

BCR. MPR. - 18

TECHNICAL SECTION

of

PROGRESS REPORT NO. 18

on

CONTRACT NO. 14-32-0001-1513

to

OFFICE OF COAL RESEARCH

July 23, 1974

BATTELLE
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

SUMMARY

Work continued during this reporting period on the detailed design, procurement, and installation of the Coal Gasification Process Development Unit (PDU) by Battelle's subcontractor, Chemico.

Chemico's work in New York was concentrated on the production of drawings needed in the field and the conclusion of their procurement activity.

Field construction formally began by Chemico at our West Jefferson site on June 10. To date most work has dealt with excavation and foundation pouring. At this point there do not appear to be equipment or materials delivery problems which should preclude completion of the PDU construction in the first quarter of calendar year 1974 as scheduled. There is an apparent delay in the delivery of structural steel to the site and this problem is being explored further with Chemico and the Steel Fabricator.

Battelle continued to monitor the activity of Chemico on the subcontract and to otherwise technically interface with them.

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INTRODUCTION AND PROJECT OBJECTIVE

This progress report describes work completed by Battelle on the Coal Gasification Program during the period June 17 - July 16, 1974. The work completed during this period was nonexperimental and was associated with the installation of the 25-ton-a-day coal gasification process development unit by Chemico for Battelle. Nothing of a patentable nature is disclosed within this report.

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.

WORK COMPLETEDDetailed Engineering Design and Procurement of the PDU

Chemico provided us with a new overall project schedule for the PDU installation on April 4. This schedule was first presented in Progress Report Number 15. Since then Chemico has been updating the schedule and reissuing it on a biweekly basis. Their most recent version dated July 7, is incorporated in this report as page 18. No change has occurred in the end point of the schedule since it was issued. Internal changes are discussed in the "Work Plan and Schedule" section. PDU turnover to Battelle is still to be in the first quarter of calendar year 1975.

Chemico has emphasized procurement of bulk materials, expediting bulks and major equipment, and completion of their engineering design work during this reporting period. Battelle project staff have continued to spend time in residence at Chemico's New York offices the past 2 weeks. Field construction of the PDU at Battelle's West Jefferson site started June 10 and the foundation work is well under way at the time of this report. Part of the Battelle Project staff has been assigned to the field and they have been following the Chemico activity at the site. The following status of activities is provided based on our observations during this period as well as the monthly and weekly reports received from Chemico.

Drawings

The details which follow in this subsection are our appraisal of the status of the drawings necessary for construction of the PDU which Chemico lists on their drawing list.

Based on firsthand information from the Chemico drafting coordinator we believe a priority has been assigned to production of finished drawings currently needed in the field (foundations, rebar, etc.). The next highest priority appears to be piping isometrics and specifically those which pertain to Teflon[®] lined and refractory lined pipe. Production of finished drawings for which marked-up copies are adequate for draftsman

use appears to assume a lower priority. In this latter category are the process flow diagrams and P&I's. A staff of five draftsmen and a coordinator are currently working on the Battelle job at Chemico.

● Process Flow Diagrams*. In March discussions of Chemico's most up-to-date process flow diagrams were held with C. F. Braun, Battelle, and Chemico participation. Based on these discussions it appeared that the flowsheets essentially represented the Battelle Coal Gasification PDU but that minor modifications were required before formal approval could be provided. Also some cleaning up of the heat and material balance information shown on the flowsheets was required.

When a revised edition of the process flowsheets was not forthcoming, Battelle insisted that an adequate commitment of process engineering manpower be made to conclude the necessary work. We received assurances of this immediate commitment during the week of May 3.

At this date revised process flowsheets have still not been received. We recognize that only minor modifications are required to the flowsheets and it is our belief that a back-log of more critical drawings in drafting at Chemico may be precluding production of the "final" flow-sheet drawings. This matter was discussed most recently with Chemico's project manager, Mr. John Regan. We expect issuance of the new drawings within the forthcoming reporting period.

