



THE COAL CAPITAL  
OF THE WORLD

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Wayne T. Rutherford, County Judge/Executive  
COAL GASIFICATION PROJECT



March 25, 1980

To Attached Addressees

Gentlemen:

PIKE COUNTY COAL GASIFICATION PROJECT

Enclosed are the following reports:

Annual Report FE-2570-24,  
Monthly Technical Reports FE-2570-25, FE-2570-26,  
FE-2570-28, FE-2570-29, FE-2570-31, and FE-2570-32,  
Quarterly Reports FE-2570-27, FE-2570-30, FE-2570-33

Mason & Hanger submitted to us the above reports for distribution.

Very truly yours,

James P. Pruitt, Jr.  
Acting Project Manager

JPP:VLS:vls

Attachments

APPROVED FOR RELEASE OR  
PUBLICATION BY THE PROJECT GROUP  
4/28/80  
BY J.P.P.

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J. Mitchell, K.D.O.E.	1
W. T. Rutherford, P.C. Judge	1
R. Clark, P.C.	1
M. Potterf, ARC	1
J. Pruitt, P.C.	2 (gen. file)

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ANNUAL REPORT SUMMARY  
COAL GASIFICATION PLANT  
PIKE COUNTY, KENTUCKY  
IN CONJUNCTION WITH  
MASON & HANGER-SILAS MASON CO., INC.

1. OBJECTIVES

The objective of this work, primarily, is to use coal gasifiers in conjunction with an energy plant using "state of the art" equipment as the sole energy system to support a Governmental-Commercial development with provisions to furnish low Btu gas to industrial users in the future.

Secondarily, the objective is to provide a demonstration facility serving to collect technical, environmental and economic data on a low Btu gasification system. All phases of the program, i.e., design, fabrication, installation, and up to three years of operation, will be evaluated to furnish data for the basis of analyzing the utilization of coal gasification for similar applications.

The initial concept of the project did not extend beyond the design, installation, and operation of a basic energy plant consisting of gas producers, boilers, chillers, and the required ancillary pumps, motors, etc. necessary to provide hot and/or chilled water for heating and

cooling with the surplus producer gas, if any, being available for sale to possible future industrial users. However, immediately after the signing of the Cooperative Agreement, the decision was made by the Federal Agency then in charge, the United States Energy Research and Development Administration (ERDA), to add the design of a gas cleanup system to the project with the understanding that future modifications to the Cooperative Agreement would be made to enable the construction of this unit. The design of the cleanup system was included at this time in order that the costs and the physical space requirements could be more accurately estimated and the future final decisions regarding the additional funding required might proceed in an orderly manner.

### II. NATURE OF THE PROJECT

The primary impact of this work is to provide DOE with a definition of the characteristics, performance and economics of future coal gasification complexes.

The project is generally divided into three phases, namely Design, Construction and Operation. Although the work is designated as being broken into Phases, with specific Tasks under each Phase, there will of necessity be an overlap of the Tasks under Phase I-Design and Phase II-Construction.

Under Phase I-Design there are five Tasks as follows:

Task I - Procurement of Long Lead Items

Task II - Preliminary Design and Analysis

Task III - Final Design

Task IV - Design Reviews

Task V - Environmental Impact Statement

1. Task I will involve the preparation of purchase specifications for the long lead equipment items, issuance of these specifications to prospective bidders, receiving and analysing the bids and issuance of purchase orders or contracts for the items.

a. Among these long lead items are the gas producers which will be handled on a "sole-source" procurement basis, due to the precontract agreement to utilize the Wellman-Galusha 6"-6" diameter single stage producers, the boilers, and the absorption chillers. Both the boilers and the chillers will be handled on a competitive bidding basis as there are several available manufacturers.

2. Task II - Preliminary Design and Analysis will consist of the preparation of the preliminary design to the point that all changes which have occurred since the inception of the project are incorporated thus establishing a firm basis for continuation through Task III - Final Design. Also at this time, a more accurate assessment of the Operational and Cost Analyses can be made which can be updated to reflect current planning.

3. Task III - Final Design will be accomplished in stages and each stage will consist of a "bid package" which will be issued for competitive lump sum bidding. The design involved in these bid packages will be based on information derived from manufacturer's factory drawings or shop drawings thereby greatly reducing the possibility of field changes and/or modifications once the contract for the particular work involved is started. This will also accomplish two other main objectives; namely, to speed up the actual construction of the Energy Plant by allowing early portions of the construction to proceed prior to completion of the final design and to eliminate, insofar as possible, some of the ongoing escalation in both labor and material costs. These "staged" bid packages may consist, in part, of the building to house the Energy Plant, the foundations and equipment pads, the hot and chilled water distribution system, and the final installation and hookup, both mechanical and electrical, of all major items of equipment as well as the furnishing and installation of all remaining minor items of equipment.
  
4. Task IV - Design Reviews consists of the Design Reviews which are planned to be held at least once a month during the entire design Phase of the project. These will serve as an ongoing check on the progress of the work as well as providing a sounding board wherein all current information regarding modifications to the "state-of-the-art as well as changes in regulations affecting the operation

of the facility, can be incorporated into the design by all parties concerned.

5. Task V - Environmental Impact Statement. This is to consist first, of the preparation of an Environmental Assessment (EA) which will determine whether or not the more complicated Environmental Impact Statement is required. The primary purpose of the EA is to ascertain that all requirements of all regulatory agencies involved are going to be complied with or, if not, state valid, logical reasons why. After the submission of the EA, if it is not acceptable, or in other words, it produces a Positive Declaration, then, and only then, does an Environmental Impact Statement become a necessity.

Phase II - Construction consists of the following Tasks:

Task I - Site Development

Task II - The Energy Plant Building

Task III - Delivery of Major Purchased Equipment Items

Task IV - Installation of Major Equipment Items

Task V - Completion of Piping, Electrical, Mechanical and Instrumentation, as well as minor equipment items, required to complete the Energy Plant and allow Phase III to proceed.

1. It is at this point that the overlap of Phase I and Phase II, as mentioned earlier, will occur. Due to the staged construction

being planned, the Tasks under Phase II will not necessarily follow the exact numerical order they have been assigned. For instance, the Site Development cannot be accomplished until the Energy Plant Building and its' foundations, equipment pads, etc. have been installed, and it is entirely possible, due to price and weather conditions prevailing at the time, that some items of major purchased equipment may be delivered and stored at the site until the actual building is ready to receive them.

