

TECHNICAL SECTION

of

PROGRESS REPORT NO. 12

on

CONTRACT NO. 14-32-0001-1513

to

OFFICE OF COAL RESEARCH

January 15, 1974

BATTELLE
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

TECHNICAL SECTION
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INTRODUCTION AND PROJECT OBJECTIVE

This progress report describes work completed by Battelle on the Coal Gasification Program during the period December 14, 1973-January 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 a 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 design and procurement of equipment for the Battelle Coal Gasification PDU.

A schedule was received from Chemico indicating start of PDU construction March 1 and turnover by September 1. The contractual problem which has existed due to an increase in subcontract costs is being resolved and planning is continuing in accordance with the Chemico PDU installation schedule.

Activities previously initiated by Battelle not directly related to the PDU installation were also continued. However, the major activity on the program in this reporting period by Battelle has been in working with the subcontractor on the acquisition of PDU equipment. A small amount of work related to coal characterization was continued. Attention has also

continued to be given to specifying and making arrangements for acquisition of the turbine.

WORK COMPLETED

Contractual

Battelle received verbal permission from OCR to increase the funding of the Chemico subcontract.

Detailed Engineering Design of the PDU

Chemico Activity

The schedule shown as Table 1 was received from Chemico on December 17. The PDU construction start date now planned is March 1, 1974, and PDU turnover to Battelle by September 1, 1974, is planned. Chemico is presently working on the engineering-design and procurement phases of their project directed at meeting these dates. A synthesis of information provided by Chemico's weekly reports of December 18, December 28, and January 4, their monthly report of January 10, and information obtained by our resident Project Engineer, R. R. Adams, provides the following status of scheduled activities.

- Flow Diagrams and Data Sheets. The process flow diagrams have remained reasonably fixed since their last issue (in September). Chemico is continuing to check heat and material balances and make minor modifications as necessary. We are informed that calculations for inert gas and steam purges have been completed. Issue of an updated set of flowsheets is expected soon.

- Requisitions and Purchases. Table 2 provides Battelle's summary of the status of procurement of the major items of process equipment. It is estimated that 44 percent of the major items of process

equipment have been fully approved for purchase and that 13 percent of the equipment has not yet been requisitioned. Chemico's monthly estimate for December is in close agreement with Battelle's estimate showing 42 percent in the first category and about 11 percent in the second category.

TABLE 2. MAJOR PROCESS EQUIPMENT ITEMS STATUS SUMMARY

Process Area (a)	Total Items	Not Requisitioned	Requisitions Out	Purchase Approved
100	5	1	3	1
200	11	0	3	8
300	8	1	5	2
400	8	0	0	8
500	19	2	12	5
600	10	3	5	2
700	7	2	0	5
800	10	2	6	2
Misc (b)	<u>12</u>	<u>1</u>	<u>4</u>	<u>7</u>
	90	12	38	40

(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) Structural steel, anchor bolts, reinforcing bars, etc.

A listing of the items of equipment for the PDU showing their status in the procurement cycle is appended as Table A-1.

Table 2 and the listing of Table A-1 represent about 75 percent of the expected PDU requisitions.

- Process P and I Diagrams. We have been receiving frequently updated versions of the process piping and instrumentation diagrams. These have served as the basis for several review sessions between the Battelle and Chemico engineering staffs. Battelle presently is reviewing the most recent process P & I's from Chemico dated 12/12/73.

On the basis of a technical review with Chemico on January 4, it appears that the basic process P & I's are just about complete and should provide us with the control of the process desired. At the January 4 review comments of T. L. Tewksbury, Battelle's Supervisor of Operations for the PDU, regarding placement of controls and the control panel were covered with Chemico instrumentation specialists.

- Utility P & I Diagrams. Chemico does not plan to issue utility section flowsheets. Schematic flow diagrams of the inert gas and steam systems and P & I drawings for the natural gas and air systems are being reviewed at Battelle.

- General Arrangement Drawings. The general arrangement drawings are still being modified and updated at Chemico as they receive more detailed information on purchased equipment. The basic plot plan is not changing, however, arrangement on certain platforms is requiring modification.

- Piping Analytical. Considerable piping analytical work has been concluded on cold piping during the course of development of the process P & I diagrams. Stress and other calculations for hot piping are also underway. Recommendations for the purchase of hot valves have been made to Battelle by Chemico.

