MEMPHIS INDUSTRIAL FUEL GAS
DEMONSTRATION PLANT PROJECT

PILOT PLANT TEST PLAN
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PREPARED FOR THE
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PILOT PLANT TEST PLAN

TASK IX TECHNICAL SUPPORT

INDUSTRIAL LOW-Btu FUEL GAS DEMONSTRATION-PLANT PROGRAM

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AAG Pilot Plant Operation Schedule

PILOT PLANT TEST PLAN

The objective of the AAG pilot plant operation is to provide process design data for the gasification and related sections of the demonstration plant. Since the AAG pilot plant will not operate at the actual pressure level of the demonstration plant, it is planned to perform tests at two different pressures to obtain a sound basis for pressure scale-up.

TASK IX TECHNICAL SUPPORT

The operation of the pilot plant is planned to provide information on the following: **DEMONSTRATION-PLANT PROGRAM**

1. Feasibility of feeding Kentucky coal directly into the bed.
2. High carbon conversion efficiency with low carbon-content residue discharge.
3. Trouble-free continuous operation of the gasifier.
4. Product gas quality and yield by
5. Utility requirements.
6. Range of operating parameters.
7. Start-up and shutdown procedures
8. Turndown capability
9. Peripheral equipment design.

The following schedule is estimated to provide the above information during the planned 6 month operation. However, the schedule will have to be continuously updated and changed, if necessary, as information becomes available from test runs.

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During the six-month period of the AAG technology, one thousand tons of the coal crushed to below 1/2 inch has been purchased from Island Creek Coal Company. The overall schedule for operation of the AAG pilot plant is shown in Figure 1 and the test schedule is shown in Figure 2.

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AAG Pilot Plant Operation Schedule

TEST PLAN		JAN	FEB	MARCH	APRIL	MAY	JUNE
1. COAL TESTS AT ATMOSPHERIC PRESSURE		[REDACTED]					
2. ENGINEERING AND EQUIPMENT PROCUREMENT FOR PRESSURE OPERATION		[REDACTED]					
3. UNIT MODIFICATIONS AND CHANGES		[REDACTED]					
4. COAL TESTS AT 3-ATM PRESSURE		[REDACTED]					

- Utility requirements.
- Ran...
- Start-up and shutdown...
- Turndown capacity...
- Peripheral equipment design.

During the first two months of the program, tests will be run on Western Kentucky coal at atmospheric pressure. In general, these tests will confirm high carbon gasification efficiency, dust recycle, and predicted product gas composition with a coal similar to that to be used in the demonstration plant. Further, smooth and steady-state operation will form one base-point for later scale-up of the pilot-plant results to the pressure level of the demonstration plant. These tests will also establish the feasibility of feeding the caking Kentucky coal to the gasifier without pretreatment. Engineering and equipment ordering for modifying the AAG for operation at about 3 atmospheres have been started during the first month. After the first two months of operation, the pilot plant will be shut down, and actual modification and additions to the unit will begin. It is estimated that it will take about two months before the unit is pressure-tested and ready for operation.

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Next, the pilot plant will be operated with the Kentucky coal at pressure for about two months. These tests will confirm the process design variables used in the demonstration plant design. In addition steady-state operation of the gasifier will establish the predicted product gas composition, heat, and material balance around the system and firm up the oxygen and steam requirement for gasification. Pressurized operation will indicate the effects of pressure on high carbon conversion, dust recycle, and further pressure scale-up to the level of the demonstration-plant operating pressure.

The test plan with objectives and approximate duration of each test is shown below. The plan will have to be continuously reviewed and changed when necessary as test data becomes available.

<u>Run No.</u>	<u>Objective</u>	<u>Coal Feed Duration</u>
117	Operation with bituminous coal without bed defluidization.	Total 4 to 6 hours.
118	Feed Kentucky coal directly into fluidized bed.	12 hours.
119	Feed Kentucky coal in bed. Obtain high ash-content discharge. Recycle all external cyclone dust.	3 to 4 days.
120	Investigate range of operability without defluidization.	2 to 3 days.
121	Feed Kentucky coal in bed at 3 atmosphere pressure.	2 to 3 days.
122	Obtain high ash-content discharge. Recycle all external cyclone dust.	3 to 4 days.
123	Investigate range of operability without defluidization. Investigate turndown capability.	3 to 4 days.
124	Perform long duration run.	7 to 14 days.

Next, the pilot plant will be operated with the Kentucky coal at pressure for about two months. These tests will confirm the process design variables used in the demonstration plant design. In addition steady-state operation of the gasifier will establish the predicted product gas composition, heat, and material balance around the system and firm up the oxygen and steam requirement for gasification. Pressurized operation will indicate the effects of pressure on high carbon conversion, dust recycle, and further pressure scale-up to the level of the demonstration-plant operating pressure.

The test plan with objectives and approximate duration of each test is shown below. The plan will have to be continuously reviewed and changed when necessary as test data becomes available.

4. COAL TESTS AT 3-ATM			
Run No.	Objective	Coal Feed Duration	
1978 117	Operation with bituminous coal without bed defluidization.	Total 4 to 6 hours	
118	Feed Kentucky coal directly into fluidized bed.	12 hours.	
119	Feed Kentucky coal in bed. Obtain high ash-content discharge. Recycle all external cyclone dust.	3 to 4 days	
120	Investigate range of operability without defluidization.	2 to 3 days.	
121	Feed Kentucky coal in bed at 3 atmosphere pressure.	2 to 3 days.	
122	Obtain high ash-content discharge. Recycle all external cyclone dust.	3 to 4 days	
123	Investigate range of operability without defluidization.	3 to 4 days.	
124	Perform long duration test.	7 to 14 days.	

Figure 2. ESTIMATED TEST SCHEDULE FOR AAG OPERATIONS