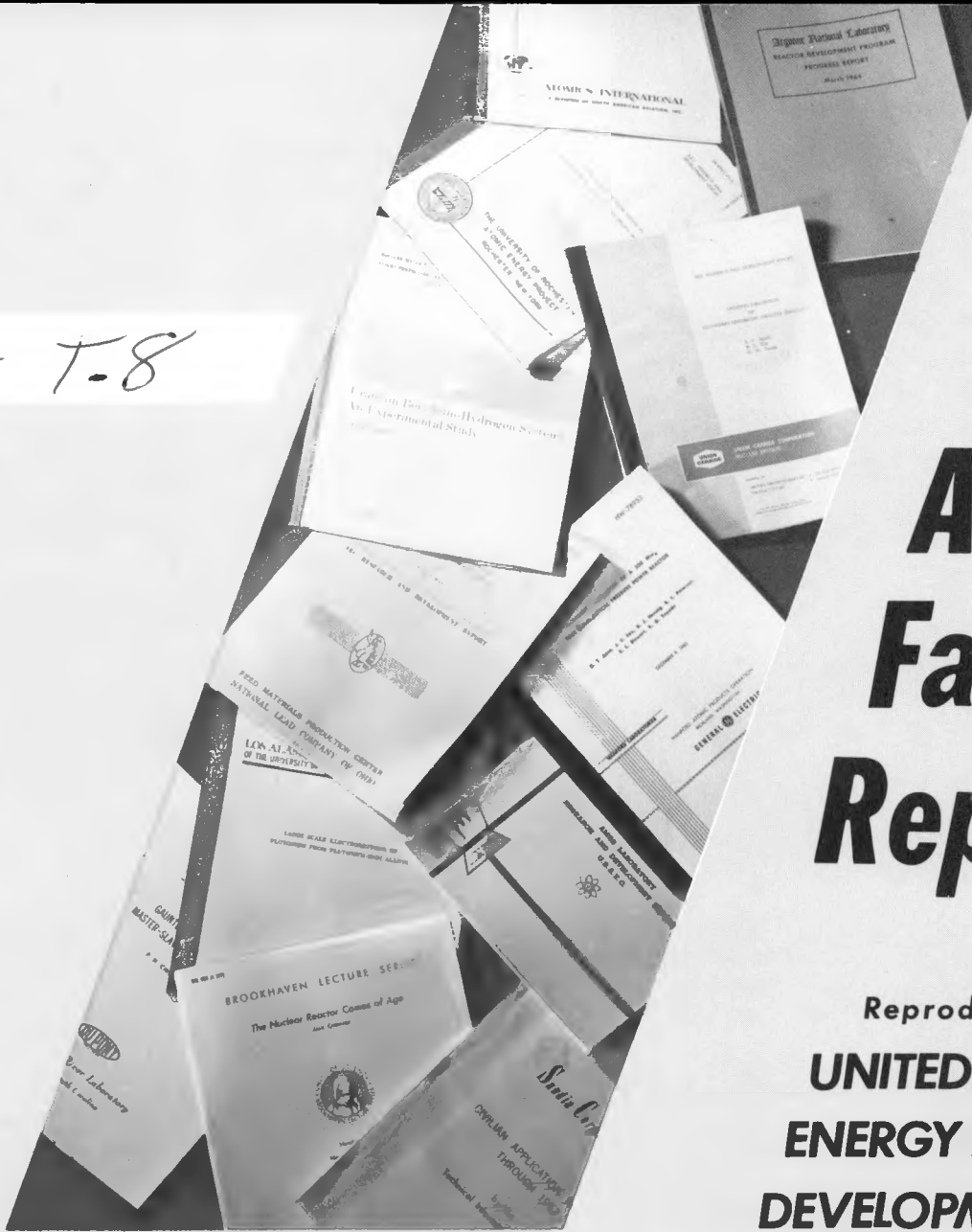


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FE-415-T-8



MASTER

A Facsimile Report



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MASTER

FE--415-T8

**CONSOL LIGNITE GASIFICATION
PROCESS DEVELOPMENT**

Monthly Progress Reports for the
Period January - December, 1971

Consolidation Coal Company
Liberty, Pennsylvania 15129

Prepared for
Office of Coal Research
U. S. Department of the Interior

OCR Contract No. 14-01-0001-415(3)

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FE--415-T8

CONTENTS

Monthly Progress Reports 80 through 91 covering each
month January 1 through December 31, 1971, respectively

NOTICE

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or usefulness of any information, apparatus, product or
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PROGRESS REPORT NO. 80
 OCR CONTRACT NO. 14-01-0001-415(3)
CONSOL LIGNITE GASIFICATION PROCESS DEVELOPMENT

January 1 to 31, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

The present supply of welders is adequate for construction needs; the current projected construction completion date remains July 5, 1971. As directed by OCR, no interruption of the construction work is planned, despite a possible shortage of funds in late FY 1971.

The projected GMP remains unchanged. Five change orders currently are in negotiation; it is expected that all but the one related to engineering of changes will be received by late February.

Stearns has agreed to hold costs associated with operations at about the current level for the next few months (to reduce costs in FY 1971). Current effort is devoted to technical familiarization and operating manual preparation.

Financial

Estimated expenditures in January were \$552,080 by Stearns and \$15,000 by Consol. Cumulative project cost is \$8,172,200.

B. Technical Results and Program

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

1. Supporting Process and Economic Analysis (Project No. 533)

No work was done on this project.

2. Supporting Patent and Legal Activities (Project No. 534)

The current reports and memoranda were reviewed for Subject Inventions.

3. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 536)

Consol's major activity continues to be monitoring the field activities of Stearns-Roger. This requires one full-time engineer and miscellaneous part-time experts. The refractory specialist continued to check on installation of reactor internals. A piping and welding specialist made several visits, checking on welding procedures and welder test requirements.

Eleven change orders were reviewed and presented to OCR for approval. This includes Nos. 8, 17, 42, 43, 53, 54, 55, 57, 63, 66, and 73 and totalled \$634,957. Change Orders No. 53, 55, and 57 largely relate to providing facilities for conforming to the latest local, State and Federal air and liquid anti-pollution requirements. These three change orders totalled \$509,290.

Five orders remain unresolved but of these, all but No. 74 (Engineering) should be mutually agreed upon before the end of February. These five total \$339,839.

A meeting was held in Rapid City on Jan. 20, 1971 to review the status and funding of the project. Despite a possible limitation in funds in FY 1971, OCR directed Consol and Stearns not to interrupt the construction work. Insulation and hot tracing will be deferred until June or July of 1971.

January, 1971

4. Stearns-Roger Construction Subcontract (Project No. 700)

The Stearns progress report is attached. The current target completion date is July 15, 1971. Sufficient welders are now on the job to meet the construction needs. Prefabricated pipe delivery is currently the critical item.

The current projected GMP is \$9,054,155; this includes the controversial \$345,609 item for engineering of change orders, but excludes \$180,000 which is associated with deferred heat tracing, painting and insulation.

5. Consol Guidance on Operations (Project No. 702)

Current effort is directed to the transfer of technical information to the Stearns staff. Daily operating meetings are being held for familiarization and for review of drafts of operating manuals.

6. Stearns-Roger Operating Subcontract (Project No. 701)

The progress report is attached. Current Stearns operating personnel include:

W. E. Powell, Plant Manager
Don Mosher, Operating Superintendent
Marion Vardaman, Technical Superintendent
Harold Lawless, Chief Chemist
Frank Johnson, Shift Engineer

Despite the limited funds available for the remainder of FY 1971, this nucleus can make very effective preparations for plant startup, short of operator recruiting and training.

C. Subject Inventions

None.

January, 1971

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through December, 1970</u>		
Through June, 1969	\$ 1,878,256	\$ 1,878,256
Consol	339,544	257,470
Stearns	5,387,300	5,366,600*
Total through December, 1970	\$ 7,605,100	\$ 7,502,326
<u>Expended in Period (estimate)</u>		
Consol	\$ 15,000	\$ 20,135
Stearns	532,100	719,500
Total, January, 1971	\$ 567,100	\$ 739,635
Cumulative through January, 1971	\$ 8,172,200	\$ 8,241,961

*Revised to be current as of January 1, 1971.

2/11/71

Att. - Stearns Roger Construction and Operations Progress Reports
Monthly Progress Chart

CONSOLIDATION COAL COMPANY PROJECT
CSA PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job. No. B-17400
February 2, 1971

OPERATIONS REPORT #11

The two hour meetings during each day have been held quite religiously. The meetings are quite informative and very helpful to all concerned to get to know the plant. Most of this month has been devoted to the study of the main panel board. We have discovered that the nomenclature between the panel alarm's graphic panel and main panel do not all check out. This is not necessarily mistakes; as an example, in one case there are sixty letters on a plastic window which is a nominal 2 X 3 window of which only 1/4 of the area is suitable for writing. These windows are up in the air approximately fourteen feet and there are roughly one hundred forty active lights per panel board. It is almost an impossibility to read this much information at that distance and to determine what is said. At the present time we are attempting to find out how that system can be abbreviated and letters made larger so that they can be read at a glance.

For all practical purposes we will have to rewrite the portion of the manuals prepared to date because the nomenclature for any piece of equipment must be the same with reference to operation and maintenance. This does not necessarily effect any construction work but that simplification will have to be put into practice for any reasonable type operation. The writing of this manual will become complicated enough with the simplest of language.

The rewriting of the manuals will also include a revised approach to the start up of area 200. The first step in the new approach will be to pressurize the system with inert gas, rather than air. The air will be excluded from the system, whenever the temperature in the reactors is less than 1000°F to prevent accumulation of hazardous gas mixtures.

We are informed by Mr. John Phinney by his letter of January 29 to Mr. Chuck Stone that we will have approximately \$150,000 to cover expenses of operation through the first six months of FY 1971.

With this in mind the operating department will operate on a tight budget for the months of February and March and make no commitments other than those absolutely necessary to keep running. By the end of March we will have a fair idea of where we stand at that particular time. This should also give us a clue on how much money we would have available to spend the last three months of the fiscal year.

(Continued)

CCC Project No. 536
February 2, 1971
Page 2-Continues

Amount Paid out to 1/31/71.....	\$98,870
Commitment thru January.....	63,625
December & January Payroll & Taxes.....	\$18,000
GSA Office Furniture.....	7,500
Telephone-January.....	300
Denver Charges.....	5,000
Dec. & Jan. Utilities, Guard Services, Sewer @ \$300.....	600
January Rentals.....	225
Laboratory Furniture.....	32,000
TOTAL	\$63,625
GRAND TOTAL.....	\$162,495
Amount of money for operation to December 31, 1970...	\$100,000
Amount of money for operation from January 1, 1971 to June 30, 1971.....	150,000
TOTAL	\$250,000

This would leave..... \$47,505
for operation to June 30, 1971.

PLANS FOR THE MONTH OF FEBRUARY

1. Since the two hour meetings that we have each day are working out so well we plan to continue these meetings until such time as the people get tied up in training of operators.
2. Complete operating manuals in all areas using the new nomenclature that will agree with the panel board, and the new approach.
3. Continue to complete the second laboratory list so that it can be submitted to GSA.

The entire list of Laboratory equipment will then be in the hands of GSA so that they can determine delivery and keep billing into July and August of 1971.

SPARE PARTS

We are endeavoring to go out on more quotes on spare parts. We are still having some difficulty in obtaining information to intelligently order some of these parts. In most cases when this exists we can go directly to the vendor and get information free of charge and much simpler an effort to run down to find out what happened.

W. E. Powell, Plant Manager

CC: Chuck Stone, Denver
Dick Hanson, Denver
John Phinney, Library
Joe Marvig
Don Mosher

Marion Vardaman
Frank Johnson
Harold Lawless
Darrel Dietrich
File

PROJECT STATUS REPORT
CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-37000
 February 3, 1971

PROJECT REPORT SUMMARY

Shift to the fifty hour week for pipefitters has now resulted in attracting enough qualified welders to meet our needs. Except for work deferred by Consol, project completion for the week of July 5 is determined by the maximum number of pipefitters that can work in the process structure.

ENGINEERINGProcess

The remaining process engineering work of reviewing plant operating instructions is about 35% complete.

Mechanical

Major equipment is all purchased and about 93% delivered. During January considerable time was spent to review and check the detail fabrication drawings for the process fired heaters.

Drafting - - - About 99% complete.

Piping line index has been issued. Remaining work is to check final vendor drawings and parts lists to be included in the mechanical catalogs.

Electrical work yet to be done includes detail checking of subcontractor's estimate for instrument and control work not shown on the original issue of subcontract bid drawings.

Instrumentation

Index has been issued. A few more hours will be needed to check some of the late vendor prints.

PROJECT ENGINEERING

The diagram schedule attached to this report has been updated to show completed and unfinished work separated by the decorative line. Lack of qualified procedures and welders in the shop of the fired heater vendor, Thermal Transfer Corporation, has forced the vendor to subcontract the pressure piping work to Power Piping Inc. in Pittsburgh. Defining and resolving this problem has caused the heaters delivery promise to extend 3-4 weeks and make these ten items very close to critical.

PROJECT STATUS REPORT
CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-37000
 February 3, 1971

PROJECT ENGINEERING - continued

Based on the time spent to complete the first two pieces of internally insulated and jacketed prefabricated pipe, the remaining fifteen pieces will be shipped by March 29. This late delivery will hold up much of the other piping in a very congested area, and make piping around the reactors very close to being the critical item determining project completion.

Cost report for the period ending December 31 and a forecast of expenditures on a monthly basis has been issued. Total probable cost is about the same as that shown on the last report.

CONSTRUCTION

Materials Handling Building and main process structural steel is about 95% complete. Asbestos siding for Materials Handling Building is about 60% installed. Concrete slabs and masonry in structure are complete. Masonry for control room in Materials Handling Building has started. Roofing work in structure is in progress. Refractory lining for the Devolatilizer is complete. Refractory work in the Gasifier and Regenerator should be complete by February 26. About 92% of the 3" and larger plus 33% of the 2" and smaller prefabricated pipe has been received. Installation of major piping which excludes instrumentation and steam tracing, is about 31% complete. Equipment Status is summarized in the following table:

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job No. B-37000
February 3, 1971

AREA	TOTAL PIECES	BEING FABRICATED	RECEIVED		?
			AND NOT SET	INSTALLED	
Utilities	26	0	1	25	96
Proc. Struc.					
1st Floor	42	2	3	37	90
2nd Floor	25	10	2	13	52
3rd Floor	10	0	1	9	90
4th Floor	8	0	3	5	14
5th Floor	7	0	0	7	100
6th Floor	16	1	8	7	44
7th Floor	9	0	2	7	78
8th Floor	9	0	3	6	67
9th Floor	3	0	0	3	100
Roof	4	3	0	1	25
Pump House	8	0	0	8	100
Mat's Receiving & Handling	36	0	1	35	97
Yard Area	13	0	0	13	100
TOTALS	216	16	24	176	
PERCENT	100	7	11	82	

D. H. Dawson
D. H. Dawson
Project Manager

Attachments:

Summary of Project Changes
Progress Chart - 1-31-71
Master Plan Schedule - 1-31-71
Equal Employment Opportunity Report (To be mailed under separate cover on February 5.)

Distribution:

Consol - 3
C. A. Schmalz
U. D. Marwig
S-2 - 7
FCP/HFD/CIS/TCS/File, CPL/JTN/VLB/HAN/JCN, ALC, FAN/JAP, DHD, WEPowell, Field

Continental Oil Company - 6
E. E. Ellington, CED
D. F. Wegner, Field
L. Thompson, MEB
J. B. Hambleton, CED
G. E. Fagerberg, CED
Dr. C. V. Foster, PED

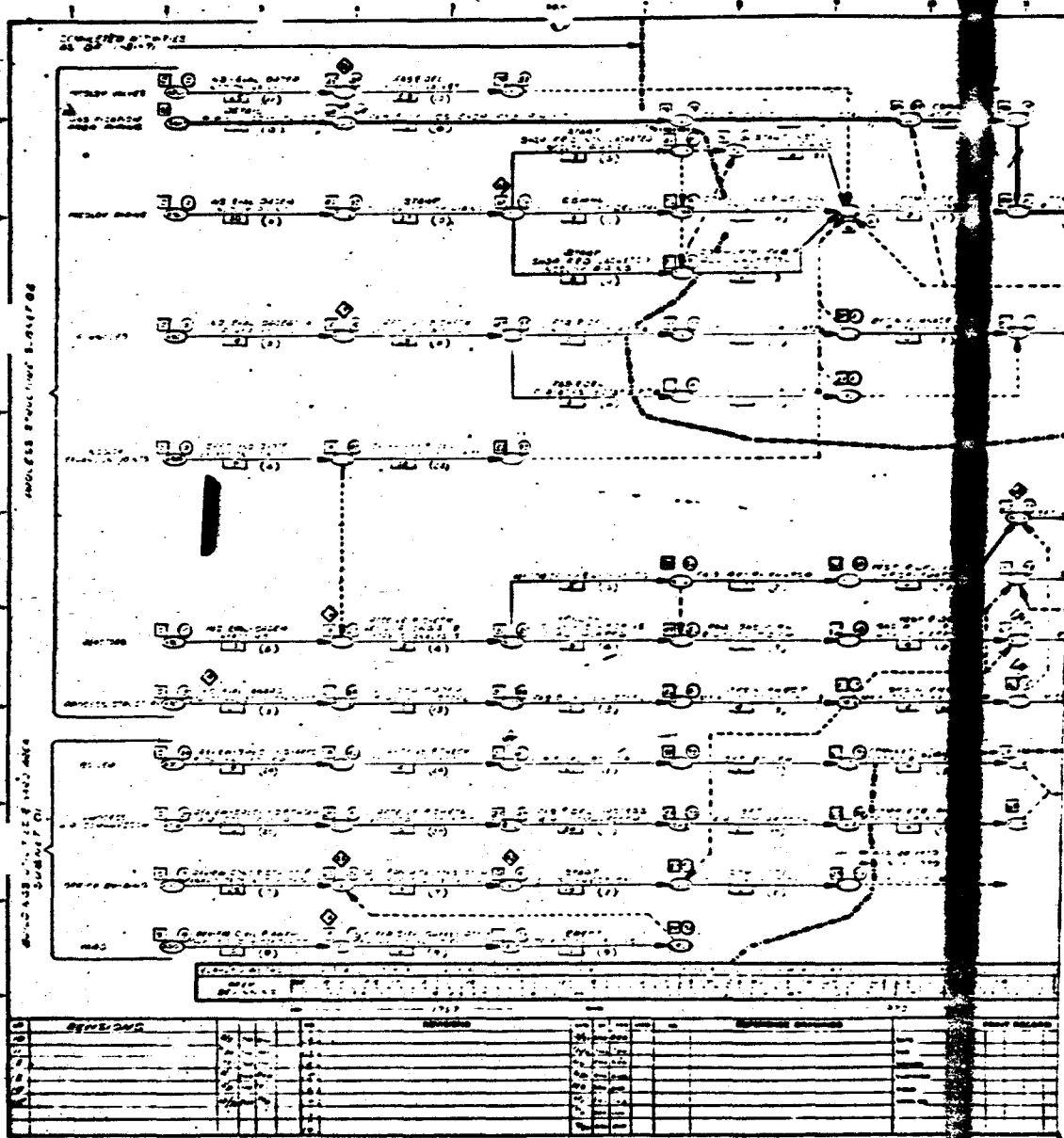
PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

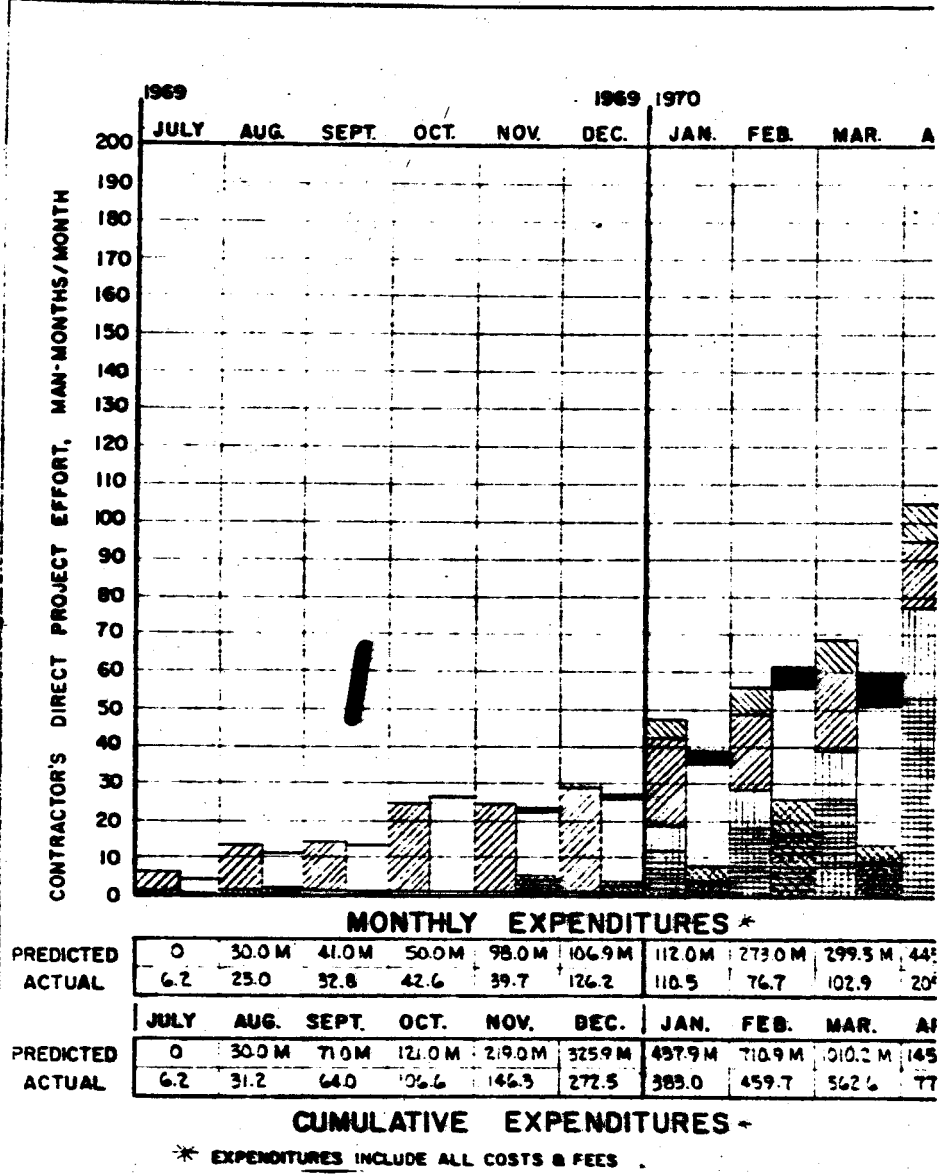
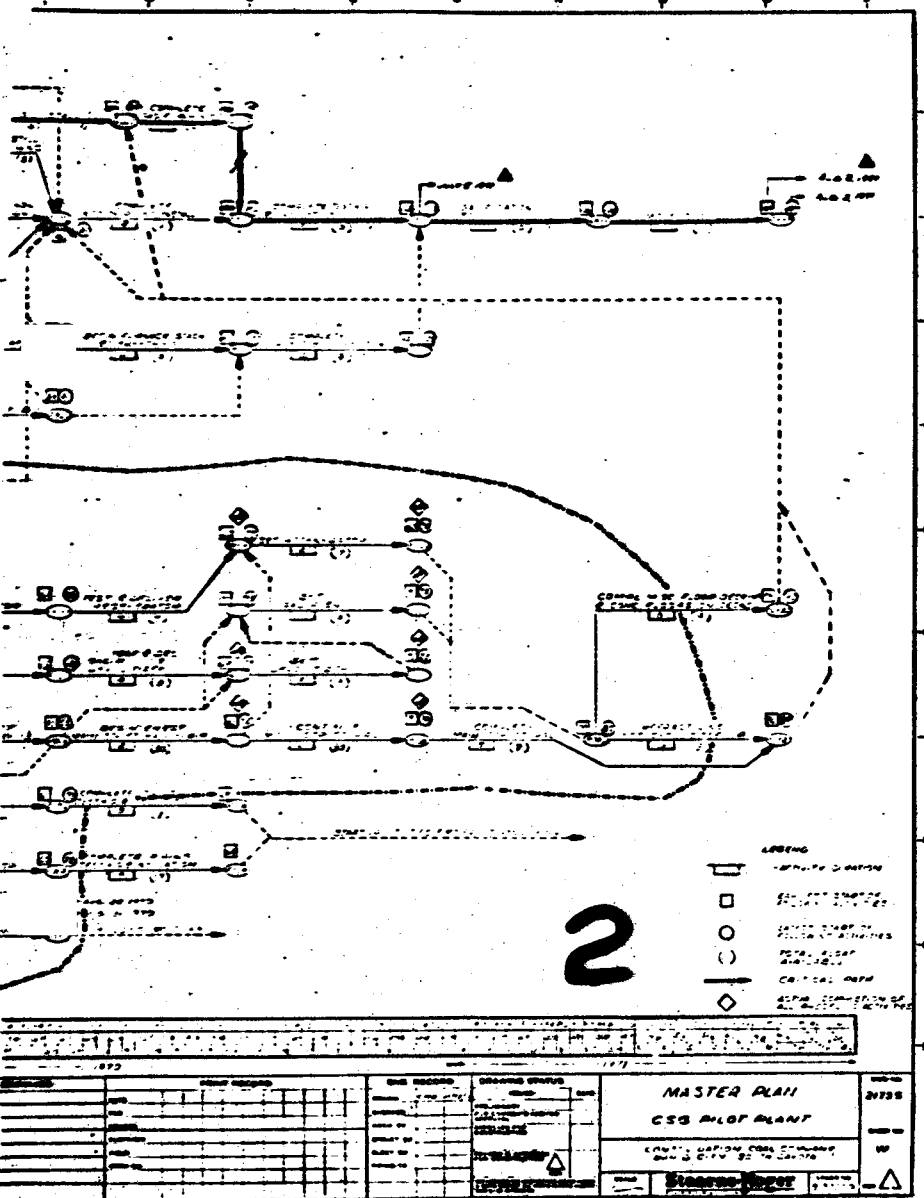
CCC Project No. 536
S-R Job No. B-37000
February 3, 1971

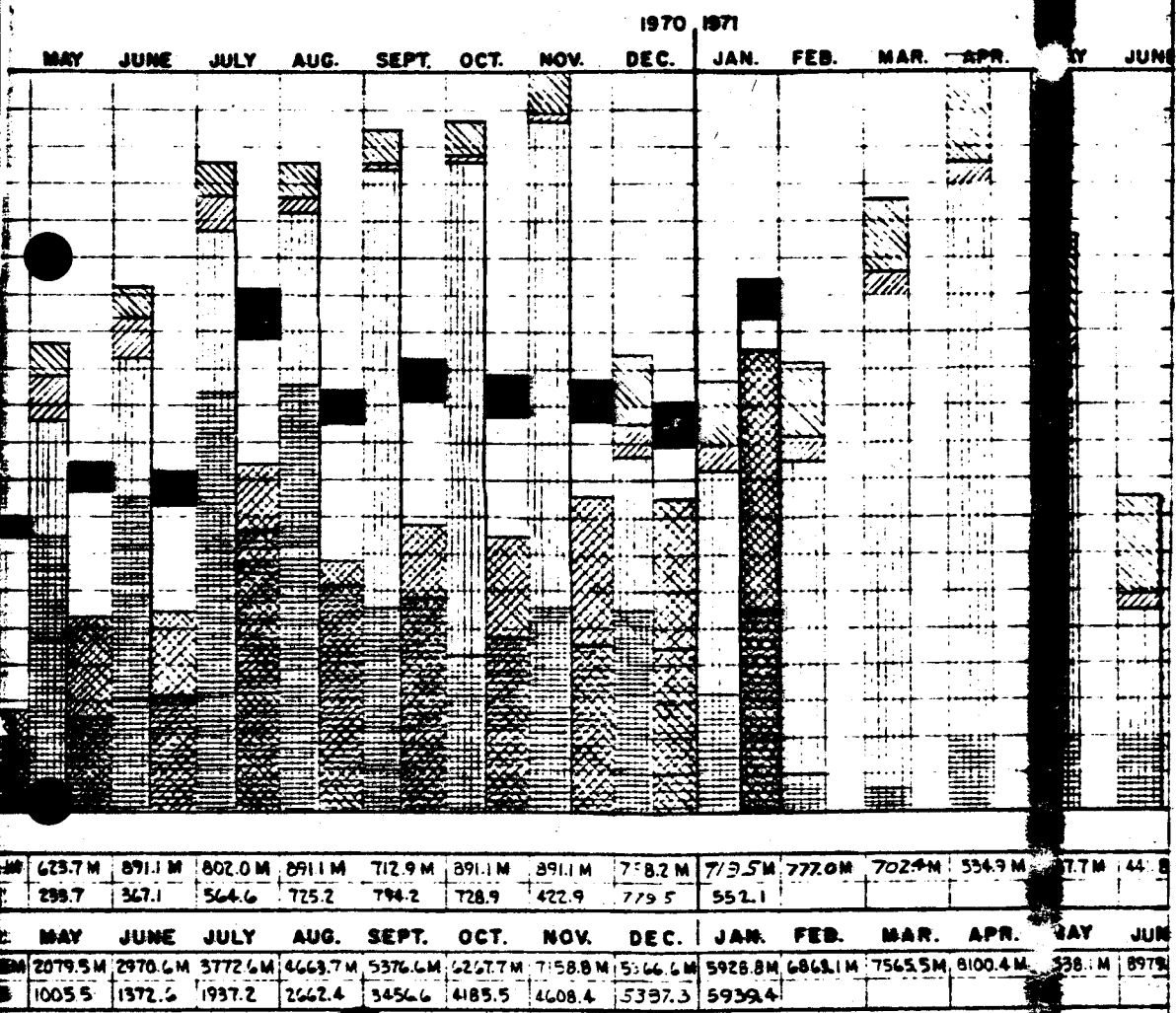
SUMMARY OF PROJECT CHANGES

Pending Change Notices and Change Orders Awaiting Approval	Increase	Decrease
8. Redesign Purge Gas System	48,550	
17. Redesign Expansion Joints	13,640	
40. Accum Costs for future transfer to Oper. Contract B-37400	125,000	
41. Revise Solids Handling	90,240	
42. Misc. Changes in Pipe Specs, Sizes, directions & additions	44,040	
43. Revise hot piping		85,640
45. Revise Misc. Reactor Internals	29,020	
49. Revise Flare System	14,180	
53. Revise gas quench syst. metalg. des.	146,670	
54. Redesign dolomite & lignite silos	8,770	
55. Revise Liq. Waste Disp.	248,290	
57. Add'l Heat Trace & Ins.	114,330	
63. Revise boiler burners & controls	8,280	
64. Revised ntrs @ RR spur		6,490
71. Delete Heat Trace, painting & piping insulation		180,000
72. Delete piping for C-313		24,550
73. Incr. wall thickness reactor T/M's	7,927	
74. Consolidated engineering for all CO's approved after Oct. 1	365,609	
Net Pending Changes	947,846	
Net Approved Changes (CO's 1, 5, 7, 9-11, 13, 14, 16, 18-24, 26, 28, 29, 32-39, 44, 46, 47, 50-52, 56, 58-62, 64, 65, 69, 70, 75)		233,820
Original Maximum Price		\$8,463,129
Estimated Project Cost		\$9,179,155
40. Future Transfer of 1970 Operating Charges to Operating Contract B-37400	125,000	
Construction Cost only		\$9,054,155



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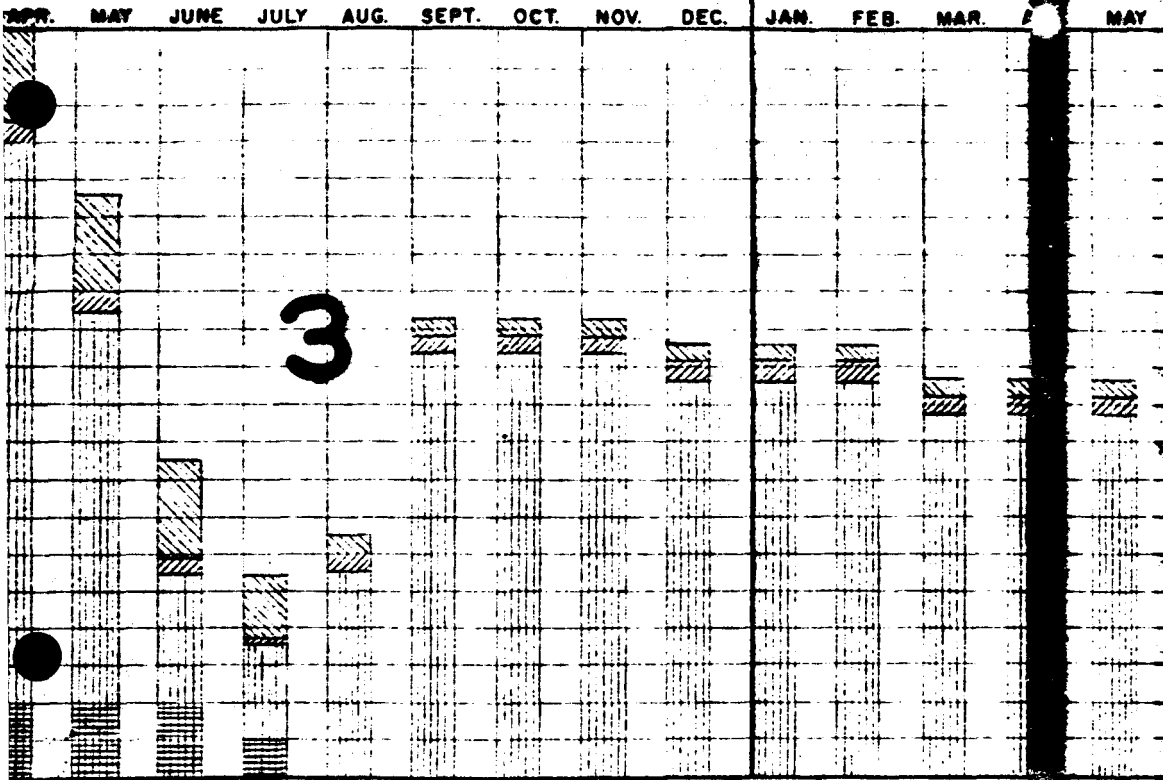
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MONTHLY PROGRESS CHART

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CONTRACT NO. 14-01-0001-415 (3)

1971, 1972



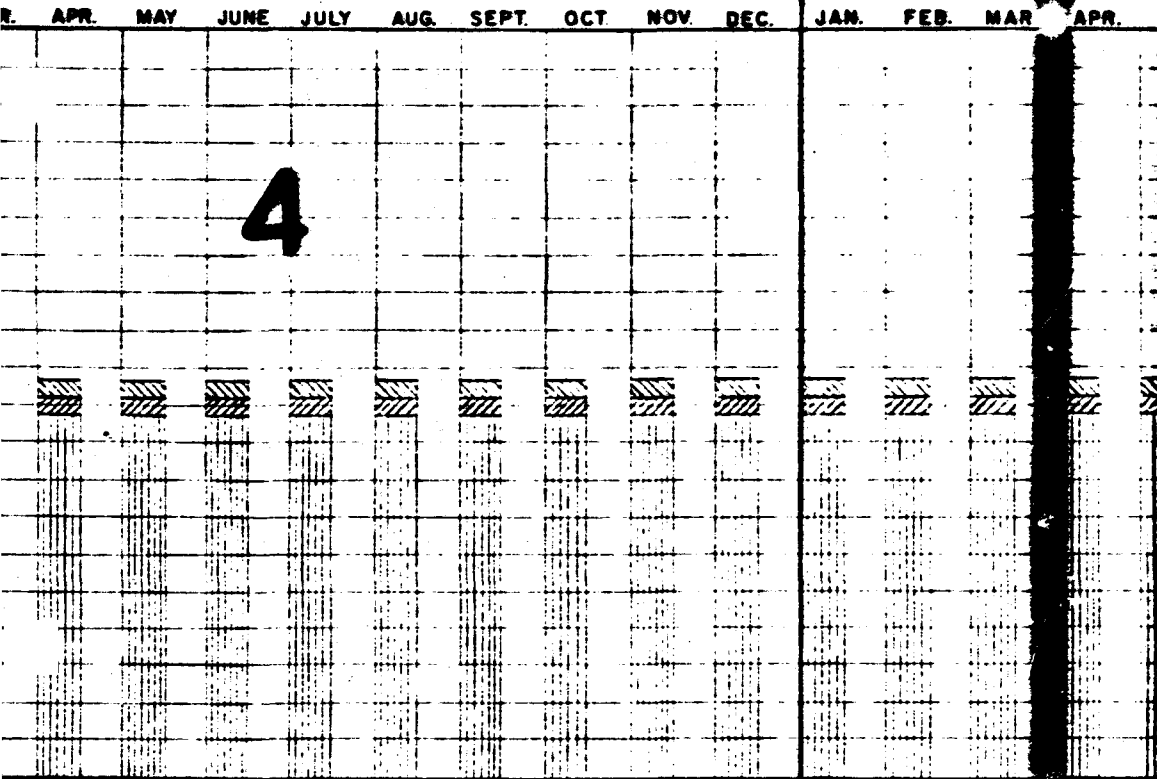
36.9 M	467.7 M	441.8 M	285.0 M	220.8 M	218.1 M	218.0 M	219.1 M	211.9 M	211.5 M	211.5 M	185.1 M	185.1 M	204.7 M
APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
00.0 M	8938.1 M	8979.9 M	9264.9 M	9185.7 M	9703.8 M	9921.8 M	10140.9 M	10352.8 M	10564.3 M	10775.8 M	10960.9 M	11150.0 M	11350.1 M

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(CONSTRUCTION & OPERATION)

(REVISED 12/31/70)

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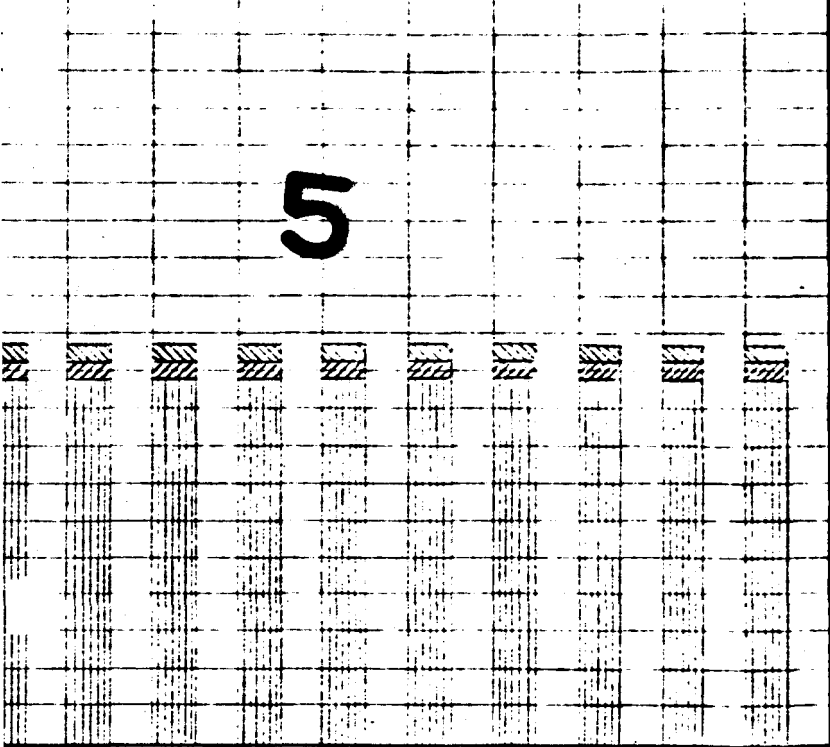
M	184.5M	204.7M	203.9M	202.8M	202.8M	202.9M	201.8M	201.5M	201.4M	185.2M	182.9M	182.1M	180.5M
R.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR	APR.
19M	11,145.4M	11,350.1M	11,554.0M	11,756.8M	11,959.6M	12,162.5M	12,364.3M	12,565.8M	12,767.2M	12,950.4M	13,133.3M	13,315.4M	13,495.9M

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DATE: 12-31-70

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MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

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- INCLUDES SUPERVISOR
- INCLUDES CLERICAL

CONSTRUCTION OPERATIONS STEARNS-STEARNS

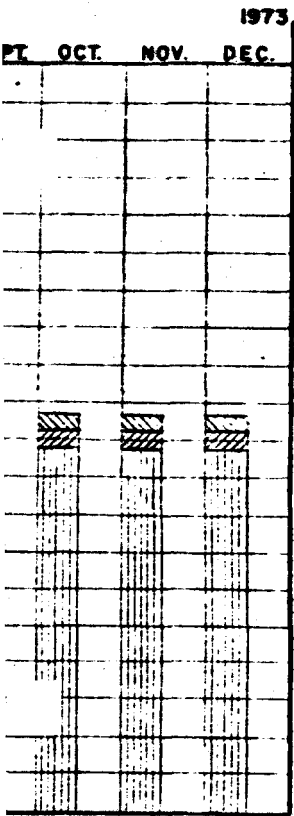
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182.1M	180.5M	177.5M	170.0M	161.2M	140.8M	130.1M	130.0M	130.0M	24.9M
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MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
315.4M	3495.9M	3673.4M	3843.4M	4204.6M	4154.4M	4275.5M	4405.5M	4535.5M	4540.4M

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U.S. DEPARTMENT
CONSOLIDATED
RESEARCH DIVISION

DATE: 12-31-70



PREDICTED **ACTUAL**

SUPERVISING [diagonal lines] [solid black]

PROFESSIONAL [diagonal lines] [white with circle]

TECHNICIAN S-R [diagonal lines] [diagonal lines with circle]

TECHNICIAN S/C [diagonal lines] [diagonal lines with circle]

⊕ INCLUDES SUPERVISORY EXEMPT TECHNICIANS
⊕ ⊖ INCLUDES CLERICAL

CONSTRUCTION — STEARNS-ROGER JOB B-3700G
OPERATIONS — STEARNS-ROGER JOB B-3740G

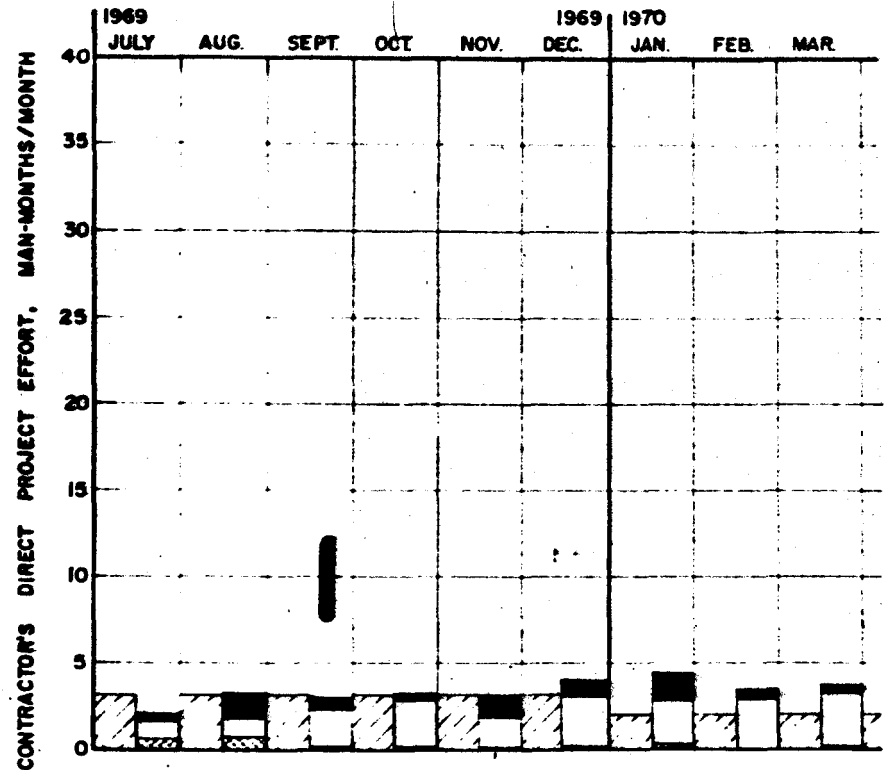
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1973	OCT.	NOV.	DEC.
CONSTRUCTION	150.0M	130.0M	24.9M
OPERATIONS	14.4055M	14.5355M	14.5604M

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
U.S. DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
RESEARCH DIVISION LIBRARY, PA.



	MONTHLY EXPENDITURES*											
	PREDICTED	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
PREDICTED	6,215	14,695	14,965	13,155	14,385	17,065	15,595	15,595	12,655	11,745	11,745	11,745
ACTUAL	11,745	14,754	9,609	11,925	10,130	15,205	14,378	14,027	15,019	15,019	15,019	15,019
PREDICTED	16,215	30,900	45,865	59,020	73,405	90,470	106,065	121,660	134,305	146,020	157,765	169,510
ACTUAL	11,745	46,479	56,078	67,913	78,043	93,243	107,626	121,653	136,672	151,691	166,710	181,729

CUMULATIVE EXPENDITURES*

MONTHLY

CONTRACT

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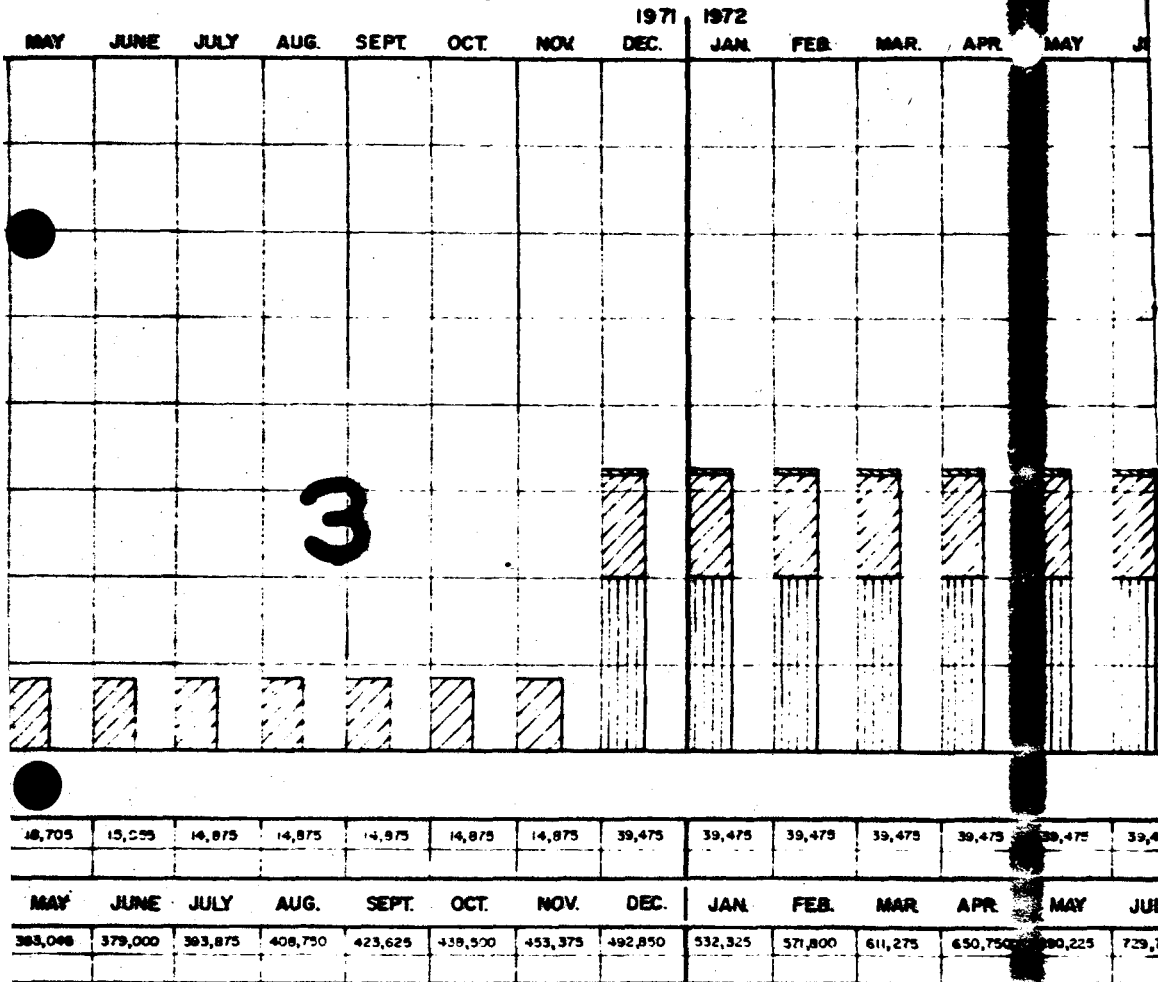
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13,815	12,655	13,315	12,835	12,505	12,505	12,505	20,155	20,135	23,295	22,295	21,145	5	15,955
7,342	19,319	20,054	13,955	25,003	21,296	9,584	23,091	15,000					
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
160,395	173,650	186,965	199,800	212,305	224,810	237,315	257,470	277,605	300,900	323,135	344,348	365,562	379,000
207,242	226,561	246,615	260,570	283,573	306,869	316,453	339,544	354,544					

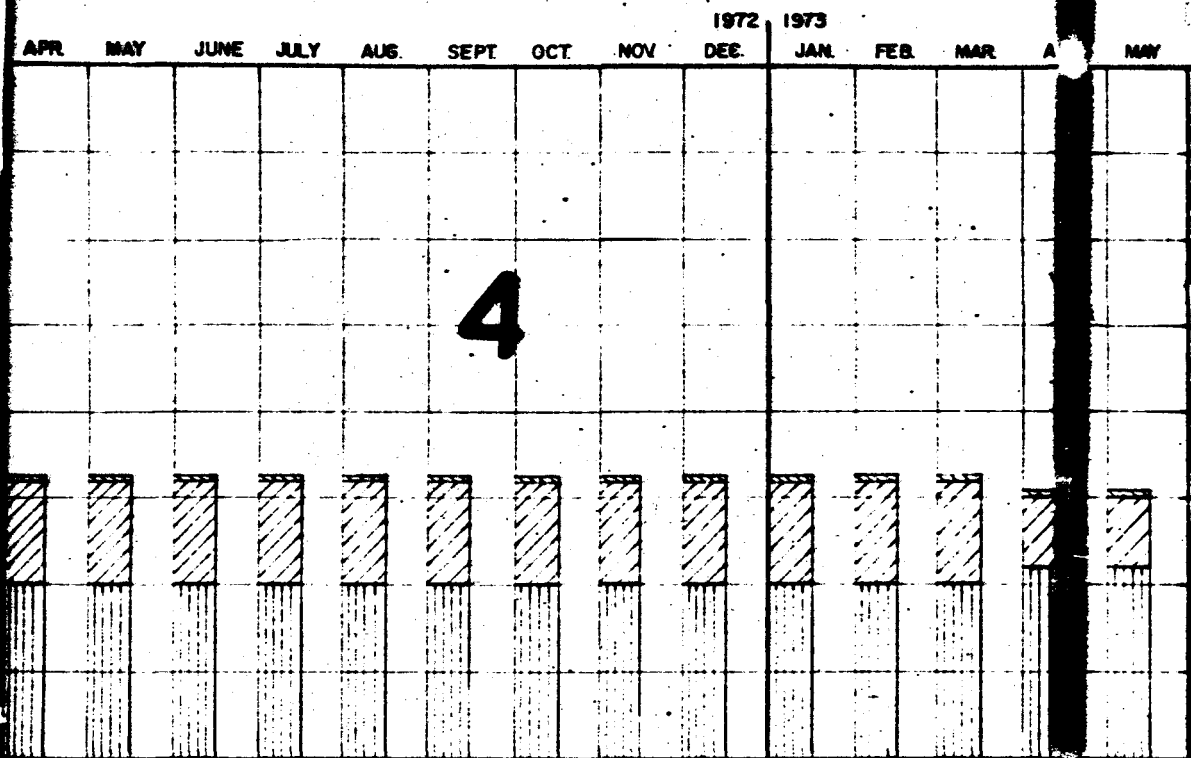
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CONTRACT No. 14-01-0001-415 (3)



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39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	36,075
690,790	690,225	729,700	769,175	808,650	848,125	887,600	927,075	966,550	1,006,025	1,045,500	1,084,975	1,124,450	1,163,925	1,203,400	1,242,875

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1973

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PREDICTED

SUPERVISING

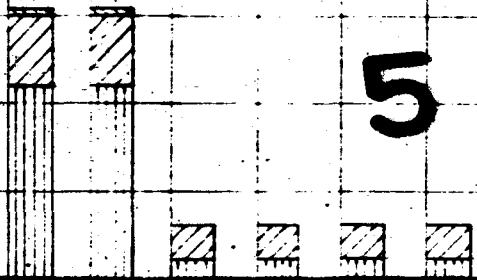
PROFESSIONAL

TECHNICIAN

⊕ Includes Supervisory Ex

⊗ Includes Clerical

5



APR	MAY	JUNE	JULY	AUG	SEPT.
36,075	36,075	11,475	11,475	11,475	41,120

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RESEARCH DIVISION







CONTRACT No. 14

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(See 415 Chart)

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	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		 ⊕
TECHNICIAN		 ⊕ ⊕

⊕ Includes Supervisory Exempt Technicians.
 ⊕ ⊕ Includes Clerical.

6

MONTHLY PROGRESS CHART

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CONTRACT No. 14-01-0001-415 (3)

CCDC-MPR--81

PROGRESS REPORT NO. 61
OCR CONTRACT NO. 14-01-0001-415(3)
CONSOL. LIGNITE GASIFICATION PROCESS DEVELOPMENT

February 1 to 28, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete

Phase IV - Pilot Plant Construction

The correction of design errors and faulty fabrication of the process furnaces (Thermal Transfer) will probably result in a one-two month delay in completion of construction.

The projected GMP remains unchanged. Two change orders (one related to engineering) remain unresolved.

The efforts of the existing operating force are currently devoted to preparation of operating manuals and a review of the as-built plant for necessary future field changes.

Financial

Estimated expenditures in February were \$16,800 by Consol and \$800,600 by Stearns. Cumulative project cost is \$8,581,075.

B. Technical Results and Program

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

1. Supporting Process and Economic Analysis (Project No. 533)

No work was done on this project.

2. Supporting Patent and Legal Activities (Project No. 534)

The current reports and memoranda were reviewed for Subject Inventions.

3. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 53a)

Monitoring of Stearns-Roger field activities continues. Consol specialists on welding, piping fabrication, refractory installation and mechanical equipment visited the job in February. In addition, field trips were made to the Stearns-Roger pipe fabrication shop in Denver and to the Thermal Transfer offices in Pittsburgh to expedite deliveries and to attempt to correct deficiencies. It is apparent that design errors and improper fabrication techniques by Thermal Transfer will significantly delay the delivery of the process furnaces to the job site. This in turn will probably delay the completion of plant construction.

Consol and Stearns have reached agreement on all change orders except the following:

Stearns-Roger Figure

43	Revise Hot Piping	- \$ 85,640
74	Engineering of Change Orders	+ 346,600

4. Stearns-Roger Construction Subcontract (Project No. 700)

The Stearns progress report is attached. In view of the difficulties with the process furnaces at Thermal Transfer, project completion is now projected for August, 1971 (although the diagram schedule does not reflect this).

The projected GMP remains at \$9,054,156 on the basis of Stearns' figures for the unresolved change orders.

5. Consol Guidance on Operations (Project No. 702)

Joint effort with Stearns continues on preparation of operating manuals. In addition, a program of checking flowcharts with field installation has been instituted to develop a list of necessary future field changes.

6. Stearns-Roger Operating Subcontract (Project No. 701)

The progress report is attached. Expenditures and staffing have been curtailed to limit expenditures in FY 1971 as directed by OCR (letter of George Futch, 2/5/71).

C. Subject Inventions

None.

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
Cumulative through January, 1971		
Through June, 1970	\$ 1,878,256	\$ 1,878,256
Consol	358,019	277,605
Stearns	5,289,490	5,288,900
	<u>\$ 8,173,675</u>	<u>\$ 8,084,661</u>
<u>Expended in Period (estimate)</u>		
Consol	16,900	23,296
Stearns	690,680	777,000
Total, February, 1971	<u>\$ 707,400</u>	<u>\$ 800,296</u>
Cumulative through February, 1971	<u>\$ 8,281,075</u>	<u>\$ 8,884,956</u>

Att. - Construction Progress Report
Operations Progress Report
Progress Charts.

T: 3/12/71

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-37000
 March 9, 1971

PROJECT REPORT SUMMARY

The assignment of a full time expediter to the shop of the fired heater fabricator, as noted in our October 7, 1970, Project Status Report, has resulted in our inspectors uncovering more and more defective fabrication by this vendor. Thermal Transfer Corporation has continued to extend unreliable delivery promises for these ten items to the point where they now determine project completion--which may be early in August. In an effort to help with work coordination, inspection and quality assurance, we have sent a fabrication supervisor from our shop to be in the vendor's shop until the heaters are completed.

ENGINEERING

Process, instrumentation, and mechanical engineering are complete.

Drafting -- About 99% complete.

Remaining work is to receive and process final vendor drawings and parts lists that are to be included in the mechanical catalogs. Electrical work yet to be done is final checking of subcontractor's estimates for instrument and control work not shown on the original issues of subcontract bid drawings. As part of operations contract B-37400, design and drafting work is in progress for supply circuits for laboratory equipment.

PROJECT MANAGEMENT

The diagram schedule attached to this report has been updated to show completed and unfinished work separated by the decorative line. Rejection of most of the welding and some of the bending work on the fired heater coils has extended delivery of the heaters beyond that shown on this diagram. It is difficult to estimate when this vendor, now proven to be incompetent, will be able to reschedule, subcontract and finish the remaining work. We estimate possible heater delivery as late as May 15 to 30. This will be followed by about 8-9 weeks for Incoloy pipe welding, testing and insulation before the project is complete. Fabrication and delivery of the jacketed high temperature piping is close to the schedule issued February 9. Delivery of the last of the 17 spools is planned for March 29.

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-37000
 March 9, 1971

PROJECT MANAGEMENT - continued

Due to lack of funds appropriated by the Office of Coal Research, Consoel has instructed us to defer insulation, painting, steam and electrical tracing, communications system, and laboratory furniture installation until payments can be made after July 1.

Cost report for the period ending January 31 and the monthly forecast of expenditures has been issued. Total probable cost based on using about half of the contingency should be about 3K under the Guaranteed Maximum Price.

CONSTRUCTION - - About 55% complete.

Materials Handling Building and main process structural steel is about 90% complete. Asbestos siding in the process structure, for materials handling building and wind screens at the railroad spur have been completed. Building subcontractor is in the final phases of finish and trim work in the control rooms. Roofing has been completed. Refractory linings for the three reactor vessels are complete. About 93% of the 3" and larger plus 64% of the 2" and smaller prefabricated pipe has been received. Installation of major piping, which includes instrumentation and steam tracing, is about 54% complete. Equipment status is summarized in the following table:

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
COB PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job No. B-37000
March 9, 1971

AREA	TOTAL PIECES	BEING FABRICATED	RECEIVED AND		%
			NOT SHY	INSTALLED	
Utilities	26	0	0	26	100
res. Struc.	42	1	3	37	90
1st Floor	25	10	2	13	52
2nd Floor	10	0	0	10	100
3rd Floor	8	0	2	6	75
4th Floor	7	0	0	7	100
5th Floor	16	1	5	10	63
6th Floor	9	0	2	7	78
7th Floor	9	0	1	8	89
8th Floor	3	0	0	3	100
9th Floor	4	0	1	3	75
Roof	8	0	0	8	100
Pump House	36	0	0	36	100
Mat's Receiving & Handling	13	0	0	13	100
Yard Area					
TOTALS	216	13	16	187	
PERCENT	100	5	7	88	

D. H. Dawson
D. H. Dawson
Project Manager

Attachments:

Summary of Project Changes
Progress Chart - 2/28/71
Master Plan Schedule - 2/28/71
Equal Employment Opportunity Report

Distribution:

<u>Consol - 5</u>	<u>Continental Oil Company - 6</u>
C. A. Schmitz	E. E. Ellington, CED J. B. Hambleton, CED
U. D. Marwig	D. F. Wegner, Field G. E. Faberberg, CED
	L. Thompson, MEO Dr. C. V. Foster, MEO

S-R - 7
FCF/HFD/CMB/TCS/Flie, CFL/JTH/VLB/NAH/JCH, ALC, FAN/JAB, DHD
WEPowell, Field

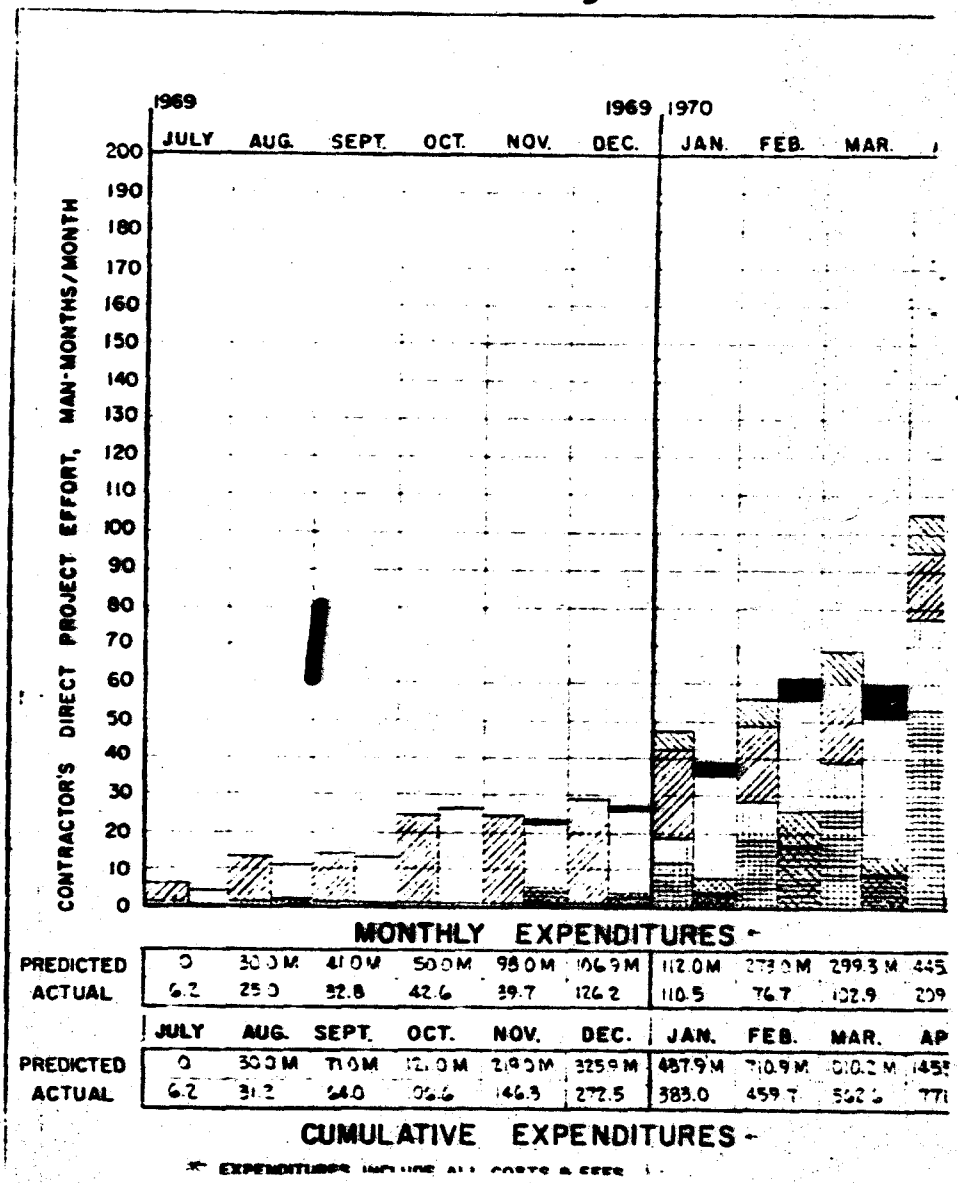
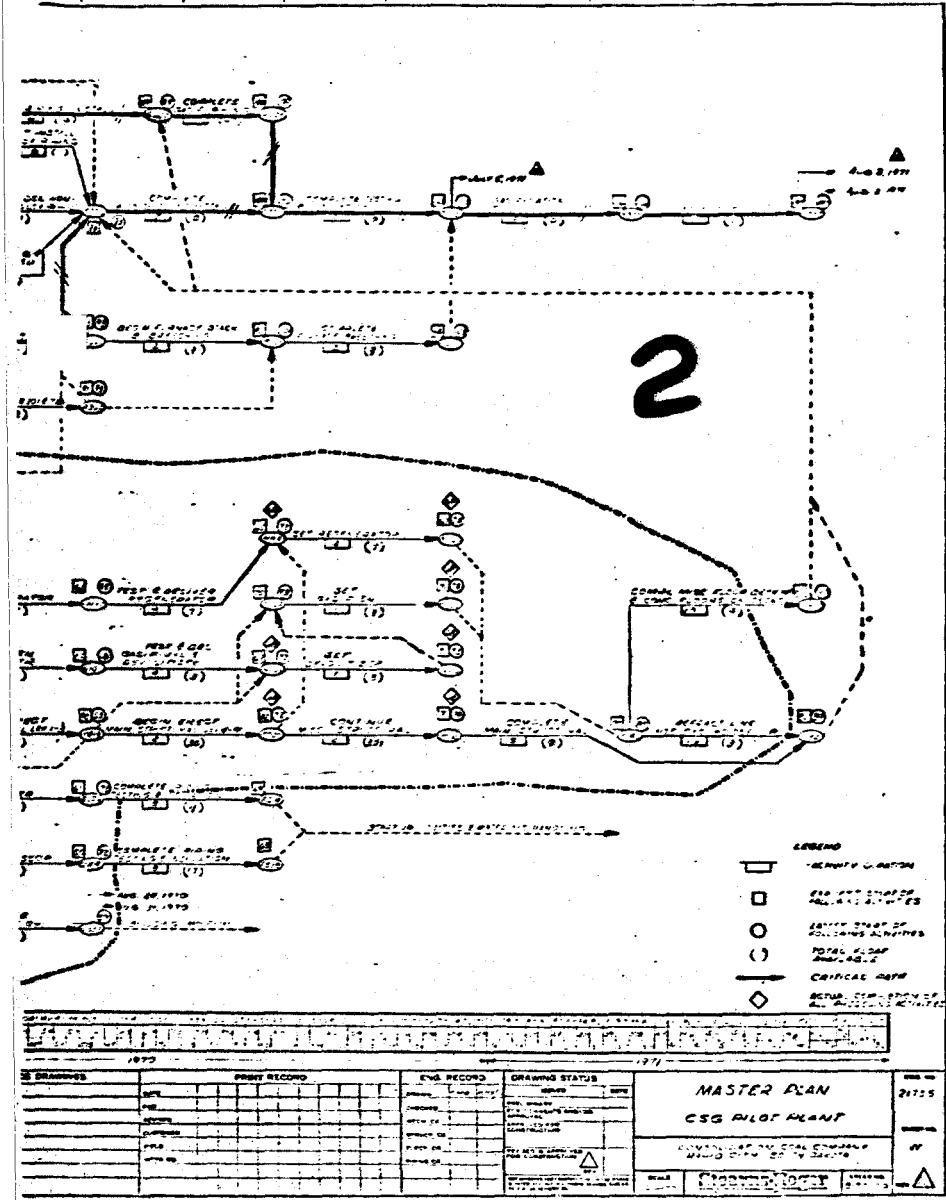
PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
COB PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job No. B-37000
March 9, 1971

SUMMARY OF PROJECT CHANGES

Pending Change Orders Awaiting Approval	Increase	Decrease
63. Revise hot piping		85,640
49. Revise Flare System	14,180	
71. Delete Heat Trace, Painting & piping insulation		180,000
74. Consolidate enrgy on all CO's approved after Oct. 1, 1970.	355,602	
Net Pending Charges	94,149	
Net Approved Changes (CO's 1, 5, 7-11, 13, 14, 16-24, 26, 28 29, 32-42, 44, 46, 47, 50-66, 69, 70, 72, 73, 75)	619,877	
Original Guar. Max. Price		\$8,465,129
Revised Est. Guar. Max. Price		\$9,179,155
40. Future Credit Transfer of 1970 Operating Charges to Operating Contract		125,000
Construction Cost only GMP		\$9,054,155



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	1970 1971												
	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
9.5M	891.1M	802.0M	691.1M	712.9M	391.1M	391.1M	718.2M	715.5M	772.0M	702.4M	554.9M	457.1M	44.9M
5.5	567.1	564.6	725.2	794.2	728.9	422.9	779.5	552.1	690.6				
9.5M	2970.6M	3772.6M	4663.7M	5376.6M	2327.7M	7158.8M	5164.6M	5928.2M	4853.1M	7365.5M	9100.4M	9539.9M	8919.9M
5.5	1937.2	2462.4	3456.6	4185.5	4608.4	5397.3	5939.4	6630.0					

2

MONTHLY PROGRESS CHART (CONSTR)

CONTRACT NO. 14-01-0001-415 (3)

1971 1972

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUNE

3

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M	487.7M	44.8M	285.0M	220.8M	218.1M	218.0M	219.1M	211.9M	211.5M	211.5M	185.1M	184.5M	17M	203.4
M	8538.1M	8979.9M	9264.9M	9185.7M	9203.6M	9221.8M	10140.9M	9352.8M	9564.3M	9775.8M	9960.9M	11145.4M	11301.1M	11554

DATE: February, 1973

1973

MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

5

- PREDICTED
- SUPERVISING
- PROFESSIONAL
- TECHNICIAN S-R
- TECHNICIAN S/C
- INCLUDES SUPERVISORY
- INCLUDES COUNCIL
- CONSTRUCTION — EARNINGS-RC
- OPERATIONS — EARNINGS-RC

182.1M 180.5M 177.5M 173.0M 161.2M 140.8M 130.1M 130.0M 130.0M 24.9M

MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

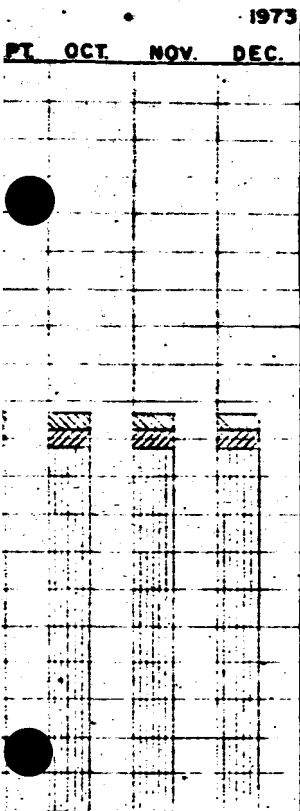
313.4M 3,495.9M 13,673.4M 13,843.4M 14,004.2M 4,544.4M 14,275.5M 14,405.5M 14,535.5M 4,560.4M

APPROXIMATE TOTAL CONSTRUCTION ≈ 8,800,000
 APPROXIMATE TOTAL OPERATIONS ≈ 5,760,400
 14,560,400

MONTHLY PAY
 OFFICE OF C
 U.S. DEPARTMENT
 CONSOLIDAT
 RESEARCH DIVISION
 CONTRACT NO. 1
 (REVISED 12/31/70)

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DATE: February, 1971



	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN S-R		
TECHNICIAN S/C		

① INCLUDES SUPERVISORY EXEMPT TECHNICIANS
 ② INCLUDES CLERICAL

CONSTRUCTION— STEARNS-ROGER JOB B-37000
 OPERATIONS— STEARNS-ROGER JOB B-37400

6

3.1M 130.0M 130.0M 24.9M

PT. OCT. NOV. DEC.