2. Task - I Site Development will consist of the paving required to provide parking for the operating and administrative staff, access to the building for fuel supply, ash removal, and maintenance, the necessary grading and leveling required to provide storm drainage, the required settling ponds or basins to handle liquid waste, and the exterior facilities for coal storage.
3. Task II - Energy Plant Building will, as explained hereinbefore, be purchased by competitive bidding, and along with its associated foundations and equipment pads, will be the first item of actual construction on the site.
4. Task III - Delivery of Major Purchased Equipment Items will be staged not only to coincide with their actual need on the site but also to suit the manufacturer's production schedule and to take every possible advantage of shipping and economic factors.

5. Task IV - Installation of Major Equipment Items, will in a sense, be fragmented due to the fact that some of these items, namely the gas producers and portions of the boilers, will be installed by the manufacturers, and the size of some of the equipment dictates that it must be installed before the building to house it is complete.
6. Task V - The Final Task under this Phase, the Completion of Piping, Electrical, and other equipment in the building is programmed to be accomplished under one General Construction Contract and will also include the installation of the balance of the major equipment items as well as the furnishing and installation of miscellaneous minor equipment such as pumps, motors, etc.

Phase III - Operation is divided into three Tasks as follows:

Task I - Startup and Shakedown

Task II - Steadystate Operation and Data Collection

Task III - Final Report

1. Task I - Startup and Shakedown is programmed to extend over a two month period and, as the title implies, is the period during which all the "bugs" in the system can be detected and corrected and operator training can be accomplished. The full "steady state"

operation crew will be on board and will be thoroughly trained during this period.

2. Task II - Steadystate Operation - Data Collection is programmed for a maximum of three years and is the period during which the primary purpose of the project will be accomplished. That is, the full collection and analization of complete operational data, cost, efficiency, etc. will be recorded and used to better determine the future use of coal gasification facilities to supplement the nation's energy supply.
3. Task III - Final Report is programmed to be submitted two months following the conclusion of Task II and will be a full and factual history of the project from its' inception to such conclusion of data collection and will contain all financial and operational data.

### III. STATUS OF TASKS

#### 1. Accomplishments

- a. Insofar as Phase I is concerned, all Tasks have proceeded in an orderly manner. The effort on behalf of Task I - Procurement of Long Lead Items has resulted in the purchase of the gas producers, the boilers, and the absorption chillers. Task II - Preliminary Design and Analysis was com-

pleted and submitted on 29 September 1977. Task III - Final Design began on 1 October 1977 and, with some delays caused mainly be revised regulations contained in the Clean Air Act as Amended, dated 7 August 1977 (PL95-95), has proceeded in general as originally programmed.

This Clean Air Act as Amended, which originated in 1967 as the "Air Quality Act" and in 1970 had the "Clean Air Amendments" added to it and was then further amended in August of 1977, among other things, placed much more stringent limitations of the SO<sub>2</sub> content of the stack emission than those that were in effect at the time the PON was issued, the basic design was formulated, or the Cooperative Agreement was signed.

At the time of the issuance of the PON, the standard for SO<sub>2</sub> emissions was 1.2# per million Btu input which, for this installation, would have resulted in an allowable maximum SO<sub>2</sub> output of 30.7# per hour. The Clean Air Act as amended, 1977 restricted the allowable maximum output for SO<sub>2</sub> to 17.84# per hour. This change coupled with the fact that the decision by Department of Energy was to accept the Clean Air Act as Amended, 1977 as being retroactive and requiring compliance of this project with all the revised requirements, has resulted in serious delays due to the design changes required and the consequent extension of the various schedules involved.

These changes in design involved not only revisions to the stack itself, but changes to the boilers and the burners to the extent that the direct coal-fired (stoker fed) mode of operation had to be completely eliminated which reflected itself further in requiring changes in the foundation and basement design.

- b. The Design Reviews as covered by Task IV have been held on a monthly basis and have, since the change in Governmental Agencies which occurred after project start, been attended by representatives of DOE in lieu of the original ERDA representatives. These have resulted in a more complete understanding by all parties to the project of the problems associated with an effort of this type where "state-of-the-art" equipment and processes are not really applicable in the fullest context due to the change in use versus that of several years ago and the stricter rules and regulations now existing. These Design Reviews have also, in the latter part of this reporting period, been participated in by representatives of the other two funding agencies involved in the project which has resulted in better cooperation by all concerned.

Task V, which addresses itself more properly to these new rules and regulations has been prepared and submitted, in

draft form, for review and comment to both State and Federal control agencies and has been accepted and issued with no deleterious impact on the project.

- c. Phase II Task effort has resulted in the building to house the Energy Plant being contracted for and scheduling of the delivery of the purchased equipment items. This delivery scheduling has necessarily "slipped" from what was originally planned to suit the actual delivery more aptly to the revised construction schedules.

Also, the Hollow Metal Doors, Frames and Hardware for the building have been contracted for and the Foundations and Floor Slabs have been bid and contracted for and actual construction work on this item is well under way. At this time, due to unusually bad weather during the winter months, the planned scheduling for this work will suffer some slippage but it is not felt that this will seriously affect the total project.

In addition to the above, constant tracking of the current situation in the coal mining industry has been accomplished in order that timely reports could be made as to the availability of various types of coal. This has revealed that the originally contemplated 0.6% sulfur coal is not available

in the Pike County area and that coal averaging 1.0% sulfur will be the best available. This has caused further changes in the basic design due to the increased quantities of  $\text{SO}_2$  emissions that have to be taken into consideration.

The net result of the required changes in the boiler and stack design has been greatly increased cost for these items due largely to the fact that the need for the changes was not made evident until the Purchase Order had been issued and actual fabrication of the equipment had begun.

Additionally, the elimination of the direct coal-fired (stoker fed) mode of operation greatly reduced the quantity of ash expected to be produced by the operation. This dictated the elimination of the relatively expensive pneumatic system of ash removal and caused this to be replaced with a more primitive, but much more economical, manual-mechanical method of ash removal.