- Structural Steel. We are informed by Chemico that the drawings for the outer structure (i.e., the structure containing the feed hoppers, etc) have been issued to the fabricator. We presume the fabricator is proceeding with shop drawings.

Chemico has notified us that the drawings for the inner steel structure are being made. To assist in this they have built a model of the inner steel structure which supports the burner and gasifier and associated piping. A scale model of the burner and gasifier and associated piping is contained in the modeled inner structure. According to the Chemico schedule, the inner structure drawings are to be issued in mid-January.

- Foundations. The foundation drawings for the inner structure are scheduled to have been completed at the end of the first week in January. We have not seen the drawings and no reference is made to them in the Chemico monthly report for December. We presume that the scheduled completion date has not been met.

The foundation drawings for the outer structure are scheduled for issue during the fourth week in January. From our observations we gather this activity is behind schedule.

We still have not been able to determine if Chemico has a commitment on reinforcing bars which locally are in short supply.

- Electrical. Apparently progress on the electrical design has not gone beyond the one time drawing for high voltage reported in our previous monthly. This is not believed by Chemico to be a critical activity as is indicated in their schedule.

A layout drawing for the electrical transformer substations being purchased from GE has been made and approved by Battelle.

- Equipment Deliveries. Much of the Ingersoll-Rand Process air compressor equipment is ready for delivery to the site. Chemico has been informed that the Williams Patent Crusher and Pulverizer Company expects them to inspect the coal mill at the end of January. We presume it will be ready for shipment shortly after that.

Due to a communications error, several components of the process air compressor were sent to the West Jefferson site by the vendor. Chemico made arrangements for redirection of these items to storage in Columbus. Other vendors have been advised to await instructions from Chemico's shipping department before making delivery.

- Construction. Chemico now estimates construction at the site will start on March 1. Meetings between the Chemico construction supervision and representatives of Battelle's Physical Plant and Facilities Department are arranged for January 29 and 30. These meetings will establish the ground rules for the joint Battelle site modification - Chemico PDU installation work at the site in preparation for Chemico's scheduled meetings with local trade unions the first week in February.

Battelle Activity Directly Related to Detailed Design of the PDU

Major activity by Battelle related to the PDU design has concerned examination of bids and bid analyses transmitted by Chemico to Battelle, analysis of Chemico's equipment specifications contained in their requisitions, and review of process P & I's and other engineering drawings with Chemico.

Administratively, Bob Adams has continued in residence at Chemico's offices for purposes of expediting approvals, expediting interchange of technical information, and generally monitoring the subcontractor's activities. He has been joined by F. Crowe, the sponsor's representative, for some of this time.

T. L. Tewksbury who will be responsible for operation of the PDU has become more intimately involved in our activities. Substantial amounts of his time have been devoted to review of the process flowsheets and P & I's. He also has visited with Mr. Harry Cier, the sponsor's representative at the CO₂ Acceptor Process Pilot Plant, for purposes of technical discussions and observing a start-up.

Site modification activities by Battelle's Plant Facilities Department are progressing. We are informed by them that the site is adequately prepared now for Chemico's initial construction work.

In our previous monthly we described the status of our inquiries to companies capable of supplying the gas turbine for the PDU. Discussions with some of the companies responding to our inquiry have continued at a nominal level by Mr. R. O. Fischer of Battelle's Thermal and Mechanical Energy Systems Section. Interest in particular in application of General Electric's and AiResearch's axial flow inlet turbines to use in our PDU is being pursued.

We are still awaiting administrative action on our permit applications filed with the Ohio Environmental Protection Agency.

Other Work Related Indirectly to PDU Design

Coal Characterization and Bench-Scale Fluidized-Bed Studies

This activity during the reporting period was concerned with analysis and correlation of data from self-agglomerating combustion experiments made with several coals in bench-scale fluidized beds. However, only nominal work was done in order to permit greater concentration on activities related to the PDU installation.

Related to the coal characterization work on our OCR/AGA program but financed by Battelle has been the consolidation of our characterization equipment into a new laboratory. Additional specialized equipment has also been acquired. The new laboratory contains equipment for complete physical, chemical, thermal, and microscopic characterization of coal and measurement of properties of coal and solid fuels. This improvement at this time should complement the analytical facilities planned at the PDU site.

PROBLEMS AND RECOMMENDATIONS

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

WORK PLAN AND SCHEDULE

Major emphasis will be given to our activities associated with installation of the PDU. Work will also be continued on analysis of the data acquired in the characterization studies of Phase II-A.