5.5M 1440.5M 14535.5M 14560.4M

CONSTRUCTION ≈ 8,800,000

OPERATIONS ≈ 5,760,400
 14,560,400

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
 U.S. DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA.

CONTRACT NO. 14-01-0001-415 (3)

(REVISED 12/31/70)

CONSOLIDATION COAL COMPANY PROJECT
 CSA PILOT PLANT
 RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-37400
 March 2, 1971

OPERATIONS REPORT #12

PROGRESS

The operating manual for the gasification cycles has been written in its primary form and reviewed once, with many corrections. We have attempted to write one procedure to cover four situations:

1. At the 150 psig Level
2. At the 300 psig Level
3. Using a 2 vessel operation
4. Using a 3 vessel operation

It may turn out that this write-up is too complicated to teach the shift engineers and the operators. This being the case, we will have to write four (4) different manuals, one for each situation. For the moment we are going to try to make this one work.

This manual has been very difficult to write for a number of reasons other than the four mentioned.

1. The nomenclature of various items was too long.
2. The nomenclature of items in the field did not agree with the panel board.
3. Lack of vendor information
4. A rough process has to be developed for each condition other than the 300 psig set up with 3 vessels.

In order to start to rewrite what was already written it was necessary to first shorten the names of items and then to bring the panel board nomenclature into balance with the field. This same thing applied to the small panels in the field. From these conditions the manuals are being reviewed. A copy will be released as soon as it is reviewed and retyped.

Enclosed is the table of contents for the process and the off-sites.

TECHNICAL GROUP

1. Recheck electrical load for laboratory
2. Clarified the work to be carried by the Data group in order to determine the various levels of experience needed for this group.

PLANS FOR MARCH

1. Continue to work on operating manuals
2. We are working on salary scales and a benefit package for Rapid City. As soon as this is approved we will start to search for people.

- A. Shift Engineers
- B. Panel Board Operators
- C. Chemists for Laboratory
- D. Engineers for Technical Group

Page 2
CCC Project No. 536
March 1, 1971

3. People in item 2 to be hired when money is available and when needed.
4. Continue to develop a laboratory manual
5. Continue to send out requisitions for spare parts

STAFFING

Management and Supervision..... 5
Janitor..... 1
Receptionist..... 1
TOTAL STAFF..... 7

COSTS

Amount paid out to 2-28-71 \$127,882.53
Committed thru February..... 46,100.00
January 1971 Field Payroll yet to be billed
from Denver..... \$ 8,800.00
GSA Office Furniture..... 1,000.00
Telephone-January & February..... 600.00
Denver Charges..... 2,000.00
Utilities for 4 months, Nov. thru Feb. \$350.. 1,400.00
February Rentals..... 300.00
Laboratory Furniture..... 32,000.00
TOTAL.....\$46,100.00

GRAND TOTAL..... \$173,982.53

TOTAL BUDGET..... \$250,000.00

Amount Spent as of 2-28-71 173,982.53

\$ 76,917.47

MISCELLANEOUS

We received one set of mechanical catalogs, but information on spare parts continues to be a problem.

Yours truly,

William E. Powell
William E. Powell

Attachments:

CC: Uwe Harwig-3
Chuck Stone Denver-2
Harold Lawless/F. Johnson/M. Varilaman/D. Mosher/D. Dietrich
File/W.E. Powell

WEP:ska

OPERATING MANUAL Section 100

Book I

LIGNITE AND DOLOMITE PREPARATION

Indicates Completion TABLE OF CONTENTS

- ✓ I. General Description of Section 100
- ✓ II. Lignite Crushing, Grinding & Drying
 - ✓ A. Pre-Start Up Check List
 - ✓ B. Start Up Procedure for Lignite Crushing System
 - ✓ C. Start Up Procedure for Lignite Grinding & Drying System
 - ✓ D. Operating Variables
 - ✓ 1. Circulating Gas Flow
 - ✓ 2. Velocity Separator Inner Sleeve Location
 - ✓ 3. Roller Mill Outlet Temperature
 - ✓ 4. Dryer Furnace Outlet Temperature
 - ✓ 5. Lignite Feed Rate
 - ✓ 6. Dust Collector Pressure Drop
 - ✓ E. Shutdown Procedure for Lignite Grinding & Drying System
 - ✓ F. Operating Contingencies
 - ✓ 1. Flame Failure in Dryer Furnace
 - ✓ 2. Loss of Feed to Roller Mill
 - ✓ 3. Failure of Primary Fan
 - ✓ 4. Failure of Secondary Fan
 - ✓ 5. Failure of Bag Filter Flow or Carriage Drive
 - ✓ 6. Failure of Cyclone Discharge Rotary Feeder
 - ✓ 7. Failure of Rupture Disks
- ✓ III. Lignite Preheater
 - ✓ A. Process Description
 - ✓ B. Start Up Procedure for Lignite Preheater
 - ✓ 1. Using Steam in Preheater
 - ✓ 2. Using Excess Flue Gas in Preheater
 - ✓ C. Normal Shutdown of Preheater
 - ✓ D. Operating Contingencies
 - ✓ 1. Flame-Out in Preheater Furnace
 - ✓ 2. Shutdown of Furnace Air Compressor
 - ✓ 3. High Temperature Shutdown
 - ✓ 4. High Furnace Outlet Temperature
 - ✓ 5. High Level or Plugging in Venturi Scrubber

APPENDIX

- ✓ Figure 1 - Simplified Flow Diagram of Lignite and Dolomite Preparation Section
- ✓ Figure 2 - Preheater Furnace Local Panel Board
- ✓ B-101 - Engineering Flow Diagram, Section 100 - Solids Handling, Grinding & Drying
- ✓ B-202 - Engineering Flow Diagram, Section 100 - Solids Handling, Lignite Preheat & Feed

✓ Indicates Completion

OPERATING MANUAL
Book II
Area 200 & 300
Outline

- ✓ I. Table of Contents
- ✓ II. Introduction
- III. Reactor Jacket and Piping Cooling Systems
 - A. Process Description
 - B. Equipment
 - C. Instrumentation
 - D. Safety
 - E. Operation-Normal Conditions
 - F. Procedures
 - 1. Normal Start-Up Procedure
 - 2. Normal Shut-Down Procedure
 - 3. Emergency Procedures
 - 4. Alarms-Action
 - 5. Miscellaneous Procedures
 - G. Diagrams
- IV. Reactor, Cycle Systems and Heaters
 - ✓ A. Process Description
 - B. Equipment
 - C. Instrumentation
 - D. Safety
 - E. Operation-Normal Conditions
 - F. Procedures
 - 1. Normal Start-Up Procedure
 - 2. Normal Shut-Down Procedure
 - 3. Emergency Procedures
 - 4. Alarms-Action
 - 5. Miscellaneous Procedures
 - G. Diagrams
- V. Quench Water Systems
 - ✓ A. Process Description
 - B. Equipment
 - C. Instrumentation
 - D. Safety
 - E. Operation-Normal Conditions
 - F. Procedures
 - 1. Normal Start-Up Procedure
 - 2. Normal Shut-Down Procedure
 - 3. Emergency Procedures
 - 4. Alarms-Action
 - 5. Miscellaneous Procedures
 - G. Diagrams

OPERATING MANUAL
Book II
Area 200 & 300
Outline
Continued

- VI. Feed Lock Hoppers
 - A. Process Description
 - B. Equipment
 - C. Instrumentation
 - D. Safety
 - E. Operation-Normal Conditions
 - F. Procedures
 - 1. Normal Start-Up Procedure
 - 2. Normal Shut-Down Procedure
 - 3. Emergency Procedures
 - 4. Alarms-Action
 - 5. Miscellaneous Procedures
 - G. Diagrams
- ✓ VII. NPC System
 - A. Process & Equipment Description
 - B. Instrumentation
 - C. Safety
 - D. Operation-Normal Condition
 - ✓ 1. Routine Operation
 - ✓ 2. Normal Operation Conditions
 - E. Procedures
 - ✓ 1. Preparing the System for Start-Up
 - ✓ 2. Placing the System in Operation
 - ✓ 3. Normal Shut-Down
 - F. Diagrams
- VIII. Sample Schedule
- IX. Log Sheets

OPERATING MANUAL
BOOK III
AREA 500 - UTILITIES

✓ Indicates Completion

I. Boiler & Water Treating System

✓A. Zeolite Water Softener

- ✓1. Process Description
- ✓2. Equipment
- ✓3. Operating Procedures
 - ✓a. Initial Operation
 - ✓b. Normal Operation

✓B. Boiler Feed Water Deaerator

- ✓1. Process Description
- ✓2. Equipment
- ✓3. Operating Procedures
 - ✓a. Normal Start-Up Procedure

✓C. Chemical Feeders

- ✓1. Process Description
- ✓2. Equipment
- ✓3. Operating Procedures
 - ✓a. Normal Start-Up Procedure

✓D. Boiler

- ✓1. Equipment
- ✓2. Operating Procedures
 - ✓a. Inspection and Preparing for Service
 - ✓b. Boiling Out
 - ✓c. Normal Start-Up Procedure
 - ✓d. Operation in Service
 - ✓e. Switching to Propane Firing
 - ✓f. Normal Shut Down

II. Cooling Water System

A. Cooling Tower

1. Equipment
2. Operating Procedures

III. Plant & Instrument Air System

A. Plant & Instrument Air Compressor

1. Equipment
2. Operating Procedures
 - a.
 - b.
 - c.

B. Emergency Instrument Air Compressor

- a.
- b.

C. Instrument Air Drier

- a.
- b.
- c.

IV. Inert Gas System

A. Inert Gas Generator

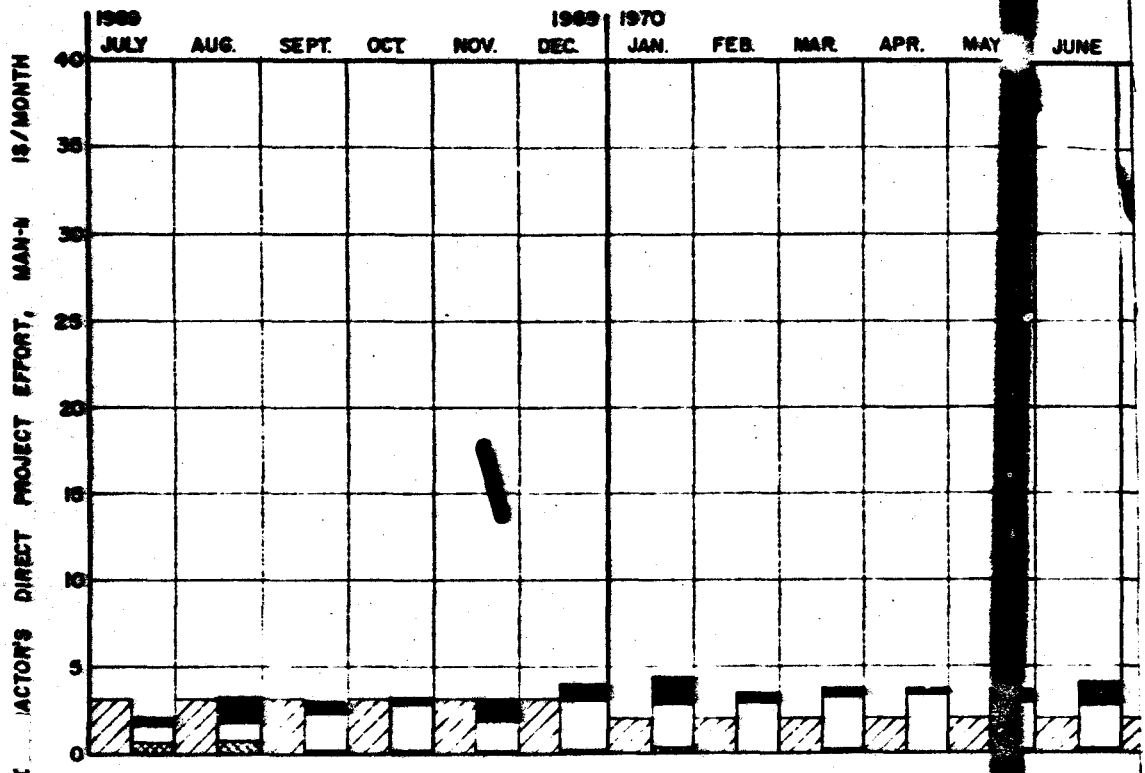
1. Equipment
2. Operating Procedures
 - a.
 - b.
 - c.

B. Low Pressure System

1. Equipment

C. High Pressure System

1. Equipment



MONTHLY EXPENDITURES*

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
PREDICTED	16,215	14,695	14,965	13,155	14,385	17,085	15,585	15,595	12,655	12,875	13,115	12,655
ACTUAL	11,745	34,734	3,609	11,825	10,130	15,205	14,378	14,027	15,019	53,228	7,115	19,319

CUMULATIVE EXPENDITURES*

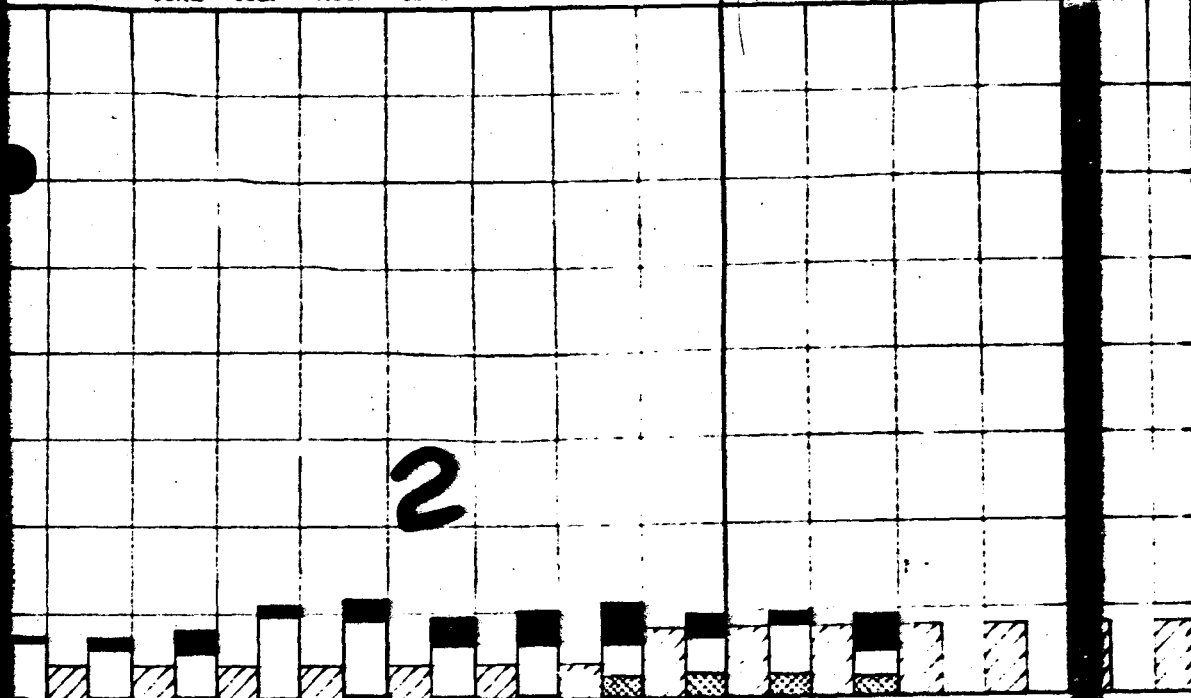
	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
PREDICTED	16,215	30,900	45,865	59,020	73,405	90,470	106,055	121,650	134,305	147,180	160,295	173,650
ACTUAL	11,745	46,479	56,088	67,913	78,043	93,248	107,626	121,653	136,672	189,900	207,015	226,551

*Expenditures Include All Costs & Fees

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MONTHLY
CONTR

1970 1971
 MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUN



	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUN
1970	13,815	12,655	13,315	12,835	12,505	12,505	2,505	20,155	20,135	23,295	22,295	21,145	17,705	15,405
1971	17,342	19,319	20,054	13,955	25,003	21,296	9,584	23,091	16,475	16,800				
1970	160,995	173,650	186,985	199,800	212,305	224,810	237,315	257,470	277,605	300,900	323,195	344,340	365,045	379,000
1971	207,242	226,561	246,615	260,570	285,573	308,869	316,453	339,544	356,019	339,544				

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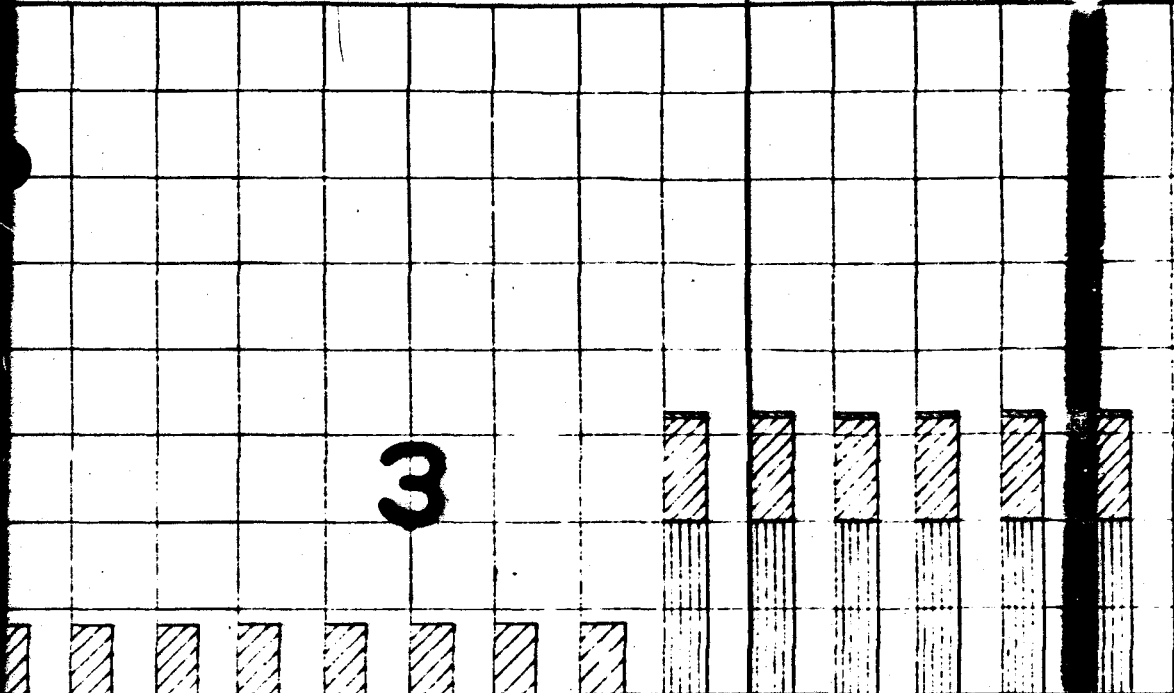
MONTHLY PROGRESS CHART

(SUPERVISIC 8-

CONTRACT No. 14-01-0001-415 (3)

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. 1971 1972 JAN. FEB. MAR. APR. MAY

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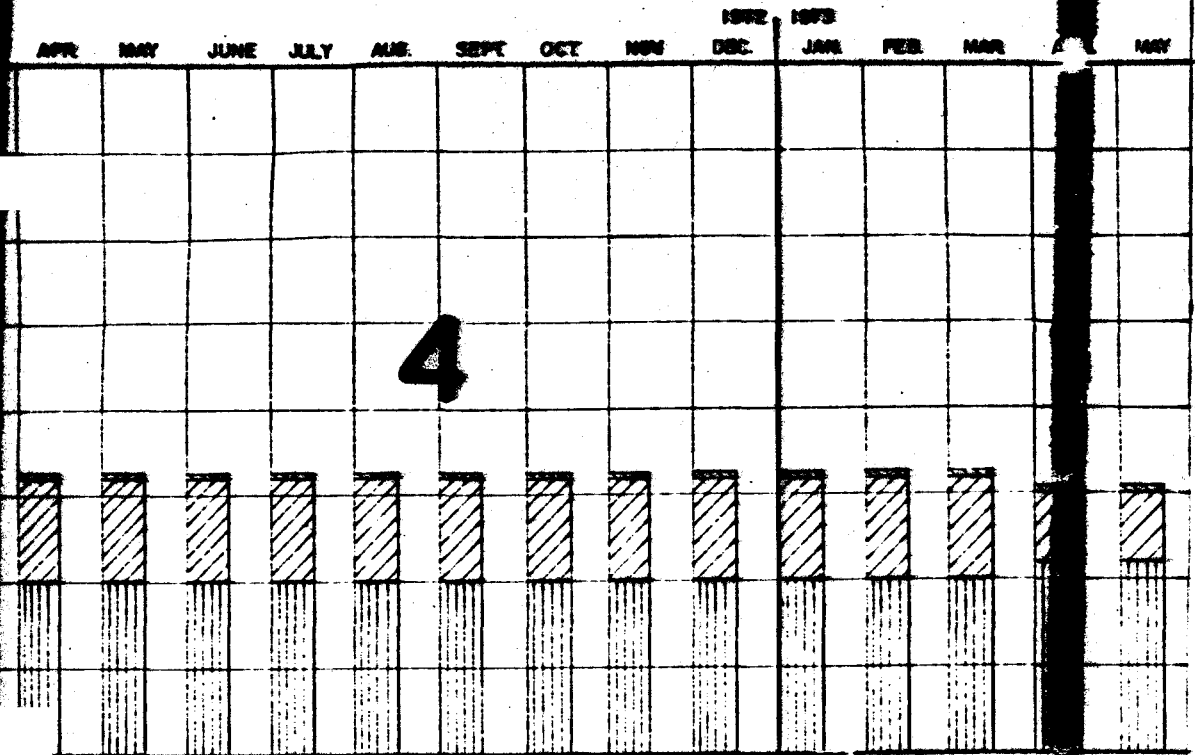


14,145	18,705	15,955	14,875	14,875	14,875	14,875	14,875	14,875	39,475	39,475	39,475	39,475	39,475	39,475
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APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
14,145	363,045	179,000	393,875	408,750	423,625	438,500	453,375	492,850	532,325	571,800	611,275	650,750	690,225

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VISION & LAB WORK)

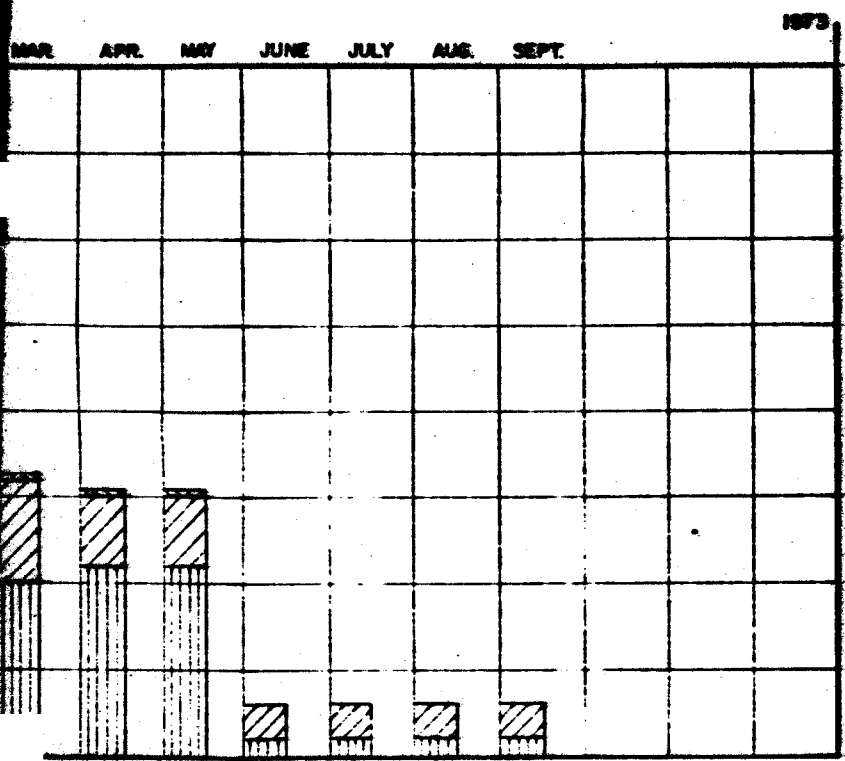





39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	36,075
APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	
650,750	690,225	729,700	769,175	808,650	848,125	887,600	927,075	966,550	1,006,025	1,045,500	1,084,975	1,124,450	1,157,125	

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1 Nov. 6

DATE: *February 1971*



SUPERVISING 
 PROFESSIONAL 
 TECHNICIAN 
 ⊙ Includes Supervisory
 ⊛ Includes Const.

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MAR	APR	MAY	JUNE	JULY	AUG.	SEPT.
30,475	36,075	36,075	11,475	11,475	11,475	44,120
1,094,975	1,121,050	1,157,125	1,168,600	1,180,075	1,181,550	1,232,670

5

MONTHLY PR
 OFFICE OF
 DEPARTMENT
 CONSOLIDA
 RESEARCH DIVISION
 CONTRACT No.

DATE: February, 1971

1973

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN		

⊕ Includes Supervisory Exempt Technicians.

⊕⊕ Includes Clerical.

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
RESEARCH DIVISION LIBRARY, PA.

CONTRACT No. 14-01-0001-415 (3)

PROGRESS REPORT NO. 82
OCR CONTRACT NO. 14-01-0001-415(3)
CONSOL. LIQUID GASIFICATION PROCESS DEVELOPMENT

March 1 to 31, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

With the delay in delivery of the process furnaces and the deferral of heat tracing, insulation and painting until FY 1972, the projected completion date for the pilot plant appears to be September, 1971.

The projected GMP remains at \$9,054,105, subject to the resolution of change orders for engineering and hot piping.

The operating force continues the preparation of operating manuals. Recruiting of operating personnel is underway with the intent of hiring utility operators and coal preparation operators as of June 1.

Financial

Estimated expenditures in March were \$14,000 by Consol and \$737,700 by Stearns. Cumulative project expense is \$9,652,600.

B. Technical Results and Program

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

1. Supporting Process and Economic Analysis (Project No. 533)

No work was done on this project.

2. Supporting Patent and Legal Activities (Project No. 534)

The current reports and memoranda were reviewed for Subject Inventions.

3. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 536)

Expediting of the process furnace job at Thermal Transfer apparently has resolved the quality control problems; however, delivery to the field is still indefinite and will probably delay job completion. In view of this situation, consideration is being given to returning to a 40-hour test schedule.

Four change orders were received and submitted to OER (OER-413-623) for approval. Remaining change orders (excluding the current deletion of insulation, etc.) relate to hot piping revisions (No. 43) and engineering of change orders (No. 74). The projected GMP remains at \$9,034,155 using the Stearns figures for the pending change orders.

4. Stearns-Roger Construction Subcontract (Project No. 700)

The Stearns progress report is attached. The program schedule now projects completion as of August 30, 1971.

5. Consol Guidance on Operations (Project No. 702)

Joint effort with Stearns personnel has continued on operating manuals and verification of the field installation. Assistance has been provided as needed in planning for the buildup of operating forces and in scheduled recruiting.

6. Stearns-Roger Operating Subcontract (Project No. 701)

The progress report is attached. As indicated, recruiting is in progress in order to have sufficient personnel to initiate break-in of the utilities and coal preparation sections in July. (This will not result in increased monthly operating costs in FY 1971.)

Drafts of operating manuals for Section 100 and 200/300 have been completed for review.

C. Subject Inventions

None.

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through February, 1971</u>		
Through June, 1969	\$ 1,878,256	\$ 1,878,256
Consol	372,652	300,900
Stearns	<u>6,629,000</u>	<u>6,863,100</u>
	\$ 8,880,908	\$ 9,042,256
<u>Expended in Period (estimate)</u>		
Consol	14,008	22,295
Stearns	<u>757,700</u>	<u>702,400</u>
Total, March, 1971	\$ 771,708	724,695
Cumulative through March, 1971	<u>\$ 9,652,608</u>	<u>\$ 9,766,951</u>

Att. - Construction Progress Report
Operations Progress Report
Progress Charts.
R 4/9/71

**CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA**

CCC Project No. 536
S-R Job No. B-37000
April 5, 1971

PROJECT REPORT SUMMARY

Assignment of the fabrication supervisor to coordinate and expedite work on the ten fired heaters at Thermal Transfer Corporation has helped the vendor to get organized on the basis of better quality control. Scheduling is still rather indefinite, but the first heater could arrive by May 7, and the last could arrive by June 7. This delivery would set the completion of the currently authorized portions of the project for early August. Work on heat tracing, insulation and painting has been deferred by Consol, so that it may complete in September.

ENGINEERING - Essentially complete.

Only remaining work is for very minor routine items such as receiving and processing final vendor drawings and parts lists, issue of drawings for subcontracts and issue of electrical drawings for laboratory furniture and heat tracing. These electrical drawings are now ready for approval by Consol.

PROJECT MANAGEMENT

The diagram schedule attached to this report has been updated to show completed and unfinished work separated by the decorative line. Rejection of some of the bending work on the fired heater coils forced the fabricator to find more thin wall alloy heater tubing. All heater materials are now in the shop. Planning and production have both improved during the past month. All of the jacketed prefabricated pipe has been installed. Approximately 96% of the carbon steel and stainless 3" and larger and 90% of the 2" and smaller prefabricated pipe has been installed. Most of the bare Incoloy prefabricated pipe bends are associated with the fired heaters. Seven of these 25 spool pieces have been received. Prefabricated piping will be snipped complete by April 9. The 55' long thermal well assemblies for the reactors are scheduled to ship by special stretch length trailer truck by April 15. Bids have been solicited for subcontract on grading, sidewalks, curbs and asphalt surfacing.

CONSTRUCTION - - - About 66% complete.

Structural steel and general building subcontracts are about 99% complete. All phases of piping work are now in progress. Pumps, compressors and equipment are being aligned and grouted. Subcontractors are completing caulking, flashing, handrail and final fitting of grating. Equipment status is summarized in the following table.

PROJECT STATUS REPORT

**CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA**

CCC Project No. 536
S-R Job No. B-37000
April 5, 1971

AREA	TOTAL PIECES	BEING FABRICATED	RECEIVED AND NOT SET	INSTALLED	2 INSTALLED
Utilities	26	0	0	26	100
Proc. Struct.	42	1	0	41	98
1st Floor	25	10	0	15	60
2nd Floor	10	0	0	10	100
3rd Floor	8	0	2	6	75
4th Floor	7	0	0	7	100
5th Floor	16	0	3	13	81
6th Floor	9	0	0	9	100
7th Floor	9	0	1	8	88
8th Floor	3	0	0	3	100
9th Floor	4	0	1	3	75
Roof	8	0	0	8	100
Pump House	36	0	0	36	100
Mat's Receiving & Handling	13	0	0	13	100
Yard Area					
TOTALS	216	11	7	198	
PERCENT	100	5	3	92	

D. H. Dawson
D. H. Dawson
Project Manager

Attachments:

- Summary of Project Changes
- Progress Chart - 3/31/71
- Master Plan Schedule - 3/31/71
- Equal Employment Opportunity Report

Distribution:

- | | |
|--------------|-----------------------------|
| Consol - 5 | Continental Oil Company - 6 |
| C. A. Schulz | E. E. Ellington, CED |
| B. B. Harwig | J. B. Hambleton, CED |
| | D. F. Wagner, Field |
| | G. E. Faberberg, CED |
| | L. Thompson, MED |
| | Dr. C. V. Foster, PED |

S-R - 7
FCR/MS/ONS/TCS/Field, CFI/JON/VLR/CIN/JCR, MLC, FAM/JAP, DWD
WEPowell, Field

PROJECT STATUS REPORT

**CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
BARTON CITY, SOUTH DAKOTA**

COC Project No. 536
S-R Job No. D-37000
April 5, 1971

SUMMARY OF PROJECT CHANGES

**Pending Change Orders
Awaiting Approval**

	<u>Increase</u>	<u>Decrease</u>
43. Revise hot piping		85,640
49. Revise Flare System	14,180	
71. Delete Heat Trace, Painting & Piping Insulation		100,000
74. Consolidate engrg on all CO's approved after Oct. 1, 1970.	<u>365,600</u>	

Net Pending Changes

96,140

Net Approved Changes

(CO's 1, 5, 7-11, 13, 14, 16-26, 28, 29, 32-39, 41, 42, 44, 46, 47, 50-66, 69, 70, 72, 73, 75 & Contr. Adj)

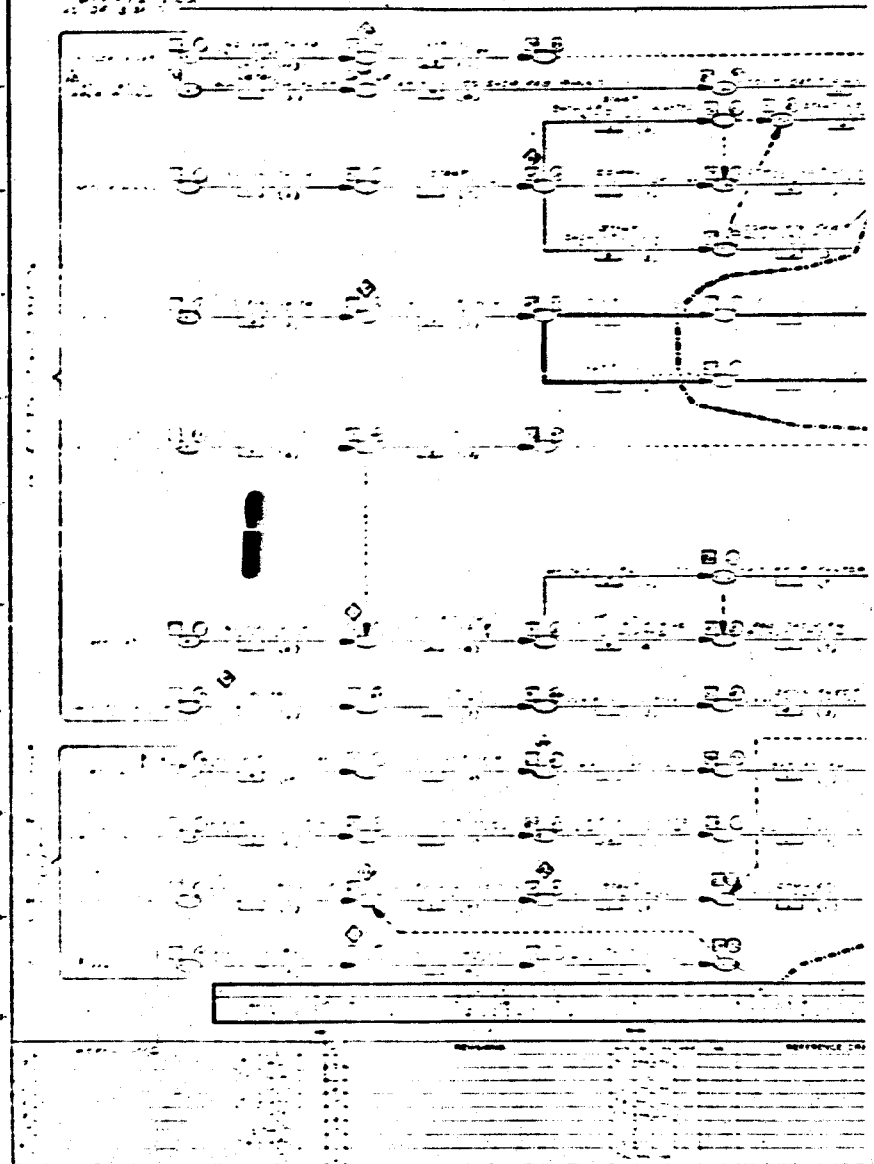
494,877

Original Guar. Min. Price

90,446,129

Revised Est. Guar. Min. Price

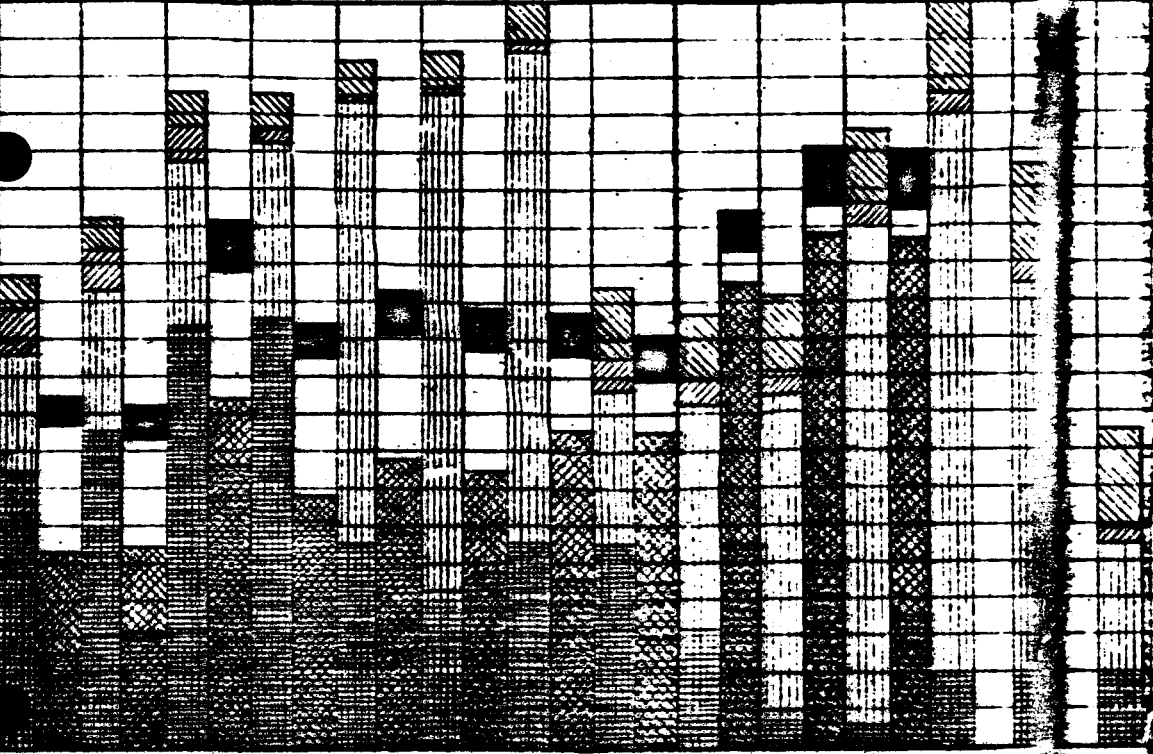
99,004,155



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1970 BPT

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUNE



629.7M	891.1M	800.0M	891.1M	712.9M	891.1M	891.1M	758.2M	719.5M	772.0M	702.9M	554.9M	7M	441.8
288.7	367.1	564.6	725.2	794.2	728.9	422.9	779.5	552.1	690.6	757.7			
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
2079.5M	2970.6M	3772.6M	4669.7M	5576.6M	6262.7M	7158.8M	8166.6M	8928.8M	9868.1M	7568.5M	8100.4M	81M	8919
1005.5	1972.6	1957.2	2662.4	3456.6	489.5	4608.4	5397.3	5939.4	6680.0	7587.7			

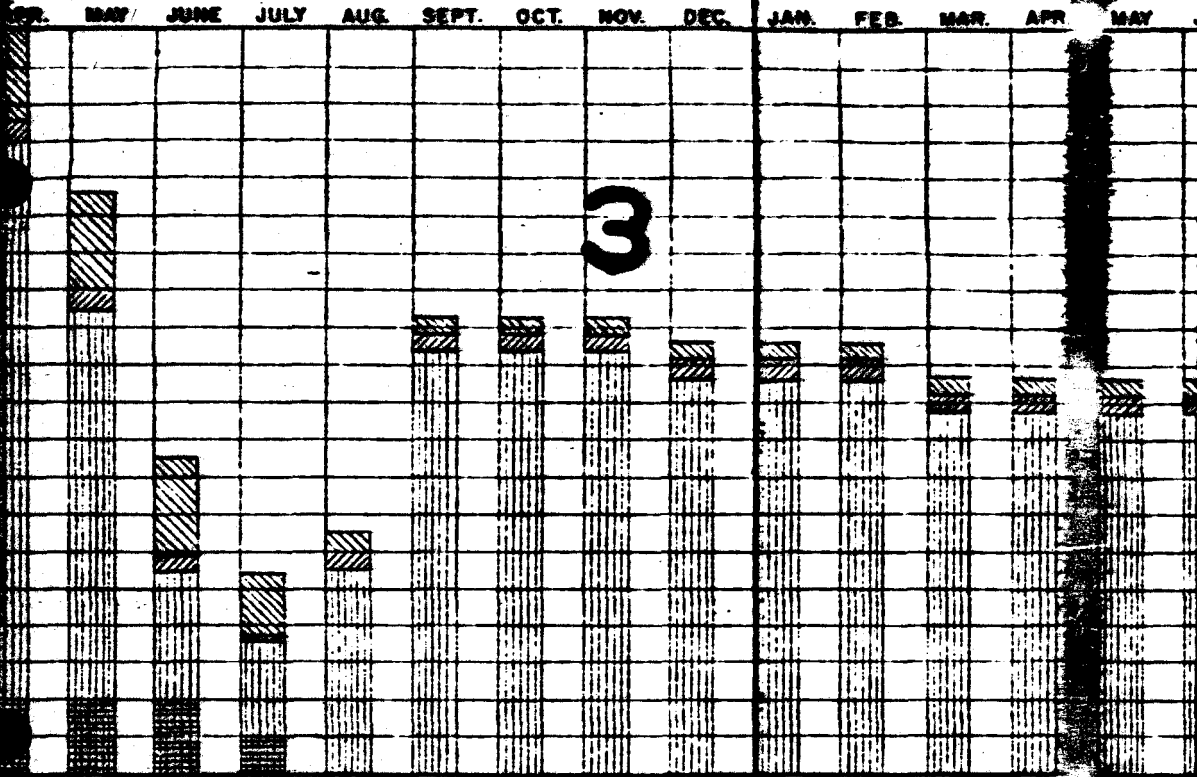
OPERATIONS COST INCLUDED IN CUMULATIVE TOTAL

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MONTHLY PROGRESS CHART (CONST)

CONTRACT NO. 14-CF-0001-415 (3)

1972



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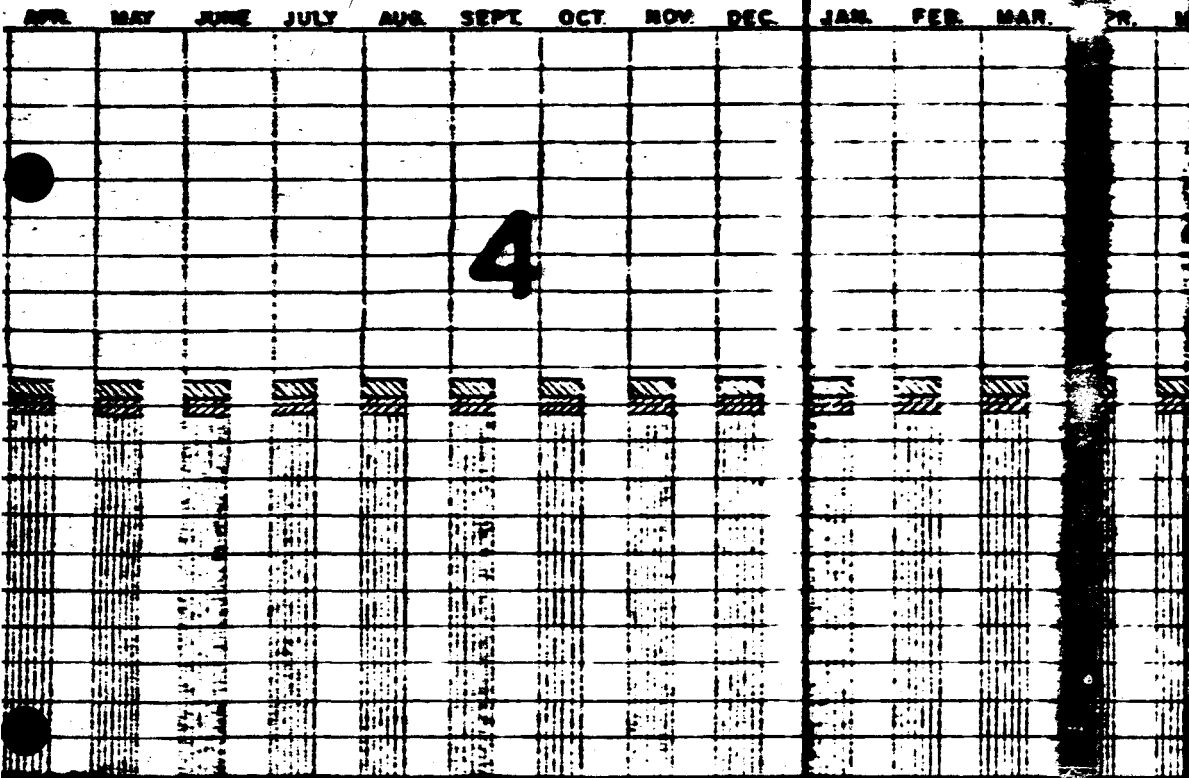
204.4M	487.7M	441.8M	285.0M	220.8M	218.1M	218.0M	219.1M	211.9M	211.5M	211.5M	185.1M	184.5M	204.7M
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APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
204.4M	897.9M	897.9M	924.9M	948.7M	970.8M	992.0M	1010.0M	1035.8M	1056.8M	1077.8M	1096.9M	1114.5M	1130.1M

(CONSTRUCTION & OPERATION)

(REVISED 12/31/70)

1972 1973

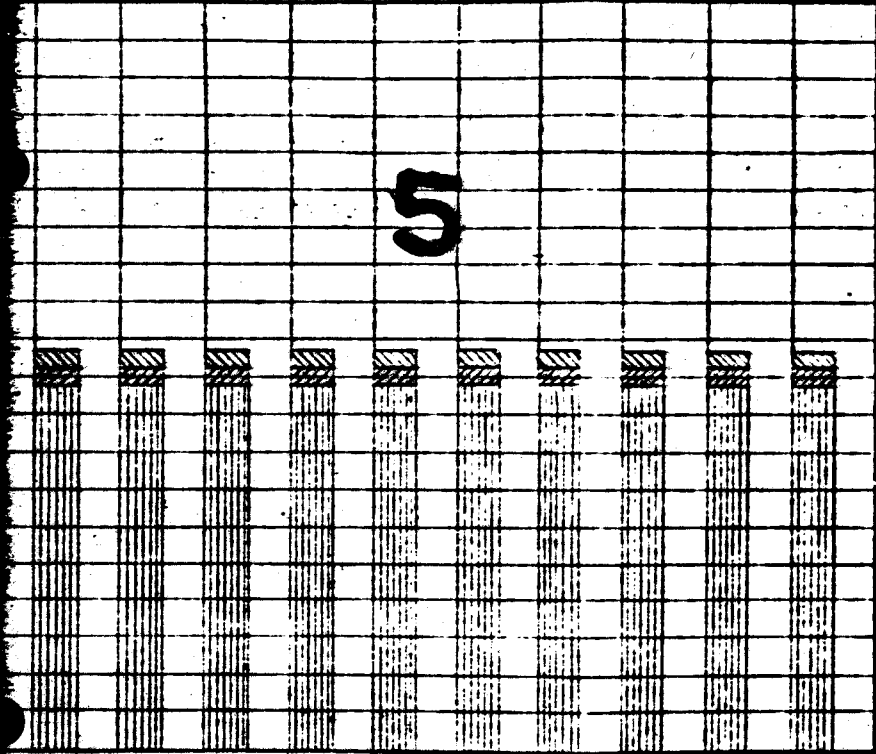


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DATE: 3-31-71

1973

MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.



- PREDICT
- SUPERVISING
- PROFESSIONAL
- TECHNICIAN S-
- TECHNICIAN S/

- ⊕ INCLUDES SUPERVISOR
- ⊗ INCLUDES OPERATIONAL

CONSTRUCTION — TEARING
 OPERATIONS — TEARING

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M	182.1M	180.5M	177.5M	170.0M	161.2M	140.8M	130.1M	130.0M	130.0M	26.9M
	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
M	18,815.4M	18,495.9M	18,673.4M	18,843.4M	18,004.6M	16,154.4M	14,275.5M	14,403.5M	14,535.5M	14,500.4M



APPROXIMATE TOTAL CONSTRUCTION ≈ 8,800,000
 APPROXIMATE TOTAL OPERATIONS ≈ 5,760,000
 14,560,000



MONTHLY
 OFFICE
 U.S. PARTS
 CONSOLIDATED
 RESOURCES DIVISION
 CONTRACT



DATE: 3-31-71



1973

PREDICTED ACTUAL

SUPERVISING  

PROFESSIONAL  

TECHNICIAN S-R  

TECHNICIAN S/C  

⊕ INCLUDES SUPERVISORY EXEMPT TECHNICIANS
 ⊕ INCLUDES CLERICAL

CONSTRUCTION— STEARNS-ROGER JOB B-37000
 OPERATIONS— STEARNS-ROGER JOB B-37000

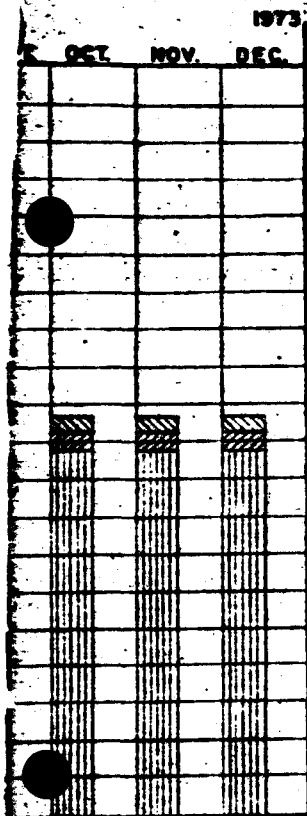
6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
 U.S. DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA.

CONTRACT NO. 14-01-0001-415 (3)
 (REVISED 11/31/70)



130.0M 130.0M 24.9M

OCT. NOV. DEC.

14,409.5M 14,595.5M 14,540.4M

CONSTRUCTION ≈ 8,800,000
 OPERATIONS ≈ 5,760,000
 14,560,000

CONSOLIDATION COAL COMPANY PROJECT
 CSA PILOT PLANT
 RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-37400
 April 5, 1971

OPERATIONS REPORT #13

PROGRESS

MANUALS

Startup procedures are complete for all systems except Dolomite Crushing and Grinding, Reactor Jacket Cooling and Inert Gas Generation. Drafts for these sections will be completed this month and all sections needed for training will be completed before our training program starts. Copies are attached of the startup procedures for which review here at Rapid City is complete.

Work was started during the month on sections of the procedures dealing with safety. There is no problem relative to the process aspects; however, there is work needed relative to personnel safety. A number of process streams in the plant contain large percentages of CO. We have supplied Mine Safety Appliances with stream analyses and plant layouts to obtain their recommendations for analyzers and safety programs.

INTERVIEWS AND PLANS

During the month, six chemists were interviewed at Ponca City; fourteen men, mostly operators, were interviewed at Liberal, Kansas and approximately six men were interviewed at Rapid City. The tentative schedule for hiring additional personnel is:

	JUNE 1	AUGUST 1	TOTAL AS OF AUGUST	COMMITTED TO DATE
Operations	6-14	12-18	26	4
Technical (including lab)	4-6	5	9-10	1
Instrument Tech.	2	2	4	0
Maintenance	Transfer from construction as needed			

We plan to (1) hire from 8 to 14 men on or about June 1, (2) train them for one month, and (3) take over the utilities and 100 area about July 1. Next we hope that in 6 weeks or by the middle of August, we can start up these areas, clear up operating difficulties, perform the required tests and shut the areas down. During July and August we would also bring up the operating crew to about 26 men. Starting in mid August we will train all the operating people for about 2 months, at which time all of the plant should be complete. When the plant is completed we will begin checking out the gasification area.

The target for hiring 8 to 14 people to start in June, is broad because of the possibility that shift engineers are going to be hard to come by. We would like to have the shift engineers by June, but if we cannot find them by that time, we will go ahead with the schedule. We will hire the shift engineers when we can find them.

COMPUTER TERMINAL

We determined the need for and had installed a teletype #33 terminal to be used for on line time sharing of a computer. This will be used for Data Processing and other engineering calculations.

SUPERVISION AND INSTRUMENT TECHNICIANS

The information gathered to date indicates that we will need to advertise for Shift Engineers and Instrument Technicians. Advertisements will be run for Shift Engineers in mid April. We plan to make offers to several chemists at Ponca City and to about six operators at National Helium in Liberal, Kansas.

PLANS FOR APRIL

1. Continue work of manuals.
2. Continue to search for people as outlined in schedule.
3. Place some purchase orders for spare parts for June delivery.
4. The people that furnish the laboratory furniture have been on strike for the past two months. The order was almost completed when the strike was called. The company (Kewaunee) thinks that the strike will be settled about the middle of April and that it would take about 2 weeks to finish and ship the furniture. If the above is true, we should be installing the laboratory furniture about May 1, 1971.

STAFFING

PRESENT STAFF

Management and Supervision.....	5
Janitor.....	1
Receptionist.....	1
TOTAL STAFF.....	7

COSTS

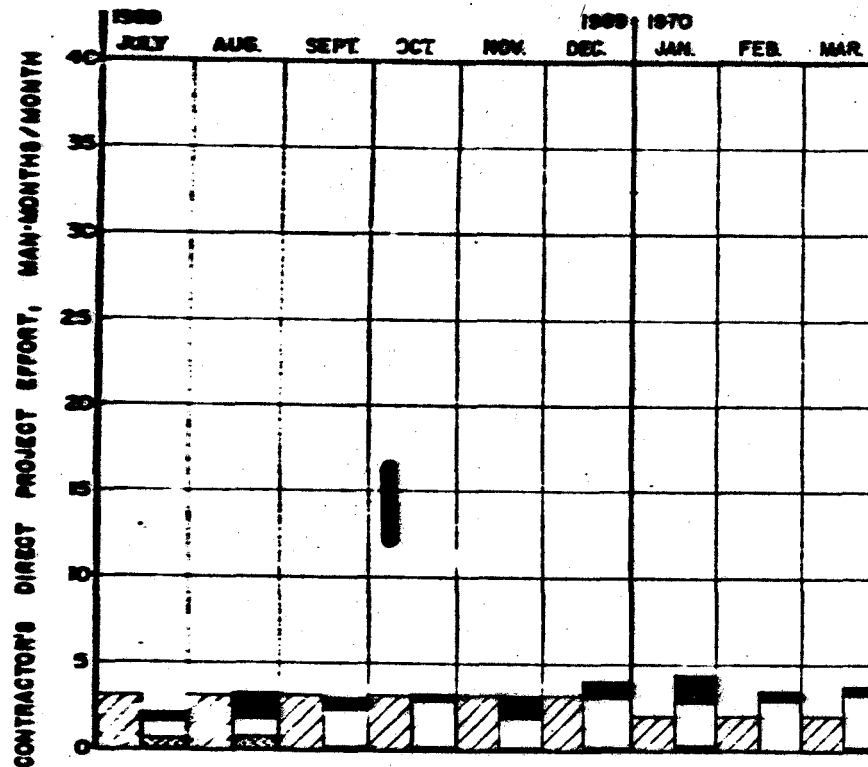
Amount paid out to 3-31-71.....	\$130,939.66
Committed thru March.....	51,550.00
January 1971 Field Payroll yet to be billed from Denver..	\$ 8,600.00
March 1971 field payroll not billed.....	8,500.00
GSA Office Furniture.....	1,000.00
Telephone-March.....	300.00
Denver Charges.....	2,000.00
Utilities for March.....	350.00
March Rentals.....	300.00
Laboratory Furniture.....	32,000.00
TOTAL	\$51,550.00
GRAND TOTAL	\$184,489.66

TOTAL BUDGET.....	\$250,000.00
Amount spent as of	
3-31-71.....	\$ 184,489.66
	\$ 65,489.66

Yours truly,

William E. Powell
 William E. Powell

WEP:aka
 Attachments:
 CC: Eve Marwig-6
 Chuck Stone-Denver-2
 H. Lawless/P. Johnson/M. Vardaman/D. Mosher/D. Dietrich/File/W. E. Powell



	MONTHLY EXPENDITURES*											
	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.			
PREDICTED	4,225	14,885	14,965	13,125	14,385	17,085	15,585	15,595	12,655			
ACTUAL	4,785	34,724	9,609	11,825	10,130	15,205	14,378	14,027	15,019			

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.
PREDICTED	4,225	32,300	45,885	59,020	73,405	90,470	106,055	121,650	134,305
ACTUAL	4,785	46,479	56,088	67,913	78,043	93,248	107,626	121,653	136,672

CUMULATIVE EXPENDITURES*

*Expenditures Include All Costs & Fees

MONTHLY

CONTRACT

MAY 1970 JUNE JULY AUG. SEPT. OCT. NOV. DEC. 1971 JAN. FEB. MAR. APR. MAY JUNE

2



13,818	12,859	13,313	12,835	12,505	12,505	12,505	20,195	20,135	23,295	22,295	21,145	15,905	15,905
17,342	19,319	20,054	13,955	25,003	21,296	9,584	23,091	16,475	16,663	14,000			

MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUN.
188,888	173,658	186,988	196,800	212,305	224,810	237,318	297,470	277,605	300,988	323,195	344,348	350,000	379,000
287,242	228,561	246,615	280,570	288,573	308,888	316,453	339,544	356,019	372,682	388,882			

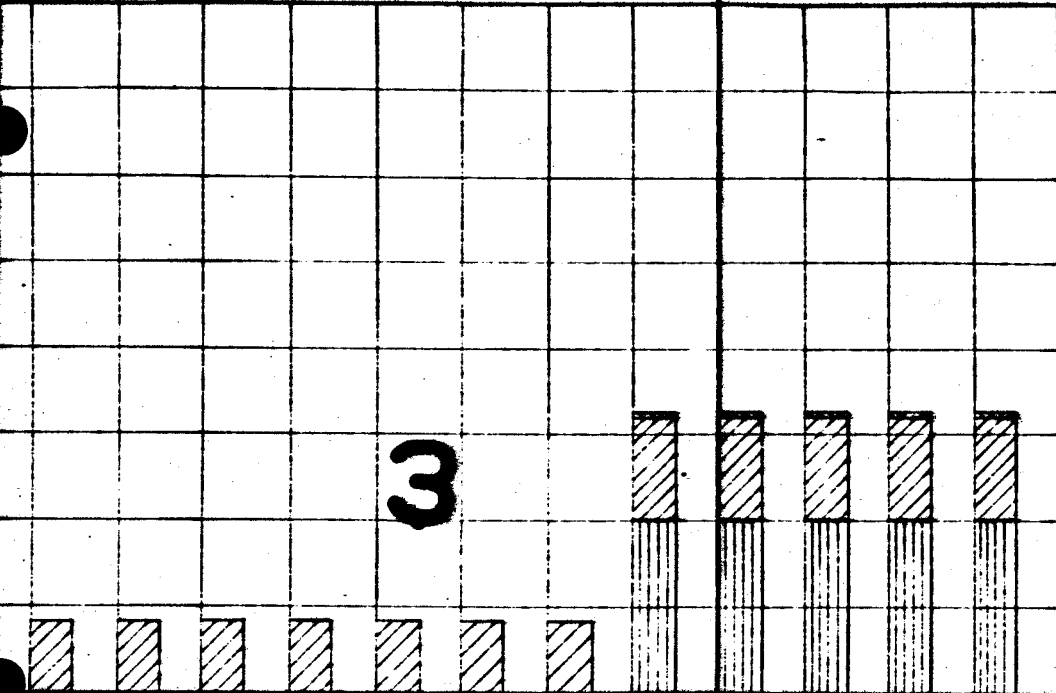
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MONTHLY PROGRESS CHART (SUPERVISION)

CONTRACT No. 14-01-0001-415 (3)

MAY JUNE JULY AUG. SEPT OCT NOV DEC. 1971 JAN FEB MAR APR 1972

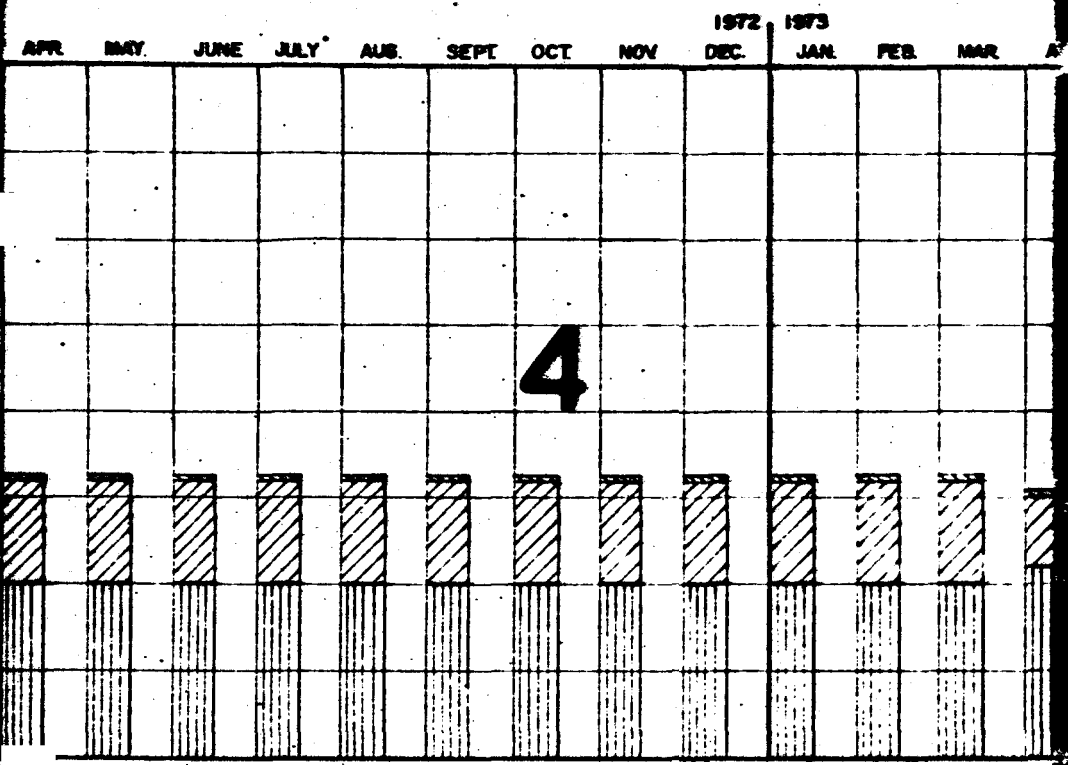
3



	18,705	15,955	14,875	14,875	14,875	14,875	14,875	39,475	39,475	39,475	39,475	39,475
	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
	363,045	379,000	393,875	408,750	423,625	438,500	453,375	492,850	532,325	571,800	611,275	650,750

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SION & LAB WORK)



APR	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV	DEC.	JAN.	FEB.	MAR.	APR.
39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475
690,790	690,225	729,790	769,175	808,690	848,125	887,600	927,075	966,550	1,006,025	1,045,500	1,084,975	1,124,450

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DATE: *March*

1973

APR. MAY JUNE JULY AUG. SEPT.

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⊕ Includes Super
 ⊕⊕ Includes Cleri

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73	36,075	36,075	11,475	11,475	11,475	41,120		
73	1,121,050	1,157,125	1,168,600	1,190,075	1,191,550	1,232,670		

MONT
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RESEARCH
CONTRA

(New 412 Chart)

DATE: March 1971

1973

SEPT.

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN		

⊕ Includes Supervisory Exempt Technicians.
 ⊕⊕ Includes Clerical.

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
RESEARCH DIVISION LIBRARY, PA.

CONTRACT No. 14-01-0001-415 (3)

CEOC-MPR--83

PROGRESS REPORT NO. 83
OCR CONTRACT NO. 14-01-0001-415(3)
CONSOL LIGNITE GASIFICATION PROCESS DEVELOPMENT

April 1 to 30, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

The projected completion date for the pilot plant is September 21, 1971, as a result of the delays in process furnace deliveries. Acceptance tests on coal preparation, gas cleanup, and utility sections can be carried out in June and July.

The remaining change orders were resolved, resulting in a final GMP of \$9,299,967 (subject to downward revision of actual premium pay if less than \$60,000).

Recruiting of operating personnel continues. Work on necessary field changes and acceptance test procedures is under way.

Financial

Estimated expenditures in April were \$21,000 by Consol and \$496,700 by Stearns. Cumulative project expense is \$10,169,158.

64,120			
SEPT.			
232,670			

B. Technical Results and Program

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

1. Supporting Process and Economic Analysis (Project No. 533)

No work was done on this project.

2. Supporting Patent and Legal Activities (Project No. 534)

The current reports and memoranda were reviewed for Subject Inventions.

3. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 536)

Expediting and monitoring of Stearns' construction work continued throughout the month. It now appears that the delay in the process furnaces delivery from Thermal Transfer will result in a September completion date. However, the Coal Preparation, Gas Cleanup and Utility Sections will be ready for mechanical acceptance tests (ex insulation) in June and July.

All outstanding change orders were negotiated with Stearns and submitted to OCR for approval. Change Order 71, involving deletion of insulation, tracing, and painting was rescinded. The final GMP for the construction job is \$9,299,967, subject to downward revision if actual premium pay is less than \$60,000 (Change Order 75). Of this total, \$599,720 represents work added to the scope of the contract, primarily in the area of added provisions for abatement of water and air pollution.

4. Stearns-Roger Construction Subcontract (Project No. 700)

The Stearns Progress Report is attached. Target completion date is now September 27, 1971. After consideration of the total schedule, it was decided to continue work on a premium time basis.

5. Consol Guidance on Operations (Project No. 702)

Considerable time was spent in reviewing the "as built" plant status and defining field changes necessary prior to startup. Engineering of the more urgent changes is now being done by the Stearns Rapid City staff.

Assistance was given to Stearns in interviewing prospective employees.

6. Stearns Operating Subcontract (Project No. 701)

The progress report is attached. Operating personnel now total 11 with the addition of a mechanical engineer, a draftsman, and two "A" operators. Recruiting continues in an effort to achieve a total operating staff (ex maintenance) of ca 50 by August 1.

Authorization for purchase of spare parts has been requested. A list of shop equipment is being prepared for approval and purchase authorization.

Suitable mechanical acceptance tests are being developed with the construction group. Engineering of high priority field changes is under way; such changes will be initiated after the successful completion of mechanical acceptance tests.

7. School of Mines Subcontract (Project No. 703)

Preparatory work on the various aspects of this subcontract is under way. Priority is being given to the survey of Western dolomites and the work on noxious elements in lignite. Dr. Bomberger (Library) visited the school in April to provide information and guidance on analytical techniques.

C. Subject Inventions

None.

April, 1971

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through March, 1971</u>		
Through June, 1969	\$ 1,878,236	\$ 1,878,236
Consol	385,502	323,195
Stearns	7,387,700	7,565,500
	<u>\$ 9,651,438</u>	<u>\$ 9,766,931</u>
<u>Expended in Period (estimate)</u>		
Consol	21,000	21,145
Stearns	496,700	534,900
Total, April, 1971	<u>\$ 517,700</u>	<u>\$ 556,045</u>
Cumulative through April, 1971	<u>\$ 10,169,138</u>	<u>\$ 10,322,976</u>

Att. - Construction Progress Report
Operations Progress Report
Progress Charts
T: 5/18/71

CONSOLIDATION COAL COMPANY PROJECT
CSA PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 701
S-R Job No. 3-37400
May 3, 1971

OPERATIONS REPORT #14

PROGRESS

MANUALS

We have not done much with the manuals this month relative to the write-up but we have been checking various stages of start-up to determine how much detail will be involved in various stages of plant operation. Some of the operating procedures from various vendors are not in our possession as of this writing. We are writing various vendors directly and in addition to this we are notifying our purchasing department of this action.

Mine Safety Appliance Company representatives reviewed the safety aspects of the site relative to hazardous concentration of CO in a meeting held at the plant. Various alternative methods for CO detection were presented. With the information submitted we feel we can now develop the locations of the detectors and provide a safety program so that this situation can be handled without jeopardizing our people.

INTERVIEWS AND PLANS

During the month of April much time has been taken up by the technical group and operations group with interviews of various people. Thirty people from out of town visited the plant for interviews. The advertisements for shift engineers have produced contacts so that we may be able to fill the two remaining positions. The following chart indicates the number of interviews per classification, those accepted, declined and out-standing offers.

	<u>Interviewed or contacted</u>	<u>Accepted</u>	<u>Declined</u>	<u>Offers Outstanding</u>
Operations,				
Shift Engineers:	6	2	3	1
Operators:	13	5	4	4
Technical (Including lab):	10	2	0	0
Instrument Tech.:	1	0	1	0
Maintenance:	Transfer from construction as needed			

We had hoped by this time we would have had someone accept an offer from National Helium in Liberal, Kansas however, since the government is somewhat reluctant to firm up the exact status of that plant most of the people are holding on, hoping something firm will develop, as a result none have accepted offers to date.

TECHNICAL DEPARTMENT

1.) Equipment

The laboratory furniture is still being held at the plant due to a UAW strike. To date we have no indication when this furniture will be released. Some of the laboratory equipment is being delivered to the plant site. The bulk of the equipment however, will be held in Denver and only that equipment, whereby special orders have been issued by CSA, will be shipped directly.

A second order of laboratory supplies and equipment is now being prepared by reviewing each set of standard methods in order to come up with miscellaneous equipment and chemicals.

The computer terminal installed late in March has been operated to test conditions with both Consol and Stearns Denver. In the preliminary programs both locations checked out so for all practical purposes the computer will work.

Efforts are being made to make sure sufficient information is available to complete the ordering of spare parts. The lubrication schedule has been basically completed. An itemized list of proposed changes is in the process of being worked up relative to engineering cost, material take-off and drafting. Procedures for implementing this program beyond these stages will have to be worked up between this location, Consol, Library, and Stearns Denver.

OPERATING GROUP

The construction group is now in a position whereby they wish to clean up various lines and compressors in the plant so that they can be operated. The construction group as such has their own method for cleaning up lines for operations. The operating contract calls for the operating group to write up a plan for operations take over and clean up. These two write ups as such are so close together that one write up should be made to serve both purposes as these write ups will apply to the same piece of equipment for operations, therefore only one of these detailed descriptions should be worked up.

To date the instrument air compressors have both been run but the discharge piping on the discharge of the main compressor was not satisfactory therefore, the emergency compressor has been used to clean out the instrument air compressor.

PLANS FOR MAY

1. To go out for estimates on spare parts, write purchase orders and hold for authority to release.
2. Continue to check the plant for details of operation.
3. Continue to search for two more shift engineers and to look for "B" operators.
4. Write standard procedures for laboratory operation.
5. Check the plant for application of safety instructions.

