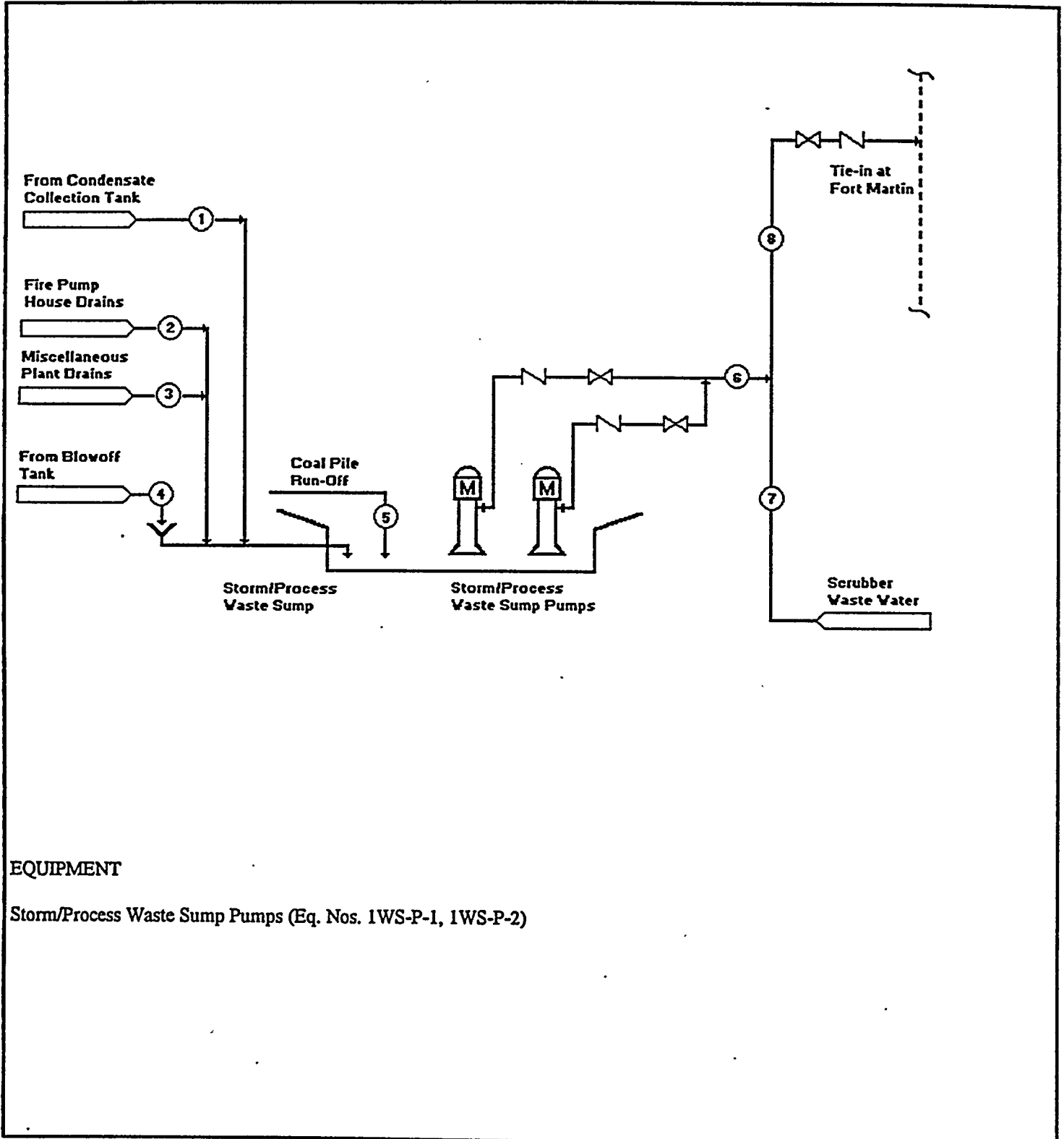


SYSTEM PROCESS DESIGN BASIS
PDB No. 40 - 1WS - 1
System Name Process Waste Water Distribution
Flowsheet No. 16N25706-40-F-1WS-002



EQUIPMENT

Storm/Process Waste Sump Pumps (Eq. Nos. 1WS-P-1, 1WS-P-2)

SYSTEM PROCESS DESIGN BASIS

PDB No. 40 - 1WS - 1

System Name Process Waste Water Distribution

Flowsheet No. 16N25706-40-F-1WS-002

I. DESIGN PHILOSOPHY

1. The function of the Process Waste Water Distribution System is to collect and forward the GPIF waste water to the Fort Martin waste water system.
2. The Storm/Process Waste Sump collects condensate from the GPIF to Fort Martin steam line, waste water from the fire pump house floor drains, waste water from the miscellaneous plant floor drains, process water from the boiler blowoff tank and coal pile runoff (rain) water.
3. One of two 100% capacity Storm/Process Waste Sump Pumps forwards the waste water along the pipe bridge to the Fort Martin waste water system.
4. Flue gas scrubber waste water ties into the storm/process waste water line downstream of the sump pumps and is also forwarded to Fort Martin.

SYSTEM PROCESS DESIGN BASIS
 PDB No. 40 - 1WS - 1
 System Name Process Waste Water Distribution
 Flowsheet No. 16N25706-40-F-1WS-002

II. DESIGN CRITERIA

ITEM	PROCESS STREAM	MAXIMUM FLOW GPM	NORMAL FLOW GPM	MINIMUM FLOW GPM	MAXIMUM TEMP. °F	MINIMUM TEMP. °F	MAXIMUM PRESS.. PSIG	MINIMUM PRESS. PSIG
1	From Condensate Collection Tank	Hold	Hold	Hold	Hold	Hold	Hold	Hold
2	From Fire Pump House Drains	Hold	Hold	Hold	Hold	Hold	Hold	Hold
3	From Miscellaneous Drains	Hold	Hold	Hold	Hold	Hold	Hold	Hold
4	From Blowoff Tank	Hold	Hold	Hold	Hold	Hold	Hold	Hold
5	Coal Pile Run-off	Hold	Hold	Hold	Hold	Hold	Hold	Hold
6	Process Waste Pump Discharge	Hold	Hold	Hold	Hold	Hold	Hold	Hold
7	Scrubber Waste Water	(See Mass Balance)	(See Mass Balance)	(See Mass Balance)	(See Mass Balance)	(See Mass Balance)	(See Mass Balance)	(See Mass Balance)
8	Waste Water to Fort Martin	Hold	Hold	Hold	Hold	Hold	Hold	Hold

SYSTEM PROCESS DESIGN BASIS

PDB No. 40 - 1WS - 1

System Name Process Waste Water Distribution

Flowsheet No. 16N25706-40-F-1WS-002

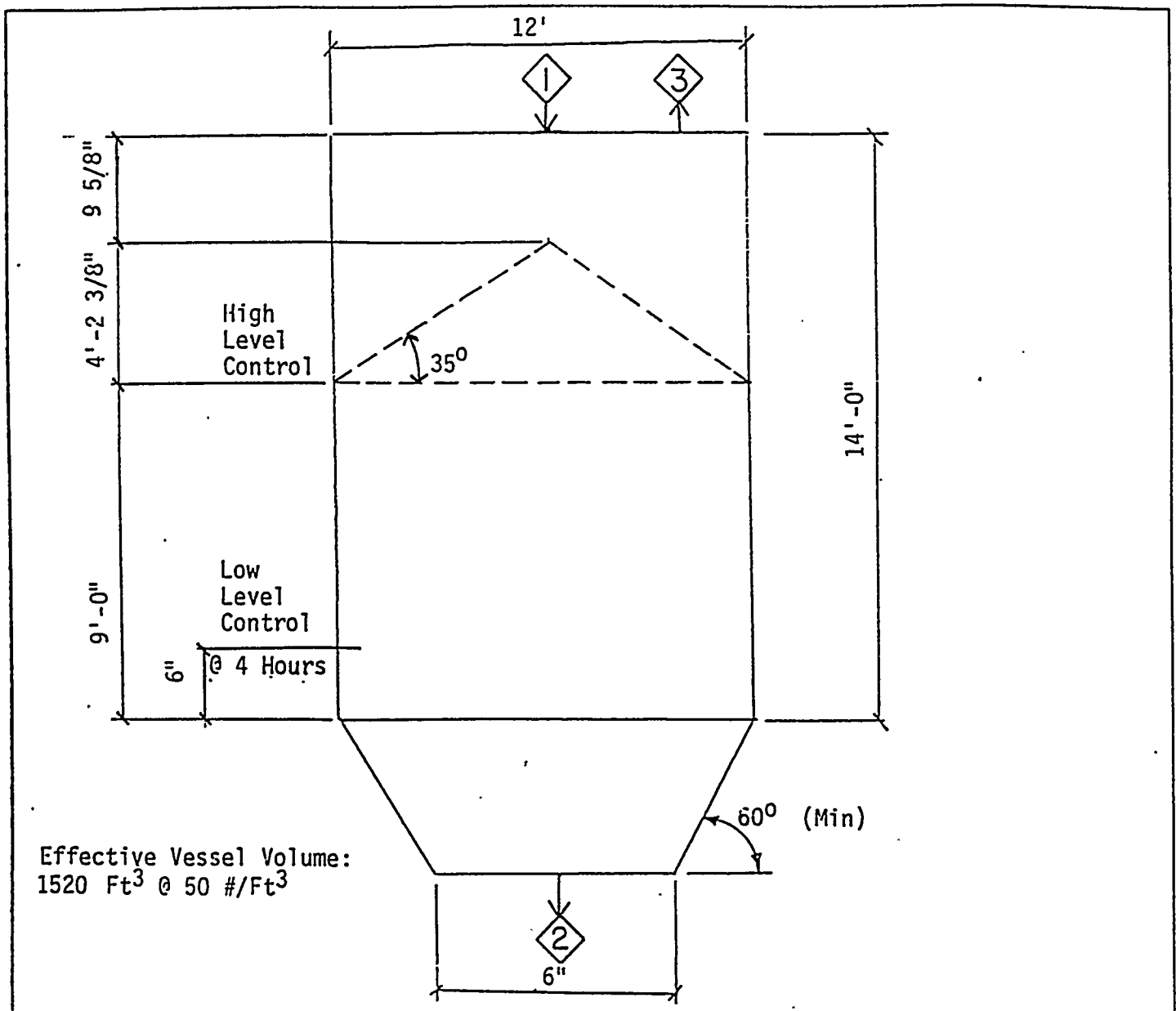
III. DESIGN NOTES

1. Current design is based on Mass Balance dated (later).
2. The Storm/Process Waste Sump is sized to hold 20,000 gallons of water. This capacity along with the rainwater storage capability of the coal yard is based on the 10 year 24 hour storm as depicted in West Virginia Erosion and Sediment Control Handbook for Developing Areas.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DH - 1

Equipment Name Coal Storage Bin
Equipment No. IDH-TK-1
System Name Coal Receiving, Storage & Reclaim
Flowsheet No. 16N25706-82-F-1DH-001



PROCESS DESIGN BASIS
PDB No. 82-IDH-1

Equipment Name	<u>Coal Storage Bin</u>
Equipment No.	<u>1DH-TK-1</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

I. DESIGN PHILOSOPHY

1. The Coal Storage Bin provides several hours of live fuel inventory for the PyGas™ Coal Gasifier.
2. The PyGas™ Coal Gasifier and Coal Storage Bin will operate continuously, 24 hours per day, for two week periods and be out of service for six weeks between each period.
3. The Coal Storage Bin will be installed outdoors. See Design Notes for ambient weather criteria.
4. Coal feed to the bin will be continuous 8 hours per day 7 days per week during each two week period of operation.
5. The minimum and maximum capacity of coal flow to the Coal Storage Bin will be based on the 7 day, 24 hour average operating capacity of the Mass Balance being handled in a 8 hour operating period, 7 days per week.
6. The Coal Storage Bin discharge will be assisted utilizing a Vibratory Bin Discharger and multiple Air Cannons.

PROCESS DESIGN BASIS
PDB No. 82-IDH-1

Equipment Name Coal Storage Bin
 Equipment No. 1DH-TK-1
 System Name Coal Receiving, Storage & Reclaim
 Flowsheet No. 16N25706-82-F-1DH-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS. PSIG	MIN. PRESS. PSIG
1	PRODUCT COAL IN	18878	(See Mass Bal.)		130		(See Mass Bal.)	
2	PRODUCT COAL OUT	6675	(See Mass Bal.)		130		(See Mass Bal.)	
3	BIN VENT (SOLIDS)	4	(See Mass Bal.)		100		(See Mass Bal.)	
	BIN VENT (GAS)	6188						

- | | |
|----------------------------|--------------------------------|
| 1. Hours Storage Available | 19 |
| 2. Effective Bin Volume | 1520 Ft ³ , 38 Tons |
| 3. Bin Diameter | 12'-0" |
| 4. Discharge Cone Angle | 60° (Min) |
| 5. Bin Discharger Size | 6'-0" Dia. (Min) |

PROCESS DESIGN BASIS
PDB No. 82-IDH-1

Equipment Name	<u>Coal Storage Bin</u>
Equipment No.	<u>IDH-TK-1</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

II. DESIGN CRITERIA - (cont'd.)

6. Basic design loads include live, wind, and earthquake in addition to dead loads. Minimum basic loads shall be:

Roof Load:	Roof Live Load = 100 psf (No Reduction Allowed)
Snow Load:	PG = 30 psf Ground Snow Load, Snow Exposure Factor $C_e = 0.9$
Wind Load:	70 mph, Exposure C
Seismic:	$A_v = < 0.05$, $A_a = < 0.05$, Hazard Exposure Group = 1 Soil - Profile Type = S_3
Importance Factor (I):	$I(\text{Snow}) = 1.0$, $I(\text{Wind}) = 1.0$

7. Snow and wind loading shall be in accordance with the West Virginia State Building Code (BOCA), latest edition, and Factory Mutual Standards.
8. Combinations of the loads shall be as specified in the West Virginia State Building Code (BOCA), latest edition.

PROCESS DESIGN BASIS

PDB No. 82-IDH-1

Equipment Name	<u>Coal Storage Bin</u>
Equipment No.	<u>1DH-TK-1</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

III. DESIGN NOTES

1. Product coal flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coal flow, Appendix A-8, Mass and Energy Balance results, to allow for operation variations.

- | | |
|----------------------------|----------------------|
| 2. Coal Type | Bituminous |
| 3. Coal Moisture | 6% |
| 4. Coal Specific Heat | 0.30 Btu/Lb.-F |
| 5. Coal Bulk Density | 50 #/Ft ³ |
| 6. Angle of Repose | 35 deg. |
| 7. Coal Grindability Index | 40-90 |
| 8. Coal Feed: | |

<u>Size Analysis</u>		<u>Sample</u>
(As Received)		(Estimated)
+1-1/2"		0.0%
-1-1/2	+1	6.3%
-1	+3/4	7.3%
-3/4	+1/2	8.5%
-1/2	+3/8	8.4%
-3/8	+1/4	11.7%
-1/4	+#4 (Mesh)	8.2%
-4	+6	7.7%
-6	+16	19.6%
-16	+30	8.3%
-30	+50	5.1%
-50	+100	3.6%
-100	+200	2.1%
-200		3.2%

Note: The coal size gradation analysis shown above is taken from the Riley Fuels Laboratory Test Report for three coals used at the Fort Martin Facility dated February 1, 1994. The size gradation for Consol #2 coal was used.

9. Design Operating Temperature 100°F

PROCESS DESIGN BASIS
PDB No. 82-IDH-1

Equipment Name	<u>Coal Storage Bin</u>
Equipment No.	<u>1DH-TK-1</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

III. DESIGN NOTES (cont'd.)

10. Ambient Weather
Criteria

Design Temperature:

Dry Bulb:

Winter -	-20°F (lowest on record-use for freeze protection)
Winter -	4° F (99%)
Summer -	90° (99%)

Wet Bulb: 74° (99%)

Performance Temperature: 80°

Performance Relative Humidity: 60%

11. All data, i.e. capacities, flows, sizes etc., indicated in the Process Design Basis is to be considered the minimum required.

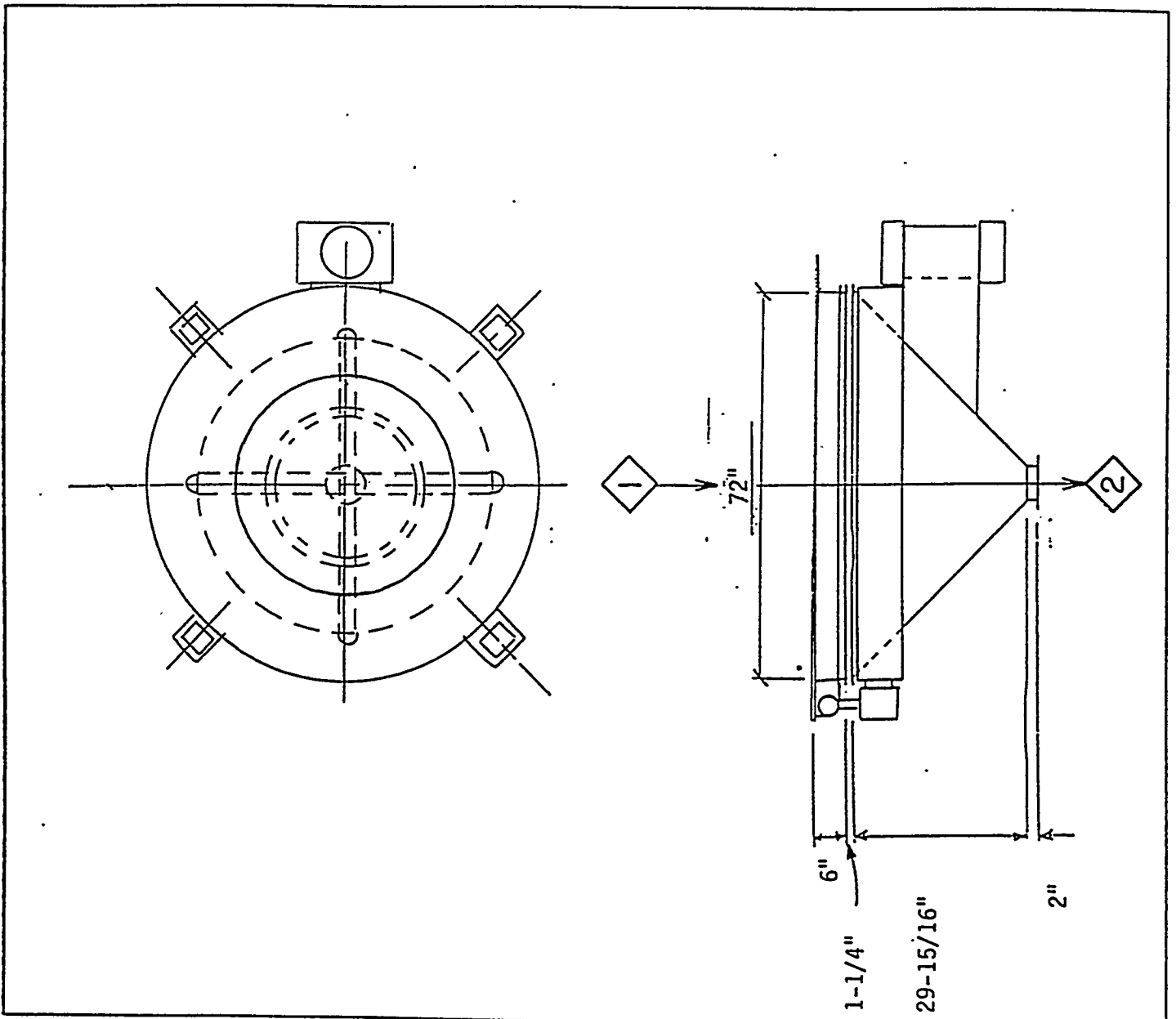
12. Bin nozzles required for:

Material Inlet
Dust Collector
Top Manway
Continuous Level Monitor
Vac/Press. Relief Hatch
High Level Control
Low Level Control
Bottom Manway
Air Cannons (4)
Bin Discharger
Vent from Bucket Elevator

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DH - 2

Equipment Name Coal Storage Bin Discharger
Equipment No. 1DH-CONV-2
System Name Coal Receiving, Storage & Reclaim
Flowsheet No. 16N25706-82-F-1DH-001



PROCESS DESIGN BASIS
PDB No. 82-IDH-2

Equipment Name	<u>Coal Storage Bin Discharger</u>
Equipment No.	<u>1DH-CONV-2</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-F-1DH-001</u>

I. DESIGN PHILOSOPHY

1. The Coal Storage Bin Discharger will promote coal feed from the Coal Storage Bin and deliver it to the Coal Screw Feeder.
2. The PyGas TMCoal Gasifier and Coal Storage Bin Discharger will operate continuously, 24 hours per day, for two week periods and be out of service for six weeks between each period.
3. The Coal Storage Bin Discharger will be installed outdoors. See Design Notes for ambient weather criteria.

PROCESS DESIGN BASIS
 PDB No. 82-IDH-2

Equipment Name Coal Storage Bin Discharger
 Equipment No. 1DH-CONV-2
 System Name Coal Receiving, Storage & Reclaim
 Flowsheet No. 16N25706-82-F-1DH-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS PSIG
1	Product Coal In	6675	(See Mass Bal.)		130	(See Mass Bal.)		
2	Product Coal Out	6675	(See Mass Bal.)		130	(See Mass Bal.)		

PROCESS DESIGN BASIS

PDB No. 82-IDH-2

Equipment Name	<u>Coal Storage Bin Discharger</u>
Equipment No.	<u>1DH-CONV-2</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

III. DESIGN NOTES

- Product coal flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coal flow, Appendix A-8, Mass and Energy Balance results, to allow for operation variations.
- Coal Type Bituminous
- Coal Moisture 6%
- Coal Specific Heat 0.30 Btu/Lb-F
- Coal Bulk Density 50 #/Ft³
- Coal Grindability Index 40-90
- Angle of Repose 35 deg.
- Coal Feed

<u>Size Analysis</u> (As Received)	<u>Sample</u> (Estimated)
+ 1-1/2	0.0%
-1-1/2 + 1	6.3%
-1 + 3/4	7.3%
-3/4 + 1/2	8.5%
-1/2 + 3/8	8.4%
-3/8 + 1/4	11.7%
-1/4 + #4 (mesh)	8.2%
-4 + 6	7.7%
-6 + 16	19.6%
-16 + 30	8.3%
-30 + 50	5.1%
-50 + 100	3.6%
-100 + 200	2.1%
-200	3.2%

Note: The coal size gradation analysis shown above is taken from the Riley Fuels Laboratory Test Report for three coals used at the Fort Martin Facility dated February 1, 1994. The size gradation for Consol #2 was used.

PROCESS DESIGN BASIS

PDB No. 82-IDH-2

Equipment Name Coal Storage Bin Discharger
Equipment No. 1DH-CONV-2
System Name Coal Receiving, Storage & Reclaim
Flowsheet No. 16N25706-82-F-1DH-001

III. DESIGN NOTES (cont'd.)

9. Design Operating
Temperature 100°F

10. Ambient Weather
Criteria

Design Temperature:

Dry Bulb:

Winter - -20°F (lowest on record-use
for freeze protection)
Winter - 4° F (99%)
Summer - 90° (99%)

Wet Bulb: 74° (99%)

Performance Temperature: 80°

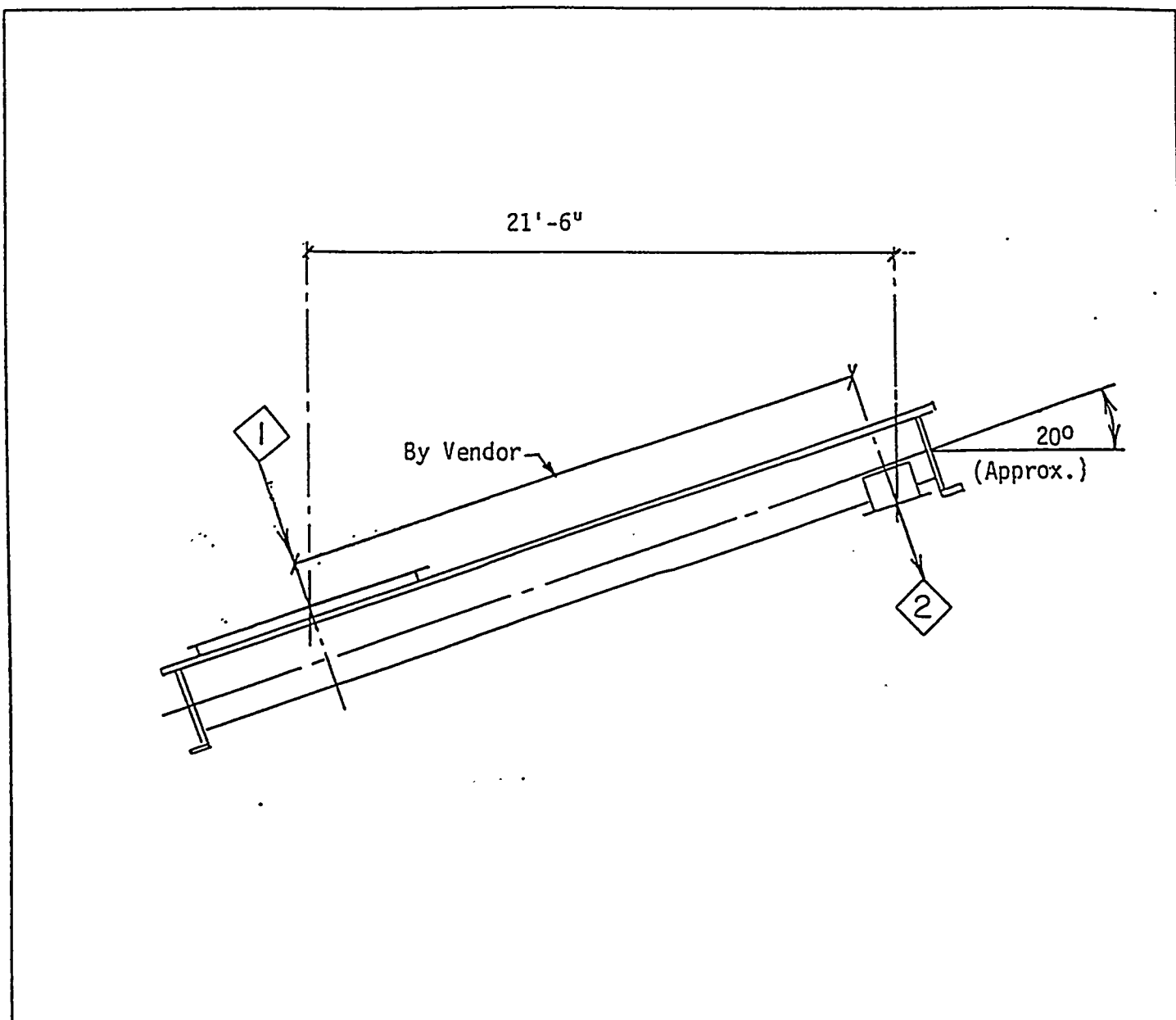
Performance Relative Humidity: 60%

11. All data, i.e. capacities, flows, sizes, etc., indicated in the Process Design Basis is to be considered the minimum required.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DH - 3

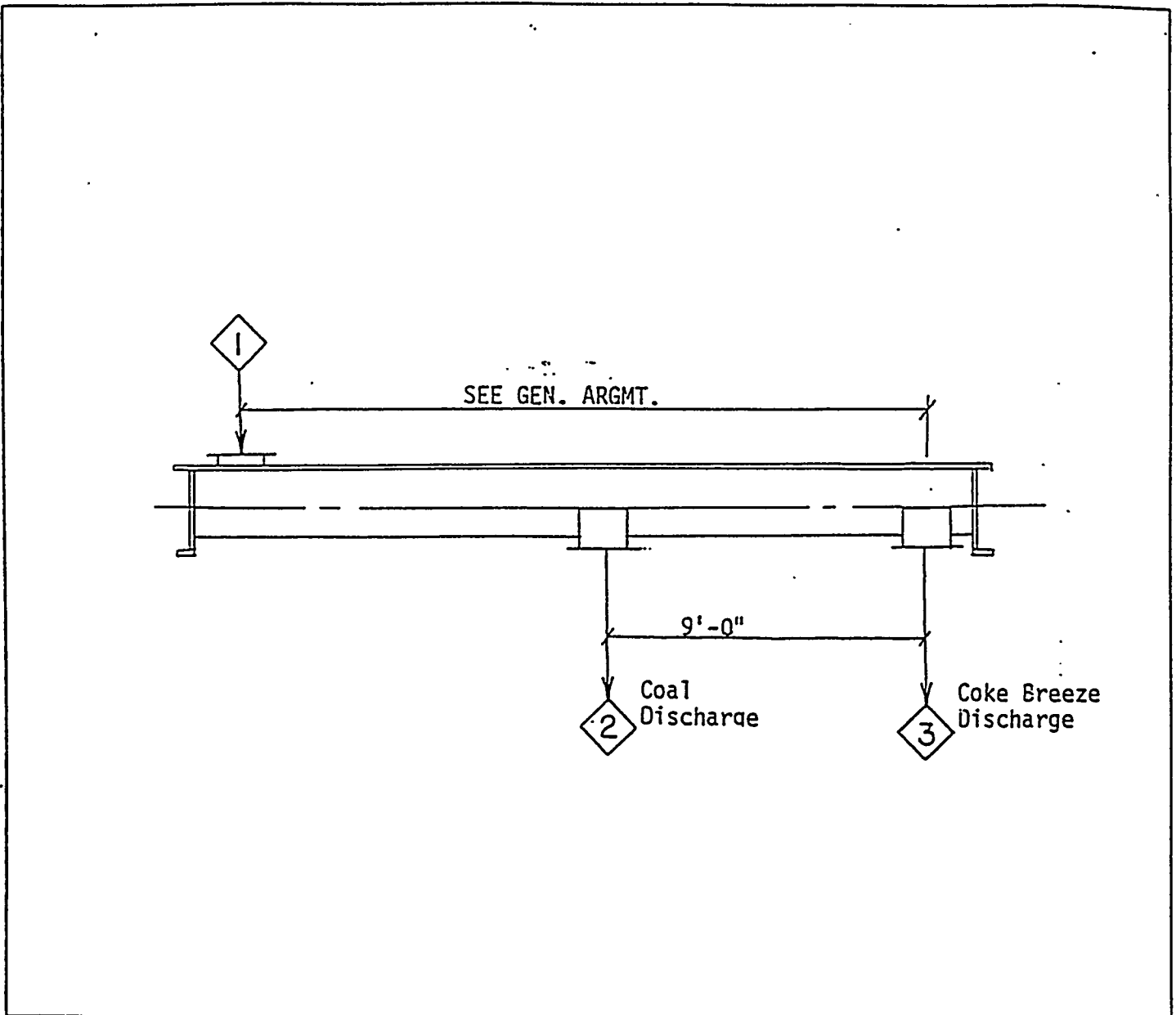
Equipment Name Coal Screw Feeder
Equipment No. 1DH-FDR-1
System Name Coal Receiving, Storage, & Reclaim
Flowsheet No. 16N25706-82-F-1DH-001



SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DH - 3

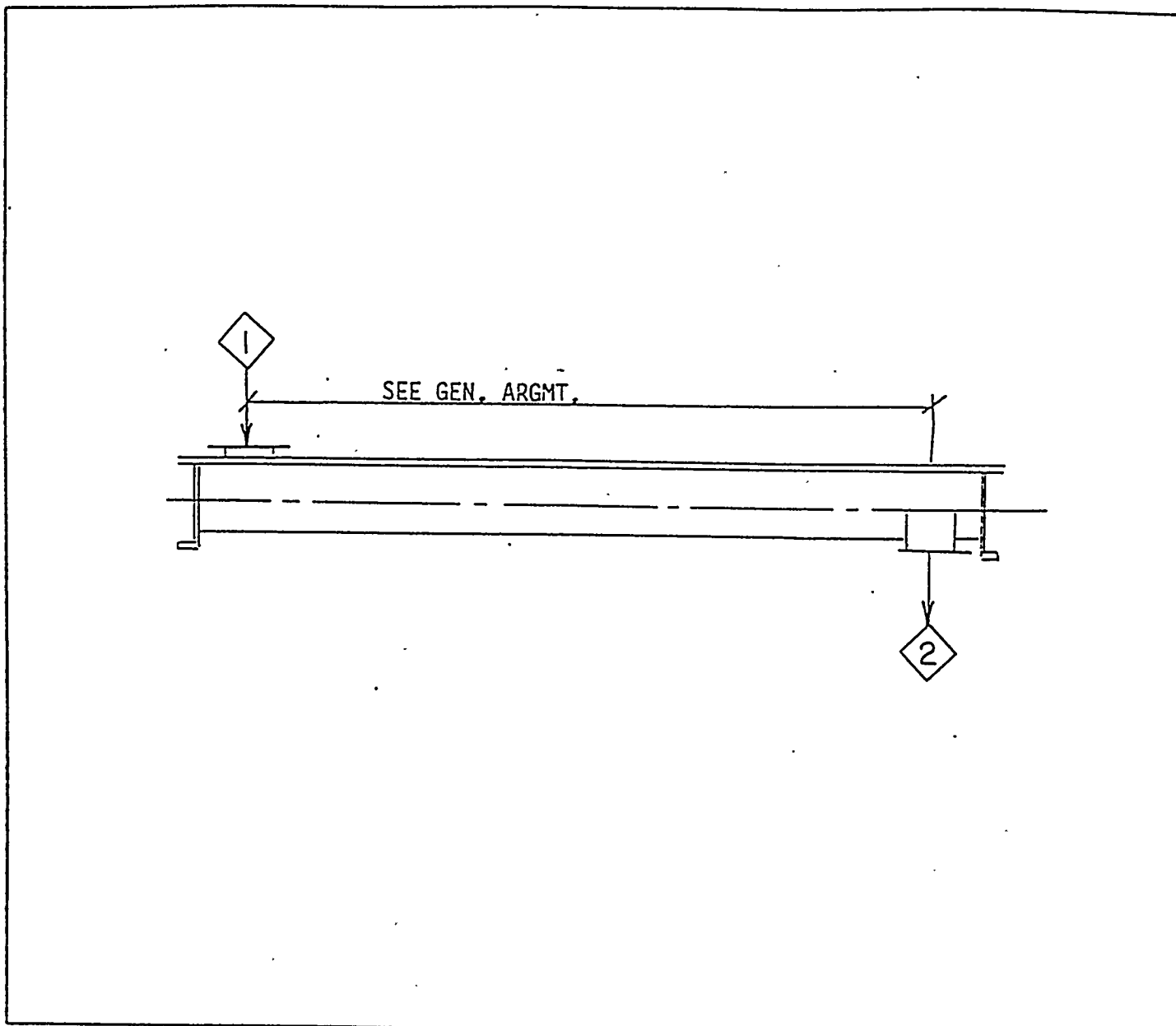
Equipment Name Coal Screw Conveyor
Equipment No. 1DH-CONV-1
System Name Coal Receiving, Storage, & Reclaim
Flowsheet No. 16N25706-82-F-1DH-001



SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DH - 3

Equipment Name Coal Screw Feeder
Equipment No. 1DH-FDR-2
System Name Coal Receiving, Storage, & Reclaim
Flowsheet No. 16N25706-82-F-1DH-001



PROCESS DESIGN BASIS
PDB No. 82-IDH-3

Equipment Name	<u>Screw Conveyors & Feeders</u>
Equipment No.	<u>1DH-FDR-1; 1DH-CONV-1; 1DH-FDR-2</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

I. DESIGN PHILOSOPHY

1. The screw conveyors and feeders transport coal or coke breeze from point to point in the process.
2. The PyGas™ Coal Gasifier and Coal Screw Feeder 1DH-FDR-2 will operate continuously, 24 hours per day, for two week periods and be out of service for six weeks between each period. The Coal Screw Feeder 1DH-FDR-1 and Coal Screw Conveyor 1DH-CONV-1 will operate continuously 8 hours per day, 7 days per week for the two week periods.
3. The minimum and maximum capacity of the Coal Screw Feeder 1DH-FDR-1 and Coal Screw Conveyor 1DH-CONV-1 will be based on the 7 day, 24-hour average operating capacity of the Mass Balance being handled in a 8-hour operating period, 7-days per week.
4. The screw conveyors and feeders will be installed outdoors. See Design Notes for ambient weather criteria.
5. The minimum conveyor and feeder size is 12" diameter.
6. Coke breeze will be handled by the coal handling equipment for use as a start-up fuel and potentially as a "Hot Hold" condition fuel in the PyGas™ Coal Gasifier at a reduced capacity.

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PROCESS DESIGN BASIS
 PDB No. 82-IDH-3

Equipment Name Coal Screw Feeder
 Equipment No. 1DH-FDR-1
 System Name Coal Receiving, Storage & Reclaim
 Flowsheet No. 16N25706-82-F-1DH-001

II. DESIGN CRITERIA

COAL HANDLING OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS. PSIG	MIN. PRESS. PSIG
1	PRODUCT COAL IN	18878	15102	15102	130	(SEE MASS BAL.)		
2	PRODUCT COAL OUT	18878	15102	15102	130	(SEE MASS BAL.)		

COKE HANDLING OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS. PSIG	MIN. PRESS. PSIG
1	PRODUCT COKE BREEZE IN	9439	7551	7551	130	(SEE MASS BAL.)		
2	PRODUCT COKE BREEZE OUT	9439	7551	7551	130	(SEE MASS BAL.)		

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PROCESS DESIGN BASIS
PDB No. 82-IDH-3

Equipment Name Coal Screw Conveyor
 Equipment No. 1DH-CONV-1
 System Name Coal Receiving, Storage & Reclaim
 Flowsheet No. 16N25706-82-F-1DH-001

II. DESIGN CRITERIA

COAL HANDLING OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS PSIG
1	PRODUCT COAL IN	18878	15102	15102	130	(SEE MASS BAL.)		
2	PRODUCT COAL OUT	18878	15102	15102	130	(SEE MASS BAL.)		

COKE HANDLING OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS PSIG
1	PRODUCT COKE BREEZE IN	9439	7551	7551	130	(SEE MASS BAL.)		
3	PRODUCT COKE BREEZE OUT	9439	7551	7551	130	(SEE MASS BAL.)		

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PROCESS DESIGN BASIS

PDB No. 82-IDH-3

Equipment Name	<u>Coal Screw Feeder</u>
Equipment No.	<u>1DH-FDR-2</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-00</u>

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS. PSIG	MIN. PRESS. PSIG
1	PRODUCT COAL IN	6675	(SEE MASS BAL.)		130	(SEE MASS BAL.)		
2	PRODUCT COAL OUT	6675	(SEE MASS BAL.)		130	(SEE MASS BAL.)		

PROCESS DESIGN BASIS

PDB No. 82-IDH-3

Equipment Name	<u>Screw Conveyors & Feeders</u>
Equipment No.	<u>1DH-FDR-1; 1DH-CONV-1; 1DH-FDR-2</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

III. <u>DESIGN NOTES</u>		
1.	Product coal and coke breeze flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coal and coke breeze flows, Mass and Energy Balance results, to allow for operation variations.	
2.	The maximum and minimum flow rates for coke breeze are based on the coal feed capacity with a density of 50 pcf and are reduced by 50% when handling coke breeze with a density of 25 pcf.	
3.	Coal Type	Bituminous
4.	Coal Moisture	6%
	Coke Moisture	0%
5.	Coal Specific Heat	0.30 Btu/lb. -F
6.	Coal Bulk Density	50#/Ft ³
	Coke Breeze Bulk Density	25-35#/Ft ³
7.	Coal Grindability Index	40 - 90
8.	Coke Breeze Size	-1/4" x 0"
9.	Coal Feed:	
	<u>Size Analysis</u>	<u>Sample</u>
	(As Received)	
	+1-1/2"	0.0%
-1-1/2	+1	6.3%
-1	+3/4	7.3%
-3/4	+1/2	8.5%
-1/2	+3/8	8.4%
-3/8	+1/4	11.7%
-1/4	+#4 (Mesh)	8.2%
-4	+6	7.7%
-6	+16	19.6%
-16	+30	8.3%
-30	+56	5.1%
-50	+100	3.6%
-100	+200	2.1%
-200		3.2%

PROCESS DESIGN BASIS

PDB No. 82-IDH-3

Equipment Name	<u>Screw Conveyors & Feeders</u>
Equipment No.	<u>1DH-FDR-1; 1DH-CONV-1; 1DH-FDR-2</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

III DESIGN NOTES - Continued

Note: The coal size gradation analysis shown above is taken from the Riley Fuels Laboratory Test Report for three coals used at the Fort Martin Facility dated February 1, 1994. The size gradation for Consol #2 coal was used.

10. Design Operating Temperature 130°F

11. Ambient Weather Criteria

Design Temperature:

Dry Bulb:

Winter

-20°F (lowest on record-use for freeze protection)

Winter

4°F (99%)

Summer

90°F (99%)

Wet Bulb:

74°F (99%)

Performance Temperature:

80°F

Performance Relative Humidity:

60%

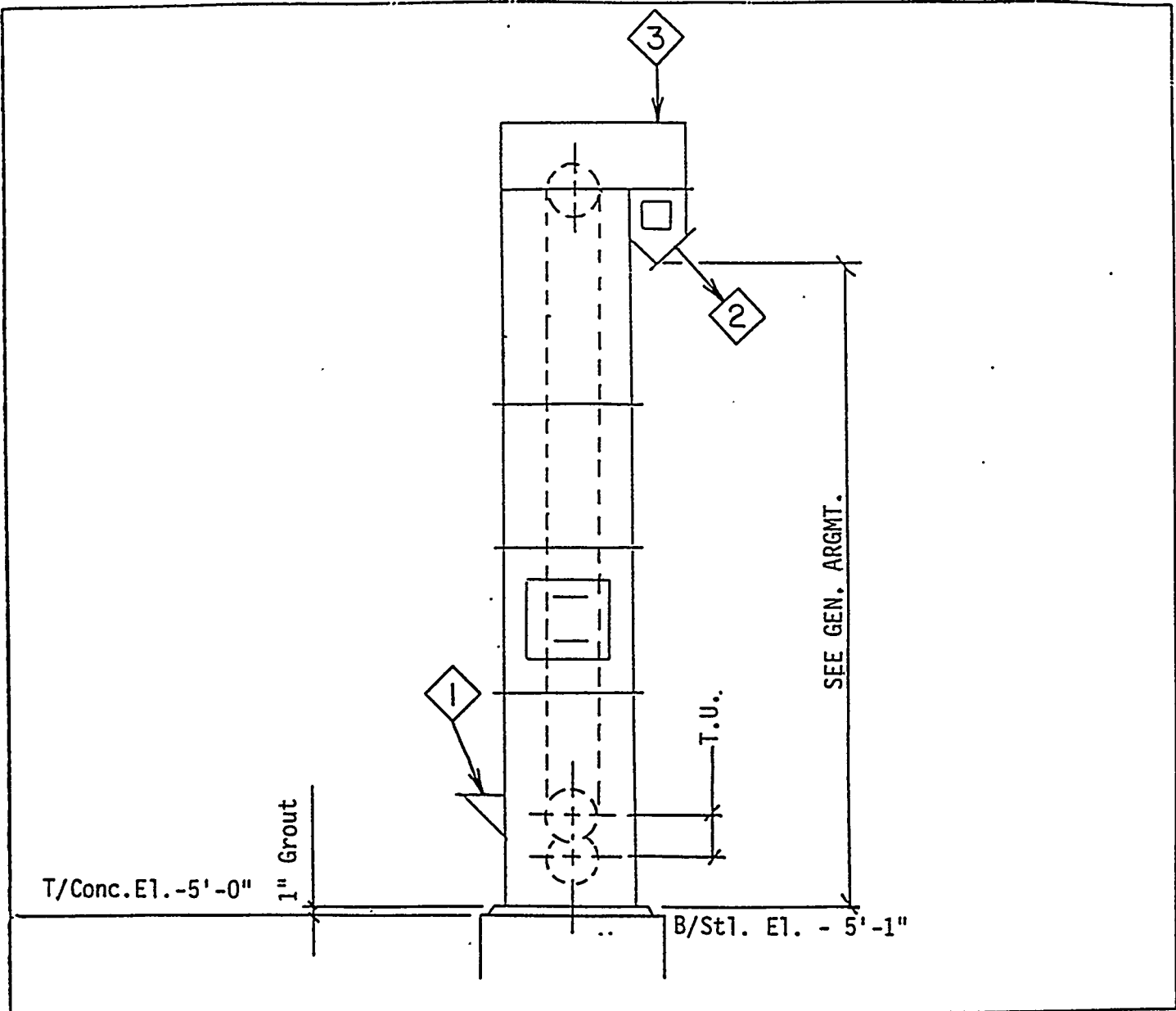
12. All data, i.e., capacities, flows, sizes etc., indicated in the Process Design Basis is to be considered the minimum requirement.