* By process flow diagrams we mean the flow diagrams for the 6 basic sections of the PDU namely:

<u>Section Number</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

• Utility Flow Diagrams**. Reviews of these flow diagrams have been conducted in detail under the direction of Chemico's project manager on the Battelle job. Battelle observed some of these reviews. Considerable modification of the piping and instrumentation*** was directed by Mr. Regan based on his review. On July 10, Mr. E. Reidy, Chemico's project engineer on our job informed us that the following is the status of the utility flow diagrams, all of which have been reviewed to Mr. Reidy's and Mr. Regan's satisfaction.

<u>Drawing Number</u>	<u>Title</u>	<u>Status</u>
80-80-11	Steam Generation and Distribution Sheet 1	Has been redrafted, a checking copy is being checked by Piping Analytical
80-70-10	Inert Gas Generation and Distribution	Has been redrafted, checking copy check completed by Piping Analytical and now being checked by Instrumentation group
80-70-11	Natural Gas and Air Systems	Same status as 80-70-10
80-80-10	Cooling Water Distribution System	Ready for reissue
80-50-12	Steam Generation and Distribution	Project Manager and Project Engineer review complete - Piping Analytical and Instrumentation groups checking prior to redrafting

** By utility flow diagrams we mean the flow diagrams for the utility sections of the PDU namely

<u>Section Number</u>	<u>Name</u>
700	Air, Inert Gas, and Natural Gas Utilities
800	Steam and Water Utilities

*** Because Chemico does not plan to issue both flow diagrams and P&I diagrams for the utilities sections, the flow diagrams are actually "hybrids" and show instrumentation.

The previous issues of the Utility Flow Diagrams issued to Battelle were very incomplete and only a cursory review of them was made by us. The drawings in production which we examined in Chemico's offices appear to be much more complete and incorporate the Chemico project manager's and project engineer's directions to the extent we are aware of them. It is hoped that Battelle can provide approvals of these drawings during the week of July 22, when they are supposed to be reissued.

- Piping and Instrumentation Diagrams. These diagrams were also reviewed in depth under Mr. Regan's direction. Battelle has observed reviews of the P&I's for Sections 100 and 200, 300 (partial), 500 (partial), and 600 (partial). In some cases it appeared that fairly extensive redrawing of the P&I's would be required.

The corrections and modifications directed by Mr. Regan appear to be based on sound engineering analysis and, while fairly numerous, they primarily involve piping and instrumentation and not major changes to equipment.

On July 10, Mr. E. Reidy reported the following to be the status of the process P&I's.

<u>Drawing Number</u>	<u>Title</u>	<u>Status</u>
80-10-10	Coal Preparation and Grinding	Battelle participated in a meeting in which the Vendor furnishing this equipment was called in to explain his control system. Issuance of a new P&I expected in the forthcoming reporting period.
80-30-10	Coal Pretreatment	Has been revised and redrafted as a result of the project manager's and project engineer's review. Checking copy being examined by Piping Analytical.
80-40-10	Coal Feeding	Same status as 80-30-10
80-50-10	Gasification - Sheet 1	Same status as 80-30-10
80-50-11	Gasification - Sheet 2	Same status as 80-50-12
80-60-10	Gas Treatment	Same status as 80-50-12

Based on numerous prior reviews by Battelle of the Chemico process P&I's we provided Chemico a provisional approval to issue these drawings "For Construction" in May. We have examined all of the above drawings at Chemico and believe the Chemico Project Manager's directions as well as our own are being incorporated. The recent internal reviews at Chemico combined with the Battelle remarks stipulated in the provisional approval will hopefully permit us to make a final approval of the process P&I's when they reissue the week of July 22.

● Electrical Wiring Drawings. These drawings are reported to range between 20 and 60 percent complete in Chemico's June 16 drawing list (most recent we have). The Chemico monthly status report for June reports electrical drafting to be 80 percent complete as of July 3. Last month we reported to OCS that the degree of completeness ranged between 10 percent and 55 percent. We believe considerable work is being done on the electrical drawings by Chemico. This belief is reinforced by the fact that, for the past 2 weeks, Chemico's electrical Supervisor (Mr. Fred Matherne) has been at the site and is applying pressure to receive these drawings.

● Foundation Drawings. In their monthly status report for June Chemico reports that the foundation design for both the Coal Feed and the Combustor-Gasifier Structures are complete. Their drawing list confirms that between 98* and 100 percent of all foundation drawings are complete. A check with Chemico's Field Superintendent indicates that, on July 16, all necessary foundation drawings are on the site.