At present we believe Chemico is meeting the schedule presented in Table 1. Delay of the PDU completion from that anticipated at the outset of the program obviously has a major effect on the overall schedule. We hope to have the opportunity to discuss this with the sponsors within the coming reporting period. Our planning is still directed at being able to demonstrate basic process operability by mid-1975.

APPENDIX

DETAILED STATUS OF EQUIPMENT PROCUREMENT

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DETAILED STATUS OF EQUIPMENT PROCUREMENT

TABLE A-1. STATUS OF PDU EQUIPMENT PROCUREMENT

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

<u>Equipment Item Number</u>	<u>Name</u>	<u>OCR/AGA Authorization Sheet Serial Number</u>
G-101	Coal Pulverizer Surge Hopper	2
D-201	Inert Gas Generator (for Coal Pulverizer)	3
K-201	Main Fan	3
K-202	Auxiliary Fan	3
K-203	Combustion Air Blower	3
O-201	Coal Pulverizer	3
P-201	Cyclone Separator	3
P-203	Bag Filter	3
P-204	Vibrating Screen	19
O-301	Screw Conveyor Cooler	11 Rev. 1
P-301	Coal Pretreater Cyclone	9
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 Pressure Hopper	2
G-403	Combustor Feed Injection Hopper	2
G-404	Pretreated Coal Receiving Bin	2
G-405	Gasifier Feed Pressure Bin	2
G-406	Gasifier Feed Injection Bin	2
H-501	Combustor Vessel	6
H-502	Gasifier Vessel	6
O-502	Ash and Char Conveyor Cooler	11 Rev. 1
P-501	Combustor Cyclone	9
P-502	Gasifier Cyclone	9
G-603	Sludge Settler Tank	13
E-604	Recycle Make Gas Cooler	5
G-701A&B	Process Air Receivers	1
K-701A&B	Process Air Compressors	1
D-702	Inert Gas Generator	16
G-702	Inert Gas Receiver Tank	16
R-701	Instrument Air Dryer Package	18

TABLE A-1. (Cont)

<u>Equipment Item Number</u>	<u>Name</u>	<u>OCR/AGA Authorization Sheet Serial Number</u>
G-802	High-Pressure Water Storage Tank	13
D-803	Steam Superheater	12
	• Panel Instruments	4
	• Unit Price Structural Steel	7
	• Weigh Systems	8
	• Gas Analyzers	10
	Anchor Bolts (unit price)	None Required
V-050	Instrument Control Panel	15
V-020	Transformer Substations	17

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/AGA after Battelle's review.

J-301A&B	Oil-Solids Pumps	22 & 23
J-601A&B	Venturi Circulating Pumps	22 & 23
J-602A&B	Venturi Circulating Pumps	22 & 23
G-702	Inert Gas Storage Tank	21
D-802	Package Steam Boiler	20
	• Hot Valves for Let-Down Lock Hoppers	26
	• Emergency Hot Shut-Off Valves	25
	• Throttling Valves for Hot Solids	24
U-030	Multipoint Temperature Indicators and Recorder	27

3. Initial bids or revised bids have been received on the following items by Chemico. They are currently evaluating the bids and will transmit their recommendations to us very soon.

O-101	Coarse Coal En Masse Conveyor/Elevator
O-205	Ground Coal Conveyor/Elevator
D-602	Combustor Furnace With Stack
R-803	Cooling Tower and Erection
R-804	Water Treatment System (Cooling Tower)

TABLE A-1. (Cont)

 4. The following items are out for bids

G-102	Coal Receiving Hopper
R-101	Grizzly
K-204	Screened Coal Blower
P-205	Screened Coal Cyclone
H-301	Coal Pretreater
R-301	Pretreater Venturi Scrubber
P-302	Pretreated Coal Bag Filter
K-303	Pretreated Coal Blower
D-501	Start-Up (and Pretreater) Heater
H-501	Combustor Refractories
H-502	Gasifier Refractories
G-501	Combustor Cyclone Receiving Hopper
G-502	Combustor Cyclone Let-Down Hopper
G-503	Gasifier Cyclone Receiving Hopper
G-504	Gasifier Cyclone Let-Down Hopper
G-505	Char Receiving Hopper
G-506	Char Let-Down Hopper
G-509	Gasifier Ash Let-Down Hopper
G-510	Combustor Ash Let-Down Hopper
G-511	Cooler Conveyor Receiving Hopper
R-601	Flue Gas Venturi Scrubber
R-602	Make Gas Venturi Scrubber
J-801A&B	Boiler Feedwater Pumps
G-801	Deaerator
R-801	Boiler Feedwater Treatment System
	• Reinforcing Bars
U-030	Annunciators
U-041	Receivers
V-100	Motor Control Centers