STAFFING

Present Staff

Management and Supervision.....	5
Engineering.....	1
Operators.....	2
Draftsman.....	1
Janitor.....	1
Receptionist.....	1
TOTAL STAFF.....	11

COSTS

NOTE: The amount spent in April was estimated due to late billing because of changes.

Amount paid out to 4-30-71.....\$162,935
 Committed through April..... 45,056

January 1971 Field Payroll yet to be billed from Denver...	\$ 8,000.00
GSA Office Furniture.....	1,000.00
Telephone-April.....	600.00
Denver Charges.....	2,000.00
Utilities for April.....	350.00
April Rentals.....	300.00
Laboratory Furniture.....	32,000.00

TOTAL..... \$45,050.00

GRANT TOTAL..... \$207,989

TOTAL BUDGET.....\$250,000.00

Amount spent as of 4-30-71..... 207,959.60

\$ 42,010.40

Yours truly,

STEARNS-ROGER CORPORATION

William E. Powell

William E. Powell

MEP:skk

CC: Uwe Harvig-6
 Chuck Stone, Denver-2
 H. Lawless/F. Johnson/M. Vardaman
 B. Mosher/D. Dietrich/File

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job No. B-37000
May 12, 1971

PROJECT REPORT SUMMARY

Work on the ten fired heaters at Thermal Transfer Corporation is now organized to the point that shipment of the first two heaters is now estimated by May 21 and the last could ship by July 3. This delivery sets completion of piping by late August. Construction completion including painting and insulation would be by September 13.

ENGINEERING - - - Essentially complete.

Design engineering work during the past month included final detail checking of header design and hydrostatic test pressures for the fired heaters.

PROJECT MANAGEMENT

The diagram schedule attached to this report shows completed and unfinished work separated by the decorative line. Coils for the first two items were successfully hydrotested on May 8. Approximately 1 1/2 - 2 weeks after hydrotest are required to install the coil in the heater shell and to complete final assembly work. The only other major items affecting project completion date are the thermocouples and thermowells which were finally received in late April and completed in early May. Subcontract for grading, sidewalks, curbs and asphalt surfacing has been awarded. Inquiry for insulation subcontract has been sent to bidders. Inquiry for painting subcontract will be issued the week of May 17. All pending change orders have been approved.

CONSTRUCTION - - - About 75% complete.

All prefabricated piping has been received. Almost all of it, except the heavy wall Incoloy 800 pieces associated with the fired heaters, has been installed. Piping is about 80% complete. Hydrotest and electrical checkout of the utilities system, and loop checkout of the pneumatic controls circuits have started. Steam tracing, previously deferred by Consol, was started in late April. Of the 216 total pieces of major equipment, all except one pump and the ten fired heaters have been set in place. Present plans call for electrical and mechanical engineers from our Denver office to check out the equipment and controls for the materials handling and utilities sections starting on May 17.

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job No. B-37000
May 12, 1971

SUMMARY OF PROJECT CHANGES

Orig. Coor. Max. Price	\$8,465,129
Previously App'd Changes	493,977
Changes App'd in April:	
CO 43, 49 (Deer)	(89,360)
Net Revision to CO 53	2,230
CO 74, 76, 77	627,921
Revised App'd CIP	\$9,299,967

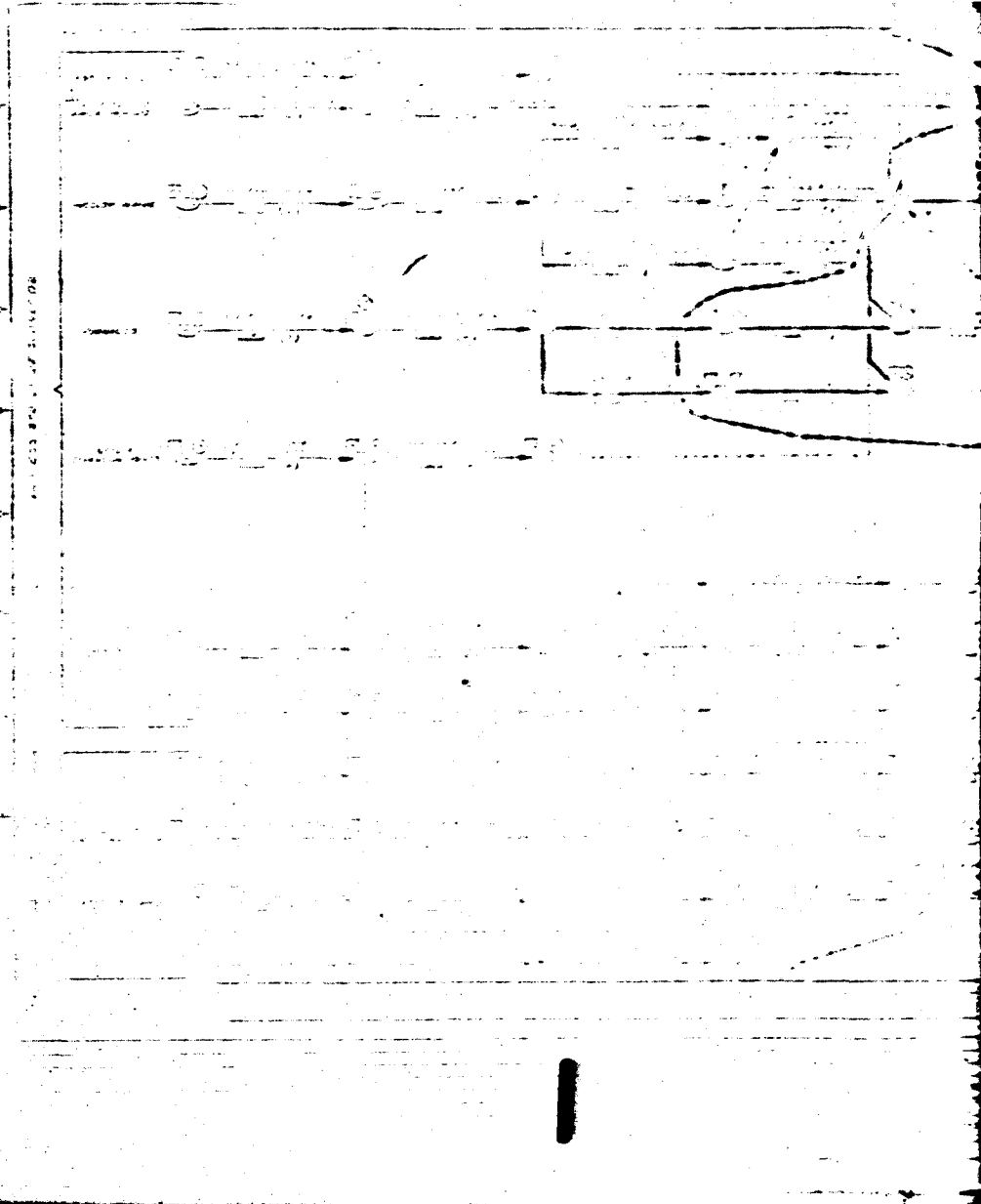
D. H. Rouse
D. H. Rouse
Project Manager

Attachments:

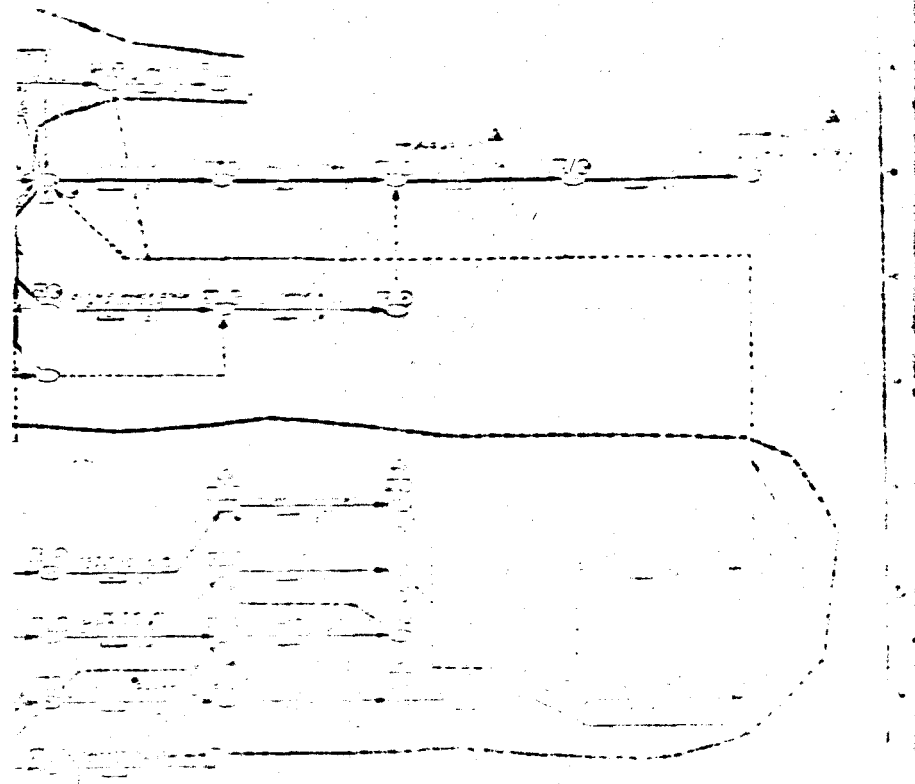
Progress Chart - 4/30/71
Master Plan Schedule - 4/30/71
Equal Employment Opportunity Report

Distribution:

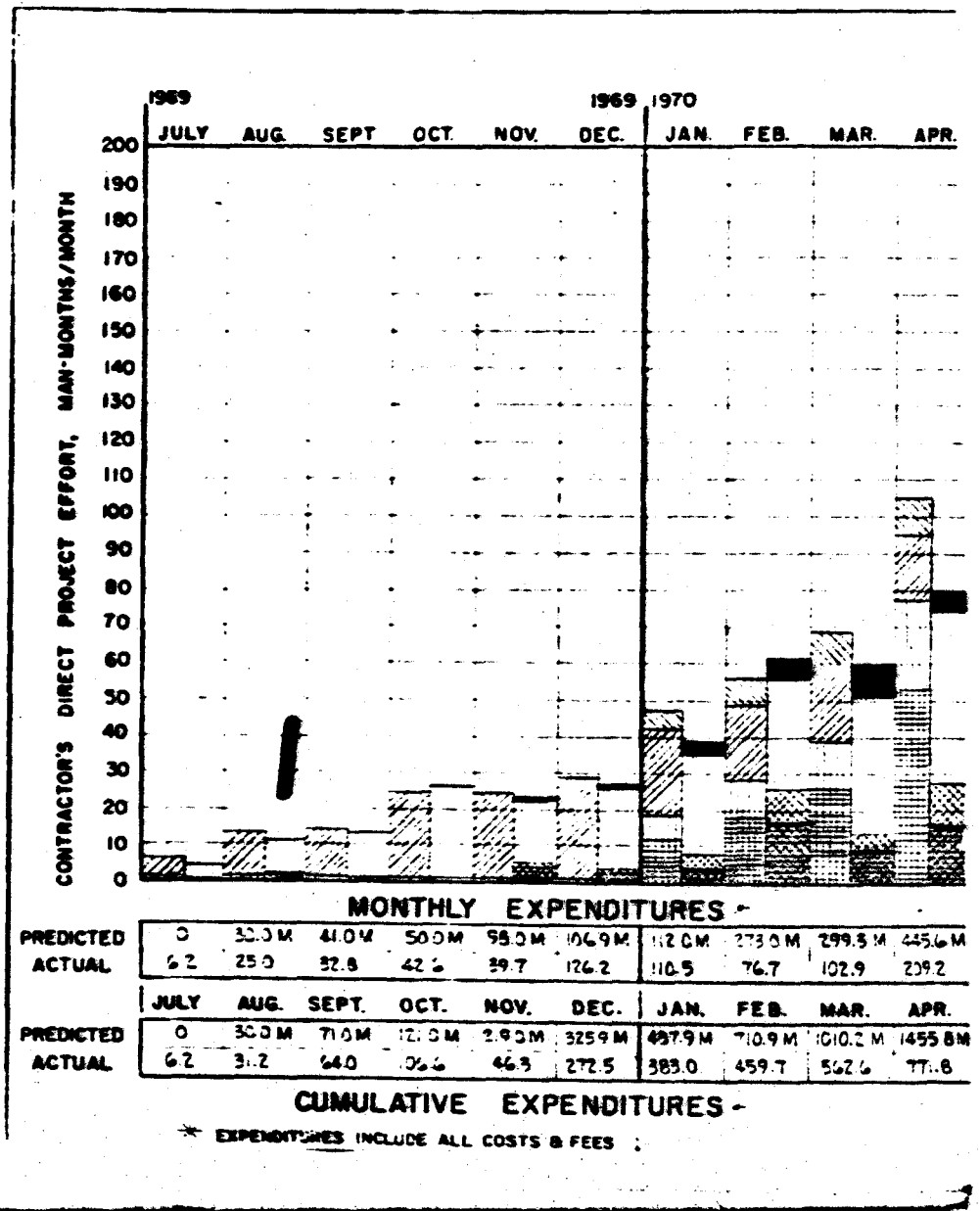
<u>Consol - 5</u>	<u>Continental Oil Company - 6</u>	
C. A. Schulz	E. E. Ellington, CED	J. B. Hambleton, Jr.
U. B. Marwig	D. F. Wagner, Field	C. E. Fagerberg, CED
	L. Thompson, MED	Dr. C. V. Foster, MED
<u>S-R - 7</u>		
PCP/HFD/CMS/TCS/Fls.	CFL/JTH/VLS/CIN/JON,	ALC.
FAM/JAP, DMB,	NEFowell, Field	



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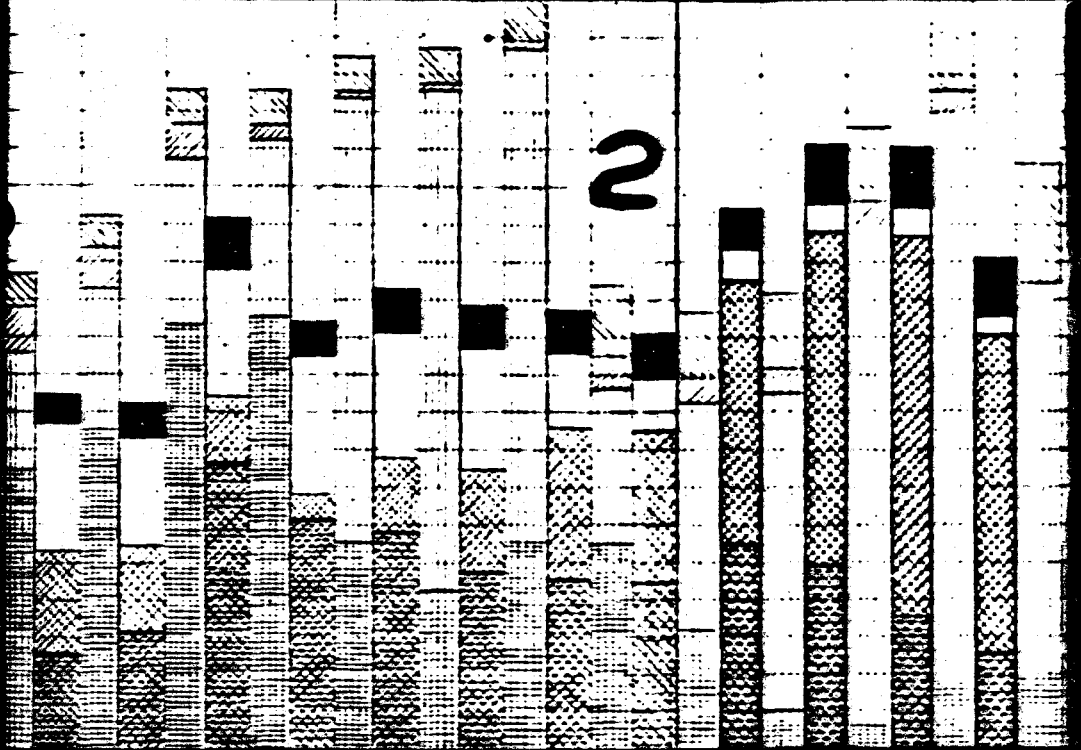


		JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
MONTHLY EXPENDITURES -											
PREDICTED		0	30.0M	41.0M	50.0M	58.0M	106.9M	112.0M	233.0M	299.8M	445.6M
ACTUAL		6.2	25.0	32.8	42.6	39.7	126.2	110.5	76.7	102.9	239.2
CUMULATIVE EXPENDITURES -											
PREDICTED		0	30.0M	71.0M	121.0M	179.0M	325.9M	437.9M	710.9M	1010.2M	1455.8M
ACTUAL		6.2	31.2	64.0	106.6	146.3	272.5	383.0	459.7	562.6	771.8

* EXPENDITURES INCLUDE ALL COSTS & FEES

1970 1971

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY



229.7M	291.1M	302.0M	251.1M	712.9M	591.1M	391.1M	778.2M	723.5M	777.0M	702.4M	534.9M	437
233.7	267.1	564.6	725.2	794.2	728.9	472.9	779.5	552.1	690.6	757.7	496.7	

MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
2079.5M	2970.6M	3772.6M	4663.7M	5376.6M	6257.7M	7588.8M	8546.6M	5925.8M	6862.1M	7565.5M	8004.4M	8538
2005	1972.6	1937.2	2662.4	3456.6	485.5	4608.4	5337.3	5939.4	6630.0	7357.7	7884.4	

OPERATIONS COST INCLUDED IN CUMULATIVE 1980 1050
 CONSTRUCTION COST INCLUDED IN CUMULATIVE 7117.7 7121.4
 NON FUNDED SALES TAX RESERVE NOT INCLUDED IN CUMULATIVE 1572

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MONTHLY PROGRESS CHART (CON)

CONTRACT NO. 14-CI-0001-415 (3)

1971 1972

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY

3

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4877M 44.8M 285.0M 220.8M 218.1M 218.0M 219.1M 21.9M 211.5M 211.5M 185.1M 185.5M 71

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY

8538.1M 8979.9M 9264.9M 9155.7M 8703.3M 8921.8M 10100.9M 9152.8M 9564.3M 9775.8M 9900.9M 10454.4M 80

(CONSTRUCTION & OPERATION)

(REVISED 12/31/70)

1972 1973

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

4

194.5M 204.7M 203.9M 202.8M 202.8M 202.9M 201.8M 201.5M 201.4M 85.2M 82.9M 82.1M 80.5M

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

145.4M 11,350.1M 11,554.0M 11,756.8M 11,959.6M 12,162.5M 12,364.3M 25,558M 12,767M 2,950.4M 3,333M 3,354M 3,475M

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1973

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

PREDICTED

SUPERVISING



PROFESSIONAL



TECHNICIAN S-R

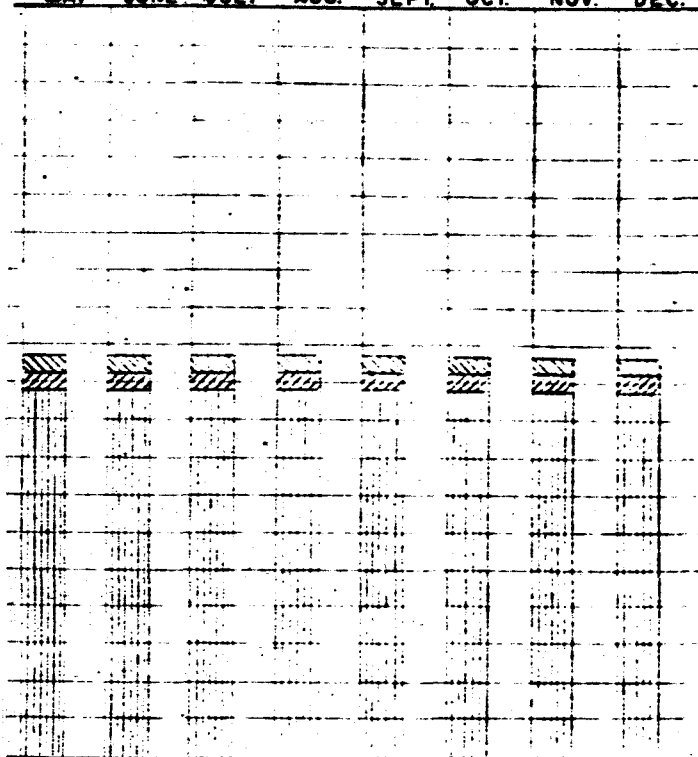


TECHNICIAN S/C



- ⊙ INCLUDES SUPERVISORY EXP.
- ⊙ INCLUDES CLERICAL

CONSTRUCTION — STEARNS-ROE
 OPERATIONS — STEARNS-ROE



5

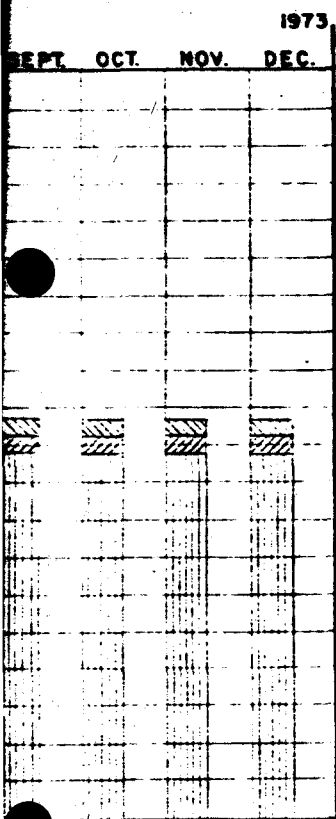
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MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
13,673.4M	13,843.4M	14,004.6M	14,154.4M	14,275.5M	14,405.5M	14,535.5M	14,560.4M

APPROXIMATE TOTAL CONSTRUCTION ≈ 8,800,000
 APPROXIMATE TOTAL OPERATIONS ≈ 5,760,400
 14,560,400

MONTHLY PRO
 OFFICE OF CO
 U.S. DEPARTMENT
 CONSOLIDATI
 RESEARCH DIVISION
 CONTRACT NO. 14
 (REVISED

DATE: April 1971



	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN S-R		
TECHNICIAN S/C		

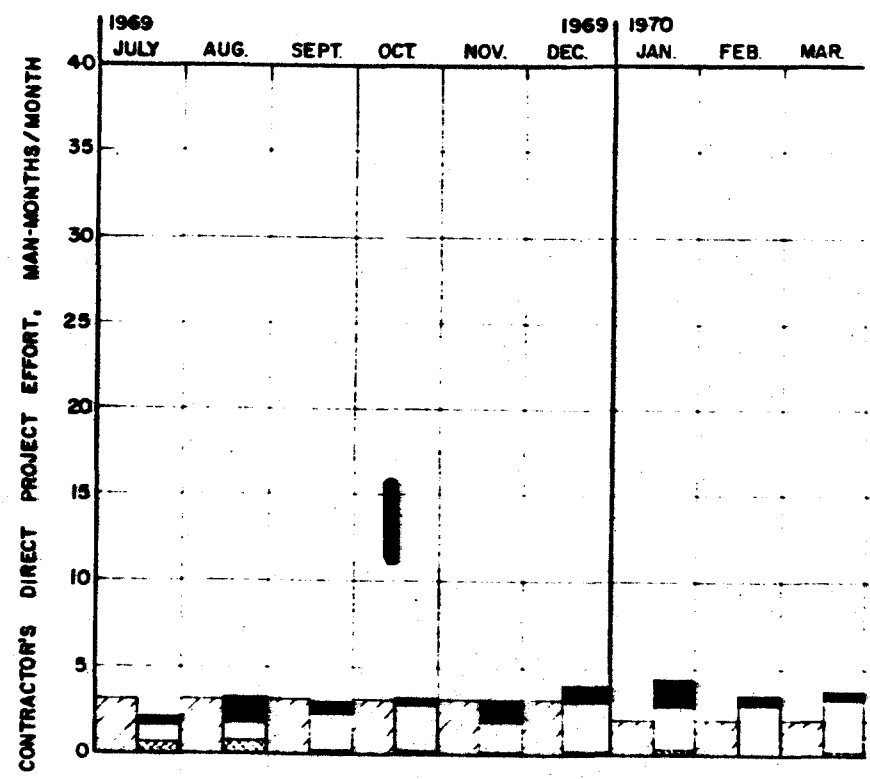
⊕ INCLUDES SUPERVISORY EXEMPT TECHNICIANS
 ⊗ INCLUDES CLERICAL

CONSTRUCTION — STEARNS-ROSER JOB B-37000
 OPERATIONS — STEARNS-ROSER JOB B-37000

6

130.1M	130.0M	130.0M	24.9M
SEPT.	OCT.	NOV.	DEC.
14,275.5M	14,405.5M	14,535.5M	14,560.4M
TOTAL CONSTRUCTION ≈ 8,800,000			
TOTAL OPERATIONS ≈ 5,760,400			
14,560,400			

MONTHLY PROGRESS CHART
 OFFICE OF COAL RESEARCH
 U.S. DEPARTMENT OF THE INTERIOR
CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA.
 CONTRACT NO. 14-01-0001-415 (3)
 (REVISED 12/31/70)



	MONTHLY EXPENDITURES*								
	1969 JULY	AUG.	SEPT.	OCT.	NOV.	1969 DEC.	1970 JAN.	FEB.	MAR.
PREDICTED	16,215	16,685	14,965	13,155	14,395	17,065	15,595	15,535	11,675
ACTUAL	11,745	14,735	9,609	11,925	10,130	15,205	4,178	14,227	5,013
PREDICTED	16,215	30,900	45,865	59,020	73,405	90,470	106,065	121,650	134,325
ACTUAL	11,745	46,479	56,098	67,913	78,043	93,249	107,626	121,653	136,677

CUMULATIVE EXPENDITURES*

* Expenditures Include All Costs & Fees

JUNE JULY AUG. SEPT. OCT. NOV. 1970 DEC. 1971 JAN. FEB. MAR. APR. MAY

2



12,655	13,315	12,915	12,905	12,575	14,905	20,155	20,135	23,215	22,235	21,455	18,705
319	20,054	13,955	25,003	21,296	9,784	23,091	16,475	6,673	12,820	1,000	
JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
173,650	188,985	193,800	212,305	224,810	237,315	257,470	277,605	300,910	321,115	344,440	363,040
226,561	246,615	260,570	285,573	306,363	316,453	339,544	356,019	372,607	385,912	411,572	

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MAY



39,41

MAY

690,22

MONTHLY PROGRESS CHART (SUPERVISION)

(LAB WORK)

CONTRACT No. 14-01-0001-415 (3)

1971												1972			
MAY	JUNE	JULY	AUG.	SEPT	OCT	NOV	DEC.	JAN.	FEB	MAR.	APR	MAY	JUNE	JULY	AUG.

3

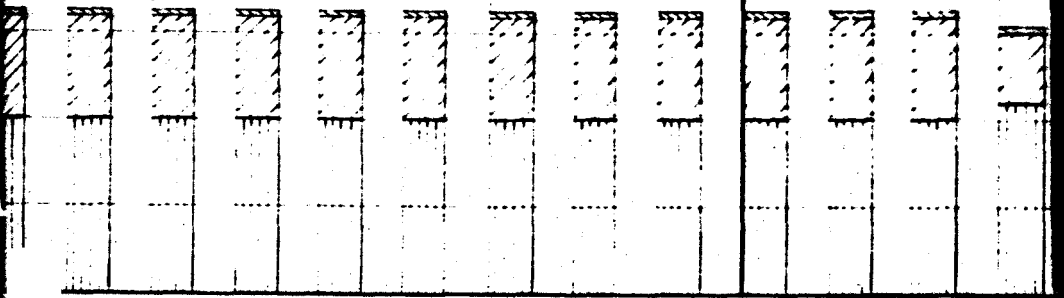
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16,705	15,955	14,875	4,875	4,975	4,875	4,875	5,075	5,275	5,275	5,275	5,275	5,275	5,275	5,275	5,275	5,275
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.
363,045	379,000	393,875	408,750	423,625	438,500	453,375	468,250	532,325	577,200	622,075	666,950					

SION & LAB WORK)

1972 1973
 APR MAY JUNE JULY AUG. SEPT OCT NOV DEC JAN FEB MAR APR

4



39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	36,000
APR	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV	DEC.	JAN.	FEB.	MAR.	APR.	
39,750	690,225	729,700	769,175	808,650	848,125	887,600	927,075	966,550	1,006,025	1,045,500	1,084,975	1,124,450	

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DATE: *Sept*

1973

APR MAY JUNE JULY AUG SEPT

5

PRES
SUPERVISING
PROFESSIONAL
TECHNICIAN

a Includes Super
a & Includes Cleric

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075 36,075 11,475 1,475 475 41,120

APR MAY JUNE JULY AUG SEPT

1,010,030 1,57,425 1,164,600 1,000,000 1,191,330 1,232,670







MONTH

OFFICE
DEPARTMENT

CONSCIOUS
RESEARCH DEPARTMENT

CONTRACT

1973

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		 *
TECHNICIAN		 **

* Includes Supervisory Exempt Technicians
 ** Includes Clerical.

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
 DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA

CONTRACT No. 14-01-0001-415 (3)

PROGRESS REPORT NO. 84
 OCR CONTRACT NO. 14-01-0001-415(3)
CONSOL LIGSITE GASIFICATION PROCESS DEVELOPMENT

May 1 to 31, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

As a result of shipment of an improper grade of Incoloy by the manufacturer, the completion of the process furnaces is further delayed. The projected completion date for construction (Section 200) is now mid-October, 1971.

Recruiting of operating personnel continues. Acceptance tests on the utility sections are underway.

Financial

Estimated expenditures in May were \$13,000 by Consol and \$292,000 by Stearns. Cumulative project expense is \$10,475,354.

B. Technical Results and Program

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

1. Supporting Process and Economic Analysis (Project No. 533)

No work was done on this project.

2. Supporting Patent and Legal Activities (Project No. 534)

The current reports and memoranda were reviewed for Subject Inventions.

3. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 536)

Monitoring of Stearns' construction work continued throughout the month. Various Conoco specialists witnessed preliminary testing of compressors, furnaces, instrumentation, etc.; no difficulties were encountered.

Installation of the sewer line under Conoco-Consol supervision is proceeding on schedule.

Suitable mechanical acceptance tests for the utility sections were developed in co-operation with Stearns' personnel. These tests were initiated in May.

4. Stearns-Roger Construction Subcontract (Project No. 700)

The Stearns Progress Report is attached. Subsequent to the issuance of this report, it was learned that portions of the Incoloy 800 tubing (for the process furnaces) shipped by Huntington Alloy to Thermal Transfer had been improperly annealed. Correction of this error requires cutting some of the welding work already completed; a further delay of approximately one month is anticipated. Thus the projected (by Consol) date for completion of construction is mid-October, rather than mid-September, 1971 as set forth on the Stearns report.

In view of the above delay, the construction work scheduled will be returned to a 40 hour week as of June 15th.

5. Consol Guidance on Operations (Project No. 702)

Assistance was supplied in interviewing operating personnel applicants, in defining necessary field changes and in defining test procedures for mechanical acceptance tests.

Arrangements are being made to acquire Glenharold lignite for break-in test work in Section 100 in June-July.

The AGA Advisory Committee Meeting was held in Rapid City on May 10. The OCR Contractors Meeting in Chicago was attended on May 25th.

6. Stearns Operating Subcontract (Project No. 701)

The progress report is attached. The Stearns-Roger operating team, as of May 31, totals 20, including a part-time accountant and a part-time purchasing agent.

7. School of Mines Subcontract (Project No. 703)

The progress report is attached. As indicated, field activity to define dolomite reserves will begin in June and continue throughout the summer.

C. Subject Inventions

None.

Lignite Gasification
Progress Report No. 84

-4-

May, 1971

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through April, 1971</u>		
Through June, 1969	\$ 1,878,256	\$ 1,878,256
Consol	407,686	344,340
Stearns	7,884,400	8,100,400
	<u>\$ 10,170,354</u>	<u>\$ 10,322,996</u>
<u>Expended in Period (estimate)</u>		
Consol	13,000	18,705
Stearns	292,000	437,700
<u>Total, May, 1971</u>	<u>\$ 305,000</u>	<u>\$ 456,405</u>
<u>Cumulative through May, 1971</u>	<u>\$ 10,475,354</u>	<u>\$ 10,779,401</u>

Att. - Construction Progress Report
Operations Progress Report
School of Mines Report
Progress Charts

T: 6/14/71

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job No. B-37000
June 9, 1971

PROJECT REPORT SUMMARY

Work on the ten fired heaters at Thermal Transfer Corporation has progressed very slowly. Two heaters are ready for shipment pending final review of mill test reports on their pressure coils. Remainder are promised for shipment by July 1. This delivery sets completion of piping by late August, and completion of painting and insulation by mid-September.

ENGINEERING - - Essentially complete.

Design engineering work during the past month included further checking of details for the fired heaters. Piping designers visited the jobsite to review and revise schematic details for steam tracing.

PROJECT MANAGEMENT

The diagram schedule usually attached to this report is not included because its appearance is unchanged from last month. Progress made during May has been restricted to items that do not show up on this general type of schedule.

As a part of our expediting of the fired heater vendor, our Director of Purchases has been exerting pressure through American Brake Shoe, parent company for Thermal Transfer Corporation. Our Chief Inspector has visited the shop and been in contact with the tube supplier to expedite mill test reports. Our resident production supervisor has been pushing the 60-hour work week on coil fabrication, and our expeditor for the Pittsburgh area has been trying to push work on final assembly.

Bids for insulation are now due. Electrical subcontract has been extended to include heat tracing. Painting inquiry is being prepared.

CONSTRUCTION - - About 82% complete.

Piping is about 85% complete. Hydrotest of the utilities systems is almost finished. Loop check of the pneumatic control circuits is 70% complete. Steam tracing is 60% complete. Of the 216 total pieces of major equipment, all except one pump and ten fired heaters have been set in place. Equipment in the materials handling and utilities

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSG PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-37000
 June 9, 1971

CONSTRUCTION - continued

sections have been checked out for electrical and mechanical readiness. Refractory lining in stack has been completed. Elevator installation is progressing slowly. Grading and paving subcontractor has completed about 80% of the work on the waste ponds.

SUMMARY OF PROJECT CHANGES

Orig. Guar. Max. Price	\$8,465,129
App'd Changes	834,838
Revised App'd GMP	\$9,299,967

D. H. Dawson

D. H. Dawson
 Project Manager

Attachments: Progress Chart - 5/31/71
 Equal Employment Opportunity Report

Distribution:

<u>Consol - 5</u>	<u>Continental Oil Company - 6</u>	
C. A. Schulz - 4	E. E. Ellington, CED	J. B. Hambleton, Jr.
U. D. Marvig	D. F. Wegner, Field	G. E. Faberberg, CED
	L. Thompson, NED	Dr. C. V. Foster, PED

S-R - 7

FCP/HFD/CMS/TGS/File, CFL/JTH/VLB/CIN/JCN ALC,
 FAN/JAP, DHD, WEPowell, Field

CONSOLIDATION COAL COMPANY PROJECT
CSG PILOT PLANT
 Rapid City, South Dakota

CCC Project No. 701
 S-R Job No. B-37400
 June 3, 1971

OPERATIONS REPORT #15PROGRESS

Start-up procedures for the Utility Area and for Area 100 will be used as part of the orientation program during June. Copies of the procedures and an outline of the orientation program are attached. All of the start-up procedures to be used during the orientation program have been issued except those for Dolomite Crushing and Grinding, the Instrument Air System and the Inert Gas System. These three procedures will have to be revised and written to incorporate recent changes and new information from the vendors.

We have a proposal from Mine Safety Appliance for carbon monoxide monitoring equipment and a preliminary plan for locating test points based on criteria for warning times consistent with a practical safety program. The preliminary estimate on this equipment is \$25,000. Since a considerable amount of money is involved, this entire system will have to be checked and studied. A real danger exists in lines with flanges and compressors with packing, handling gases containing 2% carbon monoxide.

INTERVIEWS AND PLANS

Most of our effort was directed toward recruiting this month. We now have hired all of the Shift Engineers and all but one of the key operators. All of this initial complement of operating people will be here by mid-June and the orientation program has been arranged so that everyone will be ready when we start tests in Area 100.

The cumulative results of our recruiting effort over the last two months is as follows:

	Interviewed or Contacted	Accepted	Declined	Offers Outstanding
Operations				
Shift Engineers	5	5	-	0
Operator	25	5	-	0
Technical (Instrumentation Lab)	15	5	-	0
Instrumentation	1	0	2	0
Maintenance				Transfer from construction as needed

Offers to personnel at National Melior plant at Liberal, Kansas, were all rejected although some of the men indicated that they would wish to be considered when the plant shuts down. We know of two other plants, Eldorado, Kansas, and Tuscola, Illinois, where we may be able to hire additional experienced men. Also we interviewed a number of men from South Dakota School of Mines and plan to hire four (4) of them on or about July 15th, to break them in under our present highly experienced crew during the tests in Area 100.

We have been unsuccessful in hiring instrument technicians and a programmer. We are presently running advertisements and utilizing every available source to hire these people.

The schedule for hiring additional men directed toward an October start-up of the gasification system, with training to start in August is:

	<u>Now Hired</u>	<u>Add by August 1</u>	<u>Total as of August 1</u>
Operations	9	17	26
Tech. (Including Lab)	5	7	12
Instrument Tech.	0	5	5
Maintenance		Transfer from construction as needed	

This month we plan to extend our interviewing schedule to include interviews of men for operations from the plants that are shutting down. We also plan to hire one additional Chemist.

TECHNICAL DEPARTMENT

Additional spare parts orders were prepared and were held pending the go-ahead from the Office of Coal Research.

An estimate for material cost of eleven changes that should be installed during the next six weeks was prepared and, based on approval from Consolidation Coal, we have purchased the long delivery material.

Drafting required for the twenty-five changes needed before starting each of the areas is in progress and the mechanical flow sheets are being updated for use in the training programs.

The laboratory furniture, the Chromatographs, the Atomic Adsorption instrument, balances and miscellaneous equipment arrived and plans are being made for setup.

OPERATING GROUP

Purchase requisitions were prepared for (1) personnel safety equipment (2) hand tools and for (3) benches etc., needed in the control room.

All of the flushing and purging tests on piping were witnessed. Metal tags are being put on purge lines to help avoid future mix-ups in these complex systems.

Preliminary punch lists of the items that are incomplete were prepared for Area 100 and for the Utilities.

Initial attempts by a representative from Williams were observed. It would be best if we participated in the vendors efforts during the checkout and this kind of participation in future checkouts has been approved.

PLANS FOR JUNE

Prepare a program for the Area 100 tests and write specific operating instructions to suit the program.

Prepare sections of the Safety Manual and Safety Procedures needed during July and begin those for the Area 200 start-up. The carbon monoxide section of the manual will have to be started early as considerable information will have to be obtained.

Witness all construction testing and participate in vendor checkouts, as part of the orientation program.

Prepare a complete estimate for all of the changes needed for before the plant is operated.

Begin preparation for the primary training program schedule for the August to October period.

Begin calibration of laboratory instruments.

Determine the feasibility of using the computer terminal for laboratory calculations and accounting.

Issue the policy and benefit pamphlet for hourly employees.

A wats long distance telephone line will be installed as of June 1, 1971. This line will accommodate the computer terminal. In this manner it will be much cheaper.

COSTS

Amount paid out to 5-31-71	\$189,679
Committed through May.....	42,800

January 1971 Field Payroll yet to be billed from Denver..	\$6,500
GSA Office Furniture.....	1,000
Denver Charge.....	1,000
Laboratory Furniture.....	32,000

TOTAL.....\$2,800

GRAND TOTAL.....\$232,479

TOTAL BUDGET.....	\$250,000
Amount Spent as of	
5-31-71.....	232,479
	\$ 17,521

Yours truly,

STEANS-ROGER CORPORATION

William E. Powell
William E. Powell

WEPrsaa

CC: HLL/FFJ/MNV/DRM/DDD/File
CC: Uwe Narvig-o
Chuck Stone/D. Dawson

ORIENTATION SCHEDULE FOR
SHIFT ENGINEERS & "A" OPERATORS

JUNE 1971
UTILITIES AREA

June 1 thru 4 - ZEOLITE WATER SOFTENER, DEAERATOR & CHEMICAL FEEDERS

Alternate two hours classroom discussion with two hours in plant study.

Use flowsheet B-225, sht. 1 and Utilities Operating Manual together with necessary manufacturers information contained in plant data books.

If service representatives for Penn. Pump and Comp. Co. (J-202 & J-309) and Gas Atmospheres (Inert Gas Generator) are here we will adjourn to observe and learn what we can from them.

June 7 thru 11 - BOILER, FEEDWATER PUMPS, STEAM SYSTEM & PROPANE GAS STORAGE

Alternate two hours classroom discussion with two hours in plant study.

Use flowsheets B-220 and 221 and Utilities Operating Manual. Erie City and Bailey information manuals and plant data books will be used.

Service representatives from the John Zink Thermal Oxidizer, Flare Stack and Preheater Furnace B-102 may be in plant during this week. We will try to spend as much time with them as possible.

June 14 thru 18 - COOLING WATER SYSTEM, PLANT & INSTRUMENT AIR SYSTEM & INERT GAS SYSTEM

Alternate two hours classroom discussion with two hours in plant study.

Use flowsheets B-220, sheets 1 & 2, B-222 and B-227 and Utilities Operating Manual. Plant data books and Gas Atmosphere operating information will also be available.

AREA 100
LIGNITE & DOLOMITE PREPARATION

June 21 thru 25 and June 28 thru July 2

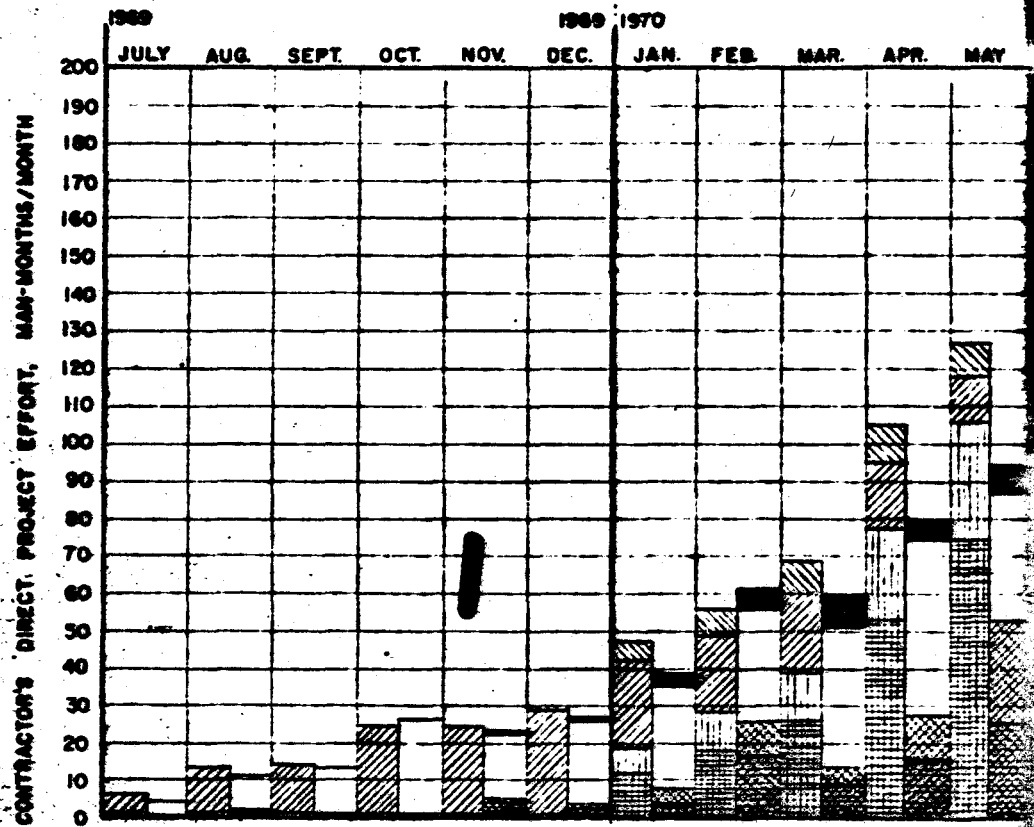
Use flowsheets B-201 and B-202 and Section 100 Operating Manual, together with Williams Company operating manual and plant data book--learn Area 100.

Alternate two hours classroom with two hours in plant study.

ADDITIONAL TOPICS TO BE DISCUSSED AS TIME PERMITS

1. Fire fighting and safety procedures.
2. Emergency procedures to be followed in case of personnel injuries.
3. Electrical lockout procedures
4. Fire, entry and special permits
5. Record keeping, log books and writing of maintenance work orders.
6. Housekeeping

It is recommended, that in so far as possible, all available laboratory and maintenance people attend these sessions so as to become acquainted with the process and plant.



MONTHLY EXPENDITURES*

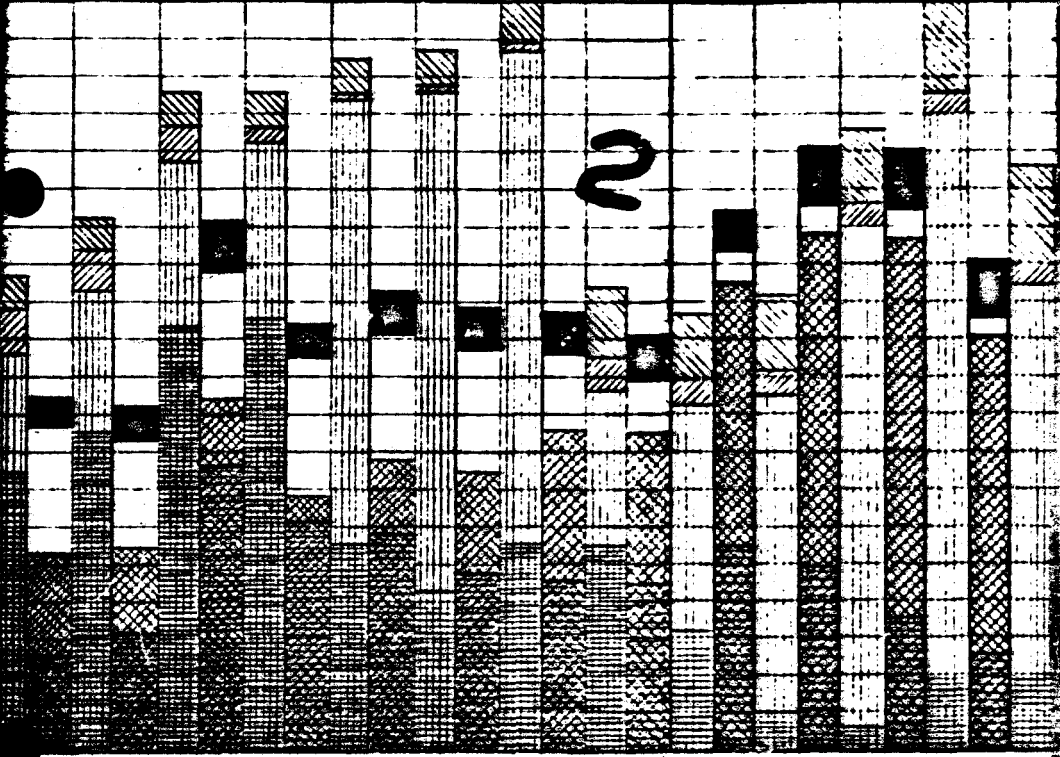
	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
PREDICTED	0	30.0M	41.0M	50.0M	98.0M	106.9M	112.0M	273.0M	299.5M	445.6M	629.7M
ACTUAL	6.2	25.0	52.8	42.6	39.7	126.2	110.9	76.7	102.9	209.2	299.7
PREDICTED	0	30.0M	71.0M	121.0M	219.0M	325.9M	437.9M	710.9M	1010.2M	1455.8M	2079.5M
ACTUAL	6.2	31.2	64.0	106.6	146.3	272.5	383.0	459.7	562.6	771.8	1005.5

CUMULATIVE EXPENDITURES*

* EXPENDITURES INCLUDE ALL COSTS & FEES

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28.7M	891.1M	802.0M	891.1M	712.9M	891.1M	891.1M	758.2M	779.5M	772.0M	702.4M	554.9M	487.7
28.7	867.1	564.6	725.2	794.2	728.9	422.9	779.5	552.1	690.6	757.7	496.7	297
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MA
879.5M	2970.6M	3772.6M	4663.7M	5376.6M	6267.7M	7158.8M	8166.6M	8928.8M	9868.1M	7565.5M	8100.4M	853
805.5	1572.6	1937.2	2662.4	3456.6	4185.5	4608.4	5387.3	5959.4	6630.0	7587.7	7884.4	817

OPERATIONS COST INCLUDED IN CUMULATIVE 181.0 163.0 18
 CONTRIBUTION COST INCLUDED IN CUMULATIVE 711.9 712.4 792
 NET FUNDING SALES TAX RESERVE NOT INCLUDED IN CUMULATIVE 152.2 152.2 152

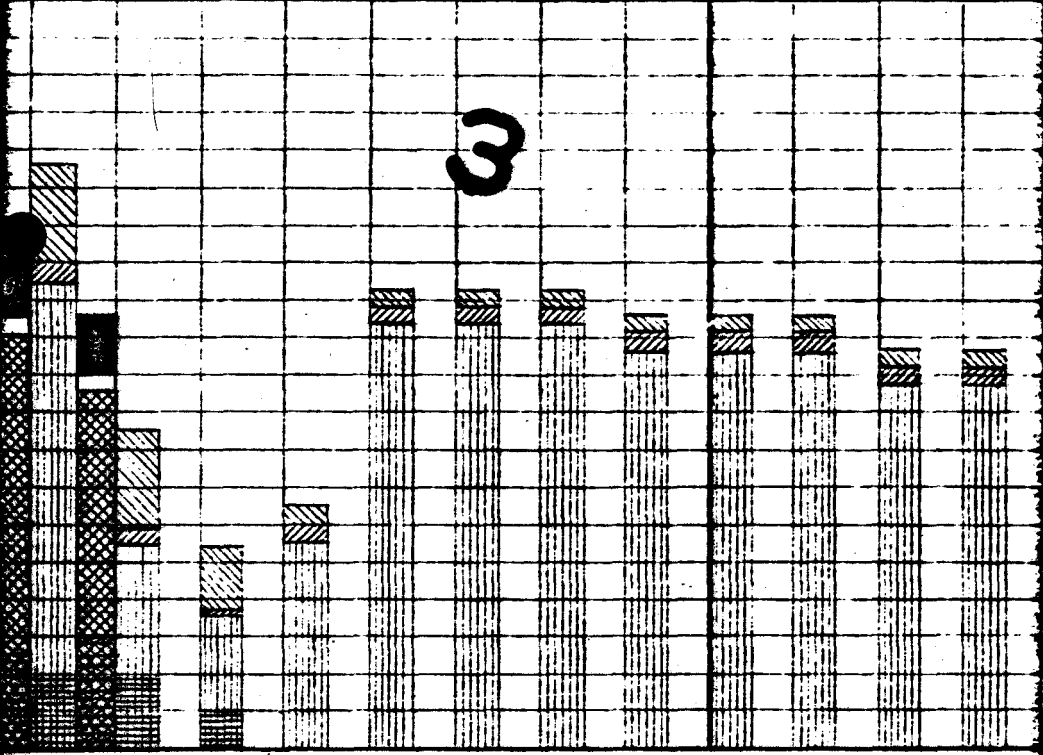
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MONTHLY PROGRESS CHART (

CONTRACT NO. 14-CI-0001-416 (3)

1971 1972

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.



287.7M	441.8M	285.0M	220.8M	218.1M	218.0M	219.1M	211.9M	211.5M	211.5M	185.1M	184.5M
292.0											

MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
8558.1M	8979.9M	9264.9M	9485.7M	9703.8M	9921.8M	10140.9M	10352.8M	10564.3M	10775.8M	10960.9M	11145.4M
8176.4											

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 180.7
 180.7

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APR	180.5
APR	815.075

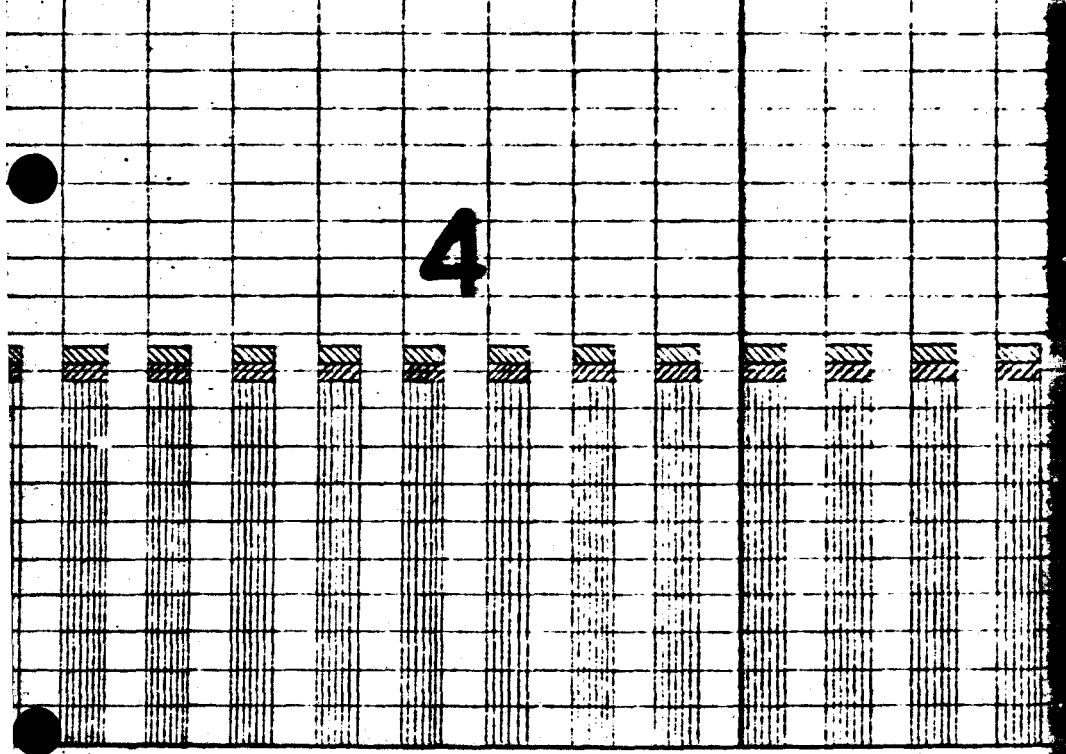
(CONSTRUCTION & OPERATION)

(REVISED 12/31/70)

1972 1973

PR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR

4



5M 204.7M 209.9M 202.8M 202.8M 202.9M 201.8M 201.5M 201.4M 189.2M 182.9M 182.1M 180.5M

PR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR

14M 11,990.1M 11,534.0M 11,756.8M 11,959.6M 12,162.5M 12,364.3M 12,565.8M 12,767.2M 12,950.4M 13,133.3M 13,315.4M 13,445.5M

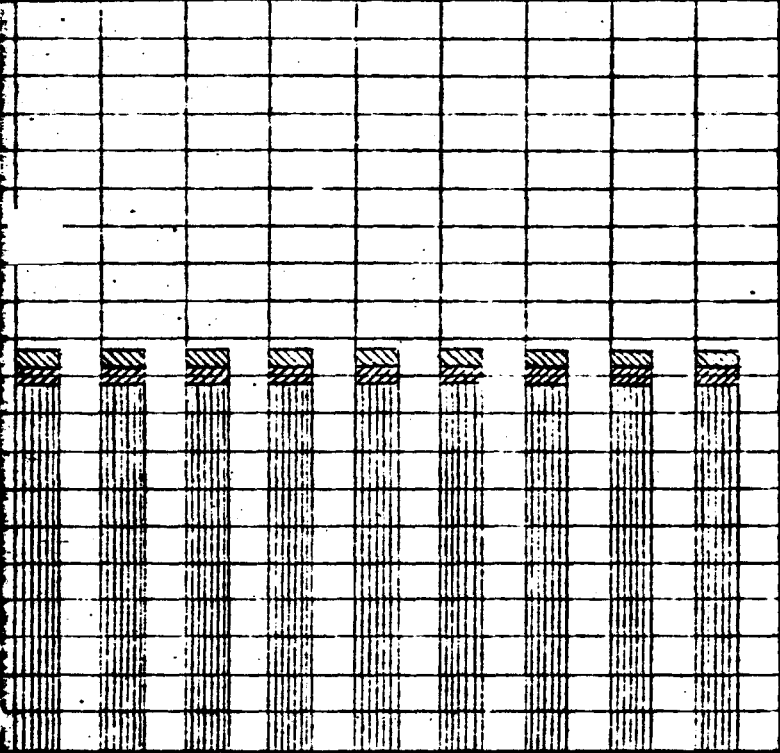
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DATE: May, 1971

1973

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.



- PRE
- SUPERVISING
- PROFESSIONAL
- TECHNICIAN S-R
- TECHNICIAN S/C
- INCLUDES SUPERV
- INCLUDES CLERK
- CONSTRUCTION — STEA
- OPERATIONS — STEA

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M	177.5M	170.0M	161.2M	140.8M	130.1M	130.0M	130.0M	24.9M
APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
13,495.9M	13,673.4M	13,843.4M	14,004.6M	14,154.4M	14,275.5M	14,405.5M	14,535.5M	14,560.4M

APPROXIMATE TOTAL CONSTRUCTION ≈ 6,800,000
 APPROXIMATE TOTAL OPERATIONS ≈ 5,760,400
 12,560,400

MONTHL
 OFFICE
 U.S. DEPART
 CONSOL
 RESEARCH DIVIS
 CONTRACT

SUBCONTRACT BETWEEN CONSOL AND SESMET RE CONSOL CO₂ ACCEPTOR PROCESS
(OCR, Prime Contract No. 14-01-0001-415(3))

I. Summary

The month was spent largely in completing plans for the more intensive investigations during the summer months beginning on June 1. Specifications were complete for the autoclave to be used in the acceptor reconstitution.

II. Resource Study of Carbonate Rocks (Mickelson)

Final work on summer field plans was completed. Dr. Mickelson and research associates Gersic and Schneider will begin full-time field work on June 1 in the Big Horns region. Dr. Gries and associate Barman will begin full-time work in July and August.

III. Acceptor Reconstitution (Fuerstenau)

Final specifications for the autoclave were completed and arrangements made for competitive bids. Additional background literature on phase relationships is being gathered and will continue in June. Final delivery of autoclave will delay active work during the summer.

IV. Noxious Elements in Lignite (Lingard)

Samples of Husky char and Coalstrip coal were subjected to preliminary emission spectrographic analysis for trace elements by direct arcing in graphite electrodes. Initial results indicate a greater number of trace elements in the Husky char than in the Coalstrip coal.

We anticipate some work on fusion techniques will begin during June.

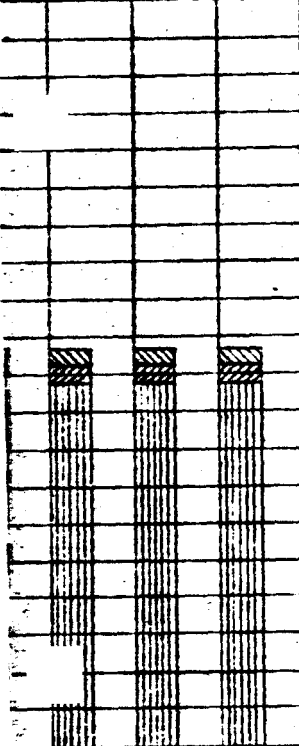
V. Pre-Gasification Beneficiation (Clarkson)

Background data is still being obtained with the intent of an intensive program beginning in June.

DATE: May, 1971

1973

PT. OCT. NOV. DEC.



PREDICTED ACTUAL

SUPERVISING [diagonal lines] [solid black]

PROFESSIONAL [diagonal lines] [white with circle]

TECHNICIAN S-R [vertical lines] [cross-hatch with circles]

TECHNICIAN S/C [grid] [cross-hatch]

⊕ INCLUDES SUPERVISORY EXEMPT TECHNICIANS
⊗ INCLUDES CLERICAL

CONSTRUCTION— STEARNS-ROGER JOB B-37000
OPERATIONS— STEARNS-ROGER JOB B-37400

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
U.S. DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
RESEARCH DIVISION LIBRARY, PA.

CONTRACT NO. 14-01-0001-415 (3)

(REVISED 8/31/70)

800 130.0M 130.0M 24.9M

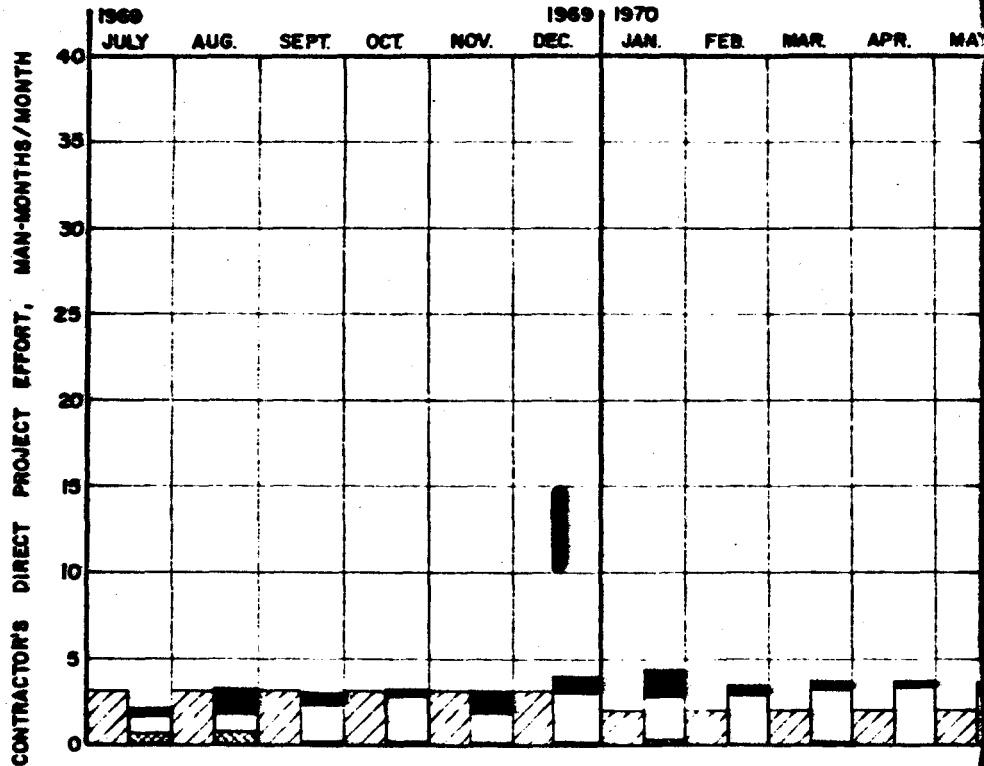
SE OCT. NOV. DEC.

SM 14,405.5M 14,535.5M 4,540.4M

CONSTRUCTION ≈ 8,800,000

OPERATIONS ≈ 5,760,400

14,560,400



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MONTHLY EXPENDITURES*

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
PREDICTED	6,215	14,685	14,965	13,155	14,385	17,065	15,595	15,595	12,655	12,875	13,605
ACTUAL	11,745	34,734	9,609	11,825	10,130	15,205	14,378	14,027	15,019	93,228	17,500

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
PREDICTED	16,215	30,900	45,865	59,020	73,405	90,470	106,065	121,660	134,315	147,190	160,795
ACTUAL	11,745	46,479	56,088	67,913	78,043	93,248	107,626	121,653	136,672	99,900	287,400

CUMULATIVE EXPENDITURES*

* Expenditures Include All Costs & Fees



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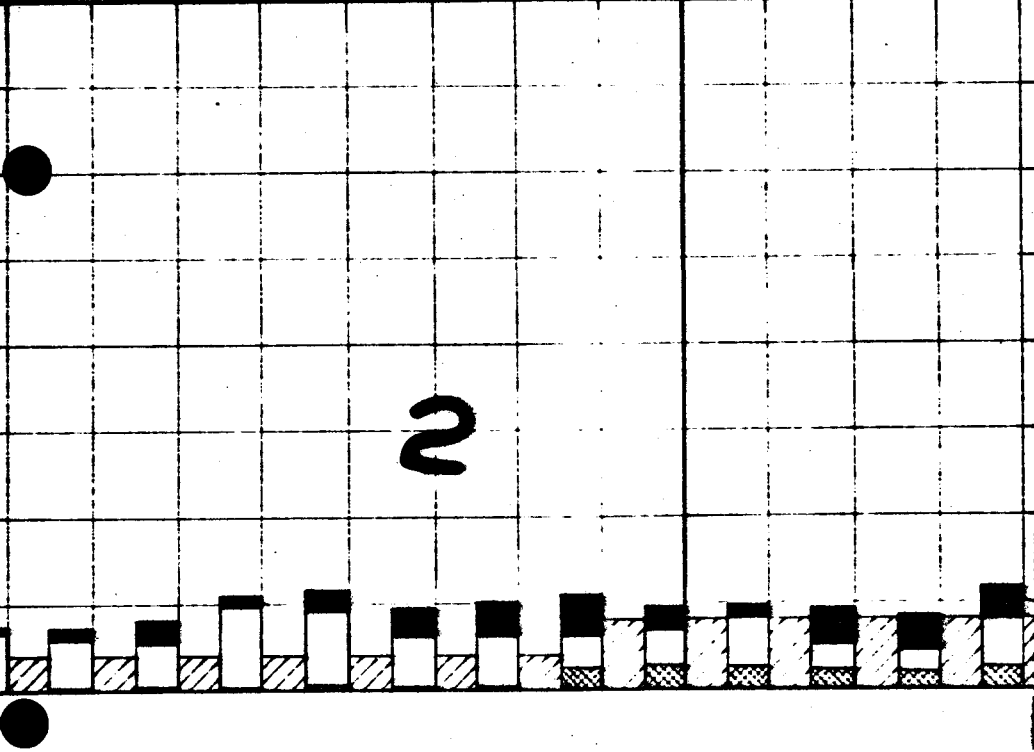


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MAY JUNE JULY AUG. SEPT. OCT. NOV. 1970 DEC. 1971 JAN FEB. MAR. APR.



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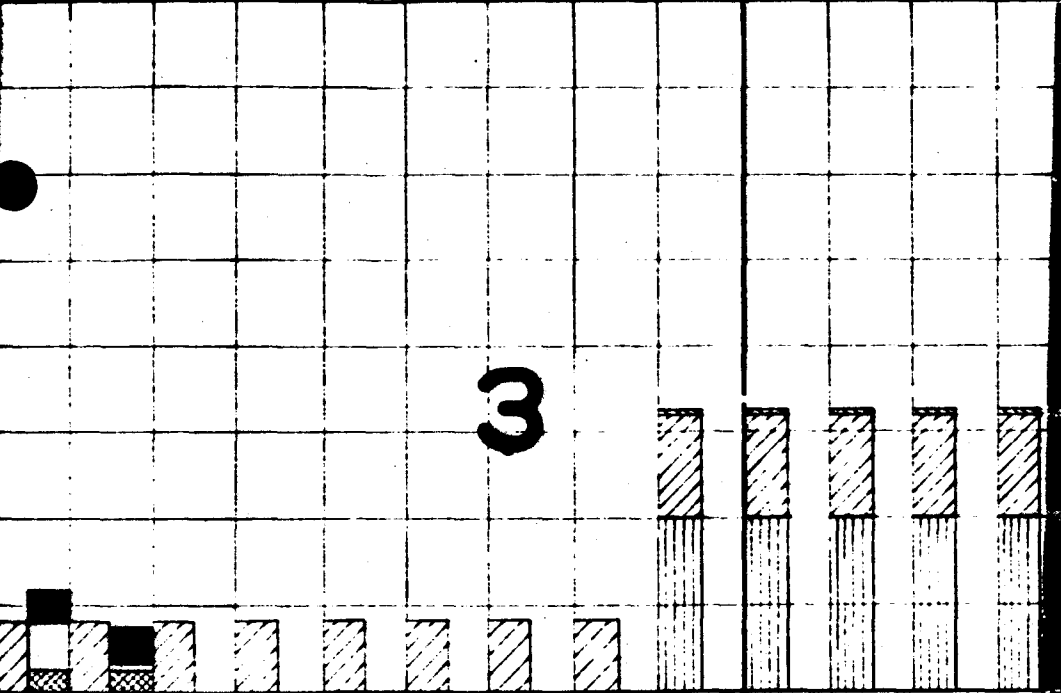
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13,813	12,638	13,315	12,735	12,505	12,505	12,505	20,155	20,135	23,235	22,295	21,145
17,342	19,319	20,054	13,955	25,003	21,298	9,584	23,091	16,475	6,663	12,820	22,198
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN	FEB.	MAR.	APR.
188,295	173,650	186,985	199,800	212,305	224,810	237,315	257,470	277,603	300,990	323,195	344,348
207,2-2	226,561	246,615	260,570	285,573	308,889	316,433	339,544	356,019	372,692	389,502	407,699

MONTHLY PROGRESS CHART (SUPERVISOR)

CONTRACT No. 14-01-0001-415(3)

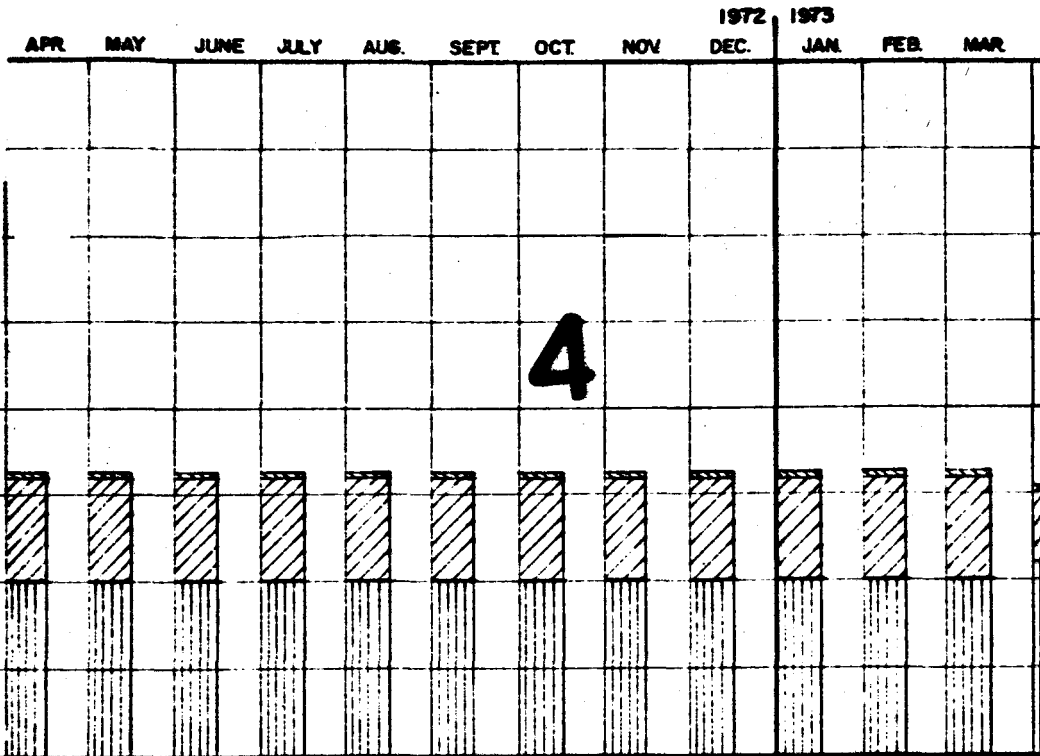
APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. 1971 JAN. FEB. MAR. APR. 1972



21,145	18,705	15,955	14,875	14,875	14,975	14,875	14,875	39,475	39,475	39,475	39,475	39,475
22,198	13,000											
APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
344,348	363,048	379,000	393,875	408,750	423,625	438,500	453,375	468,250	532,325	571,800	611,275	650,750
407,699	420,698											

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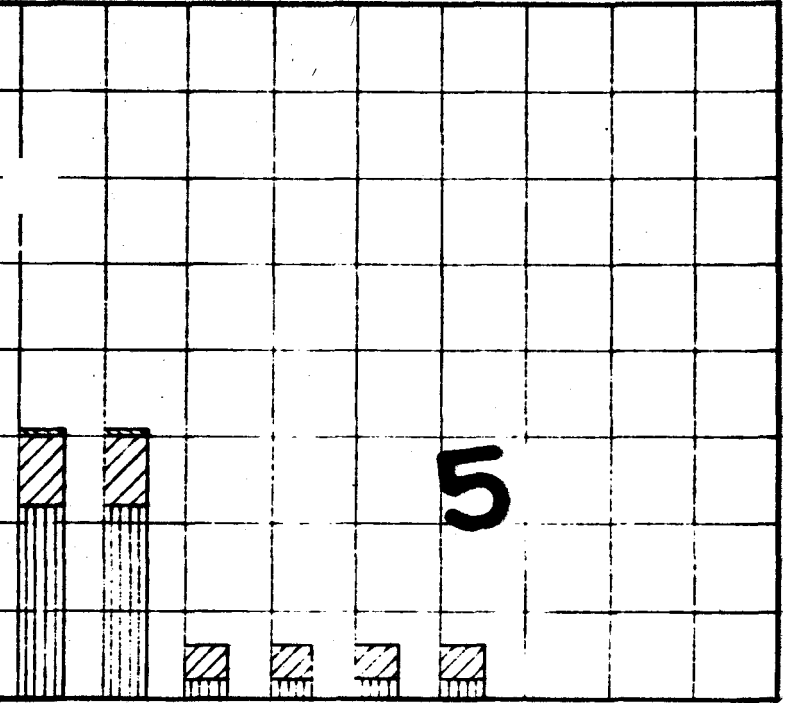
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(New 415 Chart)

DATE: May

1973

APR. MAY JUNE JULY AUG. SEPT.