● Underground Electrical and Piping Drawings. Battelle was informed by Chemico's manager of Field Construction (Mr. L. Van Amerongen) that the underground drawings would go to the field by July 15.

* Chemico reports that, for some of the equipment (nonstructure) foundations they await vendor drawings for completion of the drawings.

• Plot-Plan and General Arrangement Drawings. These were shown as 60 percent complete on Chemico's drawing list dated May 26. Apparently, no further work has been done on these because, in their report for June, Chemico still reports 60 percent completion. Battelle plans to explore this with Chemico on July 17.

• Instrument Related Drawings. Instrument related drawings and their degree of completeness as reported by Chemico are as follow:

<u>Instrument Drawing Type</u>	<u>Percent Complete</u>
Interlock Elementaries	100
Alarm Elementary	100
Electrical Layouts	25 to 80
Electrical Conduit and Wire Schedule	25
Electrical Miscellaneous Details	75 to 100
Panel Drawing	100
Panel Semigraphic	100
Mechanical Layouts	55
Conduit Routing and Control Building	20
Schematics	90
Installation Details	20
Schedule	90
Tracing Details and Indices	10

A substantial number of these drawings are at Battelle and are presently being examined.

• Structural Steel Drawings. In the monthly progress report for May we informed OCR that, based on Chemico's report to us, these drawings were complete. A trip was made to the steel fabricator on July 3, by Battelle's project engineer, Mr. R. R. Adams, and the sponsors representative for construction, Mr. B. Switalski.

At the July 3, meeting Battelle was informed by the fabricator that he had all needed information from Chemico. However, the fabricator indicated he had received the Chemico drawings later than he expected and that difficulty was being experienced in detailing of fabrication drawings in his own shop. The implications of this problem are discussed in a later section of this report.

● Vendor Certified Drawings. Battelle plans to determine firsthand how rapidly and timely these are being received by Chemico on July 17.

Requisitions and Purchases

Approximately 97 percent of the major items of process equipment shown on the process flowsheets which require the prior approval of OCR and A.G.A. for purchase have been authorized for Chemico to purchase. Purchase orders have been issued on 69 of the 97 percent and the balance is committed.

Based on their currently authorized budget, Chemico estimates that in excess of 90 percent of both the A to C* and the S to Z equipment and materials have also been purchased.

Equipment and Materials Received at the Site

Considerable equipment and materials have arrived at the site. The equipment is stored there and the materials, for the most part are being used as they are received. Equipment and material which have arrived to date are as follows:

FLWSHEET EQUIPMENT ITEMS

OCR/A.G.A. Purchase Quotation and Authorization Sheet Serial		
Number	Serial	Description
2		G-101 Coal Mill Surge Hopper
29		G-102 Coal Receiving Hopper
29		R-101 Grizzly

* A to C and S to Z are the designations Chemico uses for line items in cost estimates. A to C incorporates foundations, buildings, and structural steel. S to Z is comprised of insulation, piping, instrumentation, electrical, painting, miscellaneous site work, and labor travel and subsistence.

FLWSHEET EQUIPMENT ITEMS (Continued)

OCR/A.G.A. Purchase Quotation and Authorization Sheet Serial Number	Description
3	K-201 Main Fan
3	D-201 Inert Gas Generator (for Coal Pulverizer)
3	K-203 Combustion Air Blower
3	K-202 Auxiliary Fan
3	O-201 Coal Pulverizer
3	P-201 Cyclone Separator & Support Ring
3	L-202 Spinner Separator
3	P-203 Bag Filter
22 & 23	J-301-A&B Oil-Solids Pumps
11 Rev. 1	O-301 Screw Conveyor Cooler
2	P-401-A&B Bag Filters and Bin Vents
2	G-401-A Combustor Feed Bin
2	G-401-B 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
6	H-501 Combustor Vessel and Spare Head
11 Rev. 1	O-502 Char and Sinter Cooler-Conveyor
9	P-502 Gasifier Cyclone
22 & 23	J-602-A&B Venturi Circulating Pumps
5	E-604 Recycle Make Gas Cooler
1	G-703 Instrument Air Receiver
1	E-703 Instrument Air Aftercooler
1	K-701-A&B Process Air Compressors
1	G-701-A&B Process Air Receivers
18	R-701 Instrument Air Dryer Package

