARCH
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INTRODUCTION AND PROJECT OBJECTIVE

This progress report describes work completed by Battelle on the Coal Gasification Program during the period March 15-April 15, 1974. The section that follows is the technical section. The administrative and financial section is appended.

The general objective of the current contract is development of a two-stage fluidized-bed process utilizing a self-agglomerating fluidized-bed burner as part of a practical and economical method for producing synthesis gas by steam gasification of coal. The developed process is to be useful as part of a system for producing synthetic pipeline gas or for other purposes.

Pursuant to the general objective, a 25-ton-a-day-of-coal Process Development Unit (PDU) is to be erected and operated and the following aspects of the process explored:

- The operability of a self-agglomerating fluidized-bed coal burner operating on an Eastern bituminous coal under pressure and using air for combustion.
- The mechanical feasibility of continuously circulating a burden of hot-ash agglomerates between fluidized-bed burner and fluidized-bed gasifier vessels at 100 psig of pressure

and the rates and temperatures required for effective heat transfer.

- The operability of integrated fluidized-bed burner and gasifier vessels both fed by Eastern bituminous coal (or) char in the case of the burner) and operating at 100 psig of pressure. The gasifier is to be fluidized by steam and the endothermic heat of gasification is to be provided by the circulating burden of hot-ash agglomerates.
- The operability over extended time periods of a power-recovery turbine using hot, fluidized-bed burner effluent gases as the turbine working fluid.
- The factors that influence the long-term operability of the process. Included is to be the gathering of data on all key process variables and their effect on the characteristics of the process.

Concurrent with operation of the PDU, sufficient process data and information will be acquired to permit scale-up of the process to its next logical stage of development.

SUMMARY

During this reporting period, work was continued by Chemico on the detailed engineering design and procurement of equipment for the Battelle Coal Gasification PDU. Preconstruction planning is also under way at Chemico. No equipment has been delivered to the site yet but arrangements are being made for receipt and storage of about 20 to 25 percent of the PDU equipment which is due to arrive during the forthcoming reporting period.

A new schedule was provided by Chemico showing field construction beginning in June and mechanical completion of the PDU by mid-February 1975. We presently are reviewing the influence this new schedule has on overall program costs and the overall program schedule.

New procedures have been established at Chemico in relation to our project with them. These are explained in some length in the Financial and Administrative section of this report.

Battelle continued work with Chemico on points related to finalizing the PDU design and expediting the acquisition of PDU equipment. Substantial activity at Battelle also dealt with the turbine acquisition, the refractory design, and other matters closely related to operation of the PDU.

WORK COMPLETED

Contractual

Negotiations are still in progress regarding Chemico's exceptions to subcontract Modification No. 1 which was approved by OCR as reported in the previous monthly report.

Detailed Engineering Design of the PDU

Chemico Activity

The structural steel delivery problem has apparently been minimized by permitting the steel fabricator to obtain some steel from warehouses rather than all of it from the mill. Chemico subsequently provided us with the new schedule presented later in this report as Table 2. As recently as April 10 they confirmed the accuracy of the schedule. Chemico plans PDU turnover to Battelle during the first quarter of calendar year 1975.

Chemico is continuing work on engineering design and procurement directed at meeting a first quarter '75 or earlier turnover date. A synthesis of information provided by Chemico's weekly reports during this reporting period, their monthly report on April 9, our resident Project Engineer, R. R. Adams, and newly instituted biweekly Battelle-Chemico project reviews provides the following status of activities.

- Progress Flow Diagrams and Equipment Data Sheets. Updated process flowsheets for sections 100 through 600 were received from Chemico

on February 18. Based on discussions of the flowsheets with C. F. Braun and Company and Battelle, Chemico is making revisions and corrections to be incorporated in the next flowsheet issue.

● Process and Utility P&I's. The most recent process P and I's (Sections 100 through 600) were issued by Chemico on March 29 and are designated as Issue 2. These most recent P and I's are under examination at Battelle.

We have updated drawings for the natural gas and air system, the inert gas system and the steam system. We also are examining these drawings to provide our comments and/or approvals.

● Requisitions and Purchases. Table 1 provides Battelle's summary of the status of procurement of the major items of process equipment (equipment shown on the process and utility flowsheets). It is estimated that 55 percent of the items of process equipment have been fully approved for purchase. For another 20 percent, Battelle has authorized Chemico to issue letters of intent subject to later Government approval. Another 23 percent of the equipment is out for bids and the remaining 2 percent has not been requisitioned yet by Chemico. Chemico's estimate (D to R equipment presented in their report appended to the Administrative Section) when broken into these same categories by Battelle indicates: 2.8 percent of the equipment items have not been requisitioned, 13.2 percent are either out for bid or bids are being reviewed, and 84 percent are either purchased, authorized by letter of intent, or commitments have been made to vendors. We consider the Chemico figures to be in fairly good agreement with our own except they indicate a higher percentage as "purchased".

A listing of the major items of equipment for the PDU showing their status in the procurement cycle is appended as Table A-2. Also appended as Tables A-1 and A-3 are detailed listings showing the status of procurement for items not shown on the flowsheets. Chemico, in their monthly report, estimates that about 72.5 percent of the materials related to foundations and structure (Table A-1) have been purchased.