As to the gas producers themselves, information from the manufacturer, which was only made available quite late in the design process, revealed that the "start-up" of this equipment required an entirely different type of fuel than that planned to be used for "stady-state" operation. This also affected

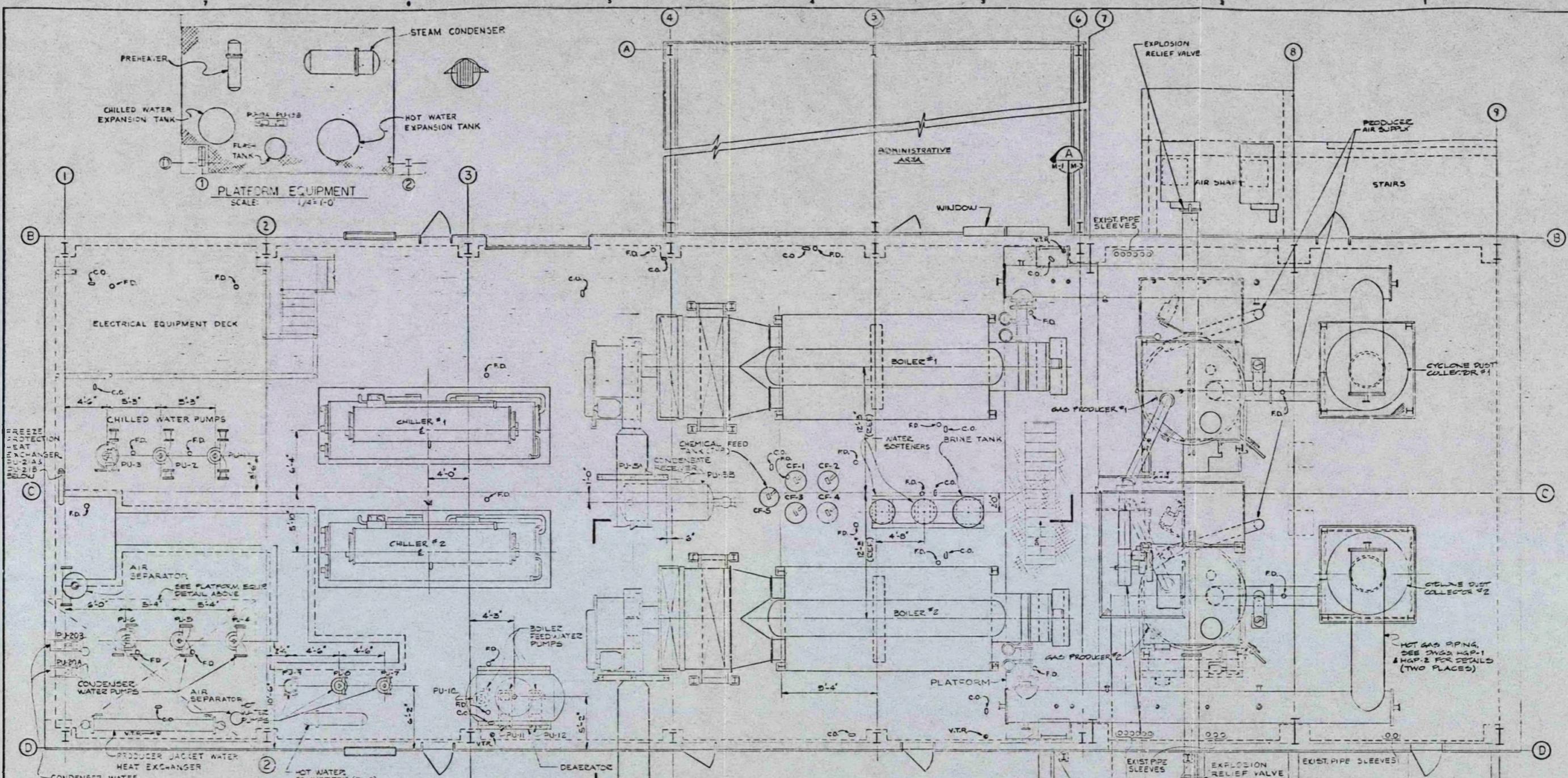
the programmed design time for the entire project by requiring a complete redesign of the coal handling system so that two distinctly different types of fuel might be accommodated.

- d. Phase III understandably, has not shown any effort at this time, however, the scheduling has proceeded to establish the future dates for this work.

2. Design Studies

- a. Equipment arrangements, both internal and external, as well as detail drawings indicating piping and electrical requirements have shown great progress as evidenced by the attached drawings labeled "Attachment A".