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SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DH - 4

Equipment Name Coal Bucket Elevator
Equipment No. 1DH-ELEV-1
System Name Coal Receiving, Storage, & Reclaim
Flowsheet No. 16N25706-82-F-1DH-001



PROCESS DESIGN BASIS
PDB No. 82-IDH-4

Equipment Name	<u>Coal Bucket Elevator</u>
Equipment No.	<u>1DH-ELEV-1</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

I. DESIGN PHILOSOPHY

1. The Coal Bucket Elevator will receive the coal or coke breeze from the Coal Screw Feeder and raise the coal or coke breeze and discharge to the Coal Screw Conveyor.
2. The PyGas™ Coal Gasifier and Coal Bucket Elevator will operate continuously, 8 hours per day, 7 days per week for two week periods and be out of service for six weeks between each period.
3. The minimum and maximum capacity of the Coal Bucket Elevator will be based on the 7 day, 24-hour average operating capacity of the Mass Balance being handled in a 8-hour operating period, 7 days per week.
4. The Coal Bucket Elevator will be installed outdoors. See Design Notes for ambient weather design criteria.
5. The vent gas from the Coal Bucket Elevator will be piped to the Coal Storage Bin.
6. The Coal Bucket Elevator will be free standing design with bracing to the Coal Storage Bin for stability.
7. Coke breeze will be handled by the Coal Bucket Elevator for use as a start-up fuel and potentially as a "Hot Hold" condition fuel in the PyGas™ Coal Gasifier at a reduced capacity.

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PROCESS DESIGN BASIS
PDB No. 82-IDH-4

Equipment Name	<u>Coal Bucket Elevator</u>
Equipment No.	<u>IDH-ELEV-1</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

II. DESIGN CRITERIA

NORMAL COAL HANDLING OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR	MAX. FLOW #/HR	MIN. FLOW #/HR	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS. PSIG
1	Product Coal In	18878	15102	15102	130		(SEE MASS BAL.)	
2	Product Coal Out	18689	14951	14951	130		(SEE MASS BAL.)	
3	Dust Vent (Solids)	189	151	151	130		(SEE MASS BAL.)	

COKE HANDLING OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR	MAX. FLOW #/HR	MIN. FLOW #/HR	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS. PSIG
1	Product Coke Breeze In	9439	7551	7551	130		(SEE MASS BAL.)	
2	Product Coke Breeze Out	9345	7475	7475	130		(SEE MASS BAL.)	
3	Dust Vent (Solids)	94	76	76	130		(SEE MASS BAL.)	

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PROCESS DESIGN BASIS
PDB No. 82-IDH-4

Equipment Name	<u>Coal Bucket Elevator</u>
Equipment No.	<u>1DH-ELEV-1</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

III. DESIGN NOTES

- Product coal and coke breeze flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coal and coke breeze flows, Mass and Energy Balance results, to allow for operation variations.
- The maximum and minimum flow rates for coke breeze are based on the coal feed capacity with a density of 50 pcf and are reduced by 50% when handling coke breeze with a density of 25 pcf.
- Coal Type Bituminous
- Coal Moisture 6%
- Coke Breeze Moisture 0%
- Coal Specific Heat 0.30 Btu/Lb-F
- Coal Bulk Density 50 #/Ft³
- Coke Breeze Bulk Density 25-35 #/ft³
- Coal Grindability Index 40-90
- Coke Breeze Size -1/4" x 0
- Coal Feed:

<u>Size Analysis</u>	<u>Sample</u>
(As Received)	

	+1-1/2"	0.0%
-1-1/2	+1	6.3%
-1	+3/4	7.3%
-3/4	+1/2	8.5%
-1/2	+3/8	8.4%
-3/8	+1/4	11.7%
-1/4	+#4 (Mesh)	8.2%
-4	+6	7.7%
-6	+16	19.6%
-16	+30	8.3%
-30	+56	5.1%
-50	+100	3.6%
-100	+200	2.1%
-200		3.2%

PROCESS DESIGN BASIS
PDB No. 82-IDH-4

Equipment Name	<u>Coal Bucket Elevator</u>
Equipment No.	<u>1DH-ELEV-1</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

III. DESIGN NOTES - Continued

Note: The coal size gradation analysis shown above is taken from the Riley Fuels Laboratory Test Report for three coals used at the Fort Martin Facility dated February 1, 1994. The size gradation for Consol #2 coal was used.

10. Design Operating Temperature 130°F

11. Ambient Weather Criteria

Design Temperature:

Dry Bulb:

Winter - -20°F (lowest on record-use for freeze protection)

Winter - 4°F (99%)

Summer - 90°F (99%)

Wet Bulk: 74°F (99%)

Performance Temperature: 80°F

Performance Relative Humidity: 60%

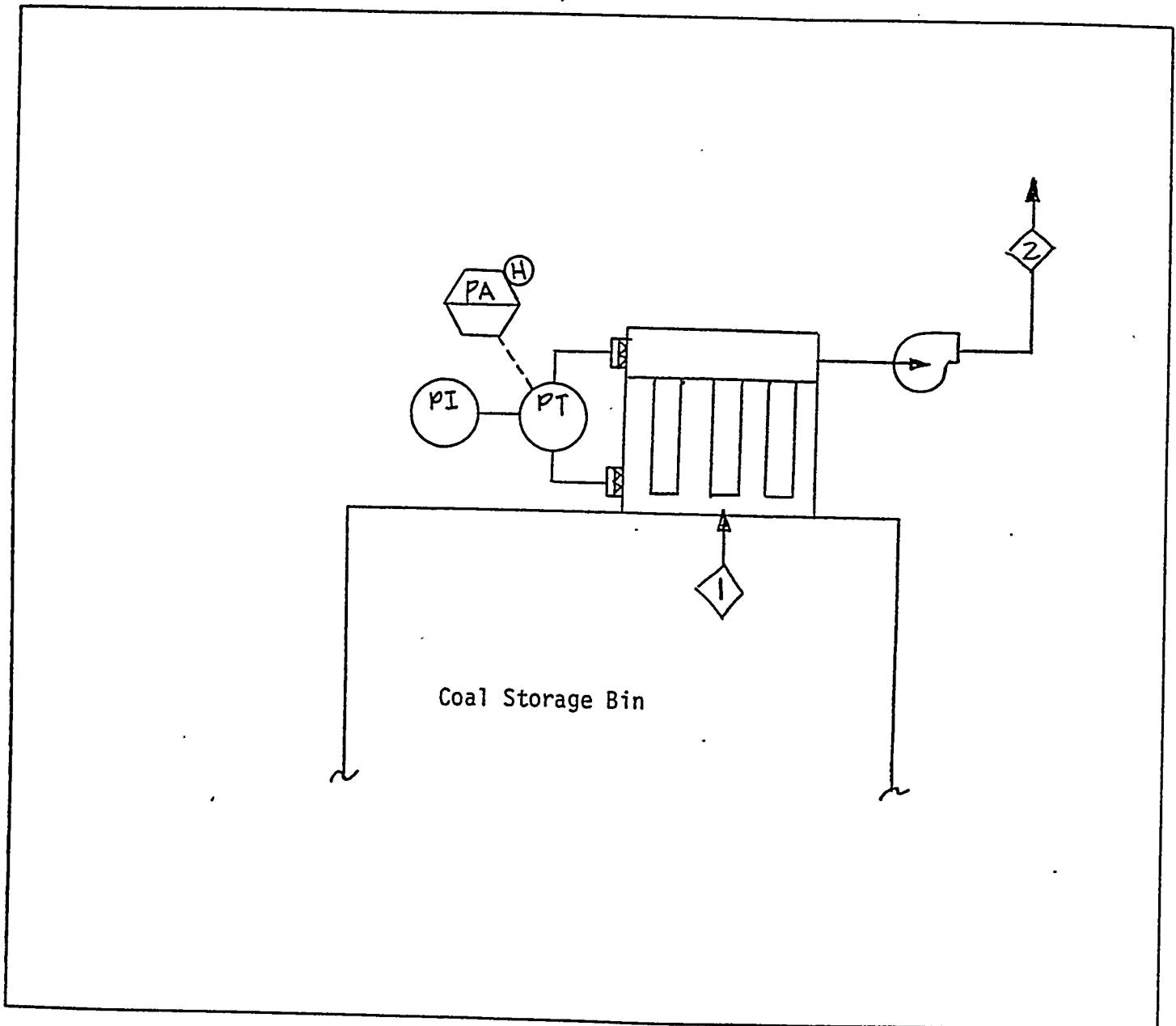
12. All data, i.e., capacities, flows, sizes etc., indicated in the Process Design Basis is to be considered the minimum requirement.

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SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DH - 5

Equipment Name Coal Storage Bin Vent Dust Collector w/Exhaust Fan
Equipment No. 1DH-DCOL-1 and 1DH-FAN-2
System Name Coal Receiving, Storage & Reclaim
Flowsheet No. 16N25706-82-F-1DH-001



PROCESS DESIGN BASIS
PDB No. 82-IDH-5

Equipment Name	<u>Coal Storage Bin Vent Dust Collector w/Exhaust Fan</u>
Equipment No.	<u>1DH-DCOL-1 and 1DH-FAN-1</u>
System Name	<u>Coal Receiving, Storage & Reclaim</u>
Flowsheet No.	<u>16N25706-82-F-1DH-001</u>

I. DESIGN PHILOSOPHY

1. The Coal Storage Bin Vent Dust Collector with exhaust fan will gather coal dust from the Coal Storage Bin.
2. The dust collector will operate continuously, 24 hours per day, for two week periods, and be out of service for six weeks between each period.
3. The dust collector will be installed outdoors. See Design Notes for ambient weather criteria.
4. Sensors will be provided on the dust collector for monitoring the differential pressure across the filter bags. A high differential pressure detected will sound an audible alarm and shut down the storage bin feed equipment.
5. The dust collector filter bags will include an integral grounding wire to prevent dust ignition from a static charge. All other areas of the dust collector exposed to dust and/or gas flow will include grounding devices to prevent the development and conductance of a static charge.

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PROCESS DESIGN BASIS

PDB No. 82-IDH-5

Equipment Name Coal Storage Bin Vent Dust Collector w/Exhaust Fan
 Equipment No. 1DH-DCOL-1 and 1DH-FAN-1
 System Name Coal Receiving, Storage & Reclaim
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS PSIG
1	Dust Vent (Solids)	1992	(See Mass Bal.)		100	(See Mass Bal.)		
	(Gas)	6188						
2	Exhaust Vent (Solids)	3.98	(See Mass Bal.)		100	(See Mass Bal.)		
	(Gas)	6188						

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PROCESS DESIGN BASIS
PDB No. 82-IDH-5

Equipment Name Coal Storage Bin Vent Dust Collector w/Exhaust Fan
Equipment No. 1DH-DCOL-1 and 1DH-FAN-1
System Name Coal Receiving, Storage & Reclaim
Flowsheet No. 16N25706-82-F-1DJ-001

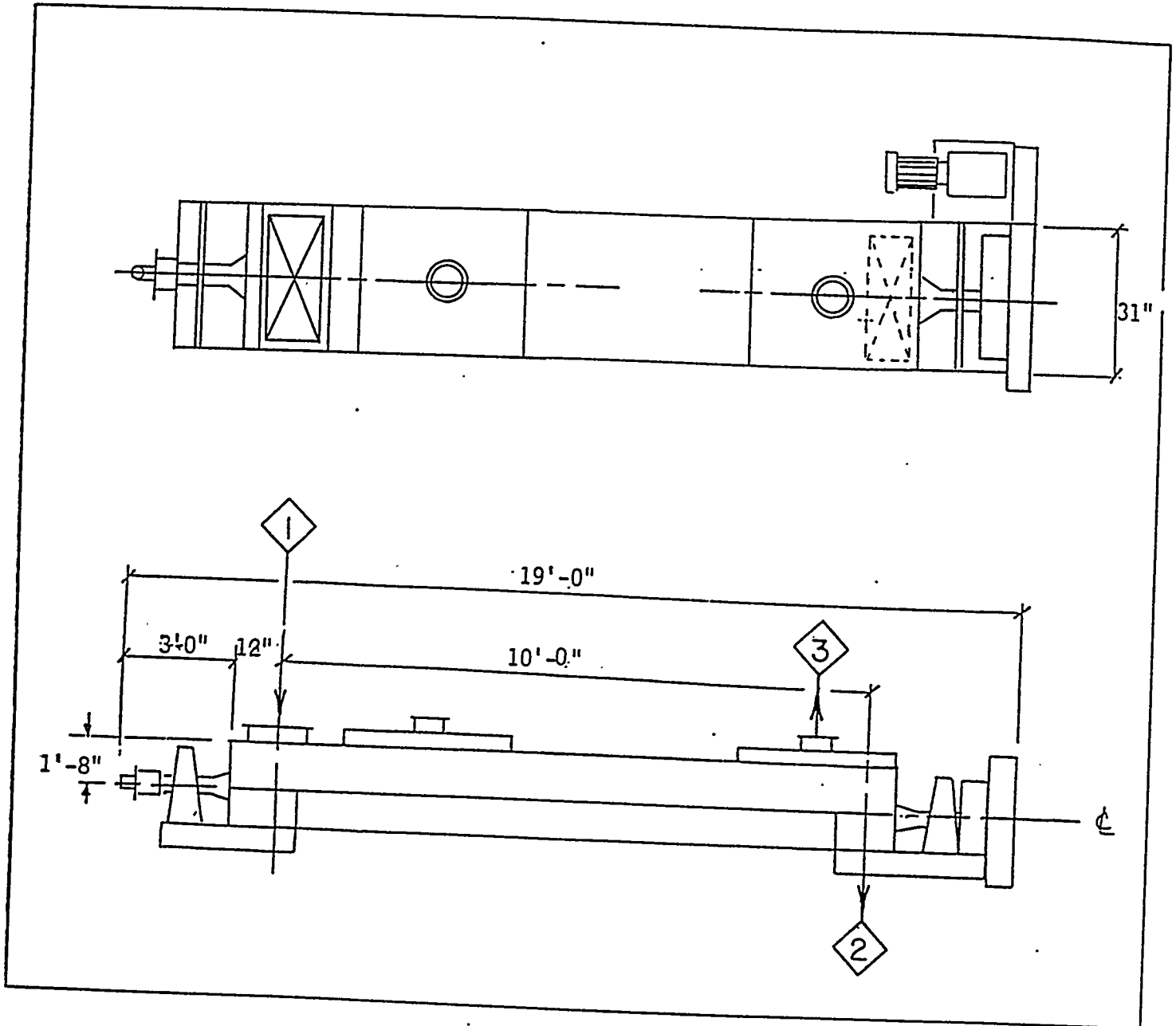
III DESIGN NOTES

1. Coal dust and exhaust flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum flow, Mass and Energy Balance results, to allow for operation variations.
2. Material Handling Coal dust from storage bin loading via bucket elevator and screw conveyor and vent from high pressure charge hopper.
3. Particle Size 100 mesh to and including 0.5 micron.
4. Moisture Content 1 to 6%
5. Design Operating Temperature 100°F
6. Efficiency Required 99.8%
7. Cloth to Air Ratio 6 to 1 minimum
8. Bag Cleaning Reverse pulse jet compressed air
9. Compressed Air Available Instrument air -
100 psig @ 100°F
10. Classification Class II, Division 2, Groups E & F
11. Motor Voltage Available 460 voltage, 3 phase, 60 hertz
12. Control Voltage Available 120 volt AC
13. Ambient Weather Criteria
Design Temperature:
Dry Bulb:
Winter -20°F (lowest on record-use for freeze protection)
Winter 4°F (99%)
Summer 90°F (99%)
Wet Bulb: 74°F (99%)
Performance Temperature: 80°F
Performance Relative Humidity: 60%
14. The dust collector will be complete with internal fire protection system.
15. All data, i.e., capacities, flows, sizes etc., indicated in the Process Design Basis is to be considered the minimum requirement.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 1

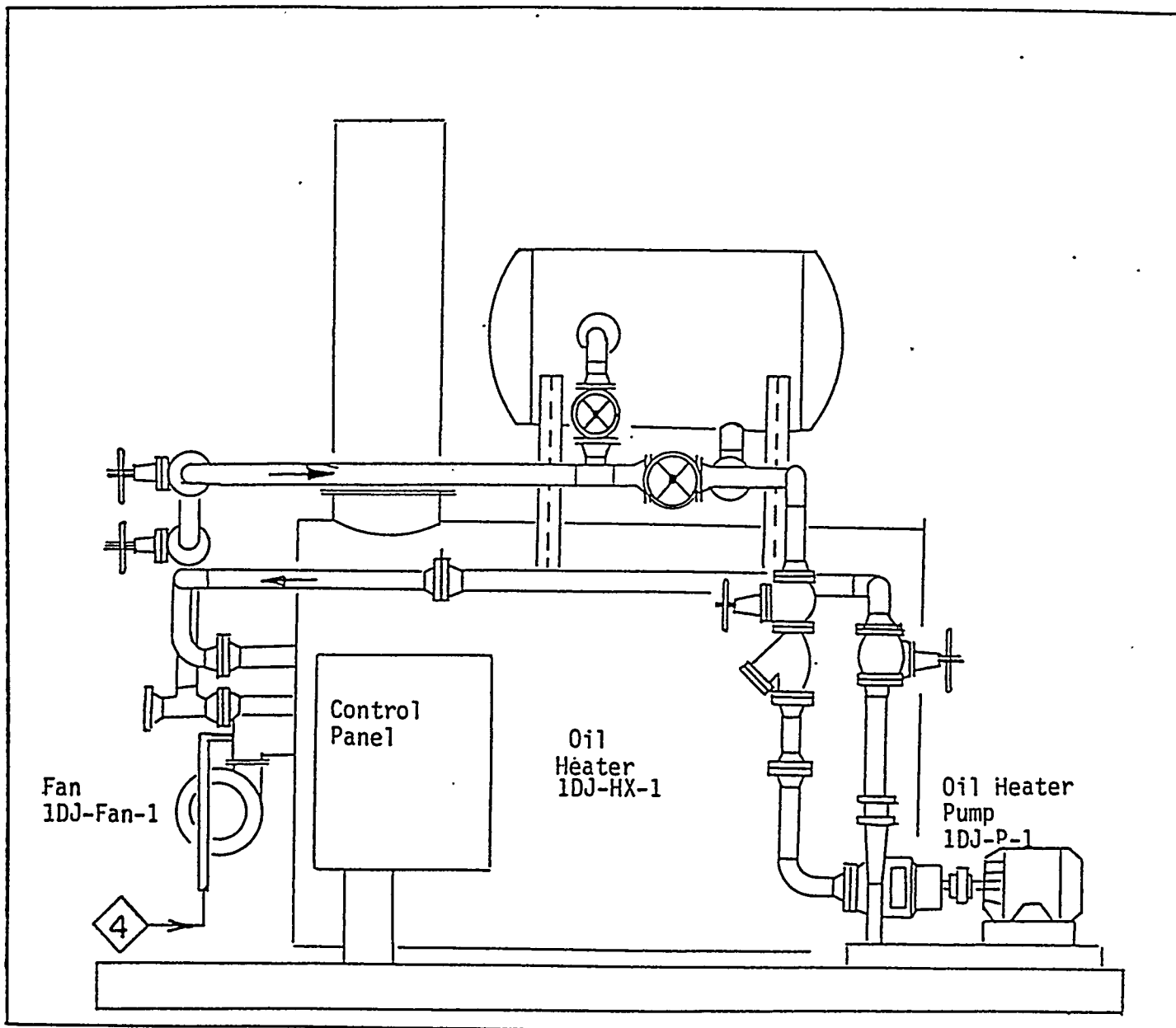
Equipment Name Coal Screw Dryer
Equipment No. 1DJ-DRY-1
System Name Coal Preparation, & Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001



SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 1

Equipment Name Oil Heater
Equipment No. 1DJ-HX-1
System Name Coal Preparation, & Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001



PROCESS DESIGN BASIS
PDB No. 82-IDJ-1

Equipment Name	<u>Coal Screw Dryer</u>
Equipment No.	<u>1DJ-DRY-1</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

I. DESIGN PHILOSOPHY

1. The Coal Screw Dryer will reduce the moisture of the crushed coal to less than 1%.
2. The PyGas™ Coal Gasifier and Coal Screw Dryer will operate continuously, 24 hours per day, for two week periods and be out of service for six weeks between each period.
3. The Coal Screw Dryer will be installed outdoors. See Design Notes for ambient weather design criteria.
4. The vent gas from the Coal Screw Dryer will be piped to the Coal Preparation Dust Collector.
5. Hot oil will be circulated through hollow flight screws in the dryer. The oil will be heated in a natural gas fired oil heater.
6. Oil heater controls will include a flame safety system.

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PROCESS DESIGN BASIS
PDB No. 82-IDJ-1

Equipment Name Coal Screw Dryer
 Equipment No. 1DJ-DRY-1
 System Name Coal Preparation & Limestone System
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
Item	Process Stream	Design Flow #/Hr.	Max. Flow #/Hr.	Min. Flow #/Hr.	Max. Temp. °F	Min. Temp °F	Max. Press Psig	Min. Press Psig
1	Product Coal In	6608	(See Mass Bal.)		200	(See Mass Bal.)		
2	Product Coal Out	6542	(See Mass Bal.)		250	(See Mass Bal.)		
3	Dust Vent (Solids)	66	(See Mass Bal.)		150	(See Mass Bal.)		
4	Natural Gas	By Vendor	(See Mass Bal.)		N/A	(See Mass Bal.)		

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PROCESS DESIGN BASIS
 PDB No. 82-IDJ-1

Equipment Name	<u>Coal Screw Dryer</u>
Equipment No.	<u>1DJ-DRY-1</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

III. DESIGN NOTES

1. Product coal flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coal flow, Appendix A-8, Mass and Energy Balance results, to allow the operation variations.

- | | |
|----------------------------|---------------------|
| 2. Coal Type | Bituminous |
| 3. Coal Moisture | 6% |
| 4. Coal Specific Heat | 0.30 Btu/Lb-F |
| 5. Coal Bulk Density | 50#/Ft ³ |
| 6. Coal Grindability Index | 40-90 |
| 7. Crushed Coal Feed: | |

<u>Size Analysis</u> (Anticipated)	<u>Sample</u> (Estimated)
-3/8 + 1/4	3%
-1/4 + 1/8	14%
-1/8 + 10 (mesh)	15%
-10 + 20	30%
-20 + 40	20%
-40 + 100	9%
-100 + 200	5%

- | | |
|------------------------------|----------------------------|
| 8. Target Outlet Moisture | <1.0% |
| 9. Natural Gas | Available at 35 to 60 psig |
| 10. Ambient Weather Criteria | |

Design Temperature:

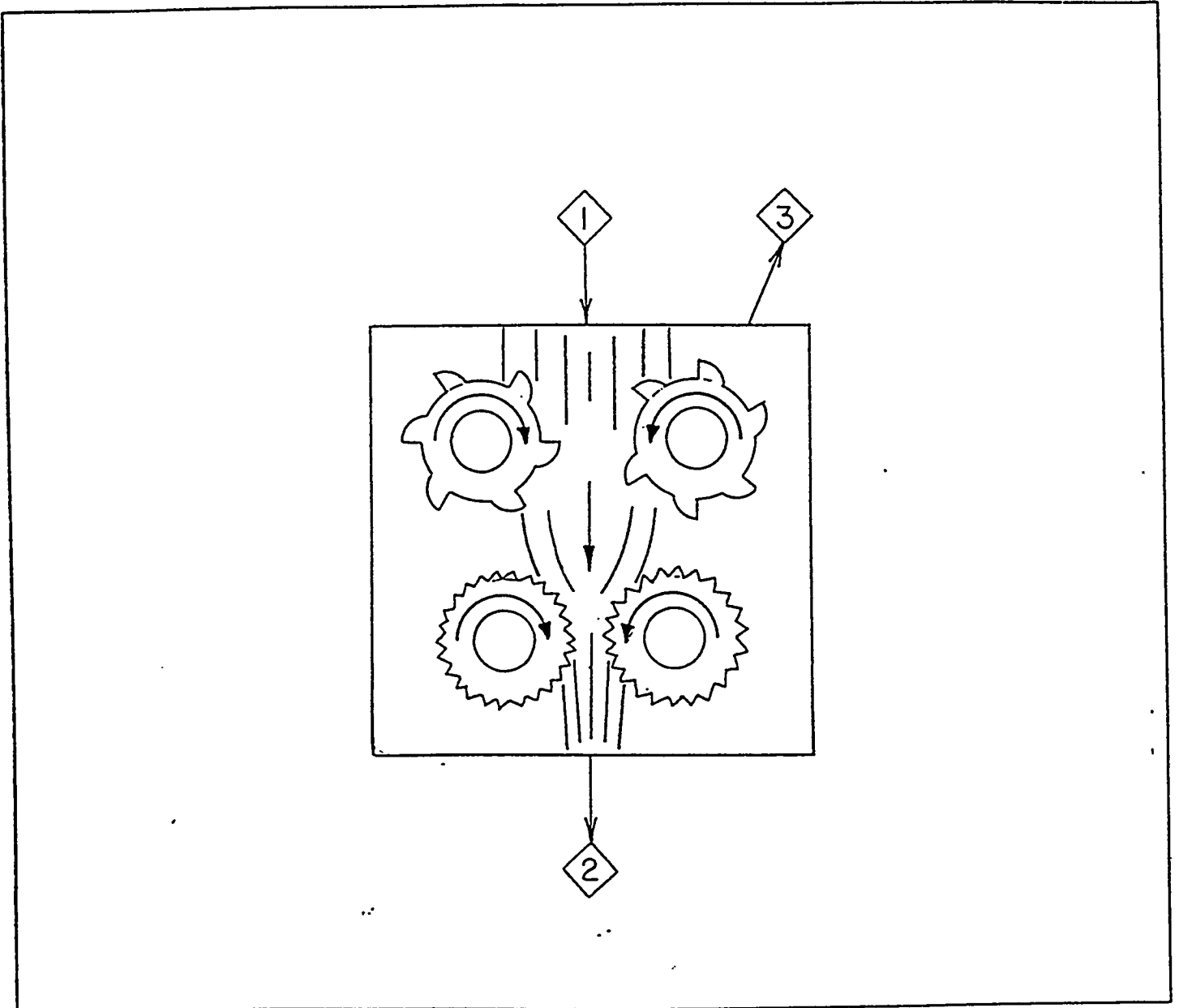
Dry Bulb:	
Winter	-20°F (lowest on record-use for freeze protection)
Winter	4°F (99%)
Summer	90°F (99%)
Wet Bulb:	74°F (99%)
Performance Temperature:	80°F
Performance Relative Humidity:	60%

11. All data, i.e., capacities, flows, sizes etc., indicated in the Process Design Basis is to be considered the minimum requirement.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 2

Equipment Name Coal Crusher
Equipment No. IDJ-CRSH-1
System Name Coal Preparation, & Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001



PROCESS DESIGN BASIS
PDB No. 82-IDJ-2

Equipment Name	<u>Coal Crusher</u>
Equipment No.	<u>1DJ-CRSH-1</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

I. DESIGN PHILOSOPHY

1. The Coal Crusher will reduce the incoming coal size to between -1/4 x 50 mesh for burning in the PyGas™ Coal Gasifier.
2. The Coal Crusher will be installed outdoors. See Design Notes for ambient weather design criteria.
3. The vent gas from the Coal Crusher will be piped to the Coal Preparation Dust Collector.
4. The Coal Crusher will operate continuously, 24 hours per day, for two week periods and be out of service for six weeks between each period.
5. The crusher will be roll or ring type with two stage crushing to minimize fines generation.
6. The coal grindability and sulfur content will vary with the specific test to be conducted.
7. A screw feeder will provide flow rate control to the coal crusher.

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PROCESS DESIGN BASIS
PDB No. 82-IDJ-2

Equipment Name Coal Crusher
 Equipment No. 1DJ-CRSH-1
 System Name Coal Preparation & Limestone System
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS PSIG
1	Product Coal In	6675	(See Mass Bal.)		100	(See Mass Bal.)		
2	Product Coal Out	6608	(See Mass Bal.)		200	(See Mass Bal.)		
3	Dust Vent (Solids)	67	(See Mass Bal.)		150	(See Mass Bal.)		

PROCESS DESIGN BASIS

Equipment Name	<u>Coal Crusher</u>
Equipment No.	<u>1DJ-CRSH-1</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

III DESIGN NOTES

- Product coal flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coal flow, Appendix A-8, Mass and Energy Balance results, to allow for operation variations.
- Coal Type Bituminous
- Coal Moisture 6%
- Coal Specific Heat 0.30 Btu/Lb-F
- Crushed Coal Target Size -1/4 x 50 mesh
- Coal Bulk Density 50 #/Ft³
- Coal Grindability Index 40-90
- Coal Feed:

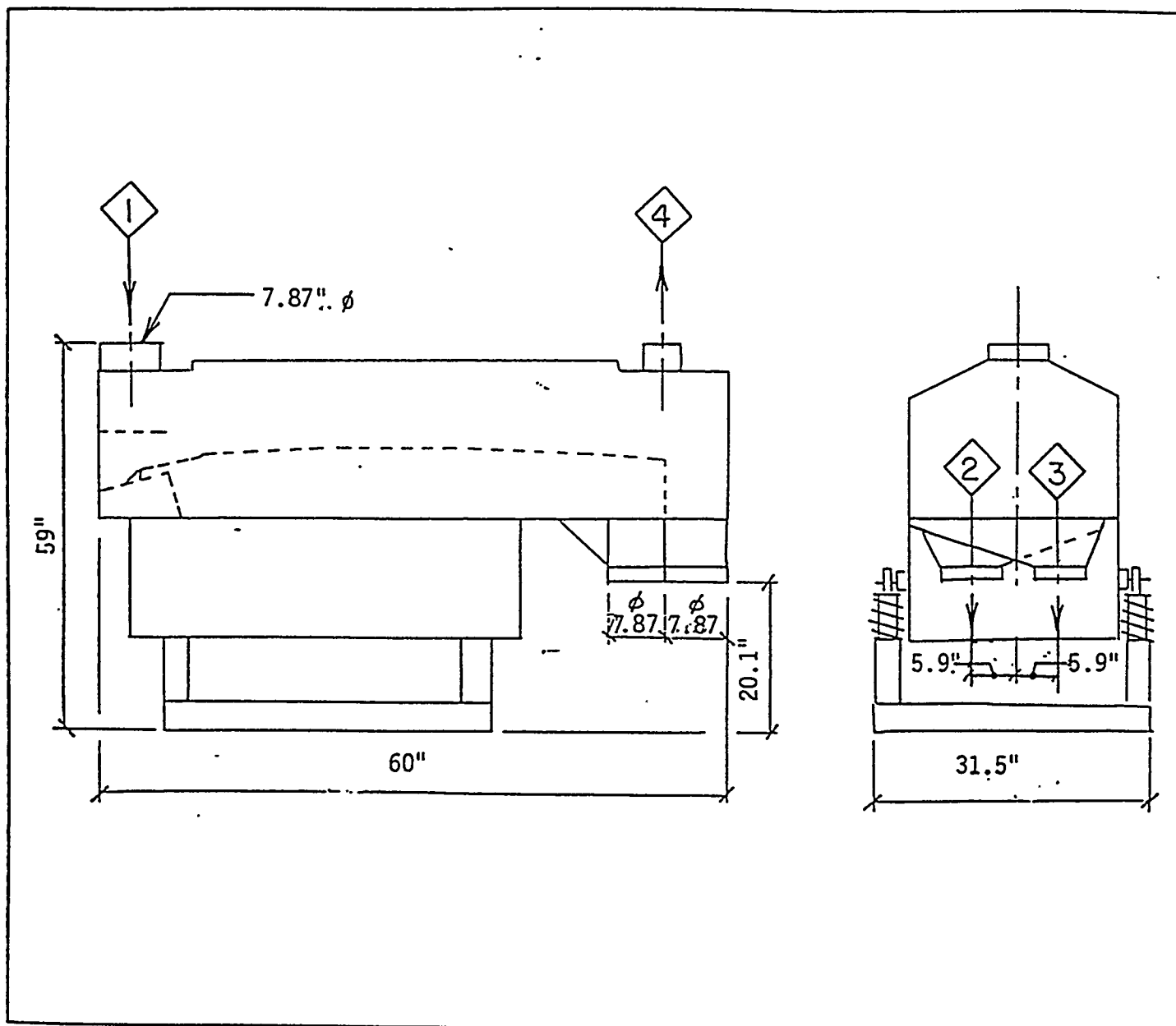
<u>Size Analysis</u>	<u>Sample</u>
(As Received)	(Estimated)
+1-1/2"	0.0%
-1-1/2 +1	6.3%
-1 +3/4	7.3%
-3/4 +1/2	8.5%
-1/2 +3/8	8.4%
-3/8 +1/4	11.7%
-1/4 +#4 (Mesh)	8.2%
-4 +6	7.7%
-6 +16	19.6%
-16 +30	8.3%
-30 +50	5.1%
-50 +100	3.6%
-100 +200	2.1%
-200	3.2%
- Design Operating Temperature 150°F
- Ambient Weather Criteria

Design Temperature:	
Dry Bulb:	
Winter	-20°F (lowest on record-use for freeze protection)
Winter	4°F (99%)
Summer	90°F (99%)
Wet Bulb:	
	74°F (99%)
Performance Temperature:	80°F
Performance Relative Humidity:	60%
- All data, i.e., capacities, flows, sizes etc., indicated in the Process Design Basis is to be considered the minimum requirement.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 3

Equipment Name Coal Classifier
Equipment No. 1DJ-CLF-1
System Name Coal Preparation, & Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001



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PROCESS DESIGN BASIS

PDB No. 82-IDJ-3

Equipment Name	<u>Coal Classifier</u>
Equipment No.	<u>1DJ-CLF-1</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

I. DESIGN PHILOSOPHY

1. The Coal Classifier will separate out the fines fraction (<50 mesh) of the crushed coal stream in preparation for burning in the PyGas™ Coal Gasifier.
2. The PyGas™ Coal Gasifier and Coal Classifier will operate continuously, 24 hours per day, for two week periods and be out of service for six weeks between each period..
3. The Coal Classifier will be installed outdoors. See Design Notes for ambient weather design criteria.
4. The vent gas from the Coal Classifier will be piped to the Coal Preparation Dust Collector.

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PROCESS DESIGN BASIS
 PDB No. 82-IDJ-3

Equipment Name Coal Classifier
 Equipment No. 1DJ-CLF-1
 System Name Coal Preparation & Limestone System
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS PSIG
1	Product Coal In	6412	(See Mass Bal.)		200	(See Mass Bal.)		
2	Product Coal Out	5205	(See Mass Bal.)		200	(See Mass Bal.)		
3	Coal Fines	1143	(See Mass Bal.)		200	(See Mass Bal.)		
4	Dust Vent (Solids)	64	(See Mass Bal.)		150	(See Mass Bal.)		

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PROCESS DESIGN BASIS

PDB No. 82-IDJ-3

Equipment Name	<u>Coal Classifier</u>
Equipment No.	<u>1DJ-CLF-1</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

III DESIGN NOTES

1. Product coal flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coal flow, Appendix A-8, Mass and Energy Balance results, to allow for operation variations.

- | | |
|--------------------------------|---------------------|
| 2. Coal Type: | Bituminous |
| 3. Coal Moisture: | <1% |
| 4. Coal Specific Heat: | 0.30 Btu/Lb-F |
| 5. Coal Bulk Density: | 50#/Ft ³ |
| 6. Coal Grindability Index: | 40-90 |
| 7. Crushed Coal Size (Target): | -1/4 x 50 mesh |
| 8. Crushed Coal Feed: | |

<u>Size Analysis</u> (Anticipated)	<u>Sample</u> (Estimated)
-3/8 +1/4	3%
-1/4 +1/4	14%
-1/8 +10 (mesh)	15%
-10 +20	30%
-20 +40	20%
-40 +100	9%
-100 +200	8.2%

9. Ambient Weather Criteria

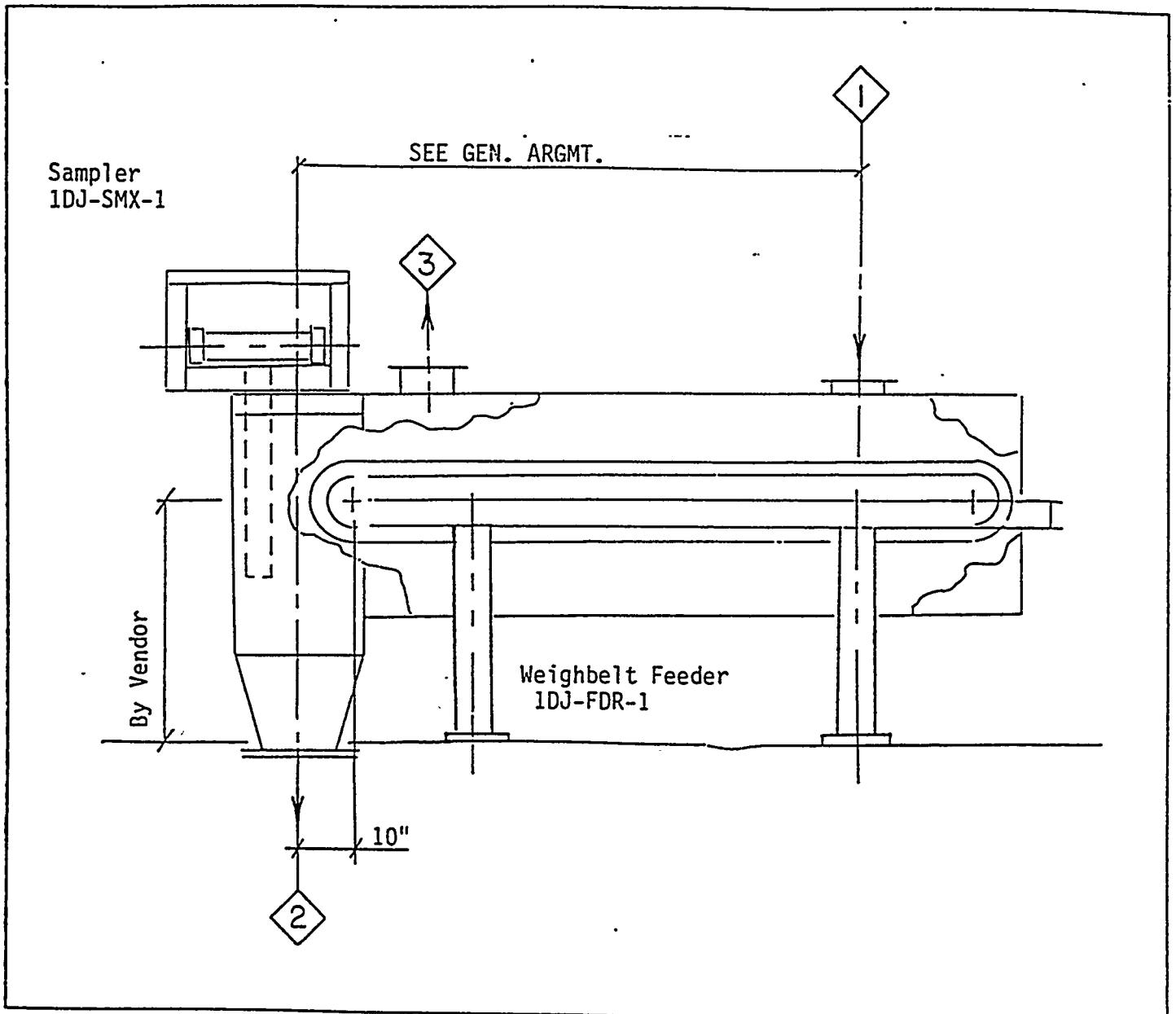
Design Temperature:	
Winter	-20°F (lowest on record-use for freeze protection)
Winter	4°F (99%)
Summer	90°F (99%)
Wet Bulb:	74°F (99%)
Performance Temperature:	80°F
Performance Relative Humidity:	60%

10. All data, i.e., capacities, flows, sizes, etc., indicated in the Process Design Basis is to be considered the minimum requirement.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 4

Equipment Name Coal Weighbelt Feeder / Sampler
Equipment No. 1DJ-FDR-1, 1DJ-SMX-1
System Name Coal Preparation, & Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001



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PROCESS DESIGN BASIS
PDB No. IDJ-4

Equipment Name	<u>Coal Weightbelt Feeder/Sampler</u>
Equipment No.	<u>1DJ-FDR-1, 1DJ-SMX-1</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

I. DESIGN PHILOSOPHY

1. The Coal Weighbelt Feeder/Sampler provides an accurate metering of coal fuel for combustion in the PyGas™ Coal Gasifier.
2. The PyGas™ Coal Gasifier and Coal Weighbelt Feeder/Sampler will operate continuously, 24 hours per day, for two week periods and be out of service for six weeks between each period.
3. The Coal Weighbelt Feeder/Sampler will be installed outdoors. See Design Notes for ambient weather design criteria.
4. The vent gas from the Coal Weighbelt Feeder/Sampler will be piped to the Coal Preparation Dust Collector.
5. The Coal Weighbelt Feeder will provide a controlled continuous feed rate to the Surge Bin of the Pyrolizer Feed System.
6. A cross-cut Sampler will be integrated into the discharge chute of the Coal Weighbelt Feeder.
7. Cross-cut samples of the coal discharge will be taken at intervals in accordance with ASTM requirements. Samples will be discharged to containers on the ground floor for lab analysis pick-up.
8. The Coal Weighbelt Feeder/Sampler will be totally enclosed and dust tight.

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PROCESS DESIGN BASIS
 PDB No. IDJ-4

Equipment Name Coal Weightbelt Feeder/Sampler
 Equipment No. 1DJ-FDR-1, 1DJ-SMX-1
 System Name Coal Preparation & Limestone System
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS. PSIG	MIN. PRESS. PSIG
1	PRODUCT COAL IN	5153	(SEE MASS BAL.)		200		(SEE MASS BAL.)	
2	PRODUCT COAL OUT	5102	(SEE MASS BAL.)		175		(SEE MASS BAL.)	
3	DUST VENT (SOLIDS)	51	(SEE MASS BAL.)		125		(SEE MASS BAL.)	