5. Requisitions have been drafted on the following items and are currently being reviewed or revised at Chemico.

K-603	Recycle Make Gas Booster Compressor
G-703	Instrument Air Receiver
K-703A&B	Natural Gas Booster Compressors

TABLE A-1. (Cont)

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

K-501	Start-Up Recycle Blower
P-503	Vibrating Screen
E-601	Sample Gas Cooler
J-603	Transfer Pump
J-802	High-Pressure Water Storage Tank Pump
J-803A&B	Cooling Tower Water Pumps
V-801	Emergency Electrical Generator

FINANCIAL AND ADMINISTRATIVE SECTION

of

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January 15, 1974

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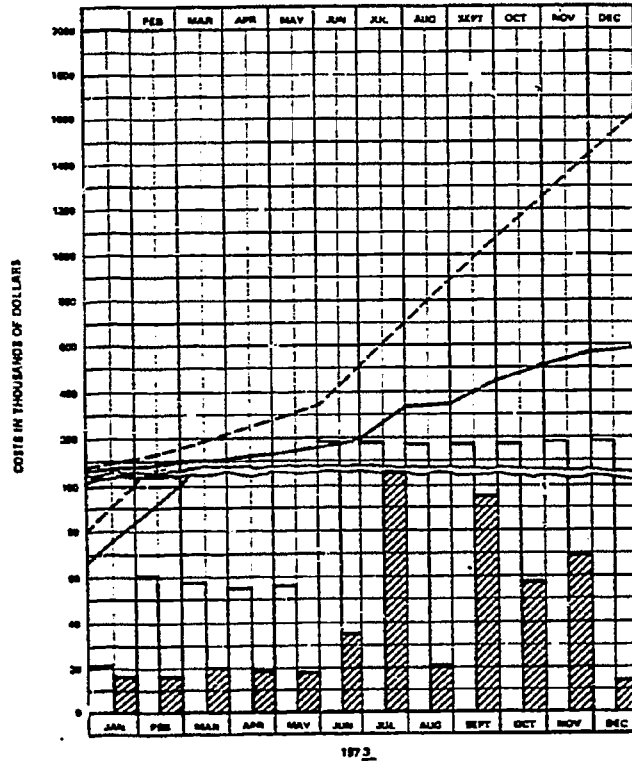
Table B-1 presents the Task Cost and Manpower Projection form for the month ending December 31, 1973. A billing received from Chemico for New York operating costs for November and their fee for the period November 16 to December 15 has been approved for payment but no disbursement has been made yet. This billing is for \$77,899.88. Total disbursements to Chemico remain at \$276,097.15, the same as in our previous monthly report.

As shown in the attached monthly report of Chemico, they estimate their December billing will be \$80,000. Neither the \$77,899.88 billing for November nor that for December is included in Table B-1. It is estimated that, as of January 2, a total of about \$434,000 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 \$700,000 (approximately) to suppliers of equipment for the PDU.

The cumulative expenditures of Battelle, including payments to Chemico to date are about \$584,000, as shown on Table B-1. The sum of actual expenditures to date, the received but unpaid Chemico billing, Chemico's estimated billing for December, and equipment purchase order commitments is about \$1,442,000 or 35.2 percent of the current 4.1 million dollar contract funding. The percentage of the present* OCR encumbered

* Letter from Mr. G. Edward Larson to Mr. Roger Evans dated November 19, 1973, increasing OCR encumbered funds from 1.6 million dollars to 2.27 million dollars.