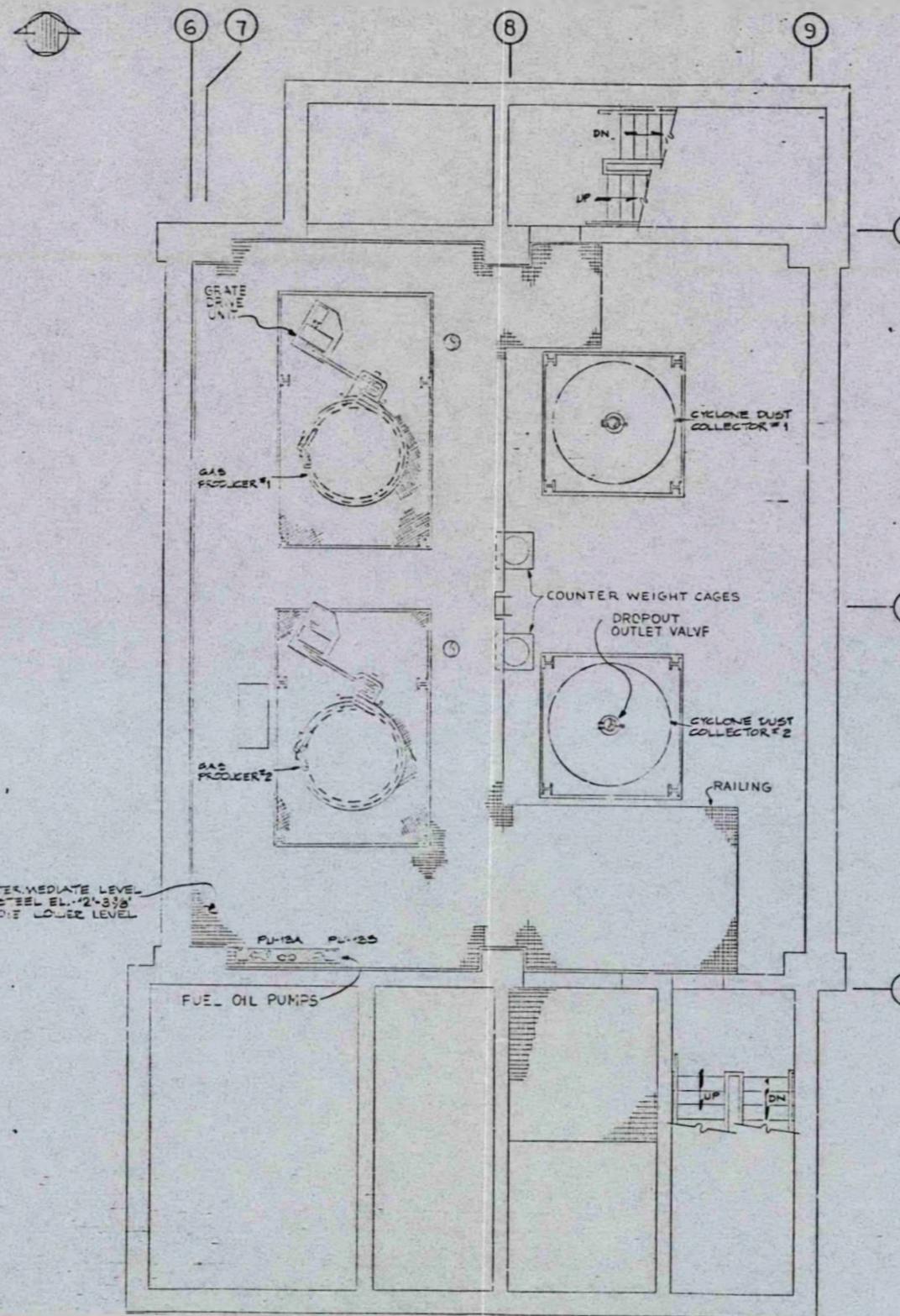
ATTACHMENT A



## SYMBOLS

## LEGEND

CWR	CHILLED WATER RETURN
CWS	CHILLED WATER SUPPLY
HWS	HOT WATER SUPPLY
HWR	HOT WATER RETURN
CS	CONDENSER SUPPLY
C	CONDENSATE
CR	CONDENSER RETURN
LPS	LOW PRESSURE STEAM
LPC	LOW PRESSURE CONDENSATE
HPS	HIGH PRESSURE STEAM
BFW	BOILER FEED WATER
WC	WATER CLOSET
HB	HOSE BIS
HPC	HIGH PRESSURE CONDENSATE
PRV	PRESSURE REDUCING VALVE
NC	NORMALLY CLOSED
FD	FLOOR DRAIN
EL	ELEVATION
CFM	CUBIC FEET PER MINUTE
EWH	ELECTRIC WATER HEATER
LAB	LABORATORY
EWC	ELECTRIC WATER COOLER
LAV	LAVATORY
UR	URINAL
VTR	VENT THRU ROOF
P	PROPANE
FOS	FUEL OIL SUPPLY
FOR	FUEL OIL RETURN
DW	DOMESTIC WATER
SW	SOFTENED WATER
N	NITROGEN
CA	COMPRESSED AIR
CF	CHEMICAL FEED
CW	COOLING WATER
WW	WASTE WATER
DFW	DEAERATOR FEED WATER
MU	MAKE-UP WATER
PW	PROCESS WATER
PCWS	PRODUCER COOLING WATER SUPPLY
PCWR	PRODUCER COOLING WATER RETURN
AFF	ABOVE FINISHED FLOOR
PU	PUMP
DN	DOWN
COND	CONDENSER
VAC	VACUUM
MPS	MEDIUM PRESSURE STEAM
PRV	PRESSURE REDUCING VALVE
HPR	HIGH PRESSURE RETURN
HGP	HOT GAS PIPE
AA	ATOMIZING AIR
AS	ATOMIZING STEAM

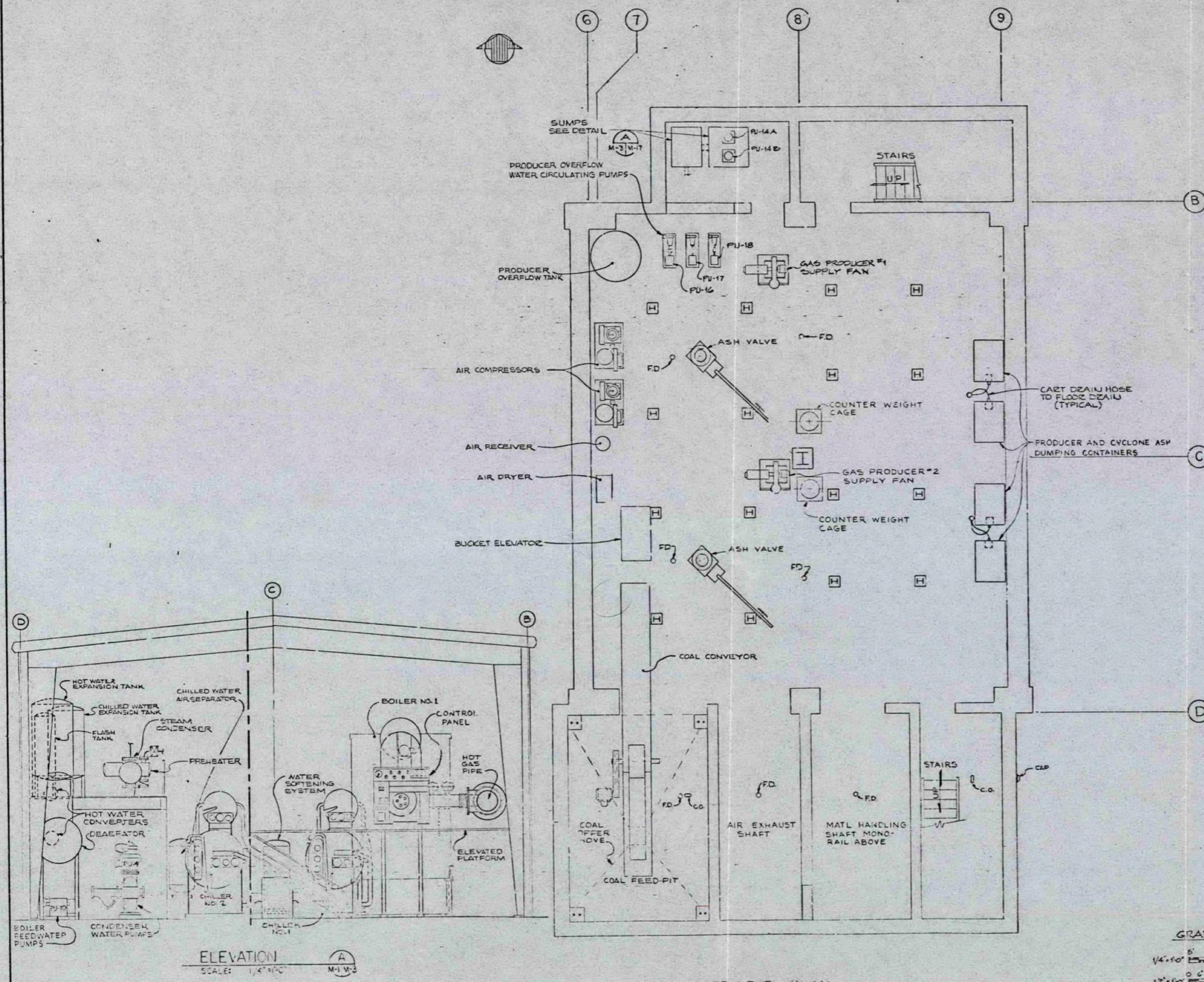


NOTE:

## INTERMEDIATE LEVEL PLAN

SCALE: 1/4" = 1'-0"

MASON & HENDERSON, BILAS MASON CO., INC. ARCHITECT-ENGINEER LEXINGTON, KENTUCKY		NO.	DATE	REVISIONS		BY CO. & E
		SEARCHED	INDEXED	SERIALIZED	FILED	
SUBMITTED		APPROVED	BY	DATE		
RECOMMENDED		DATE				
APPROVED		DATE				
		CONT. NO.	JOB NO.	RESCUE		SHED NO.
				M-2		9000-1



**NOTES:**  
 1. SEE SHEET M-1 FOR GENERAL NOTES.  
 2. SEE SHEET M-2 FOR LEGEND AND SYMBOLS.

GRAPHIC SCALES		REVISIONS	
1/4" = 5'	0	5'	BY C. A.
1/2" = 10'	0	5'	
5' 0" 10' 0" 15' 0" 20' 0" 25' 0" 30' 0" 35' 0" 40' 0" 45' 0" 50' 0" 55' 0" 60' 0" 65' 0" 70' 0" 75' 0" 80' 0" 85' 0" 90' 0" 95' 0" 100' 0"		5' 0" 10' 0" 15' 0" 20' 0" 25' 0" 30' 0" 35' 0" 40' 0" 45' 0" 50' 0" 55' 0" 60' 0" 65' 0" 70' 0" 75' 0" 80' 0" 85' 0" 90' 0" 95' 0" 100' 0"	
MASON & HANGER - SILAS MASON CO., INC. ARCHITECT - ENGINEERS LEXINGTON, KENTUCKY		GASIFICATION PROJECT DOUGLAS SITE FIVE COUNTY, KENTUCKY	
SUBMITTED	DATE	RECOMMENDED	DATE
APPROVED	DATE	APPROVED	DATE
KEY PLAN		CONT. NO.	JOB NO.
		SCALE	SHEET NO.
		A. NOTED	DRAWING NO.
			90001

**EQUIPMENT LAYOUT PLAN & DETAILS**  
**LOWER LEVEL**

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## ABSTRACT

Cooperative Agreement No. EF-77-A-01-2570 between Pike County, Kentucky and ERDA (DOE), which was signed in April, 1977, established a project to construct and cooperatively manage a low Btu coal gasification system, called an Energy Plant, in an environmentally acceptable manner at the Douglas Site located in Pike County, Kentucky. This Energy Plant is to supply hot and chilled water, for heating and cooling, to a multi-use community composed of residences, a health care facility and commercial buildings, and is to provide a test situation from which a data base may be developed to furnish technical, cost, and operational data for the future use of low Btu coal gasification facilities.

In addition to the above, it is intended to sell the gas produced over and above that required to satisfy the heating and cooling demand load to future industries to be located in the Douglas Site.

Mason & Hanger-Silas Mason Co., Inc., of Lexington, Kentucky, has been retained by Pike County, Kentucky to design the Energy Plant and to provide the necessary construction management services during the construction phase.

The original concept of the Project, as set forth in the Cooperative Agreement, calls for the work to be accomplished in three phases:

Phase I - Design, Phase II - Construction, and Phase III - Operation.

As previously stated, the responsibility for Phases I and II rests with Mason & Hanger-Silas Mason Co., Inc.

SUMMARY OF PROGRESS TO DATE

The attached chart, labeled "Project Plan and Progress Report", indicates the progress to date and also indicates the "slippage" or planned schedule extension of certain items of work occasioned by more restrictive requirements by regulatory agencies which have occurred since the inception of the project.

Foremost among these has been the revelation, since the first draft submission of the Environmental Impact Assessment, of the more stringent limitations on the SO<sub>2</sub> content of the stack emissions imposed by the Clean Air Act as amended, 1977.

The original standard that was in effect at the inception of the project allowed 1.2 pounds per hour of SO<sub>2</sub> for each 1 million Btu input which, for this project, amounted to a maximum allowable total stack output of 30.7 pounds per hour of SO<sub>2</sub>. The Clean Air Act as amended, 1977 limited the total stack output to 17.84 pounds per hour of SO<sub>2</sub> regardless of input.

At the time the Clean Air Act as amended, 1977 was put into effect, the decision by the Department of Energy was to consider this new restriction as retroactive and to require compliance for this project.

This coupled with the fact that the originally contemplated 0.6 percent sulfur content coal, which was to be used to fuel the producers, is not available in Pike County and will have to be replaced with coal which averages 1.0 percent sulfur, has caused an almost complete redesign of the stack and the boilers, and has resulted in a time delay in the Final Design and resultant schedule extension.

Further, progress in Final Design has been delayed due to the requirement also imposed by the Clean Air Act as amended, 1977 that the producer gas would have to be passed through a gas cleanup system before it could be sold to future industrial users. This has caused the gas cleanup system which was originally only a possible future addition to now be looked at as a necessary addition at this time and further delayed, or extended, the Final Design schedule.

All of the hereinbefore listed delays to Final Design have resulted in extensions to the schedule for all of the activities which necessarily follow this effort.

The requirements regarding necessary permits, Air, Water, Solid Waste, Building, etc. at both the State and Federal level have been thoroughly investigated and all permits possible to obtain at this time have either been issued or applied for. The State of Kentucky has issued an Air Permit for construction only and the required operating permit will be applied for and issued after actual operations commence. This same situation applies to the Water Permit, the construction permit has been issued and the operating permit is in the future.

The State of Kentucky has also issued a tentative agreement for the disposal of the ash in the sanitary landfill. No construction permit is required for this but after operations commence the ash produced will have to be analyzed and, based on the results of this analysis, a permit may be required.

