BCL-MPR--20

TECHNICAL SECTION

of

PROGRESS REPORT NO. 20

on

CONTRACT NO. 14-32-0001-1513

to

OFFICE OF COAL RESEARCH

September 19, 1974

BATTELLE
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

SUMMARY

Work continued on completion of the detailed design and procurement of the PDU by Chemico's New York offices during this reporting period. Substantial field construction activity by Chemico has resulted in the completion of virtually all of the foundation work. Steel erection began and all of the steel for one of the two support structures required for the PDU is at the site. Some items of PDU equipment were installed. Equipment and materials continued to arrive. Work during the forthcoming reporting period will be concentrated on steel erection, equipment installation, and the fabrication and installation of small bore piping. Progress is being made on the compressor building, construction, and modifications to the existing building. This work, a portion of Battelle's financial contribution to the program, is being done by a local contractor.

Chemico confirmed on September 17 that they will have concluded the major PDU design activity in New York by the end of September.

Technical problems have arisen regarding the acceptance of some vessels in the PDU by Chemico. These problems are not major and they are being resolved. There are administrative and financial problems of which the Operating Committee has been fully advised.

Battelle continued to monitor the activity of Chemico both in New York and in the field.

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INTRODUCTION AND PROJECT OBJECTIVE

This progress report describes work completed by Battelle on the Coal Gasification Program during the period August 18 - September 18, 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 COMPLETED

Detailed Engineering Design and Procurement of the PDU

Chemico provided us with a new overall project schedule for the PDU installation on April 4, 1974. This schedule was first presented in Progress Report Number 15. Since then Chemico has been updating the schedule and reissuing it. The most recent version received by Battelle was incorporated in the previous monthly report to OCR. No change has occurred in the end point of the schedule since it was issued. 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. On September 17, the Chemico project manager confirmed that virtually all New York office engineering design and procurement activity would be completed by the end of September. The following status of activities is provided based on our observations during this period as well as the 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 information from the Chemico project engineer, the emphasis in drafting is continuing on checking completed piping drawings.

• Process Flow Diagrams*. At this date "issued for construction" process flowsheets have still not been received. Only minor modifications are required to the flowsheets to reflect Chemico's final calculations. A backlog of more critical drawings in drafting at Chemico is obviously precluding production of the "final" flowsheet drawings. We have discussed our desire to receive Chemico's formally issued-for-construction flow diagrams with Chemico's vice president for projects. We were told by him that the drawings would be in our hands by mid-October.

• Utility Flow Diagrams**. The utility flow diagrams have been approved by Battelle and issued for construction by Chemico.

• Piping and Instrumentation Diagrams. Battelle has approved these and they have been issued for construction by Chemico. The drawings are continually being "marked up" as the need arises and Battelle will be kept advised of the mark-ups on a periodic basis (e.g., in October and again in January). "As-built" drawings are not required from Chemico.

• Electrical Wiring Drawings. These drawings have been issued for construction. Battelle has copies of the electrical drawings. We are examining these and expect to follow the electrical work in the field.

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

Section Number	Name
100	Coal Receiving and Storage
200	Coal Preparation and Grinding
300	Coal Pretreatment
400	Coal Feed System
500	Coal Gasification
600	Gas Treatment

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

Section Number	Name
700	Air, Inert Gas, and Natural Gas Utilities
800	Steam and Water Utilities

• Foundation Drawings. All foundation drawings are completed and have been issued.

• Underground Electrical and Piping Drawings. These drawings are complete and have been issued to the field.

• Piping Drawings. As noted, Chemico's primary drafting activity involves continued checking of these drawings for issue. About 80 percent of the piping isometrics have been issued and Battelle has copies of these. Chemico reports that their piping drawings are 90 percent complete. Drawings of the steam tracing systems remain to be completed as do about 30 percent of the drawings for refractory-lined piping. We understand that all of the refractory-lined piping drawings will be finished the week of September 16 at which time Chemico will hand carry them to the piping fabricator. We have been told that the Teflon®-lined piping drawings have been completed and have been given to the fabricator and liner of this piping.