TABLE B-1.
BATTELLE PDJ
TASK COST AND MANPOWER PROJECTIONS
MONTH ENDING DECEMBER 31, 1973



MANPOWER (MAN-MONTHS)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Prd.	4.4	5.8	5.5	4.2	4.6	5.1	5.1	4.1	4.2	4.7	4.2	5.0
Act.	5.3	4.4	5.3	5.0	4.2	5.3	5.7	5.8	6.2	6.2	3.6	2.7

DIRECT LABOR & OVERHEAD COSTS (THOUSANDS OF DOLLARS)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Prd.	18.6	21.4	20	16.2	12.4	17.9	17.9	16.8	17.2	17.2	17.2	19.8
Act.	18.8	14.3	17.8	17.6	15.9	18.3	18.6	18.2	22.3	23.5	15.7	11.5

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

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Prd.	0	36.6	36.7	36.8	36.7	184	164.2	164	164.2	164	164.2	164
Act.	0	0.7	0.3	0	0	12.8	110.5	0	70.5	31.1	51.3	0

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

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Prd.	0	0	0	0	0	0	0	0	0	0	0	0
Act.	0	0	0	0	0	0	0	.15	0	0	0	0

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

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Prd.	2.9	2.2	2	2.2	3.4	3.1	3.8	3	2.3	2.3	4.4	2.1
Act.	1.2	2.1	3.1	2.1	3.2	4.1	2.2	3.3	3.2	2.9	2.6	1.7

TOTAL (THOUSANDS OF DOLLARS)⁽⁴⁾

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Prd.	21.5	69.4	98.7	56.2	57	196	185.9	183.8	183.7	182.5	186.8	186.9
Act.	17.8	17.1	21.2	18.7	19.1	36.2	131.8	21.3	96.0	87.5	69.9	12.2

KEY TO GRAPH.

- PREDICTED TOTAL COSTS
- ACTUAL TOTAL COSTS
- PREDICTED CUMULATIVE
- ACTUAL CUMULATIVE

NOTES

1. OTHER CONSULTANTS
2. NON-EXPENDABLE EQUIPMENT IS BY THOUSANDS OF SUBCONTRACTOR'S PRICES IN SUBCONTRACT CATEGORY
3. COST OF BATTELLE RESIDENT CONSULTANTS INCLUDED IN THIS CATEGORY
4. DOES NOT INCLUDE MATERIALS ETC

funds either spent or committed is about 63.5 percent. Of the total encumbered OCR funds and the AGA encumbered funds, the estimated present expenditure or commitment is 47.0 percent.

A comparison of the actual cumulative costs plotted in Table B-1 indicates that, as of the end of last calendar year (December 31), actual cumulative costs are less than 40 percent of those predicted in April, 1973, and first shown in the May monthly report. The reasons for this are mainly as follow:

- (1) The Chemico schedule in April contained a January, 1974, projected PDU completion and start-up date. Several PDU installation completion date delays have occurred since then.
- (2) In formulating the Battelle predicted expenditure curve, it was assumed that payments to Chemico to cover equipment billings to them by vendors would be in equal increments and start when orders were placed. It now appears that most equipment billings will not be paid until about 30 days after delivery of equipment. No equipment has actually been delivered.

If the predicted expenditure on the program at the end of December is compared with the funds not just actually expended but also committed for equipment purchase (\$1,442,000), they agree within about 10 percent.

Expenditure of actual manpower and funds by Battelle on the design and installation work of Phase I and the characterization studies of Phase IIA amounts to about 59 man-months and \$210,000 (exclusive of fec). This is approximately what was predicted (i.e., 57 man-months and \$215,000). Because of the several PDU installation schedule delays, the Battelle work related to the Phase I program activity is not completed as we expected it to be in the original overall program schedule (see the initial progress report). As a consequence, funds presently being expended by Battelle on the design and installation phase of the program are of necessity being diverted from the appropriation for the operating phases of the program.

Table B-2 is the Task Cost and Manpower Projection chart which will be used throughout calendar year 1974. The projected expenditure shown is based on our best present assessment of the program status. The projection takes into account the increased subcontract cost estimated by Chemico in August and still unchanged, the promised delivery times of equipment to the extent these are known and assuming full payment 30 days after delivery, and the Chemico project schedule given in the technical section of this monthly report. The projection has been made by Battelle on the basis of information supplied by Chemico.