TABLE 1. MAJOR PROCESS EQUIPMENT ITEMS STATUS SUMMARY

Process Area (a)	Total Items	Not Requisitioned	Requisitions Out	Purchase Approved	LOI Approved (b)
100	4	0	0	4	0
200	12	0	1	9	2
300	10	0	2	3	5
400	9	0	1	8	0
500	20	1	2	8	9
600	17	1	10	6	0
700	9	0	1	8	0
800	12	0	4	5	3

(a) The section numbers and corresponding descriptive section names are

<u>Section</u>	<u>Name</u>
100	Coal Receiving and Storage
200	Coal Preparation and Grinding
300	Coal Pretreatment
400	Coal Feed System
500	Coal Gasification
600	Gas Treatment
700	Air, Inert Gas, and Natural Gas Utilities
800	Steam and Water Utilities.

(b) Letters of intent approved by Battelle prior to obtaining formal approvals of OCR and A.G.A.

Approximately 40 percent of the miscellaneous PDU items (instruments, valves, piping, etc - see Table A-2) have been purchased.

Materials and, consequently, equipment delivery promises from vendors are averaging in excess of 20 weeks. This is a continuing problem but we are avoiding much longer delivery times by a variety of methods including payment of premiums when we must.

- General Arrangement Drawings (including floor plans and elevations). These drawings are essentially complete except for minor changes which are continually being made to show the relocation of some equipment at ground level.

- Piping. Stress and other calculations for piping are being continued by Chemico. In order to give better assurance of the solids transfer between the burner and gasifier vessel in early operations of the PDU, this piping system is being changed from one incorporating "U-bends" to one which is similar to the piping system used with fluidized-bed coking operations. Related to this piping modification it is necessary to perform some additional stress calculations.

We were informed in the previous monthly report of Chemico's that four of the five required piping plans for various levels in the PDU are in progress. These piping plans have not been released for our examination yet.

Takeoffs of valves and piping have been made according to Chemico and inquiries have been sent to vendors.

- Structural Steel. Chemico issued the structural steel drawings for the outer structure for fabrication on February 14. Steel drawings for the inner structure were released for material take-off, detailing and mill ordering on March 9. Apparently, the inner structure drawings have not been released "for fabrication" yet.

By letter of March 27 Chemico informed us that they could not get all of the structural steel required until February, 1975, unless Grep (the steel fabricator) was given permission to purchase about 20 percent of the steel from warehouses. The warehouse steel costs a premium

of 15 to 25 percent more than that provided by the mills. To expedite the schedule, Battelle obtained OCR approval for the warehouse purchases and gave Chemico the required authorization on March 28.

On April 10 we were told by Chemico's Manager of Expediting that Grempp was able to locate the warehouse steel. Consequently fabricated structural steel will begin arriving at the site in mid-June and all steel will be at the site in early August. This steel delivery is compatible with the new Chemico schedule of Table 2.

• Foundations. We have received only drawings of the foundations stamped "preliminary" to date. We were previously informed by Chemico that the foundation drawings for the outer structure have been finished and were being checked at Chemico. However, Battelle has not seen these drawings. The drawings for the inner structure foundation were not final and Chemico reported this in their monthly report for February. At that time they stated that interferences with the existing building JS-2 foundations were being encountered. Apparently, this problem was not resolved during this reporting period. We are uncertain about what the interference problem is because it has not been discussed with our Mr. Adams.

• Electrical. Chemico has been given authority to issue purchase orders for transformer substations, motor control centers, and an emergency electrical generator. Sketches of elementary diagrams for motor circuits have been prepared by Chemico. Chemico reported last month that the elementary control diagrams for the interlock systems were "finalized" The same thing is reported again this month. Battelle still does not have copies of these diagrams.

Activity on the electrical work is judged by Battelle to be nominal.

• Equipment Deliveries. We have recently received two Materials Status Reports from Chemico. The most recent one, dated April 8, shows that about 40 percent of the equipment on order (about 20 to 25 percent of the flowsheet items) is ready for shipment.

To date none of the equipment has been received at the site. Some of the items of compressor equipment are warehoused locally. Chemico informed us on April 10 that 300 square feet of inside storage and 1000 square feet of outside storage at the site are required. They plan to have a man at the site by April 24 to handle the shipments.

- Construction. Construction work at the site by Chemico is to begin the first week in June. A preliminary construction schedule has been made by representatives of the Chemico project team and their construction management. Battelle will receive an advance copy of this schedule within the next 2 weeks.

Chemico has identified their Construction Superintendent and his assistant for us. They plan to involve the assistant in the project at an earlier date than normal (within about the next 2 weeks) to smooth the transition of work into the field from the New York office.

Battelle Activity Directly Related to
Detailed Design and Installation of the PDU

The major activity by Battelle related to the PDU has been examination of specifications for purchase requisitions, study of bids and bid analyses transmitted by Chemico, review of various engineering drawings and general technical interface with Chemico.

T. L. Tewksbury, Battelle's Supervisor of Operations for the PDU, is devoting a significant amount of time to P and I diagram review and to preliminary operations planning. We plan to review the sequence we previously gave Chemico for start-up of sections of the PDU. Following this review, Mr. Tewksbury will work with Chemico to schedule completion of the sections on time and to prepare operating manuals.