FLWSHEET EQUIPMENT ITEMS (Continued)

OCR/A.G.A.
Purchase Quotation and
Authorization Sheet Serial

Number	Description
12	D-803 Steam Superheater

BULK ITEMS

Chemico Cost Code Number	Description
A-190	Anchor Bolts (partial)
T-600 & T-615	TFE Lined Valves
R-301-2, R-601-2, R-602-2	Raschig Rings for Scrubbers
--	Needle Globe Valve
--	Flow Switches
T-626	Miscellaneous Valves
T-450	Tubing
--	Strainers
--	Tube Fittings
--	Gaskets
T-620 & T-621	Miscellaneous Valves
T-615	Miscellaneous Valve
U-060	Pressure Regulators
T-450	Filter Regulators
T-450	Miscellaneous Valves
U-030	Annunciators
V-020	Transformer Substation (1)
A-190	Reinforcing Bars (partial)
U-030/U-041	Weigh Systems (load cells)
T-550	Miscellaneous Valves
U-060	Miscellaneous Valves
R-301-2, R-601-2, R-602-2	Gaskets

Slippages in the promised delivery dates of items of equipment and materials appear to be almost a daily occurrence. The most critical slippage which Battelle has identified to date has been that in the structural steel delivery described later in this report. We believe that in-shop expediting in the next 2 to 3 months is extremely important

to meeting the PDU construction mechanical completion deadline. We are encouraging Chemico to do this and Battelle is doing some visitation to vendor's shops ourselves.

Construction of the PDU

Chemico issued their construction schedule on May 23, (Issue P-1). Copies were provided to Drs. R. E. Vener and C. L. Miller of OCR, Dr. Ab Flowers of A.G.A. and Dr. R. Detman of C. F. Braun with Battelle's last monthly report.* Chemico has not formally updated the schedule and provided another issue since issue P-1. At Battelle's urging it has been agreed that Chemico will formally issue the construction schedule every 2 weeks until the internal dates have stabilized some. The first updated, formally issued modification is forthcoming on July 17. At that time copies will be provided to the Operating Committee and to Dr. Detman

Battelle's knowledge of the Chemico construction schedule indicates that, at present, it still fits within the overall Chemico project schedule shown on page 18.

Construction formally began on June 10. So far the work has involved demolition of a portion of existing building JS-2, excavation, foundation and equipment pad work and backfilling. Battelle's field office is in daily contact with the Chemico construction personnel and a procedure for more-formal biweekly meetings between the Chemico field construction management, Battelle project staff and various observers has been initiated. The most recent biweekly field meeting was held on July 3.

The status of construction is probably best depicted by the photographs enclosed with the copies of this report to Drs. Vener, Flowers, and Detman. The photographs were made July 12. The spread

* This schedule is not provided in the report because of its bulk.

footers and concrete support piers for the burner-gasifier structure and the coal feed structure have been poured and the anchor bolts have been set for receipt of the steel columns. Presently, smaller equipment foundations and sumps are being dug, framed, rebar added and additional concrete poured.

At the last biweekly field meeting (July 8) several apparent problems were delineated by Chemico's field superintendent which could potentially delay the construction work. Several of these potential problems (now apparently solved) were reported to OCR's project engineer, Mr. Steve Verikios. Among the problems which now appear resolved are as follows:

- (1) Not enough anchor bolts were at the site to anchor the thermal oxidizer (combustor furnace and stack) compressors, and other miscellaneous heavy equipment. As a consequence of this some of the foundation work might be held up. Chemico now has a promise from the supplier to have the required anchor bolts at the site on or prior to July 19. Therefore, no substantial delay should occur due to anchor bolts.
- (2) Not enough rebar had been delivered to provide for the foundations noted in (1). Nine tons of additional rebar were delivered this week. Consequently 98 percent of the required rebar is now at the site.
- (3) The absence of structural steel when it is scheduled could cause a delay. At this writing we do not have a resolution of the projected delay of up to a month in the start of steel delivery. A visit is planned to the fabricator on July 16 to attempt to resolve the problem.

It is expected that Chemico will continue their foundation-related work during the forthcoming reporting period and that a resolution to the steel problem will be obtained so they can begin raising steel.