SUPERVISING
PROFESSIONAL
TECHNICIAN

- ⊕ Includes S
- ⊗ Includes C

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36,075	36,075	11,475	11,475	11,475	41,120			
APR	MAY	JUNE	JULY	AUG.	SEPT.			
1,121,050	1,157,125	1,166,600	1,190,075	1,191,550	1,232,670			

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CONT

(New 415 Chart)

DATE: May 1971

1973

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN		

- ⊕ Includes Supervisory Exempt Technicians.
- ⊕⊕ Includes Clerical.

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
RESEARCH DIVISION LIBRARY, PA.

CONTRACT No. 14-01-0001-415 (3)

600-MPR-5

PROGRESS REPORT NO. 85
OCR CONTRACT NO. 14-01-0001-415(3)
CONSOL LIGNITE GASIFICATION PROCESS DEVELOPMENT

June 1 to 30, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

The projected completion date for construction remains mid-October, 1971. The metallurgical questions regarding the heater coils have been resolved and shipment of materials by Thermal Transfer will resume in July.

Recruiting of operating personnel and acceptance testing of completed portions of the plant continues. Coal preparation and drying equipment will be tested in August.

Financial

Estimated expenditures are \$15,500 by Consol and \$308,100 by Stearns. Cumulative project expense is \$10,798,462.

B. Technical Results and Program

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

1. Supporting Process and Economic Analysis (Project No. 533)

No work was done on this project.

2. Supporting Patent and Legal Activities (Project No. 534)

The current reports and memoranda were reviewed for Subject Inventions.

3. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 536)

Monitoring of Stearns' construction work continued during the month.

Installation of the sewer line under Consol-Consol supervision will be completed in August.

4. Stearns-Roger Construction Subcontract (Project No. 700)

The Stearns Progress Report is attached. The projected completion date is now mid-October, as a result of the delays at Thermal Transfer due to metallurgy.

5. Consol Guidance on Operations (Project No. 702)

Continued assistance was supplied to the Stearns operating group. A second engineer (Carl Pink) from Library will be transferred to Rapid City in July.

Arrangements were made to obtain 150 tons of Glenharold lignite in August for breakin of the coal preparation system.

6. Stearns-Roger Operating Subcontract (Project No. 701)

The progress report is attached. As of July 1, the following systems have been accepted from construction:

- a. Section 100 (complete)
- b. Instrument Air System
- c. Regeneration Air Compressor J202
- d. CO₂ Compressor J309
- e. Thermal Oxidizer B501
- f. Flare Stack F-502

The inert gas generator package was rejected because of inoperability; additional engineering is required to correct this situation.

The Stearns report indicates that difficulties are being encountered in recruiting operators and instrument technicians.

7. School of Mines Subcontract (Project No. 703)

The progress report is attached.

C. Subject Inventions

None.

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through May, 1971</u>		
Through June, 1969	\$ 1,878,256	\$ 1,878,256
Consol	420,206	363,043
Stearns	<u>8,176,400</u>	<u>8,538,100</u>
	\$ 10,474,862	\$ 10,779,401
<u>Expended in Period (estimate)</u>		
Consol	15,500	15,955
Stearns	<u>308,100</u>	<u>441,800</u>
Total, June	<u>\$ 323,600</u>	<u>\$ 457,755</u>
Cumulative through June, 1971	\$ 10,798,462	\$ 11,237,156

Att. - Construction Progress Report
Operations Progress Report
School of Mines Report
Progress Charts

T: 7/14/71

CONSOLIDATION COAL COMPANY PROJECT
GRAND PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 701
S-R Job No. B-37400
July 2, 1971

OPERATIONS REPORT #16

PROGRESS

The shift engineers, operators, and laboratory personnel spent most of the month reviewing the operating procedures on the Utility Area and Area 100. Approximately two hours per day were spent in discussion of these operations. The operating group has been working with construction in an effort to test out various systems and make soap tests to make sure these areas are tight. As part of this, punch lists were prepared in seven areas: (1) Lignite, Dolomite Crushing and Grinding, (2) Inert Gas Generator, (3) Instrument Air System, (4) Regeneration Air Compressor, (5) CO₂ Compressor, (6) Thermal Oxidizer, and (7) Flare Stack and Ignition System. These punch lists have been presented to construction and we are waiting for the completion of the work or their comments.

The Inert Gas Generator System was turned down in its entirety and the punch list withheld. It is the opinion of the operating group that some additional engineering needs to be done in this area. We have worked very closely with the manufacturer representatives in reviewing the operating procedures and checking with them on spare parts recommendations.

In addition to the above, personnel in the operating group have worked on special assignments: preparing and writing of the safety manual with particular emphasis on the process; and writing of a manual for the procedure and method of fighting process fires for the entire plant. Drafts of these manuals are now being revised to incorporate review comments. Procedure manuals are being prepared for the plant so that emergency equipment from outside the plant can be handled inside the plant in a safe and efficient manner.

Engineers in the technical department spent essentially all of the month reviewing and witnessing line flushing and testing, equipment checkouts by vendor, and equipment alignment. Drafting is essentially complete on the change orders that must be completed before the Area 100 tests and the run-in of utilities. The scope of the tests for Area 100 was defined and a technical program is in draft form.

About half of the installation for the laboratory furniture is complete and all of the first order of equipment from GSA is due by mid-July. Work is continuing on write-up of Standard Methods for the laboratory. Laboratory personnel attended a number of the orientation and training sessions with the shift engineers and operators.

INTERVIEWS AND PLANS

A great deal of effort has been put forth during the month to secure operating people. To date we have not been very successful in our efforts.

During this past week an interview was set up in Memphis, Tennessee, and approximately thirty (30) people answered the advertisement. Of the thirty,

Operations Report #16

-2-

July 2, 1971

twelve were interviewed in Memphis and approximately six will be offered plant interviews. It remains to be seen how many of these will actually accept, if an offer is made.

Planning for the maintenance department included outlining safety practices, preparing a list of shop equipment, and ordering \$27,000 worth of spare parts.

STAFFING

	<u>Present Payroll</u>	<u>Hired to Report in July</u>
Management	2	0
Accounting	1	0
<u>TECH. DEPT.</u>		
Laboratory	4	0
Engineering	4	1
<u>OPERATIONS</u>		
Supv.	1	0
Shift Eng.	3	1
Operator	4	0
Office & Warehouse	3	0
TOTAL	22	2

We Need Operators and Instrument Technicians

PERSONNEL

We hired a process engineer to work on the computer programs.

A Policy and Benefit Booklet for hourly operating personnel was printed. The booklet will be bound in Denver.

PLANS FOR JULY

- 1.) We will begin making offers to operating personnel to complete the complement that should be hired by the time full scale training starts for Area 200 in August.
- 2.) Heat up the Lignite circulation system for hot bolting.
- 3.) Start and run in the utilities that are needed to support the Area 100 tests.
- 4.) Complete all technical programs and operating procedures necessary to begin tests in Area 100 the first week in August. An outline for this effort is as follows:

July 2, 1971

UTILITIES

- I. Prepare Punch List & Acceptance Documents
- II. Make Priority I Revisions
- III. Calibrate and set Instruments
- IV. Inspect Vessels
- V. Purge & Flush Lines & System
- VI. Place in Service Systems as Needed
- VII. Demonstrate Continuity of Interlocks & Safety Features
- VIII. Demonstrate Design and Ultimate Capacity, Where Possible

AREA 100

- I. Prepare Punch List & Acceptance Documents
- II. Make Priority I Revisions
- III. Calibrate and set Instruments
- IV. Inspect Vessels
- V. Clean Up Where Needed
- VI. Prepare Detailed Operating & Startup Instructions for Tests
- VII. Dry Run System & Demonstrate Continuity of Interlocks & Safety Features During Dry Run, Where Appropriate
- VIII. Perform Tests

- 5.) Continue witnessing pressure tests and equipment checkout
- 6.) Complete updating of mechanical flow sheets
- 7.) Complete installation of first priority changes and continue engineering and drafting on lower priority orders.
- 8.) Complete orientation for Area 200 that is necessary before training starts in August.

COSTS

Amount Paid Out As of June 30, 1971..... \$246,476
 Commitments - P.O.s..... 34,795

The laboratory furniture and spare parts amounts to approximately \$60,000. The rest was operating supplies and material to carry out necessary changes to the plant.

TOTAL Budget to June 30, 1971.....\$250,000
 TOTAL Spent to Date - June 30, 1971..... 246,470

BUDGET ESTIMATE (Next Six Months)

July.....	\$141,000
August.....	154,000
September.....	175,000
October.....	160,000
November.....	162,000
December.....	192,000
TOTAL	\$984,000

July 2, 1971

Since this is a rough estimate, the budget should be about \$1,000,000 for the next six months.

Yours very truly,

STEARNS-ROGER CORPORATION


 William E. Powell

WEP:ska

CC: HLL
 FEJ
 MHV
 DRM
 DDD
 File

UDMarwig-(6)
 Chuck Stone
 Dick Dawson

PROJECT STATUS REPORT
CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-37000
 July 6, 1971

PROJECT REPORT SUMMARY

Progress on the ten fired heaters at Thermal Transfer during the month of June has been very slow. Removal and re-annealing parts of the coils have delayed the heater completion and subsequent project construction completion by 3-4 weeks to be the 1st week in September. Insulation and painting may extend to mid-October.

ENGINEERING - Essentially complete.

Design engineering during the past month has included further checking of details for the fired heater coils and specification of a silencer for the preheater. A few hours have been spent on final review of Data Reports on ASME Code items.

MECHANICAL EQUIPMENT

The fired heater fabricator, Thermal Transfer Corporation, was finally forced to admit that some of the components for the coils were not the correct grade of Incoloy. Sixty-six pieces were cut from fifteen coils and sent from Pittsburgh to Huntington, West Virginia, for annealing. We have verbal assurance from International Nickel and from Thermal Transfer that all materials are now equivalent to the solution annealed Incoloy 800 and 321H stainless steel specified. Our Director of Purchases will coordinate a meeting of key design, inspection and production people from Consol, Continental Oil, International Nickel and Stearns-Roger with Thermal Transfer the week of July 6. Purpose of this conference is to settle the means of proving that all materials used meet specifications. Expediting pressure is being exerted on Thermal Transfer through the president of their parent company, American Brake Shoe. Current optimistic promises call for shipment of the first three heaters by July 16, and the balance spread over the next three weeks to complete the ten heaters by August 10.

PROJECT MANAGEMENT

The diagram schedule attached to this report has been updated to show completed and unfinished work separated by the decorative line. Project completion has been extended by late heater delivery.

Insulation subcontract has been awarded. Painting bids are due July 9. Mechanical catalogs have been distributed.

PROJECT STATUS REPORT
CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-37000
 July 6, 1971

CONSTRUCTION - About 90% complete.

Piping is about 88% complete. Major progress in June has included alignment of about one-fourth of the pumps, work for the ash pond, sidewalks, curbs, rough grading for asphalt surfacing. Flushing and cleaning of completed piping and most of the steam tracing. Lack of fired heaters is holding up considerable piping work resulting in reduced work efficiency.

SUMMARY OF PROJECT CHANGES

Orig. Guar. Max. Price	\$8,465,129
App'd Changes	<u>834,838</u>
Revised App'd GWP	\$9,299,967

D. H. Dawson
 D. H. Dawson
 Project Manager

Attachments: Progress Chart - 6-30-71
 Equal Employment Opportunity Report

Distribution:

<u>Consol - 5</u>	<u>Continental Oil Company - 6</u>
C. A. Schulz - 4 U. D. Harwig	E. E. Ellington, CED D. F. Wegner, Field L. Thompson, MED
	J. B. Hambleton, Jr. G. E. Fagerberg, CED Dr. C. V. Foster, PEI
<u>Stearns-Roger - 7</u>	
PCP/NPD/CNS/TGS/Flie FAN/JAP	JIN/VLB/CIN/JCM DND WEPowell Field
	ALC

SUBCONTRACT BETWEEN CONSOL AND SYSMAT RE CONSOL CO. ACCEPTOR PROCESS
(OCR, Prime Contract No. 14-01-0001-415(3))

MONTHLY REPORT FOR JUNE, 1971

I. Summary

Full-time field work on the carbonate resources project began in June with investigations in eastern Montana and to a lesser extent in the Black Hills. Also, extensive work on sodium removal from raw lignite began.

II. Carbonate Rock Resources (Mickelson)

Virtually all of June was spent in the field by Mickelson and assistants. The Mission Canyon section and the Brown's Gulch section of the Little Rocky Mountains, Montana, were measured and sampled. The Amsden - Alaska Bench section at Beacon Hill in the Big Snowy Mountains, Montana, was measured and sampled. Reconnaissance study of the east end of the Little Bell Mountains was completed.

In the Black Hills, the Whitewood dolomite type section and the Little Elk Canyon Pahsapa sections were measured and sampled.

During July, Dr. Gries will join the field group and work will move southward into the Big Horn Mountains of Wyoming and Montana.

III. Acceptor Reconstitution (Fuerstenaue)

The beginning of laboratory investigations are pending arrival of autoclave which is expected late in the summer. Background literature is being reviewed.

IV. Noxious Elements in Lignite (Lingard)

A wet-oxidation method of solubilizing the inorganic elements in lignite, employing nitric acid and potassium chlorate, has been investigated.

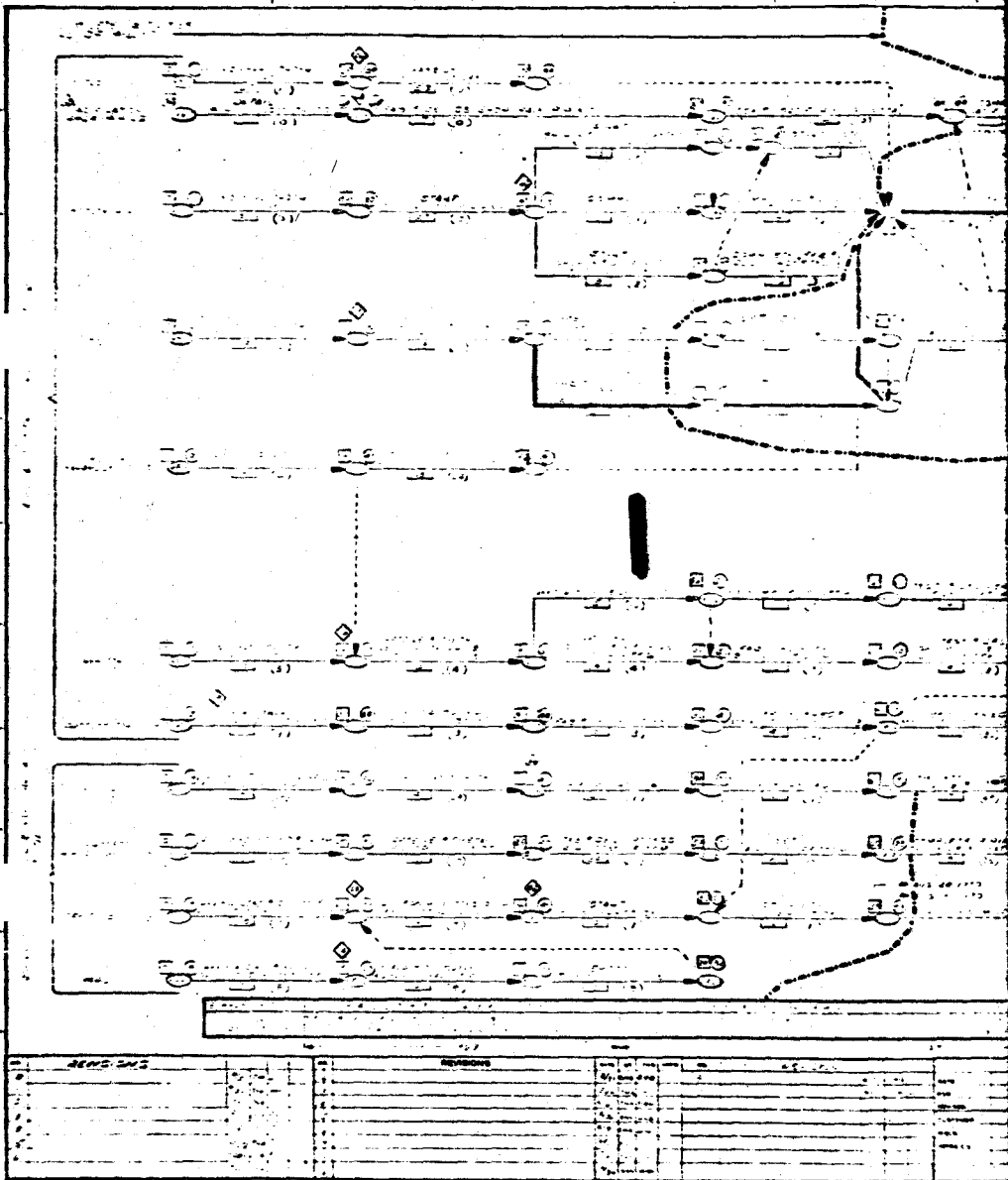
The method was fairly effective on raw lignite but was less effective on a sample of Husky char. Methods of concentration of metal ions by extraction from aqueous solution into an organic solvent were also studied. This same work will be continued in July.

V. Pre-Gasification Beneficiation (Clarkson)

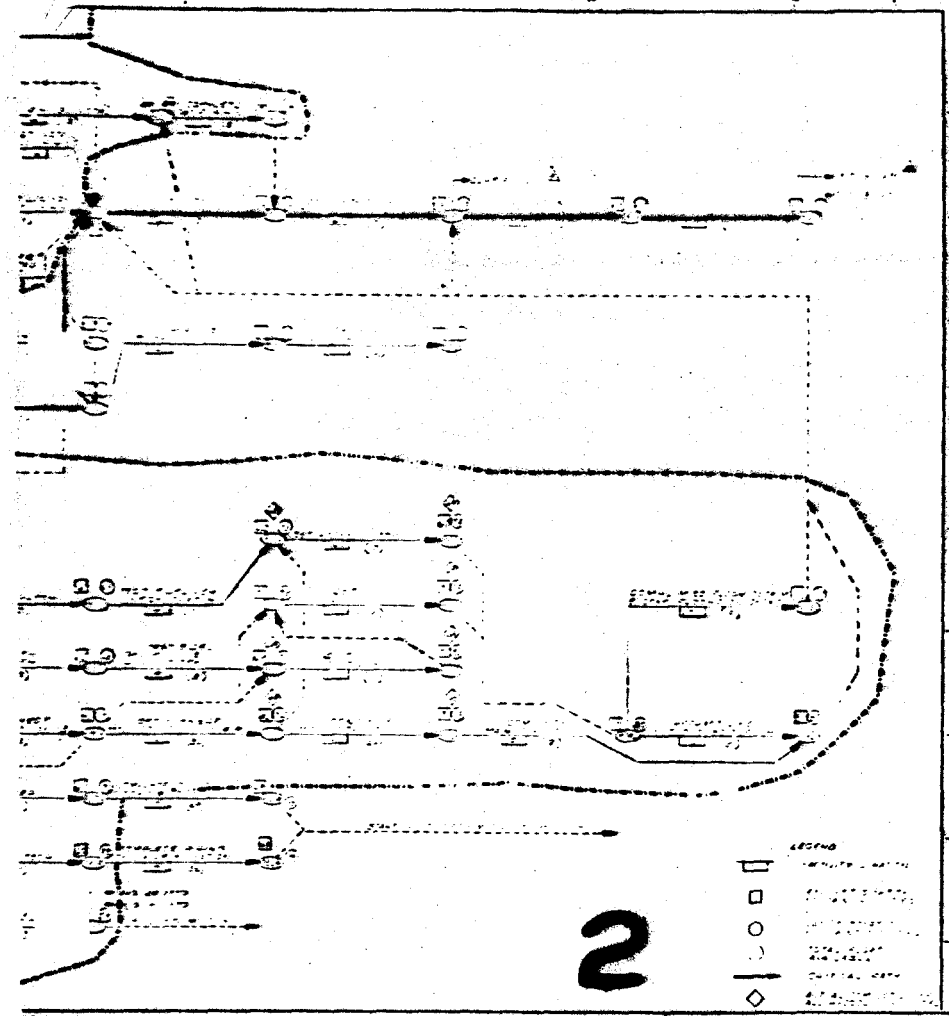
Work commenced this month on the study of sodium removal from a sample of lignite obtained from the Knife River Coal Mining Company, Beulah, North Dakota. The sample was obtained from a 10-foot Beulah seam and the ash contains 7.24% sodium (their analysis).

The first runs were to determine the time required for sodium removal from lignite samples at room temperature (23° C). The conditions were: particle size -10+14 mesh, pH 7.0, CaCl₂ concentrations equal to 0, 10⁻³ molar, 10⁻¹ molar, and liquid-to-solid ratios of 3:1 and 6:1. Our results indicate that at least two-hour runs would be required to remove significant amounts of sodium from the lignite under these conditions.

The runs in July will examine the effects of pH, particle size, temperature, and the effect of various ions. The variables will be tested with runs lasting about two hours.



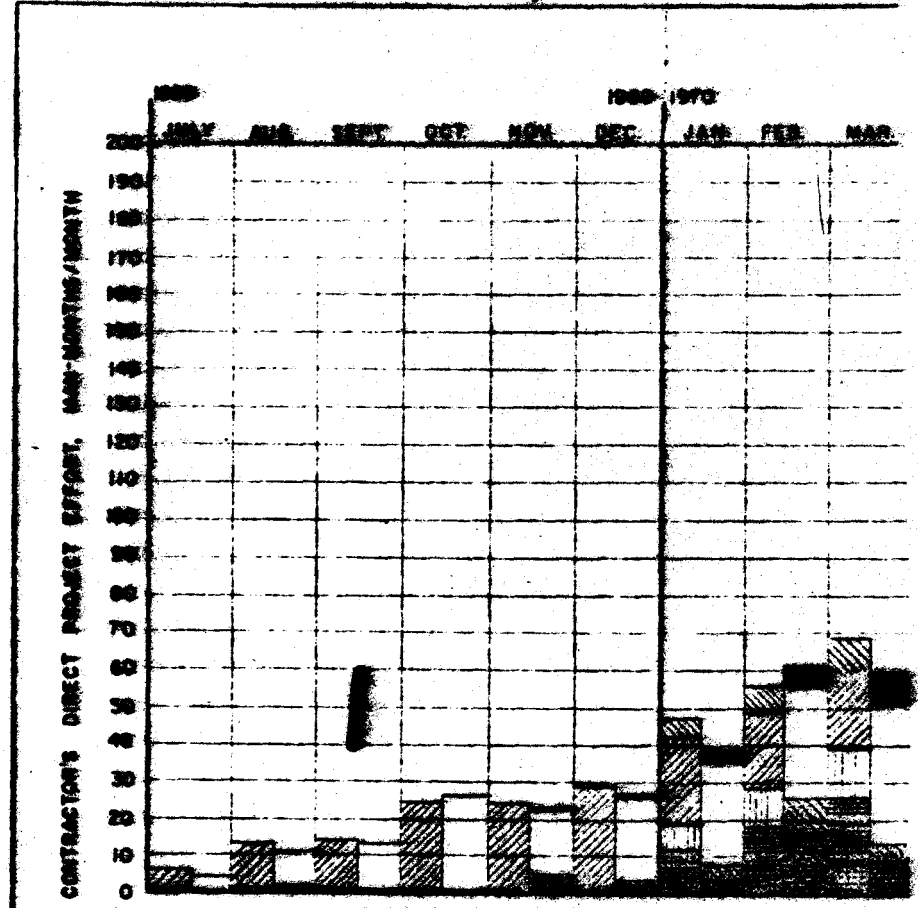
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2

- LEGEND
- STRUCTURE
 - ELECTRICAL
 - ◇ MECHANICAL
 - GENERAL DECK

DESIGN RECORD DATE: _____ DRAWN BY: _____ CHECKED BY: _____ APPROVED BY: _____		ENG RECORD NO: _____ TITLE: _____ SCALE: _____		DESIGN STATUS DATE: _____ BY: _____ FOR: _____		MASTER PLAN CSS PILOT PLANT SHEET NO. 2 OF 2	
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MONTHLY EXPENDITURES *

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.
PREDICTED	0	30.0 M	41.0 M	50.0 M	90.0 M	106.9 M	112.0 M	273.0 M	299.5 M
ACTUAL	6.2	29.0	32.8	42.6	59.7	126.2	110.5	76.7	102.9

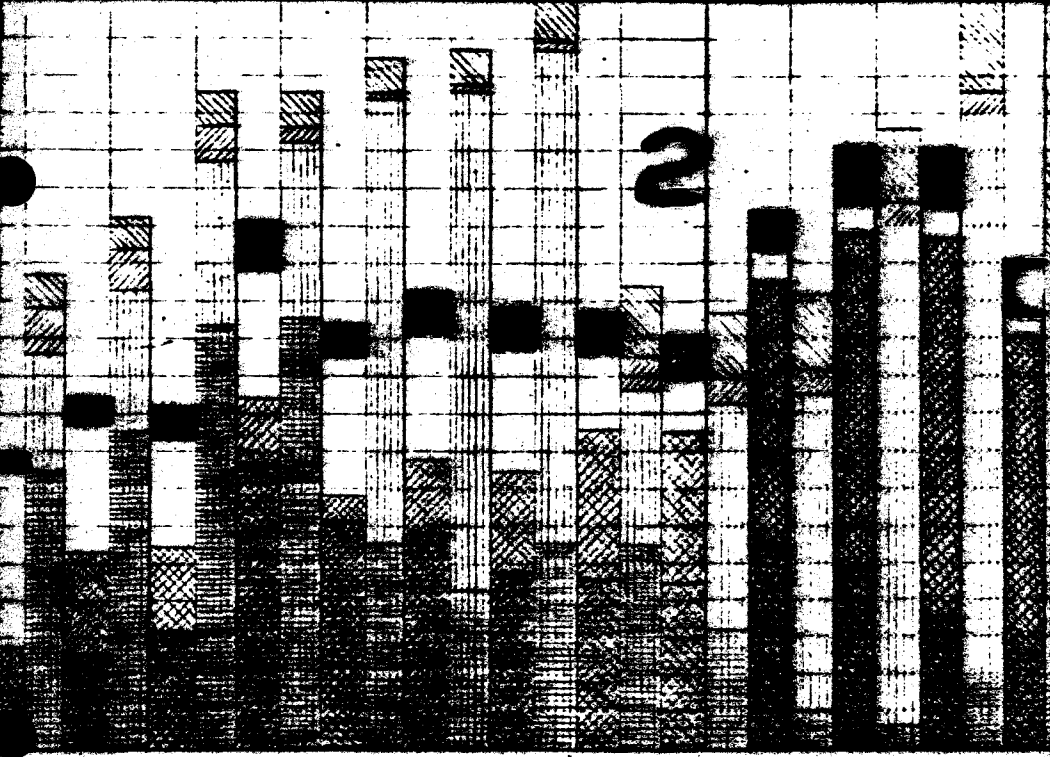
	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.
PREDICTED	0	30.0 M	71.0 M	121.0 M	210.0 M	325.9 M	437.9 M	710.9 M	1010.2 M
ACTUAL	6.2	31.2	64.0	106.6	166.3	272.5	383.0	459.7	562.6

CUMULATIVE EXPENDITURES *

* EXPENDITURES INCLUDE ALL COSTS & FEES

1970 MPT

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.



M	629.7M	891.1M	802.0M	891.1M	712.9M	891.1M	891.1M	758.2M	779.5M	772.0M	702.0M	534.9M
	299.7	367.1	564.6	725.2	794.2	728.9	422.9	779.5	552.1	690.6	751.7	496.7

	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
M	2079.5M	2970.6M	3772.6M	4668.7M	5376.6M	6267.7M	7158.8M	5366.6M	5928.8M	6866.1M	7565.9M	8100.4M
	1003.5	1972.6	1937.2	2662.4	3456.6	4483.5	4608.4	5387.3	5939.4	6600.0	7301.7	7884.4

OPERATIONS - COST INCLUDED IN CUMULATIVE 196.0 163.0
 DEPRECIATION - COST INCLUDED IN CUMULATIVE 111.8 111.8
 Net FUNDING SOURCE Tax Reserve NOT INCLUDED IN CUMULATIVE 158.2 158.2

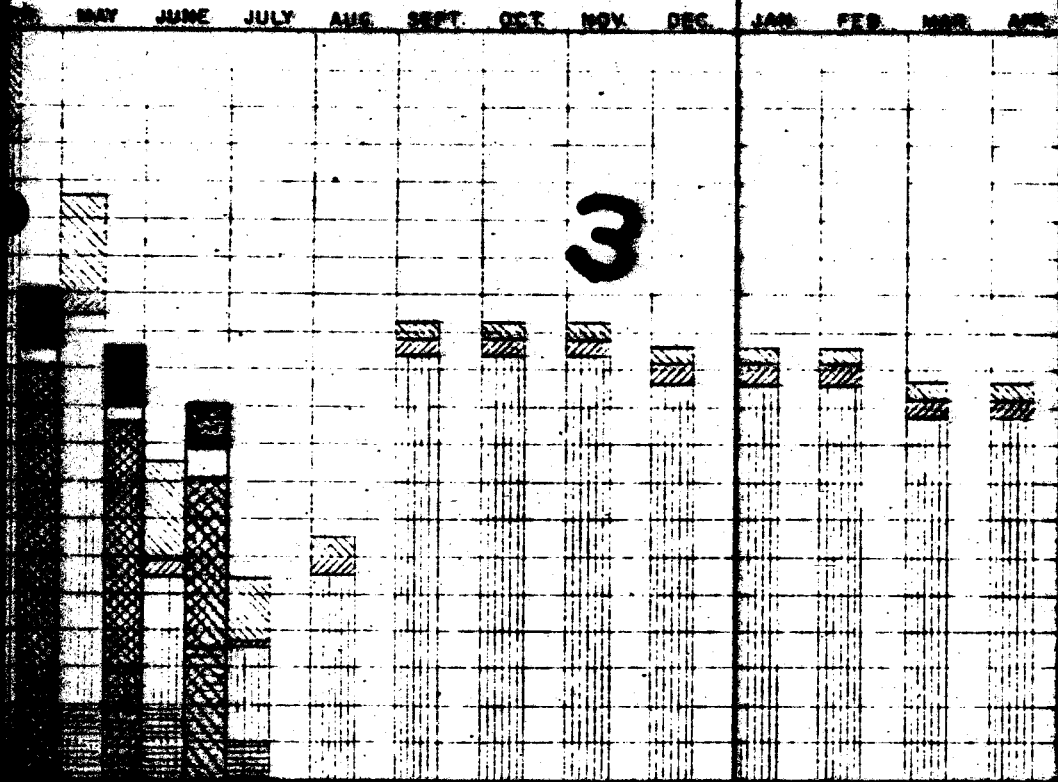
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MONTHLY PROGRESS CHART

CONTRACT NO. 14-01-0001-46 (B)

1971 1972

3



1971	487.7M	441.8M	285.0M	220.8M	218.1M	218.0M	219.1M	211.9M	211.5M	211.5M	185.1M	184.5M
1972	292.0	308.1										

PK. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

858M	8598.1M	8979.9M	9264.9M	9485.7M	9703.8M	9921.8M	10148.9M	10382.8M	10564.8M	10775.8M	10960.9M	11149.4M
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84.4	816.4	8884.8										
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83.0	180.1	244.4										
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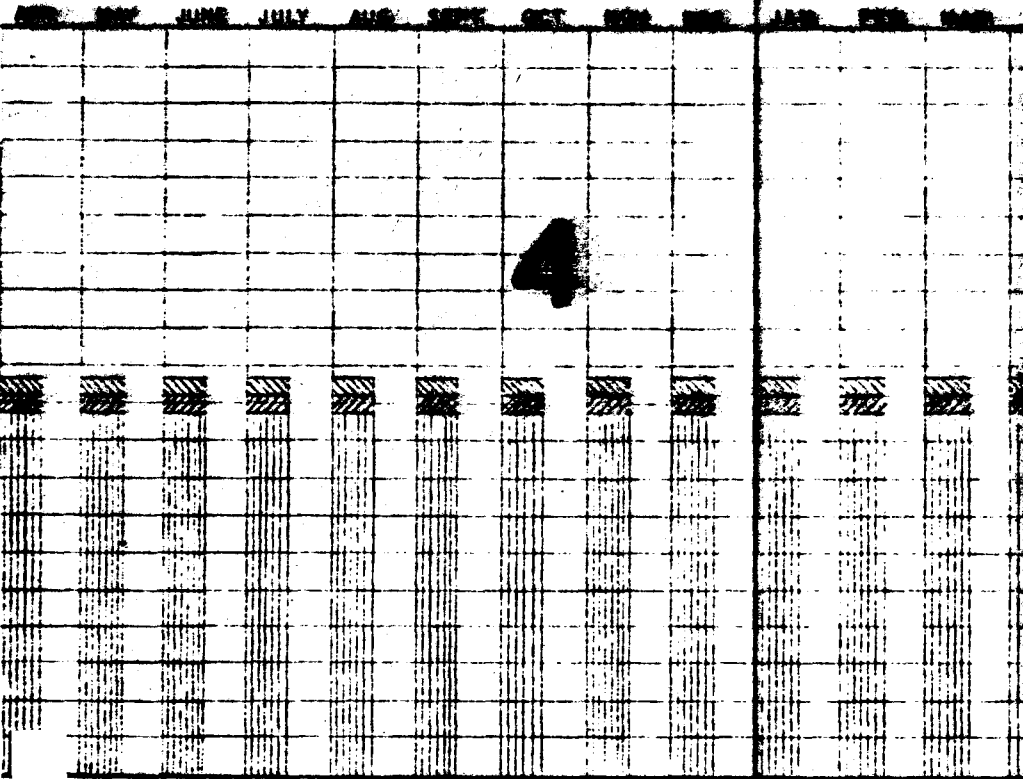
100.0	155.0	187.4										
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(CONSTRUCTION & OPERATION)

(REVISED 10/21/70)

1972, 1973



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196.5M	204.7M	203.9M	202.8M	202.8M	202.9M	201.8M	201.5M	201.4M	189.2M	182.9M	182.1M
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APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.
------	-----	------	------	------	-------	------	------	------	------	------	------

1198.4M	11,380.1M	11,554.0M	11,756.8M	11,959.6M	12,162.5M	12,364.3M	12,565.8M	12,767.2M	12,950.4M	13,133.8M	13,315.4M
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DATE: *January 1973*

1973

JAN FEB MARCH APRIL MAY JUNE JULY AUG SEPT OCT NOV DEC

5

SUPERVISORS
PROFESSIONAL
TECHNICIAN S-R
TECHNICIAN S/C

⊕ INCLUDES EMP
⊕ INCLUDES CM

CONSTRUCTION — ST
OPERATIONS — ST

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320 280.5M 177.5M 170.0M 161.2M 148.8M 130.1M 130.0M 130.0M 24.9M

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

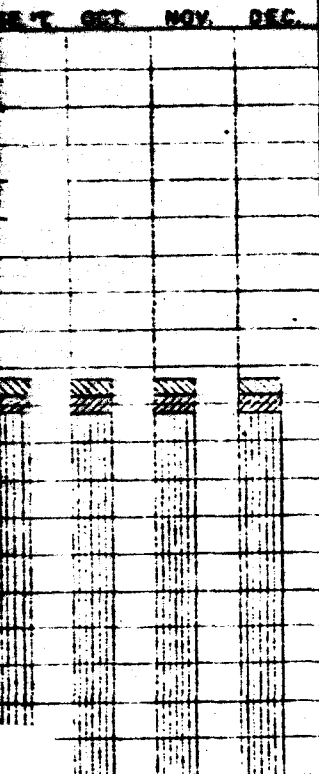
2448 2071.5M 3673.4M 17,843.4M 14,004.2M 14,154.4M 14,275.5M 14,405.5M 14,535.5M 14,560.4M

APPROXIMATE TOTAL CONSTRUCTION ≈ 8,600,000
APPROXIMATE TOTAL OPERATIONS ≈ 5,760,400
14,360,400

MONTH
OFF
U.S. DEPT
CONSTRUCTION
RESEARCH
CONTRACT

DATE Jan. 1971

1973



PREDICTED **ACTUAL**

SUPERVISING

PROFESSIONAL

TECHNICIAN S-R

TECHNICIAN S/C

⊕ INCLUDES SUPERVISORY EMPT TECHNICIANS
 ⊕⊕ INCLUDES CLERICAL

CONSTRUCTION — STEERING ROVER JOB D-37000
 OPERATIONS — STEERING ROVER JOB D-37000

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
 U.S. DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA.

CONTRACT NO. 14-01-0001-415 (3)

(REVISED 8/31/70)

190.1M 190.0M 130.0M 24.9M

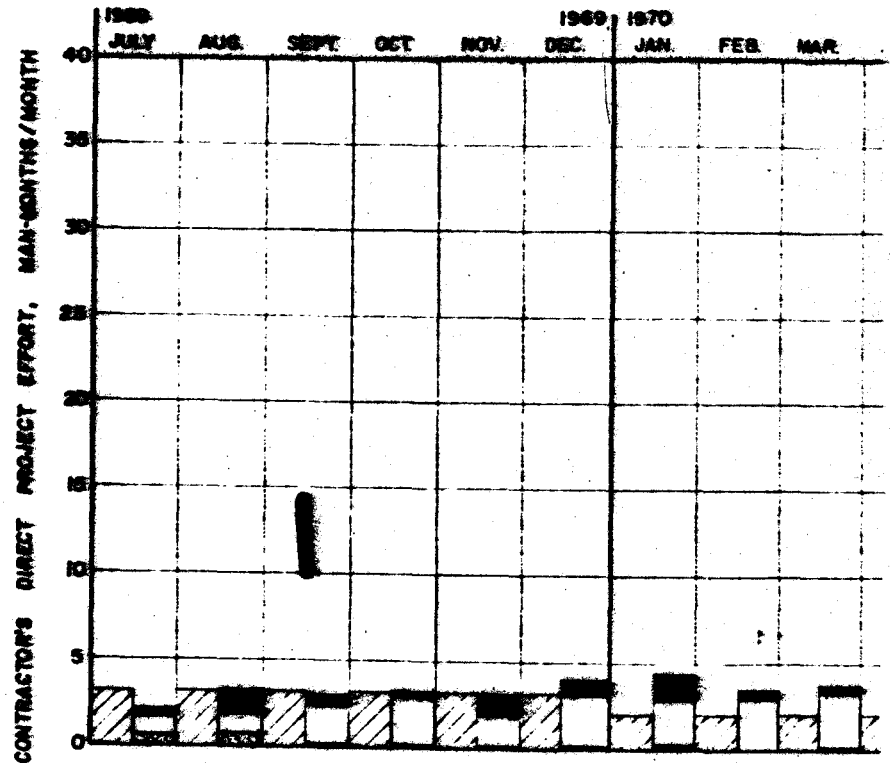
SEPT. OCT. NOV. DEC.

14,275.5M 14,405.5M 14,535.5M 14,560.4M

TOTAL CONSTRUCTION ≈ 8,800,000

TOTAL OPERATIONS ≈ 5,760,400

14,560,400



MONTHLY EXPENDITURES*

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.
PREDICTED	16,215	14,685	14,365	13,155	14,385	17,085	15,595	15,595	2,655
ACTUAL	11,745	34,754	9,609	11,825	10,130	15,205	14,578	14,027	5,019

CUMULATIVE EXPENDITURES*

* Expenditures Include All Costs & Fees

MONTH

ON 6

JUNE JULY AUG. SEPT. OCT. NOV. DEC. 1970 1971 JAN. FEB. MAR. APR. MAY

MAY

2

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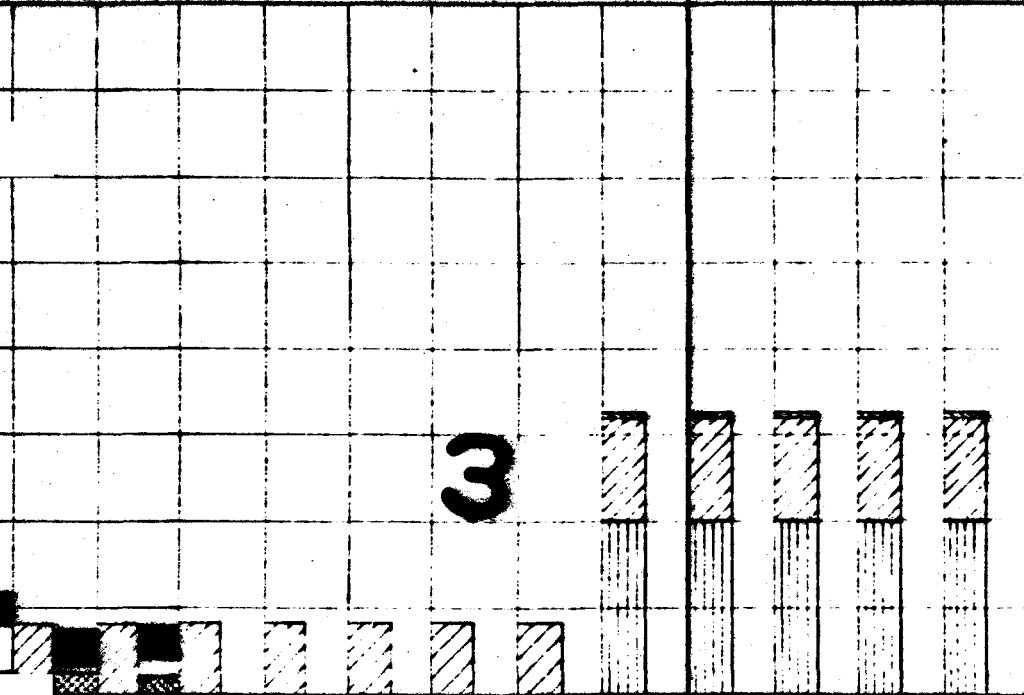
	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
1970	12,639	13,315	12,835	12,505	12,505	12,505	20,155	20,135	23,295	22,295	21,145	18,700
1971	19,319	20,054	13,955	25,003	21,296	9,584	23,091	16,475	16,663	12,820	22,196	12,500
TOTAL	32,000	33,369	26,790	37,508	33,791	22,089	43,246	36,610	39,958	35,115	43,341	31,200

1970	33,400
1971	33,400
TOTAL	66,800

MONTHLY PROGRESS CHART (SUPERVISION)

CONTRACT No. 14-01-0001-415 (3)

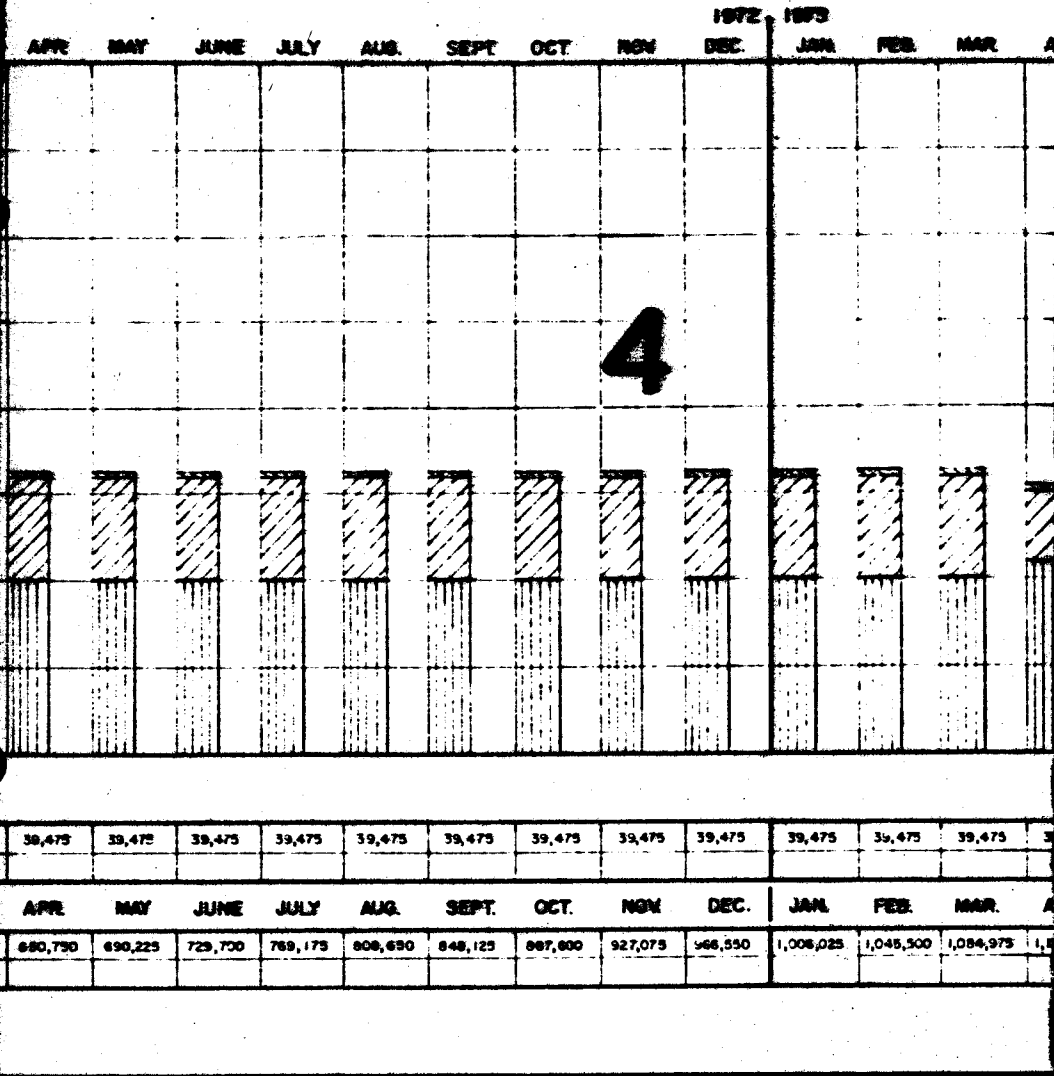
MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. 1971 1972 JAN. FEB. MAR. APR.



18,705	15,950	14,875	14,875	14,975	14,875	14,875	39,475	39,475	39,475	39,475	39,475
12,508	15,508										
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
383,046	379,000	393,875	408,750	423,625	438,500	453,375	492,850	532,325	571,800	611,275	650,750
420,206	435,706										

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VISION & LAB WORK)

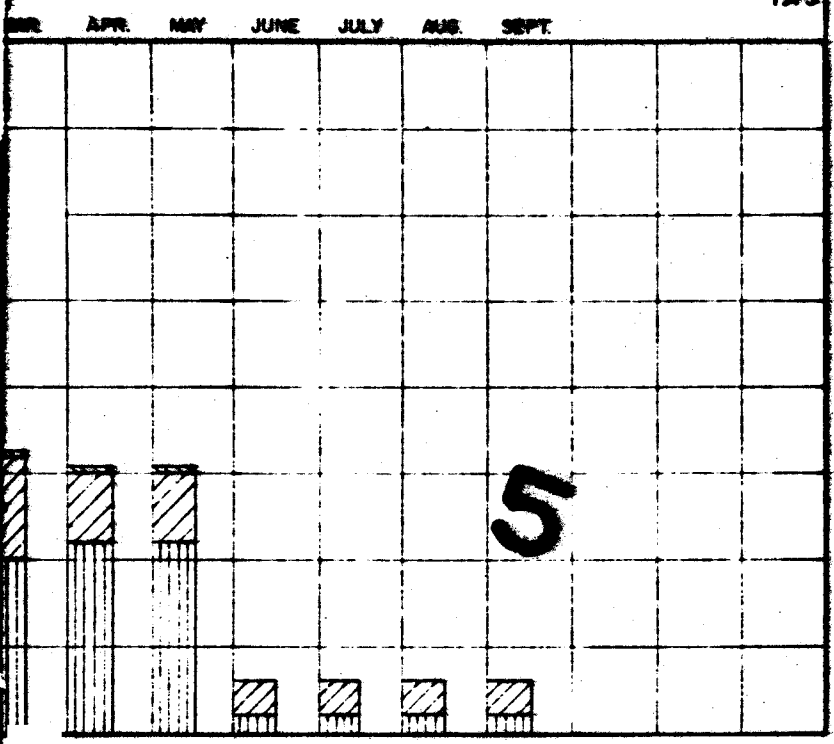


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DATE: *J. Lee*

1973



SUPERVISING
 PROFESSIONAL
 TECHNICIAN
 Includes
 Includes

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36,475	36,075	36,075	11,475	11,475	11,475	41,120			
MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.			
36,475	1,121,090	1,157,125	1,168,600	1,190,075	1,191,550	1,232,670			

MON
 C
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 RESEAR
 CONT

(See 7 Cont.)

DATE: June 1971

1973

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		 ⊕
TECHNICIAN		 ⊕ ⊕

⊕ Includes Supervisory Exempt Technicians.
 ⊕ ⊕ Includes Clerical.

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
 DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA.

CONTRACT No. 14-01-0001-415 (3)

PROGRESS REPORT NO. 06
 OCE CONTRACT NO. 14-01-0001-415(3)
CONSOL. LIGNITE GASIFICATION PROCESS DEVELOPMENT

July 1 to 31, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

The projected completion date for construction remains mid-October, 1971. Current construction effort is centered around heater piping, insulation and painting.

Equipment problems were discovered in a hot "dry run" of the drying and grinding equipment. Lignite crushing tests are deferred until September.

Financial

Estimated expenditures are \$17,500 by Consol and \$220,800 by Stearns. Cumulative project expense is \$11,037,083. Current encumbrance is \$11,540,300.

July, 1971

B. Technical Results and Progress

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

1. Supporting Process and Economic Analysis (Project No. 523)

No work was done on this project.

2. Supporting Patent and Legal Activities (Project No. 524)

The current reports and memoranda were reviewed for Subject Inventions.

3. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 536)

Consol continued to inspect and observe construction, largely utilizing the services of the resident Consol engineer. In addition, some part-time people were used to check piping and the electrical installations.

The sewer system is completely installed and is awaiting a test of the lift stations by the manufacturer before becoming fully operational.

The observation of frequent power "blinks" originating at the Black Hills Power and Light Company equipment has led to a study of emergency measures necessary to minimize plant shutdowns. The study will be completed in August.

4. Stearns-Roger Construction Subcontract (Project No. 700)

The Stearns Progress Report is attached.

The field work continues with the the largest items being the installation of piping associated with the process furnaces, insulation, and painting. At the month's end, three of the furnaces had been delivered and the remainder were expected during the week of August 9. Insulators have started but are only 5 to 10% complete. Painters have completed about 33% of the Coal Preparation Section.

The projected completion of construction is still mid-October, 1971.

June, 1971

5. Consol Guidance on Operations (Project No. 708)

A meeting is scheduled with Stearns during the week of August 16 to review progress and procedures.

6. Stearns-Roger Operating Subcontract (Project No. 701)

The Stearns report is attached. As indicated, recruiting and mechanical break-in tests continue. Difficulties reported last month with the inert gas system have been corrected, and the system has been accepted.

As of the date of this report, Buffalo Forge is making new doors and stiffening members for the duct work in the coal dryer system. These modifications will be installed in late August.

7. School of Mines Subcontract (Project No. 703)

The progress report is attached.

C. Subject Inventions

None.

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through June, 1971</u>		
Through June, 1969		
Consol	\$ 1,878,256	\$ 1,878,256
Stearns	436,037	379,000
	<u>\$ 2,314,293</u>	<u>\$ 2,257,256</u>
	\$ 10,790,783	\$ 11,237,156
<u>Expended in Period (Estimate)</u>		
Consol	\$ 17,500	\$ 14,875
Stearns	220,860	285,000
	<u>\$ 238,360</u>	<u>\$ 299,875</u>
Total, July	\$ 238,360	\$ 299,875
Cumulative through July, 1971	\$ 11,037,083	\$ 11,537,031

*Attached Progress Chart understates operating costs by \$29,300.

Att. Progress Reports for:
Construction
Operation
S.D.S.M.A.T.
Progress Charts

T: 6/12/71

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCU Project No. 536
 S-R Job No. B-37000
 July 30, 1971

PROJECT REPORT SUMMARY

Progress on the ten fired heaters from Thermal Transfer continues to be very slow as the final check-out phase reveals the Vendor's minor mechanical design and fabrication problems. Three units shipped on July 21. Balance should arrive by August 26. Mechanical construction should complete by the last week in September. Insulation and painting will extend to mid-October.

ENGINEERING - Essentially complete.

Design engineering during the past month has been mainly concerned with review of mill test reports on materials for the fired heater coils and with design of coil and diffuser supports for these heaters. All of this extra work is necessary to make up for poor performance by Thermal Transfer Corporation.

MECHANICAL EQUIPMENT

As a result of the meeting with Thermal Transfer on July 6, grain size determination by Continental Oil and by International Nickel confirmed that the Incoloy 800 had the characteristics of the specified Type II. The Vendor agreed to replace a few minor coil components where proof of metallurgy could not be established. Almost the entire capacity of Thermal Transfer's final assembly shop is now concentrated on this project.

PROJECT MANAGEMENT

The diagram schedule usually attached to this report is not included because its appearance is unchanged from last month. Progress made during July has been restricted to items that do not show up on this general type of schedule. Present plans are for a meeting of the OCR Contract Administrator, Consol Project Manager and the Stearns-Roger Project Manager in Rapid City on August 18 to review project status and the detailed plans for completion of the remaining work.

Cost report for the period ending June 30, issued under separate cover, forecasts that the final total cost will be close to the Guaranteed Maximum Price.

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCU Project No. 536
 S-R Job No. B-37000
 July 30, 1971

CONSTRUCTION - About 93% complete.

Piping is about 90% complete. Progress in July has included continuation of work on steam tracing, pipe guides and supports, hydrostatic testing, sidewalks, curbs and asphalt surfacing.

Electrical installation continues in the Process Area, and in checkout of the Utility Area. Materials Handling Area has been turned over to Operations, but remaining work there includes insulation, painting and pressurizing of the control room. Insulation and painting subcontractors have started to work. Check-out of pneumatic and electrical control circuits started in early June, and will continue through the end of construction.

SUMMARY OF PROJECT CHANGES

Orig. Guar. Max. Price	\$8,465,129
App'd Changes	836,838
Revised App'd CWP	\$9,299,967

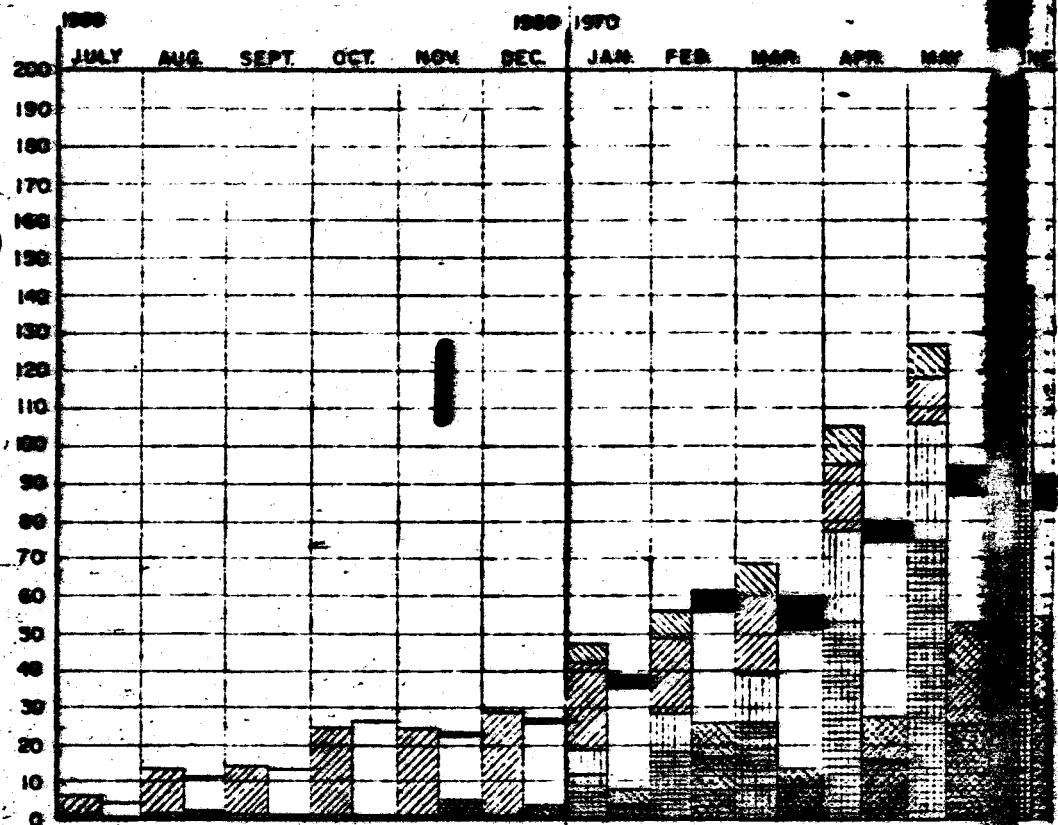
B. H. Dawson
 B. H. Dawson
 Project Manager

Attachments: Progress Chart - 7/30/71
 Equal Employment Opportunity Report (Separate Cover)

Distribution:

<u>Consol - 5</u>	<u>Continental Oil Company - 6</u>	
C. A. Schulz -4	E. E. Ellington, CED	J. B. Hambleton, Jr.
U. B. Marvig	D. F. Wegner, Field	G. E. Fagerberg, CED
	L. Thompson, MED	Dr. C. V. Foster, PED
	<u>Stearns-Roger - 7</u>	
PCP/NPD/CNS/TGS/File	JTN/VLB/CIM/JCM	ALC
FAM/JAP	DWB	WEPowell Field

FACTORY'S DIRECT PROJECT EFFORT, MAN-UNITS/MONTH



MONTHLY EXPENDITURES *

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
FORECASTED	0	30.0 M	41.0 M	50.0 M	98.0 M	106.9 M	112.0 M	273.0 M	299.9 M	445.6 M	625.7 M	91.1
ACTUAL	6.2	25.0	32.8	42.6	39.7	126.2	110.5	76.7	102.9	209.2	235.7	271.1

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
FORECASTED	0	30.0 M	71.0 M	121.0 M	219.0 M	325.9 M	437.9 M	710.9 M	1010.2 M	1455.8 M	2079.5	270.0
ACTUAL	6.2	31.2	64.0	106.6	146.3	272.5	383.0	459.7	562.6	771.8	1005.5	1277.2

CUMULATIVE EXPENDITURES *

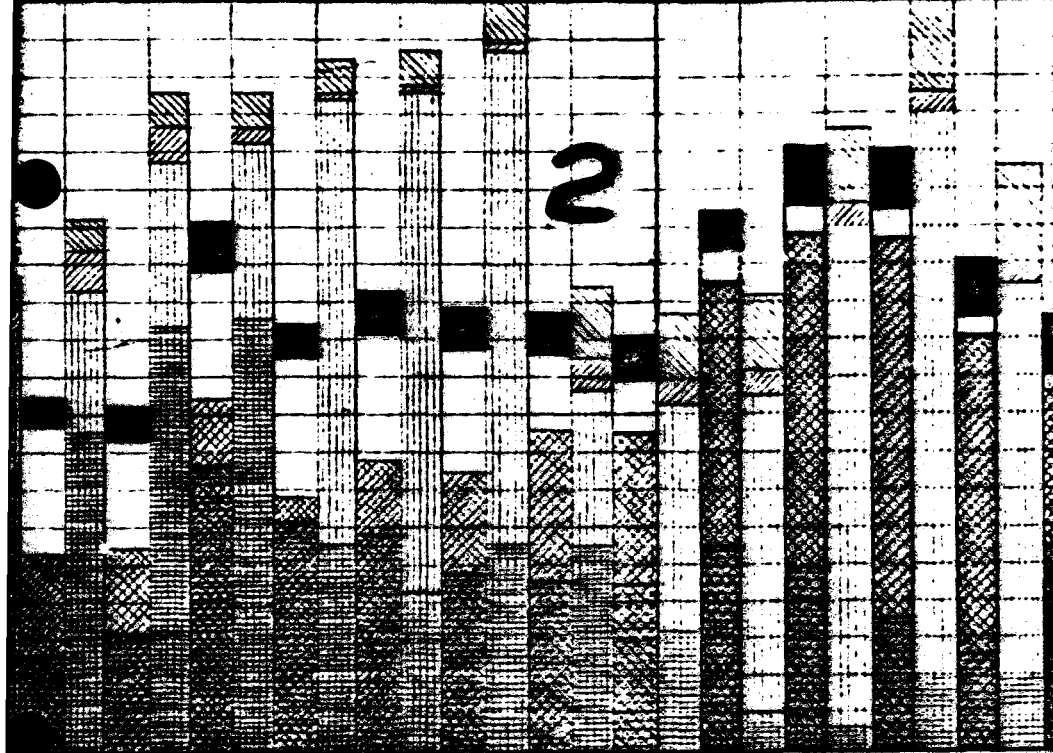
* EXPENDITURES INCLUDE ALL COSTS & FEES

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1970 1971

JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY

2



8.7M	891.1M	802.0M	891.1M	712.9M	891.1M	891.1M	758.2M	779.5M	777.0M	702.4M	554.9M	447.7M
8.7	367.1	564.6	725.2	794.2	728.9	422.9	779.5	552.1	690.6	757.7	496.7	292.7
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
199.5M	2970.6M	3772.6M	4663.7M	5376.6M	6267.7M	7158.8M	8366.6M	9028.8M	9668.1M	7365.5M	8100.4M	8538.9M
85.5	1972.6	1937.2	2662.4	3456.6	4185.5	4608.4	5287.3	5959.4	6680.0	7387.7	7984.4	8170.2

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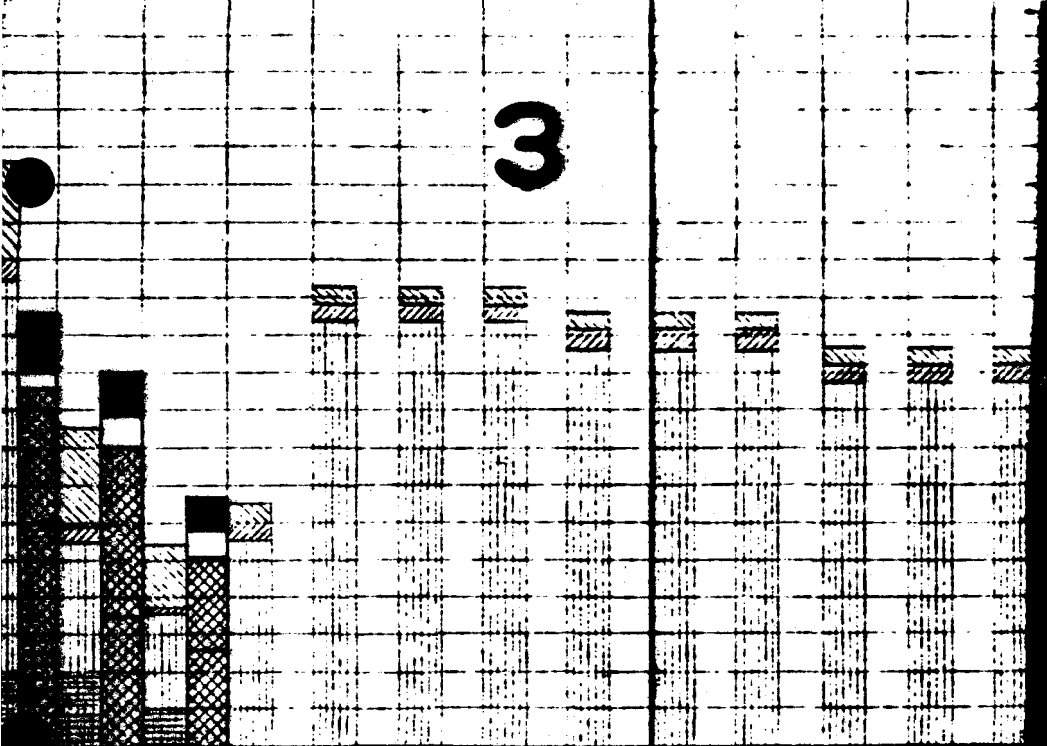
OPERATIONS COST INCLUDED IN CUMULATIVE 1970 1630 180
 CONSTRUCTION COST INCLUDED IN CUMULATIVE 110.2 712.4 195
 NET FINANCIAL SALES TAX REVENUE NET INCLUDED IN CUMULATIVE 152.6 152

MONTHLY PROGRESS CHART (CONT)

CONTRACT NO. 16-01-0001-419 (3)

1971 1972

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY



	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
RTM	441.8M	285.0M	220.8M	218.1M	218.0M	219.1M	211.9M	211.5M	211.5M	189.1M	184.5M		
PLC	308.1	196.6											
MV	8919.9M	9224.9M	9185.7M	9703.8M	9921.8M	10160.9M	3352.8M	10,564.8M	10,775.8M	10,960.9M	11,145.4M	11,329.9M	11,514.4M
TE-4	8484.5	8676.1											
TE-3	246.6	204.8											
TE-2	288.1	237.3											
TE-1	189.6	158.7											

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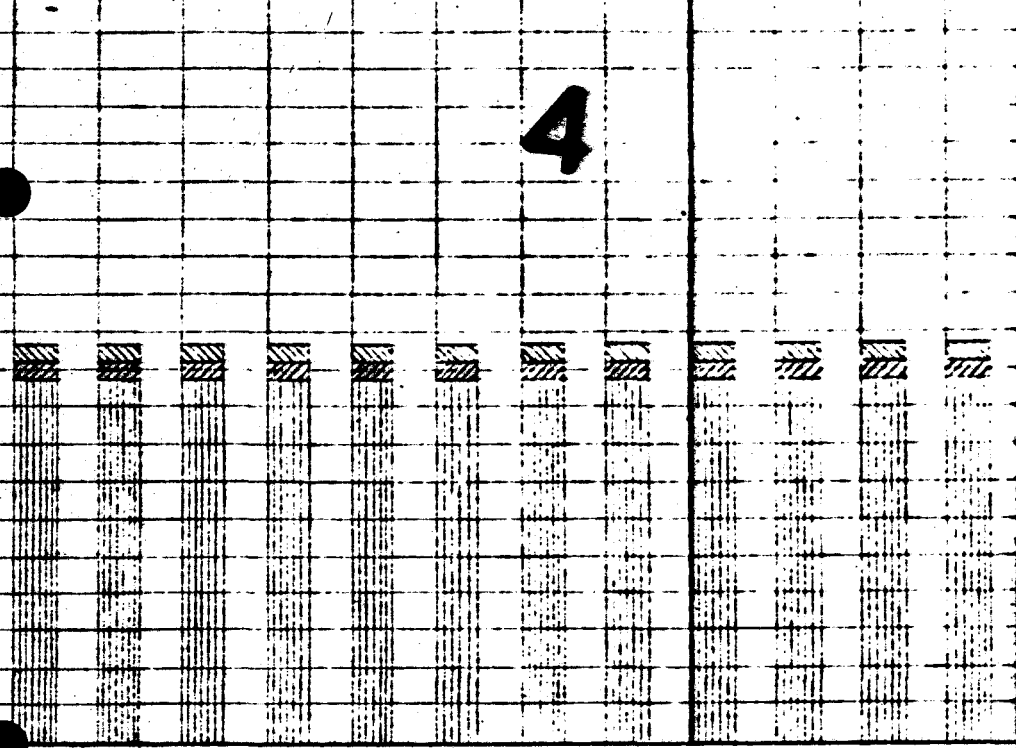
CONSTRUCTION & OPERATION)

(REVISED 12/31/70)

1972 1973

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

4



204.7M 203.9M 202.8M 202.8M 202.9M 201.8M 201.5M 201.4M 188.2M 182.9M 182.1M 180.5M

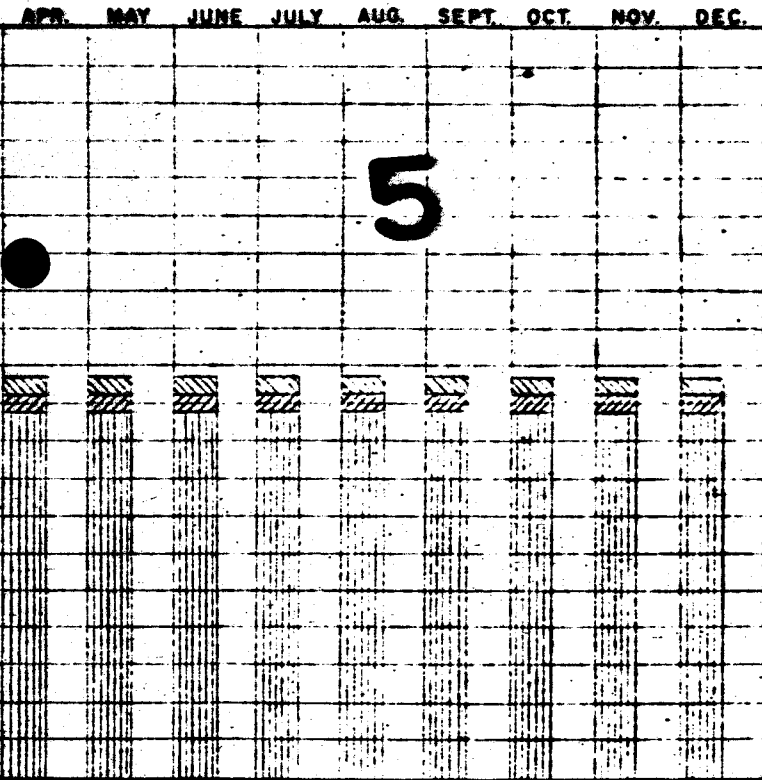
MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

11,950.1M 11,554.0M 11,756.8M 11,959.6M 12,162.5M 12,364.3M 12,565.8M 12,767.2M 12,950.4M 13,133.9M 13,315.4M 13,495.7M

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DATE: July 1971

1973



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- TECHNICIAN S/C

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CONSTRUCTION — STE
 OPERATIONS — STE

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166.5M	177.5M	170.0M	161.2M	140.8M	130.1M	130.0M	130.0M	24.9M
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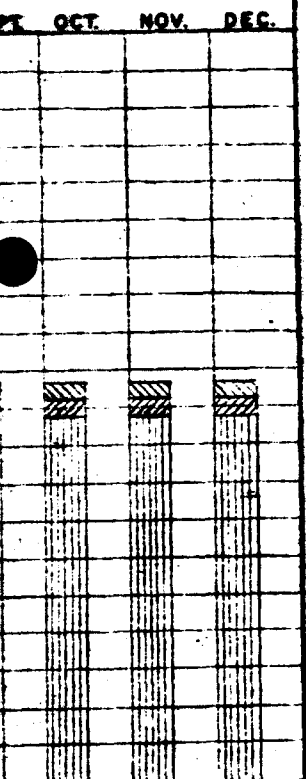
APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
13,093.7M	13,673.4M	13,843.4M	14,004.6M	14,154.4M	14,275.5M	14,409.5M	14,535.5M	14,560.4M

APPROXIMATE TOTAL CONSTRUCTION ≈ 8,800,000
 APPROXIMATE TOTAL OPERATIONS ≈ 5,769,400
 14,569,400

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DATE: July 1971

1973



	PREDICTED	ACTUAL
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PROFESSIONAL		
TECHNICIAN S-R		
TECHNICIAN S/C		

⊕ INCLUDES SUPERVISORY EXEMPT TECHNICIANS
 ⊕ ⊕ INCLUDES CLERICAL

CONSTRUCTION— STEAMNS-ROGER JOB B-37000
 OPERATIONS— STEAMNS-ROGER JOB B-37400

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
 U.S. DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA.