• Plot-Plan and General Arrangement Drawings. Chemico reported on September 17 that these are 90 percent complete. These drawings are being refined, incorporating piping information and information from vendor-certified drawings and will not be issued for construction until all piping isometrics are completed.

• Instrument Related Drawings. Instrument related drawings are, in general, 90 percent or more complete, but are being updated. We expect to receive a new instrument schedule (list) the week of September 16.

• Structural Steel Drawings. The structural steel drawings for both the burner-gasifier structure and the coal feed structure have been completed some time now. Chemico has approved the steel fabricator's detailed drawings also.

• Vendor Certified Drawings. These drawings are apparently a problem. A central office at Chemico's New York office receives these drawings from the vendors and apparently they have a substantial number of them. Neither the Chemico field construction superintendent nor Battelle have the vendor prints. Action was promised by the Chemico vice president on September 17 to assure our receipt of these vendor drawings.

Requisitions and Purchases

Purchase orders for all of the major items of process equipment shown on the process flowsheets have been issued by Chemico. Purchase orders have also been issued on substantially all of the bulk items*.

Change orders on many of the bulk-items are being issued almost daily by Chemico. The change orders are made necessary by updated materials take-offs on completed isometrics. The nature of the change orders is normally that of increasing or decreasing quantities, splitting orders, cancellations, etc.

Chemico has requested Babcock and Wilcox (the selected refractory subcontractor to Chemico) to bid on refractory lining two of the cyclones supplied by Ducon. They have not received the B and W bid yet.

Additional, new orders are also being issued on electrical conduit. All required electrical conduit is to be in the field during the first week in October. Purchase requisitions on the steam tracing, pipe supports, insulation (subcontract), and painting (subcontract) have not been released by Chemico yet. We expect momentary release of these requisitions and that selections will be made within the forthcoming reporting period.

It also appears that it will be necessary for Chemico to repurchase a steam boiler. This is discussed in the problems and recommendations section of this report.

Expediting

We have continually emphasized to Chemico the importance which Battelle attaches to thorough expediting in order to maintain the schedule. We receive Chemico's updated materials status report which lists all purchases and their status weekly. The materials status report is reviewed in depth by Battelle with Chemico's chief expediter periodically.

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* Bulk items consist of items like insulation, piping, instrumentation, electrical, painting, and miscellaneous site work.

We are informed by Chemico that for minor items they rely on telephone contacts and for major items visits to vendor's plants are made.

Between 6 and 8 items which could be classified major are supposed to be at the site and are not. Deliveries of substantial amounts of minor items also continue to be delayed. Battelle believes that currently it is the "minor" items which are retarding construction progress from a higher rate of speed.

Chemico is visiting the following vendors of major items within the next week:

(1) Steel fabricator

(2) Piping fabricator

(3) Fabricator of vessels.

Battelle will join Chemico in some of these visits.

Relentless effort is required to produce both the major and minor equipment and materials items at the site as required. We believe a conscientious effort is being made by the project management at Chemico to expedite. For examples some local spot purchasing is being done and orders are being cancelled and placed elsewhere when this is practical.

Mr. Mark Young, Chemico's construction superintendent, has been requested by the construction manager in New York to prepare a list of what materials he considers critical and what the implications of delays in their delivery are. It is expected that Battelle will receive a copy of Mr. Young's list.

Equipment and Materials Received at the Site

Approximately one-third of the major items of process equipment have arrived at the site. The rate of receipt of major items has slowed somewhat during this reporting period from what it was in the previous reporting period. The equipment is stored at the site 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:

FLOWSHEET EQUIPMENT ITEMS

Description

G-101 Coal Mill Surge Hopper
G-102 Coal Receiving Hopper
R-101 Grizzly
K-201 Main Fan
D-201 Inert Gas Generator (for Coal Pulverizer)
K-203 Combustion Air Blower
K-202 Auxiliary Fan
O-201 Coal Pulverizer
P-201 Cyclone Separator & Support Ring
L-202 Spinner Separator
P-203 Bag Filter
J-301-A&B Oil-Solids Pumps
O-301 Screw Conveyor Cooler
P-301 Pretreater Cyclone