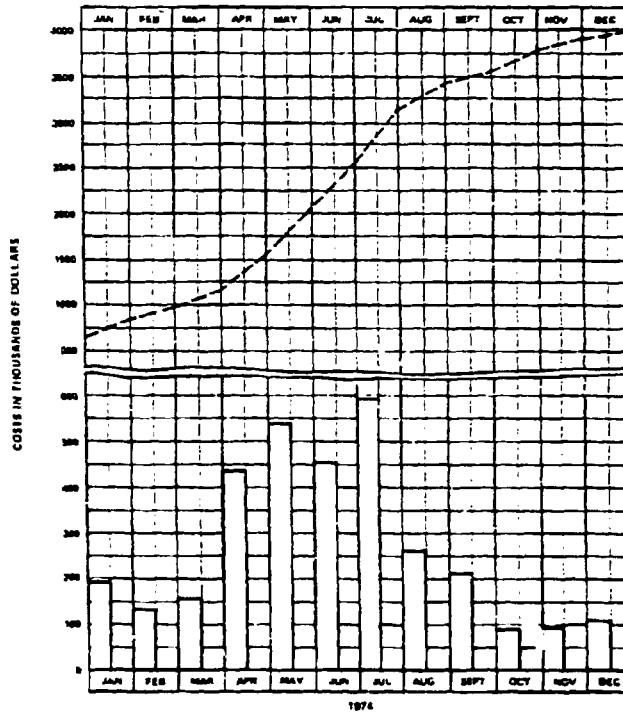
On January 9 we received verbal authorization from OCR to proceed with contract modifications to increase the Chemico subcontract appropriation from \$1,870,000 to \$3,143,000. The necessary actions are being initiated by Battelle's Contracts Department.

The attached status report by Chemico was written prior to Battelle's receiving OCR's authorization to increase their subcontract cost allocation. Consequently, this information is not reflected in their report.

On page 2 of the Chemico report, we are informed that the predicted total cost of the PDU subcontract is now \$3,241,000. This is the first estimate of costs significantly higher than the \$3,143,000 estimated by Chemico in August of which Battelle has been made aware. The reason for this estimated increase of \$98,000 above their August estimate is not clear from their report. Examination of the comparative cost estimate provided to us with the Chemico report, but not included here, shows the estimated increase to be due to nonequipment expenditures. We consider the \$98,000 addition to be only an estimate at this time and suggest no contractual action regarding it. We believe that revisions have been made to unapproved drawings (Chemico chooses to call these "Engineering Change Orders" or "E.C.O.S") which may result in other cost estimates either below or above the \$3,143,000 subcontract price.

Chemico confirms their estimated construction start date of March 1 in their status report. All present indications are that the site is adequately prepared by Battelle for start of the construction activity.

TABLE B-2
 BATTELLE PDU
 TASK COST AND MANPOWER PROJECTIONS
 MONTH ENDING 1974



MANPOWER (MAN-MONTHS)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
6.0	6.0	6.0	6.0	6.5	6.5	8.0	8.0	11	11	13	15
Act											

DIRECT LABOR & OVERHEAD COSTS (THOUSANDS OF DOLLARS)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
21.8	19.8	22.8	25	25	25	32.5	35	60.8	65	77	98.5
Act											

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
169	118	128	484	504	422	566	221	146	7	0	0
Act											

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
0	0	0	0	0	0	0.5	1.0	1.2	10.8	4.0	1.5
Act											

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
3.2	3.2	5.2	5.0	5.0	5.0	2.0	3.0	6.0	6.0	12.0	12.0
Act											

TOTAL (THOUSANDS OF DOLLARS)⁽⁴⁾

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
194	138	156	434	534	652	981	1051	1213	90	93	110
Act											

KEY TO GRAPH

- PREDICTED TOTAL COSTS
- ACTUAL TOTAL COSTS
- PREDICTED CUMULATIVE
- ACTUAL CUMULATIVE

NOTES

(1) COSTS FOR SUBCONTRACTS AND CONSULTANTS.
 (2) COSTS FOR NON-REPENDABLE EQUIPMENT.
 (3) COSTS FOR MATERIALS, SUPPLIES, TRAVEL, AND ODC.
 (4) TOTAL COSTS INCLUDING ALL CATEGORIES.

BATTELLE-COLUMBUS LABORATORIES
PERSONNEL ASSIGNED TO PROJECT**

- (1) W. M. Goldberger
- (2) W. C. Corder
- (3) R. E. 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. Ferrone | (11) M. Rosengarten |
| (5) H. Osborne | (12) S. Sun |
| (6) P. S. Schlaff | (13) G. Elsis |
| (7) M. Gerty | (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
(34th STREET BETWEEN 7th & 8th AVENUES)
TELEPHONE: (212) 239-5100 • TELEX: 234110 • CABLE: CHEMICONST, N. Y.

January 10, 1974

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

Letter No. CB-118
Contract 1947J
Re: Battelle's Columbus Laboratories
Coal Gasification
Process Development Unit

Monthly Status Report

Dear Bill:

We are sending you one copy of our Status Report dated January 6, 1974.