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PROCESS DESIGN BASIS

PDB No. IDJ-4

Equipment Name	<u>Coal Weightbelt Feeder/Sampler</u>
Equipment No.	<u>1DJ-FDR-1, 1DJ-SMX-1</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

III. DESIGN NOTES

1. Product coal flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coal flow, Appendix A-8, Mass and Energy Balance results, to allow for operation variations.
2. Coal Type Bituminous
3. Coal Moisture <1%
4. Coal Specific Heat 0.30 Btu/lb-F
5. Crushed Coal Size -1/4 x 50 mesh
6. Coal Bulk Density 50 #/Ft³
7. Coal Grindability Index 40-90
8. Crushed Coal Feed to Classifier

<u>Size Analysis</u>		<u>Sample</u>
(As Received)		(Estimated)
-3/8	+1/4	3%
-1/4	1/8	14%
-1/8	+10 (mesh)	15%
-10	+20	30%
-20	+40	20%
-40	+100	9%
-100	+200	5%

Note: The estimated coal size gradation shown above after crushing is based on the American Pulverizer analysis of a crusher discharge to produce 1/4" top size coal with the feed as depicted in the Riley Fuels Laboratory Test Report dated February 1, 1994.

9. Ambient Weather Criteria

Design Temperature:

Dry Bulb:

Winter: -20°F (lowest on record-use for freeze protection)

Winter: 4°F (99%)

Summer: 90°F (99%)

Wet Bulb: 74°F (99%)

Performance Temperature: 80°F

Performance Relative

Humidity: 60%

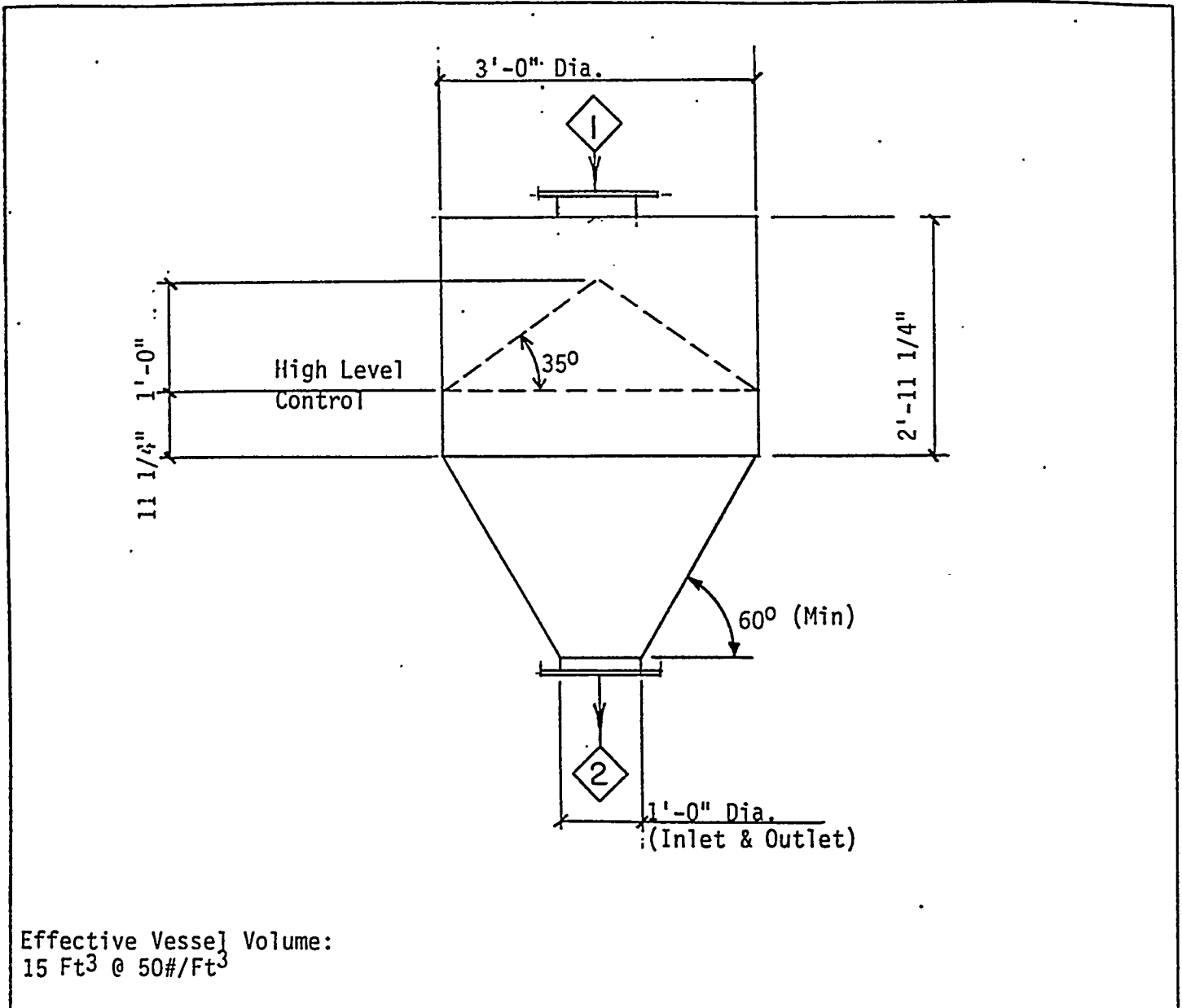
10. All data, i.e., capacities, flows, sizes, etc., indicated in the Process Design Basis is to be considered the minimum requirement.

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SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 5

Equipment Name Coal Surge Bin
Equipment No. 1DJ-TK-2
System Name Coal Preparation, & Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001



PROCESS DESIGN BASIS

PDB No. 82-IDJ-5

Equipment Name	<u>Coal Surge Bin</u>
Equipment No.	<u>1DJ-TK-2</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

I. DESIGN PHILOSOPHY

1. The Coal Surge Bin provides temporary surge capacity for feed to the Coal Weighbelt Feeder.
2. The PyGas™ Coal Gasifier and Coal Surge Bin will operate continuously, 24 hours per day, for two week periods and be out of service for six weeks between each period.
3. The Coal Surge Bin will be installed outdoors. See Design Notes for ambient weather criteria.

PROCESS DESIGN BASIS
PDB No. 82-IDJ-5

Equipment Name Coal Surge Bin
 Equipment No. 1DJ-TK-2
 System Name Coal Preparation & Limestone System
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS. PSIG	MIN. PRESS. PSIG
1	PRODUCT COAL IN	5205	(See Mass Bal.)		200	(See Mass Bal.)		
2	PRODUCT COAL OUT	5153	(See Mass Bal.)		200	(See Mass Bal.)		
3	DUST VENT (SOLIDS)	52	(See Mass Bal.)		150	(See Mass Bal.)		

- | | |
|----------------------------|---------------------|
| 1. Hours Storage Available | 0.167 (10 Minutes) |
| 2. Effective Bin Volume | 15 Ft. ³ |
| 3. Bin Diameter | 3'-0" (Min) |
| 4. Discharge Cone Angle | 60° (Min) |

PROCESS DESIGN BASIS
PDB No. 82-IDJ-5

Equipment Name	<u>Coal Surge Bin</u>
Equipment No.	<u>1DJ-TK-2</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

III. DESIGN NOTES

1. Product coal flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coal flow, Appendix A-8, Mass and Energy Balance results, to allow for operation variations.

2. Coal Type	Bituminous
3. Coal Moisture	<1%
4. Coal Specific Heat	0.30 Btu/Lb.-F
5. Coal Bulk Density	50 #/Ft ³
6. Coal Angle of Repose	35 deg.
7. Coal Grindability Index	40-90

8. <u>Size Analysis</u> (As Received)	<u>Sample</u> (Estimated)
--	------------------------------

-3/8	+1/4	3%
-1/4	+1/4	14%
-1/8	+10(mesh)	15%
-10	+20	30%
-20	+40	20%
-40	+100	9%
-100	+200	5%

Note: The estimated coal size gradation shown above after crushing is based on the American Pulverizer analysis of a crusher discharge to produce 1/4" top size coal with the feed as depicted in the Riley Fuels Laboratory Test Report dated February 1, 1994.

PROCESS DESIGN BASIS
PDB No. 82-IDJ-5

Equipment Name	<u>Coal Surge Bin</u>
Equipment No.	<u>1DJ-TK-2</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

III. DESIGN NOTES (cont'd.)

9. Ambient Weather
Criteria

Design Temperature:

Dry Bulb:

Winter -	-20°F (lowest on record-use for freeze protection)
Winter -	4° F (99%)
Summer -	90° (99%)

Wet Bulb: 74° (99%)

Performance Temperature: 80°

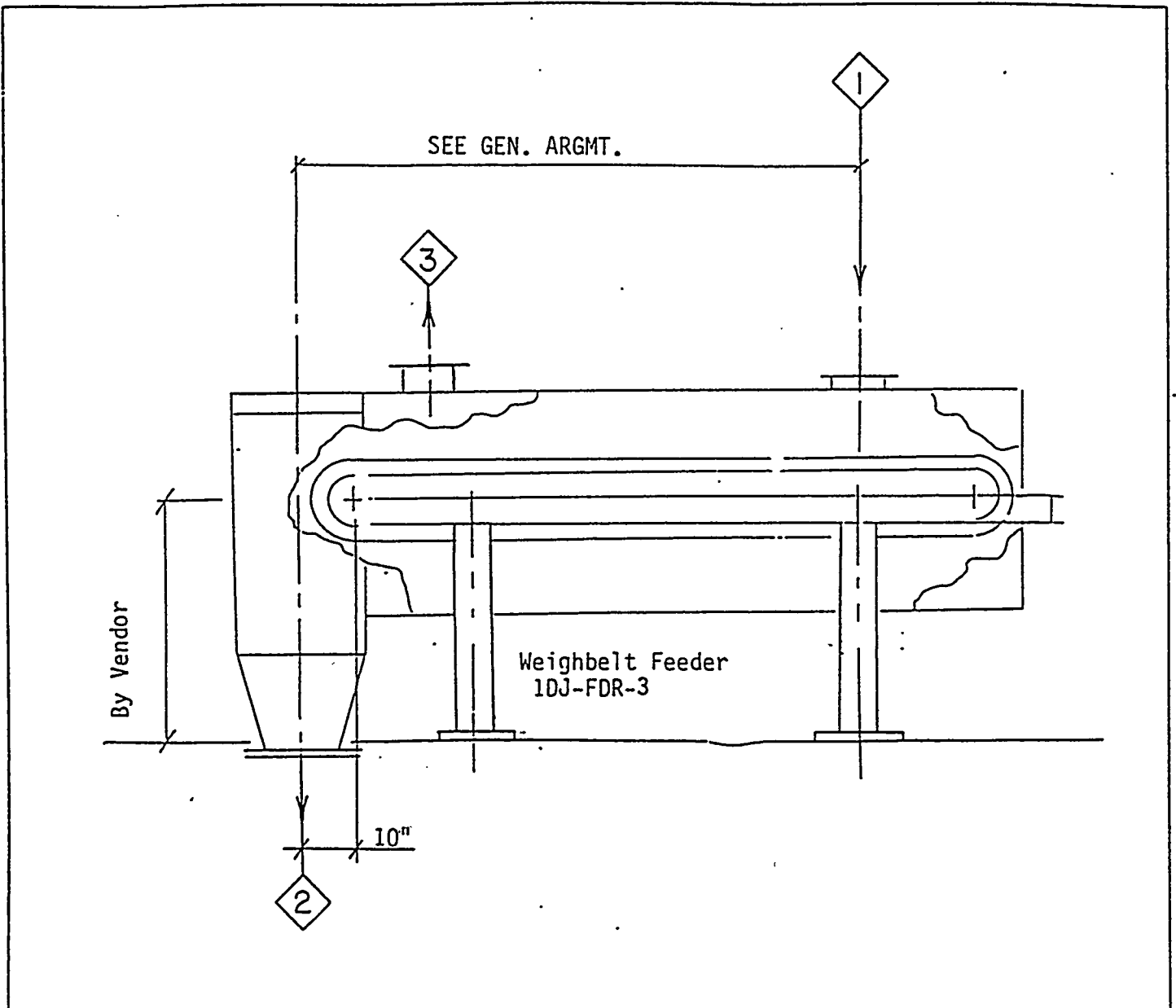
Performance Relative Humidity: 60%

10. All data, i.e. capacities, flows, sizes etc., indicated in the Process Design Basis is to be considered the minimum required.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 6

Equipment Name Coke Weighbelt Feeder
Equipment No. 1DJ-FDR-3
System Name Coal Preparation and Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001



PROCESS DESIGN BASIS
PDB No. 82-IDJ-6

Equipment Name	<u>Coke Weightbelt Feeder</u>
Equipment No.	<u>1DJ-FDR-3</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

I. DESIGN PHILOSOPHY

1. The Coke Weighbelt Feeder provides an accurate metering of coke breeze for combustion in the PyGas™ Coal Gasifier during the start-up mode.
2. During desulfurization testing, the Coke Weighbelt Feeder provides an accurate metering of limestone for combustion in the gasifier.
3. The PyGas™ Coal Gasifier and Coke Weighbelt Feeder will operate continuously during the start-up phase.
4. Upon reaching the desired temperature and pressure in the gasifier start-up mode for coal feed, the feed of coke breeze will be reduced as the coal feed is increased.
5. The Coke Weighbelt Feeder will be installed outdoors. See Design Notes for ambient weather criteria.
6. The vent gas from the Coke Weighbelt Feeder will be piped to the Coal Preparation Dust Collector.
7. The Coke Weighbelt Feeder will provide a controlled continuous feed rate to the Surge Bin of the Pyrolizer Feed System.
8. The Coke Weighbelt Feeder will be totally enclosed and dust tight.
9. Coke breeze will be handled by the coal handling equipment for use as a start-up fuel and potentially as a "Hot Hold" condition fuel in the PyGas™ Coal Gasifier at a reduced capacity.

PROCESS DESIGN BASIS
PDB No. 82-IDJ-6

Equipment Name Coke Weightbelt Feeder
 Equipment No. 1DJ-FDR-3
 System Name Coal Preparation & Limestone System
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

GASIFIER START-UP OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS. PSIG	MIN. PRESS. PSIG
1	PRODUCT COKE IN	505	(SEE MASS BAL.)		130	(SEE MASS BAL.)		
2	PRODUCT COKE OUT	500	(SEE MASS BAL.)		130	(SEE MASS BAL.)		
3	DUST VENT (SOLIDS)	5	(SEE MASS BAL.)		100	(SEE MASS BAL.)		

GASIFIER START-UP OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS. PSIG	MIN. PRESS. PSIG
1	PRODUCT LIMESTONE IN	1215	(See Mass Bal.)		130	80	14.9	10
2	PRODUCT LIMESTONE OUT	1203	(See Mass Bal.)		130	(See Mass Bal.)		
3	DUST VENT (SOLIDS)	12	(See Mass Bal.)		100	(See Mass Bal.)		

PROCESS DESIGN BASIS
PDB No. 82-IDJ-6

Equipment Name	<u>Coke Weightbelt Feeder</u>
Equipment No.	<u>1DJ-FDR-3</u>
System Name	<u>Coal Preparation & Limestone System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

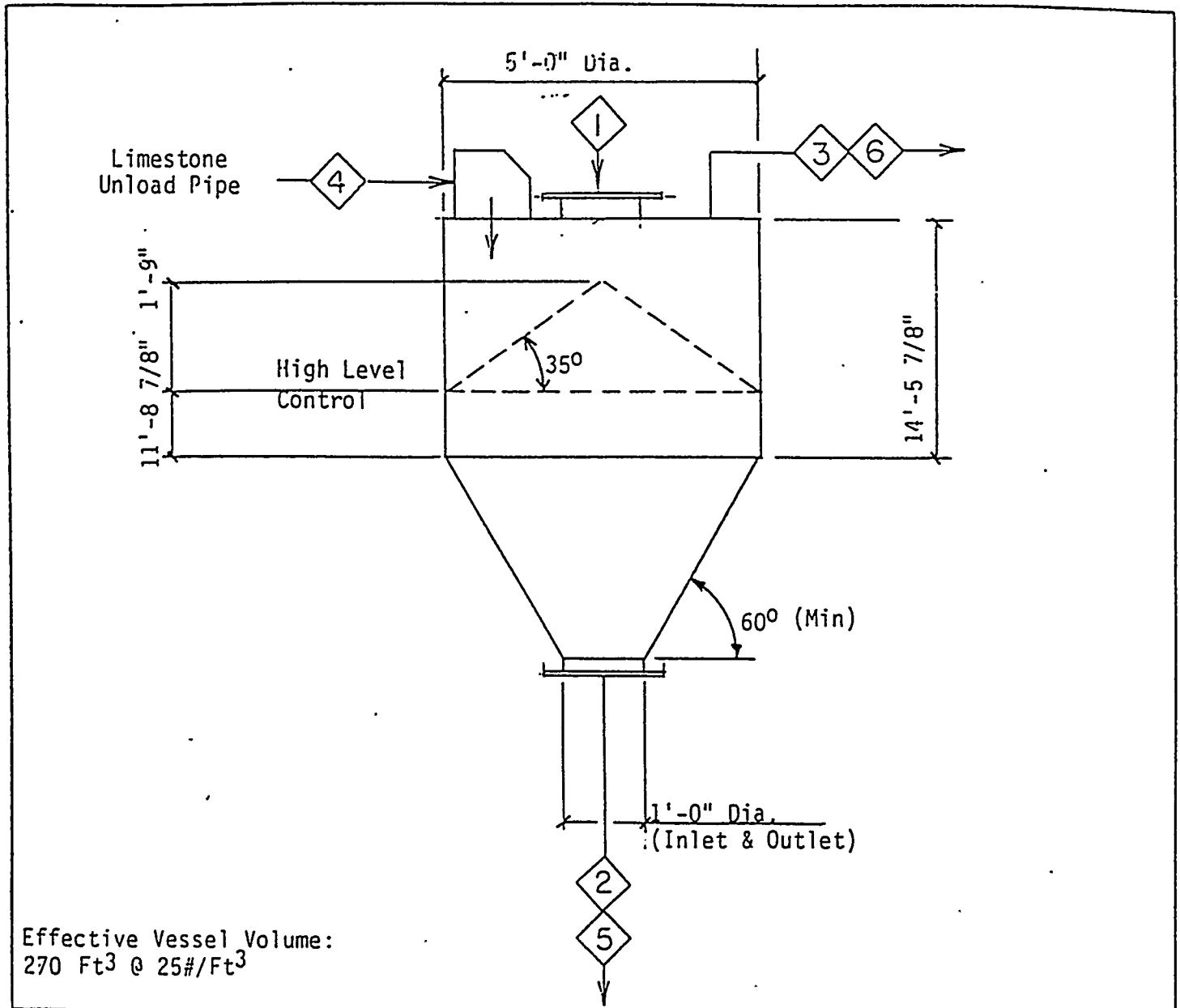
III. DESIGN NOTES

1. Product coke breeze flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coke breeze flow, Appendix A-8, Mass and Energy Balance results, to allow for operation variations.
2. Coke Moisture 0%
Limestone Moisture 1%
3. Coke Breeze Size -1/4" x 0
Limestone Size -1/8" x 200 Mesh
4. Coke Bulk Density 25-35 #/ft³
Limestone Bulk Density 68 #/ft³
5. All data, i.e., capacities, flows, sizes, etc., indicated in the Process Design Basis is to be considered the minimum requirement.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 7

Equipment Name Coke Surge Bin
Equipment No. 1DJ-TK-7
System Name Coal Preparation and Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001



SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 7

Equipment Name Coke Surge Bin
Equipment No. 1DJ-TK-7
System Name Coal Preparation and Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001

I. DESIGN PHILOSOPHY

1. The Coke Bin provides live storage of coke breeze for feed to the Coke Weighbelt Feeder during the start-up mode and potential "Hot Hold" condition of the PyGas™ Coal Gasifier.
2. During desulfurization testing, the Coke Bin will provide several hours of live sorbent inventory for the PyGas™ Coal Gasifier.
3. The PyGas™ Coal Gasifier and Coke Bin will operate continuously, during the start-up mode and desulfurization testing.
4. The Coke Bin will be installed outdoors. See Design Notes for ambient weather criteria.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 7

Equipment Name Coke Surge Bin
 Equipment No. 1DJ-TK-7
 System Name Coal Preparation and Limestone System
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

GASIFIER START-UP OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS. PSIG	MIN. PRESS. PSIG
1	PRODUCT COKE BREEZE IN	9439	7551	7551	130	(See Mass Bal.)		
2	PRODUCT COKE BREEZE OUT	505	(See Mass Bal.)		130	(See Mass Bal.)		
3	DUST VENT (SOLIDS)	94	(See Mass Bal.)		100	(See Mass Bal.)		

DESULFURIZATION TESTING								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS. PSIG	MIN. PRESS. PSIG
4	PRODUCT LIMESTONE IN	20,000	8080*	4040	130	80	14.9	10
5	PRODUCT LIMESTONE OUT	1215	(See Mass Bal.)		130	(See Mass Bal.)		
6	DUST VENT (SOLIDS)	200	(See Mass Bal.)		100	(See Mass Bal.)		

* Maximum flow is based on actual truck unloading duration of 4 hours in a 8 hour day.

- | | |
|----------------------------|----------------------|
| 1. Hours Storage Available | 16.875 Hours |
| 2. Effective Bin Volume | 270 Ft. ³ |
| 3. Bin Diameter | 5'-0" (Min) |
| 4. Discharge Cone Angle | 60° (Min) |

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 7

Equipment Name Coke Surge Bin
Equipment No. 1DJ-TK-7
System Name Coal Preparation and Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001

III. DESIGN NOTES

1. Product coke breeze and limestone flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coke breeze and limestone flows, Mass and Energy Balance results, to allow for operation variations.
2. The maximum and minimum flow rates for coke breeze are based on the coal feed capacity with a density of 50 pcf and are reduced by 50% when handling coke breeze with a density of 25 pcf.
3. Coke Breeze Moisture 0%
Limestone Moisture 1%
4. Coke Breeze Bulk Density 25-35#/Ft³
Limestone Bulk Density 68#/Ft³
5. Coke Breeze Angle of Repose 45 deg.
Limestone Angle of Repose 45 deg.
6. Coke Breeze Size -1/4" x 0
Limestone Size -1/8" x 200 mesh
7. Ambient Weather Criteria

Design Temperature:

Dry Bulb:

Winter - -20°F (lowest on record-use
for freeze protection)
Winter - 4° F (99%)
Summer - 90° (99%)

Wet Bulb: 74° (99%)

Performance Temperature: 80°F

Performance Relative Humidity: 60%

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 7

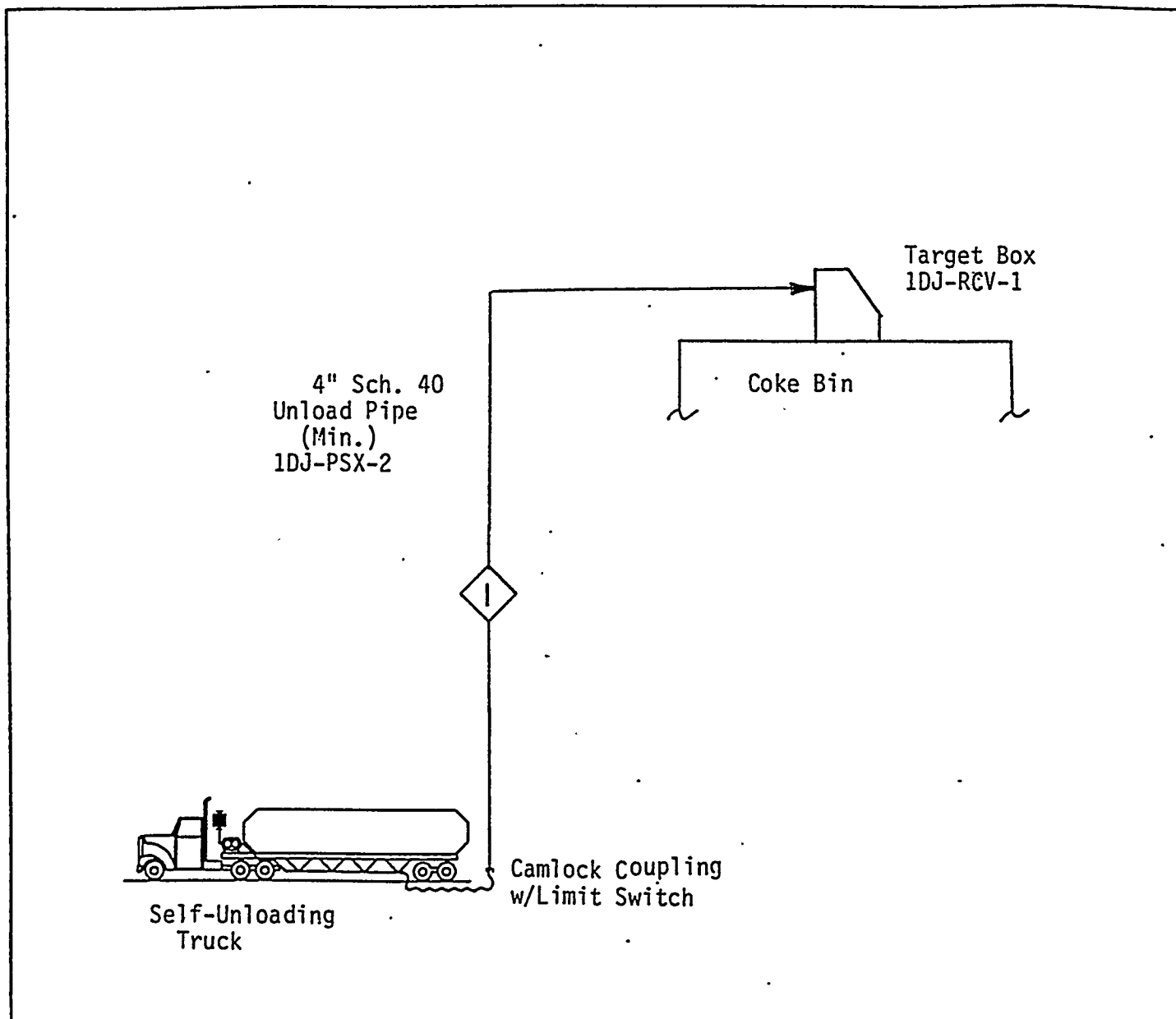
Equipment Name Coke Surge Bin
Equipment No. 1DJ-TK-7
System Name Coal Preparation and Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001

8. All data, i.e. capacities, flows, sizes, etc., indicated in the Process Design Basis is to be considered the minimum required.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 8

Equipment Name Truck Unload Pipe and Target Box
Equipment No. 1DJ-PSX-2 & 1DJ-RCV-1
System Name Limestone Unloading System
Flowsheet No. 16N25706-82-F-1DJ-001



PROCESS DESIGN BASIS
PDB No. 82-IDJ-8

Equipment Name	<u>Truck Unload Pipe and Target Box</u>
Equipment No.	<u>1DJ-PSX-2 and 1DJ-RCV-1</u>
System Name	<u>Limestone Unloading System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

I. DESIGN PHILOSOPHY

1. The Limestone Unloading System receives bulk limestone from a self-unloading truck at ground elevation and directs to the top inlet of the Coke Storage Bin.
2. The Limestone Unloading System will operate intermittently, 8 hours per day, 5 days per week for two week periods and be out of service for six weeks between each period.
3. The minimum and maximum capacity of limestone flow through the Limestone Unloading System to the Coke Storage Bin will be based on the 7 day, 24 hour average operating capacity of the Mass Balance being handled in a 8 hour operating period, 5 days per week.
4. The Limestone Unloading System will be installed outdoors. See Design Notes for ambient weather criteria.

PROCESS DESIGN BASIS
PDB No. 82-IDJ-8

Equipment Name Truck Unload Pipe and Target Box
 Equipment No. 1DJ-PSX-2 and 1DJ-RCV-1
 System Name Limestone Unloading System
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

ITEM	PROCESS STREAM	DESIGN FLOW #/HR	MAX FLOW #/HR	MIN FLOW #/HR	MAX TEMP °F	MIN TEMP °F	MAX PRESS PSIG	MIN PRESS PSIG
1	Product Limestone In	20000	8080*	4040	130	80	14.9	10

* Maximum flow rate is based on actual truck unloading duration of 4 hours in a 8 hour day.

PROCESS DESIGN BASIS
 PDB No. 82-IDJ-8

Equipment Name	<u>Truck Unload Pipe and Target Box</u>
Equipment No.	<u>1DJ-PSX-2 and 1DJ-RCV-1</u>
System Name	<u>Limestone Unloading System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

III. DESIGN NOTES

1. Product limestone flow rates are from the Mass and Energy Balances. Design condition is approximately 95 percent above the maximum limestone flow, Appendix A-8, Mass and Energy Balance results, to allow for operation variations, 7 day material receipts in 5 days and rapid truck turnaround..
2. Limestone Size -1/8 x 200 mesh
3. Limestone Bulk Density 68 #/Ft³
4. Angle of Repose 30 deg.
5. Moisture Content 1 %
6. Limestone Feed Rate to Gasifier (325 psig operation)
 - 962 #/hour
 - 23,088 #/day @ 24 hours/day
 - 161,616 #/week @ 24 hours/day
7. Limestone Truck Capacity 20,000#
8. Limestone Truck Unload Capacity 20,000 #/hour maximum
9. Truck Delivery Schedule 1.62 (2) per day @ 5 days/week for 7 days
10. Truck Turnaround 4.95 (4) hrs/truck
11. Ambient Weather Criteria
 - Design Temperature:
 - Dry Bulb:
 - Winter - -20°F (lowest on record-use for freeze protection)
 - Winter - 4° F (99%)
 - Summer - 90° (99%)
 - Wet Bulb: 74° (99%)

PROCESS DESIGN BASIS
PDB No. 82-IDJ-8

Equipment Name	<u>Truck Unload Pipe and Target Box</u>
Equipment No.	<u>1DJ-PSX-2 and 1DJ-RCV-1</u>
System Name	<u>Limestone Unloading System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

III. DESIGN NOTES (cont'd.)

Performance Temperature: 80°

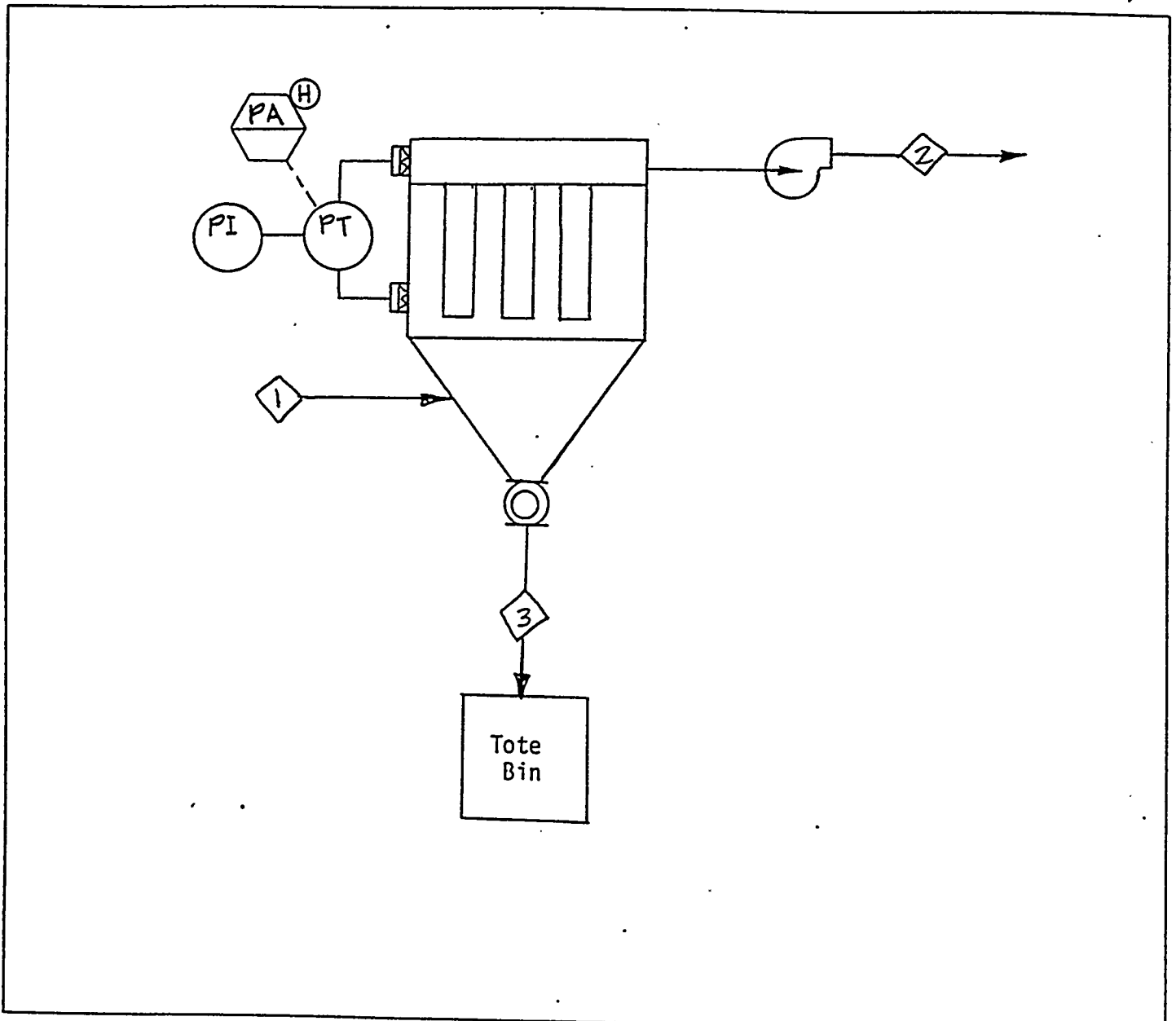
Performance Relative Humidity: 60%

12. All data, i.e. capacities, flows, sizes, etc., indicated in the Process Design Basis is to be considered the minimum required.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 9

Equipment Name Coal Preparation Dust Collector w/Exhaust Fan
Equipment No. 1DJ-DCOL-1 and 1DJ-FAN-2
System Name Coal Preparation & Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001



PROCESS DESIGN BASIS
PDB No. 82-IDJ-9

Equipment Name Coal Preparation Dust Collector w/Exhaust Fan
Equipment No. 1DJ-DCOL-1 and 1DJ-FAN-2
System Name Coal Preparation & Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001

I. DESIGN PHILOSOPHY

1. The Coal Preparation Dust Collector with exhaust fan will gather dust from the Coal Crusher, Coal Dryer, Coal Transfer System, Coal Weighbelt Feeder, Charge Hopper, Coke Bin And Coke Weighbelt Feeder, Coal Classifier, and Coal Surge Bin.
2. The dust collector will operate continuously, 24 hours per day, for two week periods, and be out of service for six weeks between each period.
3. The dust collector will be installed outdoors. See Design Notes for ambient weather criteria.
4. The Coal Preparation Dust Collector will include an airlock rotary valve for discharge of the collected dust to a tote bin. The dust collector discharge hopper will be sized to allow the airlock to be stopped for 15 minutes during tote bin change out.
5. A high level control will be provided in the dust collector discharge hopper to prevent excessive back-up of material.
6. Sensors will be provided on the dust collector for monitoring the differential pressure across the filter bags. A high differential pressure detected will sound an audible alarm and shutdown the coal preparation system equipment.
7. The dust collector filter bags will include an integral grounding wire to prevent dust ignition from a static charge. All other areas of the dust collector exposed to dust and/or gas flow will include grounding devices to prevent the development and conductance of a static charge.

PROCESS DESIGN BASIS

PDB No. 82-IDJ-9

Equipment Name Coal Preparation Dust Collector w/Exhaust Fan
 Equipment No. 1DJ-DCOL-1 and 1DJ-FAN-2
 System Name Coal Preparation & Limestone System
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS PSIG
1	Dust Vent (Solids) (Gas)	1089 16875	(See Mass Bal.)		250	(See Mass Bal.)		
2	Exhaust Vent (Solids) (Gas)	2.18 16875	(See Mass Bal.)		250	(See Mass Bal.)		
3	Fines to Tote Bin	1086.8	(See Mass Bal.)		250	(See Mass Bal.)		

PROCESS DESIGN BASIS
PDB No. 82-IDJ-9

Equipment Name Coal Preparation Dust Collector w/Exhaust Fan
Equipment No. 1DJ-DCOL-1 and 1DJ-FAN-2
System Name Coal Preparation & Limestone System
Flowsheet No. 16N25706-82-F-1DJ-001

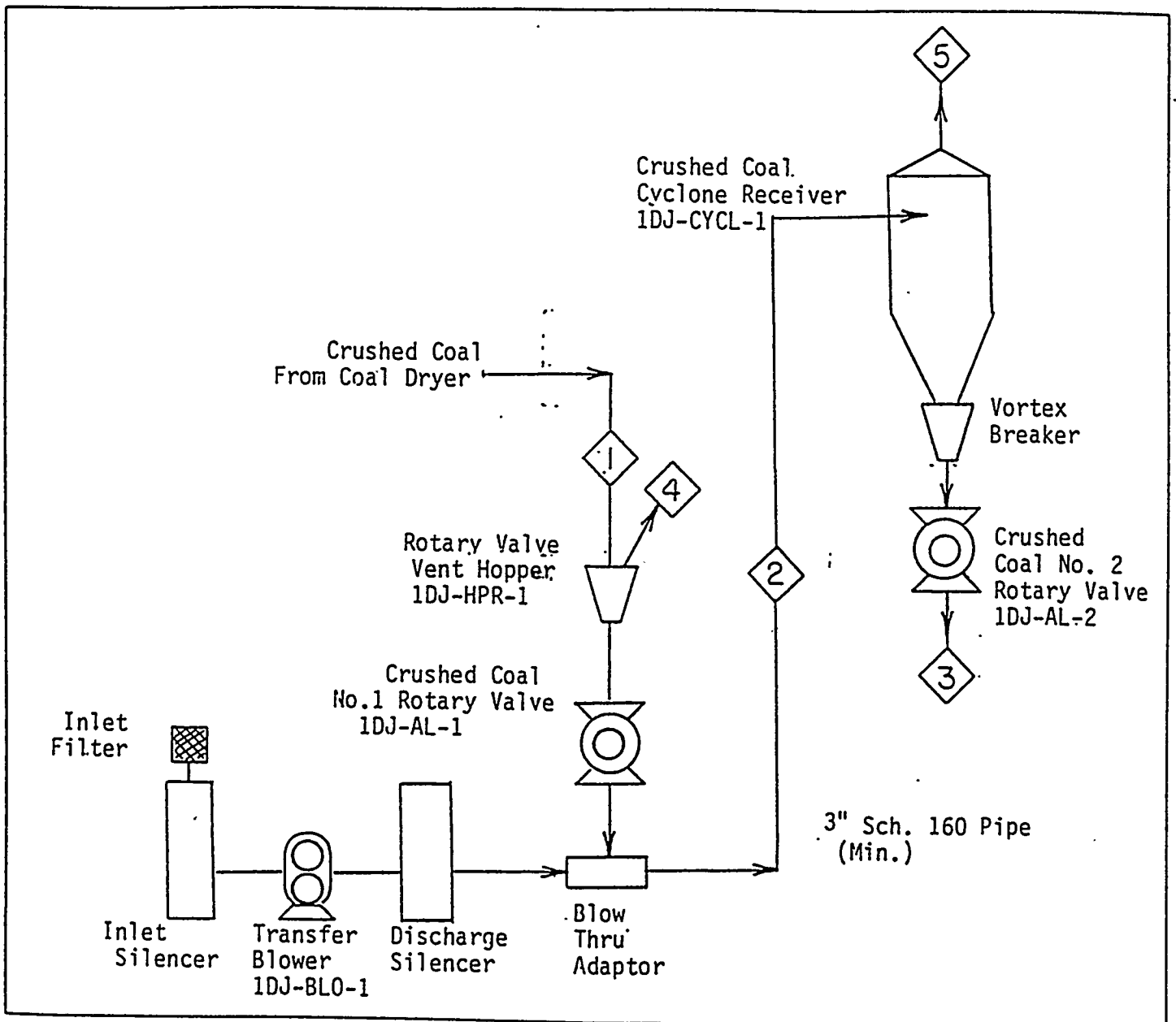
III DESIGN NOTES

1. Coal dust and exhaust flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum flow, Mass and Energy Balance results, to allow for operation variations.
2. Material Handling Coal dust collected from the coal preparation process of crushing, drying, and handling for feed to the gasifier.
3. Particle Size 100 mesh to and including 0.5 micron.
4. Moisture Content 1 to 6%
5. Design Operating Temperature 250°F
6. Efficiency Required 99.8%
7. Cloth to Air Ratio 6 to 1 minimum
8. Bag Cleaning Reverse pulse jet compressed air
9. Compressed Air Available Instrument air -
100 psig @ 100°F
10. Classification Class II, Division 2, Groups E & F
11. Motor Voltage Available 460 voltage, 3 phase, 60 hertz
12. Control Voltage Available 120 volt AC
13. Ambient Weather Criteria
Design Temperature:
Dry Bulb:
Winter -20°F (lowest on record-use for freeze protection)
Winter 4°F (99%)
Summer 90°F (99%)
Wet Bulb: 74°F (99%)
Performance Temperature: 80°F
Performance Relative Humidity: 60%
14. All data, i.e., capacities, flows, sizes etc., indicated in the Process Design Basis is to be considered the minimum requirement.

SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DJ - 10

System Name Coal Transfer System
Flowsheet No. 16N25706-82-F-1DJ-001



325

PROCESS DESIGN BASIS
PDB No. 82-1DJ-10

Equipment Name	_____
Equipment No.	_____
System Name	<u>Coal Transfer System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

I. DESIGN PHILOSOPHY

1. The Coal Transfer System conveys dried, crushed coal to the next unit operation which is classification (fines removal).
2. The PyGas™ Coal Gasifier and Coal Transfer System will operate continuously, 24 hours per day, for two week periods and be out of service for six weeks between each period.
3. The Coal Transfer System will be installed outdoors. See Design Notes for ambient weather criteria.
4. The vent gas from the Coal Transfer System will be piped to the Cal Preparation Dust Collector.

PROCESS DESIGN BASIS
 PDB No. 82-1DJ-10

Equipment Name _____
 Equipment No. _____
 System Name Coal Transfer System
 Flowsheet No. 16N25706-82-F-1DJ-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR.	MAX. FLOW #/HR.	MIN. FLOW #/HR.	MAX. TEMP. °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS PSIG
1	Product Coal In	6542	(See Mass Bal.)		250	(See Mass Bal.)		
2	Product Coal Transfer	6477	(See Mass Bal.)		225	(See Mass Bal.)		
3	Product Coal Out	6412	(See Mass Bal.)		200	(See Mass Bal.)		
4	Dust Vent (Solids)	65	(See Mass Bal.)		150	(See Mass Bal.)		
5	Dust Vent (Solids)	65	(See Mass Bal.)		150	(See Mass Bal.)		

PROCESS DESIGN BASIS
 PDB No. 82-1DJ-10

Equipment Name	_____
Equipment No.	_____
System Name	<u>Coal Transfer System</u>
Flowsheet No.	<u>16N25706-82-F-1DJ-001</u>

III DESIGN NOTES

1. Product coal flow rates are from the Mass and Energy Balances. Design condition is approximately 20 percent above the maximum coal flow, Appendix A-8, Mass and Energy Balance results, to allow for operation variations.