P-401-A&B Bag Filters and Bin Vents
G-401-A Combustor Feed Bin
G-401-B Gasifier Feed Bin
G-402 Combustor Feed Pressurizing Bin
G-403 Combustor Feed Injection Bin
G-404 Pretreated Coal Receiving Bin
G-405 Gasifier Feed Pressurizing Bin
G-406 Gasifier Feed Injection Bin

H-502 Gasifier Vessel and Spare Head*
H-501 Combustor Vessel and Spare Head*
O-502 Char and Sinter Cooler-Conveyor
K-501 Heater Recycle Blower

J-602-A&B Venturi Circulating Pumps
E-604 Recycle Make Gas Cooler
K-603 Recycle Make Gas Compressor

G-703 Instrument Air Receiver
E-703 Instrument Air Aftercooler
K-701-A&B Process Air Compressors
G-701-A&B Process Air Receivers
R-701 Instrument Air Dryer Package
K-703 Natural Gas Booster Compressor

D-803 Steam Superheater
J-804-A&B Valve Cooling Water Pumps
V-802 Emergency Electrical Generator**

* Returned to vendor for modification.

** Dropped in the field and returned to vendor for repairs.

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 Glove 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
U-041	Pneumatic Pressure Transmitters
V-032	Miscellaneous Electrical Supplies
U-060	Control Valves
U-020	Pressure Gauges
B-101	Small Bore Pipe
U-030	AIT 10-22 Gas Analyzers
"	AIT 30-39 Gas Analyzers
"	AIT 50-11 Gas Analyzers
80V	Unistut
80V	Lighting Fixtures
80T-022	Pipe Fittings
U-100	Lab Panel
U-041	d/p Transmitters
80T-040	SS Pipe
U-060	Valves
80T-615	Valves
T-450	Swagelock Fittings

In addition to the above items the fabricated structural steel from the fabricator began to arrive on August 15. Presently all the steel for the coal feed structure is on site. The steel for the other structure

(the burner-gasifier structure) is currently being fabricated in Chicago and we understand* from Chemico it will be on site the first week in October.

Because of difficulties with the major vessels which are described in the Problems and Recommendations Section of this report, Chemico has decided to place a full-time inspector in the vessel fabricator's shop beginning September 19.

Construction of the PDU

Chemico issued their first construction schedule on May 23, (Issue P-1). Several refinements to the schedule have been made since the first issue. Copies of the updated issues have been provided to Dr. R. E. Vener of OCR, Dr. Ab Flowers of A.G.A., and Dr. R. Detman of C. F. Braun with Battelle's monthly reports**. Chemico's most recent updated construction schedule which we presently have is dated September 16. Copies of this are being provided to the Operating Committee and to Dr. Detman.

The updated issues of the construction schedule are revised to show the projected delayed delivery of structural steel and projected later dates for refractory installation. Also shown on the construction schedule are the "actuals". Battelle's knowledge of the Chemico construction schedule indicates that, probably mechanical completion will be delayed from February 15, 1975, to around April 1, 1975. A delay has not been formally reported by Chemico.

Construction formally began on June 10. Work done prior to mid-August was reported in our previous monthly reports to OCR. Battelle's field office is in daily contact with the Chemico construction personnel and more formal biweekly meetings between the Chemico field construction management, Battelle project staff, and various observers are held.

During the current reporting period, the underground water lines to the cooling-tower area were fabricated, emplaced, tested, and accepted. This completes all underground water distribution piping.

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* Battelle's Mr. R. R. Adams is visiting the fabricator on September 19th to verify this.

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

Backfilling and compaction of the coal-feed and burner-gasifier areas was completed, the electrical grounding system was installed, and the floors with their equipment-supporting pads were poured. With the exception of the pads for the electrical substation, the cooling-water-treatment system, the coal-storage area, and an external pad for some minor equipment, all concrete work is complete. A picture showing the foundations substantially complete and the backfilling activity is shown on the next page.

Steel erection was started during the first week of September. The coal-feed structure has been essentially completed to the first support level, and the first major coal-feed vessels are scheduled to be hung in position on September 16. The steel work completed as of September 9 is shown in the picture on the page after the next one.