Several reports have been received from a consultant hired by DOE on the operation of other gasifier installations throughout the United States. These reports have been furnished to the Engineers and pertinent comments therein are being incorporated into the design.

By reason of a "Monthly Status Report" form, requested by the Owner and designed by the Engineers, it has become apparent that a sizeable "cost growth" is being experienced by the project. This "Monthly Status Report", sample attached as "Exhibit A", amplifies the information contained in the normal reporting forms, Forms 332 and 334, by reporting actual month to month expenditures, commitments, and total projected final costs.

The Coal Handling System has been completely redesigned to accomodate more than one type of fuel, reissued for bid, and the bids have been received.

Meetings have been held with the suppliers of both the gas producers and the boilers to resolve details of design and operation and to establish final firm shipping and installation dates.

In view of the previously discovered problems with the accumulation of tars and oils in the hot gas piping a "burn out" procedure has been developed by the Engineers and is included as "Exhibit B".

It has been determined that a larger capacity fuel oil tank, to be used to supplement the hot gas fired in the boilers would have the effect of reducing the fuel oil cost by buying in larger quantities and this has been incorporated into the design.

The supporting steed framework for the gas producers and cyclones has been delivered to the site and is expected to be erected soon.

In the succeeding quarter, it is planned to continue the work on the foundations and floor slabs, erect the support steel for the gas producers and cyclones, continue with the completion of the final design and issue a contract for the Coal Handling System.

3RD QUARTERLY REPORT

FE-2570-1

A LOW BTU GASIFICATION SYSTEM  
TO FUEL ENERGY PLANT  
AT THE DOUGLAS SITE, PIKE COUNTY, KENTUCKY

QUARTERLY TECHNICAL PROGRESS REPORT  
PERIOD NOVEMBER 1, 1978 to JANUARY 31, 1979

G. R. PUFFER

MASON & HANGER-SILAS MASON CO., INC.  
1500 WEST MAIN STREET  
LEXINGTON, KENTUCKY 40505

DATE PUBLISHED - FEBRUARY 17, 1978

PREPARED FOR THE UNITED STATES  
DEPARTMENT OF ENERGY  
UNDER COOPERATIVE AGREEMENT NO. EF-77-A-01-2570

## ABSTRACT

~~Cooperative~~ Agreement No. EF-77-A-01-2570 between Pike County, Kentucky and ERDA (DOE) establishes a project to construct and cooperatively manage a low Btu Coal Gasification system, in an environmentally acceptable manner, at the Douglas Site, Pike County, Kentucky. The gasifier-energy plant is to support a multi-use community composed of residences, a hospital, a school, municipal buildings, and future industries and will provide a test area from which a data base may be developed to furnish technical, cost and operational data on low Btu gasification for such applications.

Mason & Hanger-Silas Mason Co., Inc. has been retained by Pike County, Kentucky to design such gasification system and to provide the necessary construction management services during the construction phase. The subcontract between Pike County and Mason & Hanger-Silas Mason Co., Inc. delineates two primary branches to the work to be performed. Phase I consists of Procurement of Long Lead Items, Preliminary Design and Analysis, Final Design, Design Reviews and Environmental Impact Statement. Phase II consists of site Development Construction of Main Energy Plant Building, Delivery of Major Equipment, Installation of Major Equipment, and Installation of Piping, Electrical, Mechanical and Instrumentation.

## SUMMARY OF PROGRESS TO DATE

On 4 April 1977 The Cooperative Agreement between ERDA (DOE) and Pike County was signed and on 13 April 1977 Mason & Hanger-Silas Mason Co., Inc. (MHSM) was notified to proceed by letter of intent from Pike County stating that MHSM would be retained to perform the Engineering Design and Construction Management for the Project.

The kick-off meeting, originally scheduled for April 1977 was delayed until 11 May 1977 due to floods experienced by Pike County on or about 4 April 1977. This delay resulted in an approximate 45 day delay in the Project Schedule as originally contemplated.

During the reporting period of this Quarterly Report meetings were held on 10 November 1977, 15 December 1977, 12 January 1978 and 24 and 25 January 1978 at which several items of key importance were discussed and resolutions arrived at or at least put into an action for status for resolution as soon as possible.

Of particular importance was the meeting of 10 November 1977, held in DOE offices in Washington, D. C. This meeting was held as a result of comments by DOE at a review meeting in Mason & Hanger-Silas Mason Co., Inc. offices in Lexington, Ky. on 19 October 1977, relative to the general design at the facility. DOE had questioned the advisability of producers and cyclones being installed in a pit due to the possibility of an accumulation of hazardous gases. This matter was thoroughly discussed at the meeting of 10 November 1977 and the final result was approval of the design by DOE subjects to the results of a Risk and Hazards Analysis to be performed by Hercules, Inc. acting as consultants to DOE.

The review meeting of 15 December 1977 held in the offices at Mason & Hanger-Silas Mason Co., Inc. in Lexington, Kentucky brought up the questions, by DOE of how the demand loads (both heating and cooling) on the Energy Plant had been calculated and the statement, by DOE, that they felt that insufficient capacity was being provided to adequately heat and cool the entire project due to the change in total square footage for all the elements of the project since the original proposal had been submitted. It was pointed out by MHSM that all design of output capacity was in fact based on the original proposal figures and that changes in these figures, which had been occasioned by changes made by Pike County at various times during the design stage, should not be considered. These changes occurred after major "long-lead" items had been purchased, (gas producers, boilers, chillers), and changing requirements for these items at this time would be prohibitively expensive as well as creating a considerable impact time-wise on the project. Additionally, MHSM stated that they had used standard good practice in calculating all design loads, which were in fact "peak" loads that might never occur and that they were professionally satisfied that the output

capacity of the Energy Plant would meet all requirements. Also, at this meeting, DOE brought up the subject of their dissatisfaction with the MHSM subcontract which had not been approved. DOE stated that they were unable to approve this subcontract on a "fixed price" basis as it presently existed, and wanted it changed to a "cost plus fixed fee" basis. Both Pike County and MHSM objected to this due to the fact that review of this subcontract was occurring approximately 9 months after submittal of it, MHSM was specifically named in the Cooperative Agreement between DOE and Pike County as the engineering subcontractor, and that at a meeting of 2 March 1977 in ERDA offices in Washington, D. C. prior to the signing of the Cooperative Agreement, the terms of the MHSM subcontract had been approved by ERDA representatives. This meeting caused an impact time-wise on the project by creating a state of confusion in everyone's mind as to exactly what DOE wanted in the way of information and to what extent were they going to be involved with the purely technical aspects of the project.