We have narrowed the number of bidders on refractory installation to two. We expect Chemico to award a refractories subcontract within the next 2 weeks. Battelle's Thermal and Mechanical Energy Systems Section will assist Chemico and the refractory subcontractor in developing a suitable detailed refractory design.

During this reporting period, the proposals of vendors interested in supplying the gas turbine for the PDU were reviewed at Battelle. Mr. R. D. Fischer, Battelle's principal engineer for this activity, assisted us in this review. The number of bidders was reduced to two. We are awaiting additional information from the two remaining bidders before we make a formal recommendation to OCR and A.G.A. We plan to discuss the reasons for our selection with C. F. Braun and Company's turbine specialists.

Drawings for a building to house auxiliary equipment (building to be provided by Battelle) were sent to Chemico to allow them first opportunity to bid. Our Plant and Facilities Department, the customer in the case of this building, believes it may be more convenient and expedient to have the building erected by Chemico if their bid is competitive. A bid has been received from Chemico and is being evaluated by the Plant and Facilities Department.

We received a letter from the Ohio EPA granting us permission to proceed with the construction of the PDU. We are seeking clarification from them regarding a number of points related to the PDU operation. Currently the problem of an increased natural gas requirement at the site is still being discussed between the Battelle and Ohio Public Utilities legal staffs.

Within this reporting period, Mr. R. R. Adams and Mr. W. C. Gorder accompanied by Mr. Frank Crowe, the sponsor's representative, visited the shop of FACE Valve Company to discuss the hot valves FACE is providing. As a consequence of this visit, we believe FACE is capable of providing the valves.

Mr. Adams has continued in residence at Chemico's offices for purposes of expediting approvals, speeding the interchange of technical information between Battelle and Chemico, and generally monitoring the subcontractors' activity. Mr. Adams has been joined by Mr. Crowe for much of this time.

PROBLEMS AND RECOMMENDATIONS

Items of continuing concern are those related to administrative and financial aspects of the program as are indicated in the Financial and Administrative Section of this report.

The problem noted in previous monthly progress reports regarding ability to obtain adequate natural gas for the PDU operation is still unresolved. If resolution is not forthcoming soon, we will reevaluate our options.

A problem causing continuing apprehension is the delivery of materials to vendors of equipment and structural components for the PDU. The immediate problems related to delivery of PDU equipment items appear to be resolved.

We have taken the following actions to minimize problems related to deliveries:

- (1) Requested that Chemico insure that the vendors have drawings and other technical information at the times anticipated as necessary by the vendors in their bids.
- (2) Agreed with Chemico that "shop" approval of drawings can lead to expeditious deliveries in some cases.
- (3) Asked Chemico to give continuing emphasis to their expediting function.
- (4) Agreed to specification relaxations (within limits) to obtain faster delivery.
- (5) Instructed Chemico to ask vendors how much delivery can be improved if premiums are paid.
- (6) Spoken with OCR on several occasions about the possibility of obtaining a government priority on materials.

WORK PLAN AND SCHEDULE

Major emphasis will be given to our activities associated with installation and planning the start-up and operation of the PDU.

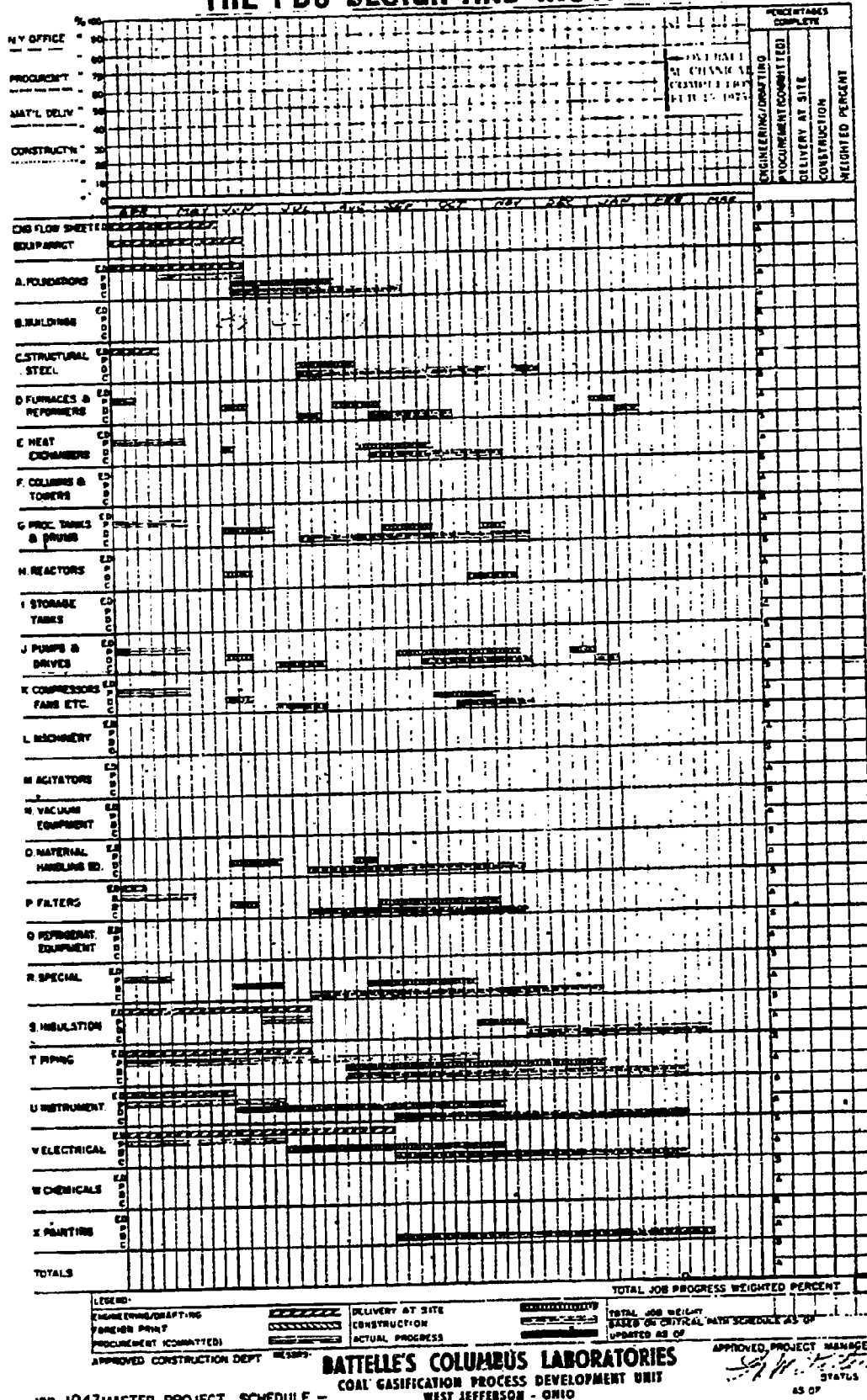
Table 2 is the schedule which Chemico is presently working under. The schedule shows a field work start time of June and a mechanical completion date of mid-February, 1975. This delay is a disappointment. However, we believe the schedule to be realistic as Chemico assures us it is.