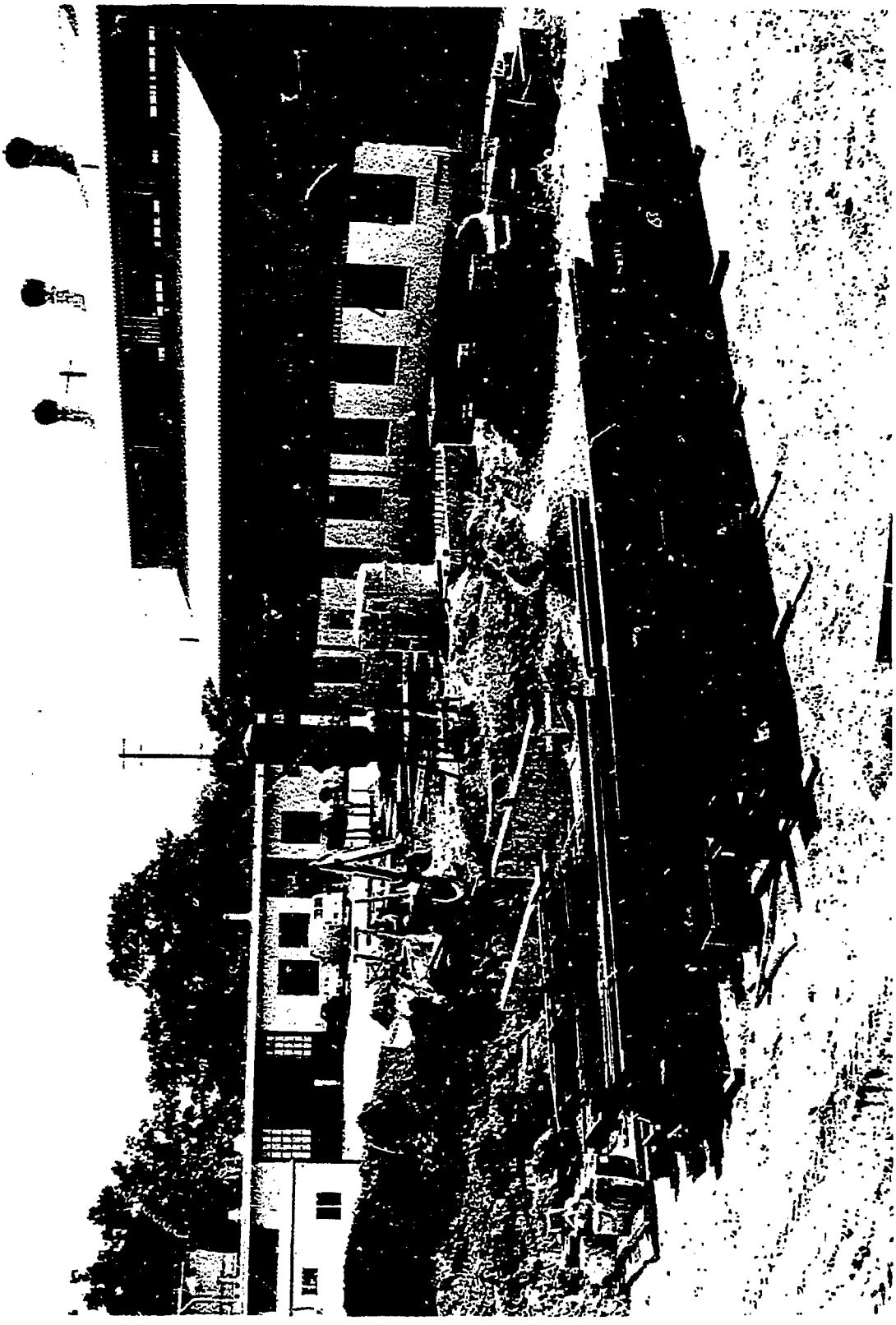
Eleven items of equipment, including the pulverizer and the char conveyor/cooler have been set in position at the ground level.

Chemico's temporary building for pipe fabrication and storage was completed and is in use. Battelle's contractor is at the site to commence construction of the building to house the compressors, boiler, and auxiliary equipment and to make the necessary modification to the existing facilities.