CONTRACT NO. 14-01-0001-415 (3)
 (REVISED 12/31/70)

	EPT.	OCT.	NOV.	DEC.
CONSTRUCTION	2.9M	14,405.5M	14,535.5M	4,560.4M
OPERATIONS				

**SUBCONTRACT BETWEEN CONSOL AND SDS&T RE CONSOL CO₂
 ACCEPTOR PROCESS
 (DCK, Prime Contract No. 14-01-001-115(3))
 MONTHLY REPORT FOR JULY, 1971**

I. General

Full scale field investigations on the carbonate resources is continuing during the favorable field weather. More than half of the contemplated field work is complete. Acceptor reconstitution work largely awaits deliver of the autoclave. Comparative methods of digesting samples for the trace amounts of sensous elements are being evaluated. Studies on sodium removal on Baulah, North Dakota samples of lignite are complete.

II. Resource Study of Carbonate Rocks (Michelson)

Sections of Mississippian and Ordovician were measured and sampled in the Dayton area of the Bighorn Mountains of Wyoming. The Pryor Mountains area is not open to exploration because of restriction of the Crow Indian Tribal regulations. The section of Ordovician rocks was sampled in the Bear Lodge Mountains of eastern Wyoming. Ordovician sections in Spearfish Canyon and Whitewood Canyon areas were measured and sampled.

Mississippian sections were measured at Rhodes Ranch on Rapid Creek in the western Hills, at Box Elder Creek, and at Whitewood Canyon.

Samples have been prepared for chemical analysis and analytical work has started.

During August we will sample sections of Mississippian age rocks at Spring Creek, Dark Canyon and if possible at Spearfish Canyon in the Black

Hills. It is probably not possible to get a complete Mississippian section at Elk Creek Canyon.

It is also planned to study the available diamond drill cores from Ragged Top in the northern Black Hills for Mississippian and Ordovician rocks. The testing of samples for crushing strength and amount of fines will be initiated.

III. Acceptor Reconstitution (Puerstenu)

Other than completing plans for the installation of the autoclave, little new work was accomplished pending delivery of the autoclave by the manufacturer.

IV. Noxious Elements in Lignite (Lingard)

Since elements of interest in this study may be present in the lignite in both inorganic and organic forms some method of sample preparation which will break down both forms of the elements, without loss of volatile elements, to form soluble compounds is required. Three methods of sample preparation have been tried and are being evaluated: (1) The sample is digested at moderate heat with nitric acid and potassium chlorate until all organic matter is destroyed and most of the elements are in solution; (2) the sample is digested at moderate heat with a small volume of aqua regia, formed from a 1:1 mixture of nitric acid (70%) and hydrochloric acid (30%), to break down inorganic and organic forms of the elements and form soluble compounds, followed by dilution and filtration to remove unoxidized carbon; and (3) the sample is burned in a Schöniger combustion flask containing an absorption liquid for the elements of interest.

Atomic absorption has been used to analyze for lead, cadmium, and mercury in a sample of lignite (from Firesteel, SD) prepared by these three methods but the results are not in good agreement.

The validity of results obtained by these methods will continue to be investigated.

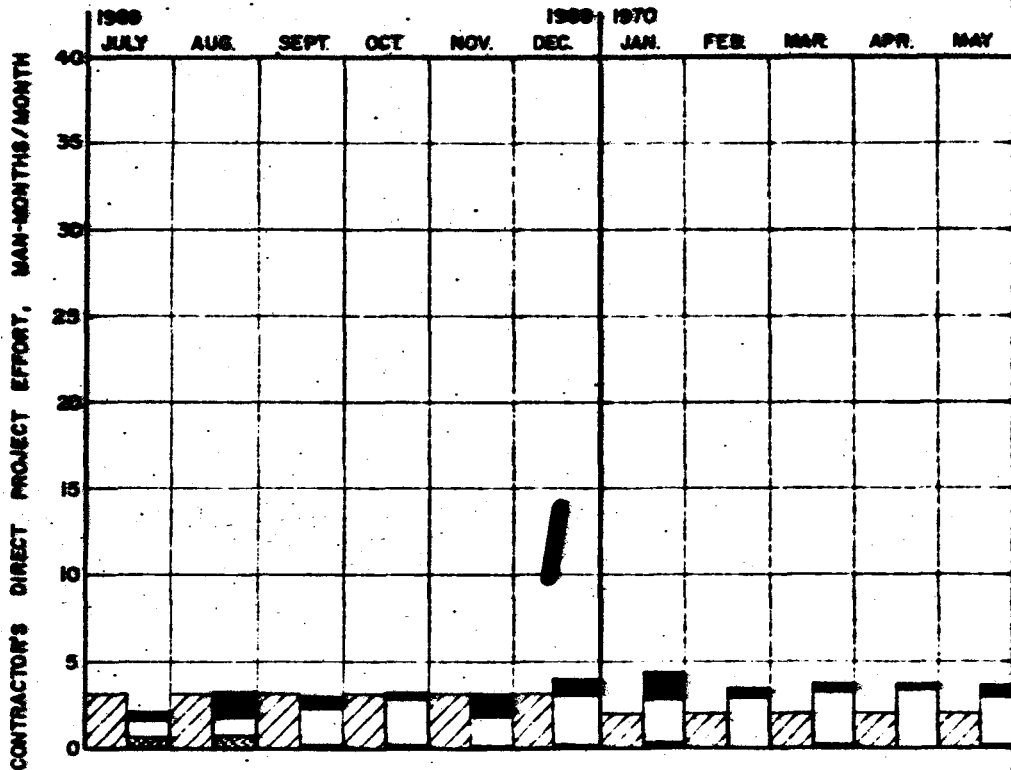
V. Pre-Calcification Beneficiation (Clarkson)

The study of sodium removal from Beulah, North Dakota lignites was essentially completed this month. The variables studied include: contact time, temperature (3-6° C, 23° C), pH, calcium ion concentration (0, 10^{-3} , and 10^{-1} M), particle size (4 size ranges), and pulp density (3:1, 6:1, L:S). The only tests remaining are studies on the effectiveness of magnesium in removing sodium from lignite.

These studies have shown that essentially all of the sodium is removed in one hour under the following conditions: pH 6.5, 10^{-1} mole/liter Ca^{++} , liquid-solid ratio of 3:1, particle size of -14+20 mesh, and 23° C. Even when the temperature of the system is lowered to 3 - 6° C, the technique is still effective in removing 90 percent of the sodium.

When the calcium concentration is lowered to 10^{-3} mole/liter, 25 percent of the sodium is removed under these conditions.

Work next month will involve samples from other locations in North Dakota.



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MONTHLY EXPENDITURES*

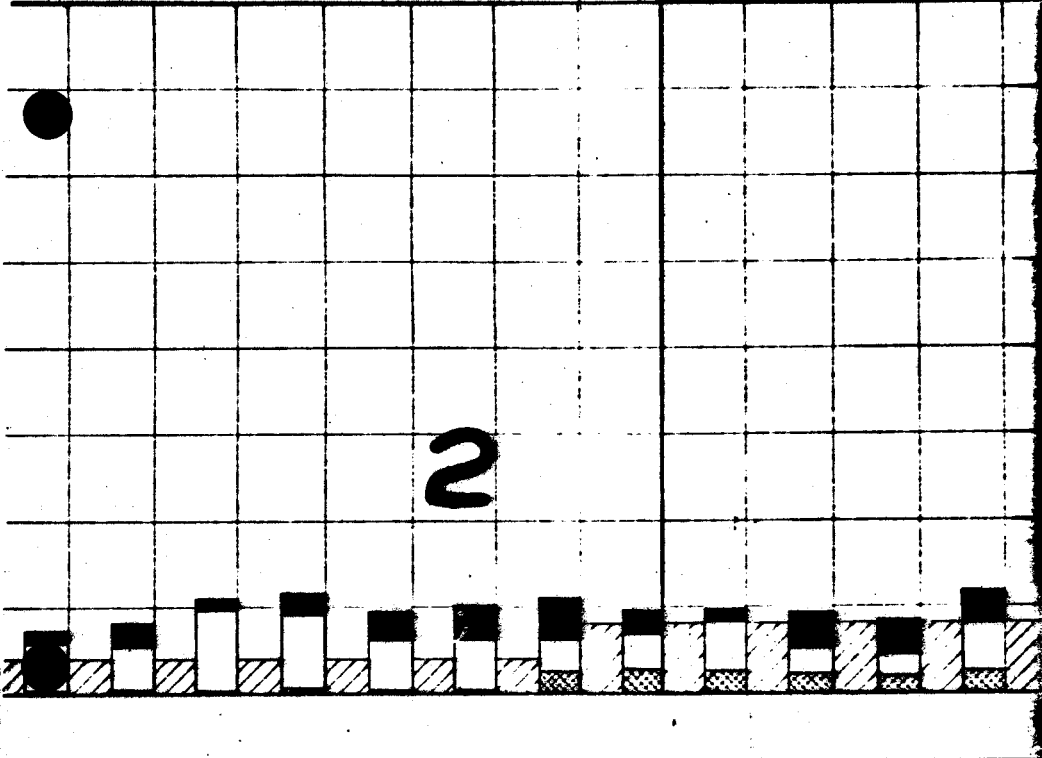
PREDICTED	16,215	14,685	14,965	13,155	14,385	17,065	15,545	15,595	12,655	12,875	13,815
ACTUAL	11,745	34,734	9,609	11,925	10,130	15,209	14,378	14,027	15,019	55,228	7,342
	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
PREDICTED	16,215	30,900	45,865	59,020	73,405	90,470	108,055	121,650	134,305	147,180	160,995
ACTUAL	11,745	46,479	56,088	67,913	78,043	93,249	107,628	121,653	136,672	89,900	207,242

CUMULATIVE EXPENDITURES*

* Expenditures Include All Costs & Fees By Contract And S. Dakota School of Min.

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1970 1971
 MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MA



3,818	12,855	13,315	12,835	12,505	12,505	12,505	20,155	20,135	23,295	22,295	21,145
7,342	19,319	20,054	15,955	25,003	21,296	9,584	23,091	16,475	16,663	12,820	22,198
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
10,309	173,650	186,961	199,800	212,305	224,810	237,315	257,470	277,605	300,900	323,195	344,348
37,242	226,561	244,615	260,570	285,573	306,869	316,453	339,544	356,019	372,642	385,902	407,694

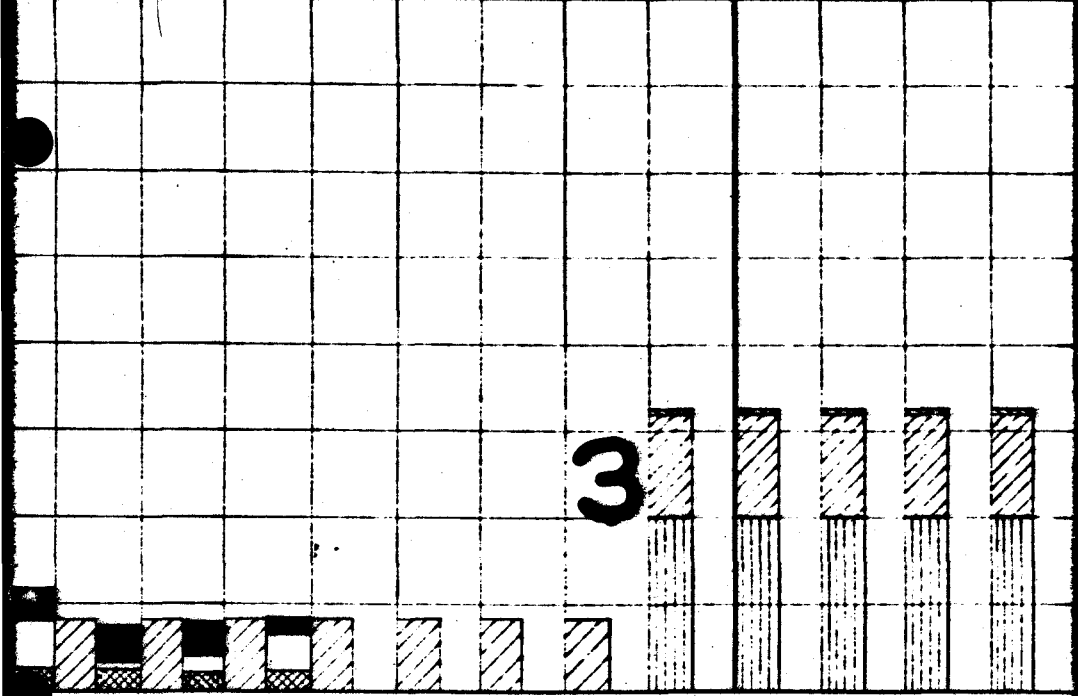
Mines.

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MONTHLY PROGRESS CHART (SUPERVISOR)

CONTRACT No. 14-01-0001-415 (3)

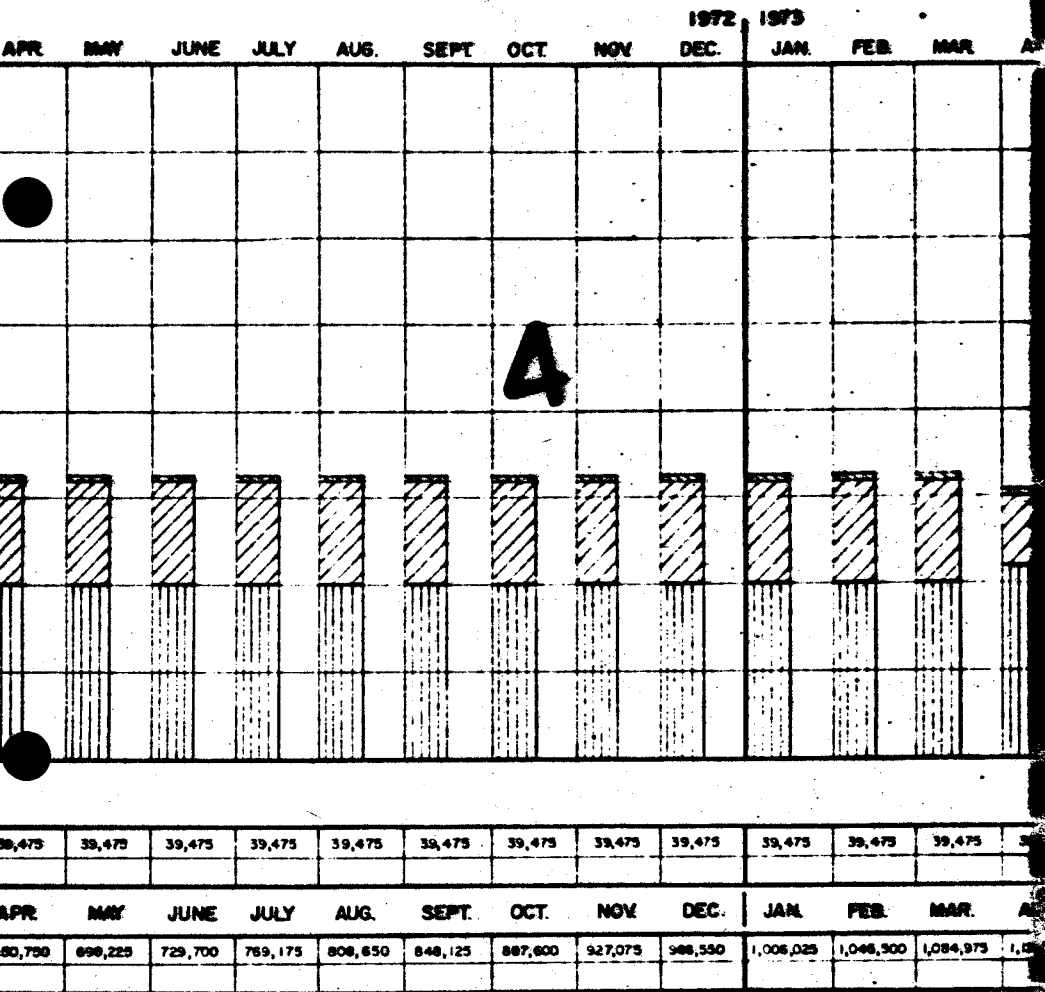
MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. 1971 JAN. FEB. MAR. APR. 1972



1971	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	1972	JAN.	FEB.	MAR.	APR.	
1971	10,705	15,955	14,875	14,875	14,875	14,875	14,875	39,475	1972	39,475	39,475	39,475	39,475	39,475
1971	12,508	15,831	17,500											
1971	363,045	379,000	393,875	408,750	423,625	438,500	453,375	492,850	1972	532,325	571,800	611,275	650,750	690,225
1971	420,206	436,037	453,537											

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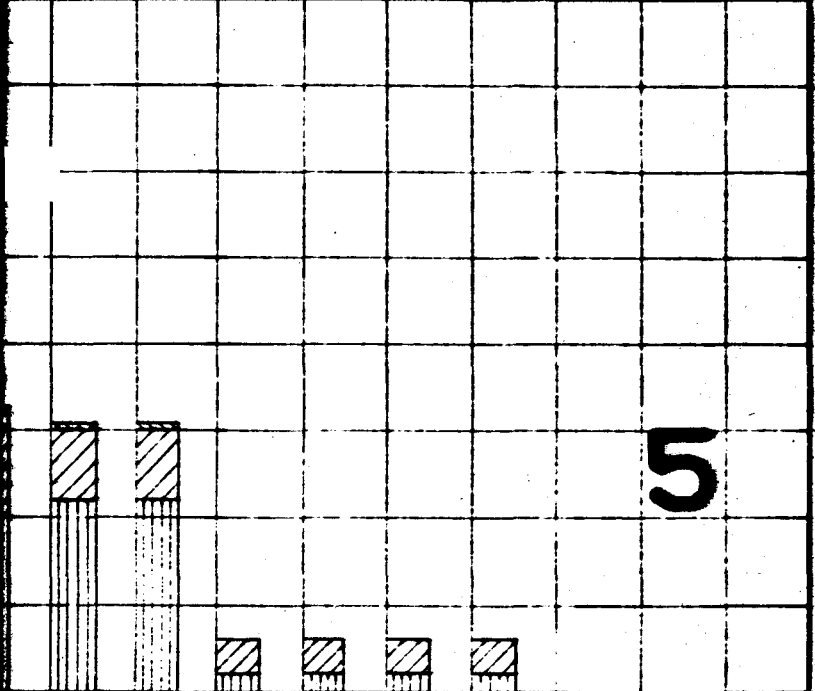
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APR. MAY JUNE JULY AUG. SEPT.



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1973	36,075	36,075	11,475	11,475	11,475	41,120		
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	APR.	MAY	JUNE	JULY	AUG.	SEPT.
1973	1,121,059	1,157,125	1,166,600	1,180,075	1,194,550	1,232,670

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DATE: July 1971

1973

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN		

⊕ Includes Supervisory Exempt Technicians.
 ⊕⊕ Includes Clerical.

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
 DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA.

CONTRACT No. 14-01-0001-415 (3)

PROGRESS REPORT NO. 87
 OCR CONTRACT NO. 14-01-0001-415(3)
CONSOL. LIGNITE GASIFICATION PROCESS DEVELOPMENT

August 1 to 31, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

The projected completion date of construction remains mid-October, 1971. Current construction effort is centered around electrical, insulation and painting work.

Recruiting, training, and mechanical acceptance tests continue. Hot testing of the drying and grinding equipment (without coal) was carried out in August; revisions are under way and a further test is planned for September.

A preliminary start-up schedule projects initial gasification tests (barring unforeseen delays) in January, 1972.

Financial

Estimated monthly expenditures are \$24,216 by Consol and \$288,608 by Stearns. Cumulative project expense to date is \$11,361,132.

B. Technical Results and Program

Phase II - Beach-Sonic Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

1. Supporting Process and Economic Analysis (Project No. 533)

No work was done on this project.

2. Supporting Patent and Legal Activities (Project No. 534)

The current reports and memoranda were reviewed for Subject Inventions.

3. Consoel Assistance on Construction of Lignite Pilot Plant (Project No. 536)

Consoel continued to inspect and observe construction, largely utilizing the services of the resident Conoco engineer. Conoco specialists were utilized as required to check piping, electrical work, and instrumentation.

The study of power outages was completed jointly with Stearns-Roger. About 20 power "blinks" (outages of about 12 cycles duration) occur each year, according to Black Hills Power and Light. The following major revisions are required to avoid plant shutdowns during these "blinks".

1. An additional inverter is needed to maintain operation of the key control circuits.
2. Automatic restart devices (with a one second time delay) are required for the gasification and utility equipment; manual restart will be employed for the coal preparation and the gas cleanup areas.

The air compressor (J-202) will require electrical unloading to permit automatic restarting. The estimated cost of these revisions is \$30,000.

The sewer system has been tested successfully and is in use.

4. Stearns-Roger Construction Subcontract (Project No. 700)

The Stearns progress report is attached.

Equipment installation is now complete; electrical, insulation, and painting are now the principal items of uncompleted work.

The project completion date for construction remains mid-October, 1971.

5. Consoel Guidance on Operations (Project No. 702)

Cooperative work with Stearns continued in the following areas:

- a) Definition of key equipment affected by power "blinks",
- b) Observation of plant mechanical acceptance tests,
- c) Preparation of a detailed program for the next hot "dry run" on the coal preparation facilities.

6. Stearns-Roger Operating Subcontract (Project No. 701)

The Stearns report is attached. Recruiting, operator training and breakin of various portions of the plant have been the primary areas of activity.

The hot "dry run" on the coal drying equipment carried out in late August was unsuccessful in demonstrating controlled gas circulation with low oxygen concentrations. Revisions have been made and a repeat test will be made in September.

A start-up program for the pilot plant has been submitted to Consoel for review. Key target dates are proposed as follows:

- | | |
|---|-------------------------------|
| 1) Crushing and grinding of lignite | October 4-15, 1971 |
| 2) Performance tests, hot pot system | October 25-31, 1971 |
| 3) Hot pressure testing of gasification | November 22-December 12, 1971 |
| 4) Heat loss tests | December 13-19, 1971 |
| 5) Delomite flow tests | December 13-29, 1971 |
| 6) Char circulation tests | January 3-16, 1972 |
| 7) Initiate gasification tests | January 17, 1972 |

Lignite Gasification
Progress Report No. 87

-4-

August, 1971

7. School of Mines Subcontract (Project No. 708)

The progress report is attached.

C. Subject Inventions

None.

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through July, 1971</u>		
Through June, 1969	\$ 1,878,256	\$ 1,878,256
Consol	452,960	383,875
Stearns-Roger	8,708,100	9,264,900
	<u>\$ 11,037,316</u>	<u>\$ 11,537,031</u>
<u>Expended in Period (estimate)</u>		
Consol	24,216	14,875
Stearns	299,600	220,800
	<u>\$ 323,816</u>	<u>\$ 235,675</u>
<u>Total, August</u>	<u>\$ 11,361,132</u>	<u>\$ 11,772,706</u>
<u>Cumulative through August, 1971</u>		

Att. Progress Reports
Construction
Operation
South Dakota School of Mines
Progress Charts

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSG PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job No. B-37000
September 3, 1971

PROJECT REPORT SUMMARY

Since the arrival of the last of the ten fired heaters on August 13, progress toward completion has accelerated. Process piping is complete. Testing, insulation and painting are scheduled to result in plant completion by October 15.

ENGINEERING

Design engineering during the past month has been concerned with revisions to the automatic restart system for electrical motors. Momentary dips in electrical service occur much more frequently than originally contemplated by Consol.

PROJECT MANAGEMENT

The diagram schedule attached to this report has been updated to show completed and unfinished work separated by the decorative line. All construction in the materials handling and utilities areas is scheduled to be complete by September 10. Chemical cleaning and boil-out of the boiler will be done the week of September 13. Due to lack of materials, the insulation subcontractor is about a week behind schedule.

CONSTRUCTION

Installation of process piping, steam, tracing, electrical tracing, intercom system, instrumentation piping, concrete curbs and asphalt surfacing are all complete. Completion of the elevator will now permit removal of the construction hoist and completion of the building siding and nearby sidewalk. Work in progress now includes: pipe guides, hydrostatic testing, electrical work for the heater controls and emergency shutdown system, insulation, painting, pressurization of control rooms, cleanup and starting the removal of temporary construction facilities. Completion status of subcontracts is: electrical - 96%, insulation - 38%, painting - 35%. Consol has taken over occupancy of the main control room.

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-17000
 September 3, 1971

SUMMARY OF PROJECT CHANGES

Orig. Guar. Max. Price	\$8,465,129
App'd Changes	834,838
Revised App'd GWP	\$9,299,967

D. H. Dawson
 D. H. Dawson
 Project Manager

Attachments: Progress Chart - 8/31/71
 Master Plan Schedule - 8/31/71
 Equal Employment Opportunity Report (Separate Cover)

Distribution:

Consol - 5	Continental Oil Company - 6	
C. A. Schulz - A	E. E. Ellington, CED	J. B. Hambleton, Jr.
U. D. Marwig	D. F. Wegner, Field	G. E. Fagerberg, CED
	L. Thompson, MED	Dr. C. V. Foster, PEI

S-R - 7

FCE/HFD/CMS/TCS/File,	CFL/JIN/VLB/CIM/JCN	ALC,
FAM/JAF, DHD,	WEPowell, Field	

CONSOLIDATION COAL COMPANY PRA CT
 CSC PILOT PLANT
 RAPID CITY, SOUTH DAKOTA

CCC Project NO. 701
 S-R Job NO. B-37400
 September 3, 1971

OPERATIONS REPORT #18GENERAL

Thirteen operators, a maintenance coordinator and four others started work this month. A training program has been prepared for the "B" Operators for September 7 through the first week in November. Laboratory and maintenance personnel will also attend some of these sessions, though there will be separate programs for the laboratory and for maintenance. An up to date organization chart and the class schedule for the "B" operator training is attached.

A schedule and program for the next six months were prepared and are now being updated based on recommendations from Consolidation Coal.

We are waiting for finalization of the maintenance contract. Meetings with the local craft unions should be held in the near future, when the contract is finalized.

In Area 100, most of the equipment has been partially run in, an additional hot run was performed, and plans for solving problems with the bag house were worked out with the vendors. Copies of startup procedures for sections of Area 100, all those not previously issued, are attached. The safety section for Area 100 is nearly complete and will be issued next month.

In Area 200, the orientation for the shift engineers and panel operators, was completed to a point preparatory for the formal training classes starting September 7. The main Compressor J-202 has been run approximately 20 hours. A number of problems were discovered and most have been corrected. The start up procedures have been prepared with the exception of the safety procedures and jacket water system.

Essentially all of the items listed in the Plans For August in last months report are complete. The inert gas machine was not run in, due to delays in revisions that were necessary to make the system operable. Installation of change orders for Area 100 is also running about one week behind schedule.

For the coming month most of the operating effort will be directed at training. One shift engineer and one operator will be free most of the time to run in equipment, prepare for the grinding tests in Area 100 now scheduled to start October 4th, unload lignite, and complete the operating and safety manuals.

MONTHLY ACCOMPLISHMENTS - OPERATIONS

During the month of August, the shift engineers and panel operators attended and participated in orientation and training sessions covering the 200 and 300 sections of the plant. The sessions were normally held in the 200 Area control room; this classroom work was supplemented with trips into the structure to locate instruments, valves and equipment discussed in the classroom. Additional flow diagrams and sketches of equipment were prepared by various people to aid in developing a better understanding of the equipment. These will be of great value for use as teaching aids in the upcoming training sessions for "B" Operators.

Also during August, shift engineers and panel operators (and "B" operators after August 16) operated the following equipment:

1. Cooling tower and cooling water system. The system was flushed and air agitated to remove scale and rust. The firewater system was flushed at the same time.
2. The main Air Compressor, J-202, was operated on and off for two weeks. A log sheet was prepared for this compressor and a test was performed to simulate how the compressor would respond to power dips that occur on the average of twenty (20) times per year.
3. The belt conveyor and receiving hopper vibrating feeder, that will be used to bring solids into the plant, were also cleaned and operated.
4. The dolomite handling system; which includes two screw conveyors, two vibrating feeders, a bucket elevator and hammermill; was also test operated.
5. An additional hot test run on the Williams equipment in Area 100 was also performed.

In addition to participating in all plant training and operating sessions, the shift engineers prepared the following:

1. An operating manual for the lignite and dolomite lock hopping systems.
2. Scale drawings of the devolatilizer, gasifier and regenerator vessel pressure taps for use as training aids.
3. Safe work procedures and permit forms.
4. Design modifications to bag house on Williams system.
5. A schedule of training classes for "B" Operator training which will start September 7.

Studies continued on the fire fighting procedures, foam and sprinkler systems and facilities for additional inert gas blanketing. Plans for communication between plant and office and control room were also studied and recommendations will be forthcoming. At the suggestion of several men, material used at other plants is being gathered for a "Disaster Plan" by which it would be possible to coordinate activities with local municipal groups and the Air Base.

MONTHLY ACCOMPLISHMENTS - TECHNICAL DEPARTMENT

Work in the engineering group has centered around the following:

1. Review of the electrical system and listing of items that must be on an inverter because of the twenty power dips per-month experience in Rapid City.
2. Engineering continued on various change orders and studies per their priority.
3. Completed engineering and drafting on fifteen assigned change orders.
4. Inspection of flushing, cleaning and hydrotesting of lines made available by receipt of the fired heaters.
5. Calculated a steady state steam balance for winter operations.
6. The first sample of char, obtained elsewhere, was run to check out equipment.
7. The Betz Water Analysis and Orsat equipment was assembled and tested.
8. Dew points were run on the instrument air to make sure it is sufficiently dry to prevent problems in the plant instrument system.
9. The chromatograph, spectrograph and thermal balance were inspected preparatory to their installation.

MONTHLY ACCOMPLISHMENTS - MAINTENANCE

Four men are now on the payroll and we have begun routine maintenance in a number of areas. A number of problems with the main Air Compressor were resolved and maintenance personnel are installing laboratory piping. Work procedures consistent with the Safe Work Permits are being outlined. Approximately 80% of the spare parts for the pumps and compressors are on order. For other items, only 10% are on order.

September 3, 1971

MONTHLY ACCOMPLISHMENTS - INSTRUMENT GROUP

Cabinets and benches were installed in the shop and test equipment is being set up. Other accomplishments include:

1. Started ordering spare parts for instruments.
2. Started installation of air filters in the 100 Area.
3. Continued orientation, familiarization and training for technicians.
4. Continued construction installation check out.

September 3, 1971

PLANS FOR SEPTEMBER

1. Assist with construction and vendor representative check-out of the boiler, the water treater and the deaerator. Boil out boiler.
2. Put the inert gas system in service.
3. Fill the two open "B" operator positions, continue to build a maintenance group and fill the open position for a technical engineer.
4. Unload and transfer lignite from railroad hopper cars to lignite storage bin. Place in operation the bin purge system using purchased nitrogen.
5. Continue installation of change orders per their priority.
6. Completion of laboratory plumbing, electrical and ductwork to allow instrument calibration.
7. Start preparing a detailed program of mechanical testing and checks on material in the high temperature regions of Area 200.
8. Carry out training programs for the "B" operators, chemists and maintenance personnel.
9. Calibrate 100 Area instruments and utility area instruments.
10. Continue setting up repair shop tools and equipment.
11. Run hot test in Section 100 to determine $\% O_2$.

September 3, 1971

STAFFING

	<u>Present Payroll</u>	<u>Hired to Report in September</u>
Management	2	0
Accounting	1	1*
Clerical	3	1*
Janitorial	1	0
<u>TECH. DEPT.</u>		
Laboratory	4	1
Engineering	6	2
<u>MAINTENANCE</u>		
Supv.	1	2*
Crafts	4	10*
<u>OPERATIONS</u>		
Supv.	1	0
Shift Engineer	4	0
Operators	17	4
Warehouse	1	0
Instrument Dept.	3	2
TOTAL	48	23

*Transfers from construction could be effective this month - depending upon the progress on completion of construction of the plant.

COST

Amount Paid Out as of August 31, 1971..... (Approximately)	\$470,000
Purchase Orders Not Paid & Purchases Placed.....	90,000
Actually Spent-August.....	136,000

Yours very truly,

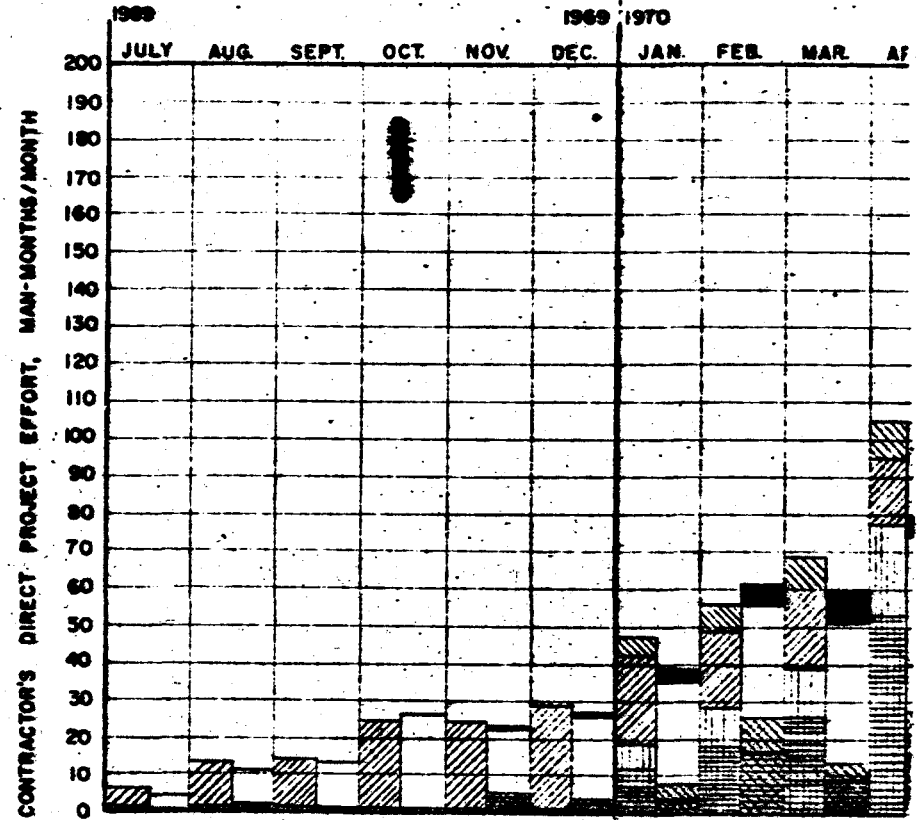
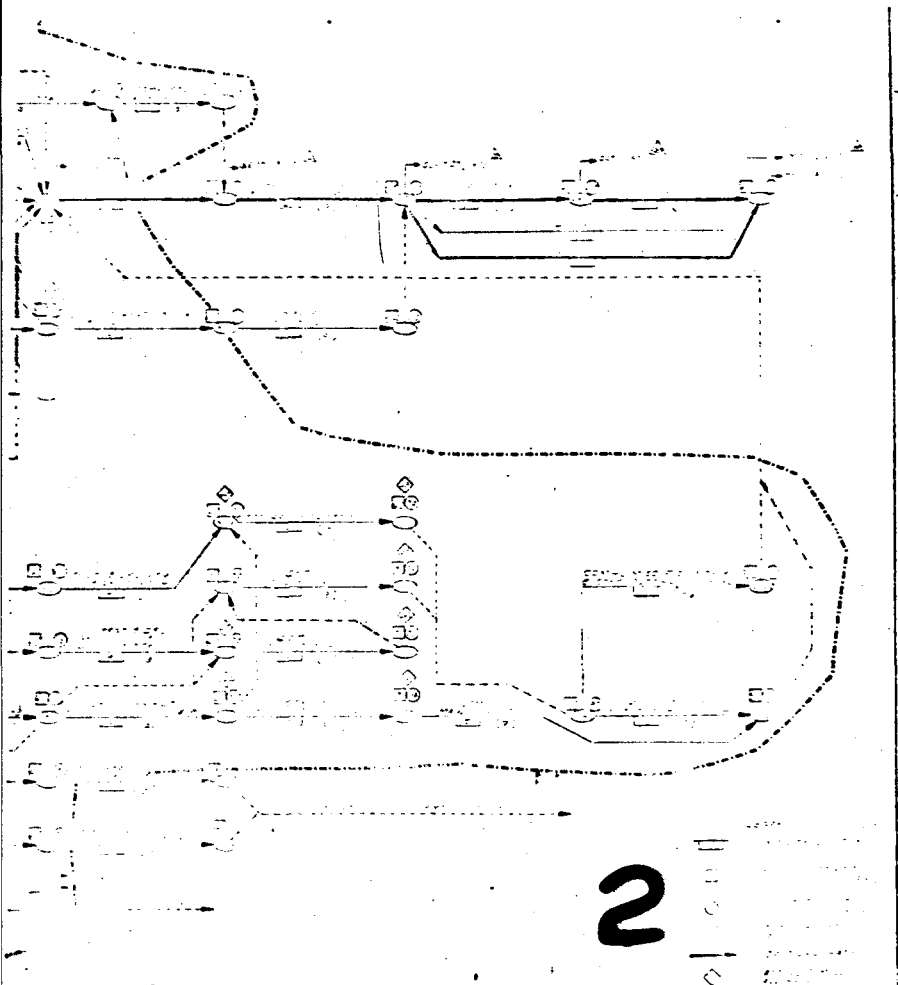
STEARNS-ROGER CORPORATION



William E. Powell

WEP:aka

CC: HLL, FEJ, MWV, DRM, DDD, WTB, JGS,
U. Marvig (6), Chuck Stone, Dick Dawson



MONTHLY EXPENDITURES *

	1969	1969					1970			
	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
PREDICTED	0	30.0 M	41.0 M	50.0 M	98.0 M	106.9 M	112.0 M	273.0 M	299.5 M	445
ACTUAL	6.2	25.0	32.8	42.6	39.7	126.2	110.5	76.7	102.9	209

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
PREDICTED	0	30.0 M	71.0 M	121.0 M	219.0 M	325.9 M	437.9 M	710.9 M	1010.2 M	1455
ACTUAL	6.2	31.2	64.0	106.6	146.3	272.5	383.0	459.7	562.6	771

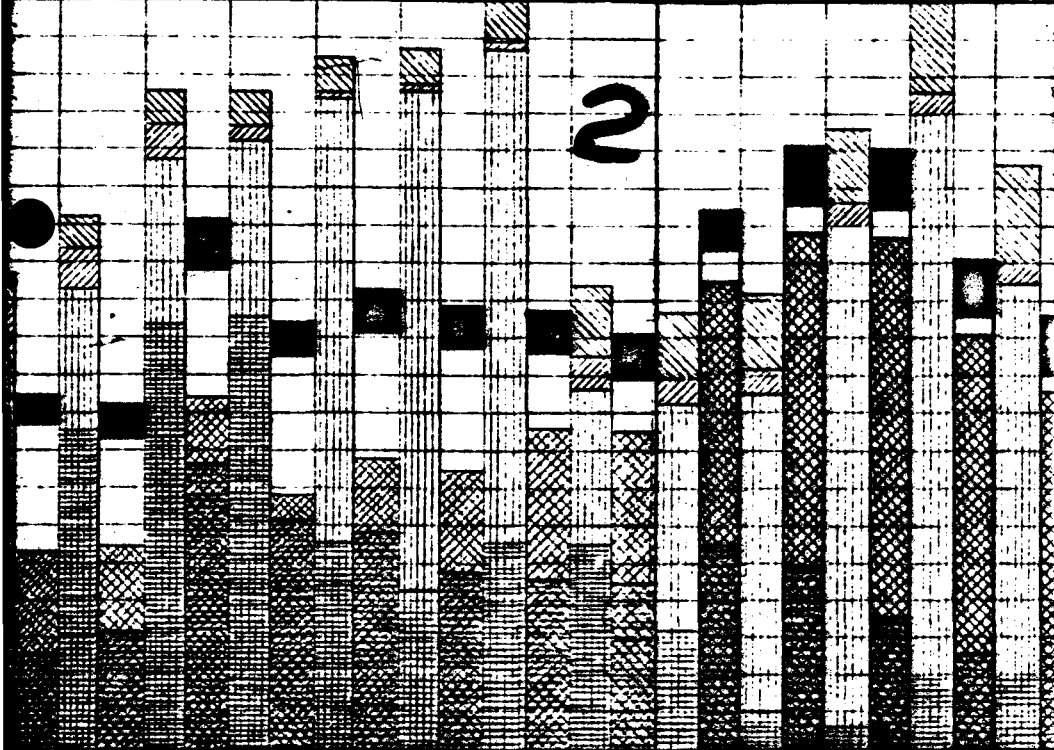
CUMULATIVE EXPENDITURES *

* EXPENDITURES INCLUDE ALL COSTS @ FEES

1970 1971

JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY

2



LYM	891.1 M	802.0 M	891.1 M	712.9 M	891.1 M	891.1 M	758.2 M	719.5 M	777.0 M	702.9 M	554.9 M	487.7
CT	367.1	564.6	725.2	794.2	728.9	422.9	779.5	552.1	690.6	757.7	496.7	298
BY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
9.5M	2970.6M	3772.6M	4663.7M	5376.6M	6262.7M	7158.8M	5366.6M	5928.8M	6862.1M	7565.5M	8108.4M	8538
3.5	1972.6	1937.2	2662.4	3456.6	4185.5	4608.4	5397.3	5939.4	6630.0	7387.7	7884.4	8176

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OPERATIONS COST INCLUDED IN CUMULATIVE 186.0 163.0 189.
 CONSTRUCTION COST INCLUDED IN CUMULATIVE 1110.3 778.4 1286.
 NON-FINANCE SALES TAX RESERVE NOT INCLUDED IN CUMULATIVE 152.6 152.6

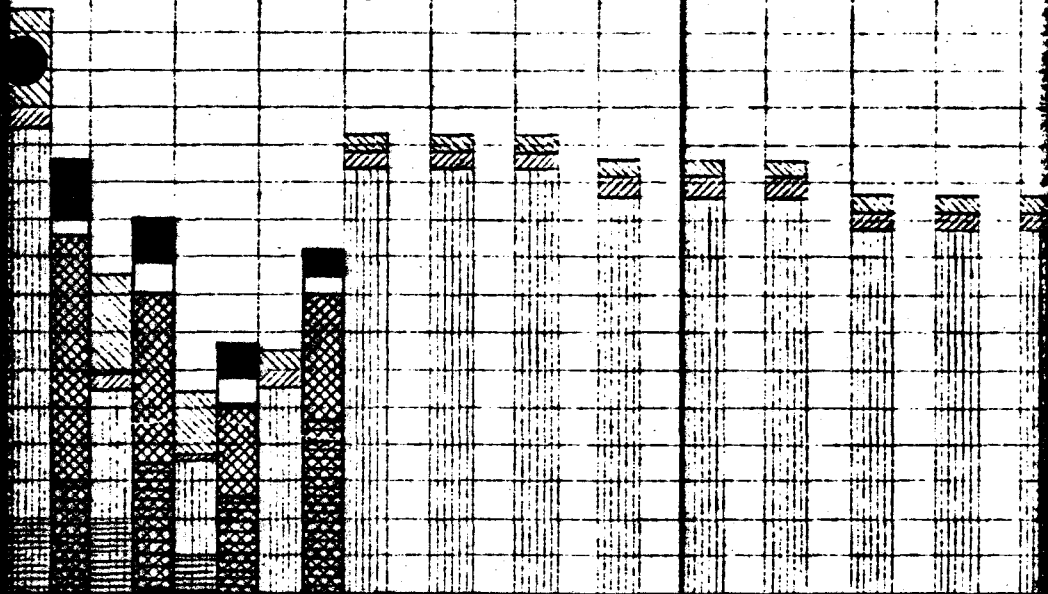
MONTHLY PROGRESS CHART (CC)

CONTRACT NO. 14-01-0001-415 (3)

1971 1972

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. M

3



487.7M	441.8M	285.0M	220.8M	218.1M	218.0M	219.1M	211.9M	211.5M	211.5M	185.1M	184.5M
292.0	308.1	221.6	299.6								

MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
538.1M	897.9M	926.9M	9485.7M	9703.8M	9921.8M	10140.9M	3352.8M	10,564.3M	10,775.8M	10,960.9M	11,145.4M
3176.4	8484.6	8706.1	9005.7								
189.7	246.2	339.8	467.5								
158.7	228.1	331.3	453.2								
144.9	197.4	188.7	159.4								

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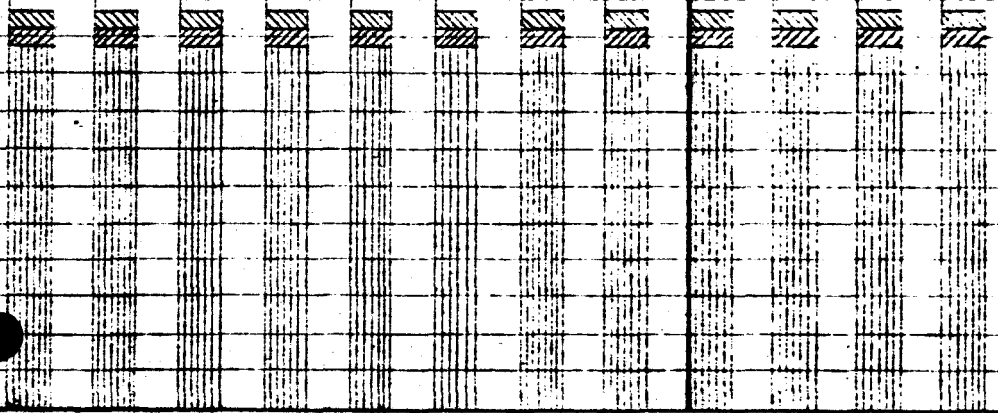
CONSTRUCTION & OPERATION)

(REVISED 12/31/70)

1972 1973

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

4



M	204.7M	203.9M	202.8M	202.8M	202.9M	201.8M	201.5M	201.4M	183.2M	182.9M	182.1M	180.5M
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	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
M	11,950.1M	11,554.0M	11,756.8M	11,959.6M	12,162.5M	12,364.3M	12,565.8M	12,767.2M	12,950.4M	13,133.8M	13,315.4M	13,495.9M

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DATE: Aug 1971

1973

PREDICT

SUPERVISING



PROFESSIONAL



TECHNICIAN S-R



TECHNICIAN S/C



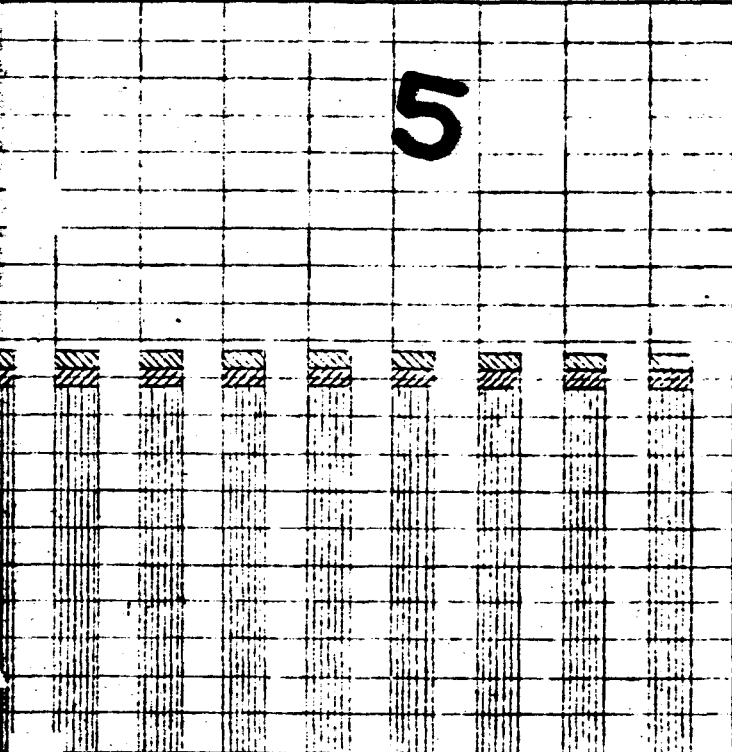
- INCLUDES SUPERVISOR
- INCLUDES CLERICAL

CONSTRUCTION — STEARNS
OPERATIONS — STEARNS

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PR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

5



5M	177.5M	170.0M	161.2M	140.8M	130.1M	130.0M	130.0M	249M
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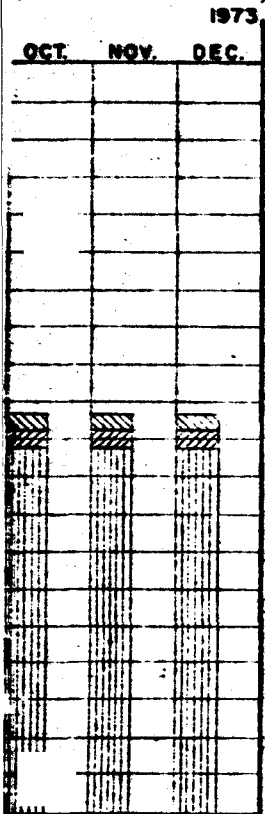
PR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

15.9M	13,673.4M	13,843.4M	14,004.6M	14,154.4M	14,275.5M	14,405.5M	14,535.5M	14,560.4M
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APPROXIMATE TOTAL CONSTRUCTION ≈ 8,800,000
 APPROXIMATE TOTAL OPERATIONS ≈ 5,760,400
 14,560,400

MONTHLY
 OFFICE OF
 U.S. DEPARTMENT
 CONSOLIDATED
 RESEARCH DIVISION
 CONTRACT NO
 (REVIS

DATE: Aug 1971



1973
OCT. NOV. DEC.

PREDICTED ACTUAL

SUPERVISING [diagonal lines] [solid black]

PROFESSIONAL [diagonal lines] [white with circle]

TECHNICIAN S-R [horizontal lines] [cross-hatch with circle]

TECHNICIAN S/C [vertical lines] [cross-hatch]

⊕ INCLUDES SUPERVISORY EXEMPT TECHNICIANS
⊗ INCLUDES CLERICAL

CONSTRUCTION — STEARNS-ROGER JOB B-37000
OPERATIONS — STEARNS-ROGER JOB B-37400

6

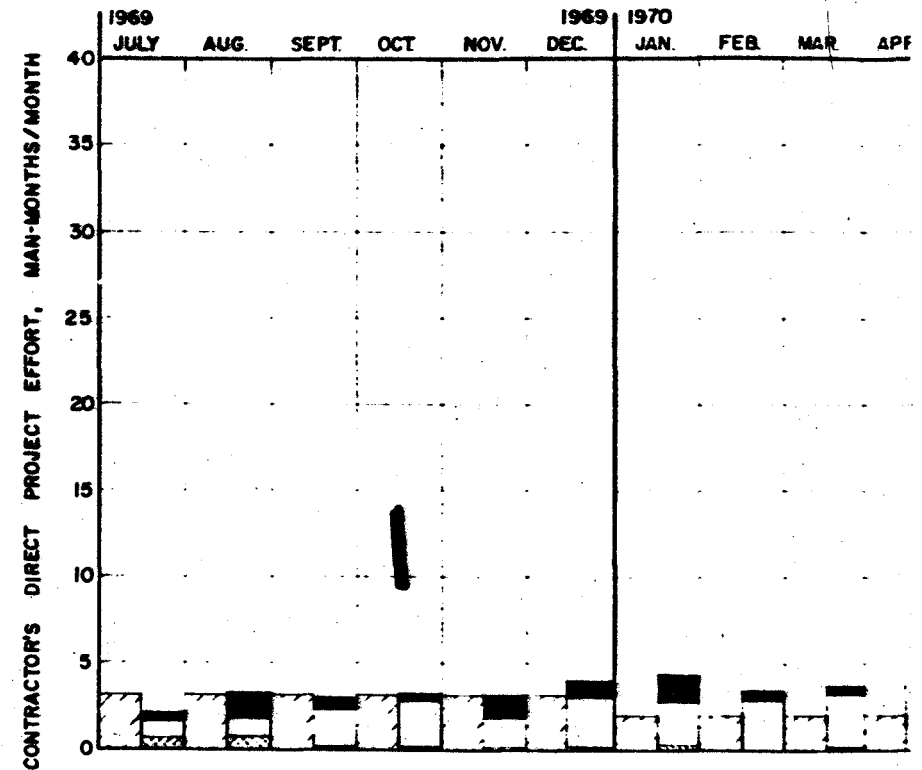
MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
U.S. DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
RESEARCH DIVISION LIBRARY, PA.

CONTRACT NO. 14-01-0001-415 (3)
(REVISED 12/31/70)

150.0M	150.0M	24.9M
OCT.	NOV.	DEC.
1405.5M	14,535.5M	14,560.4M
CONSTRUCTION ≈ 6,800,000		
OPERATIONS ≈ 5,760,400		
		14,560,400



MONTHLY EXPENDITURES*

	1969 JULY	AUG.	SEPT.	OCT.	NOV.	1969 DEC.	1970 JAN.	FEB.	MAR.	APR.
PREDICTED	6,215	14,635	4,365	17,55	14,397	17,265	5,595	5,595	11,655	1,377
ACTUAL	11,745	14,734	9,629	11,925	10,130	16,205	4,378	4,127	11,113	550

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
PREDICTED	16,215	30,900	45,265	62,820	77,217	94,482	100,077	105,672	117,327	118,704
ACTUAL	11,745	46,479	56,108	67,913	78,043	94,248	107,626	111,753	122,866	123,316

CUMULATIVE EXPENDITURES*

* Expenditures Include All Costs & Fees By Consol And S. Depts Sr

MONT

MAY JUNE JULY AUG. SEPT. OCT. NOV. 1970 DEC. 1971 JAN. FEB. MAR. APR. MA

2



13,815	12,655	13,315	12,815	12,505	12,505	12,505	21,155	20,115	23,235	22,095	21,145	18,7
7,342	19,319	20,754	13,355	25,003	21,296	9,794	23,091	16,475	6,693	12,820	2,96	12,5

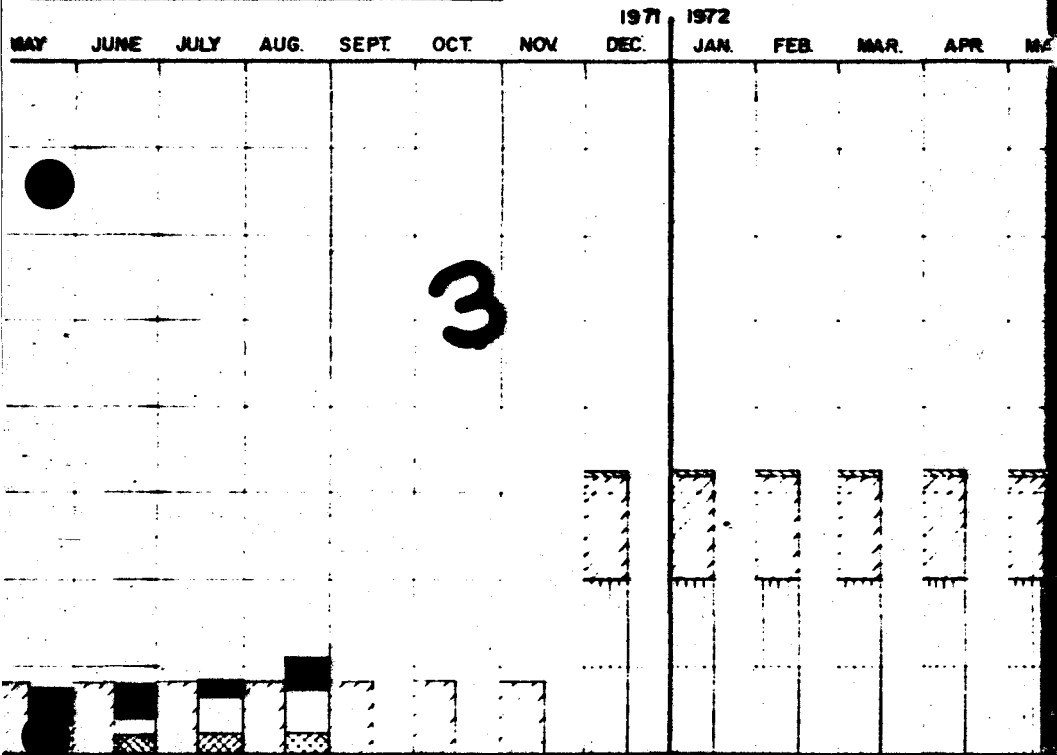
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MA
160,395	173,650	186,965	199,900	212,305	224,810	237,315	257,470	277,605	300,340	323,195	344,340	365,0
207,242	226,501	246,615	260,570	285,573	306,869	326,453	359,544	396,019	432,692	485,512	507,694	420,6

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THLY PROGRESS CHART (SUPERVISION)

CONTRACT No. 14-01-0001-415 (3)



	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
18,705	15,255	14,875	14,875	14,875	14,875	14,875	14,875	33,475	33,475	33,475	33,475	33,475	33,475
12,506	15,831	16,923	24,216										
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	
83,048	379,000	393,875	408,750	423,625	438,500	453,375	492,850	532,325	571,800	611,275	650,750	690,225	
20,206	436,037	452,960	477,176										


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ON & LAB WORK)

1972								1973			
MAY	JUNE	JULY	AUG.	SEPT	OCT.	NOV	DEC.	JAN.	FEB	MAR	APR.
						4					
39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	36,075
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV	DEC.	JAN.	FEB.	MAR.	APR.
690,225	729,700	769,175	808,650	848,125	887,600	927,075	966,550	1,006,025	1,045,500	1,084,975	1,124,450

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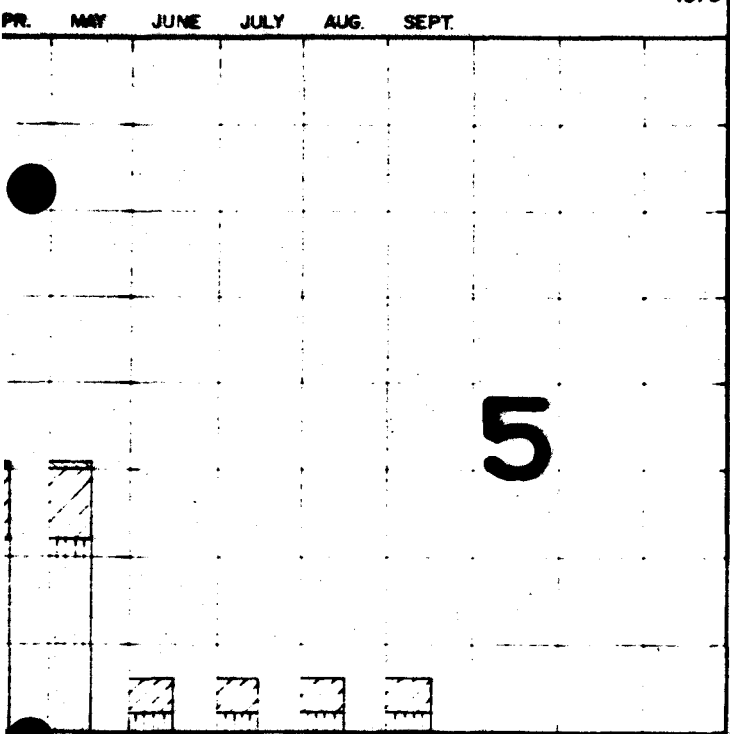
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DATE: *Aug 1971*

1973



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⊕ Includes Supervis

⊗ Includes Clerical

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775	36,075	11,475	11,475	11,475	41,120
R	MAY	JUNE	JULY	AUG.	SEPT.
790	1,157,125	1,168,600	1,190,075	1,191,350	1,232,670

MONTHLY

OFFICE OF
DEPARTMENT

CONSOLIDATED
RESEARCH DIVISION

CONTRACT NO.

DATE: Aug 1971 --

1973

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN		

* Includes Supervisory Exempt Technicians.
 * * Includes Clerical.

6

MONTHLY PROGRESS CHART	
OFFICE OF COAL RESEARCH DEPARTMENT OF THE INTERIOR	
CONSOLIDATION COAL CO. RESEARCH DIVISION LIBRARY, PA.	
CONTRACT No. 14-01-0001-415 (3)	

PROGRESS REPORT NO. 88
 OCE CONTRACT NO. 14-01-0001-415(3)
CONSOL. LIGNITE GASIFICATION PROCESS DEVELOPMENT

September 1 to 30, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

Construction is essentially complete with the exception of insulation. The estimated job cost is essentially equal to the GMP.

Training and mechanical breakin were continued. The ability of the drying equipment to operate with controlled pressures and oxygen contents was demonstrated. Crushing and drying will be carried out in early October. Run in of utility operations and calibration of gasification section instruments will also be carried out in October.

Financial

Estimated monthly expenditures are \$97,500 by Consol and \$440,100 by Stearns. Cumulative expense to date is \$11,899,435.

B. Technical Results and Program

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction

1. Supporting Process and Economic Analysis (Project No. 533)

No work was done on this project.

2. Supporting Patent and Legal Activities (Project No. 534)

The current reports and memoranda were reviewed for Subject Inventions.

3. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 536)

Efforts continued in checking the final construction of the pilot plant. Conoco "specialists" reviewed piping, electrical and instrumentation work as required.

Carl Schulz spent most of the month in Rapid City to follow the final construction efforts and the initial breakin work.

4. Stearns-Roger Construction Subcontract (Project No. 700)

The Stearns Progress Report is attached.

Construction is essentially complete with the exception of insulation. Insulation will be completed by November 1; work on this item does not interfere with acceptance tests and breakin operations.

The final job cost is currently estimated to be slightly under the GMP.

5. Consol Guidance on Operations (Project 702)

A summary review of the pilot plant breakin activities is attached. The emphasis for operations during the month of September centered around the

materials handling section (Area 100) and the utilities section (Area 500).

Area 100

Experiments were made in order to set the controls on the lignite dryer furnace and a hot run was made. The furnace was set to give about 700,000 BTU/hr. with 5% O₂ in the flue gases while operating at low fire, rather than 1.5 MM BTU/hr. with 10% O₂ as specified in the Consol program issued last month. As presently set, the furnace capacity would be 2.8 MM BTU/hr. as opposed to the design capacity which is 6 MM BTU/hr.

During the hot run, an attempt to operate the furnace at modulating conditions failed when the furnace air control valve motor failed to operate.

Three railroad cars containing lignite from the Glenharold Mine were received and loaded via the belt conveyor into the lignite storage silo. The as-received lignite was sized at minus 1 3/4-inches and contained about 37% moisture.

Area 500

The boiler was boiled out and put into service. Although it is now operating around the clock, further tuning is required before it can be run automatically.

The main air compressor, J-202, was run in. An air leak into the third stage cooling water jacket was discovered. Thus far attempts to repair the leak have failed.

The inert gas generator and the inert gas compressors have been run. As with the boiler, the inert gas generator has not been tuned in and requires constant attention. The high pressure inert gas compressor does not unload properly; therefore, the discharge pressure is controlled by blowing down the surge tank.

The CO₂ compressor was operated on inert gas supplied to the suction at 17.5 psig via the low pressure inert gas compressor. The CO₂ compressor was used to pressure up the purge gas surge tank, F-211. Due to leaks in the associated piping, the surge tank pressure could not be maintained.

Further Consol activities included presentation of a paper, Basic Features of the CO₂ Acceptor Gasification Process, before the Division of Fuel Chemistry of the American Chemical Society in Washington, D. C.

6. Stearns-Roger Operating Subcontract (Project No. 701)

The progress report is attached.

As indicated in the "Plans for October", (page 5), training, breakin of utilities, and start up of the solids preparation section (100) should be essentially completed in the coming month. Instrument calibration and mechanical breakin of the gasification section should be well along.

The program and budget for Rapid City through June, 1972 were submitted to OCR on October 5, 1971 (in letter CCC-OCR-415-734). The projection indicates that currently encumbered funds will be expended as of about February, 1972.

7. School of Mines Subcontract (Project No. 703)

The progress report is attached.

C. Subject Inventions

None.

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through August, 1971</u>		
Through June, 1969	\$ 1,878,256	\$ 1,878,256
Consol	477,879	408,750
Stearns-Roger	9,005,700	9,469,506
	<u>\$ 11,361,835</u>	<u>\$ 11,772,706</u>
<u>Expended in Period (estimate)</u>		
Consol	97,500 ⁽¹⁾	14,875
Stearns	440,100	218,000
Total, September	<u>\$ 537,600</u>	<u>\$ 232,875</u>
Cumulative through September, 1971	<u>\$ 11,899,435</u>	<u>\$ 12,015,581</u>

(1) Includes \$66,111 for sewer line construction and \$10,652 for School of Mines.

Att. - Progress Reports
Construction
Operation
South Dakota School of Mines
Progress Charts

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSG PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job No. B-37000
October 8, 1971

PROJECT REPORT SUMMARY

Construction is essentially complete. General cleanup, electrical and painting will finish by October 15, but the piping insulation has fallen behind schedule by 2-3 weeks to result in completion by about November 1. Final insulation work during the last half of October will not restrict work by operations people.

ENGINEERING

Flow diagrams, piping and structural drawings are being updated to "as built" status. Men will visit the job the week of October 11 to coordinate the marked up construction electrical drawings in preparation for revising them to "as built". Copies of process, piping and structural calculations have been sent to the three Consol offices.

PROJECT MANAGEMENT

Hydrostatic testing, chemical cleaning and boil-out of the boiler are complete. All other equipment has been accepted by Consol as mechanically ready for operation. Latest cost report indicates that total cost will be slightly under the Guaranteed Maximum Price.

CONSTRUCTION - - - About 98% complete.

Field personnel have been reduced to three craftsmen plus one supervisor and three office people on the Stearns-Roger payroll. For the first half of October there will be about five electricians and four painters and twenty insulators on subcontract work. Fuller Austin Insulation Company is doing good construction work, but has done a poor job of ordering and expediting materials and staffing the job. Productive men are not available through the local union, so men must be recruited from as far away as Houston. Completion status of subcontracts is: electrical 99%, painting 82%, insulation 61%.