- | | |
|-----------------------------|---------------------|
| 2. Coal Type: | Bituminous |
| 3. Coal Moisture: | <1% |
| 4. Coal Specific Heat: | 0.30 Btu/Lb-F |
| 5. Coal Bulk Density: | 50#/Ft ³ |
| 6. Coal Grindability Index: | 40-90 |
| 7. Crushed Coal Feed | |

<u>Size Analysis</u> (Anticipated)		<u>Sample</u> (Estimated)
-3/8	+1/4	3%
-1/4	+1/4	14%
-1/8	+10 (mesh)	15%
-10	+20	30%
-20	+40	20%
-40	+100	9%
-100	+200	5%

Note: The estimated coal size gradation shown above after crushing is based on the American Pulverizer analysis of a crusher discharge to produce 1/4" top size coal with the feed as depicted in the Riley Fuels Laboratory Test Report dated February 1, 1994.

Gasification Improvement Facility
Fort Martin Station, West Virginia
Specification No. 16N25706-82-82-005
Sirrinc Job No. 16N25706

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PROCESS DESIGN BASIS
PDB No. 82-1DJ-10

Equipment Name _____
Equipment No. _____
System Name Coal Transfer System
Flowsheet No. 16N25706-82-F-1DJ-001

8. Ambient Weather Criteria

Design Temperature:

Dry Bulb:

Winter - -20°F (lowest on record-use for freeze protection)

Winter - 4°F (99%)

Summer - 90°F (99%)

Wet Bulb: 74°F (99%)

Performance Temperature: 80°F

Performance Relative Humidity: 60%

9. All data, i.e., capacities, flows, sizes, etc., indicated in the Process Design Basis is to be considered the minimum requirement.

SYSTEM PROCESS DESIGN BASIS

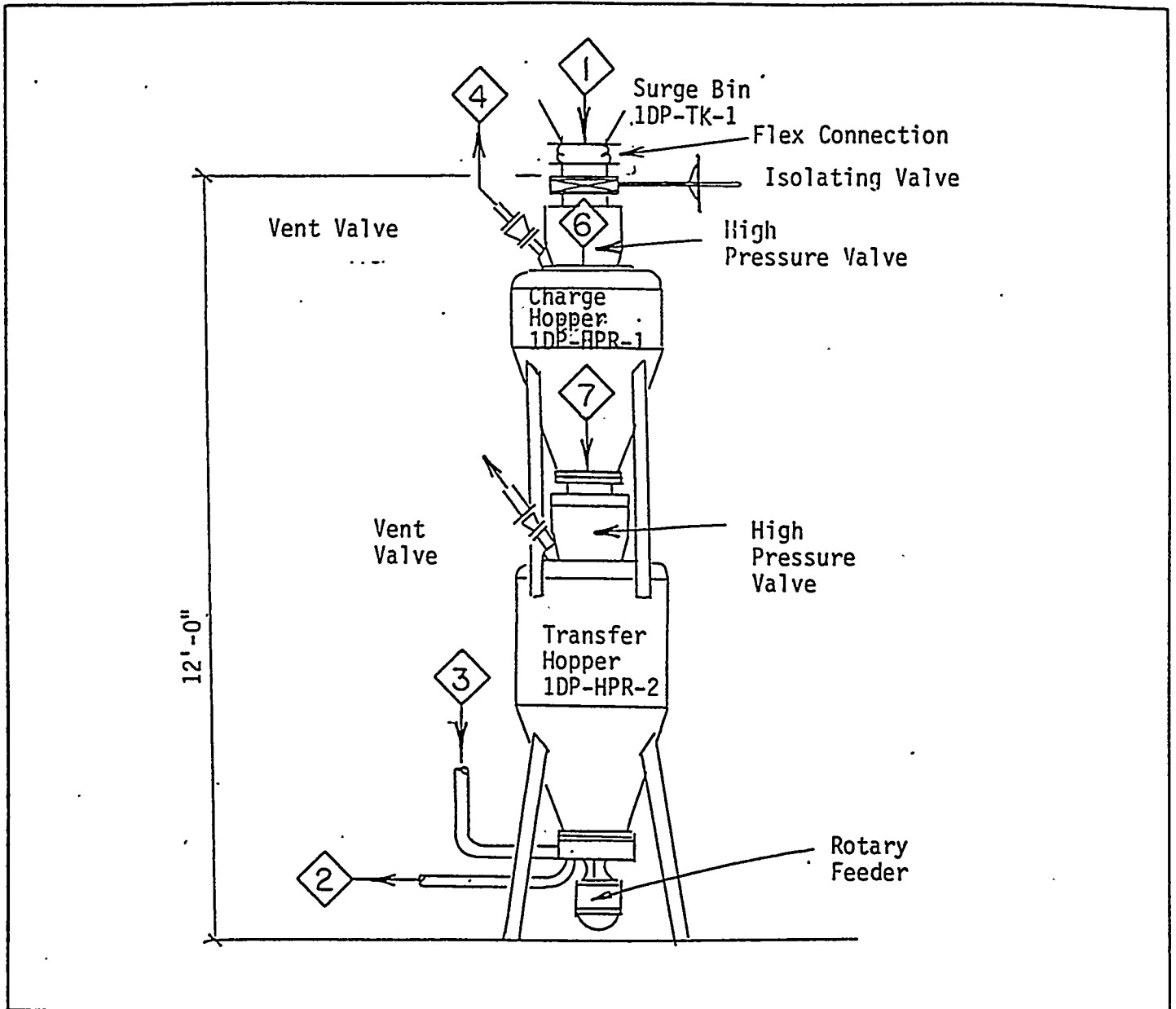
PDB No. 82 - 1DP - 1

Equipment Name Charge Hopper / Transfer Hopper

Equipment No. 1DP-HPR-1, 1DP-HPR-2, & 1DP-TK-1

System Name Pyrolizer Feed System

Flowsheet No. 16N25706-82-F-1DP-001



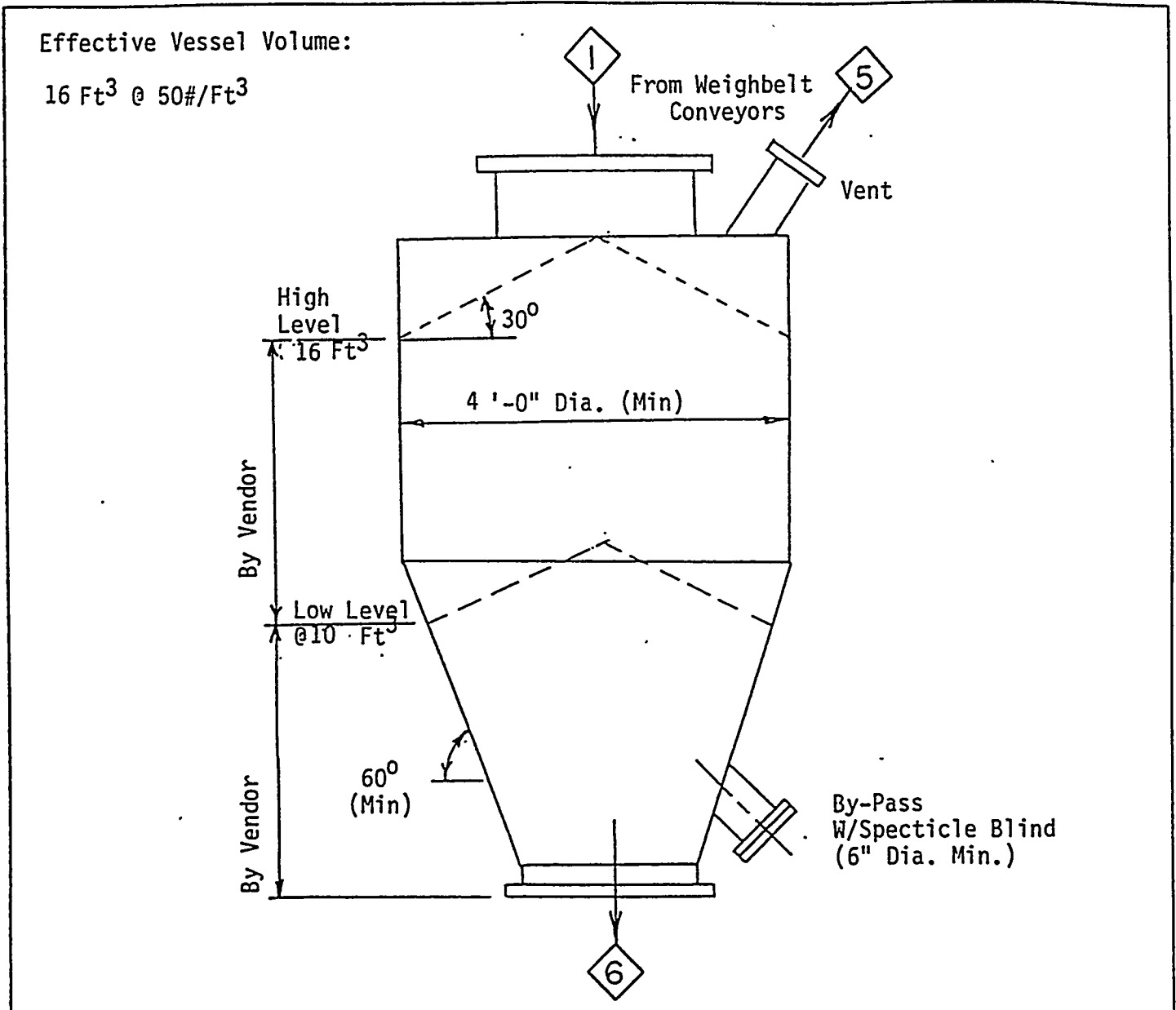
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SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DP - 1

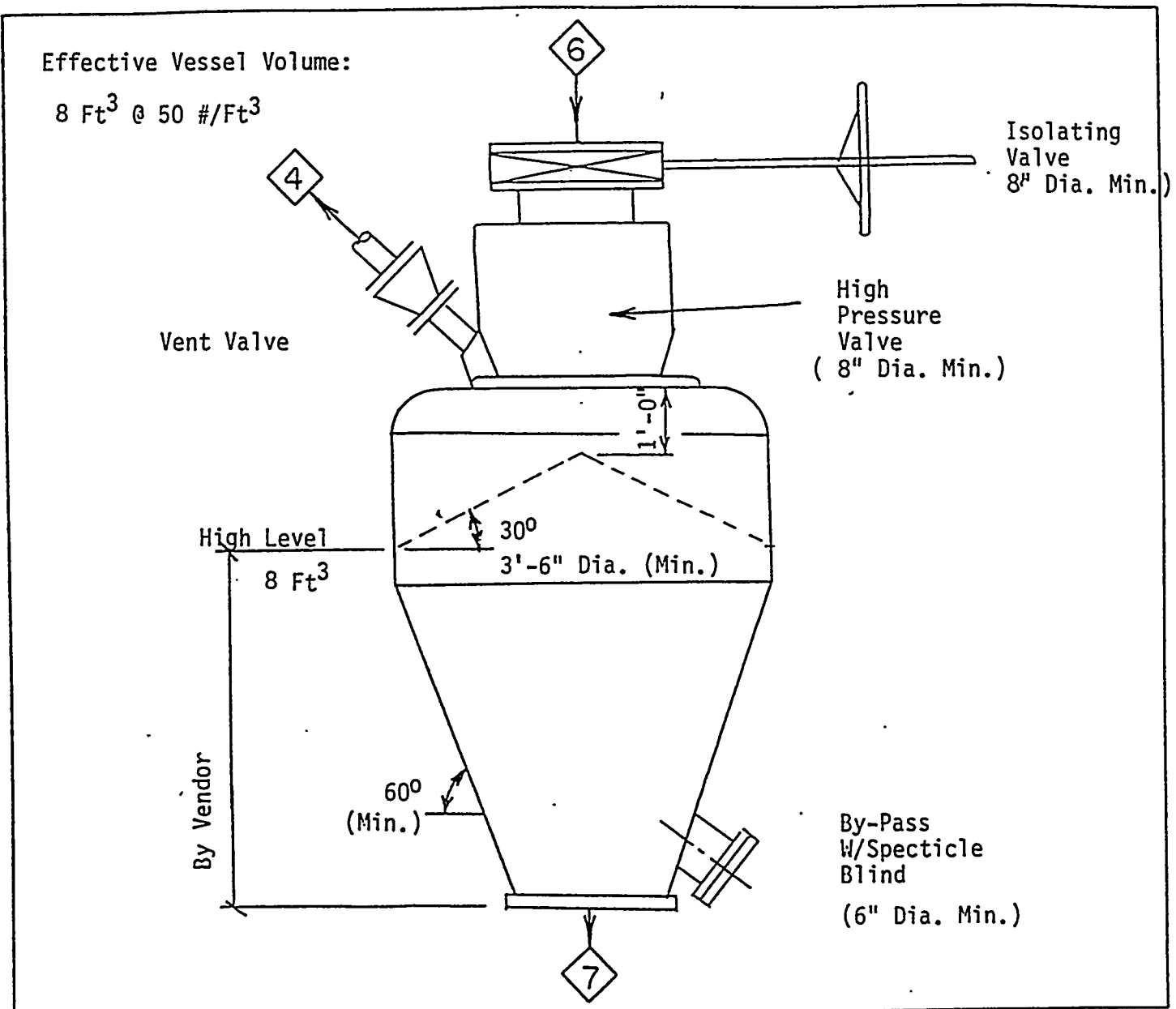
Equipment Name Surge Bin
Equipment No. 1DP-TK-1
System Name Pyrolizer Feed System
Flowsheet No. 16N25706-82-F-1DP-001



SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DP - 1

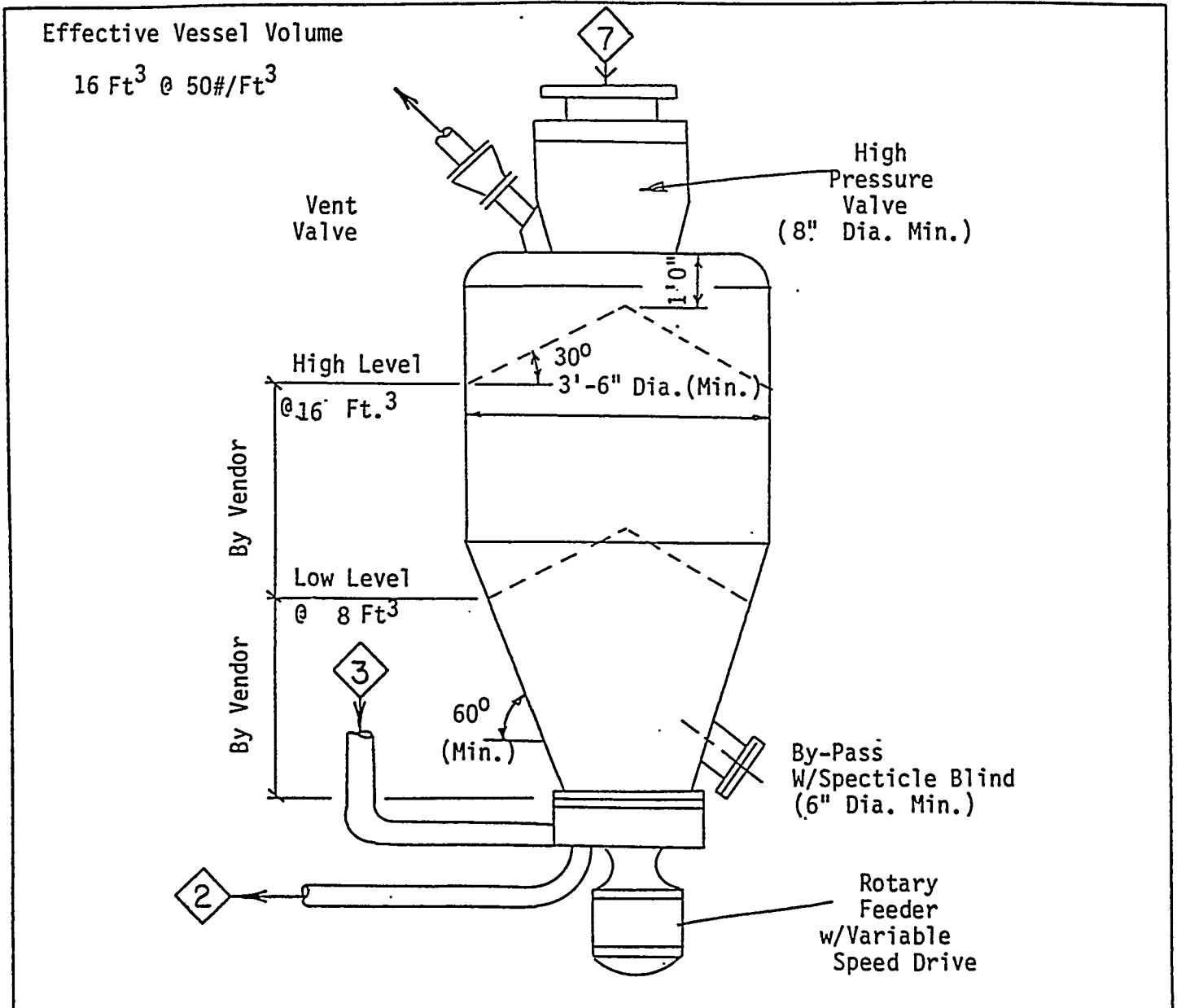
Equipment Name Charge Hopper
Equipment No. 1DP-HPR-1
System Name Pyrolizer Feed System
Flowsheet No. 16N25706-82-F-1DP-001



SYSTEM PROCESS DESIGN BASIS

PDB No. 82 - 1DP - 1

Equipment Name Transfer Hopper
Equipment No. 1DP-HPR-2
System Name Pyrolizer Feed System
Flowsheet No. 16N25706-82-F-1DP-001



PROCESS DESIGN BASIS
PDB No. 82-1DP-1

Equipment Name	<u>Charge Hopper, Transfer Hopper, Surge Bin</u>
Equipment No.	<u>1DP-HPR-1, 1DP-HPR-2, 1DP-TK-1</u>
System Name	<u>Pyrolizer Feed System</u>
Flowsheet No.	<u>16N25706-82-F-1DP-001</u>

I. DESIGN PHILOSOPHY

1. The Pyrolizer Feed System will transport coal to the PyGas™ Coal Gasifier fuel inlet with 325 psig back pressure under normal operation. During desulfurization testing, the Pyrolizer Feed System will transport a mixture of coal and limestone to the gasifier.
2. The Pyrolizer Feed System will provide a continuous feed of coal to the PyGas™ Coal Gasifier from the Transfer Hopper. Transfer of material from the Surge Bin to the Charge Hopper and Charge Hopper to Transfer Hopper will be on a batch basis. A batch is discharged to the Transfer Hopper from the Charge Hopper when the Transfer Hopper reaches a half full state.
3. The Rotary Feeder below the Transfer Hopper and Charge Hopper discharge cycles per hour will provide feed rate control to the PyGas™ Coal Gasifier.
4. The PyGas™ Coal Gasifier and Pyrolizer Feed System will operate continuously, 24 hours per day, for two week periods and be out of service for six weeks between each period.
5. The Pyrolizer Feed System will be installed outdoors. See Design Notes for ambient weather design criteria.
6. The vent gas from the Charge Hopper will be piped to the Coal Storage Bin. The vent line will be sized for increasing gas volume as pressure decreases.
7. The start-up pressure of the PyGas™ Coal Gasifier will be approximately 30 psig. The gasifier pressure and fuel flow rate will increase as the gasifier reaches operating temperature.
8. Coke breeze will be handled by the Pyrolizer Feed System for use as a start-up fuel in the PyGas™ Coal Gasifier at a reduced capacity. During start-up, as the pressure and temperature increases in the PyGas™ Coal Gasifier, the coke breeze feed will be reduced while introducing the coal or coal/limestone mixture into the Pyrolizer Feed System until operating parameters are achieved.

PROCESS DESIGN BASIS
PDB No. 82-1DP-1

Equipment Name Charge Hopper, Transfer Hopper, Surge Bin
 Equipment No. 1DP-HPR-1, 1DP-HPR-2, 1DP-TK-1
 System Name Pyrolizer Feed System
 Flowsheet No. 16N25706-82-F-1DP-001

II. DESIGN CRITERIA

NORMAL 325# GASIFIER OPERATION								
ITEM	PROCESS STREAM	DESIGN FLOW #/HR	MAX. FLOW #/HR	MIN. FLOW #/HR	MAX. TEMP °F	MIN. TEMP. °F	MAX. PRESS PSIG	MIN. PRESS PSIG
1	Product Coal In	5,102	(See Mass Bal.)		175	(See Mass Bal..)		
2	Product Coal Out	4,445	(See Mass Bal.)		175	(See Mass Bal.)		
3	Conveying Gas In	390	(See Mass Bal.)		100	(See Mass Bal.)		
4	Dust Vent (Solids)	45	(See Mass Bal.)		125	(See Mass Bal.)		
5	Dust Vent (Solids)	51	(See Mass Bal.)		125	(See Mass Bal.)		

6. The coal instantaneous discharge rate from Surge Bin to Charge Hopper is 130,909 lbs/hr based on discharging 8 ft³ of 50 lb/ft³ material (400 lbs.) in 11 seconds.
7. During desulfurization testing, the coal/limestone mixture instantaneous discharge rate from Surge Bin to Charge Hopper is 141,382 lbs/hr based on discharging 8 ft³ of 54 lb/ft³ material (432 lbs.) in 11 seconds.
8. The coal instantaneous discharge rate from Charge Hopper to Transfer Hopper is 31,304 lbs/hr based on discharging 8 ft³ of 50 lb/ft³ material (400 lbs) in 46 seconds.
9. During desulfurization testing, the coal/limestone mixture instantaneous discharge rate from Charge Hopper to Transfer Hopper is 33,809 lbs/hr based on discharging 8 ft³ of 54 lb/ft³ material (432 lbs.) in 46 seconds.
10. Compressed conveying gas to the Pyrolizer Feed System will be at minus 40 degrees F dew point to prevent condensation from forming in the conveying pipe during winter operation.

PROCESS DESIGN BASIS
PDB No. 82-1DP-1

Equipment Name Charge Hopper, Transfer Hopper, Surge Bin
 Equipment No. 1DP-HPR-1, 1DP-HPR-2, 1DP-TK-1
 System Name Pyrolizer Feed System
 Flowsheet No. 16N25706-82-F-1DP-001

III. DESIGN NOTES

1. Product coal flow rates are from the Mass and Energy Balances. Design condition is approximately 10 percent above the maximum coal flow, Mass and Energy Balance results, to allow for operation variations.
2. Coal Moisture < 1.0%
3. Coal Specific Heat 0.30 Btu/lb-F
4. Crushed Coal Size -1/4 x 50 mesh
5. Coal Bulk Density 50 #/Ft³
6. Coal Grindability Index 40-90
7. Limestone Size -1/8 x 200 mesh
8. Limestone Bulk Density 68 #/Ft³
9. Angle of Repose 30 deg.
10. Fuel Mixture to Gasifier 81% coal, 19% limestone
11. Coal/Limestone Bulk Density 54 #/cubic feet (average)
12. Crushed Coal Feed:

<u>Size Analysis</u> (Anticipated)	<u>Sample</u> (Estimated)
-3/8 + 1/4	3%
-1/4 + 1/8	14%
-1/8 + 10 (mesh)	15%
-10 + 20	30%
-20 + 40	20%
-40 + 100	9%
-100 + 200	5%
13. Ambient Weather Criteria

Design Temperature:	
Dry Bulb:	
Winter	
Winter	-20°F (lowest on record for freeze protection)
Summer	4°F (99%)
Wet Bulb:	
	90°F (99%)
Performance Temperature:	
	74°F (99%)
Performance Relative Humidity:	
	80°F
	60%
14. Surge Bin Capacity 16 cubic feet (effective volume required)
15. Charge Hopper Capacity 8 cubic feet (effective volume required)
16. Transfer Hopper Capacity 16 cubic feet (effective volume required)

PROCESS DESIGN BASIS

Equipment Name Charge Hopper, Transfer Hopper, Surge Bin
Equipment No. 1DP-HPR-1, 1DP-HPR-2, 1DP-TK-1
System Name Pyrolizer Feed System
Flowsheet No. 16N25706-82-F-1DP-001

III. DESIGN NOTES - Continued

- | | |
|---|------------------------|
| 17. Gasifier Operating Pressure | 325 psig |
| 18. System Operating Pressure
(Anticipated) | 390 psig |
| 19. Design Operating Temperature | 175 deg. F. |
| 20. Charge Hopper Cycles | 9.26 per hr. |
| Charge Hopper Fill Time | 5 seconds |
| Transfer Hopper Fill Time | 46 seconds |
| Pressure Balance Time | 60 sec. |
| Charge Hopper Vent Time | 60 sec. |
| Total Cycle Time | 177 sec. |
| 21. Coke Breeze
Bulk Density | 25-35#/Ft ³ |
| Size | 1/4 inch minus |
| 22. All data, i.e., capacities, flows, sizes etc., indicated in the Process Design Basis is to be considered the minimum requirement. | |
| 23. The Surge Bin, Charge Hopper and Transfer Hopper will be complete with a fire protection system. | |

**Gasification Product Improvement Facility
Fort Martin Station, West Virginia
Sirriner Job No. 16N25706**

Drawing List

<u>Drawing Number</u>	<u>Drawing Description</u>
16N25706-40-LE-001	Flow Diagram Legend
16N25706-40-1AA-001	Flow Diagram Gasifier System
16N25706-40-1AA-002	Flow Diagram Gasifier Gas Clean-Up System
16N25706-40-1AA-003	Flow Diagram Gasifier Cooling Water
16N25706-40-1AA-004	Flow Diagram Gasifier Ash Handling
16N25706-40-1AA-005	Flow Diagram Solid Waste Disposal System
16N25706-40-1DG-001	Flow Diagram Natural Gas Distribution
16N25706-40-1GA-001	Flow Diagram Flue Gas Desulfurization System
16N25706-40-1GG-001	Flow Diagram Process Vent Distribution
16N25706-40-1GH-001	Flow Diagram Incinerator
16N25706-40-1KD-001	Flow Diagram Chemical Feed System
16N25706-40-1KK-001	Flow Diagram Potable Water System
16N25706-40-1KV-001	Flow Diagram Auxiliary Water Distribution
16N25706-40-1KW-001	Flow Diagram Service Water System
16N25706-40-1LD-001	Flow Diagram Plant and Instrument Air System
16N25706-40-1LF-001	Flow Diagram Process Air System
16N25706-40-1LK-001	Flow Diagram Nitrogen Storage and Distribution
16N25706-40-1SB-001	Flow Diagram Natural Gas Package Boiler
16N25706-40-1SB-002	Flow Diagram Steam Distribution
16N25706-40-1SJ-001	Flow Diagram Feedwater System
16N25706-40-1WS-001	Flow Diagram Solid Waste Treatment System
16N25706-40-1WS-002	Flow Diagram Process Waste Water Distribution
16N25706-82-1DJ-001	Flow Diagram Coal Preparation and Limestone System
16N25706-82-1DH-001	Flow Diagram Coal Receiving, Storage, and Reclaim
16N25706-82-1DP-001	Flow Diagram Pyrolizer Feed System

NOTES

- STREAM NUMBERS DENOTED BY [] REFERS TO TABLE 1 OF THE CONCEPTUAL DESIGN REPORT.
- COAL NOISTYNE CONTENT IS A PARAMETER OF THE SCHEMATIC.
- NORMAL OPERATING IN THE OPERATING DESIGN CONDITIONS TABLE REFERS TO 333 PSIG GASIFIER OPERATION.
- THE CAPACITIES SHOWN ARE BASED ON HANDLING A COAL NOISTYNE SYSTEM AT 30 PCY AND IS PRODUCED BY THE PER SEAL AND FLOWING OF AIR DENSITY AT 25 PCY.
- COAL AND HOT WHEELS ARE FED SEPARATELY THROUGH A COMMON DRYER CHUTE TO THE BLANK GAS WASH TOWER AND SEPARATED (EXCEPT DURING START-UP) THROUGH THE COMMON DRYER CHUTE TO EACH.
- LIMESTONE SHALL BE FED TO THE GASIFIER THROUGH THE COKE SYSTEM PER DEMONSTRATION TESTS.

4	a	ON REVISED CONTROL SCHEME.
	b	ADD SERVICE WATER HOSE STATION. ISSUED AS REV. 1.
3	b	REVISED PER DOE COMMENTS. ISSUED FOR DESIGN.
2	a	REVISED PER SATELITE SCOPES REVIEW. ISSUED FOR COMMENTS.
1	a	REVISED STREAM SYMBOLS. ISSUED FOR DESIGN.
	b	ISSUED FOR APPROVAL COMMENTS.
	c	PROVIDED FOR INFORMATION FOR
	d	ISSUED FOR TANK & REPORT
	e	ISSUED FOR REVIEW
	f	ISSUED FOR COMMENTS

DESCRIPTION NOTE: CHOLE ALL SYSTEMS, SHOWN WITH PLUMBING, PIPING AND INSTRUMENTATION AND CHOLE AND INSTRUMENTATION NOT SHOWN.

SYMBOL CODE: [] MAT'L. S.D. [] COND'TN. [] INSTRUMENTATION [] MAT'L. PIPING [] LOCATION [] STEPS []

TO COAL PREP DUST COLLECTION (SHEET 102-1001-001)

TO COAL STORAGE BIN (SHEET 102-1001-001)

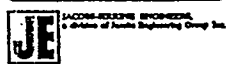
TO GASIFIER (SHEET 102-1001-001)

SEAL

SIGNATURE _____

DATE _____

DR. LANCE BATELY	DATE	06-19-93
DR. J. J. RIZZO	FILE NUMBER	
DR. J. J. RIZZO	JOB NO.	1042700
JOB FILE NO. 10-AC-2100-1042700000-001		



GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

DRAWING TITLE
FLOW DIAGRAM
PYROLYZER
FEED SYSTEM

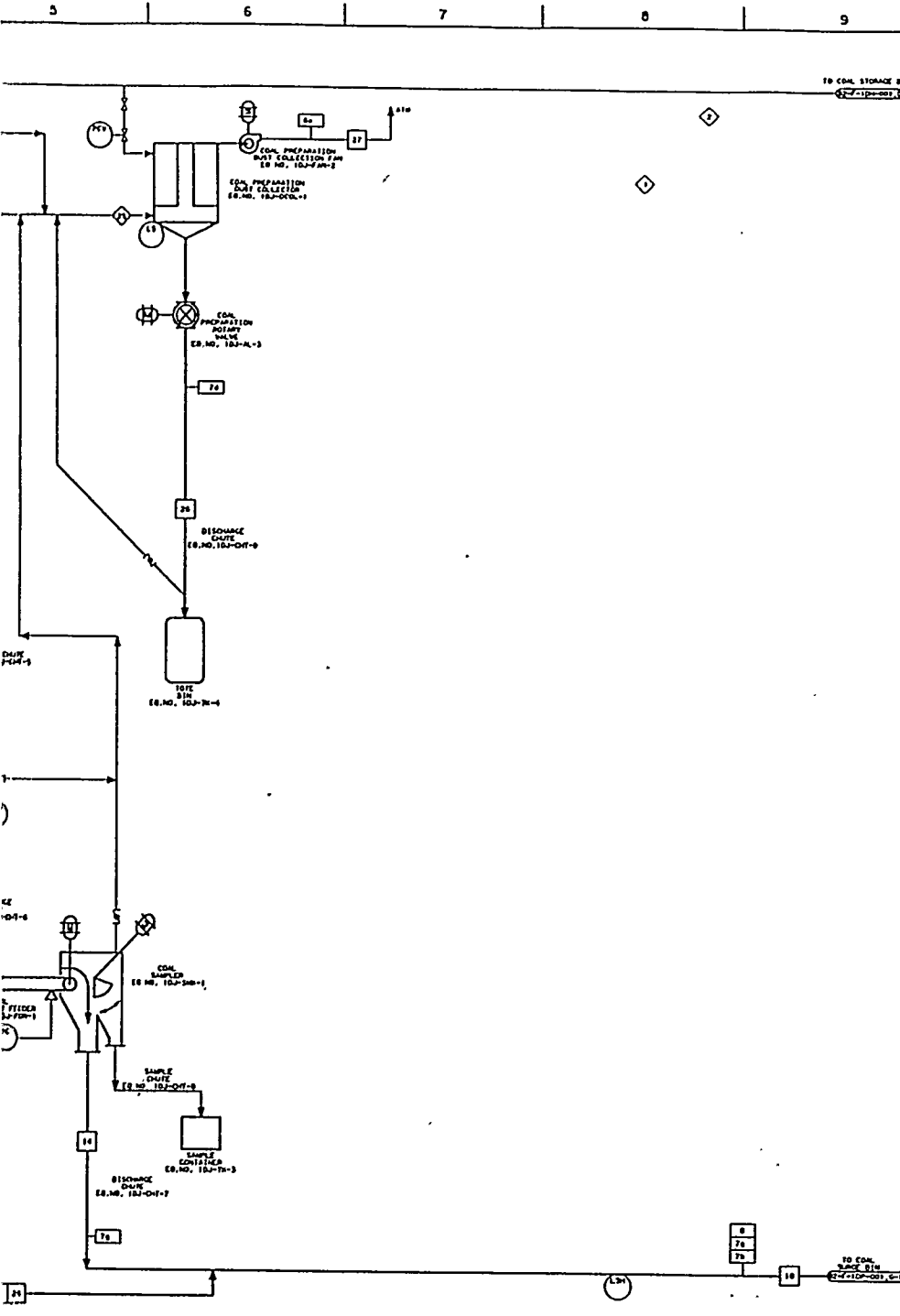
CLIENT DRAWING NUMBER

JACOBS-SIMIRNE DRAWING NUMBER
1042700-02-F-10P-001

Copyright Jacobs-Simirne Engineers as of Last Date Endorsed

35		36		37	
VE SEAL AIR		CONVEYING AIR		DELETED	
PSIG	DEG. F	PPH	PSIG	DEG. F	
440	100	1	(SEE MASS BALANCE)		
350	100	1	(SEE MASS BALANCE)		

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NOTES

1. STREAM NUMBERS DENOTED BY SYMBOLS TO FOLLOW. STREAM NUMBERS IN APPROXIMATE % OF THE CONCEPTUAL DESIGN REPORT.
2. COAL MOISTURE CONTENT IS 8 PERCENT AND DRIED TO 1 PERCENT AT THE COKE DRUM.
3. NORMAL OPERATING IN THE OPERATING/DESIGN CONDITION TABLE REFERS TO 205 PSIG GASIFIER OPERATION.
4. THE CAPACITIES SHOWN ARE BASED ON MAXIMUM COAL/LIMESTONE RATIO AT 20 PSIG AND IS REDUCED BY 50 PER CENT WHEN HANDLING COKE DRUMS AT 25 PSIG.
5. COAL AND COKE WASTES ARE FED SEPARATELY THROUGH 2 COMMON LINE CHUTE TO THE WASTE BIN. WASTE PLEAS ARE NOT REFINISHED (EXCEPT DURING START-UP) CHANGE OVER FROM COAL DRUMS TO COAL.
6. LIMESTONE WILL BE FED IN THE GASIFIER THROUGH THE COKE SYSTEM FOR DEMONSTRATION TESTS.

5	00	REVISED LATEST DESIGN DATA.
4	01	ISSUED AS REV. 1
4	02	REVISED PER DDC COMMENTS ISSUED FOR DESIGN
3	03	REVISED PER S/10/85 SCOPE REVIEW, ISSUED FOR COMMENTS
2	04	REVISED STREAM SYMBOLS ADDED LINE CONTINUATION ADDED INSTR. 412 TO COAL STORAGE BIN ISSUED FOR DESIGN
1	05	REVISED TO NOTE TO 670
0	06	ISSUED FOR APPROVAL
D	07	PRELIMINARY FOR INFORMATION
C	08	ISSUED FOR TALK & REPORT
B	09	ISSUED FOR REVIEW
A	10	ISSUED FOR COMMENTS
REV.	DATE	DESCRIPTION
1	01/01/85	NOTE: CHECK ALL REVISIONS, MODIFY WITH SYMBOL, NUMBER AND DATE. CHANGE ONLY CIRCLE AND WAVE SYMBOL NOT REVISIONS BY
1	01/01/85	ISSUE CODE (C) (M) (T) (O) (F) (COM) (R)
1	01/01/85	PRELIMINARY (D) (M) (T) (P) (U) (R) (C) (A)
1	01/01/85	DESIGN (E) (S) (I) (S) (I) (S)

SEAL

SIGNATURE

DATE

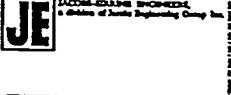
DR. LANCE BAILEY DATE 04-19-83

PRIN. J. J. RUPPEL FILE

CH. J. J. RUPPEL NUMBER

DR. J. J. RUPPEL JOB NO. 16421706

JOB FILE NO. 87.14.01000-12477210.001 827.1



GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

DRAWING TITLE
FLOW DIAGRAM
COAL PREPARATION
AND LIMESTONE SYSTEM

CLIENT DRAWING NUMBER

JACOBS-SIRMINE DRAWING NUMBER
16425706-82-F-10J-001

Copyright Jacobs-Sirmine Engineers as of Last Date Indicated

13			14			15 (NOTE 6)			16			17 (NOTE 6)			18 (NOTE 4 & 5)		
COAL	PSIG	DEG.F	COAL	PSIG	DEG.F	LIMESTONE	PSIG	DEG.F	LIMESTONE	PSIG	DEG.F	LIMESTONE	PSIG	DEG.F	COAL/LIMESTONE/COKE	PSIG	DEG.F
PPH			PPH			PPH			PPH			PPH			PPH		
1			1			4040	VENDOR	80	0	125	962	0	125	1			
1			1			4040	VENDOR	80	0	125	962	0	125	1			

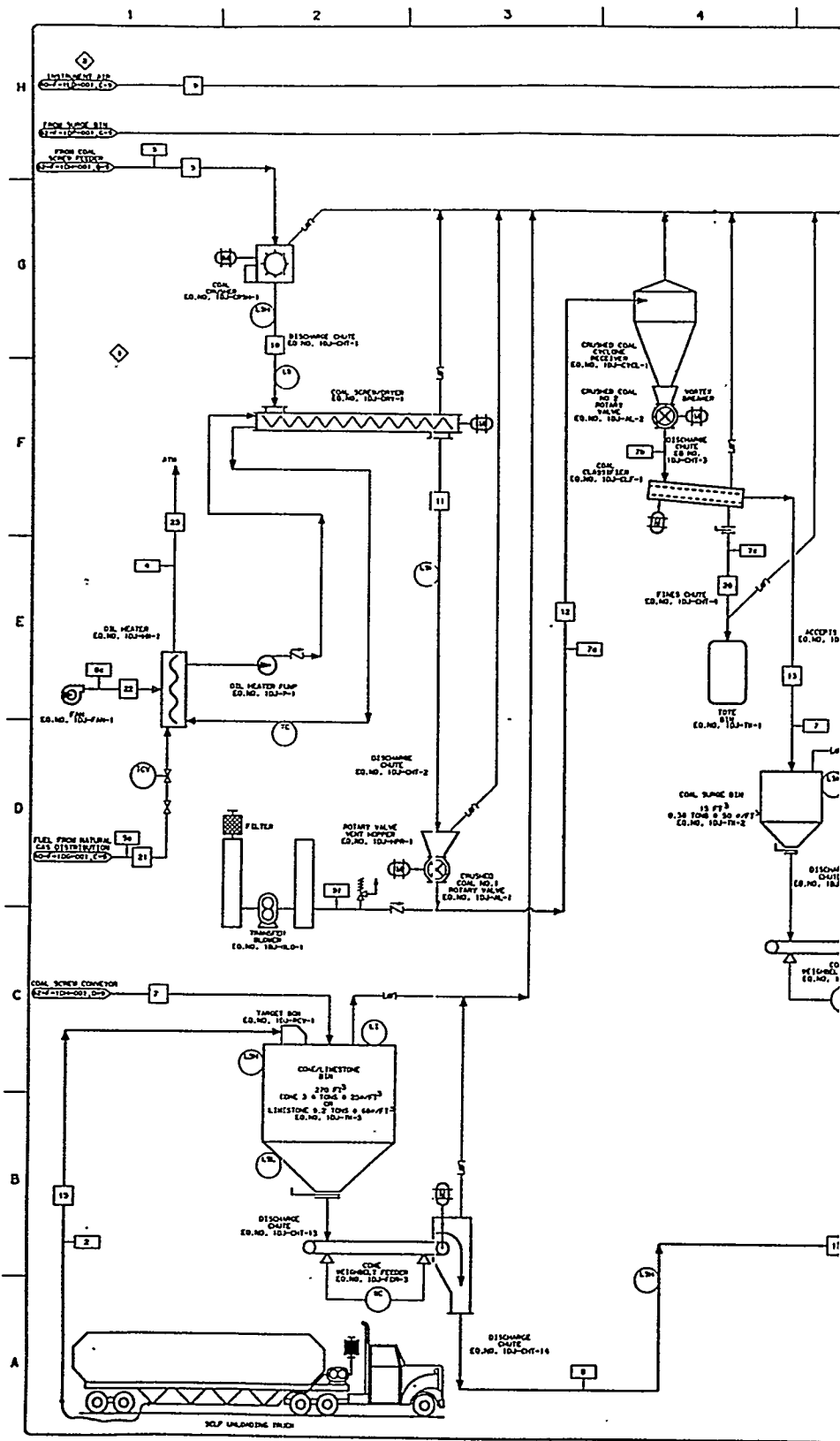
22			24 (NOTE 6)			25			26			27		
HEATER VENT	COKE	DUST VENT	COAL/COKE FINES	EXHAUST VENT										
PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F
1			1			13365	VENDOR	100	1			1		
1			1			13365	VENDOR	100	1			1		

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19-001-100 INSTRUMENT SYMBOLS LISTING 647

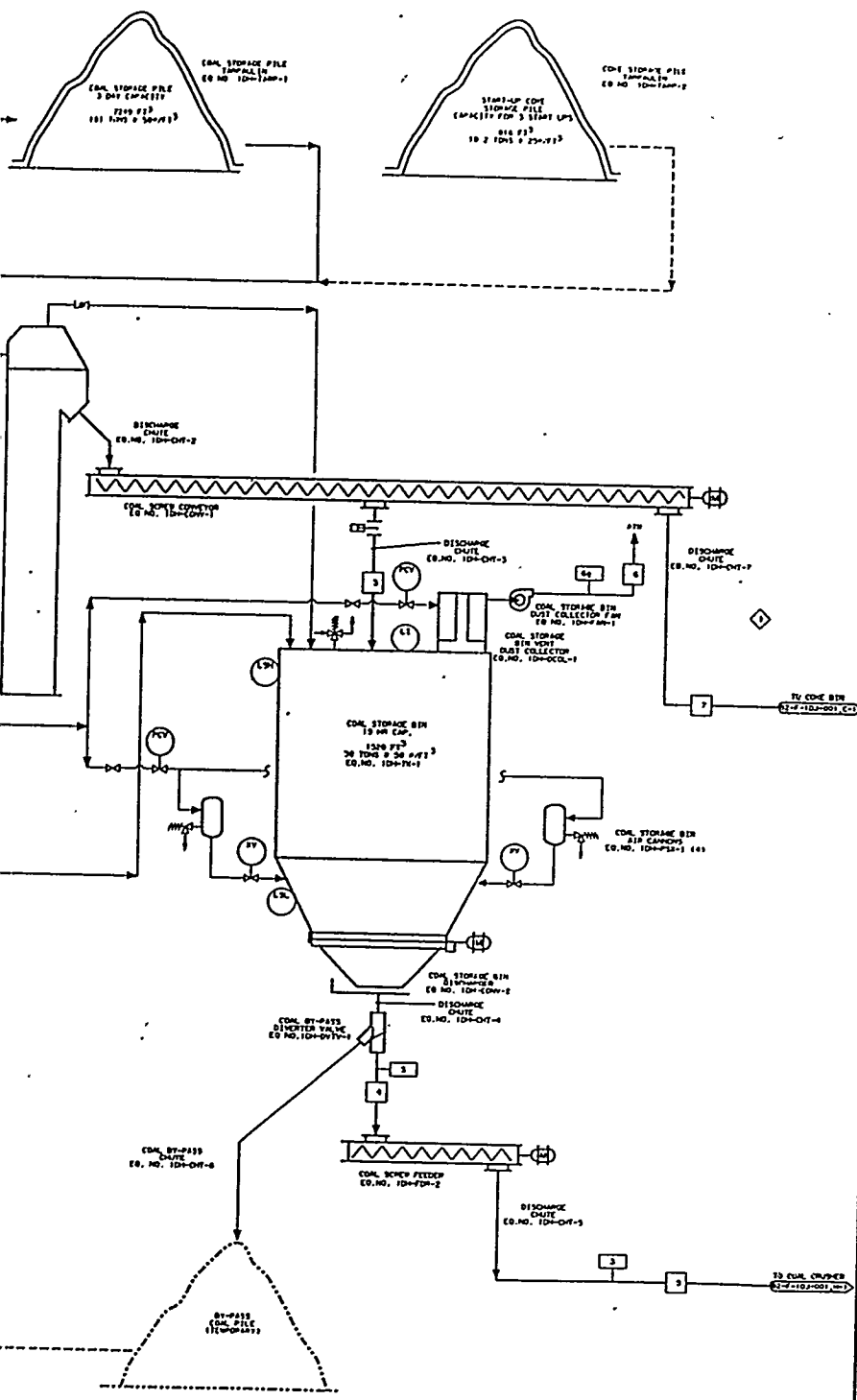
19-001-100 INSTRUMENT SYMBOLS LISTING 647

19-001-100 INSTRUMENT SYMBOLS LISTING 647



LINE NUMBER	3	10	11	12
DESCRIPTION:	INSTRUMENT AIR		COAL	
UNITS	PPH	PSIG DEG.F	PPH PSIG DEG.F	PPH PSIG DEG.F
MAXIMUM DESIGN				
MAXIMUM OPERATING				
NORMAL OPERATING	VENDOR 100	100	(SEE MASS BALANCE)	(SEE MASS BALANCE)
MINIMUM OPERATING	VENDOR 100	100	(SEE MASS BALANCE)	(SEE MASS BALANCE)
REVISION DATE				

LINE NUMBER	19	20	21	22
DESCRIPTION:	EXHAUST VENT		COAL FINES	
UNITS	PPH	PSIG DEG.F	PPH PSIG DEG.F	PPH PSIG DEG.F
MAXIMUM DESIGN				
MAXIMUM OPERATING				
NORMAL OPERATING	(SEE MASS BALANCE)	(SEE MASS BALANCE)	(SEE MASS BALANCE)	(SEE MASS BALANCE)
MINIMUM OPERATING	(SEE MASS BALANCE)	(SEE MASS BALANCE)	(SEE MASS BALANCE)	(SEE MASS BALANCE)
REVISION DATE				



NOTES

1. STREAM NUMBERS DENOTED BY REFERS TO TABLE STREAM NUMBERS IN APPENDIX C OF THE CONCEPTUAL DESIGN REPORT.
2. COAL MOISTURE CONTENT IS 6 PERCENT AS RECEIVED.
3. NORMAL OPERATING IN THE OPERATIONAL DESIGN CONDITIONS TABLE REFERS TO THE P110 CONTROL OPERATION.
4. THE COAL HANDLING CAPACITY WHICH IS BASED ON THE 24 HOUR AVERAGE OPERATING CAPACITY OF THE P110 SHALL BE MAINTAINED IN A 2 HOUR OPERATING PERIOD. 7 DAYS PER WEEK.
5. THE CAPACITY'S WHICH ARE BASED ON HANDLING COAL AT 30 MCF AND IS REDUCED BY 20 PERCENT WHEN HANDLING COKE WHEAT AT 25 MCF.
6. COAL AND COKE WHEAT WILL BE SEPARATED SEPARATELY THROUGH THE COAL HANDLING SYSTEM. THE GATE VALVE THE EXPANSION TO THE COAL STORAGE BIN WILL BE CLOSED TO PREVENT CONTAMINATION OF FIELDS DURING COKE BIN LOADING.