As noted in last month's report, the combustor vessel was returned to the fabricator for flange alterations. The gasifier vessel was received at the site during this reporting period, but it also will have to be returned for correction. This will delay the refractory-lining operation, but it may not have an adverse effect on the over-all schedule.

The locally hired labor force averaged between 30 and 35 during this reporting period. There were no lost-time accidents.

Most of the piping isometrics have now been received in the field. Work during the next reporting period will concentrate on steel erection, equipment emplacement, and fabrication and installation of piping.



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.

Battelle reviewed the drawings for refractory-lined expansion joints submitted to Chemico for approval by Tube Turns. After discussing the designs with Mr. Lou Rice at C. F. Braun we provided approval to Chemico.

Our Plant and Facilities Department has been supervising the building additions and modifications contracted for and paid for by Battelle. They are maintaining close coordination and communications with the Battelle project staff.

Members of our Applied Solids Mechanics Section have done stress analysis on the major vessels and have visited with us the vendor's shop. Battelle groups have also done wall thickness measurements on some of the vessels received and chemical analyses on metallic components of the vessels.

On September 11 a meeting was held at Battelle with Chemico participation in which we reviewed technical aspects of the project with the A.G.A. Industries Advisors. The meeting included a visit to the site.

No significant progress was made on the turbine procurement during this reporting period. Also there is no progress to report on the Battelle legal staff's attempts to get our natural gas allocation increased at the site.

PROBLEMS AND RECOMMENDATIONS

Other than the general problems of delays in equipment and materials deliveries noted elsewhere in this report the following additional technical problems are of concern.

(A) Vessels

Both the burner and the gasifier vessels had to be returned to the fabricator. In the case of the burner the depth of certain flange welds had to be increased and modifications which

permit tight bolt-down of the flanges had to be made. For the gasifier some sections of the steam injector nozzles had to be replaced with stainless steel and modifications which permit tight bolt-down of the flanges were necessary. Because these changes were required the decision was made to repeat the hydrostatic tests on these vessels. Chemico also plans to do independent hydrostatic tests on the four coal feed lock hoppers.

The circumstances which necessitated this added work prompted Chemico to assign a full-time inspector to the vessel fabricator's shop. Battelle also plans to conduct detailed examination of vessels in the shop ourselves and to have our vessel expert follow the construction and testing of remaining vessels and modifications to the ones returned. This should assure better quality control on the remaining vessels for our job from this shop. About 5 or 6 more pressure vessels are being built for us in this shop.

Unfortunately, the return of the burner and gasifier vessels is delaying the first move-in (Scheduled for September) of Babcock and Wilcox to install the refractory linings. The seriousness of such a delay has not been fully appraised yet. Babcock and Wilcox are presently scheduled for a second move-in in November* to do refractory lining of pipe and let-down lock hoppers. Possibly, in light of the vessel problem, the two moves can be combined into a single one.

(B) Refractory-lined, Shop-fabricated Pipe

As of September 17 Chemico had only provided the fabricator of this pipe with about 70 percent of the drawings required by him. The piping is mainly that in the solids transfer loop between the burner and gasifier and, in addition to being somewhat complicated (requiring substantial detailing), the procurement of it was complicated by the expansion joints purchase. The expansion joint design is now resolved and Chemico has told

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* This may be changed to December.

us the remaining drawings will be given to the fabricator the week of September 16. Upon receipt of all drawings the fabricator will provide a "firm" schedule. Battelle's estimate is that the piping to be refractory lined will not be available until about December.

(C) Scrubber Systems

The vendor (fabricator) of the three Venturi Scrubber Systems is having a problem obtaining metallic alloy parts specified by Chemico which are part of the internals in the scrubbers. Battelle, after consultation with our materials-of-contruction specialists agreed to substitutions recommended by Chemico.

The vendor is still delaying fabrication of the scrubber systems in spite of visits by Chemico expeditors and, in one case, a visit by Chemico's project engineer. The promised delivery date currently is not until January which does not fit the current PDU construction schedule. An additional visit by Chemico (and perhaps Battelle) to the vendor's shop is planned. If the scrubber systems cannot be obtained earlier it may be necessary to pipe around them and add them when they can be obtained.