At the review meeting of 24 & 25 January 1978 held in the offices of Mason & Hanger-Silas Mason Co., Inc. in Lexington, KY, DOE, after receiving a detailed description from MHSM as to how design loads for the Energy Plant were arrived at, concurred with the results and stated that their only concern was whether or not the equipment would actually perform as the rated capacities would indicate.

#### DETAILED DESCRIPTION OF TECHNICAL PROGRESS

As of this report date, progress by MHSM has been as follows:

The Pike County application for the air apollution permit has been revised by MHSM for submission to the Kentucky EPA office, it has been submitted and is reported to have been passed on to the regional EPA office in Atlanta, GA where it is in process of review and is expected to be issued in February 1978.

Approval of the Metal Building (shell only) to house the Energy Plant has been received from the State Fire Marshal's office clearing the way to issue this item for bids.

Final design of foundations, piping, electrical and associated systems (coal handling, ash removal, etc.) has proceeded, and bid packages for these items will be issued in the near future.

Shop drawings for the gas producers, boilers, and chillers have been received, reviewed, and returned to the vendors either approved or with changes noted. In the case of the boilers in particular; several problems caused by failure of the vendor to completely comprehend, or comply with the requirements of the specification are being discussed and solutions being resolved.

All items of equipment that have been purchased appear to be on time as far as scheduled delivery dates are concerned.

#### FORECAST

The upcoming quarter (1 February 1978 thru 30 April 1978) is programmed to produce the following:

1. Completion of bid package, issuance for approval, issuance for Request for Proposal, Receipt of Bids, and issuance of Contract for Energy Plant Metal Building.
2. Completion of design, issuance for approval, issuance of Request for Proposal, Receipt of Bids and issuance of Contract for Metal Doors & Frames and Hardware for Main Energy Plant & Metal Building.
3. Completion of final design, issuance for approval, issuance of Request for Proposal, Receipt of Bids and issuance of Contract for Coal Handling Equipment.
4. Completion of final design, issuance for approval, issuance of Request for Proposal, Receipt of Bids and issuance of Contract for Ash Removal System.
5. Completion of final design for instrumentation package.
6. Finalization of the Process Flow Sheets.

#### SUMMATION

As of 31 January 1978, MHSM estimates that the project is approximately 34 percent complete in respect to design and engineering and procurement of long lead items only. As of this date nothing has been done in relation to the Construction Management portion of the subcontract as 100% of this activity will occur after commencement of construction. The three major items of equipment (gas producers, boilers, and chillers) are in process of being fabricated and, as hereinbefore stated, appear to be capable of being delivered on time.

As far as the original schedule is concerned, MHSM estimates at this time that they are approximately 2 mos. behind due to the aforementioned delays caused in part by failure to receive in a timely manner, official, written instructions by responsible parties.

2ND QUARTERLY REPORT

FE-2570-1

A LOW BTU GASIFICATION SYSTEM  
TO FUEL AN ENERGY PLANT  
AT THE DOUGLAS SITE, PIKE COUNTY, KENTUCKY  
QUARTERLY TECHNICAL PROGRESS REPORT  
PERIOD AUGUST 1, 1978 to OCTOBER 31, 1978

G. R. Puffer

MASON & HANGER-SILAS MASON CO., INC.  
1500 WEST MAIN STREET  
LEXINGTON, KENTUCKY 40505

DATE PUBLISHED - FEBRUARY 17, 1978

PREPARED FOR THE UNITED STATES  
DEPARTMENT OF ENERGY  
UNDER COOPERATIVE AGREEMENT NO. EF-77-A-01-2570

## ABSTRACT

Cooperative Agreement No. EF-77-A-01-2570 between Pike County, Kentucky and ERDA (DOE) establishes a project to construct and cooperatively manage a low Btu Coal Gasification system, in an environmentally acceptable manner, at the Douglas Site, Pike County, Kentucky. The gasifier-energy plant is to support a multi-use community composed of residences, a hospital, a school, municipal buildings, and future industries and will provide a test area from which a data base may be developed to furnish technical, cost and operational data on low Btu gasification for such applications.

Mason & Hanger-Silas Mason Co., Inc. has been retained by Pike County, Kentucky to design such gasification system and to provide the necessary construction management services during the construction phase. The subcontract between Pike County and Mason & Hanger-Silas Mason Co., Inc. delineates two primary branches to the work to be performed. Phase I consists of Procurement of Long Lead Items, Preliminary Design and Analysis, Final Design, Design Reviews and Environmental Impact Statement. Phase II consists of site Development Construction of Main Energy Plant Building, Delivery of Major Equipment, Installation of Major Equipment, and Installation of Piping, Electrical, Mechanical and Instrumentation.

## SUMMARY OF PROGRESS TO DATE

on 4 April 1977 The Cooperative Agreement between ERDA and Pike County was signed and on 13 April 1977 Mason & Hanger-Silas Mason Co., Inc. (MHSM) was notified to proceed by letter of intent from Pike County that MHSM would be retained to perform the Engineering Design and Construction Management for the Project.

The kick-off meeting, originally scheduled for April 1977 was delayed until 11 May 1977 due to floods experienced by Pike County on or about 4 April 1977. This delay resulted in an approximate 45 day delay in the Project Schedule as originally contemplated.

During the reporting period of this Quarterly Report meetings were held on 5 August, 30 August, 14 & 15 October and 19 October 1977 at which several items of key importance were discussed and resolutions arrived at or at least put into action for future resolution. Of particular importance was the meeting of 19 October at which the Preliminary Design, which had been submitted on 29 September 1977, was reviewed and discussed.

In addition to the above stated meetings, MHSM held meetings on 23 September and 11 October 1977 with the State Fire Marshal's office to resolve the fire safety aspects of the design and on 6 and 12 October 1977 MHSM participated in meetings with the State EPA personnel relative to the issuance of an air pollution permit.

## DETAILED DESCRIPTION OF TECHNICAL PROGRESS

As of this report date progress by MHSM has been as follows:

1. Purchase order for Gas Producers has been issued and manufacturer has started production of these items.
2. Bids have been received for boilers, reviewed and approved, Purchase Orders issued and these items are in production.
3. Requests for Proposal have been issued for Chillers, bids have been received, reviewed and approved and Purchase Orders have been issued. These units are also in production.
4. Preliminary Design of entire project has been completed (Task 2 of Phase I) and Final Design is underway.
5. Construction Permit Request has been prepared for Pike County submission to State EPA.