5	10	REVISED LATEST DESIGN DATA.
JUN 72	10	ISSUED AS REV 1
4	10	REVISED PER COE COMMENTS ISSUED FOR DESIGN
JUN 72	10	ISSUED FOR DESIGN
3	10	REVISED PER 3/21/72 SCOP REVIEW. ISSUED FOR COMMENTS.
JUN 72	10	ISSUED FOR DESIGN
2	10	REVISED STREAM SYMBOLS ADDED INSTR. AIR HEADER ISSUED FOR DESIGN
JUN 72	10	ISSUED FOR DESIGN
1	10	REVISED TO VENT TO ATU
JUN 72	10	ISSUED FOR APPROVAL.
0	10	ISSUED FOR APPROVAL.
JUN 72	10	ISSUED FOR APPROVAL.
D	10	ISSUED FOR INFORMATION.
JUN 72	10	ISSUED FOR INFORMATION.
C	10	ISSUED FOR TYPING REPORT
JUN 72	10	ISSUED FOR TYPING REPORT
B	10	ISSUED FOR REVIEW
JUN 72	10	ISSUED FOR REVIEW
A	10	ISSUED FOR COMMENTS
JUN 72	10	ISSUED FOR COMMENTS

DESIGNER: [Signature]

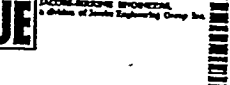
DATE: [Date]

DR. LANCE BAYLEY DATE 06-10-93

DR. J. J. BAYLEY FILE

DR. J. J. BAYLEY JOB NO 10421700

CD FILE NO. 10 AL DMC100:124712210-001 001 1



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U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

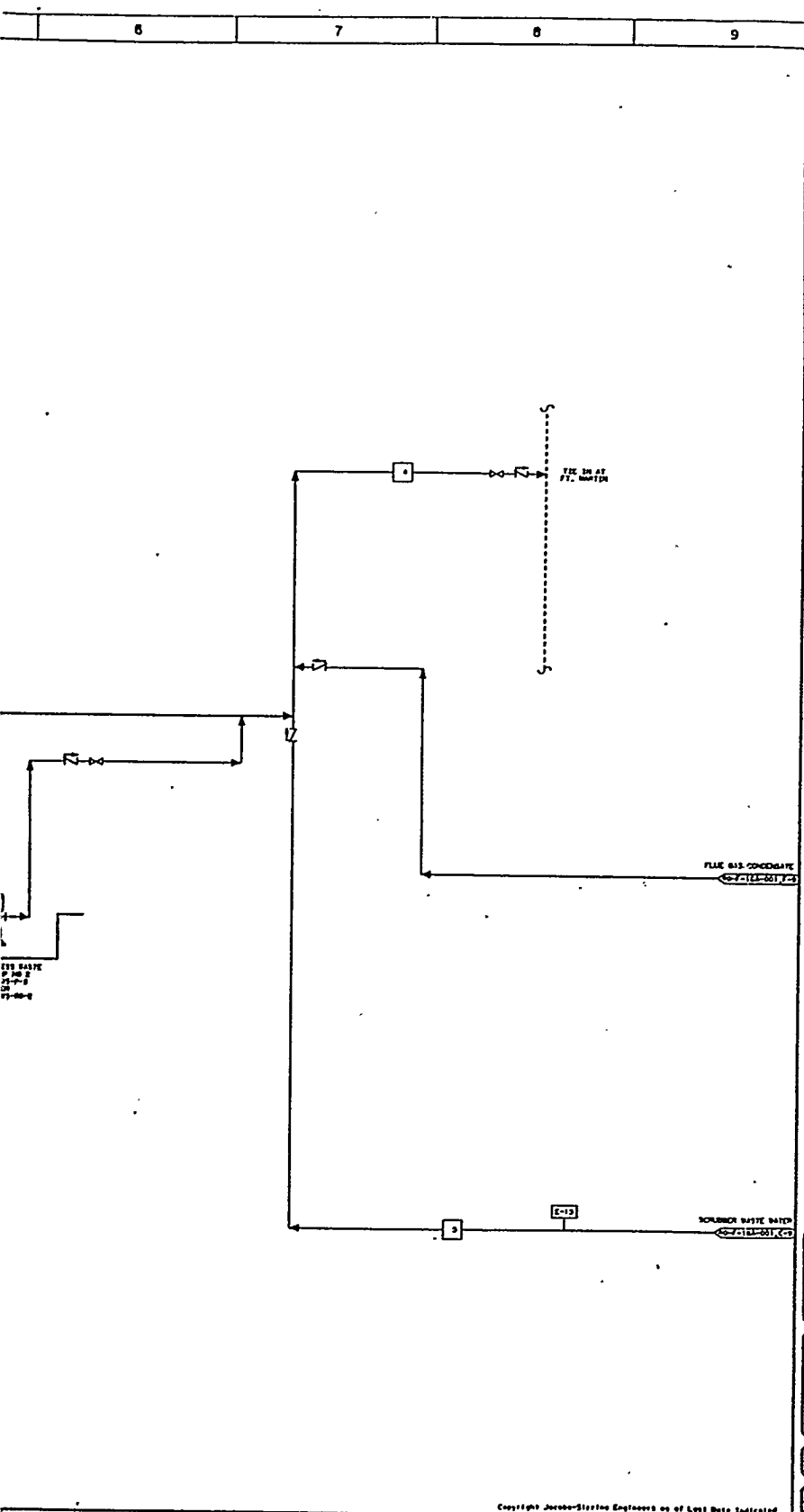
DRAWING TITLE
FLOW DIAGRAM
COAL RECEIVING,
STORAGE, AND RECLAIM

CLIENT DRAWING NUMBER
JACOBS-SIMONE DRAWING NUMBER
10425706-02-F-104-001

Copyright Jacobs-Simone Engineers as of Last Date Indicated

6			7			8		
EXHAUST VENT			COKE			INSTRUMENT AIR		
DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG
150	155	0	75	0	80	VENDOR	100	150
150	155	0	75	0	80	VENDOR	100	150

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NOTES

1. SEE REVISIONS SHEET FOR ALL CHANGES TO THIS DRAWING.

5	04	REVISED OFFICE CONNECTIONS
4	04	REVISED PER DEPARTMENT OF ENERGY COMMENTS
3	04	REVISED PER 2/18/93 SCOPE
2	04	REVISED EQ. NO., STEAM SYMBOLS
1	04	ADDED FLUE GAS SCUMPER WATER
0	04	CHANGED ONE NO. 1117A SOL-NOV-PT-002
E	10	ISSUED FOR INFORMATION ONLY
D	04	ISSUED FOR REVIEW
C	07	ISSUED FOR INTERNAL REVIEW
B	04	ISSUED FOR TANK & REPORT
A	04	ISSUED FOR REVIEW

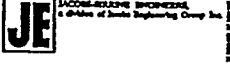
REV.	NO.	DATE	DESCRIPTION
			NOTE: CHECK ALL REVISIONS, VERIFY WITH DESIGN, PLANES AND WORK. REMOVE ONLY UNLESS AND APPROVE BEFORE ANY REVISIONS.
			ISSUE CODE: (C) MAIL, (E) E, (P) COMB'D
			(1) PRELIMINARY (2) INITIAL PLAC. (3) DECISION (4) EDS

SEAL

SIGNATURE _____

DATE _____

DR. J. STEPHEN	DATE 05-20-93
FRANK B. V. BUCH	PROJECT NAME J040
DR. J. V. BUCH	JOB NO. 21708
CONTRACT NO. 14, AL, INC 100-1247058 (REVISED, 06/93)	



GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

DRAWING TITLE
FLOW DIAGRAM
PROCESS
WASTE WATER
DISTRIBUTION

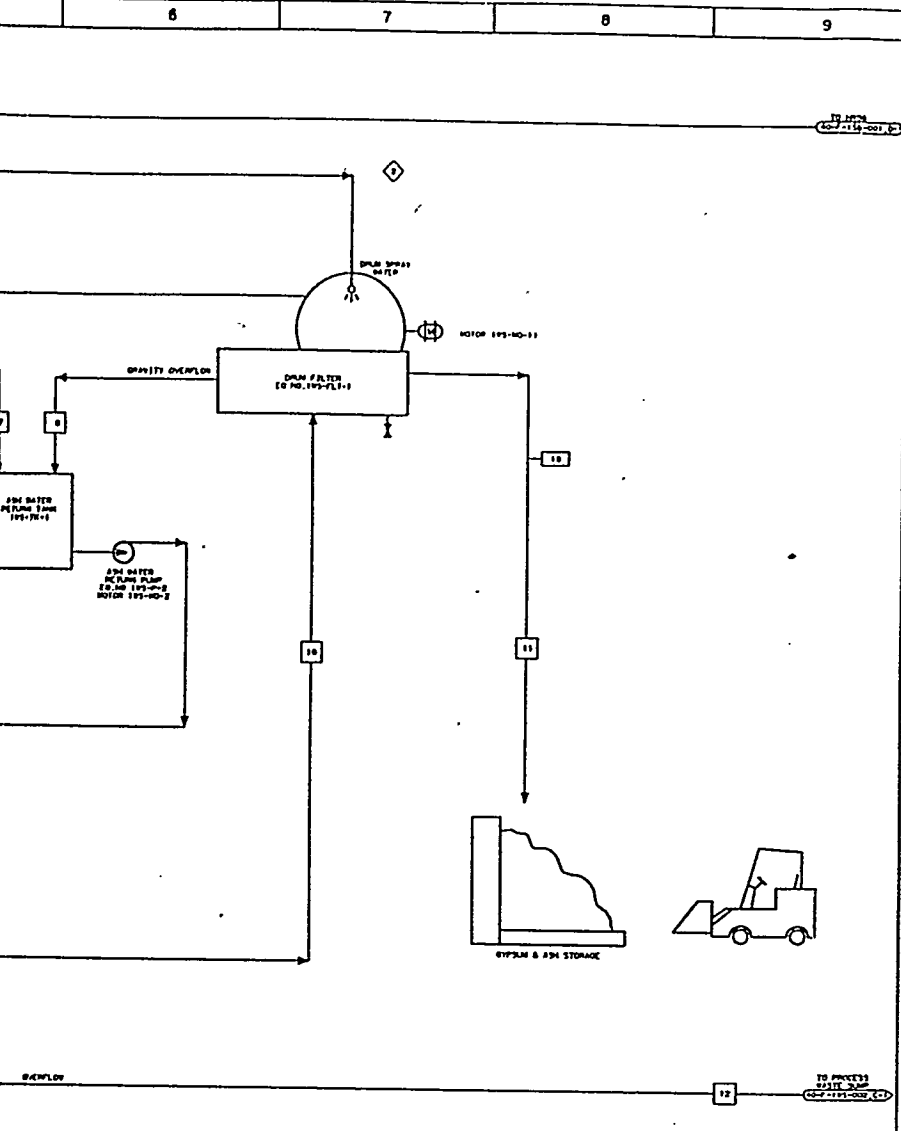
CLIENT DRAWING NUMBER

JACOBS-SIRMINE DRAWING NUMBER
16425706-40-F-185-002

Copyright Jacobs-Sirmine Engineers as of Last Date Indicated

YEAR																				
1988																				
CC1																				
CC2																				

360



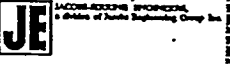
NOTES
 1. THE NO NUMBERS IN NOTES REFER TO TABLE OF SYMBOLS IN APPENDIX A-6 & A-9 WITH BALANCE
 2. NORMAL OPERATING IN THE OPERATING DESIGN CONDITIONS SHALL BE USED TO ADD P116 CALIBRATION SYSTEM RELATES TO P04 P116 CALIBRATION SYSTEM

3	A-1	VOIDED DRAWING
	M-3	ISSUED AS REV. 1
	M-3	ISSUED AS REV. 2
2	A-1	ADDED FLOW STREAMS 141014
	M-3	REVISED STREAM SYMBOLS
	M-3	ISSUED FOR DESIGN
1	A-1	REPLACED SERVICE WATER TO OF REACTOR WITH FLE GAS
	M-3	REPLACED WATER
0	A-1	REVISED DATA & NOTES FOR ADD P116 OPERATION
	M-3	CHANGED DWS NO FROM 31604-40-F-93-001
	M-3	ISSUED FOR APPROVAL
G	A-1	ISSUED FOR REVIEW
	M-3	
F	A-1	ISSUED FOR INFORMATION
	M-3	AS ONLY
E	A-1	ISSUED FOR REVIEW
	M-3	
D	A-1	ISSUED FOR INTERNAL REVIEW
	M-3	
C	A-1	ISSUED FOR TASK & REPORT
	M-3	
B	A-1	ISSUED FOR REVIEW
	M-3	
A	A-1	ISSUED FOR ESTIMATE
	M-3	

REV. NO.	DESCRIPTION
1	NOTE: SINGLE ALL REVISIONS, MODIFY WITH NUMBER, NUMBER AND JACOBS NUMBER ONLY CIRCLE AND CROSS OUT ANY OTHER REVISIONS
2	ISSUE CODE [C] DATA, [E.G.] [P] COMBINATION
3	[A] PRELIMINARY [B] DATA, PLUM, [C] DESIGN [E] RIDS [H]

SEAL
 SIGNATURE
 DATE

DR. J. PIERCE	DATE 04-20-83
DR. S. V. DUCH	JACOBS FILE NO. 16N25706-40-F-1AA-005
DR. S. V. DUCH	JOB NO. 3-1804
DR. FILE NO. 16N25706-40-F-1AA-005	



GPIF PROJECT
 U.S. DEPT. OF ENERGY
 DE-AC21-92MC28202

DRAWING TITLE
 FLOW DIAGRAM
 SOLIDS WASTE
 TREATMENT
 SYSTEM

CLIENT DRAWING NUMBER

JACOBS-SIRMING DRAWING NUMBER
 16N25706-40-F-1AA-005

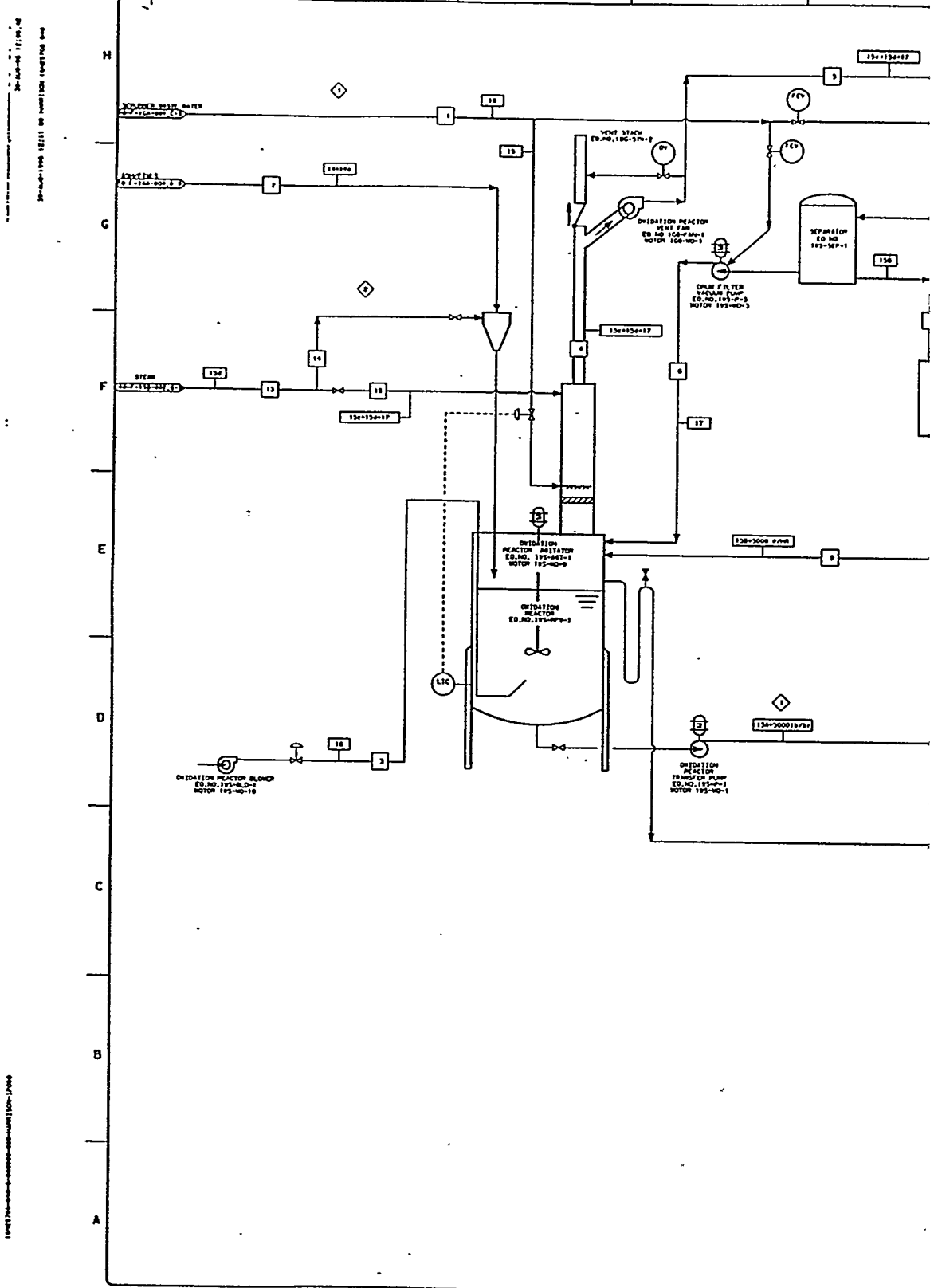
"OBSOLETE"
 6/23/95
 SUPPRESSED BY
 DWG 16N25706-40-F-1AA-005

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6			7			8			9			10			
VACUUM PUMP DISCHARGE			SCRUBBER TO ASH WATER RETURN TANK			DRUM FILTER TO ASH WATER RETURN TANK			ASH WATER RETURN TANK TO O2 REACTOR			O2 REACTOR TO DRUM FILTER			
Deg.F	PPH	PSIG	Deg.F	CPM	PSIG	Deg.F	CPM	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F
						10	0		110						
									LATER						

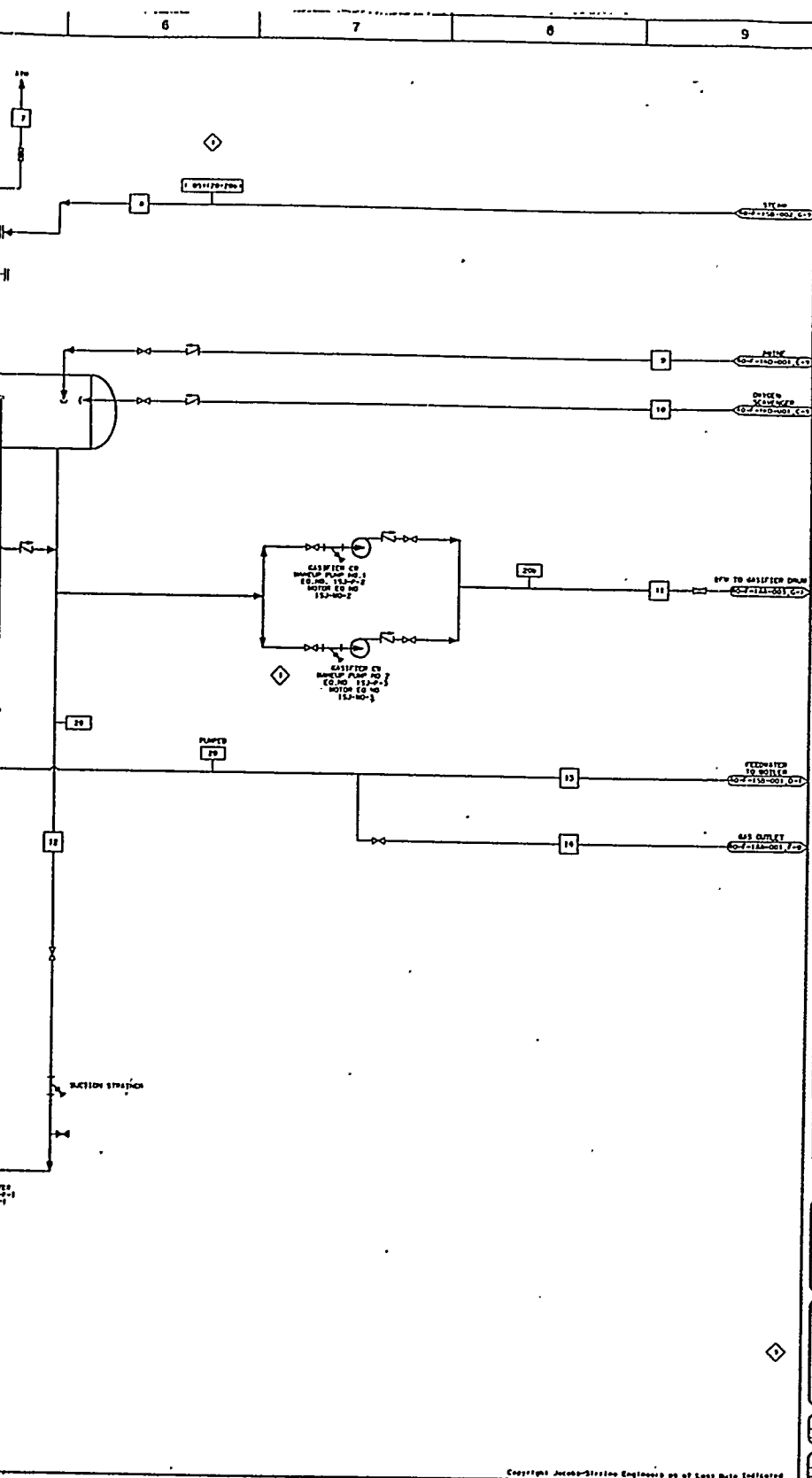
16			17			18			19			20			
SCRUBBER WASTE WATER			SCRUBBER WASTE WATER			SCRUBBER WASTE WATER									
Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F

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LINE NUMBER	1			2			3			4			5	
DESCRIPTION:	SCRUBBER WASTE WATER			GRATE ASH/CYCLONE FINES			OXIDATION AIR			VENT			VENT	
UNITS	GPM	PSIG	Deg. F	PPH	PSIG	Deg. F	PPH	PSIG	Deg. F	PPH	PSIG	Deg. F	PPH	PSIG
MAXIMUM DESIGN														
NORMAL OPERATING	{SEE MASS BALANCE}			{SEE MASS BALANCE}			{SEE MASS BALANCE}			{SEE MASS BALANCE}			{SEE MASS BALANCE}	
MINIMUM OPERATING	{SEE MASS BALANCE}			{SEE MASS BALANCE}			{SEE MASS BALANCE}			{SEE MASS BALANCE}			{SEE MASS BALANCE}	
REVISION DATE														

LINE NUMBER	11			12			13			14			15	
DESCRIPTION:	ASH WASTE			OVERFLOW			STEAM			STEAM			STEAM	
UNITS	PPH	PSIG	Deg. F	PPH	PSIG	Deg. F	PPH	PSIG	Deg. F	PPH	PSIG	Deg. F	PPH	PSIG
MAXIMUM DESIGN														
NORMAL OPERATING	{SEE MASS BALANCE}			0	0	120	{SEE MASS BALANCE}			500	5	525	{SEE MASS BALANCE}	
MINIMUM OPERATING	{SEE MASS BALANCE}			0	0	LATER	{SEE MASS BALANCE}			400	5	525	{SEE MASS BALANCE}	
REVISION DATE														



NOTES

- STEAM NUMBERS DELETED REFER TO TANK AND STEAM NUMBERS TO BE ADDED
- NORMAL OPERATIONS TO BE OPERATING WITHIN CONDITIONS LINED REFERS TO 375 PSIG GASIFIED OPERATION WITHIN PRESSURE TO 100 PSIG OF PRESSURE GASIFIED OPERATION

3	REVISED DESIGN DATA	ISSUED AS REV. 1
2	REVISED PER S111-PS SCOPE	REVISED, ISSUED FOR
1	CHANGED MASS BALANCE FLOW	STEAM, CHANGED GASIFIED
1	CO MAKE-UP PUMP EQ. NOS.	REVISED TITLE, STEAM
1	SYMBOL	ISSUED FOR DESIGN
1	REVISED DATA & NOTES FOR	MOD PSIG OPERATION,
1	CHANGED DMS NO FROM	S111-40-1-1-1-001
1	ISSUED FOR APPROVAL	
1	ISSUED FOR REVIEW	
1	ISSUED FOR INFORMATION	
1	ISSUED FOR INTERNAL	REVIEW
1	ISSUED FOR T&H & REPORT	
1	ISSUED FOR REVIEW	
1	ISSUED FOR ESTIMATE	

SEAL

SIGNATURE

DATE

J. J. FROST

DATE 04-19-83

DRW. BY J. J. FROST

FILE NO. J046

DATE P. V. BUCH

JOB NO. 3-1900

JOB FILE NO. 18-A, DC140-1247041, 12404, 12407

JE

JACOBS-SIMINE ENGINEERING

A Division of Jacobs Engineering Group Inc.

GPIF PROJECT

U.S. DEPT. OF ENERGY

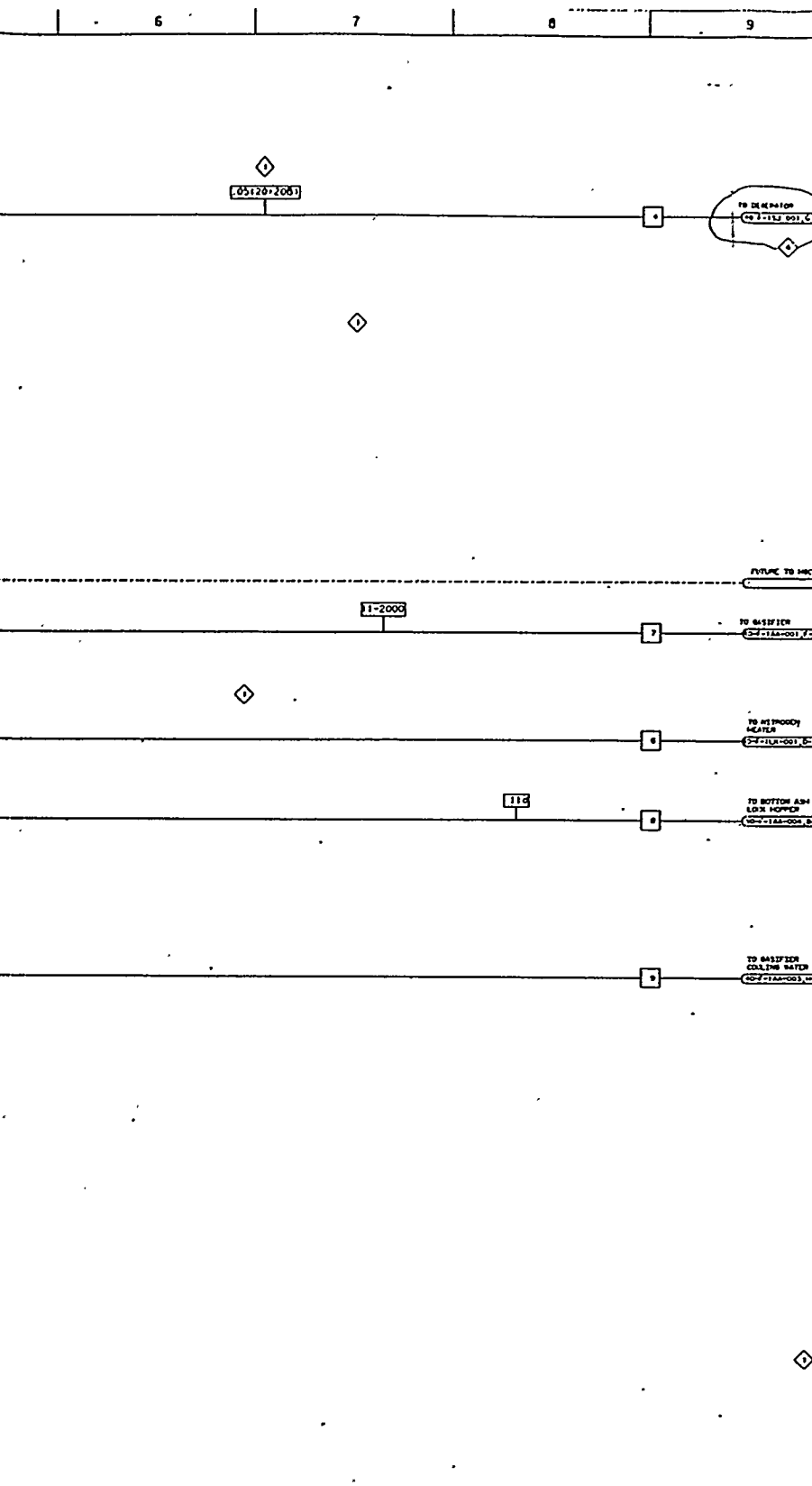
DE-AC21-92MC28202

CLIENT DRAWING NUMBER

JACOBS-SIMINE DRAWING NUMBER

18NC2706-40-F-15J-001

6			7			8			9			10			
BOILER FEEDWATER RECIRCULATION			DEAERATOR VENT			STEAM			NEUTRALIZING AMINE			O2 SCAVENGER			
Deg.F	GPM	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F
250	HOLD	10	250	HOLD	10	250	HOLD	10	250	15	10	250	15	10	250
227	0	5	227	HOLD	5	227	1500	5	227	5	80	HOLD	5	80	227
227	0	5	227	500	5	227			227	5	80	HOLD	5	80	227



NOTES

- STEAM NUMBERS SHOWN REFER TO TGA, AS TIME NUMBERS IN THIS DRAWING
- NORMAL OPERATIONS OF THE OPERATIONAL SYSTEM CONDITIONS SHALL REFER TO THE PSIG CALIBRATED OPERATING SYSTEM PRESSURE TO START OF PRELIMINARY CALIBRATED OPERATING

4	B	1	REVISED OFFSHORE CONNECTION.
3	A	1	REVISED PER DEPARTMENT OF ENERGY COMMENTS
2	A	1	REVISED PER SWINNEY SCOPE REVIEW. ISSUED FOR COMMENTS
1	B	1	REVISED TITLE, STREAM SYMBOLS, DATA, DELETED STREAM TO THE COAL GAS IS NOT HEATER
0	J	1	REVISED DATA & NOTES FOR 1200 PSIG OPERATION. CHANGED ONE NO FROM 1100PSIG-NO-F-88-001.
G	A	1	ISSUED FOR REVIEW
F	A	1	ISSUED FOR INFORMATION
E	A	1	ISSUED FOR REVIEW
D	A	1	ISSUED FOR INTERNAL REVIEW
C	A	1	ISSUED FOR TAB. & REPORT
B	A	1	ISSUED FOR REVIEW
A	A	1	ISSUED FOR ESTIMATE.

REVISIONS

NO.	DATE	BY	DESCRIPTION
1			
2			
3			
4			

NOTE: 1. SCALE ALL DIMENSIONS, SHOW UP TO 10% TOLERANCE, DIMENSIONS AND ANGLES. 2. DIMENSIONS ONLY TO CENTER UNLESS OTHERWISE SPECIFIED.

1. SCALE COIL (C) 2. H.P. (E.S.) (F) 3. CONSTANT

1. PHYLIP (H.P.) 2. DATE (L.P.L.) 3. 4. DESIGN (C) 5. BIDS (H)

SEAL: _____
SIGNATURE: _____
DATE: _____

DR. J. PIERCE	DATE: 08-21-83
DR. B. V. DUDZ	SCALE: 1/4" = 1'-0"
DR. B. V. DUDZ	NO. 1625706

JE JACOBS-SIRPINE ENGINEERING
a division of Jacobs Engineering Group Inc.

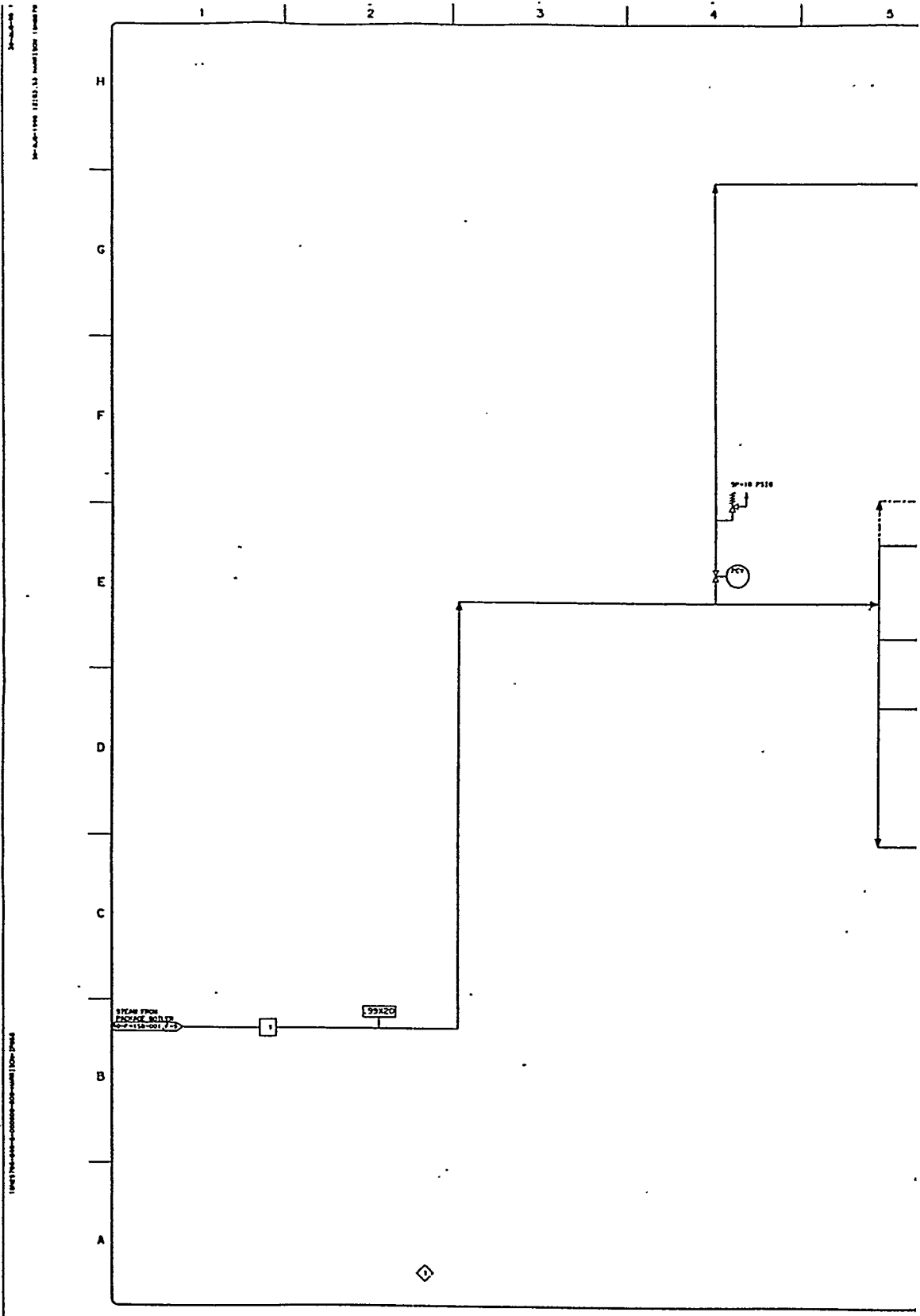
GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC26202

DRAWING TITLE
FLOW DIAGRAM
STEAM
DISTRIBUTION

CLIENT DRAWING NUMBER
JACOBS-SIRPINE DRAWING NUMBER
1625706-90-F-15B-002

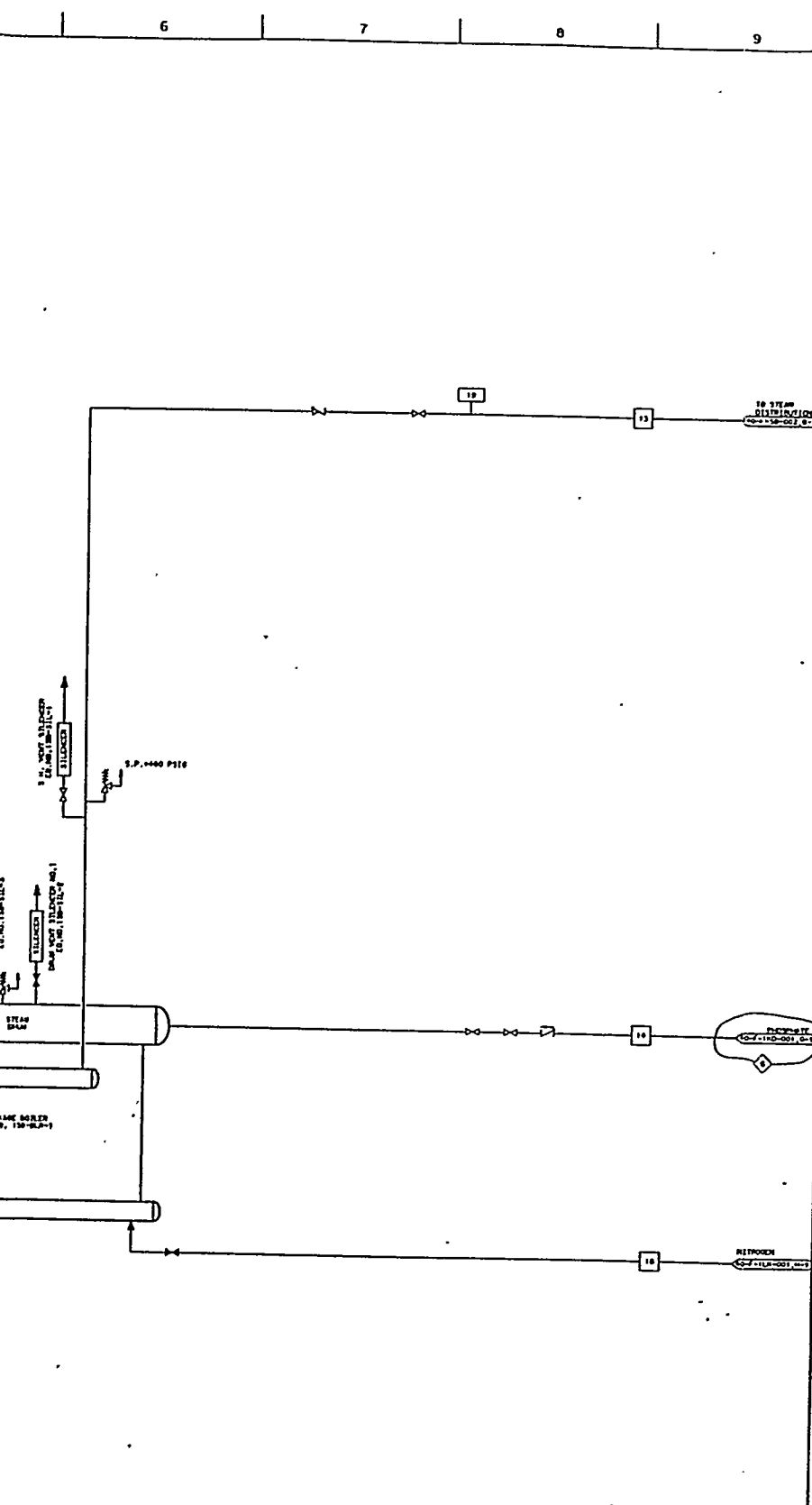
STEAM PURGE	6			7			8			9			10
	STEAM TO H.P. N2 HIR	PPH	PSIG	STEAM TO GASIFIER	PPH	PSIG	STEAM TO GASIFIER	PPH	PSIG	STEAM TO GASIFIER	PPH	PSIG	
		2000	460										
BALANCE 1	HOLD	420	550	(SEE MASS BALANCE 1)	3000	420	550	RILEY	420	550			
BALANCE 1	HOLD	360	500	(SEE MASS BALANCE 1)	3000	360	500	RILEY	360	500			

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LINE NUMBER	1			2			3			4			5	
DESCRIPTION	STEAM FROM BOILER						STEAM TO DEAERATOR						STEAM TO	
UNITS	PPH	PSIG	Deg°F	PPH	PSIG	Deg°F	PPH	PSIG	Deg°F	PPH	PSIG	Deg°F	PPH	PS
MAXIMUM DESIGN	6000	460	600							1000	10	600		
NORMAL OPERATING	{SEE MASS BALANCE}						{SEE MASS BALANCE}						{SEE MASS	
MINIMUM OPERATING	{SEE MASS BALANCE}						{SEE MASS BALANCE}						{SEE MASS	
REVISION DATE														

LINE NUMBER	11			12			13			14			15	
DESCRIPTION														
UNITS	PPH	PSIG	Deg°F	PPH	PSIG	Deg°F	PPH	PSIG	Deg°F	PPH	PSIG	Deg°F	PPH	PSI
MAXIMUM DESIGN														
NORMAL OPERATING														
MINIMUM OPERATING														
REVISION DATE														



NOTES

1 STEAM NAMEPLATE ENTRIES REVISIT TO SHOW UP STEAM NAMEPLATE TO MUST BALANCE

2 NORMAL GASIFIER OPERATING IS 207 PSIG. CHANGE IS SHOW UP PRESSURE GASIFIER DESIGN

6	1	(CONNECTED TO P&ID NOTOR AND REV OFF-P&ID CONNECTION. ISSUED AS REV. 1)
5	1	REVISED P&ID DEPARTMENT OF ENERGY COMMENTS, REV. 1
4	1	FINAL ISSUED FOR DESIGN OF REVISED P&ID SCOPE. REVISED ISSUED FOR COMMENTS
3	1	REVISED STEAM SIGNALS. CELESTIS COMPANY HEATER, SENT TO P&ID. ISSUED FOR DESIGN
2	1	DELETED COM. P&ID HEAT W/ LINE. REVISED FLUE GAS CHANGED END NO FROM 1000 PSIG GASIFIER CHANGED END NO FROM 1000 TO 200-PSIG-001 COM. P&ID SENT TO P&ID. P&ID, DELETED END TAGS. ISSUED FOR APPROVAL
0	1	ISSUED FOR APPROVAL. CHANGED DRAWING NO. FROM 11000-00-F-00-001
H	1	ISSUED FOR REVIEW
G	1	ISSUED FOR INFORMATION ONLY
F	1	ISSUED FOR O&E APPROVAL
E	1	ISSUED FOR REVIEW
D	1	ISSUED FOR INTERNAL REVIEW
C	1	ISSUED FOR IS&R & REPORT
B	1	ISSUED FOR REVIEW
A	1	ISSUED FOR ESTIMATE

REV. NO. CODE DATE

NOTE: CHECK ALL REVISED DRAWINGS FOR CHANGES. REVISED DRAWINGS SHOULD BE CHECKED AND APPROVED BEFORE NEXT REVISION.