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSG PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job No. B-37000
October 8, 1971

SUMMARY OF PROJECT CHANGES

Orig. Guar. Max. Price	\$8,465,129
App'd Changes	<u>834,838</u>
Revised App'd CWP	\$9,299,967

D. H. Dawson

D. H. Dawson
Project Manager

Attachments: Progress Chart - 9/30/71
Equal Employment Opportunity Report

Distribution:

Consol - 5

C. A. Schulz - 4
U. D. Marvig

Continental Oil Company - 6

E. E. Ellington, CED
D. F. Wegner, Field
L. Thompson, MED

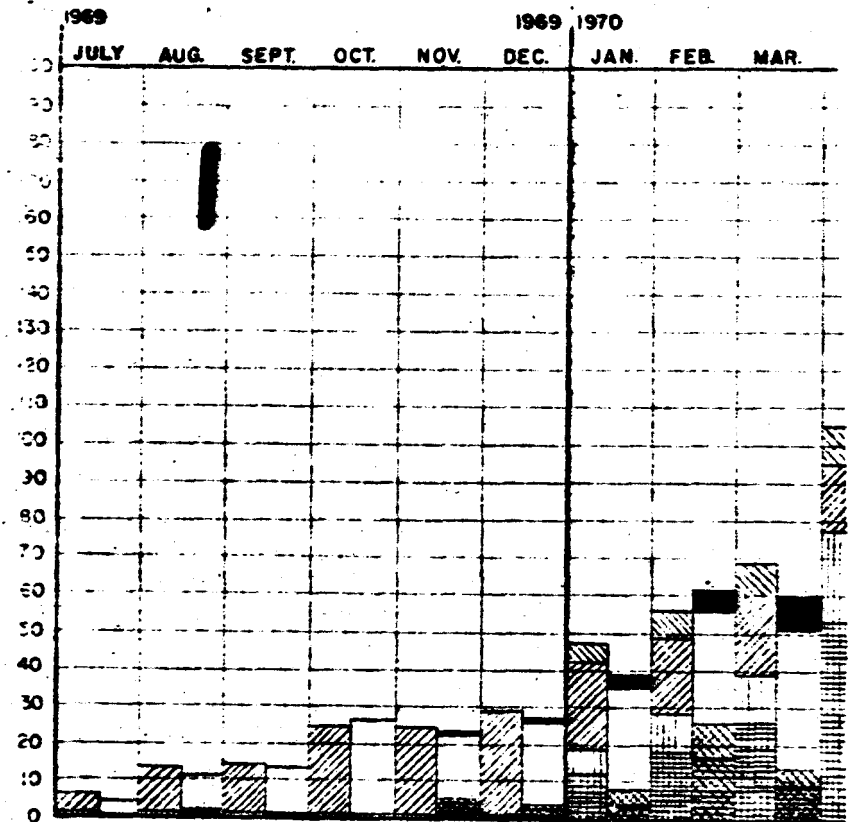
J. S. Hambleton, Jr.
G. E. Fagerberg, CED
Dr. C. V. Foster, PED

S-R - 7

PCR/BFD/CMB/TGS/File
FAM/JAP, DHD

JIN/VLB/CIN/JCN WFS
WEPowell Field

2



MONTHLY EXPENDITURES *

	1969	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	1970	JAN.	FEB.	MAR.	A
ATED	0	30.0M	41.0M	50.0M	98.0M	106.9M	112.0M	273.0M	299.3M	44		
AL	6.2	25.0	32.8	42.6	39.7	126.2	110.5	76.7	102.9	20		
ATED	0	30.0M	71.0M	121.0M	219.0M	325.9M	437.9M	710.9M	1002.2M	148		
AL	6.2	31.2	64.0	106.6	146.3	272.5	383.0	459.7	562.6	T		

CUMULATIVE EXPENDITURES *

* EXPENDITURES INCLUDE ALL COSTS & FEES

1970 1971

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MA

2

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23.7M	891.1M	802.0M	891.1M	712.9M	891.1M	891.1M	758.2M	719.5M	777.0M	702.9M	534.9M	487
88.7	367.1	564.6	725.2	794.2	728.9	422.9	779.5	552.1	690.6	757.7	496.7	27

MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MA
79.5M	2970.6M	3772.6M	4663.7M	5376.6M	6267.7M	7158.8M	5366.6M	5928.8M	6863.1M	7565.5M	8100.4M	8536
055	1372.6	1937.2	2662.4	3456.6	4183.5	4608.4	5397.3	5939.4	6630.0	7387.7	7884.4	8178

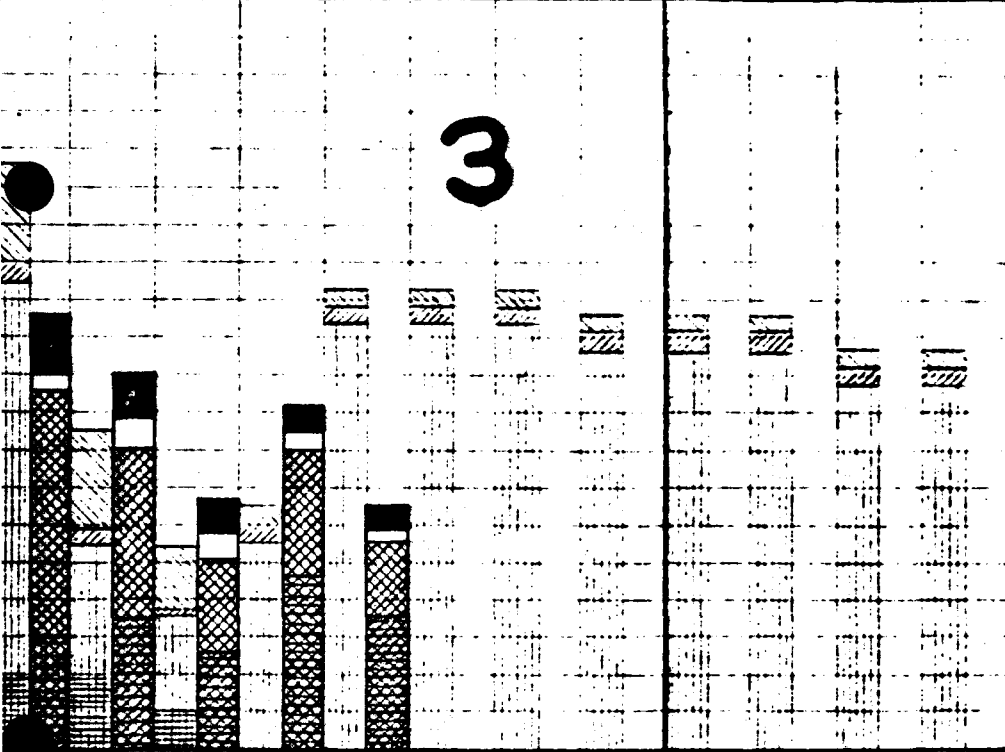
OPERATIONS COST INCLUDED IN CUMULATIVE 131.0 163.0 184.0
 CONSTRUCTION COST INCLUDED IN CUMULATIVE 1111.6 7731.4 7511.4
 Net FUTURE Sales Tax Reserve Not Included IN CUMULATIVE 1522.1 1522.1 1522.1

MONTHLY PROGRESS CHART (C)

CONTRACT NO. 14-01-0001-415 (3)

1971 1972

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.



87.7M	44.8M	285.0M	220.8M	318.1M	218.0M	219.1M	211.9M	211.5M	211.5M	185.1M	184.5M
192.0	308.1	221.6	299.6	440.1							

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

530.1M	8979.9M	9264.9M	9485.7M	9703.8M	9921.8M	10148.9M	10352.8M	10564.3M	10775.8M	10960.9M	11145.4M
176.4	8484.5	8706.1	9005.7	9445.8							
80.7	266.4	334.8	467.5	611.7							
126.7	308.1	351.3	453.2	584.1							
155.9	197.4	188.7	159.4	154.5							

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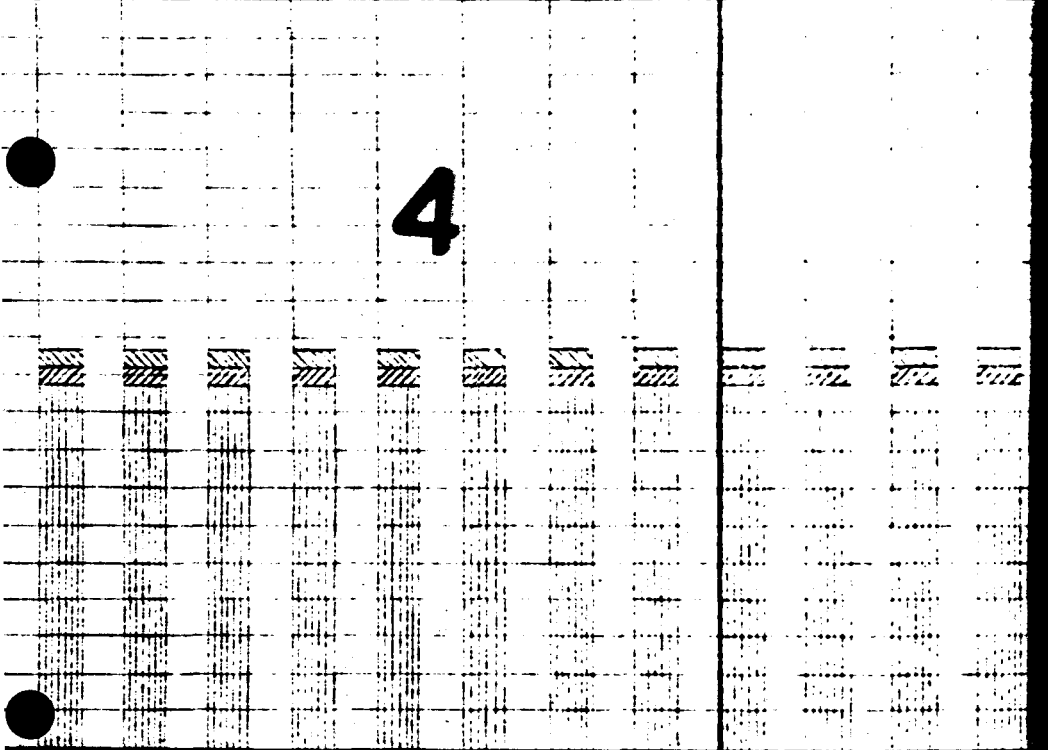
CONSTRUCTION & OPERATION)

(REVISED 12/31/70)

1972 1973

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

4



M	204.7M	203.9M	202.8M	202.8M	202.9M	201.8M	201.5M	201.4M	185.2M	182.9M	182.1M	80.5
---	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------

R.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
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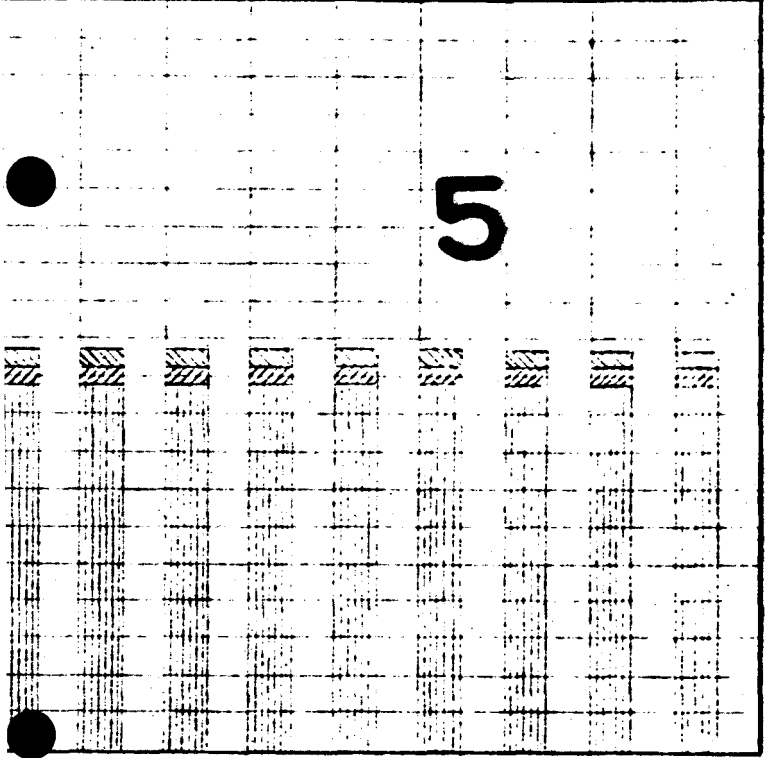
\$M	11,950.1M	11,554.0M	11,756.8M	11,959.6M	12,162.5M	12,364.3M	12,565.8M	12,767.2M	12,950.4M	13,133.3M	13,315.4M	13,495
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DATE: Sept. Dec. 1973

1973

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.



180.5M 177.5M 170.0M 161.2M 140.8M 130.1M 130.0M 130.0M 24.9M

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

1495.9M 13,673.4M 13,843.4M 14,004.6M 14,154.4M 14,275.5M 14,405.5M 14,535.5M 14,560.4M

APPROXIMATE TOTAL CONSTRUCTION ≈ 8,800,000
 APPROXIMATE TOTAL OPERATIONS ≈ 5,760,400
 14,560,400

- PRE
- SUPERVISING
- PROFESSIONAL
- TECHNICIAN S-R
- TECHNICIAN S/C

- INCLUDES SUPER
- INCLUDES CLER

CONSTRUCTION — STEA
 OPERATIONS — STEA

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DATE: Sept. - Nov. 1971

CONSOLIDATION COAL COMPANY PROJECT
CSG PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project NO. 701
S-R Job NO. B-37400
October 4, 1971

OPERATIONS REPORT #19

GENERAL

Most of the effort this month was directed to training the B operators that were hired last month, running in equipment, making changes necessary for the lignite grinding and drying tests and forming a maintenance organization. Twelve maintenance personnel were transferred from construction to operation.

Visits were made to the Library, Pennsylvania Pilot Plant of Consolidation Coal Company and to the Institute of Gas Technology to gather information on grinding and drying of lignite and dolomite.

The Area 100 system is now tested as far as it can be up to the time we introduce lignite. At the end of the month final painting and insulation and planned changes and revisions were nearing completion. All known outstanding problems had been resolved. The first 150 tons of lignite was unloaded into the lignite storage silo. A complete review of safety in Area 100 brought out that we do not have complete information; the missing information is related to the pilot plant nature of the plant and will have to be covered by taking a step by step approach to the operation. The last section of Area 100 operating manual, was completed. A copy of the procedure is attached.

In Area 200, training of B operators was started and orientation of shift engineers and panel operators was continued. Mr. George Curran reviewed the bench scale work at Library, Pennsylvania and pointed out some problems that need attention. A draft of the operating manual for the jacket water system is essentially complete and the safety section for Area 200 is about 50% complete.

A complete punch list of incomplete items for Area 200, the last construction in the plant was completed. The main air compressor, J-202, was run for another 20 hours during the month; a problem showed up at the high pressure stage which we have not been able to solve; and the problem appears to involve a basic fault that will have to be resolved by the manufacturer.

All of the items listed in the Plans For September in last month's report were completed during the month; although a number of minor delays will delay the first run of the 100 Area from October 4 to later in the week of October 4.

MONTHLY ACCOMPLISHMENTS - OPERATIONS

Three classes to train B operators were held simultaneously during the first two weeks of the month. This was changed in mid-month to a two class schedule with more emphasis on in-plant training. The training will continue through October and into November.

1973		PREDICTED	ACTUAL
NOV.	DEC.		

() INCLUDES SUPERVISORY EXEMPT TECHNICIANS
 (S) INCLUDES CLERICAL

CONSTRUCTION— STEARNS-ROGER JOB B-37000
 OPERATIONS— STEARNS-ROGER JOB B-37400

6

MONTHLY PROGRESS CHART	
OFFICE OF COAL RESEARCH U.S. DEPARTMENT OF THE INTERIOR	
RESEARCH DIVISION	LIBRARY, PA.
CONSOLIDATION COAL CO.	
CONTRACT NO. 14-01-0001-415 (3)	
(REVISED 12/31/70)	

NOV.	DEC.
130.0M	24.9M
NOV. DEC.	
14,535.5M	560.4M
TION ≈ 8,800,000	
NS ≈ 5,760,400	
14,560,400	

During the month the in-plant training included operating the following:

1. Boil out and operation of the boiler. The system was inspected after the boil out and operated on-and-off for about 30 hours. A start was made on blowing out the steam headers and steam tracing lines. Minor modifications by the vendor will be necessary before the boiler can be operated above about 75% of its capacity.
2. The Boiler Feed Water and Deaerator Systems. These systems were cleaned and routine procedures established. The gaskets in the water lines will be changed to a type of gasket that, though it can leak, cannot blow out. Several gaskets have blown out releasing large quantities of hot water.
3. The routine procedures for the chemical feed systems for the boiler and cooling tower, were established with the help of vendor representatives.
4. The Inert Gas System. The revisions made during the month proved successful in eliminating the problems found in August. Some "tuning" of the controls remains to be accomplished and the vendor will be requested to return to the plant to instruct us in the best procedures for "tuning" the controls.
5. Several pressure tests of the Bag House and some additional design revisions were required. It appears we now have a usable system.
6. Additional hot runs in which it was established that various controls are now functional and that the furnace can be fired at a low (5%) oxygen level, which is adequate.
7. The Fire Water System. Under the direction of a representative from the Oil Insurance Association and with the cooperation of the Fire Department, the system was tested with six hose streams operating. Also a test was made to determine how much makeup water can be obtained. Our fire fighting and safety plans were also reviewed by the Oil Insurance representative.
8. Unloaded and transferred 3 cars of lignite from railroad cars into surge bin. The bin has been under nitrogen purge since that time.
9. The warehouse was taken over from construction.

Monthly Accomplishments-Operations, Continued

The shift engineers and panel operators also:

1. Helped design an area alarm system to add to our communication system. This system will be needed to clear areas of the plant during an emergency.
2. Helped develop the beginnings of a comprehensive safety program. As one of the first stages a class on Industrial Safety given by the former safety director of the local power company, was attended by all operating personnel.
3. A permit system for vessel entry, welding and line repair. This system was worked out with the cooperation of the maintenance and instrument groups and was placed in effect for the lignite handling area when lignite was loaded into the bin.
4. A report on monitoring equipment needed for carbon monoxide, flammable gases and oxygen levels.

MONTHLY ACCOMPLISHMENTS - TECHNICAL DEPARTMENT

1. Two trips were made during the month to determine problems and obtain suggestions as to operation of the lignite grinding and drying system.
2. Completed observing of line flushing and hydrotesting.
3. Emergency alarm system placed on order for entire plant.
4. Designed and placed on order a 6000 gallon liquid nitrogen system.
5. Completed ten change orders in the 100 Area.
6. Placed on order an additional inverter and batteries as the result of electrical system review.
7. Completed several change orders in Areas 200, 300 and 500.
8. Initiated several new change orders required prior to lignite grinding.
9. Attended Division of Fuel Chemistry Section of American Chemical Society in Washington, D.C.
10. Laboratory.....
 - A. Equipment....All ductwork has now been installed, electrical remaining - Two blower transformers have been tied in and electrical work is complete except for a few outlets and above the blowers. Also distillation equipment controls, plumbing, AA Spectrograph complete except power to exhaust fan, Grieve Ovens and RO-TAPS mounted.

Monthly Accomplishments-Technical Dept., Continued

B. General....

Made leak test of Compressor Gas System. Have started installation of laboratory equipment including chromatographs, ovens, sieving machines, still controls, etc. Thermobalance representative due first of October to install.

C. Analysis.....

Raw lignite received has been hand screened. The bin in which lignite is being stored for CO₂ and O₂. Cooling water pH and hardness, L-109-B1-O₂ checked, Boiler feed Cl⁻ test on softener.

MONTHLY ACCOMPLISHMENTS - MAINTENANCE

1. Increased Maintenance personnel to 14 craftsmen and 2 supervisors.
2. Completed inspection of steam boiler.
3. Cleaned up intercoolers of compressor J-309, J-504, and J-202
4. Replaced bearing of hammer mill.
5. Replaced some gaskets in boiler feed water system.
6. Ran J-504 Inert Gas Compressor without valves.
7. Performed daily maintenance schedule and check.

MONTHLY ACCOMPLISHMENTS - INSTRUMENT GROUP

1. Assisted in start-up of boiler and water treating system.
2. Calibrated 100 Area instruments and Utility Area instruments.
3. Made up spare parts list
4. Continued work on Engineering change orders.
5. Orientation of technicians and continued training of technicians.
6. Finished check-out of construction and continued to set up repair shop.
7. Worked on instruments for Inert Gas Generator.

PLANS FOR OCTOBER

Operations.....

1. Continue classroom training.
2. Continue to operate utilities to prove dependability and training for operators.
3. Prepare the steam system for winter operation-such as finding low spots in condensate system and installing drains.
4. Test grind and dry lignite and grind dolomite.
5. Complete safety section of 200 area manual.
6. Begin maintenance training program and set up safety program.
7. Complete writing of maintenance procedures
8. Begin calibration of instruments and run in of mechanical equipment in 200 area.
9. Complete fire fighting and disaster planning to coordinate activities with the fire department and Airbase.

Technical.....

1. Complete installation of change orders required prior to lignite grinding test.
2. Continue installation of lower priority change orders.
3. Calibrate laboratory instrumentation.
4. Determine physical properties of Glenharold lignite.
5. Continue preparation of mechanical testing procedure.
6. Devote time to computer program writing.
7. Test lignite ignition temperature.
8. Training program for chemists as equipment becomes operational. Calibration of instruments will precede training.

October 4, 1971

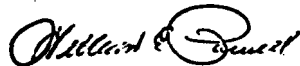
STAFFING		
	Present Payroll	Hired to Report in October
Management	2	0
Accounting	2	2
Clerical	3	1
Janitorial	1	1
Safety	0	1
Pollution	0	1
TECH. DEPT.		
Laboratory	5	0
Engineering	8	1
MAINTENANCE		
Supv.	2	2
Crafts	16	10*
Warehouse	2	0
OPERATIONS		
Supv.	1	0
Shift Engineer	4	0
Operators	19	2
Instrument Dept.	5	1
TOTAL	70	22

* Transfers from construction could be effective this month—depending upon the progress on completion of construction of the plant.

COST		
Amount paid out as of September 30, 1971.....	Approx.	\$603,215
Purchase Orders Not Paid & Purchases Placed.....		72,037
Actually spent—September.....		129,000

Yours very truly,

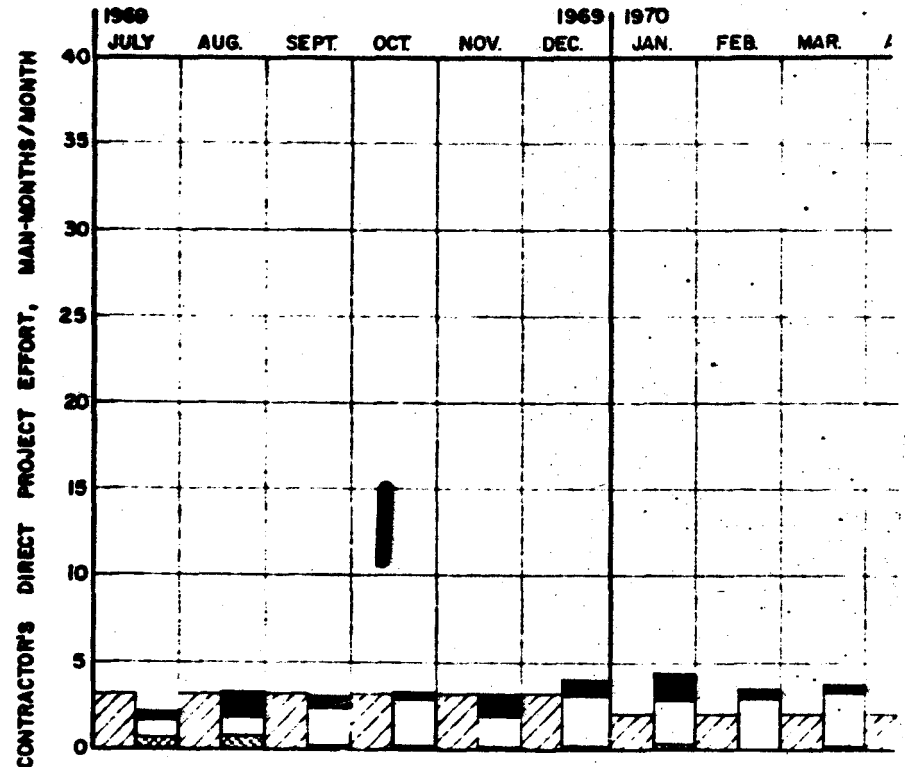
STEARNS-ROGER CORPORATION



William E. Powell

WEP:ska

cc: HLL, FEJ, MHV, DRH, DDD, WTB, JGS,
CS, UDM, CHS, DD



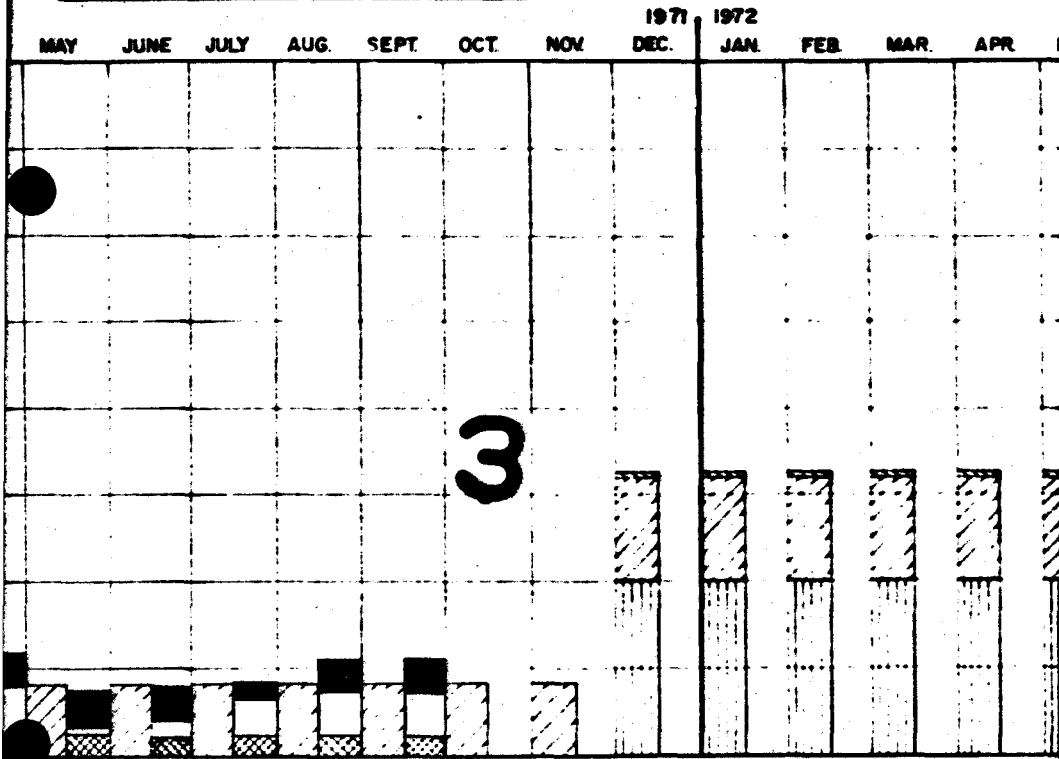
		MONTHLY EXPENDITURES*									
		JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
PREDICTED		16,215	14,685	14,965	13,155	14,385	17,065	15,585	15,595	12,655	12,655
ACTUAL		11,745	34,734	9,609	11,823	10,130	15,205	14,378	14,027	15,019	12,655
PREDICTED		16,215	30,900	45,866	59,020	73,405	90,470	106,055	121,650	134,305	146,960
ACTUAL		11,745	46,479	56,088	67,913	78,043	93,248	107,626	121,653	136,672	149,325

CUMULATIVE EXPENDITURES*

* Expenditures Include All Costs & Fees By Consol And S. Dakota S

MONTHLY PROGRESS CHART (SUPERVISION)

CONTRACT No. 14-01-0001-415 (3)



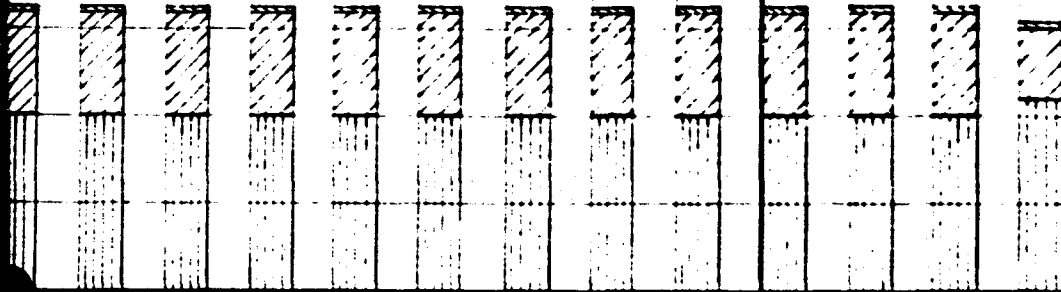
	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
	16,705	15,955	14,875	14,875	14,875	14,875	14,875	39,475	39,475	39,475	39,475	39,475
	12,508	5,821	16,923	24,949	97,500							
	583,046	379,000	393,875	408,750	423,625	438,500	453,375	492,850	532,325	571,800	611,275	650,750
	420,206	435,237	452,960	477,879	575,379							

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SION & LAB WORK)

APR MAY JUNE JULY AUG SEPT OCT NOV DEC. 1972 1973 JAN. FEB. MAR. A

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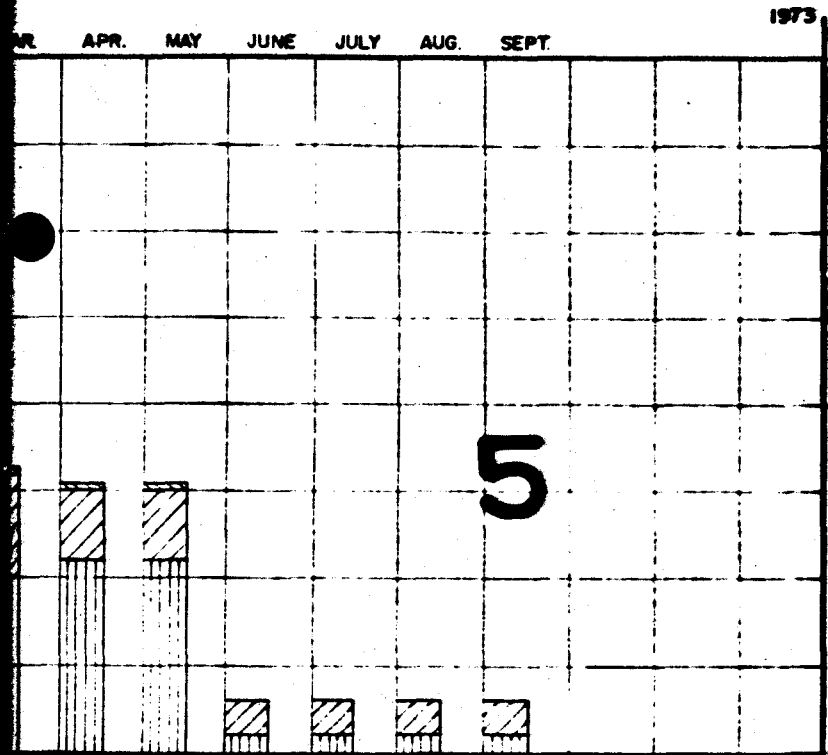
39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	36,0
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APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
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80,750	690,225	729,700	769,175	808,650	848,125	887,600	927,075	966,550	1,006,025	1,045,500	1,084,975	1,121,0
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DATE: *Sept*



SUPERVISING
 PROFESSIONAL
 TECHNICIAN
 Includes Sup
 Includes Cler

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1973	APR	MAY	JUNE	JULY	AUG	SEPT
36,075	36,075	11,475	11,475	11,475	41,120	

MONTH
 OFF
 DEPA
 CON
 RESEARCH
 CONTRA

(New 315 Chart)

DATE: Sept 1971

1973

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN		

⊕ Includes Supervisory Exempt Technicians.
 ⊕⊕ Includes Clerical.

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
RESEARCH DIVISION LIBRARY, PA.

CONTRACT No. 14-01-0001-415 (3)

CDC-MPR-89

PROGRESS REPORT NO. 89
OCR CONTRACT NO. 14-01-0001-415(3)
CONSOL LIGNITE GASIFICATION PROCESS DEVELOPMENT

October 1 to 31, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction and Operation

Insulation of the pilot plant continues, projected completion date is November 20.

Training and mechanical break-in were continued. A brief lignite crushing and drying test at controlled oxygen content was carried out successfully. Revisions will be made to reduce the amount of fines produced ca 18-20% -100 mesh. Testing of the dolomite grinding and sizing equipment was also successful.

Break-in and function tests of Section 100 will continue in November.

Financial

Estimated monthly expenditures are \$29,700 by Consol (and the South Dakota School of Mines) and \$409,400 by Stearns. Cumulative expense to date is \$12,338,738.

October, 1971

B. Technical Results and Program

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction and Operation

1. Supporting Process and Economic Analysis (Project No. 533.00)

No work was done on this project.

2. Supporting Patent and Legal Activities (Project No. 534.00)

The current reports and memoranda were reviewed for Subject Inventions.

3. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 536.00)

Consol-Conoco monitoring of construction is largely completed. Carl Schulz spent several weeks in Rapid City to assist in the transition to break-in operations.

4. Stearns-Roger Construction Subcontract (Project No. 700.00)

The Stearns Progress Report is attached.

Completion of construction has been delayed by inability of the insulation subcontractor to recruit people. Scheduled completion of insulation is November 20.

As-built drawings are being prepared and should be complete by the end of November.

Conoco's projection of the final job cost is essentially equal to the G.M.P.

5. Consol Guidance on Operations (Project No. 702.00)

A program was prepared for the first operation of the lignite grinding and drying system. The run was carried out on October 8 for a period of about seven hours with a controlled oxygen content of 2.5-3.5%. The run was terminated because of bridging in the lignite surge bin. Throughput was about 5 T/hr of raw lignite. Product moisture was 3.4-7% and product size consist was about 1.5% plus 8 mesh and 18-20% minus 100 mesh.

October, 1971

A second run is planned for early November after two of the four rolls are removed from the roller mill to produce less fines. Revision of the control instrumentation is also desired.

The dolomite grinding and sizing equipment was also operated successfully.

A program was prepared for operation of the lignite preheater.

Provisions were made to obtain supplies of Husky char and Tynochtee dolomite in anticipation of solids handling tests in Section 200.

6. Stearns-Roger Operating Subcontract (Project No. 701.00)

The progress report is attached.

As indicated, some delays have ensued in electrical and instrumentation maintenance and break-in work as a result of difficulties with the local electrical workers' union. It is not anticipated that these difficulties will persist or influence the long-range schedule.

Limited shift operation will begin in November. A further test of the lignite drying system is planned; also a test of the preheater is planned in late November.

7. School of Mines Subcontract (Project No. 703.00)

The progress report is attached.

C. Subject Inventions

None.

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through September, 1971</u>		
Through June, 1969	\$ 1,878,256	\$ 1,878,256
Consol	575,582(1)	423,625
Stearns-Roger	9,443,800	9,703,800
	<u>\$11,899,638</u>	<u>\$12,005,681</u>
<u>Expended in Period (estimate)</u>		
Consol	29,700(1)	14,875
Stearns	409,400	218,000
Total, October, 1971	<u>\$ 439,100</u>	<u>\$ 232,875</u>
Cumulative through October, 1971	<u>\$12,338,738</u>	<u>\$12,338,556</u>

(1) Includes payments to South Dakota School of Mines

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSG PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
S-R Job No. B-37000
November 9, 1971

PROJECT REPORT SUMMARY

Construction is essentially complete. Piping insulation has continued to fall behind schedule because the subcontractor has not been able to secure enough workmen. Completion, estimated to be November 20, will not restrict work by operations people.

ENGINEERING

Flow diagrams and full size piping drawings have been issued to "as built" status. Electrical drawings are now scheduled to be revised by November 23. Structural and civil drawings and piping isometric drawings will be ready for issue by November 20.

CONSTRUCTION - - 99.6% complete.

There are twenty-six insulators working to complete the last 10% of the insulation. All other construction is complete.

SUMMARY OF PROJECT CHANGES

Orig. Guar. Max. Price	\$8,465,129
App'd Changes	834,838
Revised App'd GMP	\$9,299,967


D. H. Dawson
Project Manager

Attachments: Progress Chart - 10/30/71

Distribution:

<u>Consol - 5</u>	<u>Continental Oil Company - 6</u>	
C. A. Schulz - 4	E. E. Ellington, CED	J. B. Hambleton, Jr.
U. D. Marwig	D. F. Wegner, Field	G. E. Fagerberg, CED
	L. Thompson, MED	Dr. C. V. Foster, PED

S-R - 7

FCP/HVD/CMS/TGS/FILE
YAM/JAP DMD

JTM/VLB/CIM/B/JCM
WEPowell

WFS
FIELD

CONSOLIDATION COAL COMPANY PROJECT
CSG PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 701
S-R Job No. B-37400
November 8, 1971

OPERATIONS REPORT #20

SUMMARY

All of the test programs and training procedures planned for October were completed during the month. We have, however, fallen behind on the revisions necessary to test the gasification facilities, mostly due to delays in completing electrical changes.

First of all, as of the first of the month the project maintenance agreement had not been presented to the local unions. Even though this contract had not been sent to the union, they were basically aware of its contents. The President of the local electrical workers was not willing to go along with this agreement even though the general president had signed the agreement. In view of this, we obtained an electrician from Great Northern Electric to do some of our electrical work and in some cases, we had two electricians. These electricians are basically installers and not trouble shooters; so our ability to trouble shoot was limited to having an electrical engineer on duty all the time.

On Tuesday, October 12, this maintenance agreement was presented to the local union. All of the crafts provided us people with the exception of the electricians. On Friday, October 15, Great Northern Electric finished its contract on construction and after that date, we had no electricians. On Friday, October 22, two electricians reported to the plant for work. Since on this day we did not have an electrical engineer, the electricians only did odd jobs. On Monday, October 25, we did have an electrical engineer for these two men and they worked on trouble shooting with him. On Tuesday, October 22, only one man reported for work and the other electrician reported in sick. For the next three days, October 27 and 28, two men reported to work and they were used in various places throughout the plant. On Friday, October 26, we had burned out the bearing on the motor in the main instrument air compressor for the third time, therefore, on Friday, the men worked to get this motor out and ready to send to Deaver.

From the above it is quite apparent that only a few electrical problems were solved during the entire month.

The lignite grinding and drying system was tested during the month. When the system was operated at designed conditions the product was too wet, 20% moisture and oversized. Changes in the operating conditions, jointly agreed to by Mr. Bob Williams and the Consolidation Coal Representatives, resulted in a production of lignite that was dried to the desired content of water content of 5% and that did not contain oversized material.

The dolomite grinding system was operated with various sizes of screens to determine the best combination of operating conditions and screen techniques. The runs were successful and the system is ready for production use.

Consolidation Coal has requested additional runs that will be carried out during November. Attempts to carry out the additional runs in October were not successful mainly because of delays in completing changes to the electrical system.

Essentially all of the classroom training for operators was completed during the month as scheduled.

At the end of the month, plans to obtain additional help in the electrical area were complete. It does not appear that the electrical problems will substantially interfere with accomplishing the long range schedule.

GENERAL

The training of "B" Operators continued according to schedule until the last week of October. The last two weeks of training were revised to include a concentrated program on the start-up and operation of the 200 Area for "A" and "B" Operators. The maintenance staff, which now holds approximately 25 people, is at a size large enough to permit completion of the changes ascheduled for the plant.

Testing of the 100 Area equipment at design conditions were completed during the month. To make the system usable from an operating standpoint two changes are necessary to mechanical equipment and a number of revisions to the electrical system will be necessary. The changes will be completed during November.

The training program for the 200 Area was revised toward the end of the month to permit a more comprehensive coverage of the operations and start-up procedures for Area 200. The general sections of the operating manual covering safety are complete, however, additional work on the safety sections for Area 200 is planned within the next several months.

Running of equipment throughout the plant was started during the month for everything except the emergency generator and emergency fire water pumps. The fault in the main air compressor J-202 discovered last month, was resolved with the manufacturer and the machine is now operational. All of the utilities are now operational; most of the heat tracing system was placed in operation during the last week of the month when the temperature dropped below freezing. We lost several lines and one pump due to freezing. Overall, we have completed or are in process of running in all of the other twelve compressors.

Fifteen of the seventeen items in the plans for October in last months report were completed during the month. The safety sections for the 200 manual and emergency planning and the testing program for the Area 200 were not completed as planned. Additional work on these items during the next several months will be necessary.

MONTHLY ACCOMPLISHMENTS - OPERATIONS

During the month operations were carried out simultaneously with training. A shift schedule that permitted operation during all daylight hours was initiated during the first week in October. During the last week in October it was necessary to go to a 24 hour coverage of the plant to prevent freezing. The operations during the month included:

Lignite Grinding - A test run on the lignite grinding and drying equipment was conducted. Specification product was made during the test. Electrical problems need to be corrected for the next run. Two of the four rolls have been removed from the mill at the suggestion of Mr. Bob Williams.

Dolomite - Three truckloads of local limestone were brought into the plant. This limestone was used to test the dolomite crushing and sizing equipment. Test runs were made using different screen sizes in the vibrating screen L-155. The technical group is analyzing the results.

Lignite Trailer - The lignite trailer was used to catch the product lignite from the lignite grinding run. The lignite was emptied to a pit on our property. The screw conveyors in the trailer have been revised since they were not operating properly.

Steam System - Cold weather the last week of October forced us to operate the boiler full time for equipment protection. Short shutdowns during daylight hours have been taken to make revisions to the boiler and steam systems.

Liquid Nitrogen - A liquid nitrogen system has been temporarily installed for use as inert purge to the 100 Area. The nitrogen is being used to keep an inert atmosphere on the roller mill and lignite headers. Piping has been installed to use nitrogen in the instrument air system should the instrument air compressors fail.

Equipment Operation - The following compressors were run during the month:

J-202	Regeneration Air Compressor
J-201 A	Gasifier Recycle Compressor
J-203 A	Regenerator Overhead Recycle Compressor
J-207 A	Devolatilizer Recycle Compressor

J-202 had an air-to-cooling water leak. The leak has been repaired by the compressor manufacturer.

H₂SO₄ - The Sulfuric Acid storage tank was put into service with about 2700 gallons of 66° Baume Acid.

Dry Ice - Dry ice has been used to inert the lignite silo FA-102. A liquid CO₂ system is being installed.

Fire Brigade - A fire brigade procedure was in operation for the lignite grinding test.

MONTHLY ACCOMPLISHMENTS - TECHNICAL DEPARTMENT

1. Gathered information and wrote up results of October 8th lignite grinding run. A copy of the report is attached.
2. Prepared Technical write up on Dolomite Grinding run. Gathered information, as much as possible, on run. It will be written up early in November.
3. Completed modification of the "Caboon", a converted cement truck, to handle hot lignite (250°F) prior to October 8th run. This included purge connections and water connections to use in case of fire. Engineering wrote up and conducted operator training on its use.
4. Completed installation of new ductwork for ventilation of Area 100 building prior to run. Air moved used in lieu of motor, the system was tested prior to grinding. Motor and fan now installed.
5. Assisted in conducting breathing equipment training for maintenance and operations. Included were portable breathing equipment and resuscitation equipment. This was part of the operator training program.
6. Computer program work centered around development of preliminary ISO PSIG operating run assuming char as the raw product.
7. Installed liquid N₂ system for back up to inert gas. This system was outside our September 17 schedule.
8. Also added a liquid CO₂ system to blanket FA-102, lignite silo. Again we were outside the previous schedule. This was determined to be necessary by Field Trip to North Dakota Power Plant where CO₂ was blanket gas on raw lignite storage.
9. Re-engineered the following items as necessary before further lignite grinding:
 - a. Drop line from top of structure to "Caboon".
 - b. Vibrator on F-103, Lignite Surge Bin.
10. Engineering complete and equipment partly installed for the following items prior to Lignite Preheater, D-101 testing:
 - a. Lignite line from downstream of Lignite Preheater D-101.
 - b. Steam line to B-102, Preheater Furnace.
 - c. Installed additional sample connections.
11. Mechanical engineering as required on various items of equipment with problems.

12. Completed several studies on plant problems.
13. Working on mechanical testing program. This has slipped and could effect our "hot runs".
14. Prepared Technical Write-Up for the next lignite grinding run. Included information needed, samples required and aims of run.
15. Gas chromatograph from Library has been operated. Calibration curves will be developed as soon as stable operation can be obtained. Believe helium flow control will be required - has been ordered.
16. Other chromatographs have been operated and standard curves are planned next.
17. Burrell balance for acceptor activity tests has been installed by representative.
18. Water still has been placed in operation using plant steam; the distribution piping needs to be leak-checked.

MONTHLY ACCOMPLISHMENTS - INSTRUMENT GROUP & MAINTENANCE

The training program for the personnel was started during the month. All of the maintenance and instrument group personnel attended a class on industrial safety given by the former safety director of the local power company. Safety meetings are being held as a start on a standard safety program.

Most of the activities in the instrument and maintenance area are now being scheduled on a routine basis. In all, approximately 200 items were completed during the month.

In addition to performing routine maintenance, the following items were done during the month.

1. The warehouse was organized.
2. Special maintenance procedures for work in Area 100 were completed.
3. Requisitions were prepared for essentially all of the remaining spare parts.
4. Calibration of instruments in the 100 and 500 Areas was completed.
5. Calibration was started of the 200 Area panel instruments.

Electrical

1. Marking "as built" drawings.
2. Replaced motor on L-152 (2 H.P.) with 3 H.P. Overload heaters were not changed.
3. Made up complete list of overload heaters.
4. Installing power to maintenance shop equipment.

5. Removed J-502 motor and sent it to Denver for new bearings.
6. Installed low water cut-off bypass switch on steam boiler.
7. Removed fluorescent light fixture on south side of steam boiler.
8. Installed conduit for N₂ equipment.
9. Finished construction contract.
10. Purchased fittings left over from construction.
11. Overload heaters changed in J-505 A & B M.C.C.

PLANS FOR NOVEMBER

Operations

1. Put operators on rotating shifts to test the shift organization.
2. Operate the Utilities Area.
3. Run in recycle compressors.
4. Run dolomite crushing and sizing equipment.
5. Grind lignite to further verify system and establish standard operating procedures if possible.
6. Check out and operate preheater system.
7. Pressure 200 Area with air.
8. Calibrate instruments in the 200 Area.
9. Establish fire fighting and disaster plans.
10. Revise safe work permit procedure.
11. Work on operating manuals.

Technical

1. Gather information from scheduled lignite run. Write up run as to data gathered and results.
2. Prepare write up for Lignite Preheater Test scheduled for late November.
3. Engineer change orders required before test runs and work on balance of change orders per their priority.
4. Step up work on mechanical testing program.

5. Intensify work on sample systems.
6. Conduct further investigation into properties of lignite.
7. Continue to devote time to computer programming.
8. Calibrate gas chromatographs.

Maintenance

1. Install additional freeze protection.
2. Prepare Area 200 for operating. (Will continue into December & January).
3. Complete installation of Liquid N₂ System.
4. Complete installation of sidewalks and roads.

Instruments

1. Calibration and check-out instruments on B-102 and D-101.
2. Calibrate transmitters and control valves in 200 Area.
3. Calibrate instruments in 200 Area panel.
4. Attend operations training lectures.
5. Do further instrument training.
6. Set up repair shop.
7. Assist operations as required.

Electrical

1. Remove and replace J-505 B motor.
2. Work with operations as requested.
3. Install equipment, when available, for engineering work orders.
4. Finish work for lignite grinding run.
5. Work with Instrument Technicians as requested on calibration.
6. Move conduit for insulators, as needed.
7. Check out B-102 controls.
8. Check out Thermal Oxidizer controls.
9. Install new P.D.P. in electric room.
10. Start installation of welding receptacles.

STAFFING

	<u>Present Payroll</u>	<u>Hired to Report in Nov. or Dec.</u>
Management	2	0
Accounting	2	2
Clerical	4	0
Janitorial	1	1
Safety	1	0
Pollution	0	1
TECH. DEPT.		
Laboratory	5	1
Engineering	10	2
MAINTENANCE		
Supv.	5	0
Crafts	24	4*
Warehouse	3	0
OPERATIONS		
Supv.	1	0
Shift Engineer	3	1
Operators	23	3
TOTAL	94	13

* Transfers from construction could be effective this month - depending upon the progress on completion of construction of the plant.

COST

Amount paid out as of Oct. 30, 1971	Approx.	\$ 802,935
Purchase Orders Not Paid & Purchases Placed		114,363
Actually spent - October		194,802

Yours very truly,

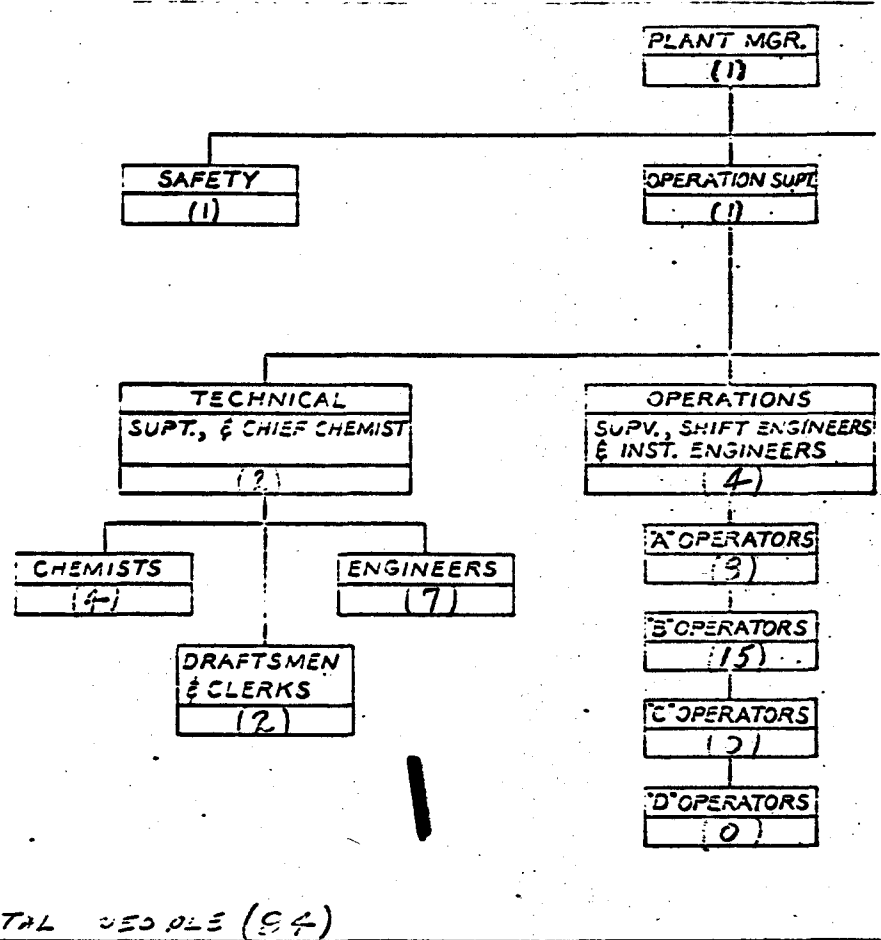
STEARNS-ROGER CORPORATION

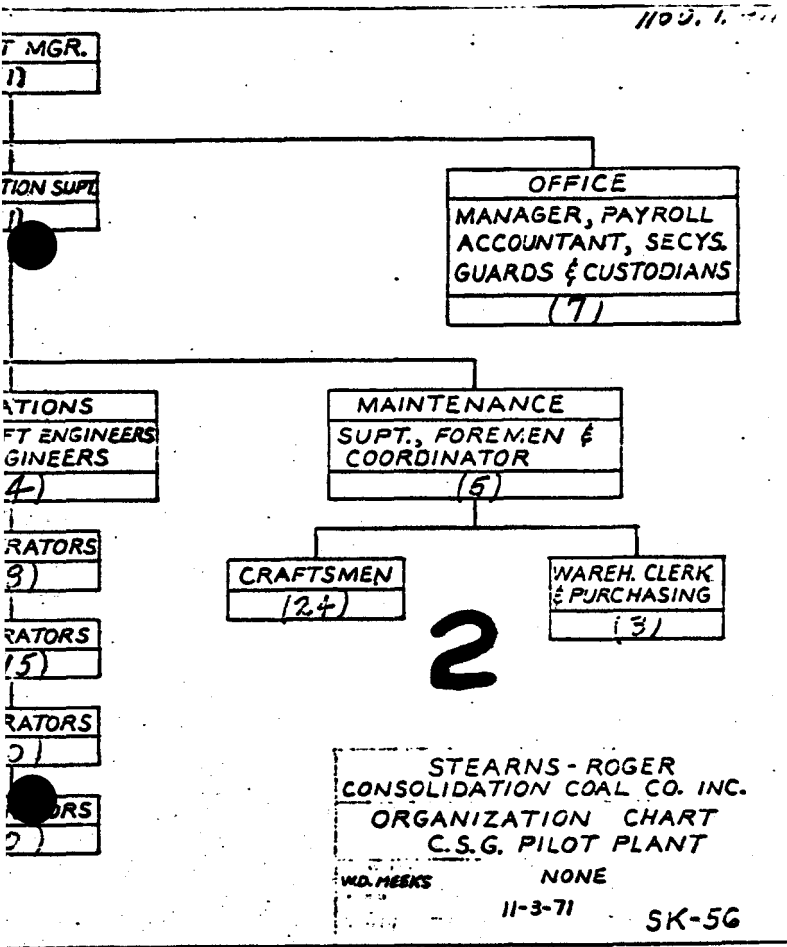


William E. Powell

Attachment

WEF:ncm
cc: HLL, FEJ, MMV, DRM, DDD, WTB, JGS,
CS, UDM, CHS, DD





SUBCONTRACT BETWEEN CONSOL AND SDS&W RE CONSOL CO₂ ACCEPTOR PROCESS
(OCR, Prime Contract No. 14-01-0001-415(3))

MONTHLY REPORT FOR OCTOBER, 1971

I. General

During October, work continued on the study of carbonate rock samples and preparation of data for the final report. The autoclave was finally delivered on October 15, but improper parts have delayed start up. In the chemical analyses of noxious elements, certain discrepancies in the Parr bomb method of solubilizing volatile elements are being checked out. Beneficiation studies involved the completion of sodium removal via stirred batch samples and the changeover to column studies. Design and fabrication work on equipment for the waste monitoring is progressing satisfactorily with good cooperation from local personnel.

II. Resource Study of Carbonate Rocks (Mickelson)

Work on the plotting of strip logs of the Spring Creek and Spearfish Canyon carbonate sections is underway and will be continued next month. Some sixty samples from three measured sections were prepared for chemical analysis. One group of samples has been tested for crushing characteristics. Crushing material has been sieved and histograms prepared.

The base map is being constructed and should be ready soon. Railroads have been contacted for freight costs and schedules. Work is progressing well. Plans are underway to get necessary thin sections prepared.

III. Acceptor Reconstitution (Fuerstenu)

During the month of October, a gas absorption apparatus was constructed and tested to measure the water and carbon dioxide content of the acceptor.

The autoclave was received on October 15, assembled, and installed. The wrong liners were sent with the unit; these were returned and the

correct liners have now been received. Experimental work in November will involve checking the phase diagram of calcium hydroxide/calcium carbonate to evaluate the performance of the autoclave. Following this, the phase diagram of calcium hydroxide/calcium carbonate in the presence of MgO will be established.

IV. Noxious Elements (Lingard)

Further investigation of the method of solubilizing volatile elements from lignite by combustion in a Parr bomb containing a few milliliters of 1 molar nitric acid has indicated that recovery of mercury by this method may be incomplete. There is evidence that mercury is adsorbed on the walls of the bomb and is removed only after repeated rinsing. Investigation of the validity of results obtained by the method will be continued with the use of spiked samples to check recoveries.

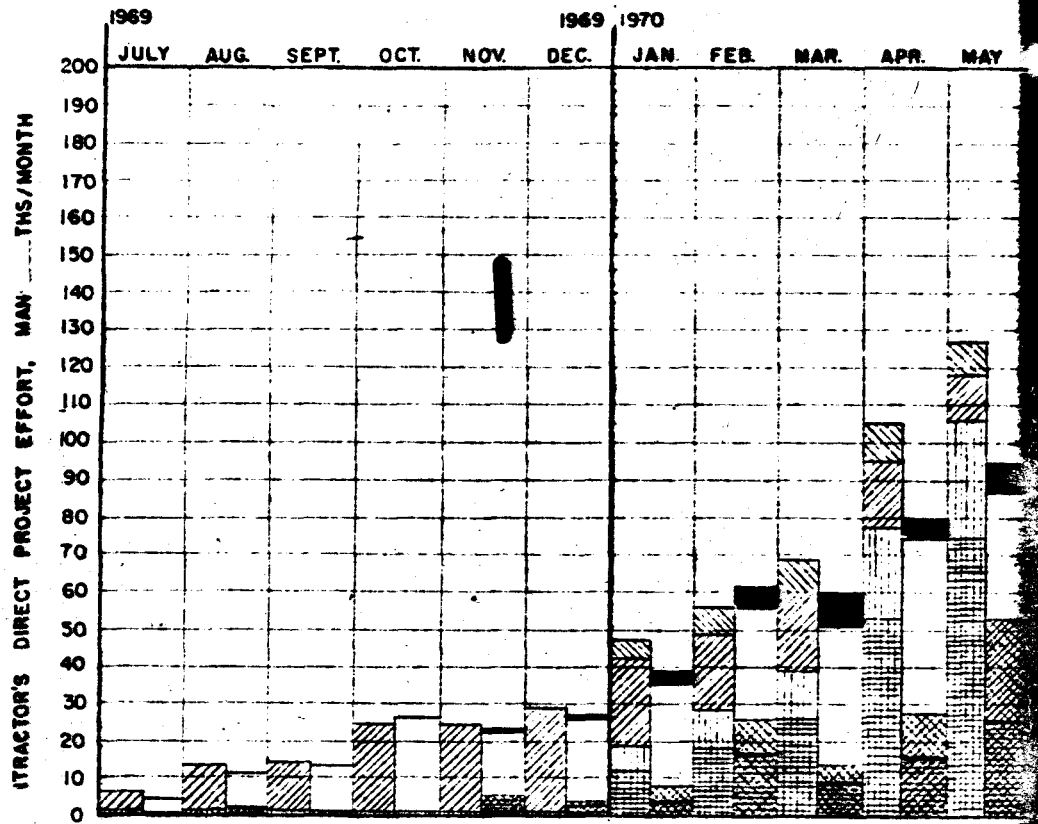
V. Pre-Gasification Beneficiation (Clarkson)

The month of October was spent completing the conversion of sodium removal experiments from stirred batch systems to column studies. Bulk coal samples from the gasification plant, which have passed the primary crusher, will be obtained next week and work will begin on sodium removal from unsized coal fractions by column exchange.

VI. Waste Monitoring (Oliver)

The adaptor for the vent stack monitor has been designed and a letter was transmitted to CONSOL (October 18, 1971) including a proposed division of effort to get the adaptor fabricated. We are waiting for a 10.5-inch length of 10-inch pipe, to be obtained by Stearns Roger, which we will machine as outlined in the letter. For particle monitoring, the optical transmitter has been completed and is being tested. Fabrication

of the receiver is in progress. For vent stack monitoring, completion and installation of the adaptor will probably be the limiting factor as regards how soon we can start monitoring. For continuous waste water monitoring, the dissolved oxygen analyzer has been received. The recorder has not yet arrived. A small steel shed has been ordered and will be located adjacent to the waste water pond and used to house the continuous monitoring instruments (pH and dissolved oxygen) and the recorder.



MONTHLY EXPENDITURES *

PREDICTED	0	30.0 M	41.0 M	50.0 M	98.0 M	106.9 M	112.0 M	273.0 M	299.3 M	445.6 M	623.7 M
ACTUAL	6.2	25.0	32.8	42.6	39.7	126.2	110.5	76.7	192.9	209.2	233.7

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
PREDICTED	0	30.0 M	71.0 M	121.0 M	219.0 M	325.9 M	437.9 M	710.9 M	1010.2 M	1455.8 M	2079.5 M
ACTUAL	6.2	31.2	64.0	106.6	146.3	272.5	383.0	459.7	562.6	771.8	1005.5

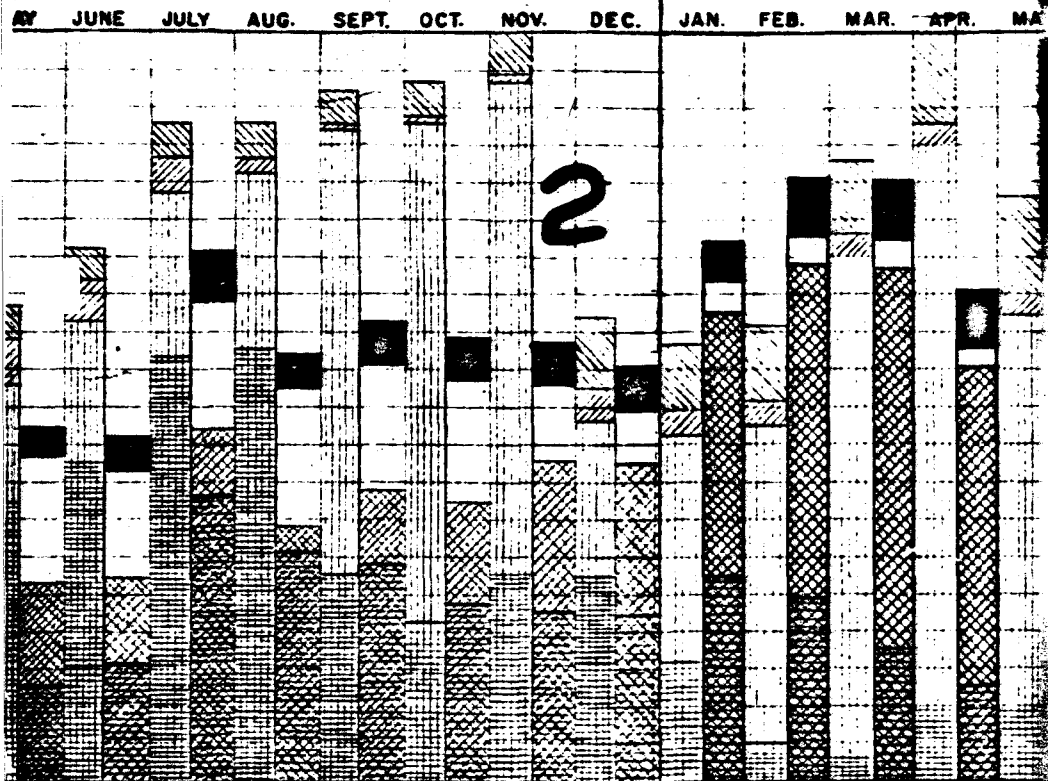
CUMULATIVE EXPENDITURES *

* EXPENDITURES INCLUDE ALL COSTS & FEES

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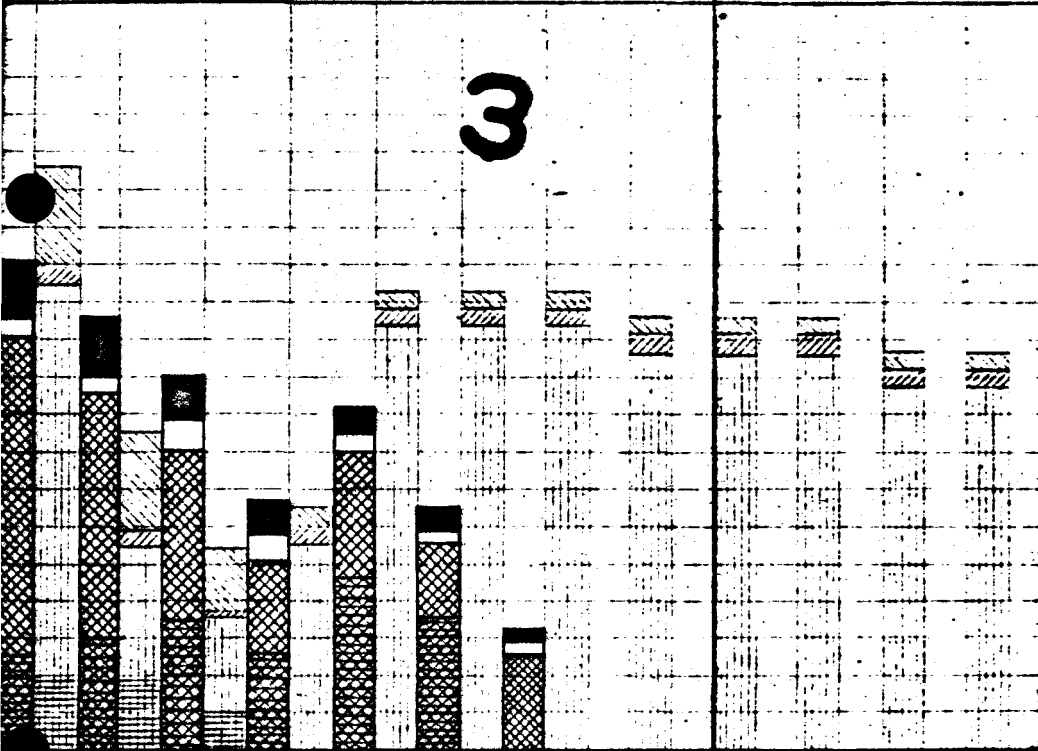
	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	
SE	191.1 M	802.0 M	891.1 M	712.9 M	891.1 M	891.1 M	758.2 M	759.5 M	777.0 M	702.4 M	534.9 M	417.1 M	
RE	567.1	564.6	725.2	794.2	728.9	422.9	779.5	552.1	690.6	757.7	496.7	297.5	
NET	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	
	19.5 M	2970.6 M	3772.6 M	4663.7 M	5376.6 M	6267.7 M	7158.8 M	5566.6 M	5928.8 M	6863.1 M	7545.5 M	8100.4 M	8538.1 M
RES	1372.6	1937.2	2662.4	3456.6	4185.5	4608.4	5397.3	5939.4	6630.0	7387.7	7884.4	8171.9	
	OPERATIONS COST INCLUDED IN							CUMULATIVE		151.0	163.0	18	
	CONSTRUCTION COST INCLUDED IN							CUMULATIVE		1111.9	1111.4	13	
	NET FUNDING SALES TAX RESERVE NET INCLUDED IN							CUMULATIVE			152.2	16	

MONTHLY PROGRESS CHART ()

CONTRACT NO. 14-01-0001-415 (3)

1971 1972

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.



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	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
M	437.7M	441.8M	285.0M	220.8M	318.1M	218.0M	219.1M	211.9M	211.5M	211.5M	185.1M	184.5M
T	292.0	308.1	221.6	299.6	440.1	409.4						
R.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
M	8538.1M	8979.9M	9264.9M	9485.7M	9703.8M	9921.8M	10140.9M	10352.8M	10564.9M	10775.8M	10990.9M	11145.4M
A.	8176.4	8484.5	8706.1	9005.7	9445.8	9855.2						
O	189.7	246.4	334.8	467.5	611.7	802.8						
E	1986.7	2188.1	2371.3	2538.2	2834.1	3252.4						
E	155.9	157.4	158.7	159.4	159.5	161.8						

API

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API

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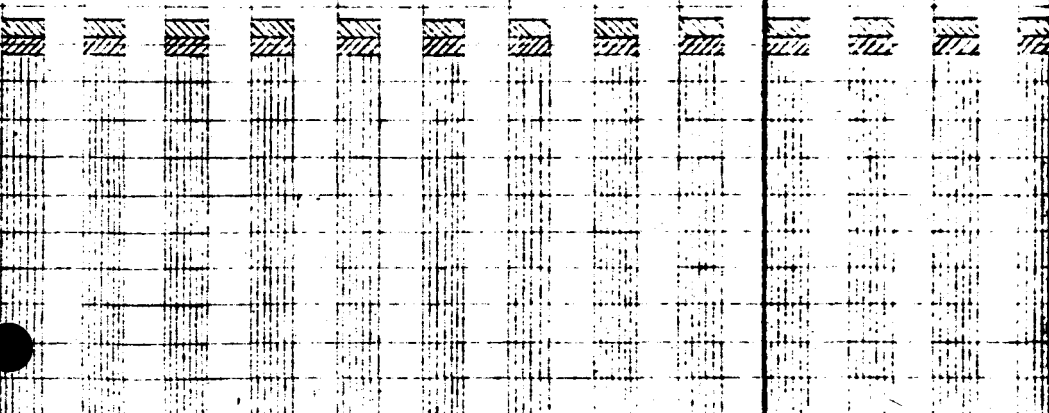
(CONSTRUCTION & OPERATION)

(REVISED 12/31/70)

1972, 1973

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

A



184.5M 204.7M 203.9M 202.8M 202.8M 202.9M 201.8M 201.5M 201.4M 183.2M 182.9M 182.1M 180.0M

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

11,145.4M 11,930.1M 11,534.0M 11,756.8M 11,959.6M 12,162.5M 12,364.3M 12,565.8M 12,767.2M 12,950.4M 13,133.3M 13,315.4M 13,497.5M

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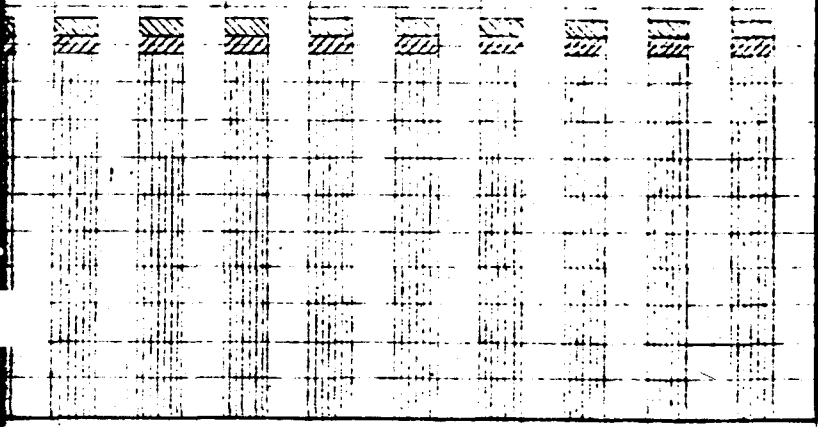
1973
AR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

5

SUPERVISING
PROFESSIONAL
TECHNICIAN S/R
TECHNICIAN S/C

☐ INCLUDES SUPERVISOR
○ INCLUDES CLIENT

CONSTRUCTION — STE
OPERATIONS — STE



1M	180.5M	177.5M	170.0M	161.2M	140.8M	130.1M	130.0M	30.0M	24.9M
AR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
5.4M	13,495.9M	13,673.4M	13,843.4M	14,004.2M	14,154.4M	14,275.5M	14,405.5M	14,535.5M	14,560.4M

APPROXIMATE TOTAL CONSTRUCTION ≈ 8,800,000

MONTH
OFFICE
U.S. DEPARTMENT OF
CONSTRUCTION
RESEARCH

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DATE: *October, 1971*

1973

PT. OCT. NOV. DEC.

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN S-R		
TECHNICIAN S/C		

⊕ INCLUDES SUPERVISORY EXEMPT TECHNICIANS
 ⊙ INCLUDES CLERICAL

CONSTRUCTION — STEARNS-ROGER JOB B-37000
 OPERATIONS — STEARNS-ROGER JOB B-37400

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
 U.S. DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA.

CONTRACT NO. 14-01-0001-415 (3)

(REVISED 12/31/70)

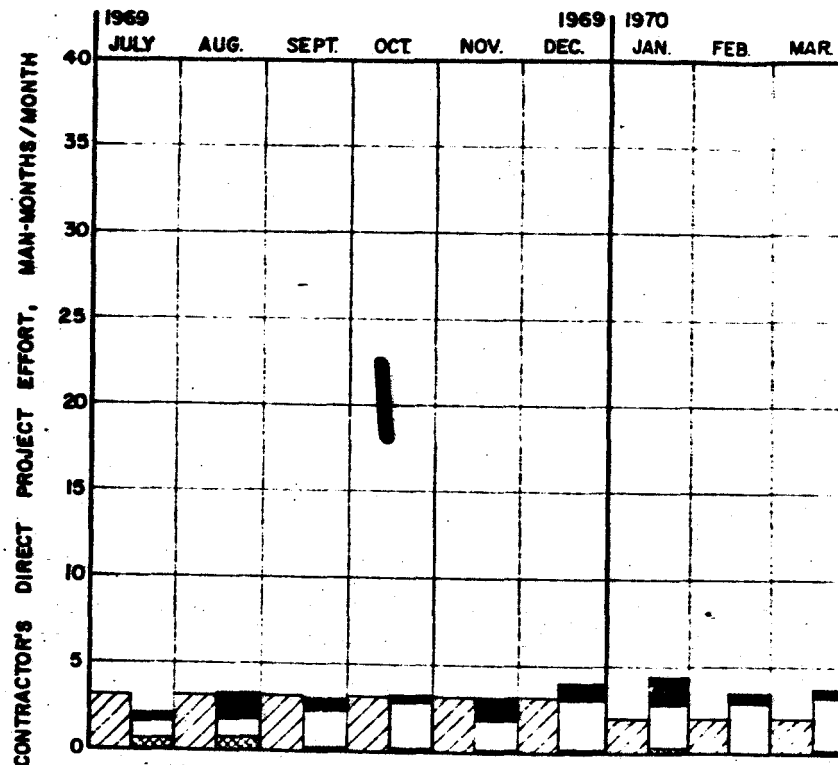
30.1M 130.0M 130.0M 24.9M

EPT. OCT. NOV. DEC.