FPRECAST

The upcoming quarter (1 November 1977 through 31 January 1978) is programmed to produce the following:

1. Completion of Final Design, issuance of Request for Proposal, Receipt of Bids, and Issuance of Contract for Main Energy Plant Building (purchase and erection)
2. Completion of Final Design and issuance of Request for Proposal for Building Foundations and Equipment Pads.
3. Completion of Final Design, issuance of Request for Proposal, Receipt of Bids, and Issuance of Purchase Order for Ash Removal System.
4. Final Design of Instrumentation Package.

SUMMATION

As of 31 OCTober 1977 MHSM estimates that the project is approximately 25 percent complete.

1ST QUARTERLY REPORT

FE-2570-1

A LOW BTU GASIFICATION SYSTEM  
TO FUEL AN ENERGY PLANT  
AT THE DOUGLAS SITE, PIKE COUNTY, KENTUCKY

QUARTERLY TECHNICAL PROGRESS REPORT  
PERIOD APRIL 13, 1978 to JULY 31, 1978

G.R.PUFFER

MASON & HANGER-SILAS MASON CO., INC.  
1500 WEST MAIN STREET  
LEXINGTON, KENTUCKY 40505

DATE PUBLISHED - FEBRUARY 17, 1978

PREPARED FOR THE UNITED STATES  
DEPARTMENT OF ENERGY  
UNDER COOPERATIVE AGREEMENT NO. EF-77-A-01-2570

## ABSTRACT

Cooperative Agreement No. EF-77-A-01-2570 between Pike County, Kentucky and ERDA (DOE) establishes a project to construct and cooperatively manage a low Btu Coal Gasification system, in an environmentally acceptable manner, at the Douglas Site, Pike County, Kentucky. The gasifier-energy plant is to support a multi-use community composed of residences, a hospital, a school, municipal buildings, and future industries and will provide a test area from which a data base may be developed to furnish technical, cost and operational data on low Btu gasification for such applications.

Mason & Hanger-Silas Mason Co., Inc. has been retained by Pike County, Kentucky to design such gasification system and to provide the necessary construction management services during the construction phase. The subcontract between Pike County and Mason & Hanger-Silas Mason Co., Inc. delineates two primary branches to the work to be performed. Phase I consists of Procurement of Long Lead Items, Preliminary Design and Analysis, Final Design, Design Reviews and Environmental Impact Statement. Phase II consists of site Development Construction of Main Energy Plant Building, Delivery of Major Equipment, Installation of Major Equipment, and Installation of Piping, Electrical, Mechanical and Instrumentation.

## SUMMARY OF PROGRESS TO DATE

On 4 April 1977, The Cooperative Agreement between ERDA and Pike County was signed and on 13 April 1977 Mason & Hanger-Silas Mason Co., Inc. (MHSM) was notified to proceed by letter of intent from Pike County that MHSM would be retained to perform the Engineering Design and Construction Management for the Project.

The kick-off meeting, originally scheduled for April 1977, was delayed until May 11, 1977 due to floods experienced by Pike County on or about 4 April 1977. This delay resulted in an approximate 45 day delay in the project Schedule as originally contemplated.

During the reporting period of this Quarterly Report meetings were held on 11 May, 9 June and 22 June 1977 at which several key items were discussed and resolved. Among these were the request by Pike County that MHSM additionally assume the design and related services for a clean-up system to remove tar, sulphur, and other pollutants from the producer gas to be generated, the design and related services for a stand-by oil burning system to supplement the gas fired system for generation of hot and chilled water, and the preparation and processing of Purchase Orders to be issued by Pike County for goods and services to be purchased under the Cooperative Agreement with ERDA. Modifications to the Pike County/MHSM Subcontract were so prepared and became effective on 9 June 1977.

## DEATAILED DESCRIPTION OF TECHNICAL PROGRESS

MHSM started work immediately upon receipt of the letter of intent from Pike County and as of this report date has proceeded as follows:

1. Preliminary design and purchase specifications for Gas Producers and Boilers have been completed and Requests for Proposals have been issued.
  - 1.a. Proposal for Gas Producers has been received, reviewed, and Purchase Orders are in process of being issued for Pike County approval and signatures.
2. Site development plan has been firmed up, test borings have been made and a test pit has been excavated to determine the exact nature of the subsurface conditions expected to be encountered so that final design of building foundations and equipment supports may proceed.
3. Preliminary design of building has been started.
  - 3.a As A result of design analysis of various sizes, shapes, and types of buildings it appears that a pre-engineered, industrial steel building would be the most economical (design analyses attached) and the design is proceeding along these lines.
4. Preliminary design analysis and preliminary design of electrical requirements is being processed and should be completed in near future.
5. Summary of Design Analysis of Mechanical is complete (copy attached) and Preliminary Design is being processed. Final completion of Instrumentation is dependent upon receipt by MHSM of ERDA requirements.
6. Project Schedule has been revised to incorporate the delay caused by the flood conditions previously mentioned and copies are attached.
7. Preliminary design analyses of Combustion Air Heat Exchangers and Water Treatment are complete.
8. Preliminary Specifications for Chilling Units, Steam Converters, and Cooling Towers have been written.

## FORECAST

The upcoming quarter (1 August 1977, to 31 October 1977) should produce the following:

1. Issuance of Purchase Orders and receipt of shop drawings for Gas Producers.
2. Receipt of Proposals for Boilers and review and issuance of Purchase Orders for same.
3. Completion of Final Design for building foundations and equipment pads and issuance of Invitation for Bid for same.
4. Issuance of Request for Proposal for Combustion Air Heat Exchangers, Water Treatment, Chilling Units, Steam Converters and Cooling Towers.
5. Design of Producer Gas Clean-Up System is being pursued and investigations to develop correct methods of tar and sulphur residues disposal are under way.
6. Final Design of Instrumentation Package dependent upon receipt of required ERDA input.
7. Ash disposal systems are under investigation as well as systems to control fumes and dust and will be carried forth in this period.
8. Delays may be experienced in this quarter in respect to final design of building foundation system and drainage and site topography due to fluid condition of overall site arrangement.
9. Construction Permit Request, including producer gas clean-up system, is being prepared for Pike County to forward to the proper authorities.

## SUMMATION

As of 31 July 1977, MHSM estimates that the project is approximately 20 percent complete.