To minimize the time required for initial start-up of the PDU, Chemico has agreed to work with Battelle and determine what pieces of equipment or sections of the PDU can be started while the construction crew is still at the site. Work related to this will be a major activity of Battelle's Operations Supervisor over the next several months.

The Chemico schedule, while providing space for it, does not show the percentage completion of various functions. When Chemico was asked about this we were told that the information would be available at our next biweekly project review (April 24).

Now that we have a realistic schedule for the PDU installation, we are examining the influence it has on the overall program schedule and costs. When we have concluded our review, we will submit a prime contract modification statement to OCR and A.G.A. This statement, of course, will include a new overall program schedule.

TABLE 2. CHEMICO SCHEDULE FOR COMPLETION OF THE PDU DESIGN AND INSTALLATION



APPENDIX

DETAILED STATUS OF EQUIPMENT PROCUREMENT

APPENDIX

DETAILED STATUS OF EQUIPMENT PROCUREMENT

TABLE A-1. STATUS OF FOUNDATIONS, BUILDINGS, AND STRUCTURAL STEEL (CHEMICO A TO C EQUIPMENT)

Purchase orders have been authorized for the following:

<u>Component Identification</u>	<u>Name</u>	<u>OCR/A.G.A. Authorization Sheet Serial Number</u>
A-190	Anchor bolts	None required
A-190	Reinforcing bars	37
B-01, 02, 03, 04	Structural steel	7
C-01, 02, 03, 04	Structural steel	7

TABLE A-2. STATUS OF FLOWSHEET ITEMS (GR CHEMICO D TO R EQUIPMENT)

1. Purchase orders have been authorized for the following items:

<u>Flowsheet or Equipment Item Number</u>	<u>Name</u>	<u>OCR/A.G.A. Authorization Sheet Serial Number</u>
G-102	Coal Receiving Hopper	29
R-101	Grizzly	29
O-101	Coarse Coal Conveyor/Elevator	30
G-101	Coal Mill Surge Hopper	2
O-201	Coal Pulverizer	3
O-205	Ground Coal Conveyor/Elevator	30
P-204	Vibrating Screen	19
P-201	Cyclone Separator	3
P-203	Bag Filter	3
K-201	Main Fan	3
K-202	Auxiliary Fan	3
K-203	Combustion Air Blower	3
D-201	Inert Gas Generator (for Coal Pulverizer)	3
O-301	Screw Conveyor Cooler	11 Rev. 1
P-301	Coal Pretreater Cyclone	9
J-301A&B	Oil-Solids Pumps	22 & 23
P-401A/B	Bag Filters and Bin Vents	14
G-401A	Combustor Feed Bin	2
G-401B	Gasifier Feed Bin	2
G-402	Combustor Feed Pressurizing Bin	2
G-403	Combustor Feed Injection Bin	2
G-404	Pretreated Coal Receiving Bin	2
G-405	Gasifier Feed Pressurizing Bin	2
G-406	Gasifier Feed Injection Bin	2
H-501	Combustor Vessel	6
H-502	Gasifier Vessel	6
P-501	Combustor Cyclone	9
P-502	Gasifier Cyclone	9
O-502	Char and Sinter Conveyor Cooler	11 Rev. 1
T-550	Emergency Hot Shut-Off Valves	25
T-550	Hot Valves for Let-Down Lock Hoppers	26
T-550	Throttling Valves for Hot Solids	24
J-601A&B	Venturi Circulating Pumps	22 & 23
J-602A&B	Venturi Circulating Pumps	22 & 23
G-603	Sludge Settler Tank	13
E-604	Recycle Make Gas Cooler	5
E-605	Recycle Make Gas Aftercooler	38
D-602	Combustor Furnace With Stack	32