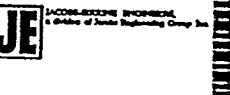
ISSUE CODE: (C) CIVIL, (F) MECHANICAL, (I) ELECTRICAL, (P) PLANT, (S) STRUCTURAL, (T) THERMAL

SEAL

SIGNATURE

DATE

DR. J. JACOBS	DATE: 06-19-83
FROM: W. D. BLOK	FILE NUMBER: 1000
DR. W. D. BLOK	JOB NO: 23706
DATE FILED: 06-21-83	FILE NO: 1000-001-001



GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC26202

DRAWING TITLE
FLOW DIAGRAM
NATURAL GAS
PACKAGE BOILER

CLIENT DRAWING NUMBER

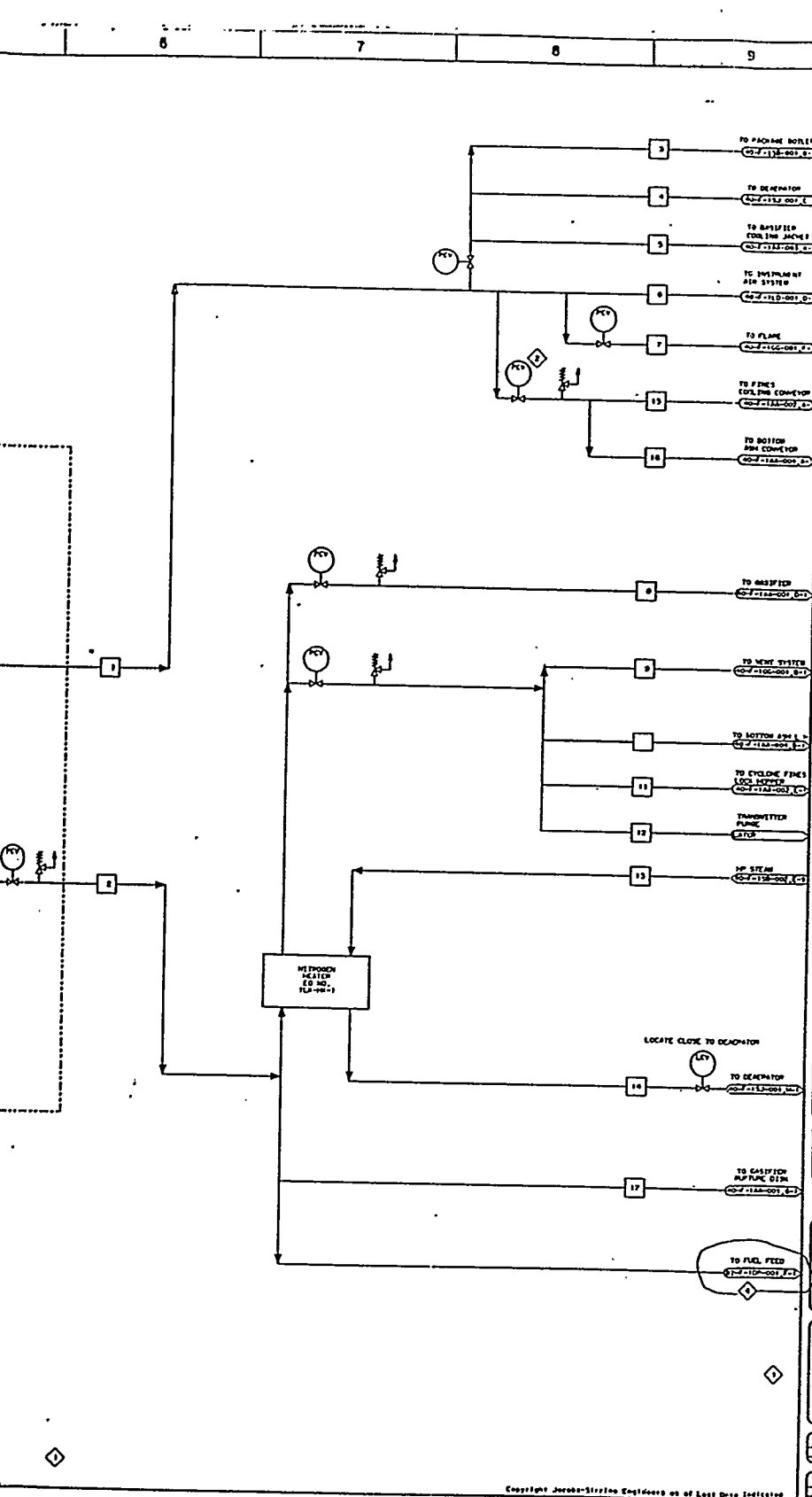
JACOBS-SHIMINE DRAWING NUMBER
1000-001-001

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6			7			8			9			10		
LN VENT FROM EXHAUST			O2 REACTOR VENT PUMP			TO PACKAGE BOILER			PYGAS TO PACKAGE BOILER			COMB AIR		
Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG
	HOLD						60	100						
			1 SEC			1 SEC			1 SEC			1 SEC		
			1 SEC			1 SEC			1 SEC			1 SEC		

16			17			18			19		
H2O EXH. TO F.F. URILITY			PYGAS TO FLARE			N2 PURGE					
Deg.F	PPH	IN. WC	Deg.F	PPH	PSIG	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F
	HOLD	HOLD									
1 SEC			0								
1 SEC			0								

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NOTES

- STEAM NUMBERS DENOTED REFER TO INSTRUMENT AIR SYSTEM NUMBERS IN THIS DRAWING
- NORMAL OPERATIONS IN THE OPERATING DESIGN CONDITIONS ARE MEANT TO BE MAINTAINED IN THE OPERATING DESIGN CONDITIONS
- TO CORRECT FROM 100 TO 100 AND 100 TO 100

4	1	ON REVISED OFFSHORE CONNECTORS
3	1	ISSUED AS REV. 1
3	1	ISSUED FOR DESIGN
2	1	REVIEWED PER 3-18-93 SCOP
1	1	REVIEWED, ISSUED FOR CONCEPTS
1	1	REVIEWED TITLE, STREAM SYMBOLS, ADDED DATA
0	1	REVIEWED DATA & NOTES FOR FOR P110 OPERATION, DASHED OUT NO FLOW
0	1	ISSUED FOR APPROVAL
0	1	ISSUED FOR INFORMATION ONLY
0	1	ISSUED FOR REVIEW
0	1	ISSUED FOR INTERNAL REVIEW
0	1	ISSUED FOR T&E REPORT
0	1	ISSUED FOR REVIEW
0	1	ISSUED FOR ESTIMATE

DESCRIPTION

NOTE: CONSULT REVISIONS, HISTORY AND COMMENTS FOR ALL REVISED DATA AND DATA TO BE NEXT REVISIONS.

ISSUE CODE (C) DATE (D) / (E) / (F) / (G) / (H) / (I) / (J) / (K) / (L) / (M) / (N) / (O) / (P) / (Q) / (R) / (S) / (T) / (U) / (V) / (W) / (X) / (Y) / (Z)

SEAL

SIGNATURE

DATE

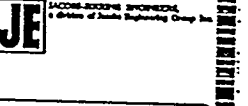
DR. J. PIERCE DATE 04-21-93

DR. J. PIERCE

DR. J. PIERCE

DR. J. PIERCE

DR. J. PIERCE



GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

DRAWING TITLE
FLOW DIAGRAM
NITROGEN STORAGE
& DISTRIBUTION

CLIENT DRAWING NUMBER

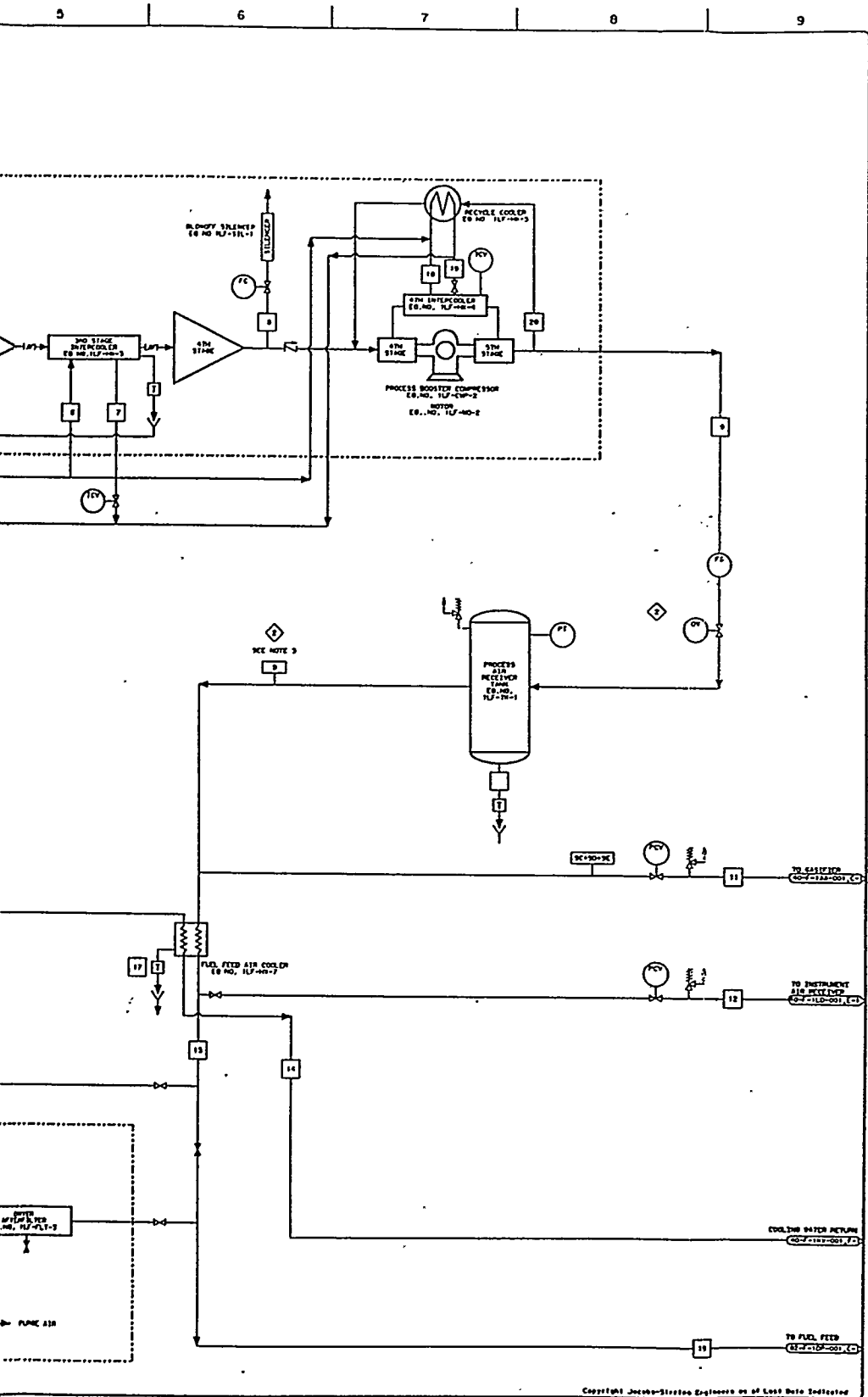
JACOBS-SIMINE DRAWING NUMBER
16K25706-40-F-1LK-001

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6			7			8			9			10			
N2 TO INSTRUMENT AIR			N2 TO FLARE			N2 TO GASIFIER			N2 TO VENT SYSTEM			N2 TO BOTTOM ASH L.H.			
DEG.F	SCFM	PSIG	DEG.F	SCFM	PSIG	DEG.F	SCFM	PSIG	DEG.F	SCFM	PSIG	DEG.F	SCFM	PSIG	DEG.F
100	438	150	100	HOLD	150	100	HOLD	374	465	HOLD	374	465	HOLD	374	465
50	0	120	50	HOLD	50	50	HOLD	153	400	HOLD	353	400	HOLD	353	400
50	0	160	50	HOLD	20	HOLD	HOLD	360	HOLD	HOLD	360	HOLD	HOLD	360	HOLD

16			17			18			19		
N2 TO BOTTOM ASH CONVEYOR			N2 TO GASIFIER								
DEG.F	SCFM	PSIG	DEG.F	SCFM	PSIG	DEG.F	SCFM	PSIG	DEG.F	SCFM	PSIG
110		10	100	100	420	100					
50		5	50	HOLD	420	50					
50		5	50	HOLD	360	50					

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NOTES

1. STEAM NUMBERS DENOTED BY STEPS TO PARALLEL STEAM NUMBERS IN THIS DRAWING.
2. NORMAL OPERATIONS IN THE OPERATING DESIGN CONCEPTS ARE REFERRED TO BY THE FOLLOWING SYMBOLS: (S) SAFETY VALVE, (T) TRIP VALVE, (C) CONTROL VALVE, (V) VALVE.
3. THIS FLOW DIAGRAM FROM THE PROCESS DESIGN IS NOT BALANCED BECAUSE AIR SYSTEM LINES ARE NOT REPRESENTED IN THIS FLOW DIAGRAM.

REV.	NO.	DATE	DESCRIPTION
5	04	04-10-13	REVISED LATEST DESIGN DATA.
4	03	04-10-13	ISSUED AS REV. 1.
3	02	04-10-13	REVISED FOR EQUIPMENT OF DESIGN COMMENTS.
2	01	04-10-13	ISSUED FOR DESIGN.
1	00	04-10-13	REVISED FOR SAFETY SCOPE REVIEW, ISSUED FOR COMMENTS.
0	00	04-10-13	REVISED STREAM SYMBOLS, DATE, REFERRED TO NOTE 3.
F	00	04-10-13	CHANGED SAFETY VALVE TO TRIP VALVE, ISSUED FOR DESIGN.
E	00	04-10-13	REVISED DATA & NOTES FOR 400 PSIG OPERATION, CHANGED SWR NO FROM 15000-001-001-001, ISSUED FOR APPROVAL.
D	00	04-10-13	ISSUED FOR APPROVAL, CHANGED DRAWING NO. FROM 31500-001-001-001, ISSUED FOR APPROVAL.
C	00	04-10-13	ISSUED FOR INFORMATION ONLY.
B	00	04-10-13	ISSUED FOR REVIEW.
A	00	04-10-13	ISSUED FOR INTERNAL REVIEW.
0	00	04-10-13	ISSUED FOR TASK & REPORT.
0	00	04-10-13	ISSUED FOR REVIEW.
0	00	04-10-13	ISSUED FOR ESTIMATE.

NOTE: CIRCLE ALL REVISIONS, INDICATE THE DATE, NAME, AND NUMBER OF THE REVISIONS, AND DATE OF THE REVISIONS. ISSUE CODE: (C) CONTROL VALVE, (S) SAFETY VALVE, (T) TRIP VALVE, (V) VALVE.

SEAL

SIGNATURE

DATE

MR. J. STORIE DATE 04-10-13
 PROJ. & V. CLERK JACOBS
 CH. FILE NUMBER J048
 SPEC. & STDS. JOB NO. 3-1004
 CO. FILE NO. 87-0-0100-1-1000-001-001

JE JACOBS-STORIE ENGINEERING & ARCHITECTURE, A Division of Jacobs Engineering Group Inc.

GPIF PROJECT
 U.S. DEPT. OF ENERGY
 DE-AC21-92AC28202

DRAWING TITLE
 FLOW DIAGRAM
 PROCESS AIR
 SYSTEM

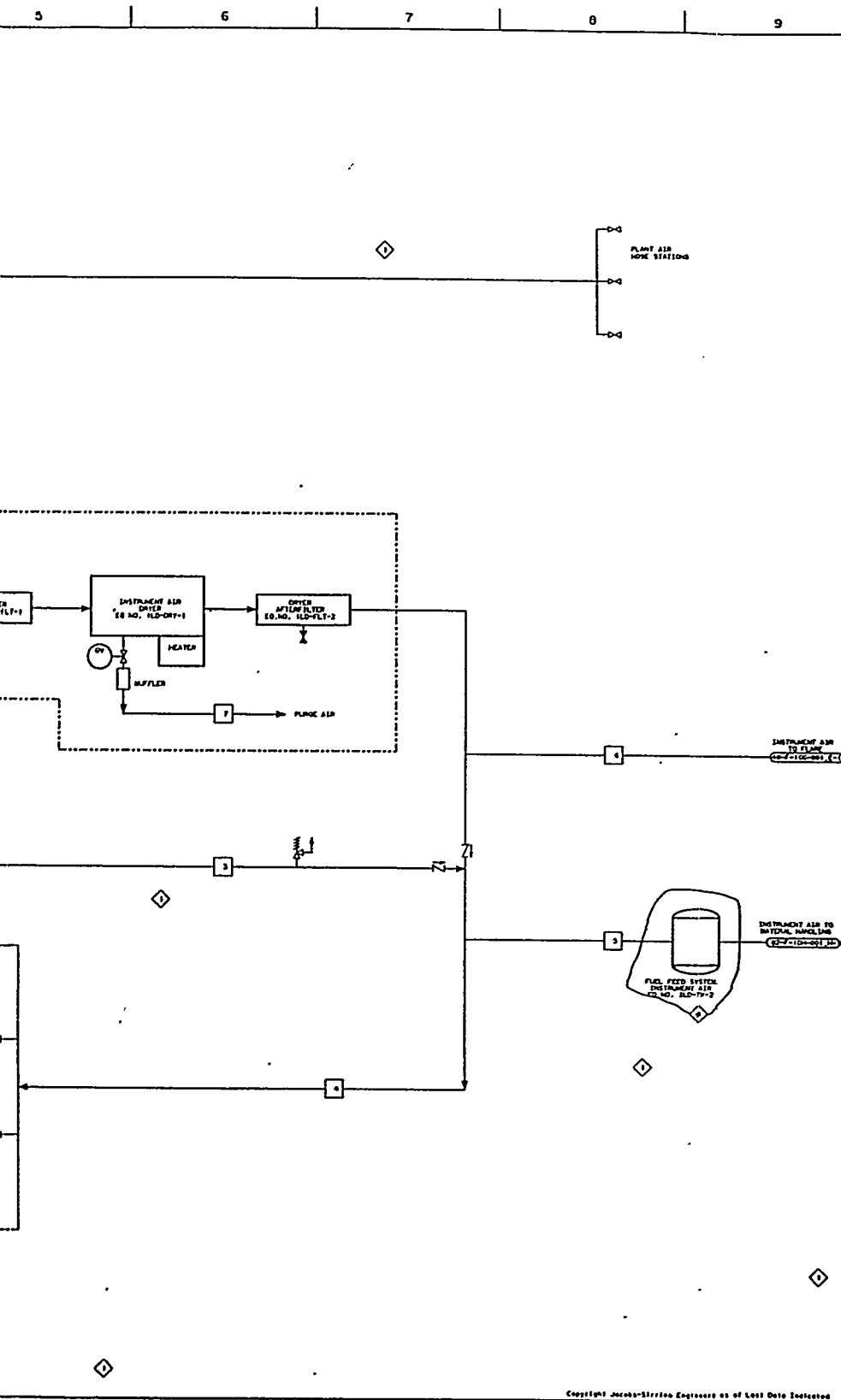
CLIENT DRAWING NUMBER

JACOBS-STORIE DRAWING NUMBER
 16025706-40-F-11F-001

5			6			7			8			9			10			
CW RETURN			CW SUPPLY			CW RETURN			COMPRESSOR BLOW OFF			COMPRESSOR DISCHARGE			COND			
F	CPM	PSIG	Deg.F	CPM	PSIG	Deg.F	CPM	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F
0	50	100	150	100	100	150	100	100	150	19250	138	120	19250	567	400	500	150	300
1	20	30	105	47	40	85	47	30	105	0	120	165	15893	315	350	300	75	105
2	HOLD	30	105	HOLD	40	85	HOLD	30	105	HOLD	120	165	HOLD	350	400	0	HOLD	HOLD

13			14			15			16			17			18			19			20		
AIR TO AIR DRYER			AIR TO CONVEYOR SYSTEM			COND			CW SUPPLY			CW RETURN			RECYCLE AIR								
F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	CPM	PSIG	Deg.F	CPM	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F		
0	1000	567	150	7000	567	150	50	567	250	50	100	100	50	100	150	19250	567	400					
1	4734	499	95	4567	489	100	23	560	100	24	40	85	24	30	105	0	315	350					
2	HOLD	HOLD	70	HOLD	HOLD	90	2	360	100	HOLD	40	85	HOLD	30	105	0	HOLD	HOLD					

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NOTES

- STEAM PIPING IS NOTED REPEATED TO TABLE WITH NO NUMBERS IN THIS SUBJECT
- APPROVAL OF THIS DRAWING IS THE RESPONSIBILITY OF THE DESIGNER. THE DESIGNER IS RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION CONTAINED HEREIN.
- NO CHANGE FROM THE DATE OF THE LAST REVISION.

REV.	DATE	DESCRIPTION
4	03-20-83	ADDED FUEL FEED SYSTEM
3	03-20-83	INSTRUMENT AIR RECEIVED
2	03-20-83	ISSUED AS REV. 1
1	03-20-83	REVISED FOR DEPARTMENT OF ENERGY COMMENTS
0	03-20-83	ISSUED FOR DESIGN
	03-20-83	NOTICED FOR S&P/S COPY
	03-20-83	REVISED, ISSUED FOR COMMENTS
	03-20-83	REVISED TITLE & STREAM SYMBOLS, ADDED COOLING WATER DATA, DETAILED PLANT AIR, ISSUED FOR DESIGN
	03-20-83	REVISED DATA & NOTES FOR S&P SISE OPERATION, CHANGED ONE NO FROM 31604-86-F-LD-001 TO 31604-86-F-LD-001
	03-20-83	ISSUED FOR APPROVAL
	03-20-83	ISSUED FOR INFORMATION
	03-20-83	ONLY
	03-20-83	ISSUED FOR REVIEW
	03-20-83	ISSUED FOR INTRON REVIEW
	03-20-83	ISSUED FOR TABLE REPORT
	03-20-83	ISSUED FOR REVIEW
	03-20-83	ISSUED FOR ESTIMATE

SEAL

SIGNATURE _____

DATE _____

DR. J. BISHOP DATE 08-21-83

ENGR. D.V. BLOD FILE NUMBER J048

CHK. BY _____ JOB NO. 3-1504

CAD FILE NO. 87_16_02166-124708L0004_40P-1

JE JACOBS-SIRRINE ENGINEERS, a division of Jacobs Engineering Group Inc.

GPIF PROJECT

U.S. DEPT. OF ENERGY

DE-AC21-92MC28202

DRAWING TITLE

FLOW DIAGRAM

PLANT AND

INSTRUMENT AIR

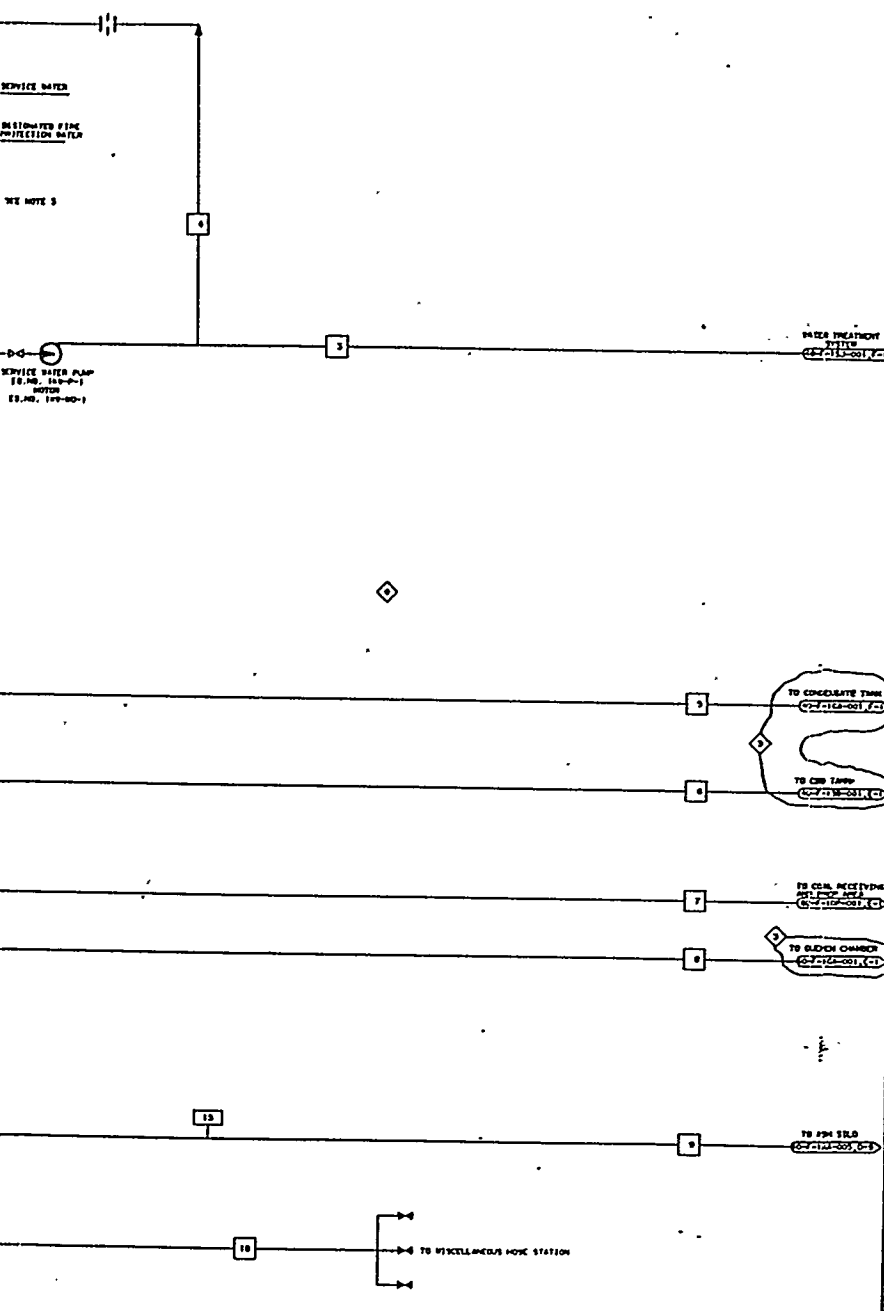
SYSTEM

CLIENT DRAWING NUMBER

JACOBS-SIRRINE DRAWING NUMBER

16N25706-4D-F-1LD-001

5			6			6											
INSTRUMENT AIR TO WATER HANDL			INSTRUMENT AIR TO FLAME			DRYER PLAGE											
PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	SCFM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F
274	125	100	90	125	100	80	125	100									
46	93	70	0	93	70	80	10	70									
0	93	60	0	93	60	HOLD	HOLD	HOLD									



NOTES

1. SYSTEM NUMBERS INDICATED REFERS TO TANK, LINE AND VALVES IN THIS SYSTEM.
2. NORMAL OPERATION TO BE OPERATING WITH ONE (1) OF THE TWO SERVICE WATER PUMPS IN SERVICE AT ALL TIMES. PRESSURE GAUGES OPERATIONAL.
3. FOR DESCRIPTION OF PIPE PUMPS AND PRESSURES SEE PARTITION EQUIPMENT SEE DRAWING 1602506-10-001 OF THE PLANT HOUSE.

REV. NO.	DATE	DESCRIPTION
0		ISSUED AS REV. 1
1		REVISED PER DEPARTMENT OF ENERGY COMMENTS
2		REVISED PER DESIGN
3		REVISED PER S/W/S/S SCOPE
4		REVISED, ISSUED FOR COMMENTS
5		REVISED SERVICE WATER FROM (16.00, 1400-1) TO (12-113-001, C)
6		DELETED SERVICE WATER TO CYCLONE & GASIFIER OUTLET OUTLETS.

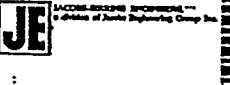
REV. NO.	DATE	DESCRIPTION
0		ISSUED AS REV. 1
1		REVISED PER DEPARTMENT OF ENERGY COMMENTS
2		REVISED PER DESIGN
3		REVISED PER S/W/S/S SCOPE
4		REVISED, ISSUED FOR COMMENTS
5		REVISED SERVICE WATER FROM (16.00, 1400-1) TO (12-113-001, C)
6		DELETED SERVICE WATER TO CYCLONE & GASIFIER OUTLET OUTLETS.

SEAL

SIGNATURE

DATE

DR. D. B. LEONARD DATE 03-13-95
 SPECIALIST IN ENGINEERING JACOBS
 CH. FILE NUMBER 1602506-10-001
 W. H. B. STUBBS JOB NO. 23708
 C&E FILE NO. 16.00, 1400-1; 12-113-001, C; 1602506-10-001



GPIF PROJECT
 U.S. DEPT. OF ENERGY
 DE-AC21-92MC26202

DRAWING TITLE

FLOW DIAGRAM
 SERVICE WATER
 SYSTEM

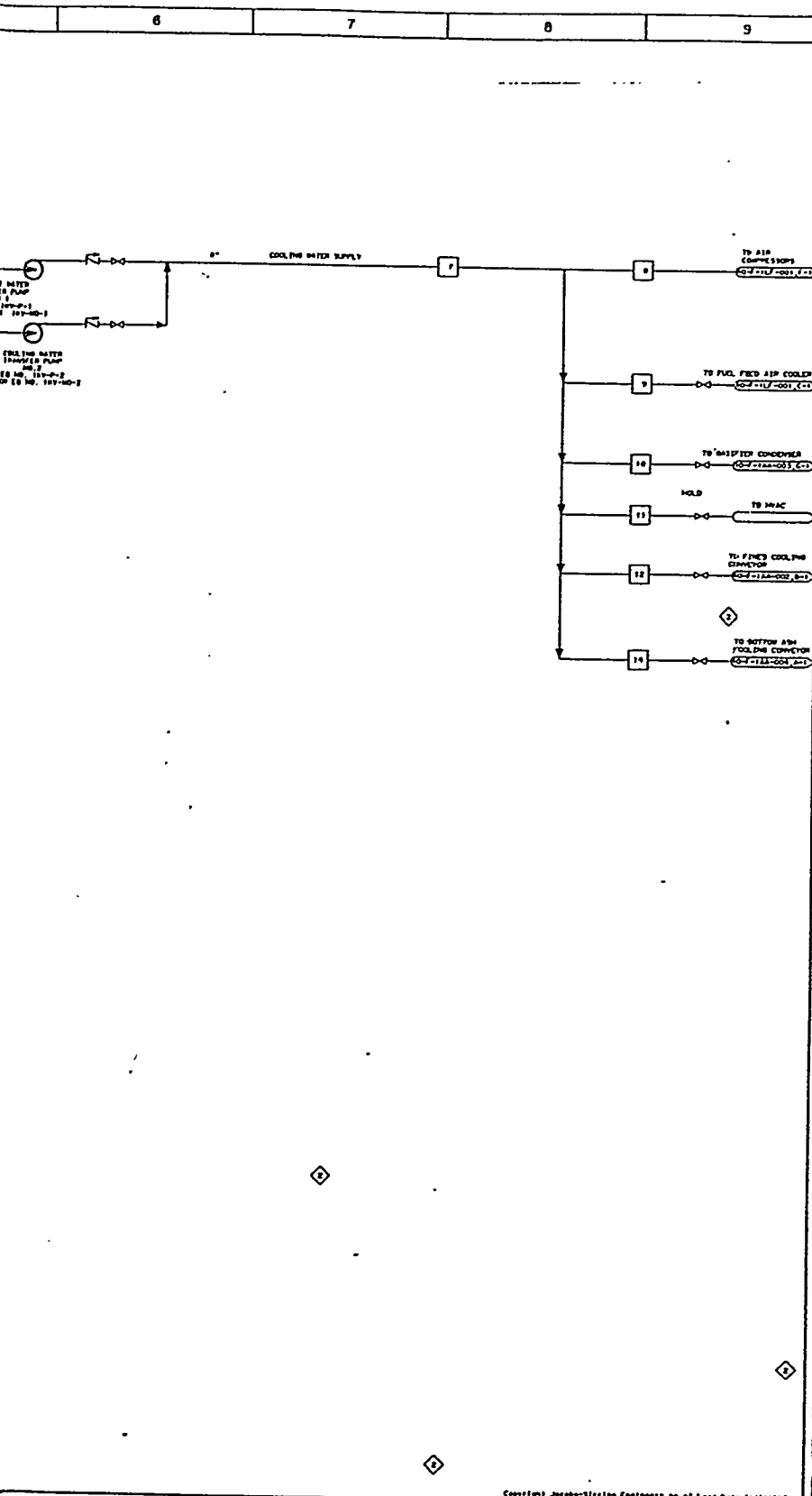
CLIENT DRAWING NUMBER

JACOBS-SIMLINE DRAWING NUMBER
 1602506-10-001

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IN	6			7			8			9			10		
	SW TO BLOWOFF TANK	SW TO COAL RECEIVING	SW TO SCRUBBER	SW TO ASH SILO	SW TO HOSE STATION										
Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	
90	HOLD	80	90	HOLD	80	90	HOLD	80	90	HOLD	80	90	HOLD	80	
80	HOLD	60	80	HOLD	60	80	HOLD	60	80	{SEE MASS BALANCE}	0	60	80	60	
60	0	40	60	0	40	60	0	40	60	{SEE MASS BALANCE}	0	40	60	60	

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NOTES

1. ITEM NUMBERS OMITTED ACCEPTS TO INCLUDE ITEM NUMBERS IN THIS DRAWING.
2. NORMAL OPERATION TO THE OPERATING DESIGN CONDITION FROM START UP PRESSURE CASIFIER OPERATION INITIAL REVIEW TO START UP PRESSURE CASIFIER OPERATION

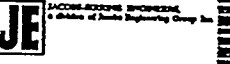
3	A	04	REVISED LATEST DESIGN
3	A	05	DATA
3	A	06	ISSUED AS REV. 1
4	A	01	REVISED PER DEPARTMENT
4	A	02	OF ENERGY COMMENTS
4	A	03	ISSUED FOR DESIGN
3	A	04	REVISED FOR S/15/95 SCOPE
3	A	05	REVISED, ISSUED FOR
3	A	06	COMMENTS
2	A	01	REMOVED POTABLE WATER AND
2	A	02	SERVICE WATER, ADDED
2	A	03	COOLING WATER TO AND FROM
2	A	04	HRAC UNITS, REVISED TITLE
2	A	05	& STEAM SYMBOL
1	A	01	ADDED SERVICE WATER TO
1	A	02	FLUE GAS SCRAMMER
0	A	01	REVISED DATA & NOTES FOR
0	A	02	ADD P/10 OPERATION
0	A	03	CHANGED ONE AND FROM
0	A	04	31000-00-0-000
0	A	05	ISSUED FOR APPROVAL
F	A	01	ISSUED FOR INFORMATION
F	A	02	ONLY
E	A	01	ISSUED FOR REVIEW
E	A	02	ONLY
D	A	01	ISSUED FOR INTERNAL
D	A	02	REVIEW
C	A	01	ISSUED FOR TASK & REPORT
C	A	02	ONLY
B	A	01	ISSUED FOR REVIEW
B	A	02	ONLY
A	A	01	ISSUED FOR ESTIMATE
A	A	02	ONLY

SEAL

SIGNATURE _____

DATE _____

DR. J. STEPHEN	DATE	04-21-93
DR. R. V. DUCH	FILE	JR06
DR.	ALIAS	
DR. R. V. DUCH	JOB NO.	3-1000
JOB FILE NO.	16425706-10-F-1000	001



GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC26202

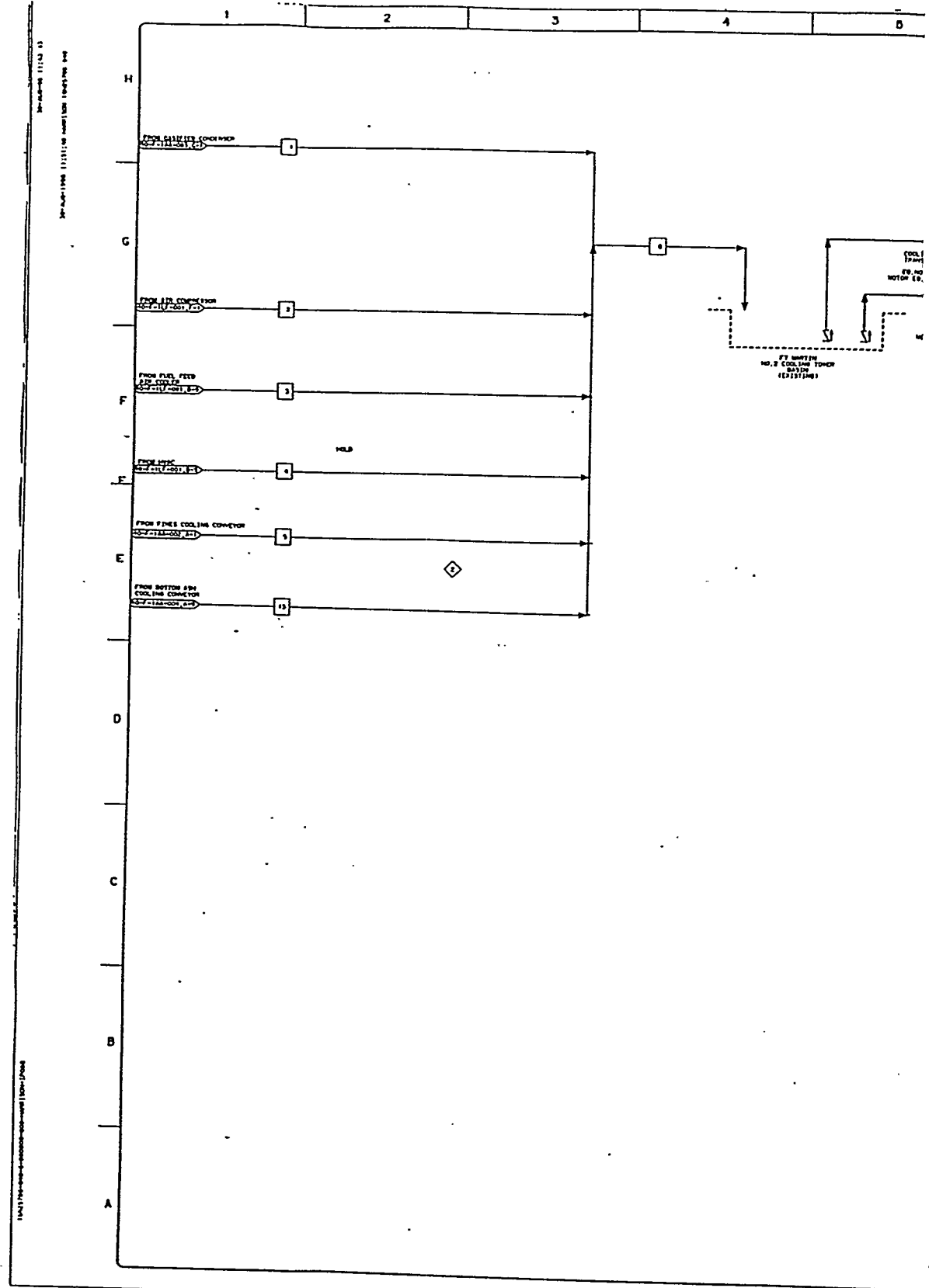
DRAWING TITLE
FLOW DIAGRAM
AUXILIARY WATER
DISTRIBUTION

CLIENT DRAWING NUMBER

JACOBS-STEARNS DRAWING NUMBER
16425706-10-F-1000-001

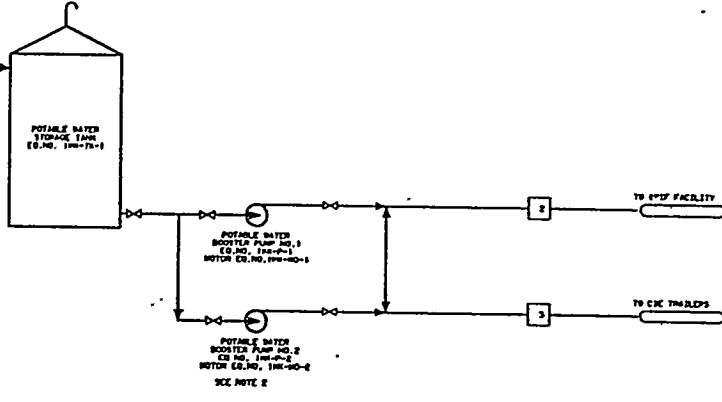
Copyright Jacobs-Stearns Engineers or of Last Date Indicated

OPERATION	6			7			8			9			10		
	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	COOLING WATER SUPPLY	
Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	
HOLD	HOLD	100	150	HOLD	100	150	500	100	150	50	100	150	HOLD	100	150
HOLD	HOLD	30	HOLD	HOLD	30	HOLD	185	40	85	35	40	85	HOLD	40	85
HOLD	HOLD	30	HOLD	HOLD	30	HOLD	HOLD	40	85	10	40	85	HOLD	40	85



LINE NUMBER	1			2			3			4			5	
DESCRIPTION:	CW RETURN FROM GASIFIER COOL			CW RETURN AIR COMPRESSOR			CW FROM FUEL FEED AIR COOLER			COOLING WATER FROM IMAC			COOLING WATER FROM FINE CO	
UNITS	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG
MAXIMUM DESIGN	HOLD	100	HOLD	500	100	150	50	100	150	HOLD	100	HOLD	HOLD	100
NORMAL OPERATING	HOLD	30	105	185	30	105	35	30	105	HOLD	30	HOLD	HOLD	30
MINIMUM OPERATING	HOLD	30	105	HOLD	30	105	10	30	105	HOLD	30	HOLD	HOLD	30
REVISION DATE														

LINE NUMBER	11			12			13			14		
DESCRIPTION:	COOLING WATER TO IMAC			COOLING WATER TO FINE CO			COOLING WATER FROM ASH CONVEYOR			COOLING WATER TO ASH CONVEYOR		
UNITS	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F
MAXIMUM DESIGN	HOLD	100	HOLD	HOLD	100	HOLD	HOLD	100	HOLD	HOLD	100	HOLD
NORMAL OPERATING	HOLD	40	85	HOLD	40	85	HOLD	40	HOLD	HOLD	30	HOLD
MINIMUM OPERATING	HOLD	40	85	HOLD	40	85	HOLD	40	HOLD	HOLD	30	HOLD
REVISION DATE												



NOTES

1. SYSTEM NAMEWAYS DERIVED FROM PIPES TO FACILITY STREAM NUMBERS TO MATCH DRAWINGS
2. POTABLE WATER BOOSTER PUMPS OPERATE INTERMITTENTLY

REV.	NO.	DATE	DESCRIPTION
0	A		ISSUED POTABLE WATER FROM DRAWING 100-10-1-DWG-001
1	A		REVISED FOR DESIGN OF ENERGY COMMENTS
2	B		REVISED FOR DESIGN OF ENERGY COMMENTS

NOTE: VERIFY ALL SYSTEMS, IDENTIFY WITH ORIGINAL DRAWING AND NUMBER, NUMBER ONLY CHANGE AND VERIFY BEFORE NEXT REVISION.