In our previous monthly report it was pointed out that the delivery of let-down lock hopper vessels could be a long range problem in construction. The Battelle project engineer visited Stacey Manufacturing

Company with Chemico to determine if the delivery could be improved. A slight improvement was promised and Chemico continues to press for a better date.

Mr. Mark Young, Chemico's construction supervisor (i.e., their No. 1 man in the field) is in Columbus and will assume his duties at the site on July 18.

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

In addition to the Battelle activity already noted, progress has been made in other areas directly related to the PDU design and installation.

Babcock and Wilcox (B&W) was awarded a subcontract (to Chemico) for the design, materials supply, and installation of refractories in the major vessels and associated piping. The Battelle Thermal and Mechanical Energy Systems Section is reviewing the refractory fabrication drawings.

Our Plant and Facilities Department has been assisting Chemico in their field utilities hook-up and the project staff in monitoring the Civil-Mechanical aspects of the Chemico field work. The Plant and Facilities Department is also prepared for the site additions and modifications which are related to the PDU (for which Battelle will pay) as soon as they receive word from Chemico through the project staff that such work should begin.

During this reporting period we received a permit from the Ohio Environmental Protection Agency to install the PDU. An operating permit will probably not be forthcoming until about 3 months before PDU operations begin.

Progress on the turbine procurement was only nominal during this reporting period.

PROBLEMS AND RECOMMENDATIONS

The major item of present concern is financial. We are in frequent contact with members of the OCR/A.G.A. Operating Committee regarding this problem.

As noted elsewhere in this report, we are identifying potential problem areas having to do with both equipment and materials deliveries and the timely production of drawings by Chemico. We believe that Chemico and, sometimes, Chemico with assistance from Battelle, are working around and solving the equipment delivery problems by a variety of methods. Chemico appears to be giving a high degree of attention to the timely production of required drawings.

Substantial technical problems which are materializing and could have an influence on the schedule are those related to the structural steel delivery previously noted and refractory installation (not previously noted in this report).

Chemico has been projecting that the fabricated structural steel delivery would begin in the first week in July and be complete by mid-August. Erection of the steel was projected to begin in mid-July. On July 3, Battelle learned that fabrication of the structural steel would not start until July 8, and that the first significant steel deliveries would not be made until mid-August with all fabricated steel deliveries completed by mid-October. If this delivery schedule cannot be improved a very serious effect on the construction schedule may result. A second meeting is being held with the steel fabricator with Battelle, the OCR sponsor's representative, Chemico (New York) and Chemico (field) participation. One purpose of the meeting is to determine what can be done to expedite the fabricated steel delivery. A possibility suggested to Chemico by Battelle is that a Chemico steel detailer or expediter be placed in residence at the fabricators shop.

The refractory problem relates to a delay in the time of the refractory installation by Babcock and Wilcox (B&W) and their installation subcontractor American Gunnite. On July 15, B&W and American Gunnite reported to the field to install refractories apparently, prematurely.

Chemico's recommendation was that the refractory installation be delayed until September. Battelle is currently exploring the implications of this delay.

WORK PLAN AND SCHEDULE

Major emphasis will be given to concluding the engineering and design-drafting work by Chemico in New York. A high level of attention must be given to expediting the production of piping drawings, especially those for shop fabricated pipe.

Field construction work will continue. The work for the forthcoming reporting period will involve primarily concrete and other foundation work including the installation of underground piping and conduit.

The overall schedule which Chemico is presently working under is shown on page 16. This is the same schedule as was first issued in early April and has been updated in our monthly progress reports since then. There are some discrepancies between this overall project schedule and the construction schedule issued in mid-July. However, as of the third of July when it was issued we believe the overall schedule is reasonably accurate. The mechanical completion date for the PDU is still mid-February 1975.

A comparison of the updated Chemico project schedule presented in this report with that in our previous monthly progress report shows the following:

- (1) Total engineering and drafting progress towards completion increased from 19.7 percent to 21.6 percent. Engineering and drafting total completion is represented by 27 percent.
- (2) Construction went from an overall project weighted percent of 0 to 0.3 percent. This is because field construction began in June and 20 percent of the foundation work was completed.
- (3) Deliveries at the site went from an actual of 2.7 percent of the equipment and materials anticipated to 4.2 percent.