TABLE A-2. (Cont)

G-701A&B	Process Air Receivers	1
K-701A&B	Process Air Compressors	1
D-702	Inert Gas Generator Package	16
G-702	Inert Gas Receiver Tank	21
R-701	Instrument Air Dryer Package	18
J-702	Inert Gas Generator Sump Pump	Included in 16
E-703	Instrument Air Aftercooler	Included in 1
G-703	Instrument Air Receiver	Included in 1
G-802	High-Pressure Water Storage Tank	13
D-802	Packaged Steam Boiler	20
D-803	Steam Superheater	12
R-804	Water Treatment System (Cooling Tower)	None required
R-803	Cooling Tower and Erection	28

2. Bids have been received by Chemico on the following items. These bids have been reviewed by Chemico, their recommendations have been made to Battelle, and requests for authority to purchase have been submitted to OCR/A.G.A. after Battelle's review.

<u>Flowsheet or Equipment Item Number</u>	<u>Name</u>	<u>OCR/A.G.A. Authorization Sheet Serial Number</u>
K-204	Screened Coal Blower	41
P-205	Screened Coal Cyclone	41
RV-301	Rotary Valve	42
RV-302	Rotary Valve	42
K-303	Pretreated Coal Blower	41
P-302	Pretreated Coal Bag Filter	41
H-301	Coal Pretreater	34
G-501	Combustor Cyclone Receiving Hopper	33
G-502	Combustor Cyclone Let-Down Hopper	33
G-503	Gasifier Cyclone Receiving Hopper	33
G-504	Gasifier Cyclone Let-Down Hopper	33
G-505	Char Receiving Hopper	33
G-506	Char Let-Down Hopper	33
G-509	Gasifier Ash Let-Down Hopper	33
G-510	Combustor Ash Let-Down Hopper	33
G-511	Cooler Conveyor Receiving Hopper	33
R-801	Boiler Feedwater Treatment System	40
J-801A&B	Boiler Feedwater Pumps	40
G-801	Deaerator	40

TABLE A-2. (Cont)

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3. Bids have been received by Chemico on the following items, they have reviewed the bids and have made recommendations to Battelle. We await conclusion of the Battelle bid review to recommend purchases to OGR/A.G.A.

H-501	Combustor Refractories
H-502	Gasifier Refractories

4. The following items are out for bids

R-201	Diverter Valve
R-301	Pretreater Venturi Scrubber
P-304	Gas Separator
R-403	Diverter Valve
K-501	Start-Up Recycle Blower
D-501	Start-Up (and Pretreater) Heater
R-605	Gas Dryer Package
R-601	Flue Gas Venturi Scrubber
R-602	Make Gas Venturi Scrubber
K-604	Combustion Air Blower
P-603	Prefilter
P-604	Afterfilter
F-601	Gas Separator
F-602	Gas Separator
K-603	Recycle Make Gas Booster Compressor
J-603	Transfer (Sludge) Pump
K-703A&B	Natural Gas Booster Compressors
J-802A&B	High-Pressure Water Storage Tank Pumps
J-803A&B	Cooling Tower Water Pumps
J-804A&B	Valve Cooling Water Pumps
G-804	Valve Water Jacket Surge Tank

5. Among the items upon which no specifications for requisition have been written by Chemico yet are the following:

P-503	Vibrating Screen (remote)
E-601	Sample Gas Cooler

TABLE A-3. STATUS OF OTHER^(a) MATERIALS AND EQUIPMENT

1. Purchase orders have been authorized for the following:

<u>Cost Identification Number</u>	<u>Name</u>	<u>OCR/A.G.A. Authorization Sheet Serial Number</u>
U-030	Radiation-Type Density Gages and Switches	35
None	Panel Instruments	4
U-030/41	Weigh Systems (load cells)	8
U-050	Instrument Control Panel	15
U-030	Multipoint Temperature Indicators and Recorders	27
U-030	Gas Analyzers	10
U-041	Receivers - Panel Mounted	Included in 15
U-030	Annunciators	None required
V-020	Transformer Substations	17
V-100	Motor Control Centers	31
V-802	Emergency Electrical Generator	36
T-550	Restrictor Valves	None required
T-550	TFE Lined Plug Valves	None required
T-640	Butterfly Valves	None required
T-550	Pinch Valves	39
T-626	Stainless Steel Valves	None required

2. The following are out for bids:

U-010	DP Transmitters
U-020	Purgemeters
U-020	Rotameters
U-060	Control Valves
U-060	Safety and Relief Valves
U-060	Pressure Regulators
U-060	Ball Valves
U-060	Air Operated Gate Valves
U-020	Thermocouples
V-100	Circuit Breaker Panel Boards
V-110	600-Volt Cable
V-200	Indoor Transformers
T-615	Cast Iron Valves
T-124	TFE-Lined Pipe
T-550	Metering Gate Valves
T-620	Forged Carbon Steel Valves

TABLE A-3. (Cont)

T-621	Cast Carbon Steel Valves
T-551	Stainless Steel Expansion Joints
T-550	Shut-Off Valves

- (a) This is called S through Z items by Chemico. These are nonflowsheet items and are insulation (S), piping (T), instrumentation (U), electrical (V), chemicals and catalysts (W), painting (X), miscellaneous site work (Y), and travel and subsistence related to field work (Z).