ISSUE CODE: [] REVISED, [] T.O., [] COMPLETE

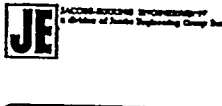
DESIGN: [] DESIGN, [] BIDDING

SEAL

SIGNATURE _____

DATE _____

DR. DR. LEONETTI	DATE 04-21-93
FRANK B. O'CONNOR	ADDRESS
CO.	FILE NUMBER
ONE N. S. STREET	CITY NO. 12704
ONE FIVE N.E. 1/4, DISTRICT OF COLUMBIA 20004	



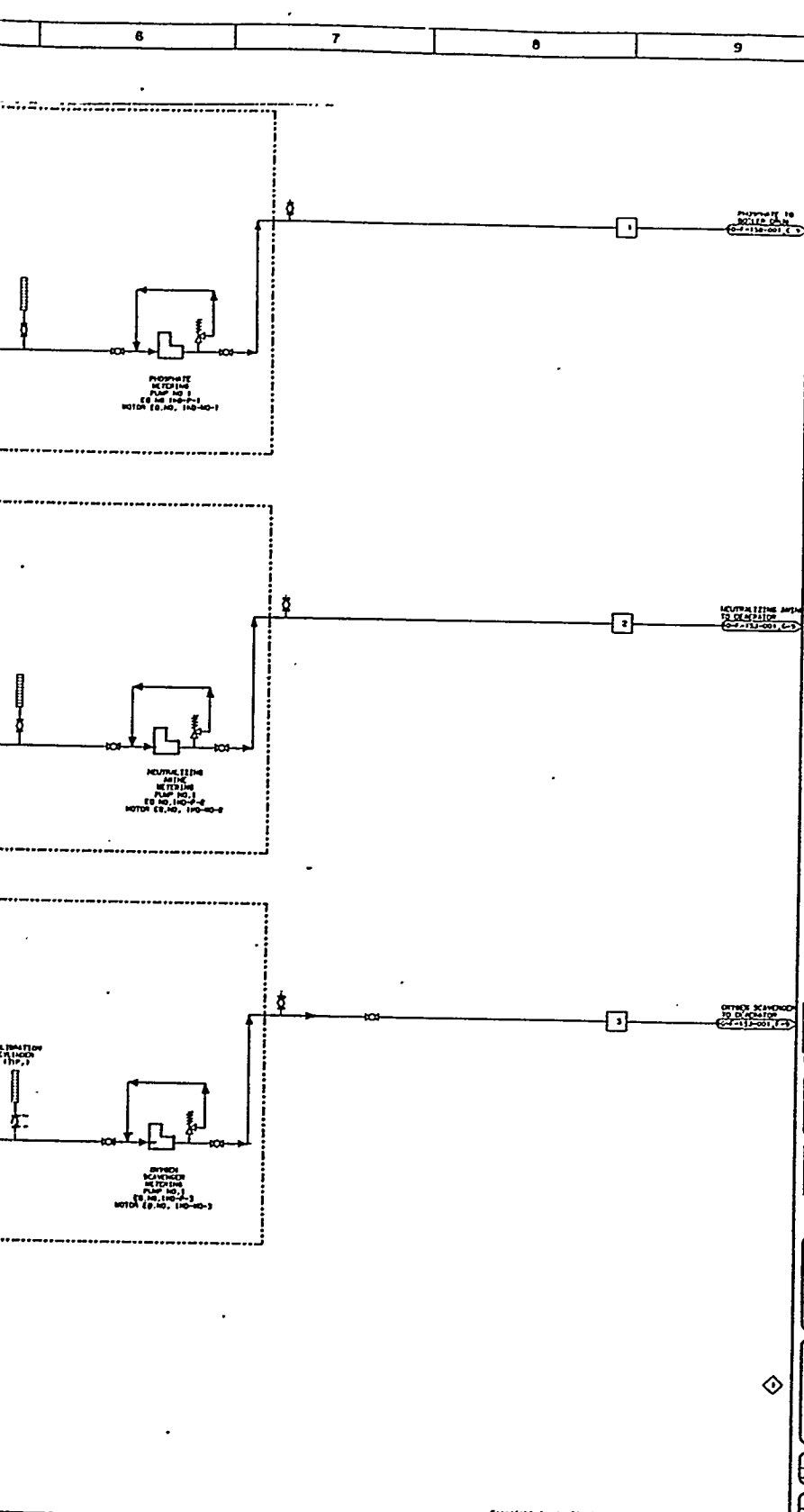
GPVF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202-1

DRAWING TITLE
FLOW DIAGRAM
POTABLE WATER
SYSTEM

CLIENT DRAWING NUMBER

JACOBS-SIPRINE DRAWING NUMBER
10023706-40-F-100-001

Copyright Jacobs-Siprine Engineers as of Last Date Indicated



NOTES

1. THE NUMBER OF REVISED DESIGN NOTES TO BE MADE SHOULD BE INDICATED BY THE NUMBER IN THE BOX.
2. NORMAL OPERATING IN THE OPERATING UNIT SHOULD BE INDICATED BY THE NUMBER IN THE BOX.

3	REVISOR	REVISION
3	JACOB	REVISION LATEST DESIGN DATA.
2	JACOB	ISSUED AS REV. 1
1	JACOB	ISSUED PER DEPARTMENT OF CHEMISTRY
0	JACOB	ISSUED FOR DESIGN
0	JACOB	ISSUED TITLE, STREAM NUMBERS.
0	JACOB	ISSUED DATA & NOTES FOR FOR P&ID OPERATION.
0	JACOB	CHANGED ONE NO FROM 113-104-1 TO 113-104-2.
0	JACOB	ISSUED FOR APPROVAL.
0	JACOB	ISSUED FOR INFORMATION ONLY.
0	JACOB	ISSUED FOR REVIEW.
0	JACOB	ISSUED FOR INTERNAL REVIEW.
0	JACOB	ISSUED FOR TEST & REPORT.
0	JACOB	ISSUED FOR REVIEW.
0	JACOB	ISSUED FOR ESTIMATE.
0	JACOB	ISSUED FOR ESTIMATE.

REV. NO. CODE CHECKED BY DATE

NOTE: MAKE ALL REVISIONS INDICATED BY THE NUMBER IN THE BOX AND APPROVE BEFORE NEXT REVIEW.

DATE CODE: C (DATE), P (P&ID), A (P&ID), D (DESIGN)

SCALE

SIGNATURE

DATE

DR. J. STEPHEN	DATE: 04-20-83
FRANK G. BUCH	FILE: J404
DR. J. STEPHEN	DATE: 0-10-83
DR. J. STEPHEN	DATE: 0-10-83

JE
JACOBS ENGINEERING CORPORATION
A Division of Jacobs Engineering Group Inc.

GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

DRAWING TITLE
FLOW DIAGRAM
CHEMICAL
FEED SYSTEM

CLIENT DRAWING NUMBER

JACOBS ENGINEERING CORPORATION
DRAWING NUMBER
16K25706-40-F-113D-001

349

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NOTES

1. ITEM NUMBERS REFERRED TO TABLES AND NUMBERS IN THIS DRAWING.
2. NUMBER SPECIFIED REFERS TO THE ITEM NUMBER IN THE DRAWING.
3. NUMBERS REFERRED TO BY INSTRUMENTS AND BURNER GAS AS A NUMBER SPECIFIED.

REV. NO.	DATE	DESCRIPTION
0		ISSUED FOR DEPARTMENT OF ENERGY COMMENTS
1		ISSUED FOR DESIGN
2		ISSUED AS REV. 1

NOTE: THIS IS A REVISION, NOT A DESIGN CHANGE. ALL REVISIONS MUST BE APPROVED BY THE PROJECT MANAGER AND THE DESIGNER. NO REVISIONS SHALL BE MADE WITHOUT THE WRITTEN APPROVAL OF THE PROJECT MANAGER AND THE DESIGNER.

ISSUE CODE: DESIGN CONSTRUCTION OPERATION

TO BURNER CHAMBER
 (S-1100-001, S-1100-002)

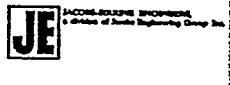
TO FLAME
 (S-1100-001, S-1100-002)

SEAL

SIGNATURE _____

DATE _____

DR. B. W. LEONETTI	DATE
DR. B. W. LEONETTI	DATE
DR. B. W. LEONETTI	DATE



GPIF PROJECT
 U.S. DEPT. OF ENERGY
 DE-AC21-92MC28202

DRAWING TITLE
 FLOW DIAGRAM
 INCINERATOR

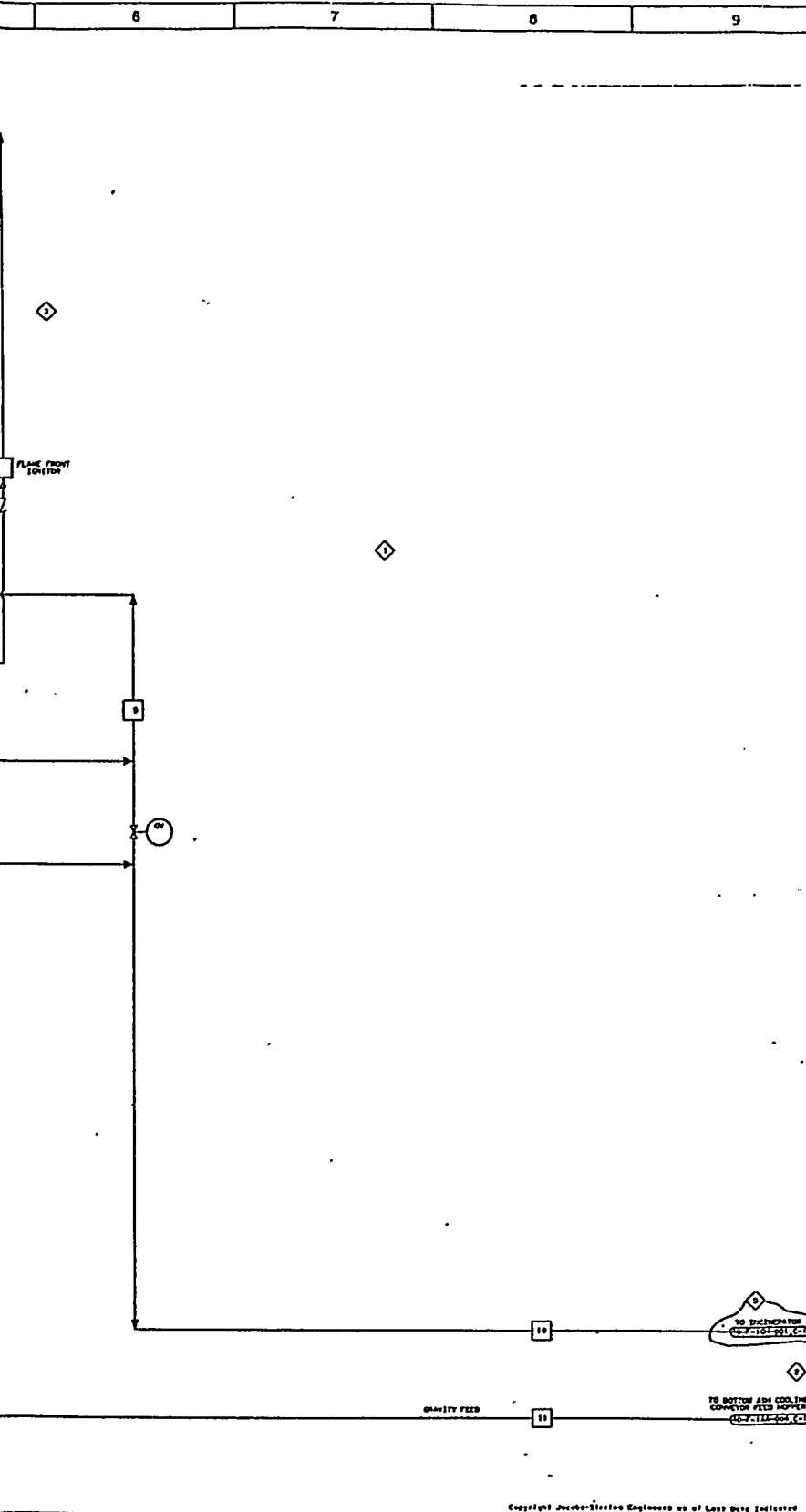
CLIENT DRAWING NUMBER

JACOBS-SIMINE DRAWING NUMBER
 1625706-60-F-104-001

Copyright Jacobs-Simine Engineers as of Last Date Indicated

6				7			8			9			10			
VENT GAS				FLUE GAS			COAL GAS BLEED									
S.F.	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F							
(C)	(S)	(S)	(S)	(S)	(S)	(S)	(S)	(S)	(S)							
(C)	(S)	(S)	(S)	(S)	(S)	(S)	(S)	(S)	(S)							

348



NOTES

1. STREAM NUMBERS DERIVED REFERS TO TABLE OF STREAM NUMBERS IN THIS DRAWING
2. NORMAL OPERATING TO THE OPERATING DESIGN CONDITIONS SHALL REFERS TO 150 PSIG OPERATING PRESSURE UNLESS OTHERWISE SPECIFIED

5	04	REVISED OFFPAGE
5	05	CONNECTORS
5	06	ISSUED AS REV 1
4	01	REVISED PER DEPARTMENT
4	02	OF ENERGY COMMENTS
4	03	ISSUED FOR DESIGN
3	01	REVISED PER 3/15/75 SCOPE
3	02	REVIEW, ISSUED FOR
3	03	COMMENTS
2	01	REVISED TITLE, STREAM
2	02	SYMBOL, & DATA, ADDED
2	03	INSTRUMENT AIR,
1	01	DELETED CON. PUMP WENT
1	02	TO BOOSTER PUMP
0	01	REVISED DATA & NOTES FOR
0	02	400 PSIG OPERATION,
0	03	CHANGED DIA. NO FROM
0	04	31600-40-F-4.3-001
0	05	ISSUED FOR APPROVAL
A	01	ISSUED FOR REVIEW
G	01	ISSUED FOR INFORMATION
F	01	ISSUED FOR INFORMATION
F	02	ONLY
E	01	ISSUED FOR REVIEW
E	02	ONLY
D	01	ISSUED FOR INTERNAL
D	02	REVIEW
C	01	ISSUED FOR TASK & REPORT
C	02	ONLY
B	01	ISSUED FOR REVIEW
B	02	ONLY
A	01	ISSUED FOR ESTIMATE
A	02	ONLY

REV. NO. CODE DATE DESCRIPTION

1. SCALE: 1" = 10' (SEE SHEET 10)

A. PNEUMATIC INSTRUMENT AIR

D. DESIGN E. ESTIMATE

SEAL

SIGNATURE

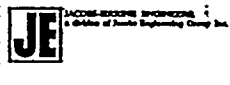
DATE

DR. J. STEPHEN DATE 08-21-85

SYMBOL V. BLOCK FILE NUMBER J-200

DR. J. STEPHEN JOB NO. 21794

CAD FILE NO. 16425706-40-F-100-001



GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

DRAWING TITLE

FLOW DIAGRAM
PROCESS VENT
DISTRIBUTION

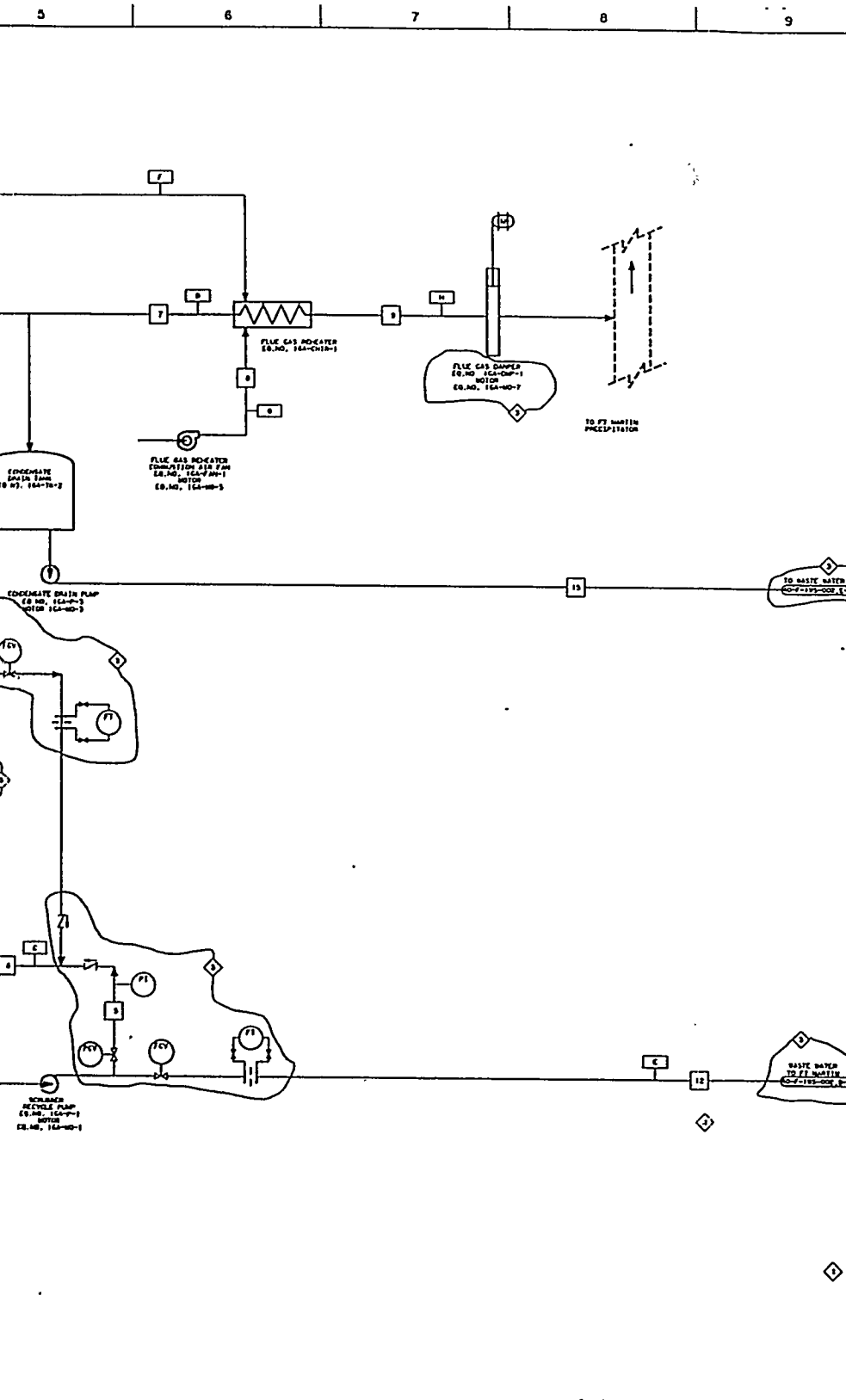
CLIENT DRAWING NUMBER

JACOBS-STEPHINE DRAWING NUMBER
16425706-40-F-100-001

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LV	6			7			8			9			10		
	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F
1100	HOLD	420	750	HOLD	420	1100	HOLD	150	100	HOLD	150	750	HOLD	150	750
1100	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	2	50	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD
1100	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD	2	50	HOLD	HOLD	HOLD	HOLD	HOLD	HOLD

347



NOTES

1. STREAM NAMES DENOTED BY TAGS TO TAGS AND STREAM NAMES IN MASS BALANCES
2. NORMAL OPERATING IN THE OPERATING DESIGN CONDITIONS TAGS REFERS TO 250 PSIA CRITICAL CONDITION. DESIGN PRESSURE IS 250 PSIA OF PRESSURE SERVICE OPERATION.

REV.	BY	DESCRIPTION
3	A	CHANGED EG NO. OF ID FAN
3	M	REMOVED INSTRUMENTS
3	M	ISSUED AS REV. 1
2	A	REVISED PER DEPARTMENT
2	M	OF DESIGN COMMENTS.
2	M	ISSUED FOR DESIGN
1	A	REVISED TITLE, STREAM
1	M	SYMBOL, TAG'S & EG. NAMES
1	M	ISSUED FOR APPROVAL
0	A	ISSUED FOR APPROVAL
0	M	ISSUED FOR APPROVAL

REV.	BY	DESCRIPTION
3	A	CHANGED EG NO. OF ID FAN
3	M	REMOVED INSTRUMENTS
3	M	ISSUED AS REV. 1
2	A	REVISED PER DEPARTMENT
2	M	OF DESIGN COMMENTS.
2	M	ISSUED FOR DESIGN
1	A	REVISED TITLE, STREAM
1	M	SYMBOL, TAG'S & EG. NAMES
1	M	ISSUED FOR APPROVAL
0	A	ISSUED FOR APPROVAL
0	M	ISSUED FOR APPROVAL

SEAL

SIGNATURE

DATE

DATE 06-10-83

FILE

NAME

JOB NO. 16A2706

JOB FILE NO. 16A-0100-121706(1)0001-0071

JE JACOBS ENGINEERING INCORPORATED
A Division of Jacobs Engineering Group Inc.

GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

DRAWING TITLE
FLOW DIAGRAM
FLUE GAS
DESULFURIZATION
SYSTEM

CLIENT DRAWING NUMBER

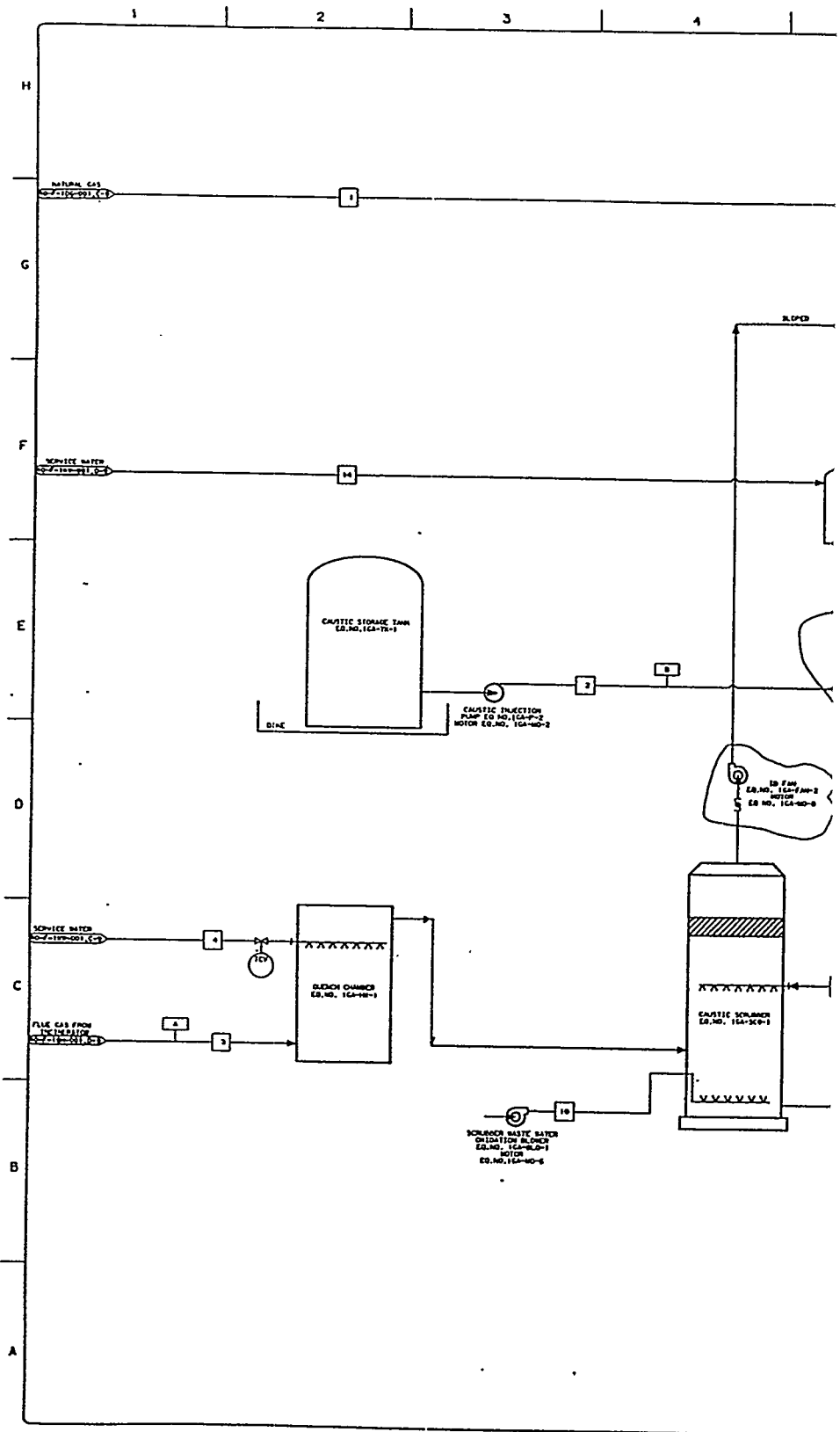
JACOBS-SHARPE DRAWING NUMBER
16A25706-40-F-16A-001

Copyright Jacobs-Sharpe Engineers as of Last Date Indicated

5			6			7			8			9			10		
SCRUBBER WATER OUTLET			SCRUBBER RECIRCULATION			SCRUBBER FLEK GAS OUTLET			COMBUSTION AIR			FLUE GAS RE-HEATER OUTLET			OXIDATION BLOWER FLOW		
CPH	PSIG	Deg.F	CPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F
30.12	3	200	(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)		
			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)		
15			16			17			18			19			20		
CONDENSATE																	
CPH	PSIG	Deg.F	CPH	PSIG	Deg.F	CPH	PSIG	Deg.F	CPH	PSIG	Deg.F	CPH	PSIG	Deg.F	CPH	PSIG	Deg.F
			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)		
			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)		

346

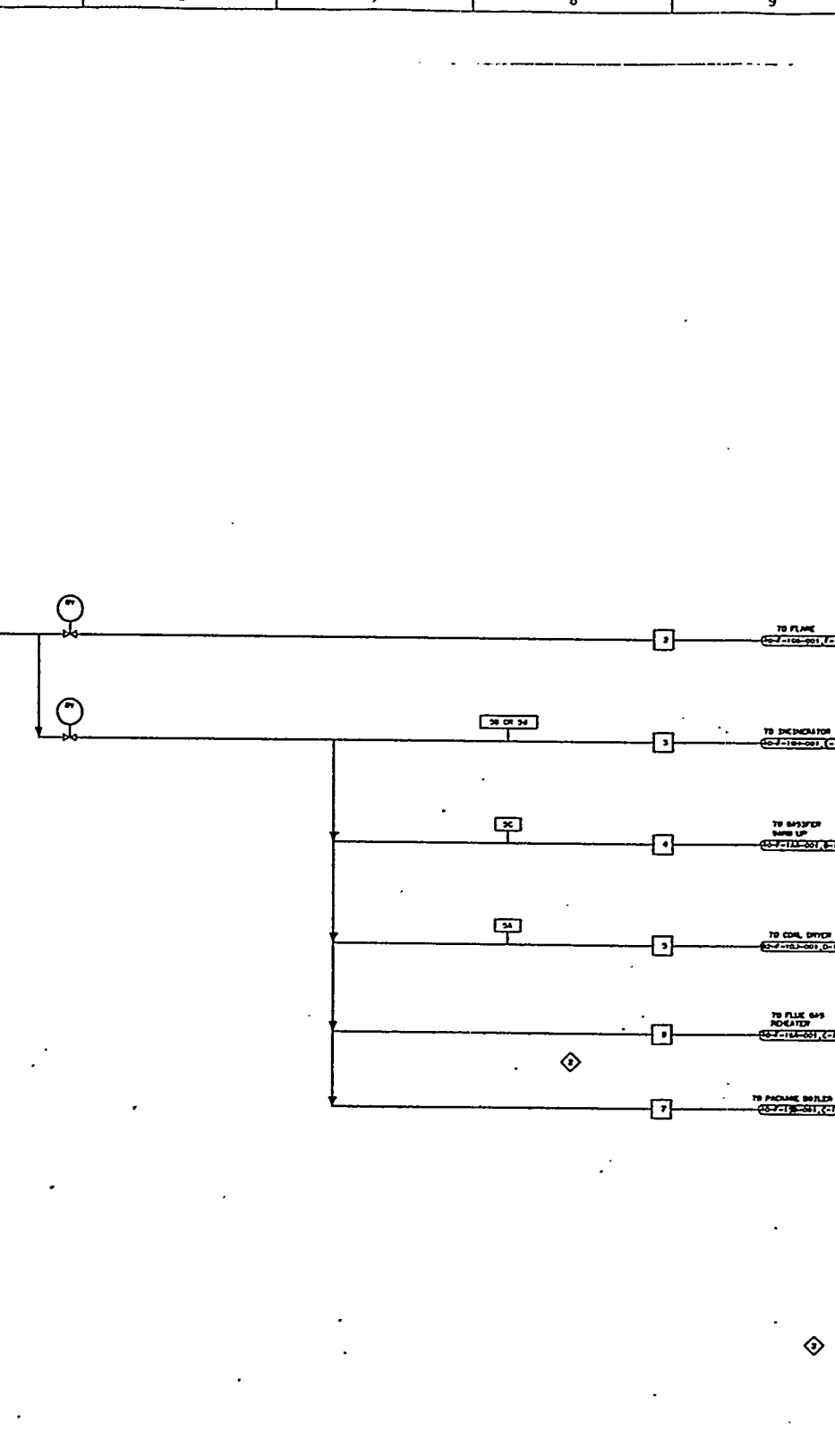
12-12-66 07.11.11M
 12-20-1966 11:22:14 P12522 1007106 000



12-12-66 07.11.11M
 12-20-1966 11:22:14 P12522 1007106 000

LINE NUMBER	1			2			3			4		
DESCRIPTION:	NATURAL GAS			CAUSTIC			HRSG FLUE GAS			SERVICE WATER MAKEUP		
UNITS	SCFM	PSIG	Deg.F	GPM	PSIG	Deg.F	PPH	PSIG	Deg.F	GPM	PSIG	Deg.F
MAXIMUM DESIGN												
MAXIMUM OPERATING												
NORMAL OPERATING	(SEE MASS BALANCE)			1.5	2	60	(SEE MASS BALANCE)			31	80	60
MINIMUM OPERATING	(SEE MASS BALANCE)						(SEE MASS BALANCE)					
REVISION DATE												

LINE NUMBER	11			12			13			14		
DESCRIPTION:	WASTE WATER			WASTE WATER			WASTE WATER			SERVICE WATER		
UNITS	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F
MAXIMUM DESIGN												
MAXIMUM OPERATING												
NORMAL OPERATING	(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)		
MINIMUM OPERATING	(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)		
REVISION DATE												



NOTES

1. STREAM NUMBERS DERIVED FROM THE MASS BALANCE SHEET. STREAM NUMBERS IN THIS DRAWING.
2. NORMAL OPERATION IN THE OPERATIONS SECTION (CONDITIONS FOR) RELIES TO THE MASS BALANCE SHEET. INITIAL PERMIT TO START UP MUST BE OBTAINED BEFORE OPERATION.

5	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10
1	10	10	10	10	10	10	10	10	10
0	10	10	10	10	10	10	10	10	10
A	10	10	10	10	10	10	10	10	10

REVISIONS:

NO.	DATE	DESCRIPTION
1		
2		
3		
4		
5		

SCALE CODE: (C) NAT'L. S. (F) COMB'N

EXPLANATION OF NAT'L. PLANS: (1) SECTION (2) S.D.P.

SEAL

SIGNATURE

DATE

DR. D. W. LEITCH

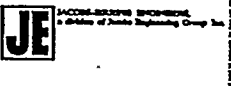
DATE: 06-13-64

PROJECT: GPIP

FILE NUMBER: 1048

JOB NO.: 3-1004

CONTRACT NO.: 12170000000000000000



GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

DRAWING TITLE

FLOW DIAGRAM
NATURAL GAS
DISTRIBUTION

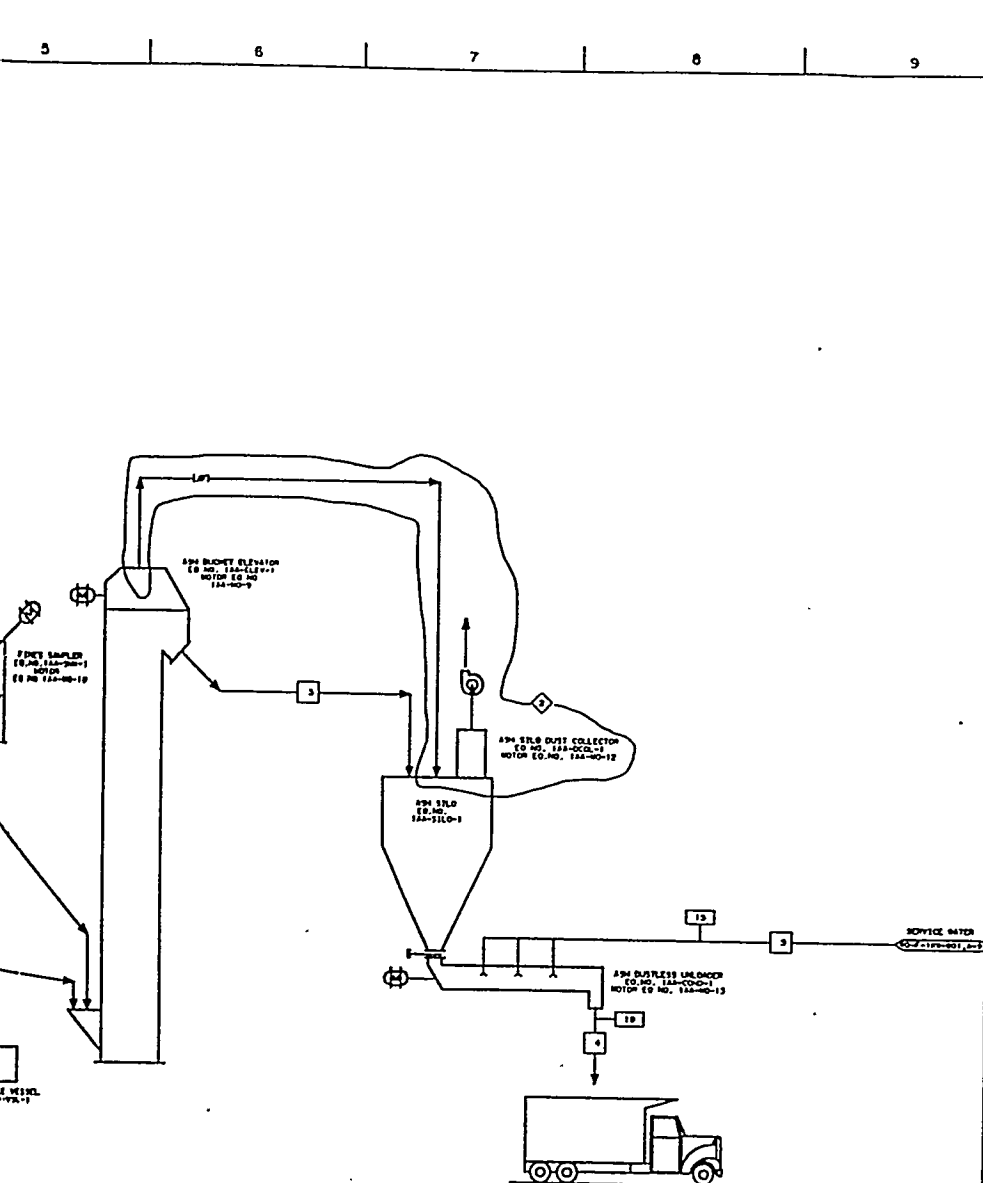
CLIENT DRAWING NUMBER

JACOBS-STIRLING DRAWING NUMBER
1823706-40-F-1DC-001

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5		6			7								
N.G. IN DRYER		N.G. TO FLUE GAS REHEATER			NATURAL GAS TO PACKAGE BOILER								
PSIG	Deg°F	PPH	PSIG	Deg°F	PPH	PSIG	Deg°F						
60	100		60			60	100						
SS BALANCE)	(SEE MASS BALANCE)		(SEE MASS BALANCE)			(SEE MASS BALANCE)							
SS BALANCE)	(SEE MASS BALANCE)		(SEE MASS BALANCE)			(SEE MASS BALANCE)							

345



NOTES

H

G

F

E

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2

1

0

REV. NO.

DATE

BY

DESCRIPTION

NOTE:

SCALE CODE

DECISION

SCALE

SIGNATURE

DATE

DR. D. S. LEONETTI

DATE 5-24-95

JACOBS

FILE

NAME

NO. 1002706

JOB NO. 1002706

JOB FILE NO. 07-A, DMC100-10479511A005, 007-1

JACOBS-SIMMONS ENGINEERING

a Division of Jacobs Engineering Group Inc.

JE

GPIF PROJECT

U.S. DEPT. OF ENERGY

DE-AC21-92MC20202

DRAWING TITLE

FLOW DIAGRAM

SOLID WASTE DISPOSAL

SYSTEM

CLIENT DRAWING NUMBER

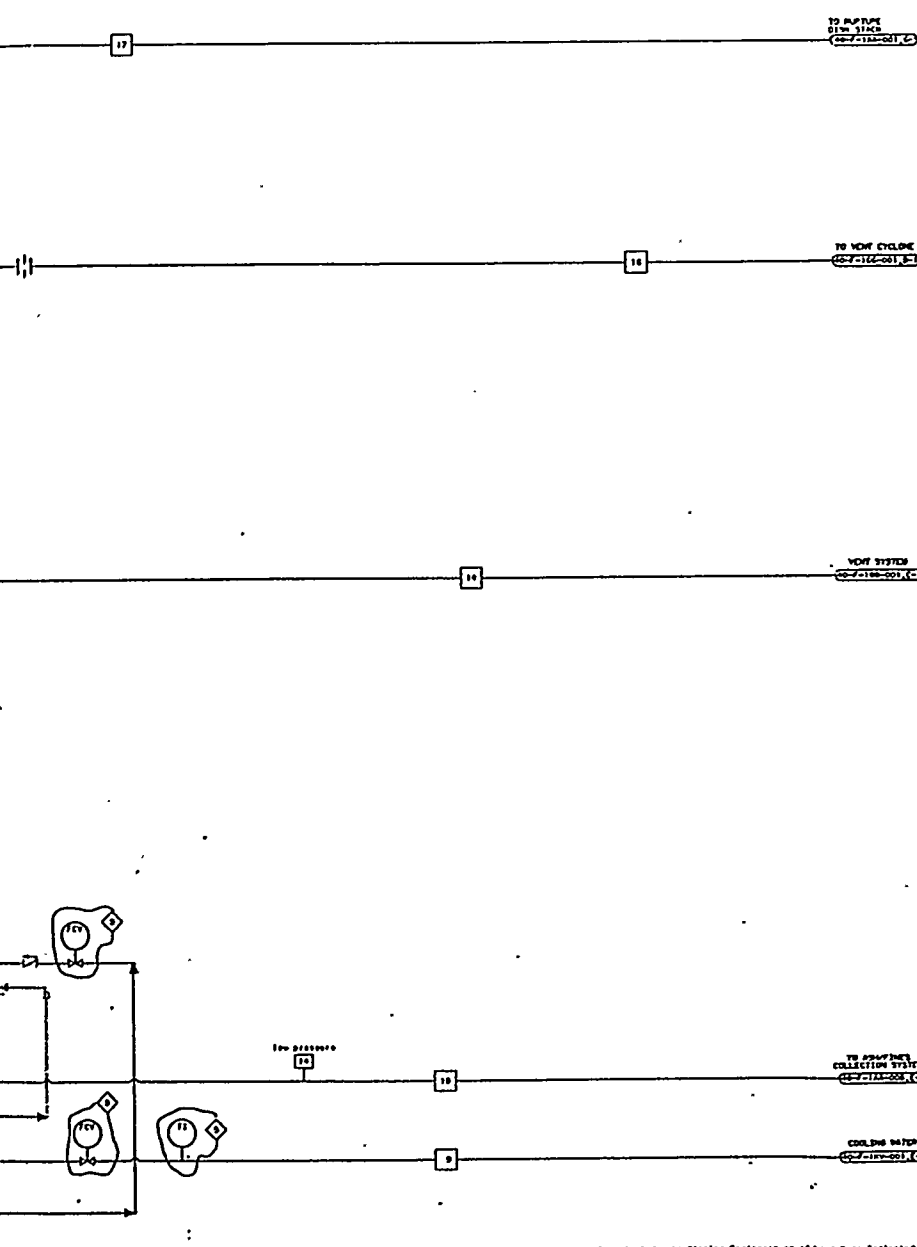
JACOBS-SIMMONS DRAWING NUMBER

16N25706-40-F-18A-005

SUPERCEDES DRAWING
16N25706-40-F-1WS-001

SERVICE WATER										
IN	PSIG	DEG. F								
OLD	HOLD	75								
1										
2										
3										
4										
5										
6										
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1. STEAM RADIANT COOLERS
 2. NORMAL OPERATIONS IN THE OPERATING
 3. RETURN WATER
- 5. 01 UPDATED FLOPP-CELL
 - 5. 02 ISSUED AS REV. 1
 - 4. 01 REVISED P&ID DEPARTMENT
 OF ENERGY COMMENTS.
 - 4. 02 ISSUED FOR DESIGN
 - 3. 01 REVISED FOR 5/18/99 SCOP
 COMMENTS. ISSUED FOR
 COMMENTS.
 - 2. 01 REVISED FINE'S SIMPLE
 VALVES & STREAM SYMBOLS
 - 2. 02 ADDER RUPTURE DISH LINES
 ISSUED FOR DESIGN
 - 1. 01 ADDER ASH/FINES CONVEYORS
 BOTTOMS OF REACTOR OUTSIDE
 ENVELOPE.
 - 1. 02 REVISED DATA & NOTES FOR
 400 PSIG OPERATION.
 CHANGED DNE NO FROM
 100000-00-F-00-001.
 ISSUED FOR APPROVAL.
 - 0. 01 ISSUED FOR APPROVAL.
 CHANGED DRAWING NO. FROM
 31000-00-F-00-000
 - 0. 02 ISSUED FOR REVIEW
 - B. 01 ISSUED FOR INFORMATION
 DELY
 - A. 01
 - A. 02

REV. NO.	DATE	DESCRIPTION
01	06-19-93	ISSUED FOR APPROVAL. CHANGED DRAWING NO. FROM 31000-00-F-00-000
02	06-19-93	ISSUED FOR REVIEW
03	06-19-93	ISSUED FOR INFORMATION DELY

NOTE: PLEASE ALL REVISING, VERIFY WITH DRAWING NUMBER AND ISSUE NUMBER ONLY (TITLE AND NUMBER BEFORE NEXT REVISED).