(D) Steam Boiler

Chemico recently learned that the vendor of the packaged steam boiler purchased on this job closed their shop and had gone into receivership. The steam boiler is only partially complete and it is probably impractical for Chemico to obtain the partially completed boiler out of the present vendor's shop and attempt to get others to complete it. Chemico is exploring the possibility of purchase of a used 6000 lb/hr boiler as well as a new one within a reasonable period of time. Battelle intends to check with local people from whom we have previously purchased packaged boilers.

(E) Pretreater Vessel and Let-down Lock Hoppers

The pretreater vessel is shown on Chemico's materials status report as due at the site on October 1. The Chemico

expeditors continue to inform us that the vendor says he will make this date. Battelle staff have visited this vendor's shop in the past two weeks and we did not observe any activity on this particular vessel.

If the pretreater is delayed a month or so, as we suspect it may be, this probably will not prove critical to the overall construction schedule.

The let-down lock hopper vessels are presently scheduled for an early November delivery. Chemico has tried without avail so far to get a commitment from the vendor to an earlier delivery. This effort will be continued.

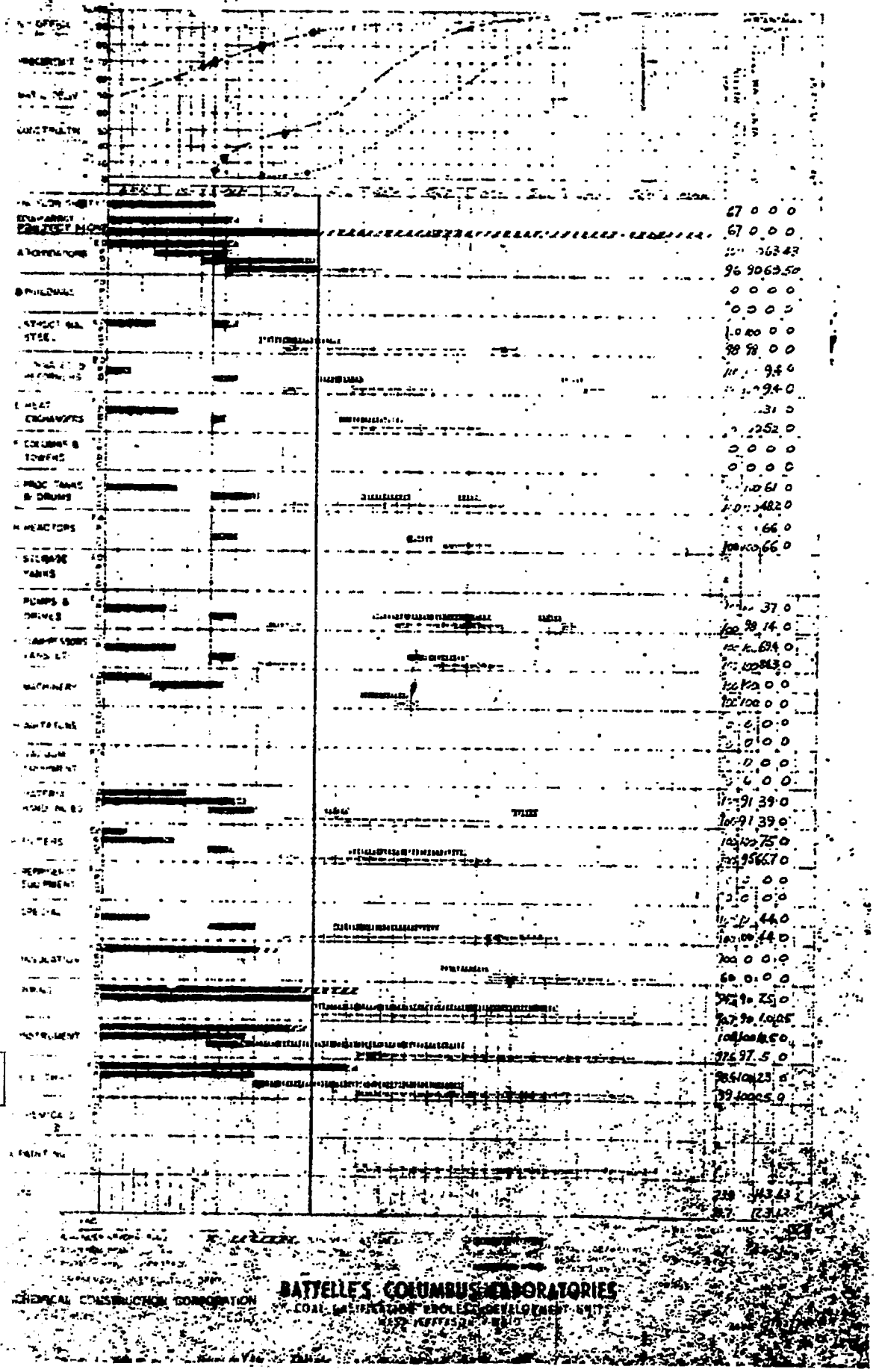
These technical problems we are experiencing related to equipment and materials deliveries of course have a bearing on the schedule. We do not believe these types of problems are unique in the industry at present. Continued diligence to solving and working around problems of the nature noted will be the general method of approach.