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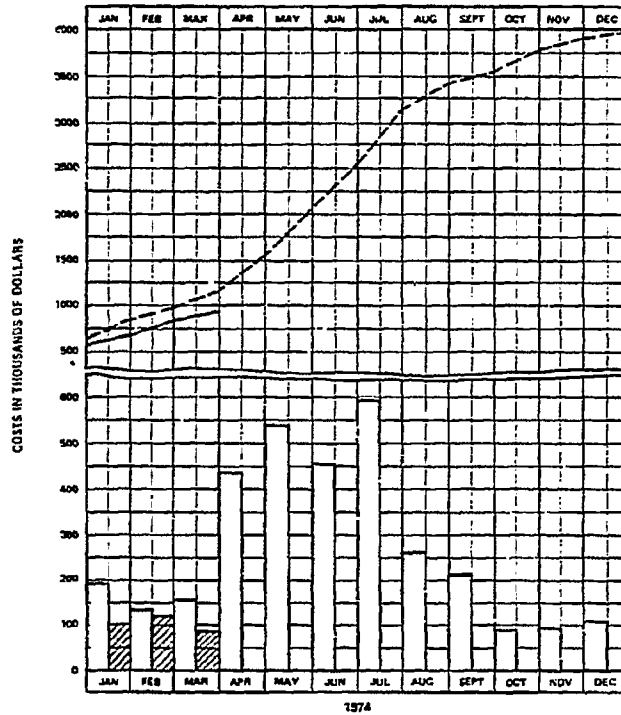
Table B-1 presents the Task Cost and Manpower Projection form for the month ending March 31, 1974. Billings have been received from Chemico for New York operating costs through February and all of their fee except for the final payment which by contract is withheld. No more-current billings have been received to date. Total actual disbursements to Chemico are \$522,105.74.

As shown in the attached monthly report of Chemico, they estimate their March billing will be \$74,000. The Chemico estimate for March is not included in Table B-1 because we have not received nor paid this billing. It is estimated that, as of April 1, a total of about \$596,000 has been spent by Chemico on engineering, procurement, and other activities related to their current phase of work. Chemico has been authorized to commit an additional \$1,400,000 (approximately) to suppliers of equipment and materials for the PDU. About \$140,000 of this is in letters of intent authorized by Battelle. They have, as indicated in their appended report, committed about \$1,034,000 of this.

The cumulative expenditures of Battelle, including payments to Chemico to date are about \$894,000, as shown in Table B-1. The sum of actual expenditures to date, the estimated billing for March by Chemico, and equipment purchase order or letter of intent authorizations is about \$2,368,000 or 62 percent of the currently encumbered* funds for the program

* Letter from Mr. James A. Nelson (OCR) to Battelle dated February 25, 1974, shows OCR funds of \$2,670,000 and A.G.A. funds of \$1,130,000.

TABLE 8-1.
 BATTELLE PDU
 TASK COST AND MANPOWER PROJECTIONS
 MONTH ENDING MARCH 31, 1974



MANPOWER (MAN-MONTHS)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Pred.	6.0	6.0	6.0	6.0	6.5	6.5	8.0	8.0	11	11	13	15
Act.	4.3	4.0	4.4									

DIRECT LABOR & OVERHEAD COSTS (THOUSANDS OF DOLLARS)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Pred.	21.8	19.8	22.8	25	25	25	32.5	36	60.8	65	77	96.5
Act.	19.6	18.2	18.4									

SUBCONTRACT AND CONSULTANT COSTS (THOUSANDS OF DOLLARS)⁽¹⁾

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Pred.	169	115	128	404	504	422	556	221	145	7	0	0
Act.	77.9	133	64.9									

NON-EXPENDABLE EQUIPMENT (THOUSANDS OF DOLLARS)⁽²⁾

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Pred.	0	0	0	0	0	0	0.5	1.0	1.2	10.0	4.0	1.5
Act.	0	0	0									

MATERIALS, SUPPLIES, TRAVEL, AND ODC (THOUSANDS OF DOLLARS)⁽³⁾

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Pred.	7.2	3.2	5.2	5.0	5.0	5.0	2.0	3.0	6.0	8.0	12.0	12.0
Act.	3.2	1.4	2.3									

TOTAL (THOUSANDS OF DOLLARS)⁽⁴⁾

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Pred.	194	138	156	434	534	452	591	261	213	90	93	110
Act.	100.7	123	85.6									

KEY TO GRAPH:

PREDICTED TOTAL COSTS
 ACTUAL TOTAL COSTS
 PREDICTED CUMULATIVE
 ACTUAL CUMULATIVE

NOTES:

- (1) DESIGN CONSULTANTS
- (2) NON-EXPENDABLE EQUIPMENT IS BE PURCHASED BY SUBCONTRACT AND IS INCLUDED IN SUBCONTRACT DATA ONLY
- (3) COST OF MATERIALS PROVIDED BY CONSULTANTS IS INCLUDED IN THIS CATEGORY
- (4) THIS DOES NOT INCLUDE BATTELLE FEE

On page 2 of the attached Chemico report, Chemico has informed us that the predicted total cost of the PDU subcontract is now \$3,446,000 but this does not include all estimated costs. The \$3,446,000 is the same figure as Chemico reported last month. However, the comparative cost estimate given in the tables attached to Chemico's monthly report to Battelle covering March (tables not provided in our report to OCR) show a predicted total cost of \$3,507,000.