35.5M 144.05M 14.535M 14.560.4M

CONSTRUCTION ≈ 8,800,000

OPERATIONS ≈ 5,760,400
 14,560,400



MONTHLY EXPENDITURES*

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.
PREDICTED	16,215	14,685	14,965	13,155	14,385	17,065	15,595	15,595	12,655
ACTUAL	11,745	34,734	9,609	11,825	10,130	15,205	14,378	14,027	15,019

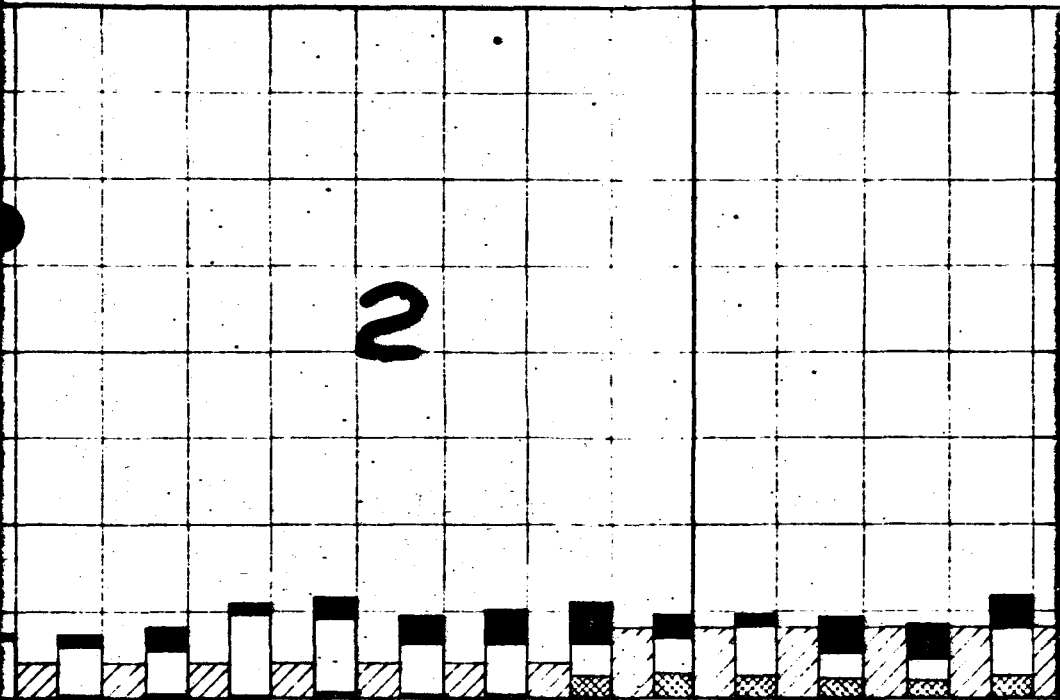
CUMULATIVE EXPENDITURES*

* Expenditures Include All Costs & Fees By Consol And S. Data

MON

MAY JUNE JULY AUG. SEPT. OCT. NOV. 1970 DEC. 1971 JAN. FEB. MAR. APR. M

2



13,815	12,655	13,315	12,835	12,505	12,305	12,505	20,155	20,135	23,295	22,295	21,145
17,342	19,319	20,054	13,995	25,003	21,298	9,584	23,091	16,475	16,663	12,820	22,198
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
160,995	173,650	186,965	199,800	212,305	224,810	237,315	257,470	277,905	300,900	323,195	344,348
207,242	226,581	246,615	260,570	285,573	306,889	316,453	339,544	356,019	372,882	385,502	407,699

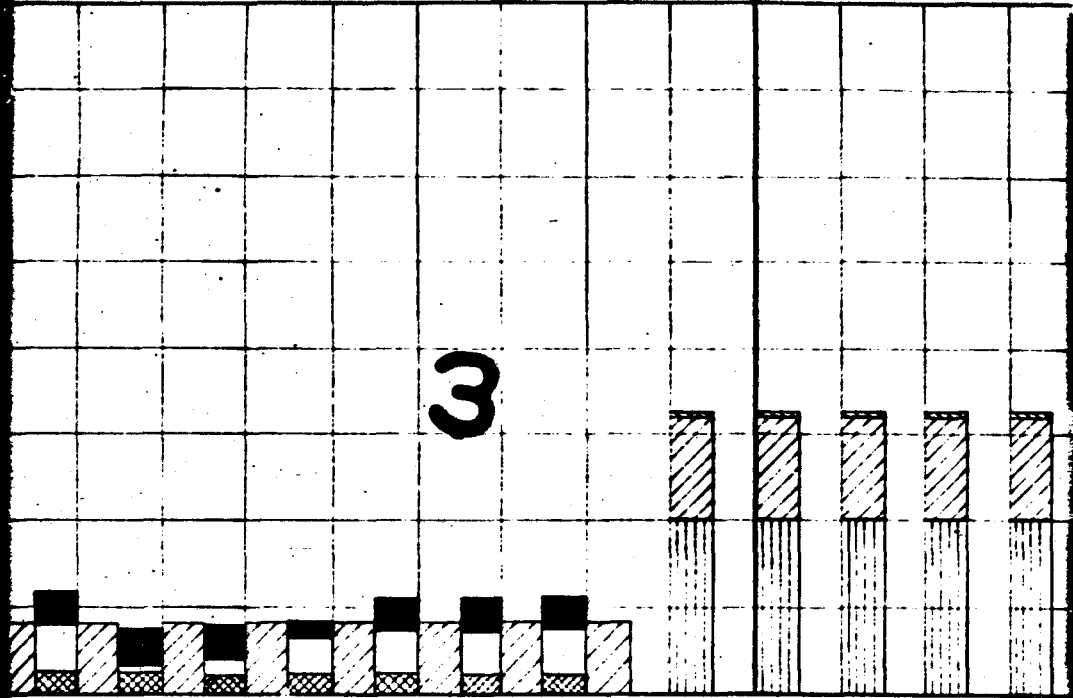
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MONTHLY PROGRESS CHART (SUPERVISOR)

CONTRACT No. 14-01-0001-415 (3)

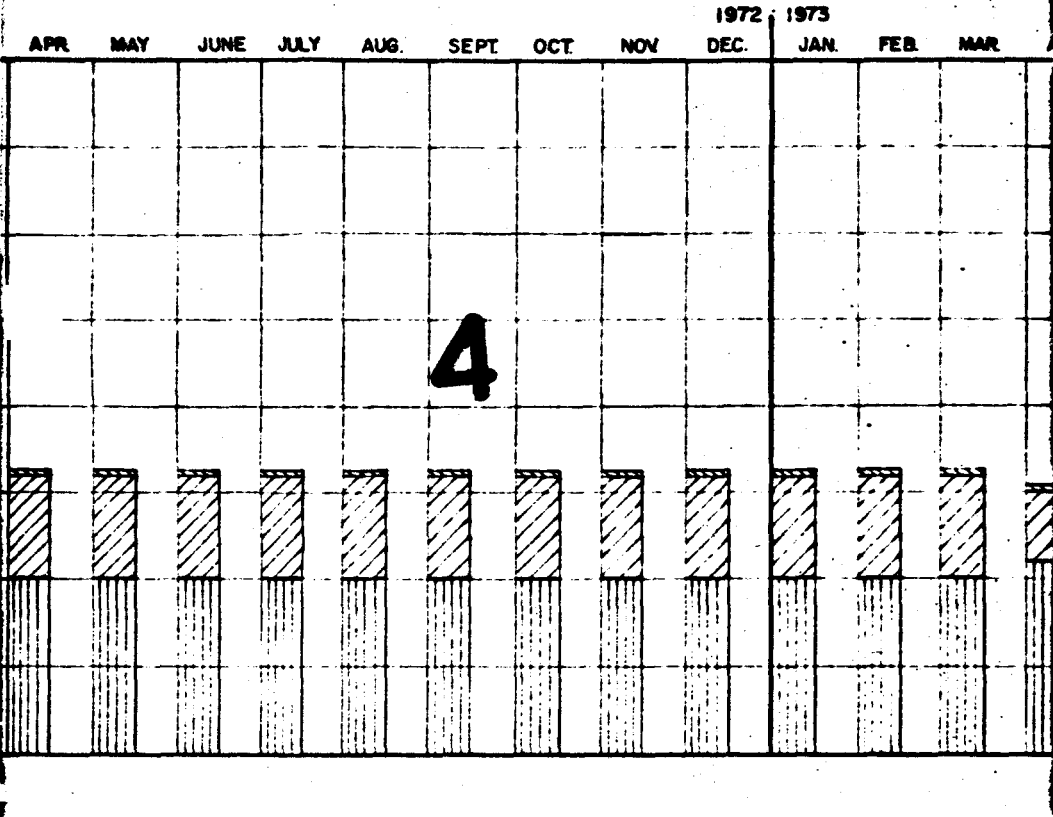
APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. 1971 | 1972 JAN. FEB. MAR. APR.



1,145	18,705	15,955	14,875	14,875	14,875	14,875	14,875	14,875	39,475	39,475	39,475	39,475	39,475
22,196	12,508	15,831	16,923	24,919	97,703	29,700							
APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	
34,340	363,045	379,000	393,875	408,750	423,625	438,500	453,375	468,250	532,325	571,800	611,275	650,750	
37,690	420,206	436,037	452,960	477,879	573,382	605,282							

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STATE OF LAB WORK



	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475
APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
680,730	790,225	729,700	769,175	808,650	848,125	887,600	927,075	966,550	1,006,025	1,045,500	1,084,975	1,124,450	1,163,925	1,203,400

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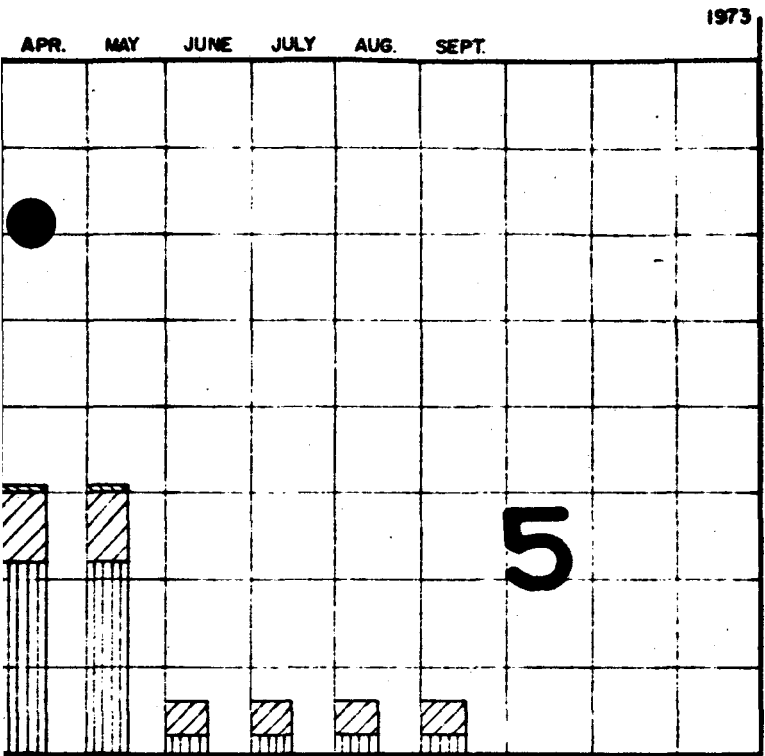
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36,075	36,075	11,475	11,475	11,475	41,120			
APR.	MAY	JUNE	JULY	AUG.	SEPT.			
1,121,050	1,157,125	1,168,600	1,180,075	1,191,550	1,232,670			

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(New 415 Chart)

DATE: October 1971

1973

	PREDICTED	ACTUAL
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PROFESSIONAL		
TECHNICIAN		

⊗ Includes Supervisory Exempt Technicians.
 ⊕ Includes Clerical.

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
RESEARCH DIVISION LIBRARY, PA.

CONTRACT No. 14-01-0001-415 (3)

CCDC-MPR--90

PROGRESS REPORT NO. 90
OCR CONTRACT NO. 14-01-0001-415(3)
CONSOL LIGNITE GASIFICATION PROCESS DEVELOPMENT

November 1 to 31, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction and Operation

Insulation of the plant is completed.

Training of personnel was essentially completed and breakin operations continued.

Test runs in the lignite dryer and preheater were not completed in November as scheduled. Mechanical problems and inclement weather were the primary reasons for delay.

These tests are scheduled for December.

Financial

Estimated monthly expenditures are \$18,600 by Consol (and the South Dakota School of Mines) and \$238,000 by Stearns. Cumulative expense to date is \$12,596,213.

L.S.C.

B. Technical Results and Program

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction and Operation

1. Supporting Process and Economic Analysis (Project No. 533.00)

In response to an OCR request, the earlier (Catalytic Construction Co.) design for gas purification and methanation facilities at Rapid City was resurrected and reestimated. A projected time and cost of installation of 20 months and \$900,000 respectively were submitted.

It is recognized that new methanation technology has been developed since the design was evolved (1968) and some process design effort should be spent, prior to proceeding with detailed design, to ensure that an up-to-date process basis is incorporated in the projected facilities.

2. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 536.00)

Work has begun on a formal report summarizing the engineering and construction of the pilot plant.

3. Stearns-Roger Construction Subcontract (Project No. 700.00)

The Stearns Progress Report is attached.

4. Library Assistance on Pilot Plant Operations (Project No. 537.00)

Assay studies were carried out to determine the characteristics of products evolved from lignite at 500°F. Some noxious materials were evolved, indicating that the pilot plant heater offgas and scrubber water may require secondary treatment.

C. A. Schulz attended a meeting of a Task Force for Materials Data for Coal Gasification, Metals Property Council (ASME, et al).

Progress review meetings were held in Denver and Rapid City on November 16 and 17. E. H. Reichl (Denver only), J. A. Phinney and C. A. Schulz attended.

5. Consol Guidance on Operations (Project No. 702.00)

The Consol (Rapid City) progress report is attached.

6. Stearns-Roger Operating Subcontract (Project No. 701.00)

The progress report is attached.

The reported "puff" in the lignite grinding and drying system on November 10 (pg 4 of report) was shown to have resulted from leakage of air into the mill as a result of inadvertent failure to close a valve connected to the start-up stack. This has been remedied.

Progress during November was disappointing in that test runs on the lignite drying system and lignite preheating system were not carried out as planned. Mechanical problems, together with inclement weather and incomplete insulation are the primary causes of delay.

Test runs on these items are scheduled for December.

7. School of Mines Subcontract (Project No. 703.00)

The progress report is attached.

C. Subject Inventions

None.

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through October, 1971</u>		
Through June, 1969		
Consol	\$ 1,878,256	\$ 1,878,256
Stearns-Roger	606,157 ⁽¹⁾	438,500
	<u>9,855,200</u>	<u>9,921,800</u>
	\$12,339,613	\$12,238,556
<u>Expended in Period (estimate)</u>		
Consol	18,600 ⁽¹⁾	14,875
Stearns-Roger	238,000	219,100
Total, November, 1971	<u>\$ 256,600</u>	<u>\$ 233,975</u>
Cumulative through November, 1971	\$12,596,213	\$12,472,531

⁽¹⁾ includes payments to South Dakota School of Mines

Att.

Project 702
CC w/ E.S.D. Check List:
E. K. Ellington
C. A. Scholz

CONSOLIDATION COAL COMPANY

RESEARCH DIVISION
LIBRARY, PENNSYLVANIA 15129

INTER-OFFICE CORRESPONDENCE

To : John A. Phinney / Date : December 8, 1971
From : Uwe D. Marwig and Carl E. Fink As (Office): Rapid City
Subject: Monthly Report No. 15 - Project 702

Consol activities during the month of November centered around the materials handling section (Area 100) and the utilities section (Area 500) of the plant.

Area 100

Upon request, operating assistance was given on tuning the Williams system in preparation for the scheduled grinding and drying run. By operating the system in the absence of lignite, several mechanical problems were discovered and repaired. By month's end system had been tuned and the operating personnel had gained experience in starting up and shutting down the system.

In preparation for the operation of the lignite preheater, a program specifying the objectives, prerequisites, procedure and data requirements of the upcoming preheater run was written and transmitted to Stearns-Roger. The attached list was prepared to enable the interlock system to be checked out without the assistance of an electrical engineer. Using this list, the operators discovered the following items:

1. FCV-1009 did not change positions
2. Inert gas valve, XCV-1009, was not connected

Similar check lists can be used to test the entire interlock system of the plant.

Area 500

The operating status of the instrument air dryer, the steam boiler, and the high pressure inert gas dryer were reviewed. The conclusions were as follows:

Instrument Air Dryer: The dryer is functioning properly. It appears that the conclusion that the system would be blocked in event of electrical failure was incorrect.

John A. Phinney
Page 2
December 2, 1971
Monthly Report No. 15 - Project 702

Steam Boiler: It was discovered that the Copes regulator which controls the boiler feed water flow rate and FC-5024 which allows steam to vent when the boiler is operating at low fire were never activated. At Consol's suggestion, these items have been corrected. The feed water control now works properly over the entire range of boiler capacity and the base steam requirement (unit heaters, deareator, and steam tracing) was measured at 5,000 lb./hr.

High Pressure Inert Gas Dryer: The inert gas dryer apparently had never operated due to the fact that the vendor's piping was incorrect. The entire inert gas system was shut down and the dryer piping revamped. The dryer should operate properly when the inert gas system is reactivated.

General

The parts to two models which were used to study acceptor circulation and acceptor showering in a fluidized bed were shipped from Library. These models will be useful to familiarize the Stearns-Roger operating people with these phenomena. Plans for assembling these models have been completed and assembly will begin in December.

The Stearns-Roger Operations Report No. 21 is attached.

C. E. Fink
C. E. Fink

U. D. Marwig
U. D. Marwig

CEF-UDM:imp

Attachments: E. S. D. Check List (1) - JAP only
Stearns-Roger Operations Report No. 21 (2)

CONSOLIDATION COAL COMPANY PROJECT
CSG PILEUP PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 701
S-R Job No. R-37400
December 6, 1971

OPERATIONS REPORT #21

SUMMARY

Most of the effort during the month was directed at (1) training sessions by the operators on shift, (2) study sessions by the shift engineers and technical personnel to define an approach to the unresolved problems in the preheater system and in the 200 Area and (3) changes previously defined as necessary to operation of the preheater system and Area 200. It is obvious that we can get to the point of "making gas" most quickly, if we limit our efforts to two vessel operation at 170 psi with lignite.

Much time has been spent in trying to prevent freezing in the cooling water system and the steam system. About thirty isolation valves were installed in the cooling water system, so that some systems could be shut off and drained. This will allow maintenance to be performed during freezing weather.

The construction insulators are working in the plant. Some of the steam lines are not covered and some lines that have tracing have not all been covered. This presents a real problem to keep these lines from freezing during cold weather.

At the present time we are having trouble getting rid of cooling water from any line and condensation from open steam hoses. Open steam hoses are necessary to keep the drains open and prevent freezing of lines not insulated. Another problem this causes is that the elevator becomes inoperable due to water running down the elevator shaft.

At the end of the month the lignite crushing and grinding system was started briefly (minute at a time) to test the shift organization capability to run the system. Many electrical problems were encountered and the feeder to the mill could not permit more than a few minutes operation. A continuous lubricator was installed by Williams and it appears that, with some revisions, it will permit continuous operation. Continuous operation will be needed to support the preheater run.

Most revisions to the preheater system were nearing completion at the end of the month. A test of the system will be carried out during December unless we encounter major problems. If we encounter major problems, the test will be deferred until after the holidays.

GENERAL

Interviewed and hired a technical engineer and a part-time draftsman. The draftsman reported to work in November. The technical engineer is to report to work early in December. An electrical engineer was hired. He reported December 1.

Maintenance crafts now total 32 men.

A group traveled to West Virginia to visit the gasification plant for possible safety measures and coal entry procedures.

Continued safety program per Federal Register.

Instructed maintenance personnel on safety procedures for 500 Area.

Meetings were held with the local union representatives and labor relations on status of the President's Agreement; subsequently, we hired all electricians on call from the local union.

MONTHLY ACCOMPLISHMENTS - TECHNICAL DEPARTMENT

1. Installed first "Denver engineered" change order. This change order was the addition of about thirty isolation valves in the cooling tower headers so that various items of equipment could be taken off stream for maintenance without shutting down the entire cooling water system.
2. Outlined mechanical testing program. Purchased ultrasonic sound detectors, optical pyrometers and surface pyrometers. The above have been received.
3. Moved 9300 gallon liquid nitrogen tank to permanent location. Connected to low pressure inert gas system. Pumps and high pressure vaporizers have not arrived.
4. Installed evacuation alarm in Area 100. Material on site for similar installation in Areas 200, 300 and 500.
5. Ordered aluminum siding and structural steel to enclose west and north sides of structure. This item is behind schedule as we needed the windbreak installed by December 15 to make maintenance and operations feasible. Installation will probably slip till February first.
6. Completed recommendations as to requirements for blinding to permit two vessel operation. This engineering job was completed on schedule.
7. Work necessary to operate Lignite Preheater, D-101, was essentially completed during November. They are:
 - A.) Installed "gooseneck" in flue gas line to D-101 from B-102, Preheater Furnace.
 - B.) Partially installed drop line from downstream of D-101 to Lignite Trailer.
 - C.) Installed sample points on gas line off D-101.
 - D.) Completed installation of start-up steam line to B-102. Preheater Furnace insulation not complete for the changes.
 - E.) Installed PSV on inert gas purge line to D-101 instruments.
 - F.) Partially installed crossover line to item c) purge line utilizing low pressure inert gas.
8. Prepared draft of Technical write-up for Lignite Preheater run. Included information needed, samples required and aims of run.
9. Assisting South Dakota School of Mines to install pollution monitoring system on vent gas stack off D-101, Lignite Preheater.

December 6, 1971

10. Issued Technical Report on the Dolomite Grinding run completed in November. The report is attached.

11. Installed safety escape ladders in Area 100.

12. Investigated operating problems on High Pressure Inert Gas system. Recommended changes to system for better operability.

13. Mechanical engineering as required on various items of equipment with problems. a.) cooling water pump, b.) main air compressor and c.) emergency air compressor.

14. Modified rupture discs on Williams system. Installed pre-tested discs on 19 inch lines and fabricating a supported disc on 32 inch opening on the lignite cyclone.

15. All laboratory equipment is operable except the carbon-hydrogen furnace, but more experience will be necessary to obtain good speed and accuracy. The right combustion tube has just been obtained for the furnace.

16. Lignite and dolomite have been analyzed during the grinding tests for size and distribution and moisture.

The following plant gases are being analyzed now:

GAS:	ANALYSIS FOR:
Flue Gas	Oxygen
Lignite Drying	Oxygen
Lignite Silo Blanket	CO, CO ₂ , O ₂
100 Area	CO, CO ₂ , O ₂
Inst. Air	Dew Point
Dry Purge "C"	Dew Point

Perisimeter has been operated successfully; some minor modifications will be made to reduce the time required to make the analysis.

* Have found that high CO₂ affects oxygen Fyrite reading and the readings made will be more consistent in the future.

MONTHLY ACCOMPLISHMENTS - OPERATIONS

"A" and "B" Operators were put on shift Monday, November 8. Evening and midnight "A" Operators worked as chief operators (operator in charge of the plant during his shift), Monday through Friday and on all weekend shifts starting Monday, November 1.

The shift engineers started working regular office daylight hours on Monday, November 15.

The Utilities area was operated through out the month. Combustion tests were run on the boiler. Some of the boiler controls do not operate satisfactorily. The H.P. Inert Gas dryers are not working properly. Too much oil and water are getting to the dryers. The holding pond was pumped (mostly boiler blowdowns and condensate) to the city water treatment plant with apparently no detrimental effects. The motor on the east cooling water pump burned out on November 3rd. It has been repaired. A temporary telephone was installed in the Utility Area for receiving calls outside of regular daylight working hours.

December 6, 1971

All six recycle compressors were run with suction and discharge valves removed.

Additional runs were made on the dolomite crushing equipment to establish normal operating procedures. Dolomite (Dymochite) was received into the plant and unloaded to the silos.

Several hot runs of the lignite grinding and drying system were made in preparation for grinding. The hot run on November 10 resulted in a "puff" in the Roller Mill. On November 15-20 an automatic lubricator was installed in the roller mill. Bill Blackburn was in the plant from November 19 to November 24. A grinding run was attempted on November 22-24. A leaking slide gate under the mill held up the run. Electrical problems with the Rotary Feeder (L-109-13) to the mill further delayed grinding. It was established that the motor on L-109-13 feeder was too small. Grinding was deferred pending installation of new motor. Another grinding run is scheduled for Thursday, December 2, with Bob Williams and Bill Blackburn in attendance. The lignite trailer and fines conveyor have been arranged to move lignite from the line from the cyclone to a pit that is west of the 100 Area building.

The refractory in the preheater furnace, B-102, was cured according to manufacturer's instructions. Subsequent tests revealed electrical and instrument malfunctions that have been corrected, such as:

- The reset button on B-102 control panel.
- The ignitor on B-102.
- The inert gas purge (A-3) to D-101.
- High level switch, ISB-1017, on L-114.

The prerequisites for filling D-101 as set forth in the November 8 letter from Mr. Karsig and Mr. Fink are being carried out. Some of these are:

- Dryout and test run furnace B-102.
- Check out interlocks and controls.
- Operate lignite fines scrubber L-114 without gas.

Pressure tests of the 200 Area have not been carried out as scheduled.

Calibration of instruments in the 200 Area is continuing.

Fire fighting plans were made for the 100 Area during lignite grinding tests.

The safe work permit procedure was revised by delegating the responsibility of the permits to the "A" Operator on the daylight shift.

Work on operating manuals is continuing. Vic Brant conducted classes for the shift engineers during the week of November 15 concerning the operation of two vessels at 150 psig. Safety of the 200 Area was stressed.

The liquid CO₂ tank was filled and put in operation on November 8. The propane storage tank was filled on November 19. The nitrogen vessel has been moved to its permanent location. Nitrogen is being used in the Inert Gas System in the 100 Area. The liquid CO₂ tank line is also tied into the 18.5 psig Inert Gas System.

The emergency generator and emergency fire water pump have been run.

Hot water has been circulated through the HPC system.

Training of operators continues on shift. Check lists for equipment startup are being prepared by them. Practice runs were made on the lignite grinding system and the pre-heater furnace and preheater system. Preparations for pressuring the 200 Area equipment were also started.

MONTHLY ACCOMPLISHMENTS - MAINTENANCE

1. Completed dunnage from B-101 to trailer.
2. Performed work on air piping to F-224 holding tank.
3. Install line for pre-heat gas from B-102.
4. Completed greasing change at railroad unloading bin.
5. Excavated trench for coal burial after grinding run.
6. Revised rupture discs.
7. Set R₁ tank on permanent foundation and piped.
8. Installed lube system for Roller Mill.
9. Installed evacuation alarm for 100 Area.
10. Completed concrete slabs, sidewalks and grout.
11. Completed cooling water isolation valves.
12. Installed orifice flanges in piping jacket cooling water system.
13. Completed escape ladders and platforms 100 Area.
14. Released purchase orders for Areas 100 and 500 spare parts.

MONTHLY ACCOMPLISHMENTS - ELECTRICAL & INSTRUMENTS

1. Calibrated part of panel instruments in 200 Area panel.
2. Calibrated differential pressure transmitters in 100 Area.
3. Calibrated instruments on B-102.
4. Adjusted air to gas ratio controls on B-501.
5. Calibrated instruments on B-501.
6. Calibrated instruments on propane system.
7. Installed a temporary pressure recorder for steam header pressure.
8. Calibrated instruments on HPC system.
9. Calibrated instruments on Inert Gas to Flare.
10. Calibrated instruments associated with B-101 and L-114.
11. Changed range spring on FKG-3014 to 200" W.C.
12. Had charges to AAT-1000 sample system.
13. Performed boiler (B-501) control tests.
14. Repaired broken control rod on XCV-1005.
15. Calibrated instruments on 1st floor 200 Area.
16. Worked on instruments in Inert Gas System. Regulators are in bad shape, because of wet gas.
17. Changed tubing on Inert Gas Drier to provide proper actuation to controls.
18. Installed 110 V receptacles in maint. shop.
19. Finished "As-Built" drawings.
20. Changed out Honeywell flame scanner on L-109-B1.
21. Installed power to new CO₂ system.
22. Made various revisions in relay panel in main control room.
23. Installed new motor for J-502.
24. Installed key-tilt-pass switches in boiler control panel.
25. Installed power to XCV-1052 and XCV-1052A.
26. Motor on J-502B was burned out. Repaired.
27. Replaced bad micro switch in J-202 water temp. alarm.
28. Installed conduit and wire for telephone equipment in shift engineer's office in control room.
29. Installed thermal elements in roller mill plenum.
30. Replaced TE-1015 in B-102 outlet with duplex TE.
31. Installed power to water treating sampling cabinet in Utility area.
32. Installed lights on new CO₂ system.
33. Installed light at chemical sump.
34. Hooked up alarm for 100 Area control room pressurizing.
35. Relocated delicate bucket elevator and vibrator switches to ground level.
36. Adjusted lab hood blowers for average draw.
37. Installed power supply to FSL-5013 on 4th floor.
38. Installed evacuation alarm in 100 Area.
39. Installed power to solenoid on air to vibrator on F-103.
40. Installed power for auto-lube on Roller Mill.
41. Started emergency power generator.
42. Started emergency fire pump. Battery charger had to be repaired.
43. Installed conduit to new guard house and electric gate.
44. Installed 110 V outlets in stone pool.
45. Installed power and controls to L-109-14A and associated equipment.
46. Started installation for welding receptacles.

December 6, 1971

PLANS FOR DECEMBER

1. Continuing Projects:
 - a. Total shift coverage with "A" Operator in charge of shift.
 - b. Operate Utilities Area.
 - c. Establish fire fighting and disaster plans.
 - d. Work on operating manuals.
 - e. Training.
2. Grind lignite to a point of proficiency.
3. Test preheater system, if possible.
4. Pressure 200 Area equipment with air.
5. Revise tag-out procedure and work permit procedure.
6. Gather information from scheduled lignite grinding run. Write up above run with information obtained.
7. Obtain information from scheduled lignite preheater run. Determine operability and obtain information as to pollution possibilities, if a sustained run is possible.
8. Continue work on engineering change orders.
9. Continue work on detailed mechanical testing program. Coordinate with operations and plan step-by-step start up and testing of Area 200.
10. Continue engineering and purchasing of material for sample systems.
11. Prepare write-up for next dolomite grinding run. This run will utilize tysochtee dolomite.
12. Initiate a program to research the explosive properties of lignite.
13. Continue to work with computer programs.
14. Prepare Area 200 for operating.
15. Complete purchasing of spare parts.
16. Begin installation of siding on structure.
17. Complete instructions on safety procedures for Areas 200 and 300 for maintenance personnel.
18. Begin training of maintenance personnel for joint maintenance operations next spring.

-8-

STAFFING

	<u>Present Payroll</u>	<u>To Be Hired Dec. or Jan.</u>
Management	2	0
Accounting	4	2
Clerical	4	0
Janitorial	2	1
Safety	1	0
Pollution	0	1
<u>TECHNICAL DEPT.</u>		
Laboratory	5	1
Engineering	10	2
<u>MAINTENANCE</u>		
Supv.	5	0
Crafts	28	0
Warehouse & Purchasing	4	0
<u>OPERATIONS</u>		
Supv.	1	0
Shift Engineer	3	1
Operators	23	3
TOTAL...	92	9

COST

Amount paid out as of November 30, 1971.....Approx.....	\$931,017.18
Purchase Orders not paid & purchases placed.....	157,597.00
Actually spent - November, 1971.....	179,574.00

Yours very truly,

STEARNS-ROGIER CORPORATION


William E. Powell
Plant ManagerWEP:ska
Encl.cc: HLL, FEJ, NIV, DSI, DDD, WTB, NOK, JGS, UINI,
Carl Schulz, C. M. Stone, D. Dusen

WET

TO: D. R. Mosher

November 19, 1971.

FROM: T. C. Towers

SUBJECT: Run II - Dolomite Grinding Test

I. OBJECTIVES

- A. Determine proper screen set for the desired ground dolomite particle sizes.
- B. Determine what changes, if any, may be required in hammer mill internals.
- C. Obtain feed rate limitations with the selected screen sizes.
- D. Exposure of equipment limitations and/or problems.

II. RESULTS

A. TABLE OF SCREEN SIZES AND THROUGH PUT

Screen Sizes	9 X 32	14 X 32	9 X 20	9 X 20 (2)
Product - lbs.	4035	4340	3515 (1)	2505
Oversize - lbs.	1370	2750	2070	---
(3) Fines - lbs.	5900	5000	6160	3040
Total Feed - lbs.	11305	12090	11745	5545
(3) Feed Rate lb/hr.	5652.5	6045	5872.5	5545

- (1) Feed Frozen in Vibrating Feeder During 1st Hour.
- (2) Oversize Recycled During Second Run.
- (3) Estimated Feed Rate after Unloading Fines Hopper (F-153).

B. TABLE OF MEAN (1) PARTICLE SIZES

Screens Used	9 X 32	14 X 32 (4)	9 X 20	9 X 20
Product Dolomite #1	.0370"	.0195"	.0355"	.0469"
#2	.0366"		.0474"	
(2) Product Dolomite #1	.0384"	.0253"	.0430"	.0471"
#2	.0394"		.0492"	

- 2 -

Feed (Raw) Dolomite #1	.468"	.651"	.380"	.666"
#2	.529"		.736"	
Oversize Dolomite #1	.111"	.0882"	.125"	Recycled
#2	.114"		.107"	
Fines #1	.00370"	No. Spl. (3)	No Spl. (3)	.00542
#2	.00402"			

- (1) Mean particle size diameter calculated from the formula $\bar{D}_{Ave} = \frac{\sum d_i^3 x_i}{\sum d_i^2 x_i}$ page 24

Studies on Mechanics of Fluo-Solids Systems

Period: July 1964 to June 1965

R & D Report No. 16, Interim Report No. 3, Book 1

by G. P. Curran and Everett Gorin

- (2) Product dolomite recalculated removing 100 mesh and smaller to show effective mean particle size after one pass through regenerator removing fines.
- (3) Not enough fines to sample.
- (4) Samples were combined for analysis.

C. Moisture Content

- 1. Samples from the fines hopper when finally emptied ran 1.1%, 1.1%, 1.9%, and 1.8% H₂O on the samples listed sequentially in the Appendix from the fines hopper (F-153).

III. OBSERVATIONS

A. Screen Results

- 1. Product mean particle size results indicate further grinding runs with 9 X 20 screen sizes should be conducted.
- 2. Oversize dolomite will be recycled to the screw conveyor (L-152) rather than removed from the system.
- 3. Full screen analysis reported in the Appendix indicates fines adhesion to the product.
- 4. Wide variance of the feed (raw) particle size is reported both in run to run and within the run sequence.
- 5. Fines screen results for the separate test runs are invalid

because of the hold up which occurred in the fines hopper (F-153).

B. Equipment Operation

1. The motor for the screw conveyor (L-152) was burned out and replaced with a larger motor.
2. Screw conveyor (L-152) feeding the hammer mill (L-153) was somewhat erratic in operation kicking out several times after replacing motor.
3. Removing fines from storage hopper (F-153) is difficult. Bridging in the hopper caused most of the fines to remain in the hopper.
4. A reduced feed rate in the screw conveyor (L-152) was necessary to avoid overloading the conveyor.
5. Lubricant thickened in vibrating screener (L-155) during cold weather causing motor to overload.
6. Some raw feed froze on vibrating conveyor (L-151A) causing reduced feed rates to the screw conveyor (L-152) on screen sizes 9 X 20.
7. Movement of tote bins proved inconvenient as a cherry picker and driver are required to accomplish the switches. Also, flexible hose under fines hopper (F-153) allows little space for tote bin movement.

C. General

1. Some improved method of starting flow of fines hopper (F-153) is necessary when moisture content of fines causes adhesion of the particles.
2. The system should be fully cleared of dolomite before shutting down the system especially screw conveyor (V-151A) from the hammer mill (L-153) to the dolomite bucket elevator (V-151B).

J. G. Towers

T. G. Towers

TGT:acc

- cc: C. M. Stone
 W. E. Powell
 H. N. Vardaman
 H. L. Lawless
 E. R. Krebs
 Shift Engineers (3)
 Technical Engineers (8)

APPENDIX TABLE 1

Size	Feed		Overload		Fines	Product	Overload	Fines	14 X 32 SCREENS	
	1013	1015	1013	1015					Feed	Product
2-	0									
1 1/2"	1.5								0	
"	11.5								0.6	
3/4"	15.7								27.6	
1/4"	47.7								21.6	
4 Wash	0.8		8.2						37.5	
6	5.7	0	17.6			6.03	18.03		0.7	4.9
8	4.6	0.3	33.8		0.1	0.3	35.45	0.79	2.7	0.03
9	X	X	X		0.2	X	X	0.40	2.0	0.04
10	2.7	6.9	32.6		0.3	7.8	29.60	0.15	X	X
"	X	X	X		0.2	X	X	0.05	X	X
14	1.9	22.8	6.7		X	25.5	5.45	X	1.0	2.29
16	X	X	X		0.5	X	X	0.05	X	X
20	1.3	26.8	0.3		X	24.4	0.20	X	0.7	14.94
24	X	X	X		0.4	X	X	0.04	X	X
28	1.0	26.5	0.07		0.2		0.08	0.04	0.6	27.65
35	0.6	9.6	0.05		0.2		0.06	0.03	0.5	17.65
49	0.4	1.1	0.05		1.0		0.06	0.69	0.8	8.74

TABLE OF SCREEN SIZES
 DOLomite CRUSHING MILL 1

14 X 32 SCREENS
 Feed
 Com-Prod
 Overload
 Fines

TABLE OF SCREEN RESULTS

DOLOMITE GRINDING RUN I

SIZE	<u>9 X 20 SCREENS</u>			<u>9 X 20 SCREENS RECYCLED</u>			<u>OVERSIZE</u>				<u>FINES REMOVED FROM HOPPER</u>			
	<u>RAW FEED</u>	<u>PRODUCT</u>	<u>OVERSIZE</u>	<u>RAW FEED</u>	<u>PRODUCT</u>	<u>OVERSIZE</u>	<u>RAW FEED</u>	<u>PRODUCT</u>	<u>FINES</u>	<u>FINES</u>	<u>FINES</u>	<u>FINES</u>	<u>FINES</u>	<u>FINES</u>
	1205	1205	1205	1235	1235	1235	1630	1630	1610	1530	1600	1625	1645	
2"	0			0										
1 1/2"	0.1			0.3			2.6							
1"	11.1			36.1			27.3							
3/4"	11.6			21.8			21.7							
1/4"	42.0			31.7			30.7							
4 Mesh	1.3		18.9	0.6		7.7	0.4							
5	7.2		18.0	1.4	0	15.8	2.6							
8	7.6	0.4	30.9	1.8	0.8	32.8	2.2	0.8	0.3					
9	X	X	X	X	X	X	X	X	X					
10	5.4	8.8	26.2	1.1	15.8	33.6	1.5	12.7	0.4					
12	X	X	X	X	X	X	X	X	X					
14	4.2	27.3	3.9	0.8	40.0	8.1	1.2	38.4	0.4					
16	X	X	X	X	X	X	X	X	X					
20	2.2	24.1	0.6	0.5	28.6	0.6	0.9	31.2	0.5	1.1	5.6	4.3	2.1	
24	X	X	X	X	X	X	X	X	X	X	X	X	X	
28	1.3	11.4	0.29	0.4	9.2	0.2	0.9	11.2	0.3	5.3	6.8	5.2	4.0	
35	0.6	6.8	0.04	0.4	1.4	0.07	1.0	2.0	0.2	11.2	7.0	7.3	8.9	

ANNEXURE PAGE 4

TABLE OF SCREEN RESULTS

DOLOMITE GRINDING RUN I

Size	<u>9 X 32 SCREENS</u>				<u>14 X 32 SCREENS</u>						
	<u>Feed</u>	<u>Prod</u>	<u>Oversize</u>	<u>Fines</u>	<u>Feed</u>	<u>Product</u>	<u>Oversize</u>	<u>Fines</u>			
	1025	1025	1025	1025	1140	1140	1140	1140			
60	0.2	1.4	0.02	2.0			0.02	1.81	0.4	2.86	0.03
100	0.3	0.3	0.04	17.1			0.12	17.02	0.6	4.56	0.03
200	0.5	0.2	0.05	21.9			0.10	21.03	0.5	4.26	0.10
Fin	3.0	3.0	0.51	55.9			0.50	57.73	1.0	16.64	0.60

FIGURES REPORTED ARE PERCENT RETAINED

X- SCREEN SIZE NOT USED

TABLE OF SCREEN RESULTS
DOLOMITE GRINDING RUN I

<u>9 X 20 SCREENS</u>						<u>OVERSIZE</u>			<u>FINES REMOVED FROM HOPPER</u>			
<u>RAW FEED</u>	<u>PRODUCT</u>	<u>OVERSIZE</u>	<u>RAW FEED</u>	<u>PRODUCT</u>	<u>OVERSIZE</u>	<u>RAW FEED</u>	<u>PRODUCT</u>	<u>FINES</u>	<u>FINES</u>	<u>FINES</u>	<u>FINES</u>	
<u>1205</u>	<u>1205</u>	<u>1205</u>	<u>1235</u>	<u>1235</u>	<u>1235</u>	<u>1620</u>	<u>1630</u>	<u>1610</u>	<u>11/9/71</u>	<u>11/8/71</u>	<u>11/9/71</u>	<u>11/9/71</u>
									<u>1530</u>	<u>1600</u>	<u>1625</u>	<u>1645</u>
0.4	2.0	0.03	0.4	0.3	0.06	1.4	0.8	0.6	14.7	19.1	25.7	4.6
0.2	0.9	0.02	0.2	0.01	0.03	0.8	0.2	1.9	7.0	5.7	17.3	5.9
0.4	2.1	0.05	0.3	0.3	0.06	1.2	0.3	16.4	13.2	17.2	21.0	12.0
0.8	3.0	0.03	0.3	0.3	0.09	0.9	0.3	29.5	12.7	22.7	15.5	11.8
3.4	13.2	1.04	1.3	3.1	0.89	2.7	2.1	58.5	34.8	15.9	3.7	53.7

FIGURES REPORTED ARE PERCENT RETAINED

X - SCREEN SIZE NOT USED

SUBCONTRACT BETWEEN CONSOL AND SD&MT RE CONSOL CO₂ ACCEPTOR PROCESS
(OCR, Prime Contract No. 14-01-0001-415(3))

MONTHLY REPORT FOR NOVEMBER, 1971

I. General

During November, work continued on laboratory tests of the carbonate samples and in compilation of data needed for the final report. Much time was spent in making the autoclave operational and actual operation runs will begin in December. Data on noxious elements indicates a reasonably reproducible result of 0.1 ppm mercury for the Firesteel sample. Beneficiation of lignite via column techniques is proceeding on Glenharold samples. Installation of monitoring equipment is progressing satisfactorily and should be ready by start-up time.

II. Resource Study of Carbonate Rocks (Mickelson)

Preparation of a base map continues. Costs and distances for rail transport of carbonate is being obtained and will be included in the final report.

The grinding of samples for chemical analysis is proceeding on schedule. Histograms of crushed samples are prepared as samples are crushed in our special crusher. We are also trying to obtain samples of the Tynochtee dolomite for comparison studies.

In an attempt to determine the strength and deformational characteristics of Pahasapa limestone, a number of specially prepared right cylindrical specimens were stressed to failure under a variety of confining pressures. The data thus obtained was plotted on a shear stress - normal stress diagram. An envelope was obtained, which defines the criteria for failure under a variety of conditions. It is hoped that this information will

OPERATIONS REPORT
NOVEMBER 1971

CONSOLIDATED
OPERATIONS REPORT

NOVEMBER 1971

2

ultimately be useful in production of crushing characteristics. A lignite reserves distribution map is also being planned.

III. Acceptor Reconstitution (Fuerstenu)

The month of November was spent gaining familiarity with the autoclave and with autoclave techniques. Much time was spent in adjustments for leaks, etc. Melts are being made to check the phase diagram of calcium hydroxide/calcium carbonate. Work in December will involve completing the work on this system and will be expanded to include the system calcium hydroxide/calcium carbonate in the presence of MgO.

IV. Noxious Elements (Lingard)

Continued studies of mercury recoveries from lignite by various ashing and solubilization techniques seem to confirm the previously reported value of about 0.1 PPM mercury in the Firesteel sample. Most consistent results have been obtained by a wet ashing technique employing nitric acid and potassium chlorate for oxidation and solubilization of the lignite.

Currently, methods of concentrating other trace elements by forming organic complexes which can be extracted into an organic solvent are being studied and will continue in December.

V. Pre-Gasification Beneficiation (Clarkson)

November was spent completing the experimental set-up for a column technique for sodium removal and establishing solution flow rates as a function of particle size. Exchange of calcium (as calcium sulfite) for sodium from lignite from the Glenharold Mine will be studied with this technique.

VI. Waste Monitoring (Oliver)

The length of 10-inch pipe (to be used in the adaptor for the vent stack monitor) has been received from Stearns-Roger and machining has begun. For waste water monitoring, electrical connections to the dissolved oxygen analyzer have been completed and calibration is being started. A concrete slab has been poured adjacent to the waste water pond, and the steel shed to house the monitoring instruments will now be delivered to Stearns-Roger for assembly on the slab. A work request has been forwarded for installation of tubing, etc., through which we will draw samples of vent stack gases for analysis with the gas chromatograph.

PROJECT STATUS REPORT

CONSOLIDATION COAL COMPANY
CSC PILOT PLANT
RAPID CITY, SOUTH DAKOTA

COC Project No. 536
 S-R Job No. S-37000
 December 3, 1971

PROJECT REPORT SUMMARY

Construction is complete. Insulation subcontractor is now moving out his temporary facilities. Stearns-Roger's field accountant will spend another 4-6 weeks working on late invoices and backcharges.

ENGINEERING

"As built" drawings have been completed and sent to Rapid City. Negotiations concerning equipment warranty are underway with Joy Manufacturing Company on the instrument air compressor and with Jeffrey Manufacturing Company on the celemite screw conveyor.

SUMMARY OF PROJECT CHANGES

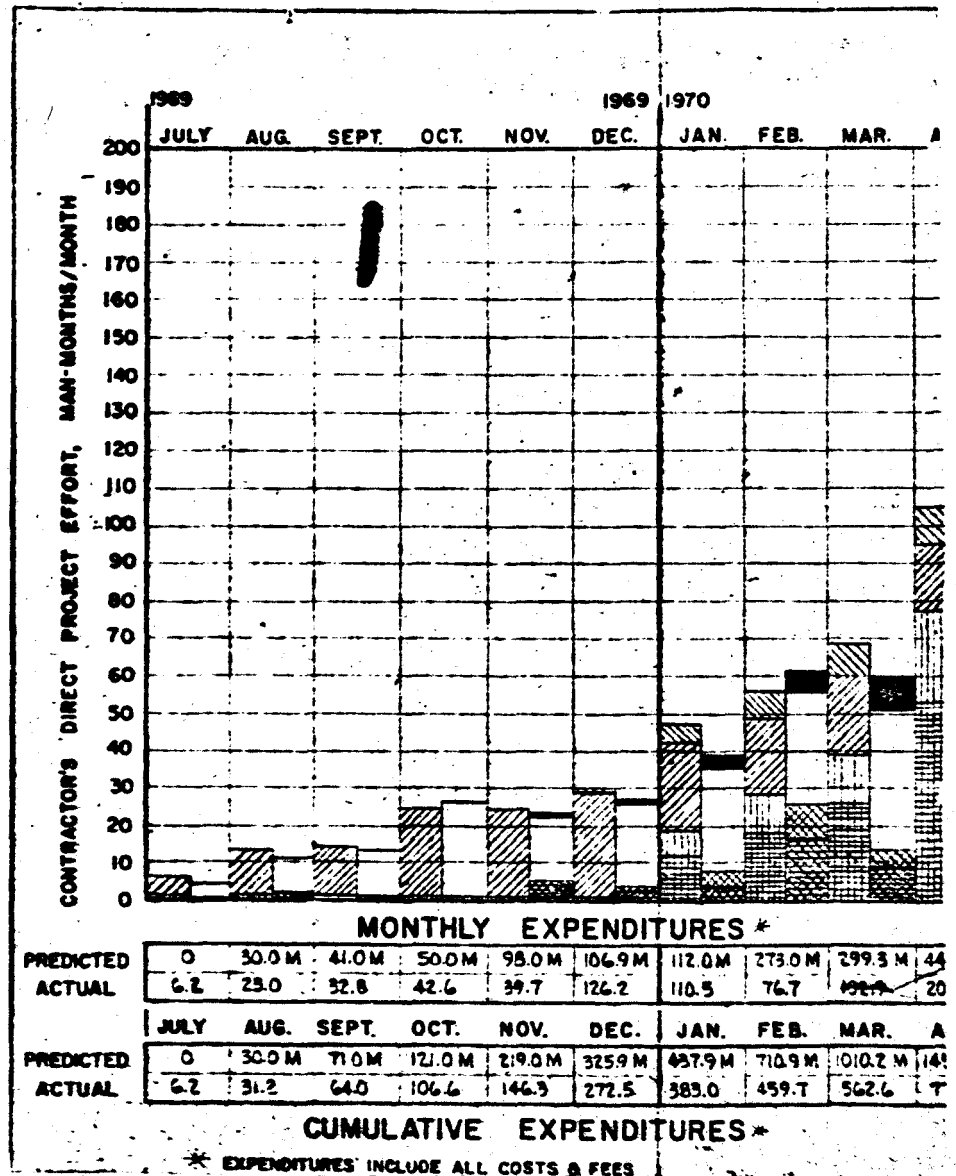
Orig. Guar. Max. Price	\$8,465,129
App'd Changes	834,838
Revised App'd GMP	\$9,299,967

D. H. Dawson
 D. H. Dawson
 Project Manager

Attachments: Progress Chart - 11-30-71

Distribution:

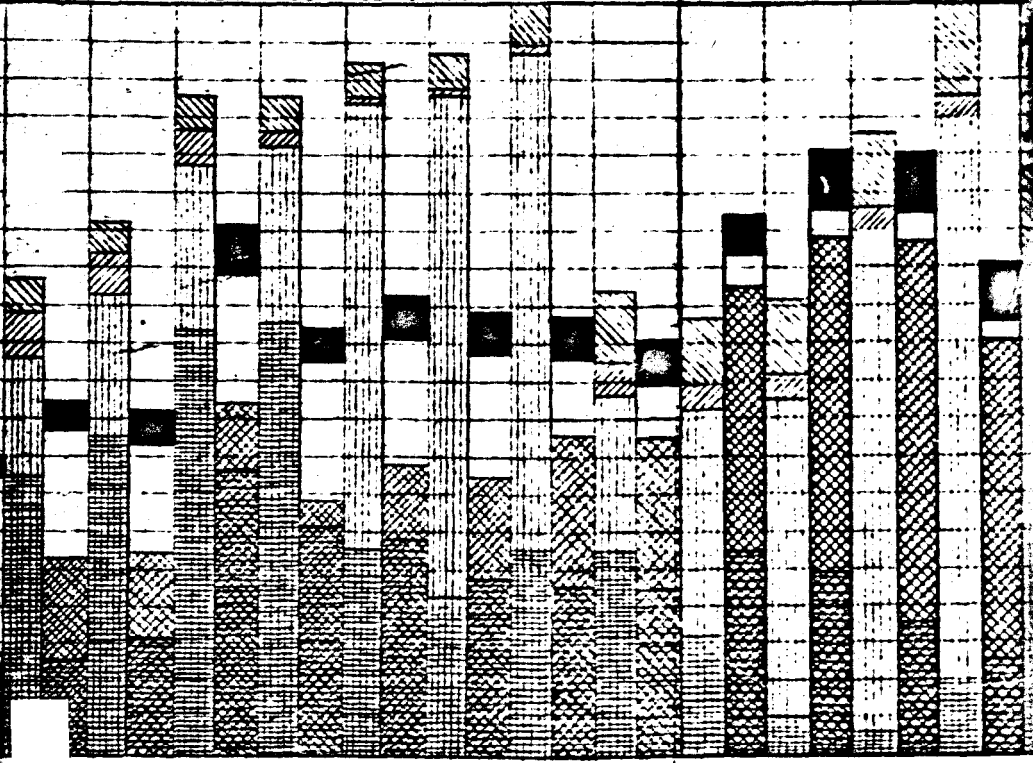
Consol - 5	Continental Oil Company - 6	
C. A. Schultz - 4	E. E. Ellington, CED	J. B. Hambleton, Jr.
U. B. Harvig	D. F. Wegner, Field	G. E. Fagerberg, CED
	L. Thompson, MED	Dr. C. V. Foster, PED
S-R - 7		
PCP/WFD/CMS/TGS/YLE	JIN/VLB/CINCB/JCN	WFS
FAM/JAP	W.E. Powell	FIELD



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1970 1971

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.



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222.7M	291.1M	302.0M	291.1M	712.9M	291.1M	291.1M	758.2M	712.5M	772.0M	702.4M	534.9M	
293.7	367.1	564.6	725.2	794.2	728.9	422.9	779.5	552.1	690.6	757.7	496.7	
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	
2079.5M	2970.6M	3772.6M	4663.7M	5376.6M	6267.7M	7158.8M	5366.6M	5928.8M	6863.1M	7565.5M	8100.4M	
1003.5	1372.6	1937.2	2662.4	3456.6	4185.5	4608.4	5387.3	5929.4	6630.0	7387.7	7884.4	
OPERATIONS COST INCLUDED IN CUMULATIVE											191.0	163.0
CONSTRUCTION COST INCLUDED IN CUMULATIVE											111.4	712.4
NON FEDERAL SALES TAX RESERVE NOT INCLUDED IN CUMULATIVE												192.2

APR.

184.5M

APR.

145.4M

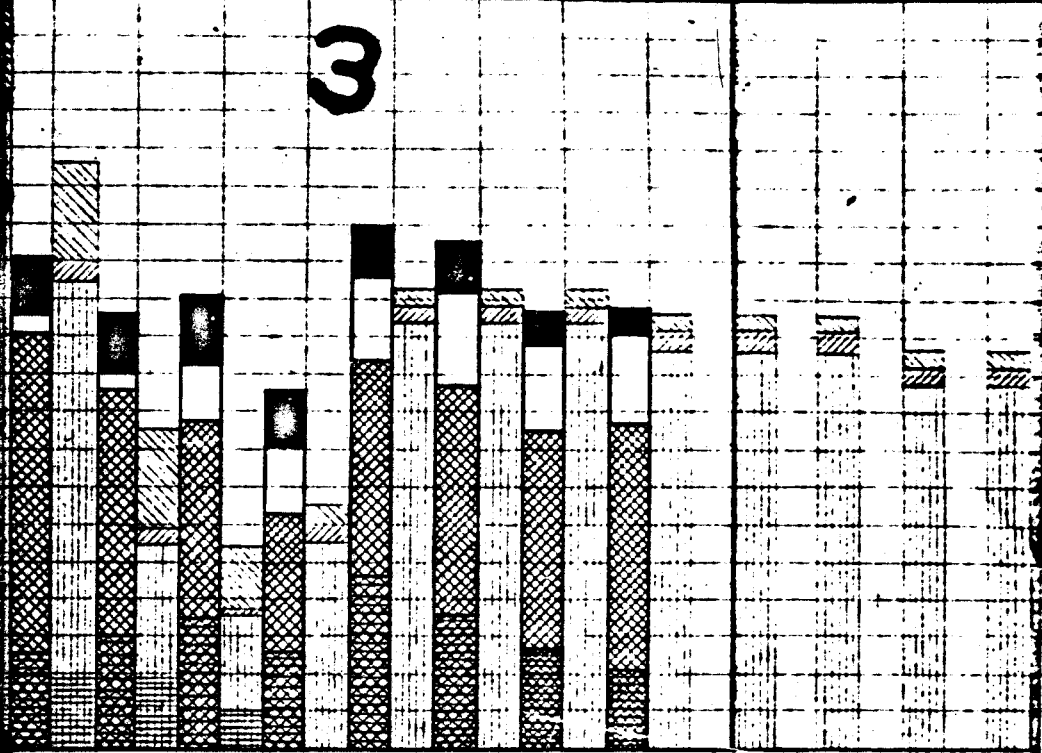
MONTHLY PROGRESS CHART

CONTRACT NO. 14-01-0001-415 (3)

1971-1972

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

3



	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
9M	447.7M	441.8M	285.0M	220.8M	318.1M	218.0M	219.1M	211.9M	211.5M	211.5M	185.1M	184.5M
57	292.0	308.1	221.6	299.6	440.1	409.4	238.0					
FR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
9M	8538.1M	8979.9M	9264.9M	9485.7M	9703.8M	9921.8M	10140.9M	10352.8M	10564.9M	10775.8M	10960.9M	11145.8M
4.4	8176.4	8484.5	8706.1	9005.7	9445.8	9855.2	10,093.2					
3.0	189.7	246.4	334.2	447.5	611.7	802.8	981.0					
0.4	136.7	173.1	231.3	322.7	434.1	582.4	717.2					
0.2	134.9	171.4	228.7	319.4	429.5	578.8	711.8					

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DATE: Mar 1971

1973

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

5

SUPERVISING
PROFESSIONAL
TECHNICIAN S-R
TECHNICIAN S/C

① INCLUDES SUPER
② INCLUDES CLERK

CONSTRUCTION — STE
OPERATIONS — STE

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MONTH

OFFICE
U.S. DEPARTMENT OF

CONSTRUCTION
RESEARCH DEPARTMENT

CONTRACT

180.5M 177.5M 170.0M 161.2M 140.8M 130.1M 130.0M 130.0M 24.9M

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

13,475.9M 13,673.4M 13,843.4M 14,004.6M 14,154.4M 14,275.5M 14,405.5M 14,535.5M 14,560.4M

APPROXIMATE TOTAL CONSTRUCTION ≈ 8,800,000
APPROXIMATE TOTAL OPERATIONS ≈ 5,760,400

DATE: Nov 1971

1973

SEPT. OCT. NOV. DEC.

PREDICTED ACTUAL

SUPERVISING
 PROFESSIONAL
 TECHNICIAN S-R
 TECHNICIAN S/C

Ⓢ INCLUDES SUPERVISORY EXEMPT TECHNICIANS
 Ⓢ INCLUDES CLERICAL

CONSTRUCTION — STEARNS-ROGER JOB 8-37000
 OPERATIONS — STEARNS-ROGER JOB 8-37400

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
 U.S. DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA.

CONTRACT NO. 14-01-0001-415 (3)

(REVISED 12/31/70)

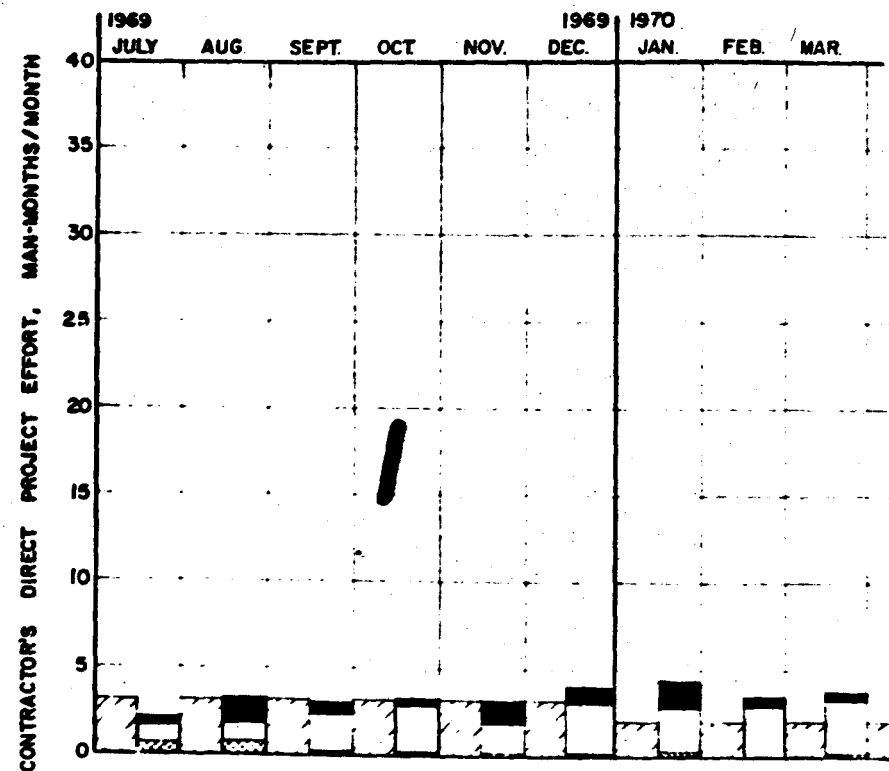
10.1M 130.0M 130.0M 24.9M

SEPT. OCT. NOV. DEC.

75.5M 144.05M 145.55M 154.4M

CONSTRUCTION ≈ 8,800,000

OPERATIONS ≈ 5,760,400
 (4,560,400)



MONTHLY EXPENDITURES*

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AI
PREDICTED	4,251	4,055	4,965	15,555	14,385	17,065	15,595	15,595	2,675	2,675
ACTUAL	11,745	14,724	9,609	11,915	10,130	15,005	14,978	13,227	13,227	53

	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AI
PREDICTED	16,251	30,306	45,865	59,020	73,405	90,470	106,065	121,660	134,335	137,010
ACTUAL	11,745	26,479	36,098	67,913	78,043	93,048	107,626	120,853	134,072	89

CUMULATIVE EXPENDITURES*

* Expenditures Include All Costs & Fees By Consol And S. Dakota S

MONTI

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MAY 1970 1971
 JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY

2

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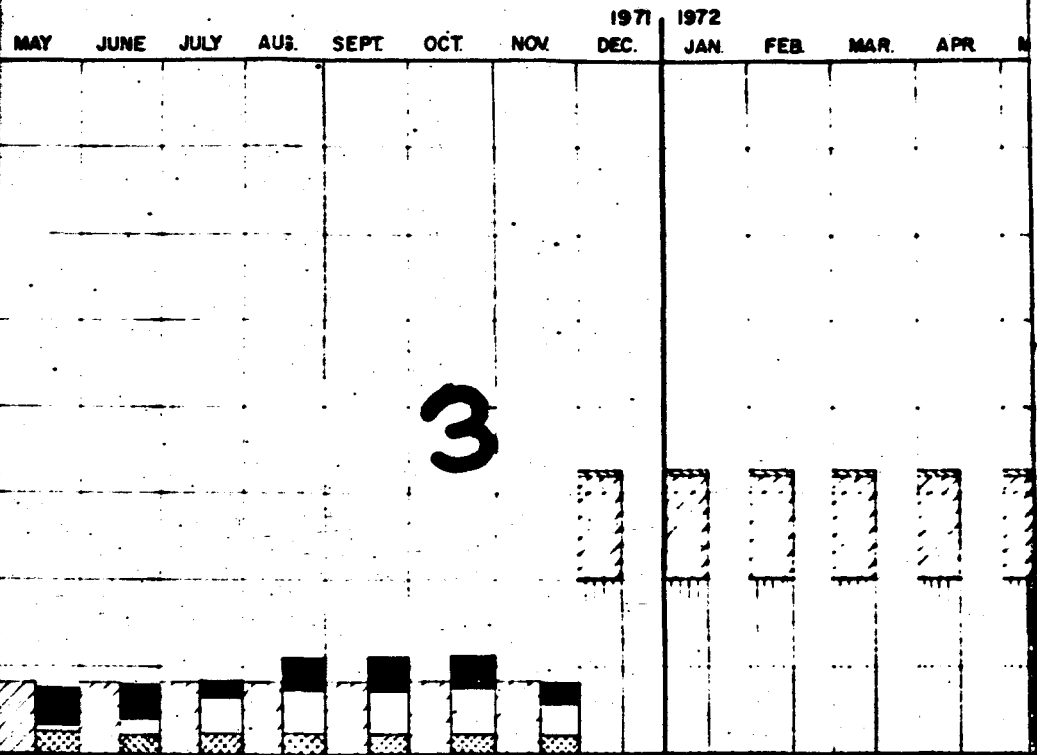


	12,655	13,315	12,935	12,505	12,575	11,500	10,150	11,135	13,205	12,135	11,145	8,700
7,342	19,319	20,054	13,355	21,003	21,296	9,794	23,091	6,475	6,663	12,820	12,196	11,500
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
0,395	173,650	166,965	159,900	212,305	224,810	237,315	257,470	277,005	300,900	323,195	344,540	363,000
7,242	226,561	246,615	260,570	285,573	306,269	316,453	339,544	356,019	372,692	385,502	407,694	420,200

7 Mines.

MONTHLY PROGRESS CHART (SUPERVISION)

CONTRACT No. 14-01-0001-415 (3)

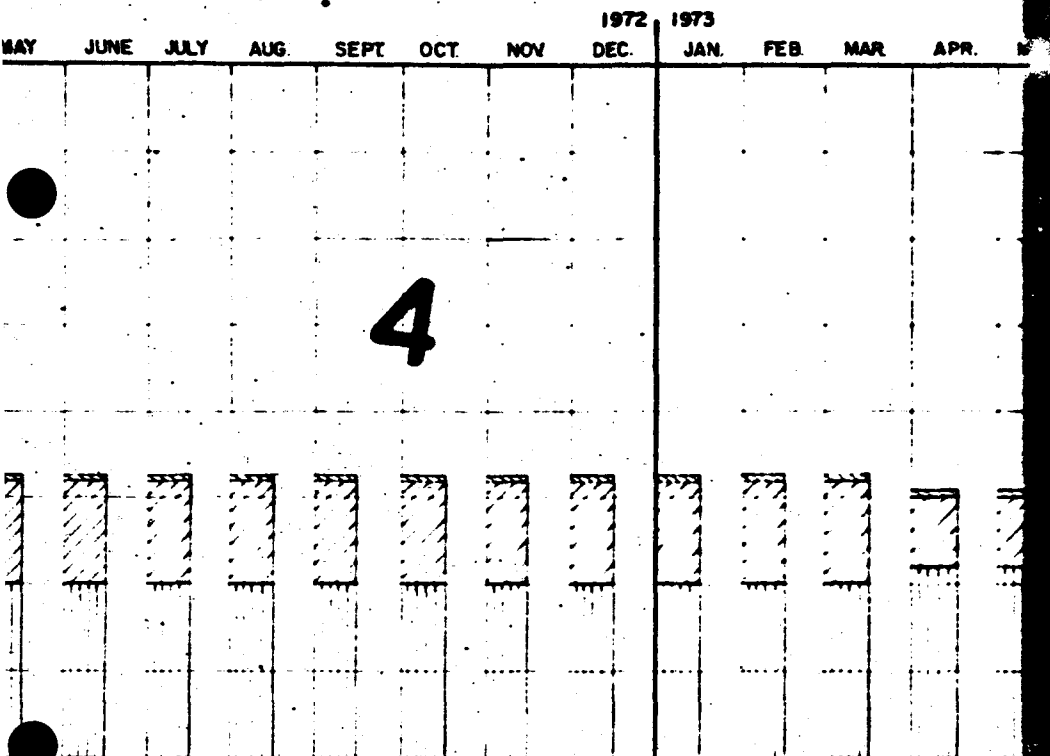


MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
18,705	35,955	54,975	74,875	94,975	114,975	134,975	154,975	174,975	194,975	214,975	234,975
12,508	25,831	39,223	52,599	67,723	82,575	98,600					

MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
363,045	379,000	393,875	408,750	423,625	438,500	453,375	462,850	532,325	571,800	611,275	650,750
420,206	456,037	492,960	477,879	575,582	606,157	624,757					

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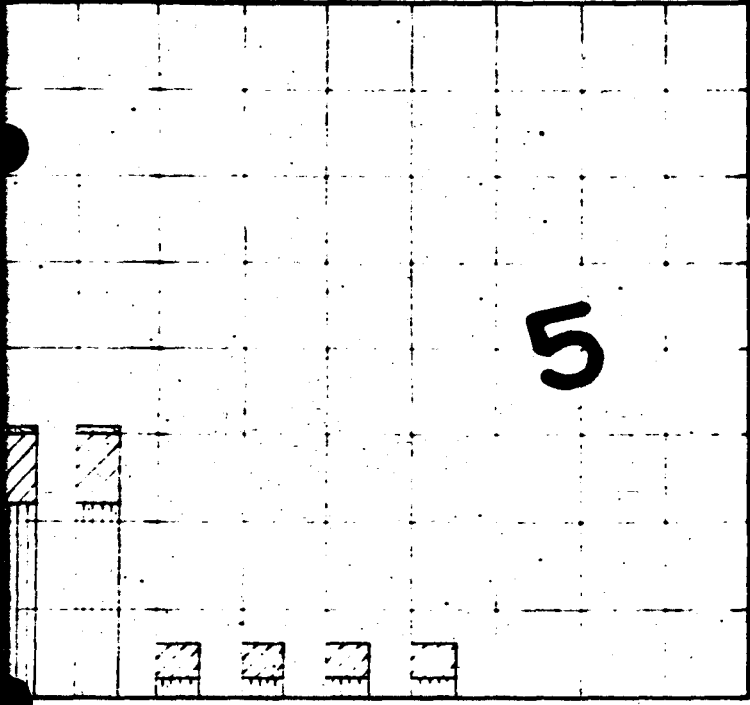


3,475	33,475	33,475	39,475	39,475	39,475	39,475	39,475	39,475	33,475	39,475	39,475	36,075	36,075
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
3,225	729,700	763,175	808,650	848,125	887,600	927,075	966,550	1,006,025	1,045,500	1,084,975	1,124,450	1,163,925	1,203,400


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DATE: *Jan* 1971


APR. MAY JUNE JULY AUG. SEPT. 1973



PREDICT

SUPERVISING 

PROFESSIONAL 

TECHNICIAN 

⊕ Includes Supervise

⊗ Includes Clerical.

36,075	36,075	11,475	11,475	11,475	41,120
APR	MAY	JUNE	JULY	AUG.	SEPT.
21,050	1,157,125	1,164,600	1,190,075	1,191,350	1,232,670

MONTHLY

OFFICE OF
DEPARTMENT

CONSOLIDATED
RESEARCH DIVISION

CONTRACT NUMBER

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(See 415 Chart)

DATE: Jan 1971

1973

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN		

⊛ Includes Supervisory Exempt Technicians.
 ⊛ Includes Clerical.

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MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
RESEARCH DIVISION LIBRARY, PA.

CONTRACT No. 14-01-0001-415 (3)

CLOC-MPR--91

PROGRESS REPORT NO. 91
OCR CONTRACT NO. 14-01-0001-415(3)
CONSOL LIGNITE GASIFICATION PROCESS DEVELOPMENT

December 1 to 31, 1971

A. Summary

Phase I - Feasibility Study

Complete.

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction and Operation

Formal acceptance of the pilot plant from construction occurred on December 28, 1971.