Work Plan and Schedule

Major emphasis at Chemico will be on concluding their New York office engineering activity, expediting, and field construction during the forthcoming reporting period.

The overall schedule which Chemico has been working on since April of this year has remained essentially unchanged since then. A copy dated August 2 was included in our previous report to OCR. This August 2 version is repeated in this report for reference as page 18. Chemico is late in transmittal of their monthly report to us this time and therefore we did not receive an updated schedule showing actual completion versus predicted in time for incorporation in this report. When we do receive it we will forward copies to the Operating Committee.

Battelle has been making the observation in the last several monthly progress reports that Chemico has been approximately on their overall schedule. However, we have been noting that deliveries appeared to be behind. This was true especially for structural steel which was about a month behind.



Now that field construction, not started until June 10, has progressed further it is becoming apparent to us that Chemico is unlikely to meet an overall mechanical completion date of February 15, 1975. We have not been formally advised by Chemico of any slippage in the projected completion date but discussions with their field personnel lead us to believe that early April may be a more realistic date for PDU completion. To avoid any further delay it is absolutely essential that deliveries improve.

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. A new overall schedule is contained in our contract modification proposed to OCR on August 6 and August 27 and is being examined by them. When the new schedule is approved, we will include it in our monthly reports.

FINANCIAL AND ADMINISTRATIVE SECTION

of

PROGRESS REPORT NO. 20

on

CONTRACT NO. 14-32-0001-1513

to

OFFICE OF COAL RESEARCH

from

BATTELLE
Columbus Laboratories

September 19, 1974

Financial

Table B-1 presents the Task Cost and Manpower Projection form for the month ending August 31, 1974. Billings have been paid to Chemico for New York operating costs through July and all of their fee except for the final payment which by contract is withheld. In addition, Chemico has been reimbursed $557,812.40 for equipment invoices paid by them. Total actual disbursements to Chemico are $1,643,554.90.

We have received and approved additional vouchers from Chemico for equipment purchases amounting to about $191,060. This approval was received too late by Battelle's accounting group for the payment to be reflected in this month's Battelle voucher to OCR.

The cumulative money actually expended by Battelle, including actual payments to Chemico but exclusive of the Battelle fee, to date are about $2,130,255 as shown in Table B-1. If the Battelle fee and approved-but-not-paid vouchers of Chemico's are included, the "expended" by Battelle is about $2,403,615. This is about 58.6 percent of the total encumbered* funds for the project.