We asked Chemico on April 10 for clarification of just what their predicted total cost is now and they could not provide a more definitive figure than \$3,507,000. This figure excludes \$148,000 for Estimating Change Order 4 and about \$100,000 for Estimating Change Orders 5 and 6 and "take-offs".

As a result of our discussion with Chemico on April 10, we can only conclude that they actually estimate the job at about \$3,755,000. Therefore, the predicted total cost figure is probably about 19.5 percent above the \$3,143,000 authorized by Subcontract Modification No. 1.

We strongly emphasized the requirement that a truly definitive cost figure be provided without delay. Chemico promises to give increased attention to firming up their estimate.

In the previous monthly progress report, we advised about actions which are being taken at Chemico as a result of administrative meetings held on March 14 between OCR, A.G.A., Battelle, and Chemico. We have observed the result of these actions for approximately a month now and have held two biweekly project review meetings* with Chemico. Our early impression is one of guarded optimism.

The assignment of supplemental manpower** to the project at Chemico at the project manager and project engineer levels seems to be having a positive effect. Mr. Stanley Noss (Chemico's Process Plants Company's Vice President for Special Projects) has been assigned overall responsibility for the job at Chemico. To date, Mr. Noss has delivered the documents and other information we require to monitor the program to us on or before the deadline agreed to.

* Participants at these meetings in addition to Chemico staff have been Dr. Goldberger, Mr. Corder, and Mr. Adams from Battelle and Mr. Frank Crowe, the sponsor's representative.

** We have not been able to determine if these assignments are permanent or temporary yet. To have done so might have been premature anyway. We will seek clarification on April 24.

BATTELLE-COLUMBUS LABORATORIES
PERSONNEL ASSIGNED TO PROJECT*

- (1) W. M. Goldberger
- (2) W. C. Corder
- (3) R. R. Adams
- (4) T. L. Tewksbury
- (5) H. R. Batchelder (Staff Consultant)
- (6) R. D. Fischer

CHEMICAL CONSTRUCTION CORPORATION
PERSONNEL ASSIGNED TO PROJECT*

- | | |
|--------------------|---------------------|
| (1) F. W. Peterson | (8) N. Razfar |
| (2) E. M. Ezcurra | (9) A. Yuen |
| (3) E. T. Coles | (10) A. Judd |
| (4) J. B. Perrone | (11) M. Rosengarten |
| (5) H. Osborne | (12) S. Sun |
| (6) P. S. Schlaff | (13) G. Elsis |
| (7) M. Getty | (14) M. Dowd |

* Only staff who devote significant portions of their time to the program are listed. Various others have temporary assignments.



Chemical Construction Corporation

ONE PENN PLAZA • NEW YORK, N. Y. 10001
134th STREET BETWEEN 7th & 8th AVENUES
TELEPHONE: (212) 239-5100 • TELEX: 234110 • CABLE: CHEMICONST. N. Y.

April 9, 1974

Mr. W. C. Corder
Minerals and Metallurgical Processing
Division
Battelle Memorial Institute
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

Letter No. CB-223
Contract 1947J
Re: Battelle's Columbus Laboratories
Coal Gasification
Process Development Unit

Monthly Status Report

Dear Bill:

Attached is one copy of our Status Report dated April 9, 1974.

Very truly yours,

A handwritten signature in dark ink, appearing to read 'F. Peterson'.

Fritz W. Peterson
Assistant Manager Operations

FWP:d
w/attachments

Monthly Status Report
Comparative Cost Statement
Period Ending March 25, 1974

JOB 1947

BATTELLE'S COLUMBUS LABORATORIES

COAL GASIFICATION PDU

STATUS AS OF APRIL 9, 1974

A). Overall Status

In the last monthly report it was mentioned that steel deliveries were second and third quarters, shortly after that some of the steel slipped to the fourth quarter. Mr. Postek, Chemico's Manager of Expediting, visited Grempe, the steel fabricator, to determine means of improving steel deliveries. It was determined that by purchasing steel from warehouses that Grempe could finish by August 1, 1974. The additional cost would range between \$15,000 and \$25,000.

On March 27, 1974, Chemico requested permission to purchase warehouse steel. On March 28, 1974, Battelle granted permission and Chemico immediately notified Grempe.

Chemico made a new schedule when firm dates were received from the steel fabricator. This schedule and the steel problems were discussed with Battelle and OCR on March 14, 1974. Chemico continued working on the steel problems and told Battelle, on March 27, that with warehouse steel the plant would be mechanically complete by February 15, 1975. A schedule reflecting this was given to Battelle on April 4, 1974.