However, according to Chemico's predictions 10.5 percent of the equipment and materials should have been delivered.

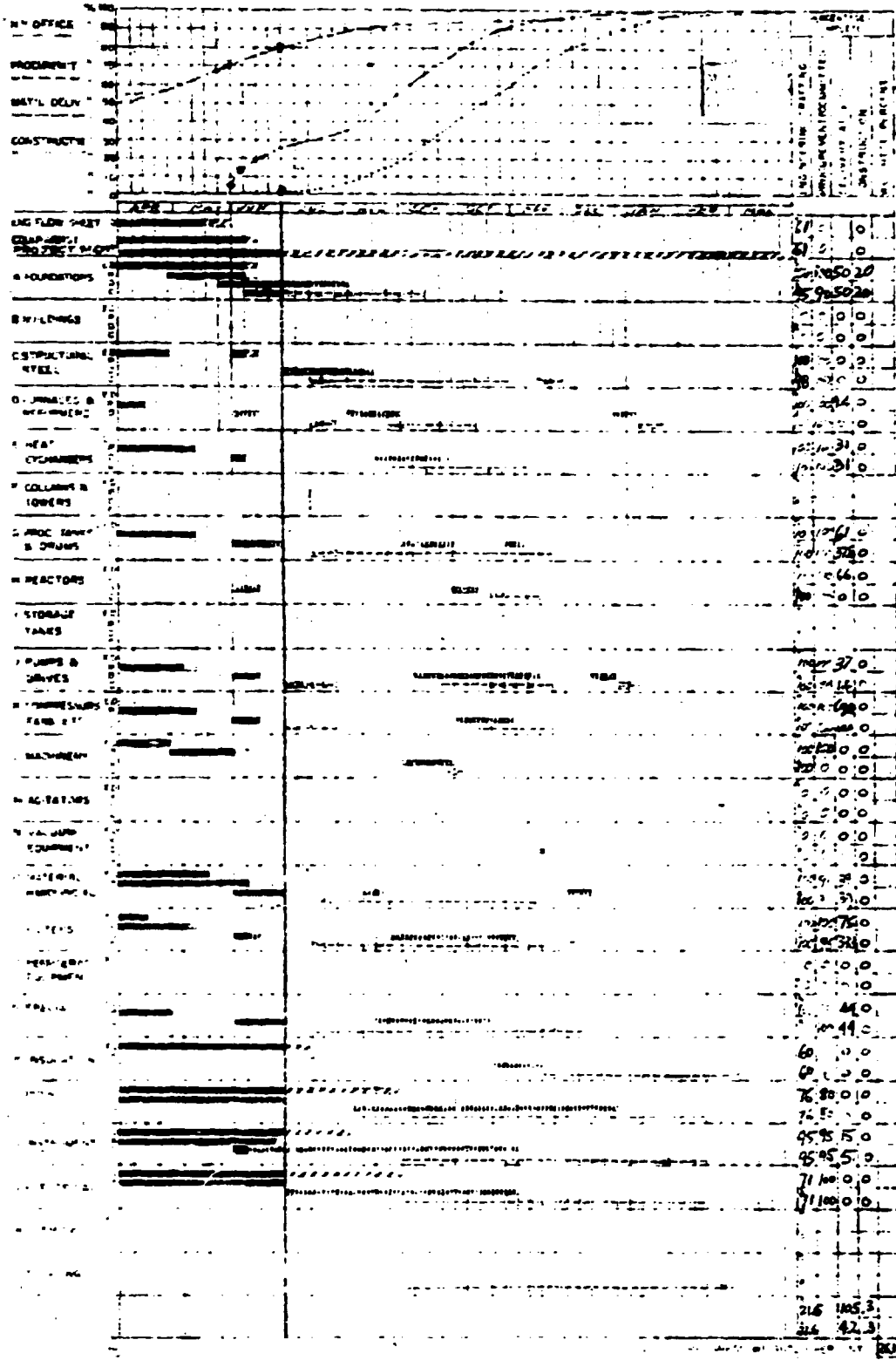
- (4) Overall, Chemico is approximately on schedule.