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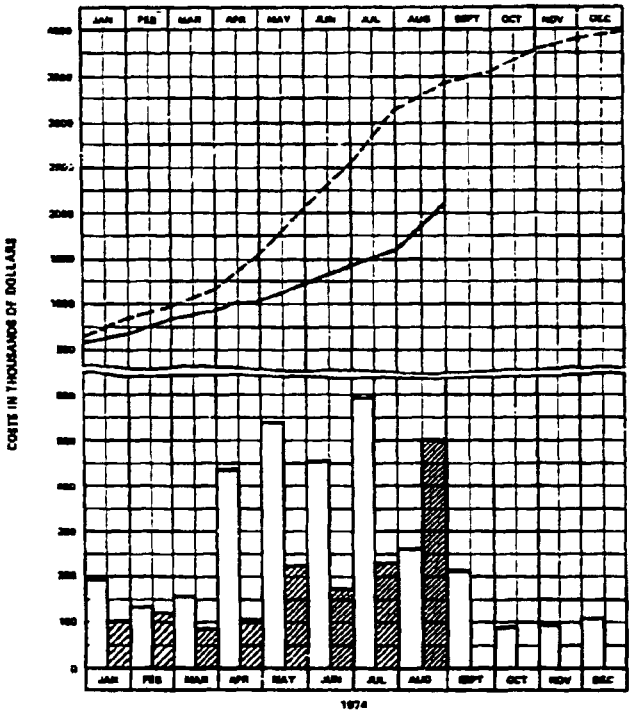
* Letter from Mr. G. Edward Larson (OCR) to Battelle dated July 24, 1974, shows OCR funds of $2,733,333 and A.G.A. funds of $1,366,667.

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



MANPOWER (MAN-MONTHS)

Proj.	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	3.7	4.0	4.8	4.2	4.3				

DIRECT LABOR & OVERHEAD COSTS (THOUSANDS OF DOLLARS)

Proj.	21.8	19.8	22.8	25	25	25	32.5	36	60.8	65	77	88.5
Act.	16.8	16.2	16.4	17.8	17.9	21.8	18.3	18.9				

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

Proj.	109	115	128	404	594	422	856	221	145	7	0	0
Act.	77.9	103	64.9	87.3	207	142	298	476				

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

Proj.	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	0	0				

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

Proj.	3.2	3.2	4.2	5.0	5.0	5.0	2.0	3.0	8.0	8.0	12.0	12.0
Act.	3.2	1.4	2.3	2.2	4.8	4.3	3.7	4.3				

TOTAL (THOUSANDS OF DOLLARS)[4]

Proj.	194	138	156	434	634	462	661	261	213	93	93	110
Act.	180.7	123	85.8	107.8	228.5	168	230	501.2				

KEY TO GRAPH:

PROJECTED TOTAL COSTS — ACTUAL TOTAL COSTS

PROJECTED CUMULATIVE — ACTUAL CUMULATIVE

NOTES:

(1) OUTSIDE CONSULTANTS

(2) NON-EXPENDABLE EQUIPMENT TO BE PURCHASED BY SUBCONTRACTOR IS INCLUDED IN SUBCONTRACT CATEGORY

(3) COST OF BATTELLE RESIDENT CONSULTANTS INCLUDED IN THIS CATEGORY

(4) DOES NOT INCLUDE BATTELLE FEE

By telephone on September 16 Chemico informed us that they estimate a total of about $3,211,681 will have been either spent by them or committed to equipment purchase by the end of September. We estimate that this combined with Battelle expenditures on the project, including the Battelle fee, will bring the total amount either spent or committed to about $3,780,000 at the end of September or 92.3 percent of the encumbered funds.

Because we were encroaching upon funds currently encumbered for the project and the delays in PDU installation would not allow Battelle to meet our schedule commitments, we submitted a proposed prime contract modification to OCR in August with subsequent copies to A.G.A. The proposal contains updated cost information and a new overall project schedule.

Both the Operating Committee and the OCR's contracts officers are fully aware of the financial problems associated with the project and Battelle is in frequent contact with them on these matters.

Administrative

We believe administrative problems we experienced before with Chemico have, for the most part, been eliminated by Chemico's assignment of Mr. John Regan as project manager and Mr. Thomas Dillon as project engineer. The monthly progress report from Chemico for the month of August is late this time. However, we believe the lateness of the report is due to valid reasons.

The chief administrative problem at this time is receiving an early approval of OCR and A.G.A. of the modified proposal for the prime contract modification submitted on August 27 to OCR with a subsequent copy to A.G.A.

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

CHEMICAL CONSTRUCTION CORPORATION PERSONNEL ASSIGNED TO PROJECT**

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

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* 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.