Very truly yours,

[Handwritten signature]

Fritz W. Peterson
Assistant Manager Operations

FWP:d
w/attachments

- Status Report 1/6/74
Comparative Cost Summary 12/31/73
Drawing List

RET. 10

Table with columns: PROJECT, ROUTE TO, INITIALS, DIV. FILES, GEN. FILES, XERO COPIES FOR

CHEMICAL CONSTRUCTION CORPORATION

JOB 1947

BATTELLE'S COLUMBUS LABORATORY
COAL GASIFICATION PDU

STATUS AS OF JANUARY 6, 1974

A). Overall Status

In our December 3, 1973 Status Report we included an analysis showing the least amount of money needed to maintain an effective engineering and procurement program that would allow us to have our drawings and equipment deliveries such as to be able to have a meaningful construction program.

The estimate for this is \$1,918,200, which is above our present authorization of \$1,870,000.

The \$1,918,200 does not include construction cost which were estimated as \$930,000, nor does it include costs of pipe, general instrument, electrical, etc., which would be another \$300,000.

We are making arrangements to hold pre-job meetings with the various unions. We will notify Battelle of the date.

We understand that the contract will be extended to the new estimated cost in the near future and we are proceeding on this basis.

B). Financial Status

Purchase Orders and Letters of Intent	\$	731,726.00
Billings up to December 20, 1973		353,997.03
Estimated Billing for December		80,000.00
Estimated Billing for January		<u>110,000.00</u>
Total	\$	1,275,723.03

B). Financial Status (continued)

We will very shortly be approaching a point where we will have to plan our expenditures so as to not exceed our authorization of \$1,870,000, and optimize our work to result in the minimum schedule delay.

Attached is the Comparative Cost Report for the Period Ending November 25, 1973, showing a Predicted Total Cost of \$3,241,000. This figure does not include the E.C.O.s that were written, or remain to be written on outstanding Design Sheets. Part of the Engineering hours are included. The internal structure increased in width, which will increase the cost of structural steel.

C). Material Status

(% Based on Estimated Cos:)

%

1. A to C Material

Total Purchased

69.4

(% Based on Estimated Cos:)

%

2. D to R Equipment

a.	Requisitions not started	2.8
b.	Requisitions being prepared	0.9
c.	Requisitions being reviewed or revised	2.6
d.	Approved requisitions being processed	5.1
e.	Requisitions out for bids	30.7
f.	Quotes being evaluated by Engineering	0.0
g.	Evaluations under Project review	0.0
h.	Recommendations submitted to BCL	0.0
i.	Approved for purchase or letter of intent.	1.6
j.	Equipment committed but not purchased	14.6
k.	Equipment purchased	41.7

C). Material Status (continued)

3. S to Z Equipment and Materials

(% Based on Estimated Cost)

	<u>%</u>
a. Approved requisitions being processed	4.2
b. Out for bids	2.2
c. Recommendations submitted to BCL	19.9
d. Equipment committed but not purchased	7.0
e. Equipment purchased	18.4

D). Process Engineering

Heat and Material Balances and Flows are complete, including Inert Gas and Steam Purge Connections.

Most of the Process work has been concentrated in review and finalizing P&Is.

E). Flow Sheets

P&Is for process and utilities have been issued.

F). Plot Plans and Elevations

Preliminary Plot Plans have been finished for the plant.

1. Outer Structure

The upper floors have been revised to as purchased equipment; the second floor is under revision, and the first floor will be started soon.

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 fabricator.

2. Inner Structure

The structural steel drawings are being made.

H). Piping

1. Stress calculations for the hot piping has been started.

2. Recommendations for the purchase of hot valves have been submitted to Battelle.

I). Instrumentation

1. P&Is have been issued and discussed with the Client as to start-up, operation and shutdown. These have been issued.

Battelle, in a recent meeting, has suggested certain changes, which are being incorporated.

J). Electrical

1. One line for high voltage has been done.

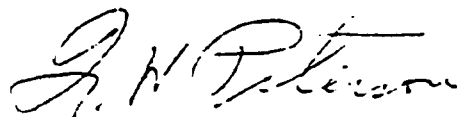
2. Substation has been purchased and the layout has been done.

K). Construction

1. Construction has not started

2. We estimate start of construction as March 1, 1974.

3. We are making arrangements for the pre-job conference.



F. W. Peterson