Specific observations about the overall project schedule are as follow:

- (1) Chemico is behind the schedule on engineering and drafting of engineering flowsheets (process flowsheets and P&I drawings), foundations, and structural steel.
- (2) The delivery of some of the equipment in Category D is behind schedule. Specifically, Battelle believes the inert gas generator and steam generator packages are delayed from an examination of Chemico's Materials Status Reports.
- (3) Neither the sludge settler tank nor the high-pressure water storage tank have been delivered yet. These were promised for late June. Consequently, in Category G, deliveries are shown behind schedule. Our opinion is that a small delay in delivery of these vessels is not critical.
- (4) Deliveries are behind in Category H because the burner and gasifier vessels were not delivered as scheduled in early June. We did receive the burner vessel at the site on July 15 and the gasifier vessel is expected the week of July 22.
- (5) The deliveries of some filters and instruments (to the panel vendor) are apparently behind also.
- (6) Procurement is only slightly behind schedule.

At present, we foresee no reason why Chemico will not complete the PDU on schedule. However, as noted in the "Problems and Recommendations" Section of this report, there is an unresolved steel problem which could seriously influence the schedule.

At present Battelle is contractually committed to conclusion of all experimental work by July, 1975. We are not including an updated overall program schedule in this report. When discussions currently in



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progress with the OCR/A.G.A. operating committee are completed, we will incorporate a new overall program schedule based on the Chemico date for PDU completion.

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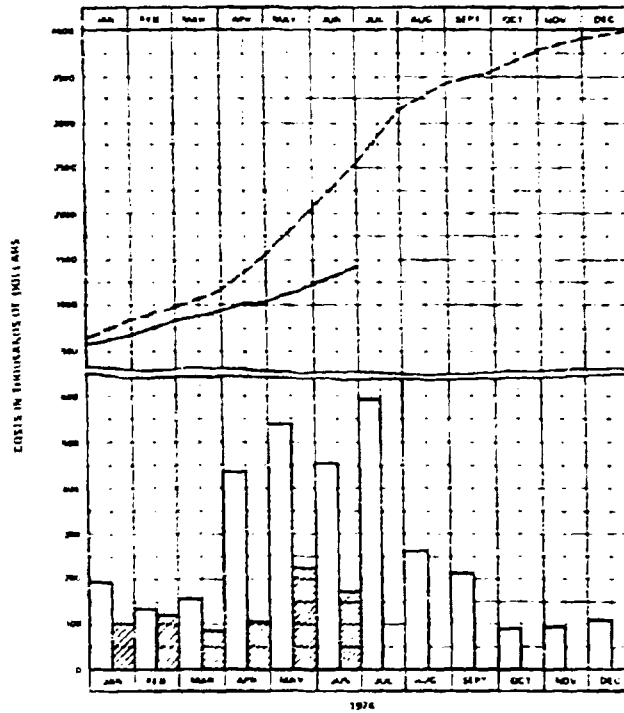
July 23, 1974

Table B-1 presents the Task Cost and Manpower Projection form for the month ending June 30, 1974. Billings have been paid to Chemico for New York operating costs through May and all of their fee except for the final payment which by contract is withheld. In addition, Chemico has been reimbursed \$109,890 for equipment invoices paid by them. Total actual disbursements to Chemico are \$957,017.41.

The cumulative money actually expended by Battelle, including payments to Chemico but exclusive of the Battelle fee, to date are about \$1,400,000 as shown in Table B-1. The cumulative expenditure, including the Battelle fee is about \$1,472,000. This is about 39 percent of the total encumbered* funds for the project. We have approved payment of another voucher from Chemico for payment by them to equipment vendors. The voucher was for \$81,057.33. Its payment is not reflected in either the total disbursement to Chemico noted above nor in our voucher to OCR for June. The approval was received too late for our accounting group to make the payment. Chemico estimates their billings for New York

* 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 B 1
BATTTELLE PDU
TASK COST AND MANPOWER PROJECTIONS
MONTH ENDING JUNE 30, 1974



MANPOWER (MAN MONTHS)

Prd	6.0	6.0	6.0	6.0	6.5	6.5	6.0	5.0	11	11	13	15
Act	4.3	4.0	4.4	3.7	3.0	4.6						

DIRECT LABOR & OVERHEAD COSTS (THOUSANDS OF DOLLARS)