SEAL
 SIGNATURE
 DATE

DR. DR. ENGINEER DATE: 06-19-93
 DRAWING NO. 31000-00-F-00-000
 FILE NAME: 31000-00-F-00-000
 SHEET NO. 1 OF 1
 JOB NO. 100000-00-F-00-001
 JOB FILE NO. 10_01_000-100000-100000-00-F-00-001

JE JACOBS-SIMINE ENGINEERS
 a Division of Jacobs Engineering Group Inc.

GPIF PROJECT
 U.S. DEPT. OF ENERGY
 DE-AC21-92MC28202

DRAWING TITLE
 FLOW DIAGRAM
 GASIFIER
 ASH HANDLING

CLIENT DRAWING NUMBER

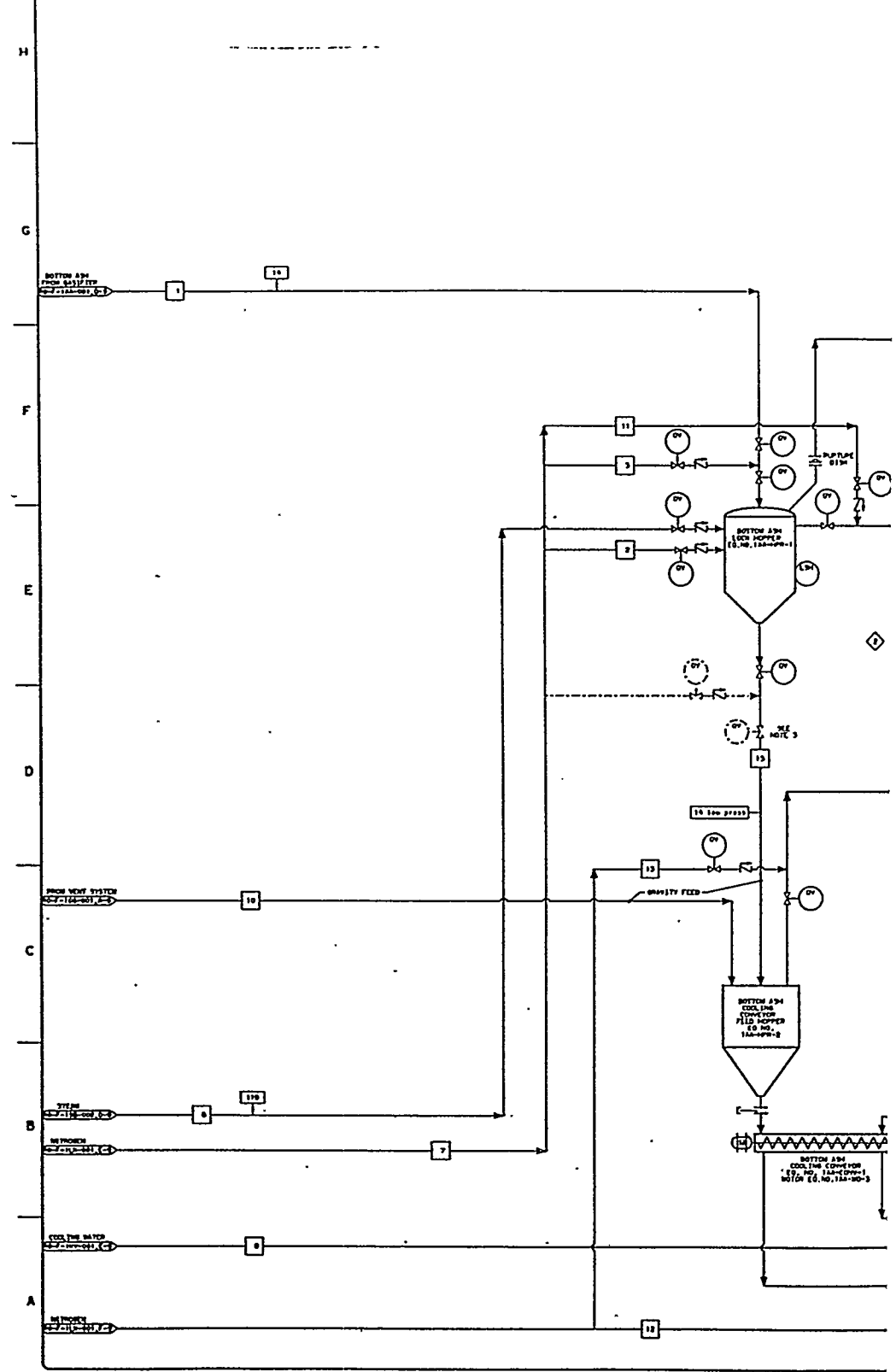
JACOBS-SIMINE DRAWING NUMBER
 10025706-00-F-100-004

6			7			8			9			10		
STEAM			NITROGEN			WATER			WATER					
PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	GPM	PSIG	Deg.F	GPM	PSIG	Deg.F	PPH	PSIG	Deg.F
HOLD	374	260	HOLD	374	465									
/SEE MASS BALANCE/			/SEE PDD/			HOLD			HOLD					
/SEE MASS BALANCE/			/SEE PDD/			0								

15			16			17			18			19			20		
VENT			SAFETY VENT			ASH											
PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	
10	750	HOLD	420	750	HOLD	420	750	1000	10	750							
/SEE MASS BALANCE/			/SEE MASS BALANCE/			/SEE MASS BALANCE/			/SEE MASS BALANCE/			/SEE MASS BALANCE/			/SEE MASS BALANCE/		
/SEE MASS BALANCE/			/SEE MASS BALANCE/			/SEE MASS BALANCE/			/SEE MASS BALANCE/			/SEE MASS BALANCE/			/SEE MASS BALANCE/		

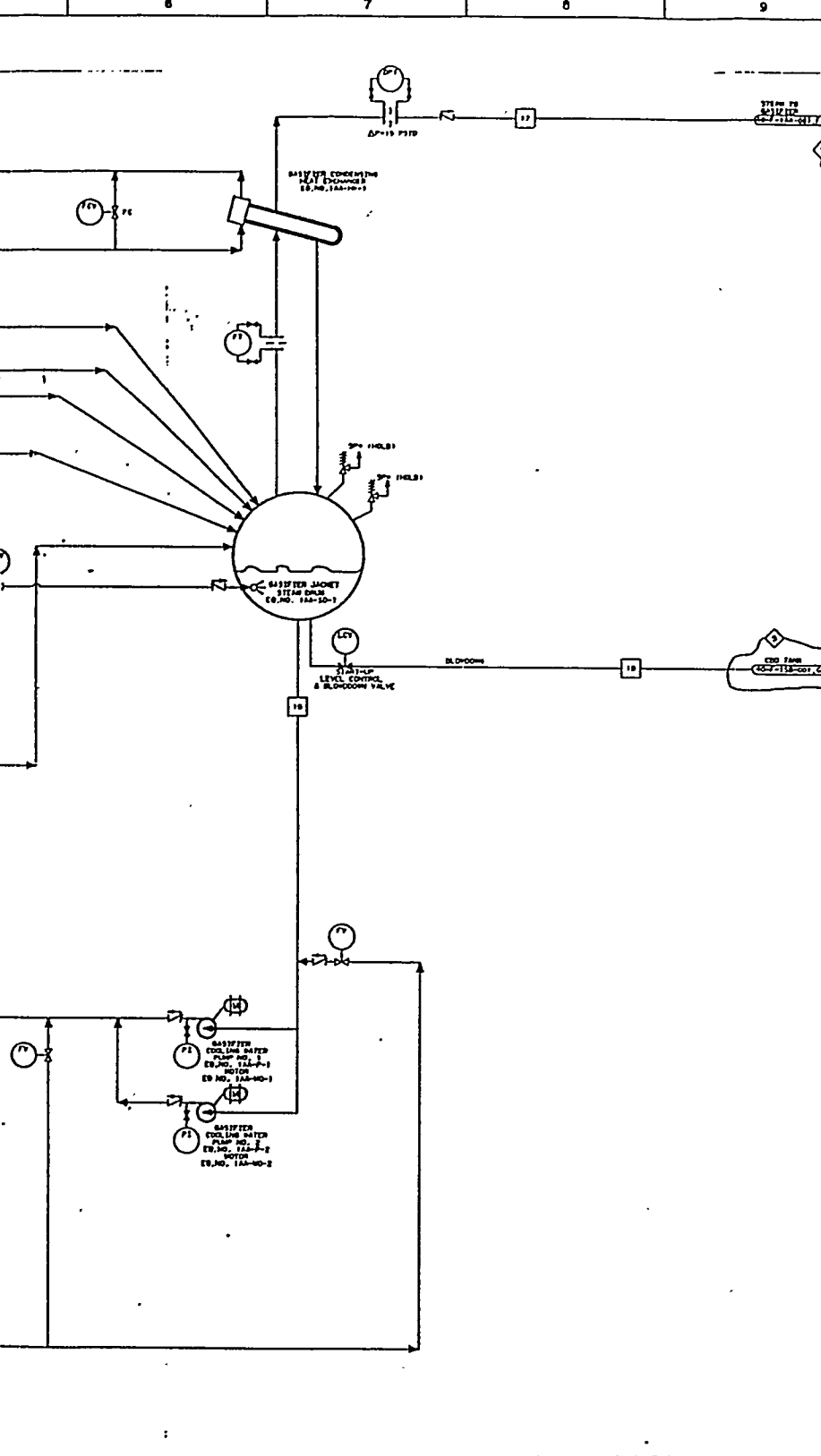
343

1003700-400-0-00000-000-00001 (Rev. 11/77)
 1003700-400-0-00000-000-00001 (Rev. 11/77)



LINE NUMBER	11			12			13			14		
DESCRIPTION:	ASH			NITROGEN			NITROGEN					
UNITS	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F			
MAXIMUM DESIGN	1000	420	750		374	465		374	465			
MAXIMUM OPERATING	1900	420	750									
NORMAL OPERATING	{SEE MASS BALANCE}			SEE PDD			SEE PDD					
MINIMUM OPERATING	{SEE MASS BALANCE}			SEE PDD			SEE PDD					
REVISION DATE												

LINE NUMBER	11			12			13			14		
DESCRIPTION:	NITROGEN			NITROGEN			NITROGEN			VENT		
UNITS	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F
MAXIMUM DESIGN	HOLD	374	465	10	100	100	HOLD	10	100	HOLD	10	750
MAXIMUM OPERATING												
NORMAL OPERATING	SEE PDD			SEE PDD			SEE PDD			HOLD	2	HOLD
MINIMUM OPERATING	SEE PDD			SEE PDD			SEE PDD			HOLD	2	INFD
REVISION DATE												



NOTES

1. NORMAL OPERATIONS IN THE OPERATING REGION CONDITIONS SHALL BE MAINTAINED TO PREVENT OVERHEATING OF THE GASIFIER. OPERATING REGION SHALL BE MAINTAINED TO PREVENT OVERHEATING OF THE GASIFIER.
2. SYSTEM PARAMETERS IDENTIFIED BY THIS DRAWING SHALL BE MAINTAINED TO PREVENT OVERHEATING OF THE GASIFIER.
3. LOCATE IN ONE AREA OF THE GASIFIER OPERATING REGION, AND MAINTAIN PRESSURE RELIEF FOR EACH COOLING LOOP AT A SINGLE LOCATION.

5	REVISED OFFLINE	REVISED OFFLINE
4	REVISED OFFLINE	REVISED OFFLINE
3	REVISED OFFLINE	REVISED OFFLINE
2	REVISED OFFLINE	REVISED OFFLINE
1	REVISED OFFLINE	REVISED OFFLINE
0	REVISED OFFLINE	REVISED OFFLINE
A	REVISED OFFLINE	REVISED OFFLINE
B	REVISED OFFLINE	REVISED OFFLINE
C	REVISED OFFLINE	REVISED OFFLINE
D	REVISED OFFLINE	REVISED OFFLINE
E	REVISED OFFLINE	REVISED OFFLINE
F	REVISED OFFLINE	REVISED OFFLINE
G	REVISED OFFLINE	REVISED OFFLINE
H	REVISED OFFLINE	REVISED OFFLINE

SEAL

SIGNATURE

DATE

DR. J. PIERCE DATE 09-15-94
 DR. B. D. STOKES FILE # 1000
 DR. H. B. STOKES JOB NO. 100007
 C&M FILE NO. 1A2-50-1 12470911A07, 007-1

JE JACOBS-SIMINE ENGINEERING
 a division of Jacobs Engineering Group Inc.

GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC20202

DRAWING TITLE

FLOW DIAGRAM
GASIFIER
COOLING WATER

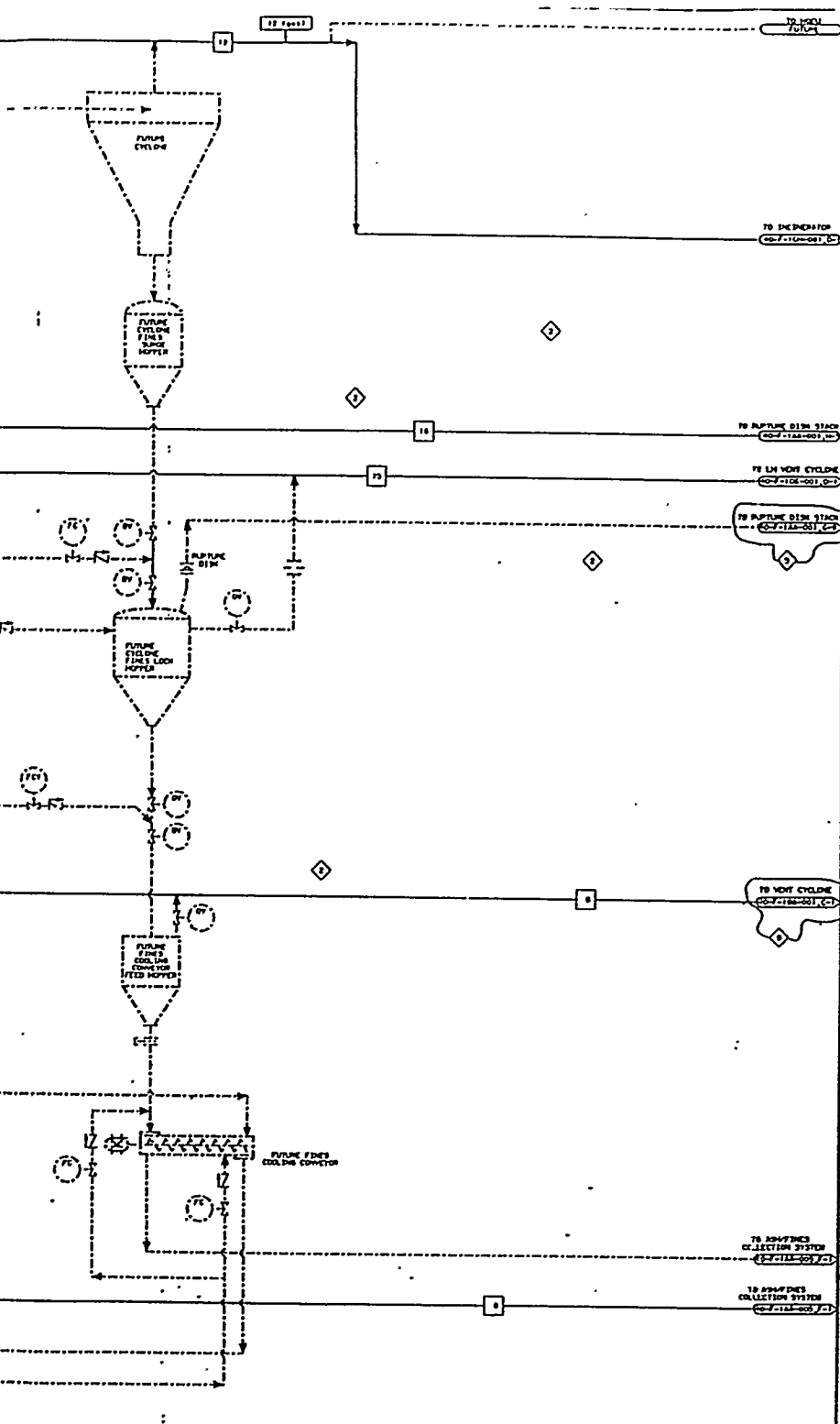
CLIENT DRAWING NUMBER

JACOBS-SIMINE DRAWING NUMBER
124709-40-F-1A2-003

6		7			8			9			10					
STEAM / C.W. FROM PYROLYZER		STEAM / C.W. FROM UPPER JACKET			STEAM/CW FROM LOWER JACKET			SHROUD COOLING WATER			UPPER JACKET COOLING WATER					
PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	CPM	PSIG	Deg.F	CPM	PSIG	Deg.F
RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY
RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY
RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY
RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY	RILEY

16		17			18		
COOLING WATER FROM DRUM		STEAM TO GASIFIER			BLOWDOWN		
PSIG	Deg.F	CPM	PSIG	Deg.F	PPH	PSIG	Deg.F
HOLD	HOLD	RILEY	RILEY	RILEY	HOLD	RILEY	RILEY
HOLD	HOLD	RILEY	RILEY	RILEY	1000	RILEY	RILEY
HOLD	HOLD	RILEY	RILEY	RILEY	500	RILEY	RILEY

342



NOTES

- STEAM TRAPS REMOVED
- VALVES TO FURNACE SYSTEM REMOVED TO NEW SERVICE
- REVISIONS SPECIFIED TO THE OPERATIONAL DESIGN CONDITIONS (AS NOTED) RELATES TO THE FINE COLLECTION SYSTEM
- REVISIONS SPECIFIED TO THE OPERATIONAL DESIGN CONDITIONS (AS NOTED) RELATES TO THE FINE COLLECTION SYSTEM
- REVISIONS SPECIFIED TO THE OPERATIONAL DESIGN CONDITIONS (AS NOTED) RELATES TO THE FINE COLLECTION SYSTEM

5	00	REVISED OFFPAGE
5	01	CONNECTIONS & INSTRUMENT
5	02	ISSUED AS REV. 1
4	00	REVISED PER DEPARTMENT
4	01	2 OF ENERGY CONNECTIONS
4	02	ISSUED FOR DESIGN
3	01	REVISED PER SAFETY SCOPE
3	02	REVISED, ISSUED FOR
3	03	CONNECTIONS
2	00	REVISED FINE SAMPLE
2	01	VALVES, STREAM SYMBOL
2	02	REMOVED STEAM & SERVICE
2	03	WATER TO COAL GAS, ADDED
2	04	RAP FINE LINE, REVISED
1	00	ISSUED FOR DESIGN
1	01	REVISED DATA & NOTES FOR
1	02	FOR FINE OPERATION
1	03	CHANGED DSW NO FROM
1	04	10K2706-40-F-1A-002
1	05	ADDED SECOND CYCLONE
1	06	ISSUED FOR APPROVAL
0	00	CHANGED DRAWING NO. FROM
0	01	10K2706-40-F-1A-002
0	02	ISSUED FOR APPROVAL
0	03	ISSUED FOR APPROVAL
0	04	ONLY
0	05	ONLY
0	06	ISSUED FOR REVIEW
0	07	ISSUED FOR REVIEW
0	08	ISSUED FOR REVIEW
0	09	ISSUED FOR REVIEW
0	10	ISSUED FOR REVIEW
0	11	ISSUED FOR REVIEW
0	12	ISSUED FOR REVIEW
0	13	ISSUED FOR REVIEW
0	14	ISSUED FOR REVIEW
0	15	ISSUED FOR REVIEW
0	16	ISSUED FOR REVIEW
0	17	ISSUED FOR REVIEW
0	18	ISSUED FOR REVIEW
0	19	ISSUED FOR REVIEW
0	20	ISSUED FOR REVIEW

DESCRIPTION

NOTE: CHECK ALL REVISIONS, VERIFY WITH DRAWING NUMBER AND APPROVAL, CHECK WITH FINE LINE AND APPROVAL BEFORE NEXT REVISION.

ISSUE CODE: MATH, I.O., P, CONST'D

DESIGN: MATH, I.O., P, CONST'D

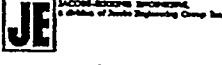
DESIGN: MATH, I.O., P, CONST'D

SEAL

SIGNATURE

DATE

DR. J. PIERCE	DATE	04-20-83
DR. J. PIERCE	FILE	JPH
DR. J. PIERCE	NO.	10K2706
DR. J. PIERCE	JOB NO.	10K2706
DR. J. PIERCE	JOB FILE NO.	10K2706-40-F-1A-002



GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

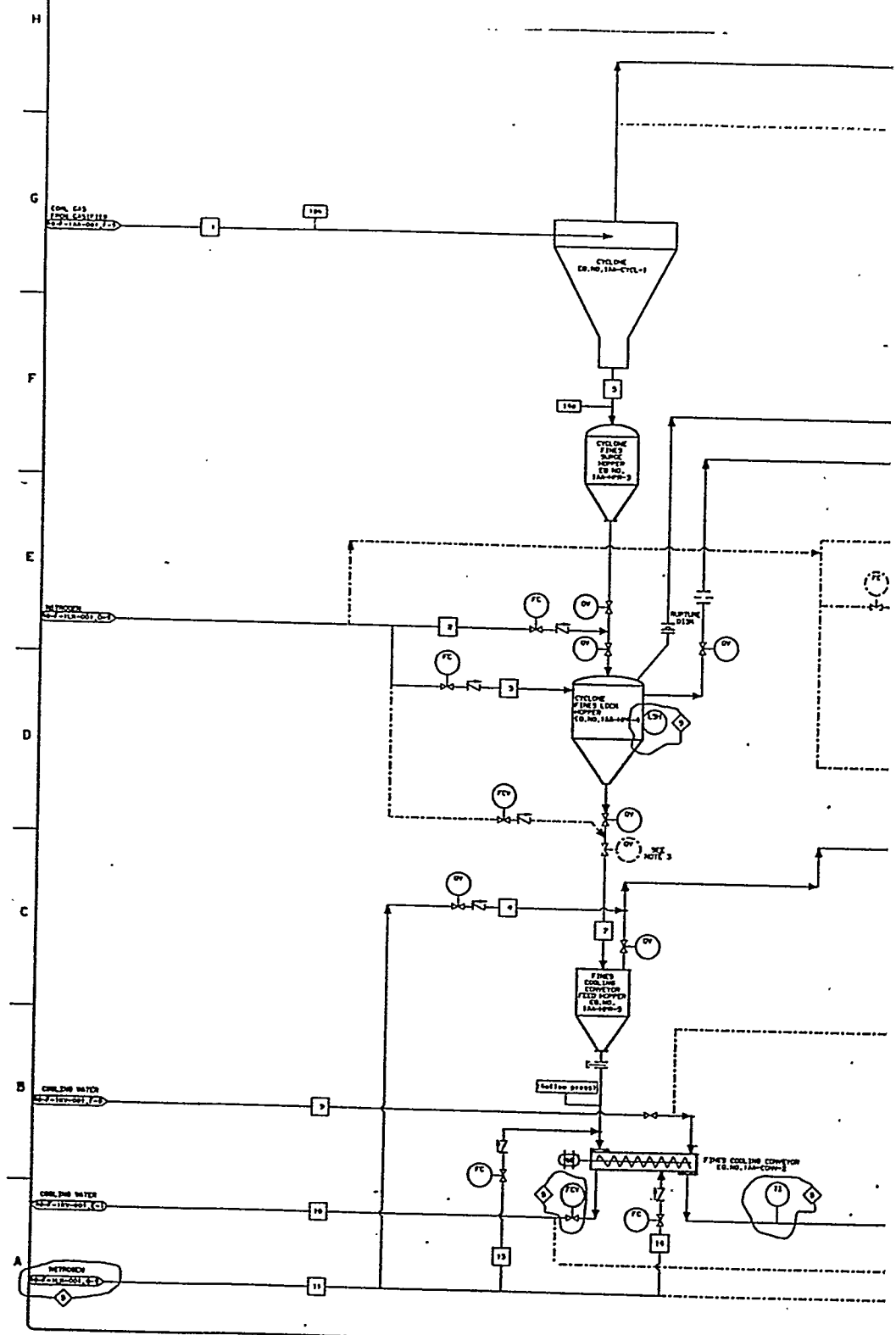
DRAWING TITLE
FLOW DIAGRAM
GASIFIER
GAS CLEAN-UP
SYSTEM

CLIENT DRAWING NUMBER

JACOBS-ENGINEERING GROUP INC.
10K2706-40-F-1A-002

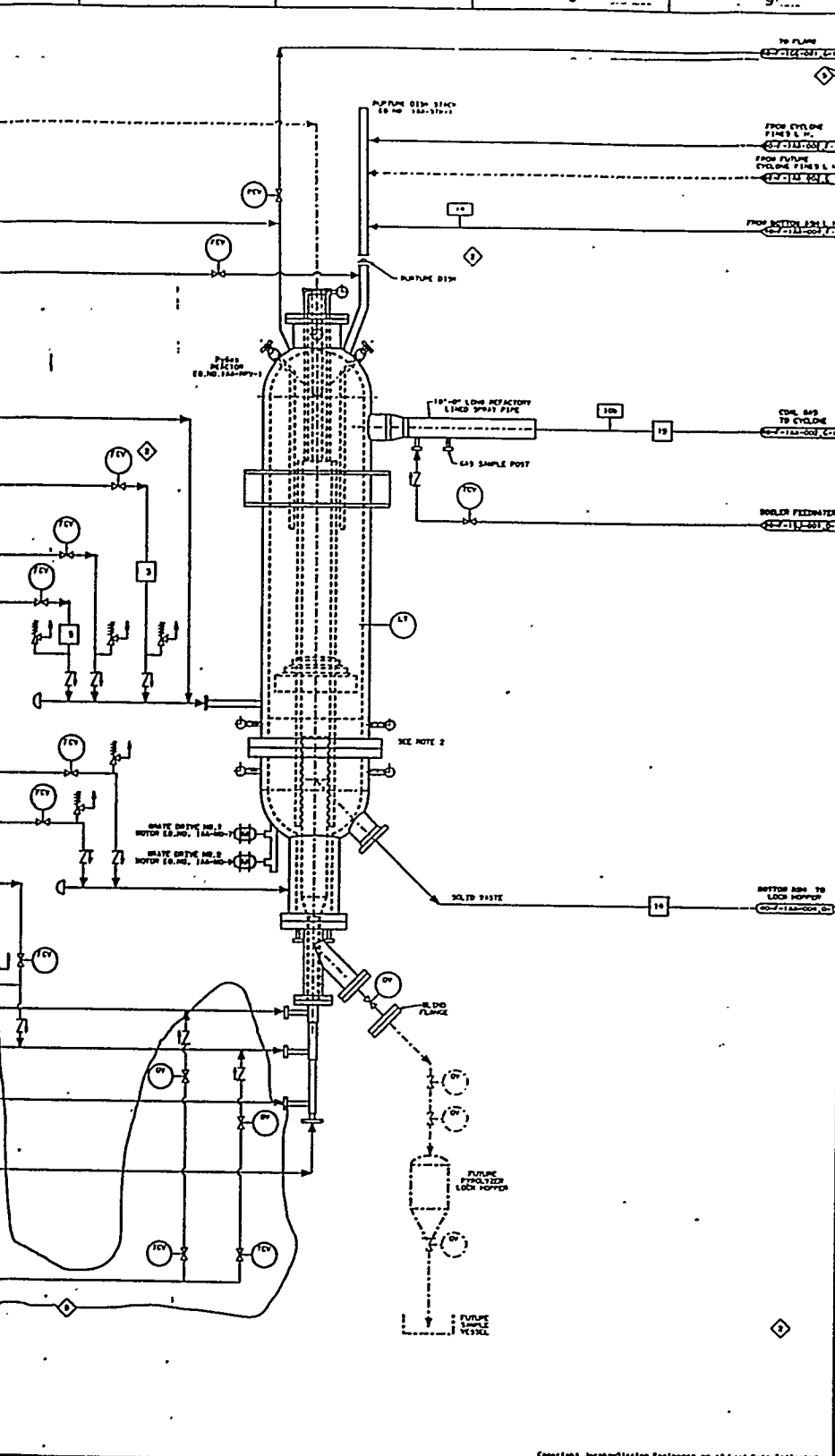
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UNIT	6			7			8			9			10		
	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG
10	1100	HOLD	10	1100			500	2	200						
11	HOLD	HOLD	2	HOLD	1500	1500	1500	1500	1500						
12	HOLD	HOLD	2	HOLD	1500	1500	1500	1500	1500						
13	HOLD	HOLD	2	HOLD	1500	1500	1500	1500	1500						
14	HOLD	HOLD	2	HOLD	1500	1500	1500	1500	1500						
15	HOLD	HOLD	2	HOLD	1500	1500	1500	1500	1500						
16	HOLD	HOLD	2	HOLD	1500	1500	1500	1500	1500						
17	HOLD	HOLD	2	HOLD	1500	1500	1500	1500	1500						
18	HOLD	HOLD	2	HOLD	1500	1500	1500	1500	1500						
19	HOLD	HOLD	2	HOLD	1500	1500	1500	1500	1500						
20	HOLD	HOLD	2	HOLD	1500	1500	1500	1500	1500						



LINE NUMBER	1			2			3			4			5	
DESCRIPTION:	COAL GAS			N2			N2			N2			FINE	
UNITS	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PS
MAXIMUM DESIGN	20,320	420	1100	HOLD	374	465	HOLD	374	465	HOLD	10	100	500	420
MAXIMUM OPERATING	{SEE MASS BALANCE}			{SEE PDB}			{SEE PDB}			HOLD			HOLD	
NORMAL OPERATING	{SEE MASS BALANCE}			{SEE PDB}			{SEE PDB}			HOLD			HOLD	
MINIMUM OPERATING	{SEE MASS BALANCE}			{SEE PDB}			{SEE PDB}			HOLD			HOLD	
REVISION DATE										HOLD			{SEE MASS}	

LINE NUMBER	11			12			13			14			15	
DESCRIPTION:	N2			COAL GAS			N2			N2			LH VC	
UNITS	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSI
MAXIMUM DESIGN	HOLD	10	100	19,970	420	1100	HOLD	10	100	HOLD	10	100	HOLD	420
MAXIMUM OPERATING	HOLD			{SEE MASS BALANCE}			{SEE PDB}			{SEE PDB}			HOLD	
NORMAL OPERATING	HOLD			{SEE MASS BALANCE}			{SEE PDB}			{SEE PDB}			HOLD	
MINIMUM OPERATING	HOLD			{SEE MASS BALANCE}			{SEE PDB}			{SEE PDB}			HOLD	
REVISION DATE				{SEE MASS BALANCE}			{SEE PDB}			{SEE PDB}			HOLD	



NOTES

1. SPECIFIC NUMBERS REFERRED TO IN THIS DRAWING ARE TO BE USED IN ALL REVISED DRAWINGS.
2. FOR DESIGN OF THE SYSTEM SEE SHEET 18007-100-001-001.
3. NORMAL OPERATION TO BE OPERATING AT 200 PSIG (200 LBS PER SQ IN) AND 600 DEG F (320 DEG C) WITH 100% HUMIDITY. PRESSURE GAUGES TO BE INSTALLED AT ALL POINTS OF OPERATION.

5	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
4	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
3	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
2	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
1	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
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A	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
B	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
C	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
D	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
E	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
F	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW
G	REVISED PER 18007-100-001-001	ISSUED FOR REVIEW

SCALE

SIGNATURE _____

DATE _____

DR. J. J. PIERCE DATE 04-10-63

PROV. D. W. QUINN JACQUES

DR. J. W. STUBBS JACQUES

DR. H. S. STUBBS JACQUES

DR. H. S. STUBBS JACQUES

JE JACQUES-STARVO ENGINEERS
A Division of Jacobs Engineering Group Inc.

GPIF PROJECT
U.S. DEPT. OF ENERGY
DE-AC21-92MC28202

DRAWING TITLE
FLOW DIAGRAM
GASIFIER
SYSTEM

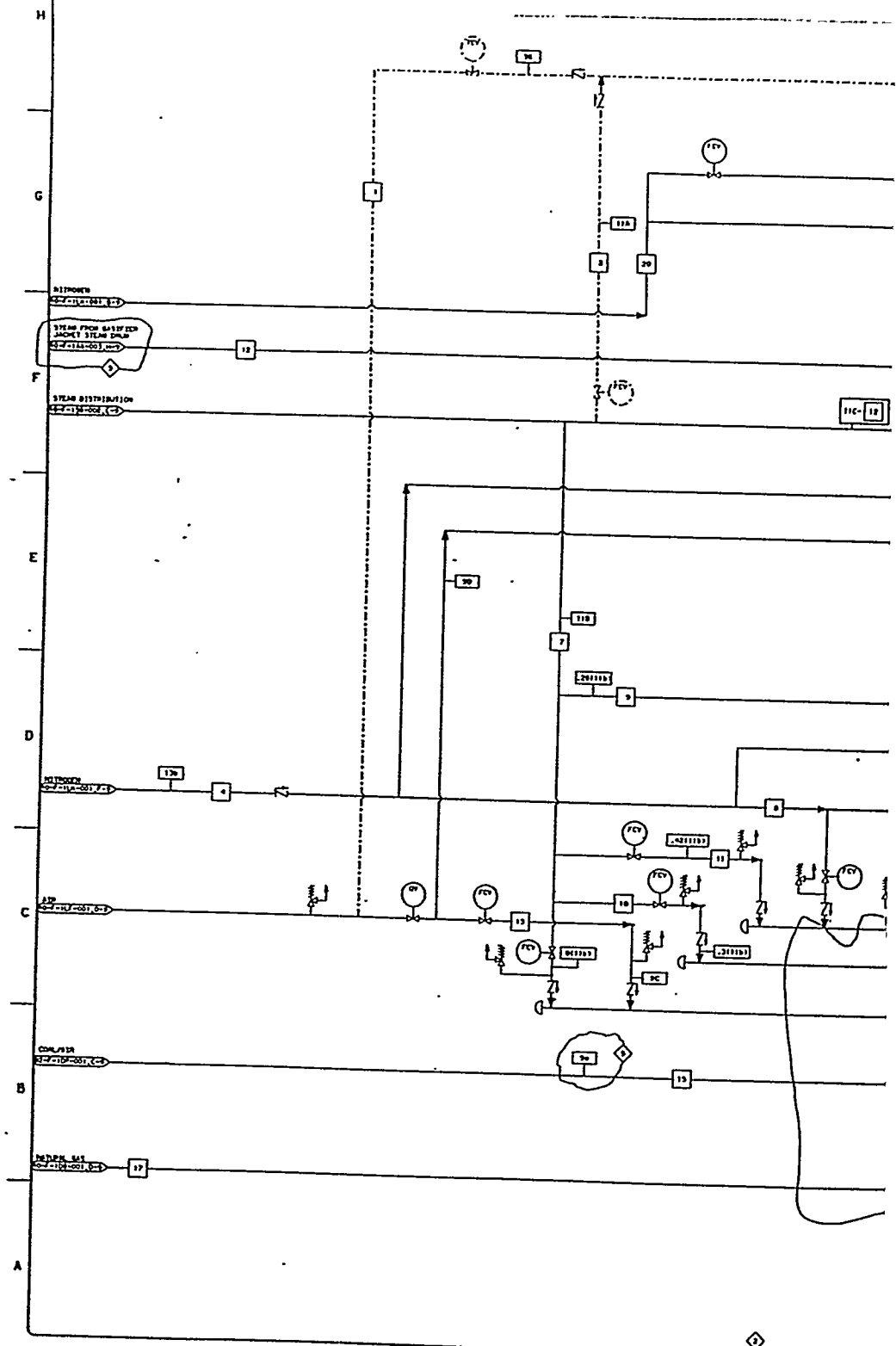
CLIENT DRAWING NUMBER
JACQUES-STARVO DRAWING NUMBER
18025706-40-F-18A-001

5			6			7			8			9			10		
GRATE			STEAM TO PYROLYZER			N2 TO PYROLYZER			SWEETING STEAM TO COKE			STEAM TO PYROLYZER COKE					
ID	DEG.F		PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F
14	410				700	374	600					700	374	600	700	374	600
BALANCE)			(SEE MASS BALANCE)			HOLD			(SEE MASS BALANCE)			(SEE MASS BALANCE)					
BALANCE)			(SEE MASS BALANCE)						(SEE MASS BALANCE)			(SEE MASS BALANCE)					

11			16			17			18			19			20		
AIR			NATURAL GAS			COAL GAS			COAL GAS			COAL GAS					
ID	DEG.F		PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F	PPH	PSIG	DEG.F
14	150				HOLD	60	AMB					20320	420	1100	HOLD	420	100
14	150				HOLD	RILEY	AMB										
BALANCE)			HOLD			RILEY			AMB			(SEE MASS BALANCE)			HOLD		
BALANCE)			HOLD			RILEY			AMB			(SEE MASS BALANCE)			HOLD		

340

11/11/11
 11/11/11
 11/11/11

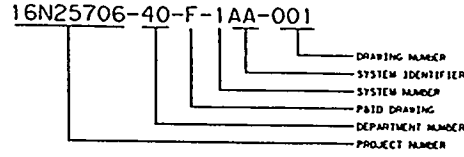


LINE NUMBER	1			2			3			4				
DESCRIPTION:	AIR TO GASIFIER TOP			STEAM TO GASIFIER TOP			STEAM TO GRATE			H ₂ O TO GASIFIER			AIR TO	
UNITS	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	P1
MAXIMUM DESIGN	FUTURE	374	410	FUTURE	374	600	FUTURE	374	600				7000	3
MAXIMUM OPERATING	FUTURE	FUTURE	FUTURE	FUTURE	FUTURE	FUTURE	(SEE MASS BALANCE)			0	HOLD		(SEE MASS BALANCE)	
NORMAL OPERATING	FUTURE	FUTURE	FUTURE	FUTURE	FUTURE	FUTURE	(SEE MASS BALANCE)			0	HOLD		(SEE MASS BALANCE)	
MINIMUM OPERATING	FUTURE	FUTURE	FUTURE	FUTURE	FUTURE	FUTURE	(SEE MASS BALANCE)			0	HOLD		(SEE MASS BALANCE)	
REVISION DATE							(SEE MASS BALANCE)			0	HOLD		(SEE MASS BALANCE)	

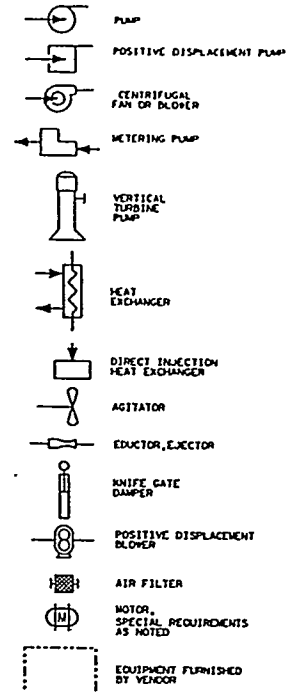
LINE NUMBER	11			12			13			14				
DESCRIPTION:	STEAM TO PYROLYZER			STEAM FROM GASIFIER STEAM DRUM			AIR TO PYROLYZER			GRATE ASH			COAL	
UNITS	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	PSIG	Deg.F	PPH	P1
MAXIMUM DESIGN	700	374	600	1000	HOLD	HOLD	4500	374	410	1000	420	700	8000	4
MAXIMUM OPERATING	(SEE MASS BALANCE)			?	HOLD	HOLD	(SEE MASS BALANCE)			(SEE MASS BALANCE)			8000	3
NORMAL OPERATING	(SEE MASS BALANCE)			?	HOLD	HOLD	(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)	
MINIMUM OPERATING	(SEE MASS BALANCE)			?	HOLD	HOLD	(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)	
REVISION DATE							(SEE MASS BALANCE)			(SEE MASS BALANCE)			(SEE MASS BALANCE)	

FLOW DIAG

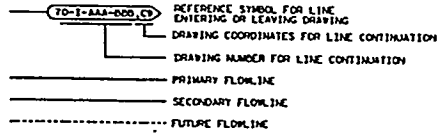
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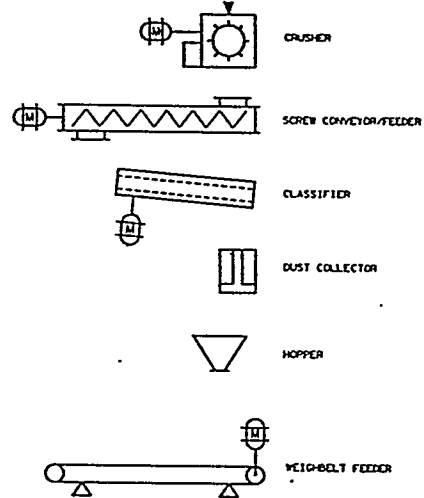
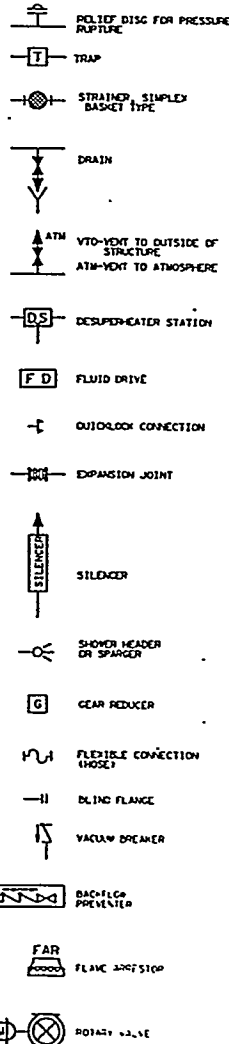
EQUIPMENT SYMBOLS



FLOW LEGEND



MISCELLANEOUS PIPING/EQUIPMENT



F
LE
LI
FIN/

SEE PK FOR FIN

16N25706-40-F-1AA-001

16N25706-40-F-1AA-001

H
G
F
E
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C
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