The changes in the fluidized flow circuit mentioned in the last report has required redesign of certain areas in the combustor-gasifier steel structure.

Battelle is making some tests to determine the fluidizing characteristics. This is needed to complete the design of the system.

CHEMICAL CONSTRUCTION CORPORATION

-2-

B). Financial Status

Purchase Orders and Letters of Intent	\$ 1,034,256.00
Billings up to March 15, 1974	471,418.19
Estimated Billing for March	74,000.00
Estimated Billing for April	275,000.00
	<hr/>
	\$ 1,854,672.19

Attached is the Comparative Cost Report for the Period Ending March 25, 1974, showing a Predicted Total Cost of \$3,446,000. This figure includes E.C.O.s Nos. 1, 2 and 3. It does not include E.C.O. No. 4 or remaining ones to be written on outstanding Design Sheets. The internal structure increased in width, which will increase the cost of structural steel; this cost is in E.C.O. No. 4. E.C.O. No. 4 is estimated to be \$149,575 and will be included in the next cost report.

Material takeoffs have been made and a new estimate will be made and incorporated in the next Comparative Cost Statement.

C). Material Status

1. A to C Material

(% Based on Estimated Cost)
%

Total Purchased 72.5

2. D to R Equipment

(% Based on Estimated Cost)
%

a. Requisitions not started	0.5
b. Requisitions being prepared	2.3
c. Requisitions being reviewed or revised	0.0
d. Approved Requisitions being processed	0.0
e. Requisitions out for bids	11.8
f. Quotes being evaluated by Engineering	0.0
g. Evaluations under Project review	0.0
h. Recommendations submitted to BCL	1.4
i. Approved for purchase or letter of intent	15.9
j. Equipment committed but not purchased	6.1
k. Equipment purchased	62.0

C). Material Status (continued)

3. S to Z Equipment and Materials

(% Based on Estimated Cost)

	%
a. Bids being evaluated	2.5
b. Approved for purchasing	22.4
c. Materials committed but not purchased	5.1
d. Materials purchased	39.4

4. Purchased Material Status

We attach a copy of the Material Status Report dated April 8, 1974.

D). Process Engineering

Heat and Material Balances and Flows were reviewed with Battelle and Braun. The comments are being incorporated in the process flow sheets.

E). Flow Sheets

Revised P&I's for process and utilities have been issued.

F). Plot Plans and Elevations

Plot Plans have been finished for the plant and are being changed to show relocation of equipment. These changes are on the ground level.

1. Outer Structure

Floor plans showing major piping have been sent to Battelle.

2. The Model of Combustor, Gasifier and associated equipment and piping has been finished.

G). Structural Steel

1. Outer Structure

The structural steel drawings have been issued to the

G). Structural Steel (continued)

1. Outer Structure

fabricator. These are released for fabrication.

Foundation drawings have been finished and are in the process of being checked.

2. Inner Structure

The structural steel drawings have been finished and checked and were mailed to the fabricator on March 9, 1974. These were released for material and detailing. Because of the changes in the fluidized flow circuits the drawings are being revised.

The foundation drawings are being made. These foundations present construction problems because they are near to existing foundations. This has been discussed with Chemico's Construction Department.

H). Piping

1. Stress calculations for the hot piping are being revised to incorporate changes in the fluidized circuit.
2. Battelle has approved the purchase of hot valves and purchase orders have been placed.
3. Piping plans for the various levels are in process. We estimate that 5 plans will be needed and we have started 4.
4. Nozzle orientations for the 300 and 400 Sections have been finished.
5. Nozzle orientations for the Combustor and Gasifier vessels have been set. Recent discussions on the fluidized flow circuit has changed the orientation on the Gasifier. The remaining vessels in the 500 Section are hoppers with top inlet and bottom outlet.
6. Takeoffs of valves and piping have been made and inquiries sent to suppliers.

I). Instrumentation

1. P&I's have been issued and discussed with the Client as to start-up, operation and shutdown. These have been issued.
2. Panel has been ordered. It is being revised for interlocks on let-down hopper.
3. Instrument takeoffs have been made and inquiries sent to suppliers.
4. Bulk takeoffs are in the process of being made.

J). Electrical

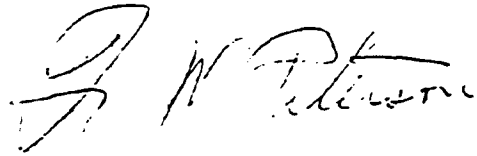
1. One line for high voltage has been done.
2. Substation has been purchased and the layout has been done.
3. Motor Control Centers have been purchased.
4. Sketches of Elementary Diagrams for motor circuits were prepared and are ready for drafting.
5. Interlock Elementary Control Diagrams have been finalized.
6. Panel and lighting takeoffs are in process.

K). Refractories

Requisitions for refractories have been sent to nine (9) companies. Meetings with Battelle, Chemico and each of the companies were held. Quotations have been received from eight (8) companies and an evaluation made. Chemico has made a recommendation to Battelle.

L). Construction

1. Construction has not started
2. The pre-job conference was held on February 20, 1974.
3. Start of construction is scheduled for June 1, 1974.



Fritz W. Peterson

FWP:d
w/att.

COMPARATIVE COST ESTIMATE OMITTED