Successful test operations of the lignite preparation and preheating sections (to 500°F) were carried out. Effort is concentrated on Sections 200 and 300 to carry out the necessary hot testing prior to gasification.

Financial

Estimated monthly expenditures are \$36,000 by Consol and \$361,200 by Stearns. Cumulative expense to date is \$12,992,985.

B. Technical Results and Program

Phase II - Bench-Scale Research

Complete.

Phase III - Pilot Plant Engineering

Complete.

Phase IV - Pilot Plant Construction and Operation

1. Supporting Process and Economic Analysis (Project No. 533.00)

No work was done on this project in December. It is planned to utilize qualified process engineering help from Conoco to prepare a process definition of the desired methanation facilities at Rapid City. This will serve as the basis for an engineering and construction subcontract for installation by Stearns-Roger.

2. Consol Assistance on Construction of Lignite Pilot Plant (Project No. 536.00)

Work continues on the report summarizing the engineering and construction of the pilot plant.

3. Stearns-Roger Construction Subcontract (Project No. 700.00)

The final Stearns Progress Report is attached. The pilot plant was accepted for operation by Consol's representative on December 28, 1971. The final construction cost is not defined precisely, pending negotiations with four vendors; however, the final cost will be very close to the GMP (\$9,299,967).

4. Library Assistance on Pilot Plant Operations (Project No. 537.00)

Progress review meetings were held in Rapid City on December 16 and 17.

5. Consol Guidance on Operations (Project No. 702.00)

The progress report is attached.

As indicated, program emphasis is now directed toward a gasification run as soon as possible, to test the mechanical integrity of the system and to demonstrate the CO₂ Acceptor principle of heat supply.

6. Stearns-Roger Operating Subcontract (Project No. 701.00)

The Progress report is attached.

As indicated, successful test operation of the lignite preparation and preheating facilities (to 500°F) was achieved.

7. School of Mines Subcontract (Project No. 703.00)

The progress report is attached.

C. Subject Inventions

None.

D. Financial Status

<u>Expense</u>	<u>Actual</u>	<u>Budget</u>
<u>Cumulative through November, 1971</u>		
Through June, 1969	\$ 1,878,256	\$ 1,878,256
Consol	624,329 ⁽¹⁾	453,375
Stearns	<u>10,093,200</u>	<u>10,140,900</u>
	\$ 12,595,785	\$ 12,472,531
<u>Expended in Period (Estimate)</u>		
Consol	36,000 ⁽¹⁾	39,475
Stearns	<u>361,200</u>	<u>211,900</u>
Total, December, 1971	<u>\$ 397,200</u>	<u>\$ 251,375</u>
Cumulative through December, 1971	\$ 12,992,985	\$ 12,723,906

⁽¹⁾ Includes payments to South Dakota School of Mines

Att.

PROJECT STATUS REPORT
CONSOLIDATION COAL COMPANY
CSG PILOT PLANT
RAPID CITY, SOUTH DAKOTA

CCC Project No. 536
 S-R Job No. B-37000
 January 10, 1972

PROJECT REPORT SUMMARY

Construction is complete. Plant has been accepted by Consol's representative. Field accountant is negotiating final settlement of backcharges to vendors. Purchasing Department is negotiating with four vendors concerning vendors' request for extras and work covered by warranties. Three-months of work were spent in December.

CUMULATIVE EXPENDITURES

	Nov.	Dec.
Operations, B37400	981.0	1,196.6
Construction, B37000	<u>9,112.2</u>	<u>9,257.8*</u>
	10,093.2	10,454.4
Non Funded Tax Reserve Not Included in Cumulative	161.8	161.9

*Final total cost of construction will be very close to the revised approved guaranteed maximum price of \$9,299,967.

Distribution:

<u>Consol - 5</u>	<u>Continental Oil Company - 5</u>	
C. A. Schulz - 4	E. E. Ellington, CED	J. B. Hambleton, Jr.
U. D. Marwig	John Counter, CED	L. Thompson, MED
	Dr. C. V. Foster, FED	

S-R - 7

PCP/HFD/CHS/TGS/File	JTM/VLB/CIM:BJCH	WFS
YAM/JAP	DMD	W. E. Powell
		FIELD

D. H. Dawson
 D. H. Dawson
 Project Manager

CONSOLIDATION COAL COMPANY
 RESEARCH DIVISION
 LIBRARY, PENNSYLVANIA 15129

Project 702
 CC w/Operation Report:
 E. E. Ellington
 C. A. Schulz

INTER-OFFICE CORRESPONDENCE

To : John A. Phinney ✓ Date : January 7, 1972
 From : Carl E. Fink and Uwe D. Marwig At (Office): Rapid City
 Subject: Monthly Report No. 16 - Project 702

During the month of December operation of the lignite preheater at 500° F was successfully demonstrated. The preheater fluidized bed was filled to a level of 14.5 feet with dry, ground lignite supplied from the Williams system. The bed was fluidized by steam and preheater furnace flue gas. The preheater furnace was operated to maintain the bed temperature at 500° F. No process problems were encountered during the run. The run was terminated before achieving the maximum bed height, 17 feet, by a plug in the bag house of the grinding and drying system.

The observed bed density in the preheater was somewhat higher than was predicted by the Consol correlation. The error is apparently in the definition of an average particle diameter for preheater feedstock where the particle sized ranged from 8 mesh to 0.

It was decided to deviate slightly from the original program in order to arrive at gasification of char in the shortest possible time. Consol prepared a tentative program listing and briefly describing the operations and tests required prior to the initiation of gasification. This program has been transmitted to Stearns-Roger for comments. A more detailed program for accomplishing the first of these runs, the quench water systems test, was also transmitted to Stearns-Roger. Detailed programs for the remaining runs will be issued in the near future.

Carl E. Fink
 Carl E. Fink

U. D. Marwig
 U. D. Marwig

CEF-UON:Imp

Attachment: Stearns-Roger Operations Report No. 22 (2)

CONSOLIDATION COAL COMPANY PROJECT

CSG PILOT PLANT
RAPID CITY, SOUTH DAKOTA

OPERATIONS REPORT #22

CCC Project NO. 701
S-R Job No. S-37400
January 5, 1972

PROGRESS REPORT SUMMARY

A lignite grinding run was made December 2nd and 3rd to prove equipment changes made since the last run. A report of the run is attached. Some of the changes made were the removal of two journals, addition of an automatic greaser in the Roller Mill, and addition of a vibrator on the Surge Tank for lignite feed to the mill. In a previous aborted test, the two-speed motor on the mill rotary feeder was determined to be too small and replaced with a single-speed larger horse power motor.

The run of December 2nd and 3rd was conducted under the direction of Bob Williams of Williams Patent Crusher. During the run, the velocity separator position was varied to change particle size to obtain coarser material. Moisture content of the ground lignite, as particle size decreases.

Approximately 72 tons of lignite were ground during the run. A particle size distribution close to the initial target value (less than 10% through 100 mesh and less than 10% larger than 8 mesh) was reached at a cone position of velocity separator 3/4 way from top.

The system was run for an extended period of time, about seven hours, without difficulty and with only one shutdown - restart for practice.

The first Preheater run was made December 14, 15 and 16, 1971, after proceeding through a 41 point check list for the lignite grinding area. Several minor items (such as reversed orifice plate on discharge of J-101 air compressor for preheater furnace) delayed the start of the run.

During the preheater run, the bulk of the operation problems occurred in the grinding area, the major one being in the bag house with the bag blower and blow ring drive. The bag blower and blow ring stopped working.

Fluid bed densities greater than those expected were obtained during the preheat run. An estimated 30-35 tons of lignite were fed to the lignite grinding area (34% moisture), and 17.5 tons were removed from the preheater at the termination of the preheater run into the lignite trailer and tote bins. The height reached in the bed was 14.5 feet. The bed density then was about 39 pounds per cubic foot. Fines carried over out of the bed during continuous operation are estimated at 3.5 tons.

Temperature control of the preheater bed was difficult until modifications made on instrumentation allowed lower flow on the preheater furnace. (These modifications were made without shutdown). Steam was used as the additional fluidizing medium.

Samples of lignite fed to preheater and product lignite from the preheater agreed well for the first section of the run.

A report, attached, of the last dolomite grinding equipment run was issued in early January. The split between fines and product of 26,400 pounds and 15,660 pounds is similar to the splits obtained on the previous dolomite tests. The last test emptied the product bin so that Tymochtee dolomite could be unloaded into both storage bins without contaminating the Tymochtee with local limestone used for tests.

A small lignite grinding run was made the first two days in January, 1972 to empty the silo. A report on this run will be issued during January. Starting on December 21, the gasification system was pressured up and a mechanical testing program was started.

Reports for the preheater run and the final lignite grinding run are now in preparation.

On the job training was the most important function organizationally during December. Testing of the plant, especially the 200 and 300 Areas, gave the operating force its first chance to function in a normal, or near normal, fashion. Our maintenance-operations permit procedure was firming up and we routinely operated equipment and did maintenance work simultaneously for the first time.

Protection against freezing required a major effort by both operations and maintenance during the month and will continue to be a problem until additions to the tracing, now underway, are completed. Steam hoses are being utilized wherever the tracing is not adequate. Ice forms where the steam condenses. We then have dangerous floors, icicles fall from the structure, the elevator door operator jam with ice and essentially our entire force has to devote full time to the problem. In any case, it is not possible then to run the plant.

Our experience with the plant now indicates that we will have to add operators and laboratory personnel to handle gasification. Most of the additional personnel will be hired locally and about one month's training will be required for the jobs they will perform. Consolidation Coal requested on December 16, that we test the gasification system using Husky Char as soon as possible. We will add eight "C" operators and four laboratory people.

The electrical work required before gasification is beginning to come in to focus. The new inverter is here and revisions are underway to install the equipment that will keep controls working during the brief power outages that frequently occur in this area. Our electrical engineer is now familiar with the system. We are adding a foreman with trouble shooting capabilities and plan to complete the work in time to avoid delaying the gasification test.

We ended up grinding 8 tons of lignite during October, 2 tons in November and 140 tons in December (including the first two days in January). The system will be cleaned and shaped up for future operation. Husky Char (three cars) has been ordered and we plan to unload the char into the lignite silo when it arrives.

The incomplete items from the Plans For December in last month's report include:

1. Establishing fire fighting and disaster plans.
2. Writing up the preheater run.
3. Initiating a program to research the explosive properties of lignite.

Fire fighting and disaster plans were prepared for the preheater run. However, we need to extend the plans for the gasification.

MONTHLY ACCOMPLISHMENTS - OPERATIONS - DECEMBER 1971

We continued shift coverage with the "A" operator functioning as shift supervisor. The boiler and cooling tower continue to be operational. The combustion air compressor, J-202, has been piped into the plant and instrument air system as backup for the plant and instrument air compressor, J-502, and the emergency instrument air compressor, J-503. Fire extinguishers have been received and placed throughout the structure. Operating instructions for two vessel operation were again reviewed by Vic Brant, the technical engineers, and the shift engineers. The training of operators, including those newly hired in December, continues on shift.

Mr. Bob Williams and Mr. Bill Blackburn were in the plant on December 2 and 3 for lignite grinding tests. A new motor was installed on the roller mill rotary feeder, L-109-L3. Successful grinding runs were obtained. The fines obtained in the lignite fines bin, F-104, are wet. This causes problems in cold weather by freezing and the fines are hard to remove. On December 11 and 12, each shift ground lignite for about an hour for practice in starting up and shutting down the system. This was in preparation for the preheater test run.

Continuing the program initiated the last two weeks in November, the preheater system was operated without lignite for training purposes. On December 6 steam was introduced into the preheater furnace, B-102, heated and sent to the preheater, D-101. A temperature of 510°F. was maintained with about 2,000# per hr. of steam. Mr. John Williams was in the plant during the week of December 13 to help with the fluidization of dry, ground lignite in the preheater, D-101. On Tuesday, December 14, we started filling the preheater. By December 16th, a bed depth of 14'6" was reached and the run terminated. High bag house differential prevented further grinding. It was discovered later that the internal hose was off of the blower ring. The bags were in good shape. The lignite in the preheater was emptied after the drop line to the lignite trailer was unplugged, the rotary feeder (L-110) was cleared of packed lignite, and tote bins were used in conjunction with the lignite trailer. The clutch on the trailer screw conveyors needed repair. The lignite from the preheater was weighed and came to about 17½ tons. The water used in the lignite fines scrubber empties to the larger pond. Quite a lot of fines and ground lignite (over 3 tons) were sent to the pond during the preheater run. Although the decanted water seemed to have a slight odor and discoloration, toxicity tests proved negative and the city sewage water treatment plant accepted the water, after a delay of 24 hours. We were careful not to include any solids to the treatment plant. The toxicity test consisted of guppies surviving 24 hours in 1%, 5%, 10%, and 20% mixes of our pond water and city potable water.

A pressure test of the 200 and 300 areas was started on December 21. The system was first brought to 50 PSIG and held there for instrument and controls checkouts. Warm weather allowed the flushing of the quench and jacket water systems. The system was brought to 95 PSIG on December 27, and to 150 PSIG on December 29. The oxygen content of the circulating gas was held to 10% by using air and nitrogen. Pressure drop tests were run on the process heaters according to Mr. Vic Brant's cold test procedures.

A new equipment tag-out procedure using numbered tags with detachable sections was inaugurated. A new safe work permit procedure was written which uses an "A" operator assigned to the day shift to monitor the procedure.

The inert gas generator system has been down for clean up, repairs, and revisions. The high pressure inert gas compressor has been piped to take nitrogen and compress it to 485 PSIG for use in the high pressure inert gas system.

Colder weather has created problems other than just freeze-ups of equipment. The chill factor on the ninth floor on December 6 was below minus 40°F.

We have Pageboy pagers for 24 hour coverage of plant operations. The Shift Engineer on weekly duty, the Day Supervisor, and the Operations Superintendent each carry one routinely when they are out of the plant and are away from their home phones. We also have two spare pagers for use by technical personnel on call during periods of unusual operations or testing.

A telephone has been installed in the 200 area control room that utilizes a Magicall attachment which allows only certain outside calls which are dialed automatically at the press of a button.

The spring loaded pipe hangers in the structure were set cold during the preliminaries of the pressure test of the 200 and 300 area equipment.

The plant adopted a restricted smoking procedure prior to the preheater test. This procedure will remain in effect until further notice and will be extended to preclude matches and lighters when necessary equipment has been installed.

We have received 20 - 55 gallon drums of char for use in the fluidization demonstration model and in fire fighting training.

New fire extinguishers for use in the structure arrived and have been installed.

MONTHLY ACCOMPLISHMENTS - TECHNICAL DEPARTMENT

1. Received another 30% of the equipment that was ordered for mechanical testing program. Maurice Schute (Denver Piping Design) prepared a flange monitoring program. Report to be issued first week of January.

2. All metal building parts have been received - chemical retain storage has been erected. Others to be installed as can be scheduled. This order is not a requirement for char gasification.

3. Pumps and vaporizers for liquid nitrogen system are to be tested January 10. This system is sixty days behind the schedule that Air Products promised at the time of the agreement. Their suppliers did not deliver equipment as promised. This change order is a requirement for char gasification.

4. Engineering is complete for Spent Dolomite and Ash Out system. All materials ordered and we are in receipt of 60%. Installation has not started. Another necessity for the gasification run.

5. Installation of aluminum siding to structure has started. Engineering complete except for minor revisions resulting from obstructions of existing equipment. Should be installed in February.

6. CO gas monitoring system is 80 plus per cent engineered. Analyzers are on order with shipment scheduled for February 15. Sample tubing is on site with installation to be started in January. A necessity for char gasification.

7. Engineering is complete for additional plant steam tracing. All material on site and installation to be scheduled in January.

8. Revision to drain system on Inert Gas system is in progress. Sump has been installed, but sump pump has not been received. Entire system has been reviewed and minor modifications were initiated to improve operation of drainers and separators.

9. Collection system for drains from CO₂ compressor was engineered and installed.

10. Pneumatic conveying system specifications were prepared by Denver Engineering and were sent to vendors for quotation. No estimate received to date.

11. Resolved sample points required. Drafting proceeding on systems. Several sample coolers purchased, but none received.

12. Placed new instrument air dryer on order. Received bid on new aftercooler as existing cooler is undersized. Began piping analysis of compressor discharge piping to reduce pulsation and vibration. This is necessary to prevent damage to dryer beds.

13. Ordered utility pumps and starters. These pumps are portable for use anywhere in plant.

14. Initiated and obtained data at operating conditions for pressure drops in the lift gas lines. Also recorded pressure drops across process heaters. Information will be used in writing two vessel operating procedures.

15. Recorded operating data and obtained plant samples during Lignite Preheater run. Data has not been analyzed to date.

16. Piping spring hangers on the 1700°F. lines in area 200 were set in cold position and all recorded for future reference. Minor modifications were made on five hanger installations.

17. Surge air tank was received. Vessel was cleaned, hydrotested and set on supports. Piping was partially installed.

18. Automatic unloaders received for Regeneration Air Compressor. Electrical and instrument engineering is in progress to complete installation.

19. Data and samples were obtained during the lignite grinding and drying operation. This was the initial run of the Williams system following installation of automatic lubricator. Report on findings of run was issued and it an attachment to this report.

20. Laboratory control chemists obtained much experience in handling ground, dry lignite. Many samples were analyzed for moisture and size distribution. Also determined gas composition in the drying system.

21. The laboratory prepared a gas of composition nearly that expected during operation. Its composition is as follows:

CH ₄	16	Wt.%
H ₂	15	Wt.%
CO	50	Wt.%
CO ₂	19	Wt.%
	100	

This mixture was not visible either in bright daylight or in a well lighted room. It was concluded that personnel protection is required on flanges located at floor level.

22. Ordered new type of gate valve for bottom of Lignite Storage Silo. Engineering complete on this item.

23. Mechanical engineering as required on various items of equipment with problems. A.) Rotary Feeder on Lignite Preheater, B.) high pressure inert gas compressor, C.) Bag House bag shaker, D.) lignite trailer, E.) Instrument Air Compressor.

24. Technical engineer reported on December 6. Electrical engineer arrived December 1. An offer was made to a candidate for final control chemist position.

25. The carbon-hydrogen furnace has been operated successfully and ready for laboratory use.

26. The following electrical engineering was accomplished in December:
- Temperature alarm relay panel addition for TR-1001.
 - Temperature alarm relay cabinet for 200 Area control panel.
 - Williams package drawing made to reflect all revisions.
 - Quench water pump control revisions.
 - Layout for inverter system change in electrical equipment room.

27. Training Program:

All chemists have run a lignite sample through proximate and ultimate analyses (except nitrogen) and have obtained heats of combustion in the calorimeter. Proximate analysis comprises moisture, volatile matter, and ash. Ultimate analysis comprises carbon, hydrogen, sulfur, nitrogen, ash and oxygen. Practice has also included operation of the chromatographs. Size analyses have been routine for some time. Some elemental analyses have been conducted.

28. Instrument Calibration:

Chromatographs:
Standard samples of H₂, CH₄, CO₂, CO, N₂, and O₂ have yielded weight factors comparable with the literature.

The Modul 1400 flame ionization detector has been placed in operation but has not remained stable. The column is being purged.

Carbon-Hydrogen furnace:

Have calibrated with sucrose and operation with lignite is satisfactory.

29. Repeatability Studies:

Moisture analysis by xylol distillation has an estimated standard deviation of 0.18% water, based on seven analyses in duplicate. The corresponding confidence limits for an individual moisture analysis are:

Confidence Level: 90%, 95%, 97.5%, 99%
Limits (% v. moisture) ± 0.35 , ± 0.44 , ± 0.53 , ± 0.66

These limits are the same as achieved by Bureau Of Mines analysts.

Hydrogen diffusion from rubber sample bags was negligible over a two day period.

Volatiles measurements of lignites have been affected by the high level of volatiles present. The heating rate has been modified.

30. Routine Analyses:

100 Area atmosphere monitoring - no CO or CO₂ has been detected except when bottom valve FA-102 (lignite storage) was opened.

Ram moisture and size on lignite and dolomite for test runs in December. Results have been reported elsewhere.

Instrument air dew point has been below -60°F.

31. Special Analyses:

Lignite fines entrained in waste water entering pond averaged 0.39% w with one sample having 17% (this sample was excluded from average). Variation among the samples indicated that the true average under these plant conditions lies between 0.1 and 0.7%. These solids settle within an hour or so except for a small amount of ultra fines.

The ultra fines are estimated to be 75% minus 325 mesh (one sample). The screens were blinded and routine screening is not feasible.

32. Personnel:

Mr. K. W. Crawford was hired as a control chemist to report January 10, 1972. He has a master's in analytical chemistry.

MONTHLY ACCOMPLISHMENTS - INSTRUMENT AND ELECTRICAL

1. Tested steam boiler controls to determine if controls are sensitive enough to respond to rapid load changes. Level control seems to be adequate. Pressure control is not adequate and high pressure shutdown is actuated before pressure controller responds. Fuel to air ratio control still has to be set at 100% to reach design steam flow.
2. Made tubing changes on Inert Gas Drier to obtain better control of various instruments. Pressure regulators on this system are being eroded by wet inert gas.
3. Performed start-up work for test runs for various pieces of equipment. Including calibration of gasification controls.
4. Removed the density meters from service and stored in the warehouse, because the two vessel char test will not require them.
5. Installed new panel section in 100 Area control room.

6. Installed new controller and control valve for steam to the preheater.
7. Installed flow recorder on instrument air to plant so that surging of the air flow can be studied.
8. Installation of new welding receptacles was completed except for final tie-in which requires a shutdown of the main 480 volt power bus gasification section of the plant.
9. N₂ system electrical was completed for existing equipment.
10. Electrical work for a water monitor was completed.
11. Added relay panel for TR -1001 alarms.
12. Moved existing inverter and batteries to new location.

MONTHLY ACCOMPLISHMENTS - MAINTENANCE

Our regular force now totals 32 craftsmen. In addition we have twelve men classified as a construction force working on siding additions to the structure. At the end of the month, our critical electrical force totaled seven and we have a call in for three additional men.

At the beginning of the month we released \$100,000 worth of spare parts. We now have ordered \$150,000 worth, which is about 75% of the required spare parts.

We now have an ongoing safety program with meetings each Tuesday. To conform with the new Health and Safety Act, lunch room facilities are being constructed, racks are being constructed for such things as air masks, and many other small additions are being made as they are defined to us.

Regular maintenance items performed during the month included:

1. Completed plant alarm system.
2. Completed installation of an air holding tank.
3. Revised drain system on the CO₂ compressor.
4. Worked on installation of the pilot plant used at Library.
5. Installed vibrators on the dolomite bins.
6. Issued maintenance contract to Carter Elevator for routine maintenance of the large elevator.
7. Excavated another trench for the lignite grinding run.
8. Set spring hangers on the 1700°F piping in the gasification.
9. Replaced insulation in about twenty areas that had to be removed for maintenance work on piping.
10. Installed jacket water flow indicators.
11. Repaired the Bag House several times.
12. Performing work to convert the inert gas compressor to permit compression of purchased nitrogen.
13. Installed escape ladders at several points on the structure.

PLANS FOR JANUARY

1. Continue work on engineering change orders.
2. Issue a report on Lignite Preheater run.
3. Schedule and obtain information from dolomite grinding system using Tymochtee dolomite.
4. Control chemist to report and interview personnel for junior chemist positions.
5. Obtain information from scheduled test on reactor system. This test is part of the mechanical testing program where the system will be operated on inert gas and air at the following conditions:
 - A. 150 PSIG and temperatures elevated in steps to design.
 - B. 335 PSIG and temperatures elevated in steps to design.
6. Continue to gain experience with computer programming.
7. Provide engineering support to operations for completion of programs outlined by Consol representatives.
8. Complete electrical engineering as necessary to install inverter system and various engineering change orders listed below:
 - A. Engineering to incorporate changes necessary to guard against plant shutdown by power dips per V.L.Brant's memo dated September 9, 1971.
 - B. Install electrical service for office trailer.
 - C. Alarm relay panel in main control room for the temperature recorders.
 - D. Electrical for metal storage buildings.
 - E. Liquid N₂ system.
 - F. Portable Pumps.
 - G. Automatic unloaders on the main air compressor.
9. Prepare the revised operating instructions for the two vessel char run.
10. Start training all operators for the two vessel char run.
11. Hire a Shift Engineer and seven "C" operators.
12. Operate dolomite crushing equipment to test Screw Conveyor, L-152.
13. Continuing projects:
 - a. Total shift coverage with "A" Operator in charge of shift.
 - b. Operate utilities area including inert gas generator.
 - c. Establish fire fighting and disaster plans.
 - d. Work on operating manuals.
 - e. Training

STAFFING

	<u>Present Payroll</u>	<u>To Be Hired January or February</u>
Management	2	0
Accounting	3	1
Clerical	5	1
Janitorial	2	0
Safety & Pollution	1	0
<u>TECHNICAL DEPT.</u>		
Laboratory	5	5
Engineering	12	1
<u>MAINTENANCE</u>		
Supervisors	5	1
Crafts	32	0
Warehouse & Purchasing	4	0
Scheduling & Planning	1	0
<u>OPERATIONS</u>		
Supervisors	1	0
Shift Engineers	3	1
Instrument Engineer	1	0
Operators	26	11
<u>NEW CONSTRUCTION PERSONNEL</u>		
Ironworkers	9 (for 4 to 6 weeks)	
<u>TOTAL</u>	112	

COST

Accumulated Operations Costs To Date 12-31-71-----	\$1,195,575.95
Purchase Order Not Paid & Purchases Placed-----	238,648.00
Acually Spent - December, 1971-----	211,811.60

Yours very truly,

STEARNS-ROGER CORPORATION



William E. Powell
Plant Manager

WEP:ska

CC: H.L. Lawless	U.D. Marvig
F.E. Johnson	C.F. Fink
N.H. Vardaman	C.A. Schulz
D.R. Mosher	J.A. Phinney
D.D. Dietrich	C.M. Stone
W.T. Blalock	D.H. Dawson
N.R. Krebs	
J.G. Sterritt	

Encl.

Stearns-Roger

CORPORATION

INTEROFFICE CORRESPONDENCE

To: D. R. Mosher
From: T. G. Towers

December 8 1971

SUBJECT Results of Lignite Grinding--Run II

I. Stated Objectives for Lignite Grinding--Run II

- Test operation of roller mill (L-109-11) after removal of two journals. Determine the loading characteristics and settings for dPS-1000.
- Evaluate effect on particle size and moisture content of changing position of velocity separator (L-109-L2).
- Test the operating capabilities of the system with the modifications made since initial grinding run.
- Operate for an extended period of time at conditions selected to give the target particle size and heat loss results.
- Make any adjustments in the operating equipment to achieve the end result of item D.

II. Results

- Estimated raw lignite ground at 144,000 pounds by two methods.
- Estimate of product out, 108,303 pounds.
- Estimate of lignite fines removed from fines hopper (F-104) was 1650 pounds.
- Particle size distribution was closest to the target value with the velocity separator in the roller mill 3/4 down.
- With the velocity separator (L-109-L2) in the up position, a moisture content for ground lignite of 5.3-5.4% was reached during extended run.
- Moisture content of the feed sample dropped during the grinding run.
- Pitot tube readings were rejected as a measure of gas flow because of their position relative to blowers and flow direction
- Tables of Screen Results, moisture contents and system readings are reported in the appendix of this report. Some of the readings reported at the sample times noted in Table I were taken by W. Blackburn of Williams. The remainder of the operations data were taken by the operating group.
- The program for Lignite Grinding-Run II by T. G. Towers to N. R. Krebs was not followed because most of the run was conducted under the direction of Bob Williams and Bill Blackburn of Williams Patent Crusher.

III. Observations

- Furnace (L-109 B1)
 - Alarm points were repaired and now operate correctly for the grinding system.
 - Controls of the dryer furnace were reset of necessity.
 - Setting of valves were changed to XCV-1003 full open and XCV-1037 one half open.

B. Mill Operation (L-109-L1)

1. Velocity separator (L-109 L-2) was operated at full up 1/3 down, 3/4 down and the fully down positions. Examination of the particle size results would indicate a separator position of 1/2 down for desired particle size results.
2. Roller mill started from panel after rewiring the panel controls.
3. Two journals were removed from the mill and an automatic greaser added.
4. Overloading of the rotary feeder (L-109-L3) occurred which made changing of the motor necessary. A single speed, larger horsepower motor was installed and operated on office control.
5. Continuous operation for seven hours except for a planned shutdown of ten minutes was obtained.
6. Mill outlet temperature was controlled at 315-320°F for the major part of the grinding run.
7. AIT-1000 was operated for most of the run and agreed well with one Orsat analysis run on the system.

C. System-General

1. Numerous problems with plugging of the hose from the conveyor after the "garboon" occurred.
2. Some plugging occurred in the drop line from the cyclone (L-109-L5).
3. At high feed rates the small screw conveyor after the "garboon" would not handle the volume from the "garboon" conveyor.
4. Operation of the mill and furnace was under the direction of Bob Williams during the 3/4 shift and the first third of the 4/12 shift.
5. A simple method was initiated for starting feed to the mill with the furnace running, turn the heat to mill switch and push the roller mill start button to activate the grinding/drying system. When the mill has been operating and is hot, it should be started first; if not, heat must be to the mill until the mill low temperature is satisfied first.

IV. Log of Operation

The following is a synopsis of the grinding run operation prepared by "B" shift with a few insertions by the writer. The letter was written to Tom Melen, December 7, 1971 on "Lignite Grind of 12-2-71 and 12-3-71 Under the Direction of Bob Williams and Bill Blackburn."

All equipment was started up and checked by the 12-8 shift in preparation for the run. Furnace was running and a level of lignite was in F-103 surge bin at 0800. No lignite was fed to the mill prior to 0800.

- 0830 Started roller mill and feeder. Started Gaboon discharge conveyors.
- 0836 Switch furnace to high fire. The surge created a high DP across the mill, which shut down the feed, which in turn caused a high mill temperature and took the heat out of the mill.
- 0840 Gaboon discharge conveyors plugged. The hose from the conveyor to the pit plugged frequently during the entire run and forced several shut downs, although this temporary arrangement is not actually a part of the lignite grinding operation.
- 0850 Adjusted primary air to the furnace so the gas manometer read 0.6", which is the equivalent of approximately 2.5 MM BTU. The primary air had been nearly full open, which provided so much heat that high temperature shut downs were unavoidable. There is now a manograph available for use in making future air-BTU-manometer adjustments.
- 0858 Heat and feed to mill Worked with Reeves Varidrive adjustment on feeder. It's now set on slowest speed. The single speed drive motor is switched on-off by a change in DP of approximately 1/4". The actual DP is not important and must be adjusted with changing conditions. The important consideration is to be guided by the sound of the mill, and keep the feed set just fast enough to prevent the mill from rumbling.
- 0930 Product sample #1-7.2% H₂O
- 0940 PRC-1000 swinging and affecting the entire system - put it on manual, but no improvement. Bag House Temperature 235°F.
- 1030 Bag House Temperature 240°F Product Sample #2 - 7.6% H₂O Feed Sample 35.8% H₂O.
- 1045 Shut down mill and furnace to install a restricting valve in the signal line to the gas valve dPCV-1005 to try to correct the swing in PRC-1000.
- 1113-1300 Made numerous minor adjustments in primary air, roller mill DP, mill temp limits, etc. Furnace and mill on and off several times.
- 1200 Feed sample 36.5% H₂O Product Sample #3 8.0% H₂O.
- 1300 Product sample #4 6.2% H₂O.
- 1308 First adjustment of cone in the mill separator-from highest position to approximately 1/4 from lowest.
- 1345 Product Sample #5 12.0% H₂O.
- 1410 Separator cone put in lowest position.
- 1420 Product Sample #6 13.4% H₂O. Shut down mill with feed on "auto" to eliminate time and effort in filling mill after start-up. This puts the "two-button" method in operation-with the furnace running it is only necessary to run the "heat to mill" switch and push the "roller mill start" button to activate the grinding/drying system. When the mill has been running and hot, it should be started

first—if not, the heat must be turned into the mill until the mill low temperature (300°F on PRC-1000) is satisfied. Instrument Department worked on PRC-1000 and it is now controlling on "auto".
Raised separator cone to maximum height.
XHC-1017 50% open XHC-1003 full open.

1428 Roller mill started (feed on auto) and heat-to-mill on.

1500 Product Sample #7 7.4% H₂O.

1650 Product Sample #8 7.1% H₂O.

1655 Lowered Cone 1/3 down from top position.

1700 Loud noise developed in the Redler conveyor. Nearly emptied F103 surge bin while trying to find the source of the noise. By start-stop operation Redler unfouled.

1730 Raised cone to full up position.

1735 Redler running okay.
Continued training of crew: in "two-button" operation and cone adjustments until 0200 12/3/71. Emptied system from surge bin through gaboon. Shut down and secured all equipment. When the furnace fan was shut down, the pressure across the system dropped 6.5", indicating leak through XCV-1003 or XCV-1008.

The primary objective 12/3/71 was to determine the time from a cold start-up to start of grinding.

0907 Furnace on.
Determined that XCV-1008 was leaking through.

0916 Feed to mill at 205°F. This minimum temperature setting was later raised to 300°F, but this should not change the timing by more than a minute. Minor problems due to incomplete pre-start-up check list--PRC-1000 was not controlling until we found that PT-1000 had been disconnected; high level in the cyclone until we found the 4" cock on the discharge line closed.

Again it should be pointed out that the screw conveyor in the "gaboon" moves product faster than the unloading screw conveyor into the pit. This causes problems and requires extra attention during unloading.

1130 System shut down and system secured under normal circumstances.

T. G. Towers
T. G. Towers

TGT:b2a

cc: C.M. Stone
W.E. Powell
M.H. Vardaman
E.R. Krebs
M.L. Lawless-H.K. Long
Technical Engineers (9)
Shift Engineers (3)
File

APPENDIX

TABLE I
PRODUCT SCREEN AND MOISTURE ANALYSIS

SAMPLE TYPE	PRODUCT 0945	PRODUCT 1020	FEED 1155	PRODUCT 1200	PRODUCT 1300	PRODUCT 1345	PRODUCT 1420	PRODUCT 1500	PRODUCT 1655	FEED 1715	PRODUCT 1725
Moist- ure % H ₂ O	7.2	7.6	36.5	8.0	6.2	12.0	13.4	7.4	7.1	34.8	8.5
Retained on Mesh											
1 1/2 Inch			0.0							1.7	
1 Inch			4.9							13.5	
3/4 Inch			7.2							16.9	
1/4 Inch			29.3							38.5	
4 MESH	0.5	0.1	1.2	0.3	0.4	1.6	5.8	0.2	0.2	1.1	0.3
6 MESH	0.4	0.2	11.5	0.5	0.4	3.5	8.3	0.4	0.3	6.6	0.8
8 MESH	1.1	0.7	9.9	1.6	1.0	6.7	10.0	1.5	1.1	5.0	2.1
10 MESH	2.7	1.8	7.9	4.0	2.8	9.9	10.8	3.8	2.6	3.5	4.1
14 MESH	5.7	4.2	6.8	7.1	6.0	12.5	11.4	6.8	5.7	3.1	7.3
20 MESH	8.6	7.3	5.7	9.6	8.1	12.8	10.5	8.5	7.6	2.3	9.6
28 MESH	14.2	13.4	4.9	14.3	13.0	13.9	10.8	12.5	11.7	1.9	13.7
35 MESH	16.5	17.1	3.8	16.1	16.0	11.6	9.2	14.8	14.0	1.6	14.6
48 MESH	16.6	17.4	3.1	15.6	17.2	9.8	8.0	16.3	16.5	1.4	15.0
60 MESH	6.7	6.7	1.2	6.0	7.0	3.8	3.1	6.8	7.5	0.6	6.3
100 MESH	11.8	13.3	1.6	11.5	12.6	6.0	5.2	12.5	14.5	1.1	11.3
200 MESH	8.1	9.3	0.7	7.4	8.3	4.0	3.5	8.6	10.5	0.8	7.9
PAN	7.1	8.5	0.1	6.0	7.2	3.9	3.4	7.3	7.7	0.4	7.0
MEAN PARTICLE SIZE DIAM	.00219"	.00185	.00240	.00214	.0432	.0611	.0223	.00199		.0247	

Mean Particle size diameter calculated from the formula

$\bar{D}_{ave} = \frac{\sum d_i^3}{\sum d_i^2}$, page 24

Studies on Mechanics of Fluo-Solids Systems

Period: July 1964 to June 1968

R & D Report No. 16, Interim Report No. 3, Book 1

by G. P. Curran and Everett Gorin

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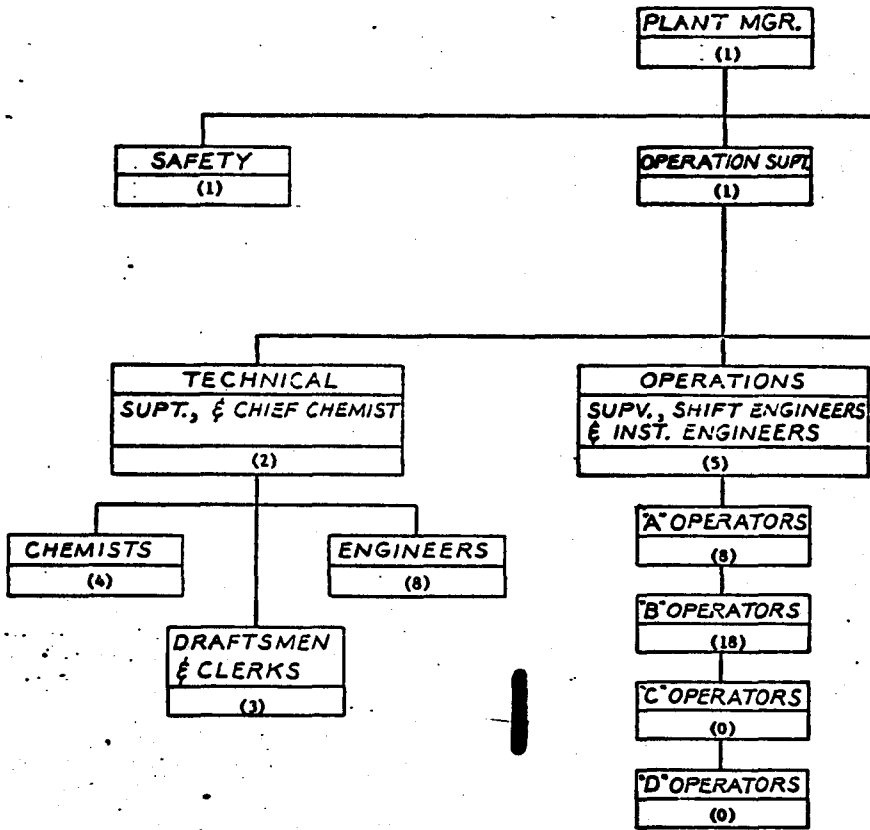
TABLE I
SCREEN AND MOISTURE ANALYSIS

PRODUCT	1500	1655	1715	1725	2000	2000	2300	2300	2300	0265	0353
7.4	7.1	34.8	8.5	31.0	5.9	33.2	5.4	32.8	5.6		
	1.7		0.8		0.7		0.8				
	13.5		8.8		11.8		9.0				
	16.9		16.2		15.4		14.4				
	38.5		41.5		39.9		43.0				
0.2	0.2	1.1	0.3	0.5	0.1	1.0	0.1	0.4	0.1		
0.4	0.3	6.6	0.8	5.3	0.1	8.3	0.1	6.3	0.1		
1.5	1.1	5.0	2.1	4.9	0.8	5.8	0.5	5.5	0.7		
3.8	2.6	3.5	4.1	4.3	2.1	3.9	1.8	4.5	2.7		
6.8	5.7	3.1	7.3	3.9	5.3	3.1	4.9	3.8	6.7		
8.5	7.6	2.3	9.6	3.1	8.0	2.3	8.1	2.8	9.2		
12.5	11.7	1.9	13.7	2.7	12.9	1.8	13.2	2.4	14.4		
14.8	14.0	1.6	14.6	2.2	15.5	1.5	15.9	1.8	16.1		
16.3	16.5	1.4	15.0	1.9	17.2	1.4	17.7	1.6	16.9		
6.8	7.5	0.6	6.3	0.8	7.3	0.6	7.7	0.7	7.1		
12.5	14.5	1.1	11.3	1.4	13.7	1.2	13.9	1.3	12.6		
8.6	10.5	0.8	7.9	1.1	9.7	0.9	9.5	1.1	8.3		
7.3	7.7	0.4	7.0	0.6	7.3	0.4	6.8	0.6	5.2		
.0223	.00199		.0247		.00192		.00185		.0210		

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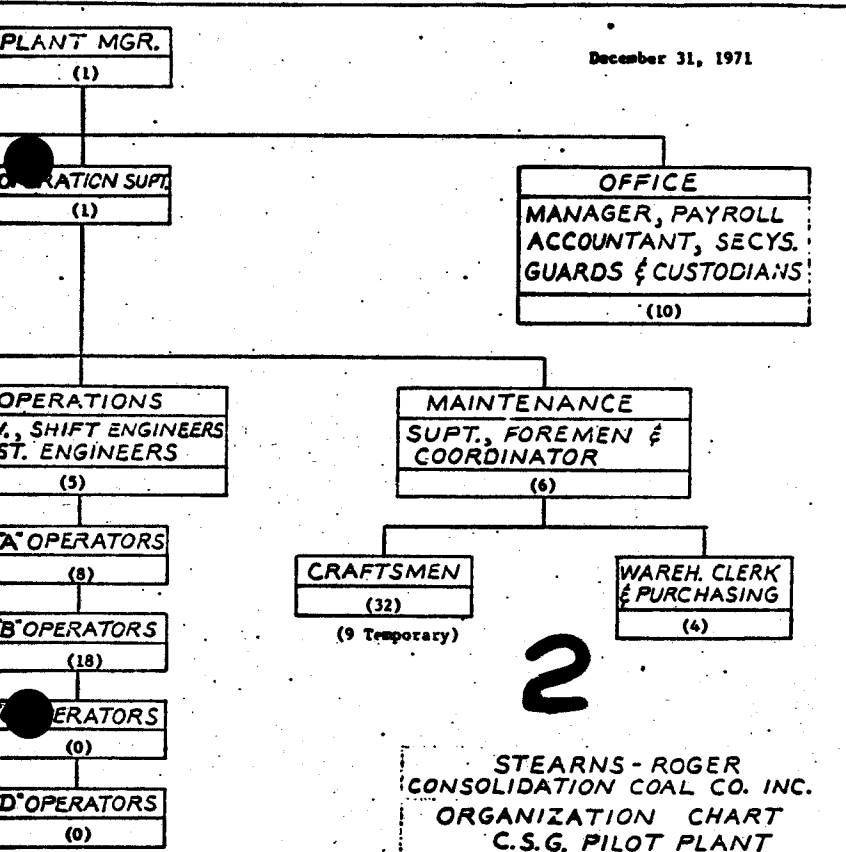
TABLE II
SYSTEM READINGS

READINGS	UNITS	12/2 0945	12/2 1020	12/2 1200	12/2 1300	12/2 1345	12/2 1420	12/2 1500	12/2 1655	12/2 1725	12/2 2000	12/2 2300	12/3 0200
Roller Mill Inlet	oF	960	900	927	940	980	1200	1120	1160	1220	1190	1160	1120
Roller Mill Plenum	oF	920	860	900	960	980	1000	975	985	1040	1020	1000	994
Roller Mill Outlet	oF	305	285	310	320	320	320	320	305	325	315	320	316
Cyclone Outlet	oF	268	259	265	283	250	259	274	271	262	274	274	280
Baghouse Outlet	oF	235	240	228	249	232	237	243	241	240	255	255	255
DP Roller Mill	In H ₂ O	8	8	8	7	7.25	7.25	7.5	7.5	7.5	8.25	8.25	7.5
Roller Mill Amps	AMPS	21	21.5	21.5	21.5	22	22	22	24	25	25	26	24
Natural Gas Flow ΔP	In H ₂ O	.60	0.6	0.65	0.76	0.75	.76	.75	0.80	0.82	0.75	0.76	0.70
Valve Position	Position	1037 Open	407 Open	407 Open	Full Open	Half Open	Half Open	Half Open	Half Open	Half Open	Half Open	Half Open	Half Open
System Press.	In H ₂ O	9	9	10	10	9.5	9.5	9.5	9.5	9	9	9.5	9
Velocity Sep Position	Position	UP	UP	UP	UP	3/4 DOWN	All DOWN	UP	UP	1/3 DOWN	UP	UP	UP
Oxygen	%	7.5	8.0%	6	3	3.5	3.5	3.5	4.4	4.4	4.0	6.7	6.5
Valve Position	Position	1003 Open	Full Open	Full Open	Full Open	Full Open	Full Open	Full Open	Full Open	Full Open	Full Open	Full Open	Full Open
Primary Fan Discharge	In H ₂ O	7	7	7	10	10	9	8	8	8	8.5	8	8
Secondary Fan Discharge	In H ₂ O	12	12	10	11.5	11.5	12	12	12	11	11.5	11	11.5



TOTAL PEOPLE (112)

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STEARNS - ROGER
CONSOLIDATION COAL CO. INC.
ORGANIZATION CHART
C.S.G. PILOT PLANT

W.D. MEEKS NONE
11-3-71 SK-5G

Stearns-Roger
CORPORATION
INTEROFFICE CORRESPONDENCE

TO: D. E. Mosher
FROM: T. G. Towers

January 5 1972

Subject Dolomite Grinding Test Run
November 13, 1971

OBJECTIVE:

1. Demonstration of Dolomite Screw Conveyor (L-152) operation, with oversize recycle in operation.
2. Determine split of fines and product using 9 x20 mesh screens in Vibrating Screener (L-155).

RESULTS:

1. The total measured throughput of Dolomite Grinding System in a four hour run period was 42,060 pounds splitting into 15,660 pounds product and 26,400 pounds fines. Feed rate obtained of 5.15 tons per hour.
2. Particle size results listed below are composite samples for the run:

Mesh Size	PRODUCT	FINES
	% Retained	% Retained
6	.1	.1
8	2.2	.1
10	26.7	.1
14	42.0	1.0
20	21.9	8.0
28	4.6	19.4
35	.8	15.3
48	.3	11.5
60	.1	4.3
100	.1	7.8
200	.1	7.6
PAN	1.1	24.8

3. Mean particle size diameter for product was 0.0543 inches calculated from the formula:

$$\phi_{AVE} = \frac{\sum \phi_i M_i}{\sum M_i}, \text{ Page 24}$$

STUDIES ON MECHANICS OF FLUO-SOLIDS SYSTEMS
Period: July 1964 to June 1968
R&D Report No. 16, Interim Report No. 3, Book 1
by G. P. Curran and Everett Gorin

4. No sample of the feed sample was pulled during the subject Dolomite grind. For indicative feed sizes see Report of "Run II - Dolomite Grinding Test" from T. G. Towers to D. R. Mosher dated November 19, 1971.

OBSERVATIONS:

1. The screw conveyor (L-152) operated sporadically until the overload heaters were changed out with larger heaters.
2. Inboard and outboard bearings on hammermill (L-153) ran warm until the excess grease in the bearings ran out.
3. Removal of fines in the storage hopper remains difficult because of bridging at the base of the cone.
4. The replacement motor on the dolomite screw conveyor (L-152) allowed better feed rates after the overload heaters were replaced.
5. Removal of the product and fines from their respective storage bins was delayed until a cherry picker driver became available.

T. G. Towers
T. G. Towers

cc C. M. Stone
W. E. Powell
H. H. Vardaman
H. L. Lawless - H. K. Long
H. R. Krebs
Shift Engineers (3)
Technical Engineers (9)

SUBCONTRACT BETWEEN CONSOL AND SD&M RE CONSOL CO₂ ACCEPTOR PROCESS
(OCR, Prime Contract No. 14-01-0001-415(3))

MONTHLY REPORT FOR DECEMBER, 1971

I. General

Laboratory work on the hundreds of samples of carbonate samples collected during the summer is progressing satisfactorily as is the gathering of other data for the final report. The checking of phases in the calcium hydroxide/calcium carbonate system is proceeding on schedule in conjunction with necessary equipment modifications. Technique for high accuracy lead determinations is satisfactory. Lignite used by the gasification plant is being studied by column ion exchange using raw materials available during the gasification process. Instrumentation on wastewater monitoring has been installed and particle monitoring equipment has been delivered for installation by Stearns-Rogers.

II. Carbonate Resources (Mickelson)

Work on the base map for transport, outcrops, etc., is almost completed. A subsection on the lignite distribution of northwestern South Dakota is complete.

Grinding of samples for chemical analysis is proceeding on schedule. Chemical analyses by the Experiment Station are off to a slow start but will be on schedule shortly. We are still trying to get some good Tynochtee dolomite samples for comparison purposes. Engineering properties on strength and deformation of the Fabsapsa limestone sample has been completed and the report is in preparation. Logging of samples continues and will soon have that portion of the report in the writing stage. Samples will be sent out for thin-sectioning in early January.

III. Acceptor Reconstitution (Fuerstenu)

Experimental work in December involved checking the phase diagram of calcium hydroxide/calcium carbonate as a function of composition and partial pressure of steam. Unusual temperature distributions in the furnace and temperature gradients within the melts have been experienced which has made certain modifications in the equipment and techniques necessary. These have been completed and melts are being studied as a function of composition and steam pressure. Similar work will be continued in January.

IV. Noxious Elements (Lingard)

Work during December was concerned primarily with methods of concentrating trace elements in lignite prior to determination by atomic absorption. Use of diethyldithiocarbamic acid as a complexing agent following dissolution of the sample by a wet ashing technique and adjustment of pH seems to allow extraction of lead into methylisobutyl ketone from which it can be determined by atomic absorption. Further studies on lead and on other elements will continue in January.

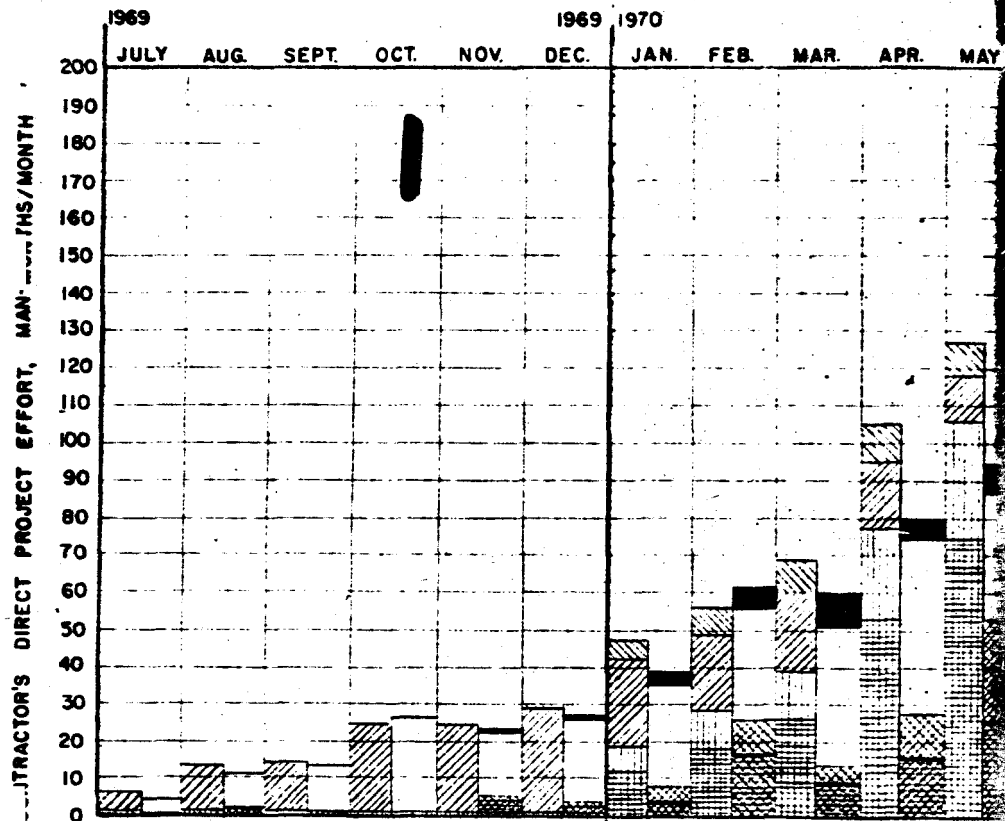
V. Pre-Gasification Beneficiation (Clarkson)

Sodium removal from coal samples obtained from the gasification pilot plant was studied with column ion exchange using a 5×10^{-3} molar solution of Ca^{++} at pH 6.0. This solution was prepared by bubbling CO_2 into a suspension of calcium carbonate at room temperature. This technique was used since such a solution can easily be prepared from raw materials produced in the gasification process. Experiments were made as a function of solution flow rate on coal samples +325 mesh in size. Coal samples were prepared by screening out the -325 mesh material

3
from the product obtained after primary crushing at the gasification plant. Studies using the pilot plant lignite will be continued in January.

VI. Waste Monitoring (Oliver)

For gas monitoring, the vent stack adaptor has been completed. As soon as the optical particle monitor is completed and installed, the adaptor will be delivered to Stearns-Roger for installation in the vent stack. Samples of ambient air in the vicinity of the plant (prior to plant operation) have been collected and analyzed with the gas chromatograph. For wastewater monitoring, the steel instrument shed adjacent to the wastewater pond has been completed and wired. A two-channel recorder for continuous recording of pH and dissolved oxygen has been received and will now be checked out and calibrated with inputs from the two measuring instruments.



MONTHLY EXPENDITURES *

	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
PREDICTED	0	30.0 M	41.0 M	50.0 M	98.0 M	106.9 M	112.0 M	273.0 M	299.3 M	445.6 M	623.7
ACTUAL	6.2	25.0	32.8	42.6	39.7	126.2	110.5	76.7	102.9	209.2	233.7
PREDICTED	0	30.0 M	71.0 M	121.0 M	219.0 M	325.9 M	437.9 M	710.9 M	1010.2 M	1455.8 M	2079
ACTUAL	6.2	31.2	64.0	106.6	146.3	272.5	383.0	459.7	562.6	771.8	1005

CUMULATIVE EXPENDITURES *

* EXPENDITURES INCLUDE ALL COSTS & FEES

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FR	64 817
SA	120
SU	198
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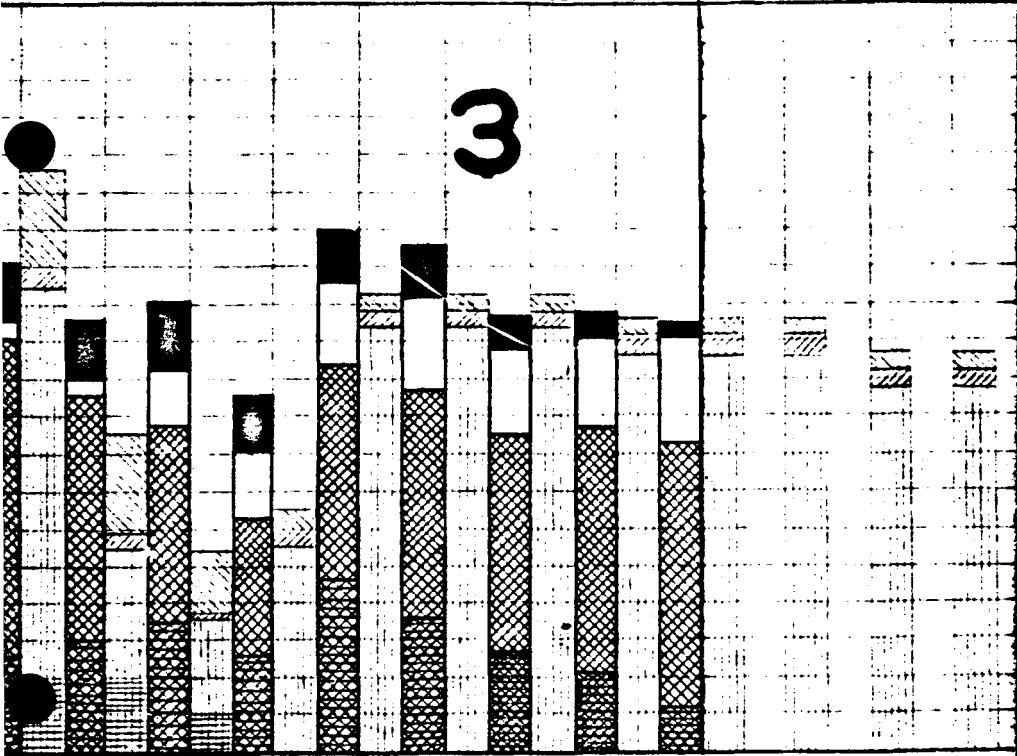
MONTHLY PROGRESS CHART (

CONTRACT NO. 14-01-0001-415 (3)

1971 1972

MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR.

3



437.7M	441.8M	285.0M	220.8M	318.1M	218.0M	219.1M	211.9M	211.5M	211.5M	185.1M	184.5M
292.0	308.1	221.6	299.6	440.1	409.4	238.0	301.2				

MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
8538.1M	8979.9M	9264.9M	9485.7M	9703.8M	9921.8M	10140.9M	10352.8M	10566.3M	10775.8M	10920.9M	11145.4M
8176.4	8484.5	8706.1	9005.7	9445.8	9855.2	10,093.2	10,454.4				
129.7	246.6	558.8	479.5	611.7	807.8	981.0	1196.6				
196.7	293.1	2571.3	1534.2	2854.1	9052.4	9,112.2	9257.8				
154.9	157.4	158.7	159.4	159.5	160.8	161.8	161.9				

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PREDICT

SUPERVISOR
CLERICAL

STEARNS
STEARNS

MONTHLY

OFFICE OF
DEPARTMENT

SOLID
CONSTRUCTION DIVISION

FACTORY
(REVENUE)

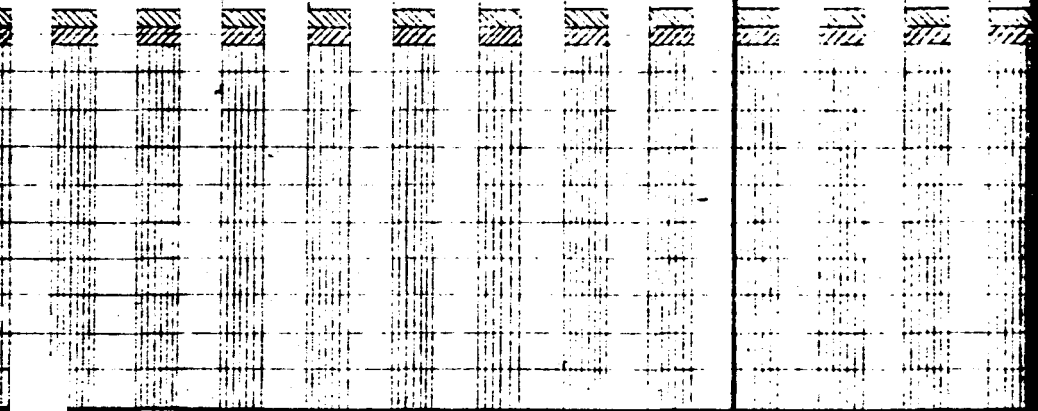
(CONSTRUCTION & OPERATION)

(REVISED 12/31/70)

1972 1973

PR. MAY JUNE JULY AUG. SEPT. OCT NOV. DEC. JAN. FEB. MAR. APR.

4



185.5M	204.7M	209.9M	202.8M	202.8M	202.9M	201.8M	201.5M	201.4M	183.2M	182.9M	182.1M	180.
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PR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
-----	-----	------	------	------	-------	------	------	------	------	------	------	------

184M	11,350.1M	11,554.0M	11,756.8M	11,959.6M	12,162.5M	12,364.3M	12,565.8M	12,767.2M	12,950.4M	13,133.3M	13,315.4M	13,498.5M
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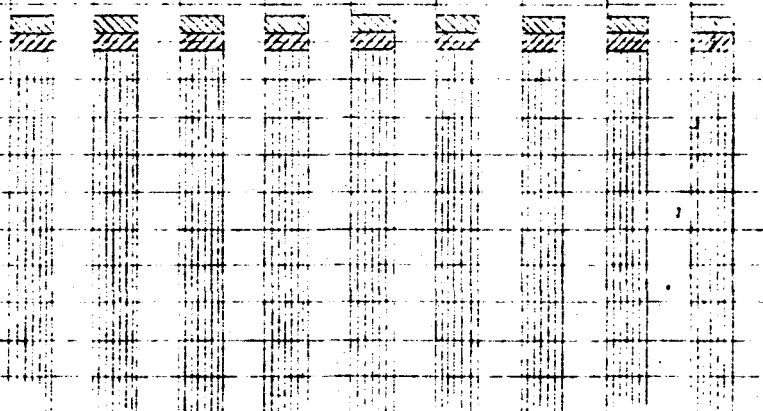
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1973

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

5



180.5M	177.5M	170.0M	161.2M	150.8M	130.1M	130.0M	130.0M	24.9M
--------	--------	--------	--------	--------	--------	--------	--------	-------

APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

13,493.9M	13,673.4M	13,843.4M	14,004.2M	14,154.4M	14,275.5M	14,405.5M	14,535.5M	14,566.4M
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APPROXIMATE TOTAL CONSTRUCTION ≈ 8,800,000
 APPROXIMATE TOTAL OPERATIONS ≈ 5,760,400
 14,560,400

PRED

SUPERVISING

PROFESSIONAL

TECHNICIAN S-R

TECHNICIAN S/C

- INCLUDES SUPERV
- INCLUDES CLERIC

CONSTRUCTION — STEAR
 OPERATIONS — STEAR

MONTHL
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 CONSO
 RESEARCH DIV
 CONTRACT

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DATE: 9 Dec 1971

1973

OCT. NOV. DEC.

	PREDICTED	ACTUAL
SUPERVISING		
PROFESSIONAL		
TECHNICIAN S-R		
TECHNICIAN S/C		

- ⊕ INCLUDES SUPERVISORY EXEMPT TECHNICIANS
- ⊙ INCLUDES CLERICAL

CONSTRUCTION — STEARNS-ROGER JOB B-37000
 OPERATIONS — STEARNS-ROGER JOB B-37400

6

MONTHLY PROGRESS CHART

OFFICE OF COAL RESEARCH
 U.S. DEPARTMENT OF THE INTERIOR

CONSOLIDATION COAL CO.
 RESEARCH DIVISION LIBRARY, PA.

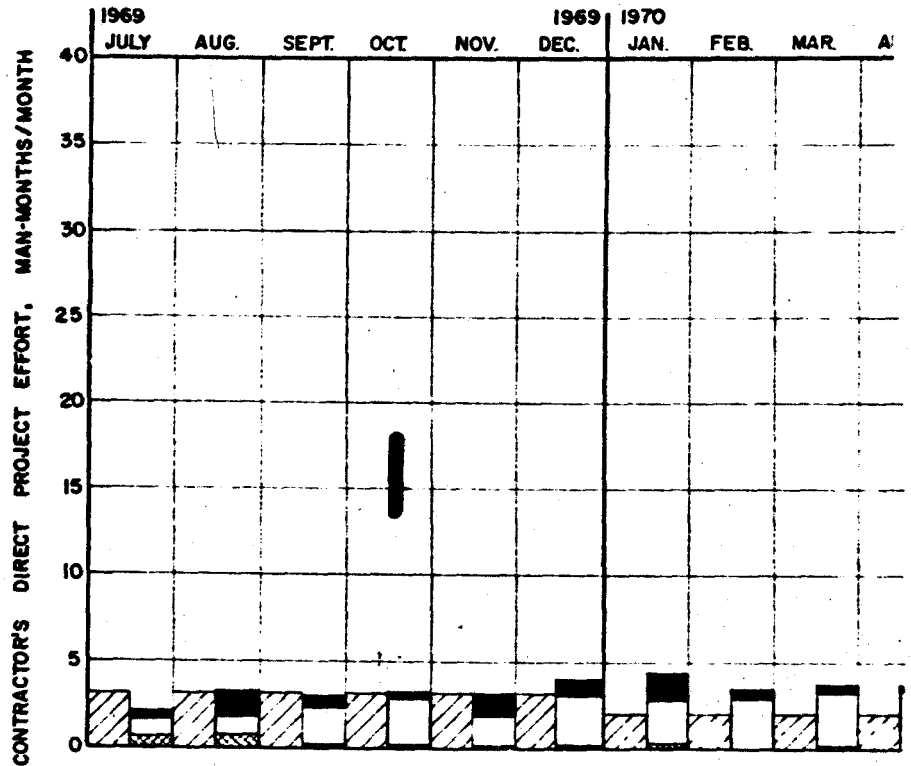
CONTRACT NO. 14-01-0001-415 (3)
 (REVISED 12/31/70)

M 130.0M 24.9M

OCT. NOV. DEC.

14,405.5M 14,535.5M 14,560.4M

CONSTRUCTION ≈ 8,600,000
 OPERATIONS ≈ 5,760,400
 14,560,400



MONTHLY EXPENDITURES*

	1969 JULY	AUG.	SEPT.	OCT.	NOV.	1969 DEC.	1970 JAN.	FEB.	MAR.	APR.
PREDICTED	16,215	14,685	14,965	13,155	14,385	17,065	15,595	15,595	12,655	12,875
ACTUAL	11,745	34,734	9,609	11,925	10,130	15,205	14,378	14,027	15,019	53,200
PREDICTED	16,215	30,900	45,865	59,020	73,405	90,470	106,055	121,650	134,305	147,180
ACTUAL	11,745	46,479	56,098	67,913	78,043	93,249	107,626	121,653	136,672	89,900

CUMULATIVE EXPENDITURES*

* Expenditures Include All Costs & Fees By Consol And S. Dakota Sci

MONT

MAY JUNE JULY AUG. SEPT. OCT. NOV. 1970 DEC. 1971 JAN. FEB. MAR. APR. MA

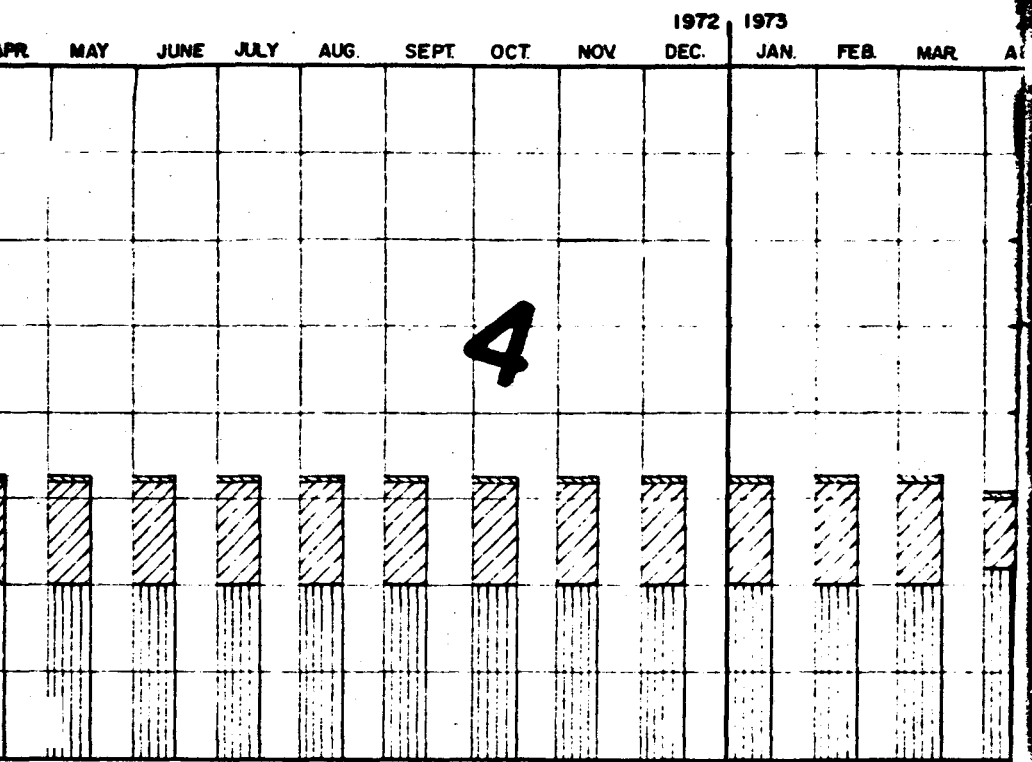
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13,815	12,655	13,315	12,835	12,505	12,505	12,505	20,155	27,135	23,295	22,295	21,145	18,145
17,342	19,319	20,054	13,955	25,003	21,296	9,584	23,091	16,475	16,663	12,820	22,198	12,145
MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY
160,995	173,650	186,965	199,800	212,305	224,810	237,315	257,470	277,605	300,900	323,195	344,340	363,145
207,242	226,561	246,615	260,570	285,573	306,869	316,453	339,544	355,019	372,642	385,502	407,694	428,145

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475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475	39,475
APR	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR	MAY	JUNE	JULY
1,750	290,225	729,700	769,175	808,650	848,125	887,600	927,075	966,550	1,006,025	1,045,500	1,084,975	1,124,450	1,163,925	1,203,400	1,242,875

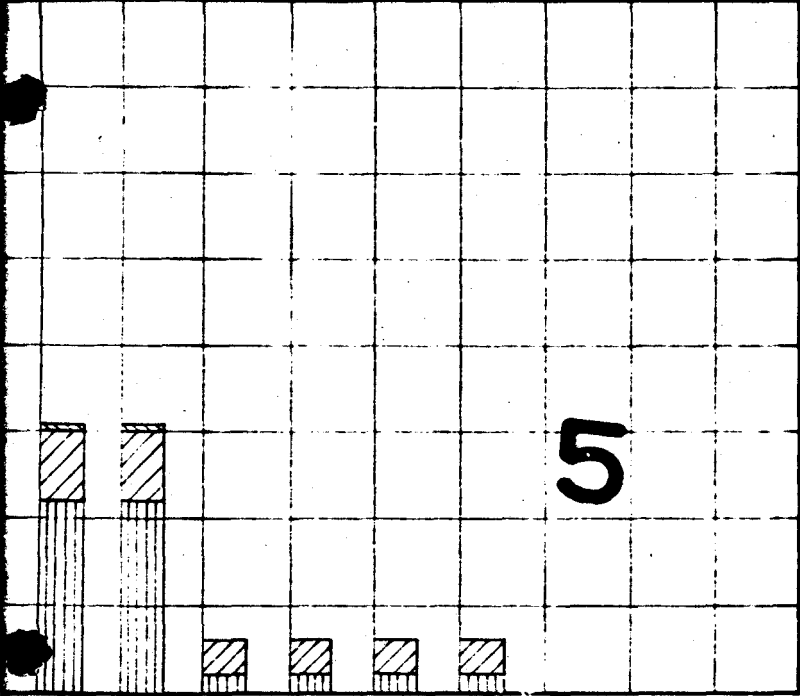
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DATE: Aug 1973

1973

APR. MAY JUNE JULY AUG. SEPT.



- PRE
- SUPERVISING
- PROFESSIONAL
- TECHNICIAN
- ⊕ Includes Super
- ⊗ Includes Cleri

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36,075	36,075	11,475	11,475	11,475	41,120			
APR	MAY	JUNE	JULY	AUG.	SEPT.			
1,121,050	1,157,125	1,166,600	1,180,075	1,191,550	1,232,670			

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