Prd	21.8	19.8	22.8	25	25	25	32.5	36	60.8	65	77	96.5
Act	19.6	18.2	16.4	17.8	17.9	21.6						

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

Prd	169	115	126	404	504	422	556	221	145	7	0	0
Act	77.9	103	64.9	87.8	207	142						

NON EXPENDABLE EQUIPMENT (THOUSANDS OF DOLLARS)⁽²⁾

Prd	0	0	0	0	0	0	0.5	1.0	1.2	10.0	4.0	1.5
Act	0	0	0	0	0	0						

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

Prd	3.2	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	2.2	4.6	4.3						

TOTAL (THOUSANDS OF DOLLARS)⁽⁴⁾

Prd	194	138	156	434	534	452	581	261	213	90	93	110
Act	100.7	123	86.6	107.8	229.5	168						

KEY TO GRAPH:

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

NOTES

- (1) INCLUDES CONSULTANT FEES
- (2) NON EXPENDABLE EQUIPMENT IS NOT PURCHASED BY SUBCONTRACTOR OR INCLUDED IN SUBCONTRACT CATEGORY
- (3) COST OF BATTTELLE RESIDENT CONSULTANTS INCLUDED IN THIS CATEGORY
- (4) DOES NOT INCLUDE BATTTELLE TAX

operating costs for the months of June and July will be about \$300,000. Only the actual disbursements to Chemico are included in Table B-1.

As of July 3 Chemico (in their monthly progress report to us) estimated that a total of about \$1,934,000 has been "spent" or committed by letter of intent for equipment and materials.

We estimate on the basis of the above information that as of early July, \$3,223,053 has either been spent or committed on the project. This is approximately 85 percent of the encumbered funds. By the end of the current month it is estimated that about \$3,373,053 will have been either spent or committed, or by the end of July, 89 percent of the encumbered funds.

In our previous monthly report to OCR we noted that, should equipment deliveries and construction hold as now scheduled, a preliminary assessment indicated we would be encroaching upon funds currently encumbered for the project within 60 days. Battelle formally advised OCR of this by letter of June 17 from M. L. Gray to J. A. Nelson.

As a result of the numerous delays in completion of our Coal Gasification PDU by the subcontractor and associated cost increases Battelle is in the process of preparing a proposal for a prime contract modification. We hope to formally submit this to OCR and A.G.A. by July 31.

The proposal will contain updated cost information and a new overall project schedule.

It is also planned that the report of the results of the special review of all aspects of Chemico's operation on our subcontract with them will be submitted around the end of this month. Continued close monitoring by Battelle of all aspects of the subcontract is planned.

BATTELLE'S 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 and Special Review)
- (6) R. D. Fischer
- (7) R. Filbert (Special Review)
- (8) D. Peterseim (Special Review)

CHEMICAL CONSTRUCTION CORPORATION
PERSONNEL ASSIGNED TO PROJECT

- | | |
|---------------------|-----------------------|
| (1) S. G. Arya | (21) J. R. Mavus |
| (2) H. H. Becker | (22) E. J. Miller |
| (3) R. A. Brady | (23) F. Nesi |
| (4) E. T. Coles | (24) S. Noss |
| (5) S. DeMarco | (25) H. Osborne |
| (6) H. M. Diamond | (26) J. L. Parodi |
| (7) M. J. Dicianni | (27) E. A. Postrik |
| (8) H. L. Drescher | (28) N. Kazfar |
| (9) G. G. Elsis | (29) J. P. Regan |
| (10) F. Elstner | (30) E. C. Reidy |
| (11) H. Fredrickson | (31) P. S. Schlaff |
| (12) G. Guterman | (32) F. W. Shirley |
| (13) G. Handza | (33) L. Van Amerongen |
| (14) H. J. Hubchen | (34) N. Vario |
| (15) D. Iorio | (35) F. Witzig |
| (16) R. L. Jordan | (36) A. Yuen |
| (17) V. Kuris | (37) F. Peterson |
| (18) J. Landy | (38) J. Ferrone |
| (19) J. Lazzarotti | (39) E. Ezcurra |
| (20) J. J. Madorna | |

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

** Identified by Chemico as "key" staff on project.