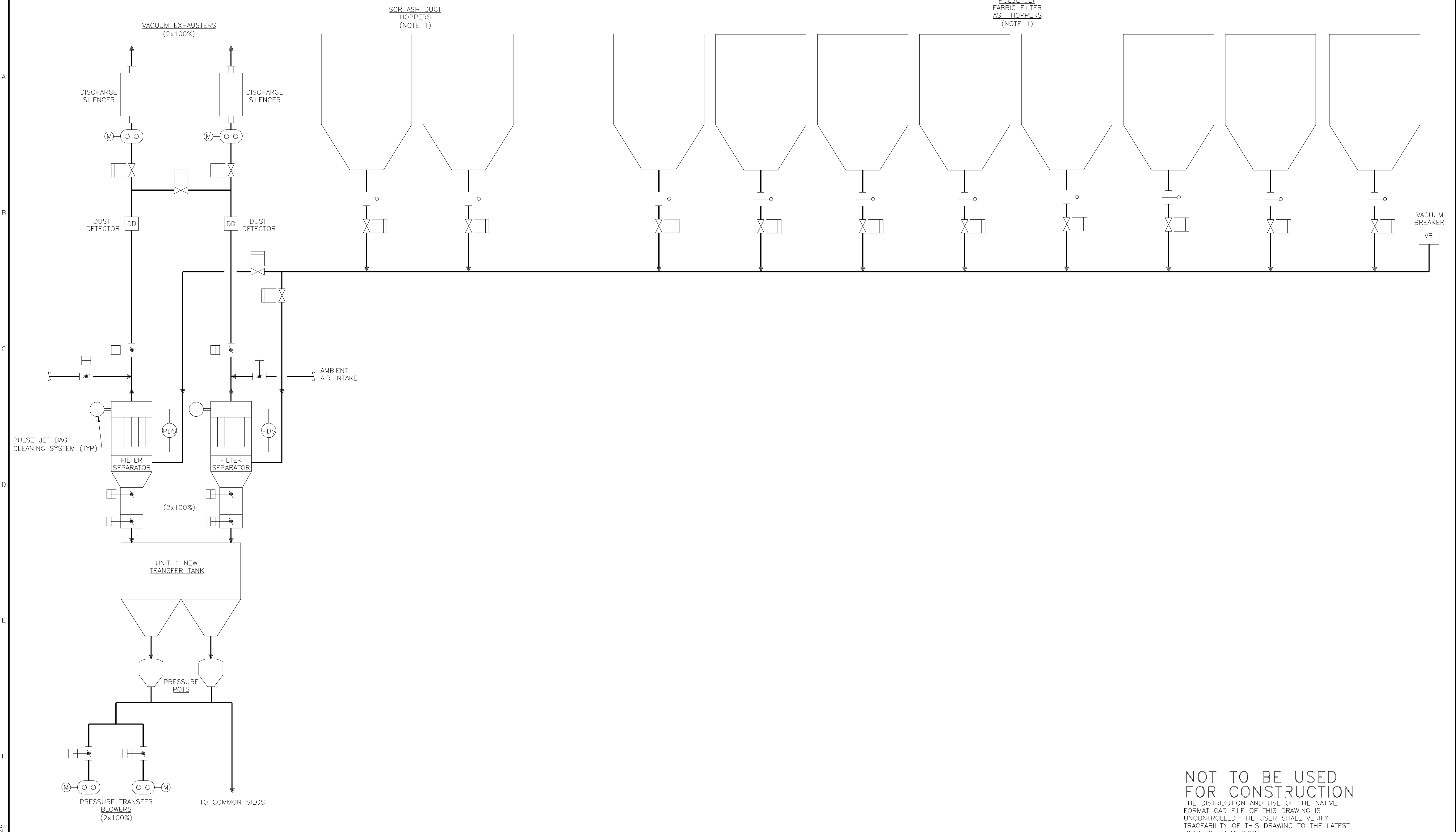


- NOTES:
1. NUMBER OF HOPPERS TO BE CONFIRMED DURING DETAILED DESIGN.
 2. SIZE AND QUANTITY OF ADDITIONAL EQUIPMENT REQUIRED TO BE DETERMINED DURING DETAILED DESIGN.



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 24/06/11 10:59:45
 1

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
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A	16/MAR/11	ISSUED FOR IN HOUSE REVIEW	PRP	SAT	MRW		

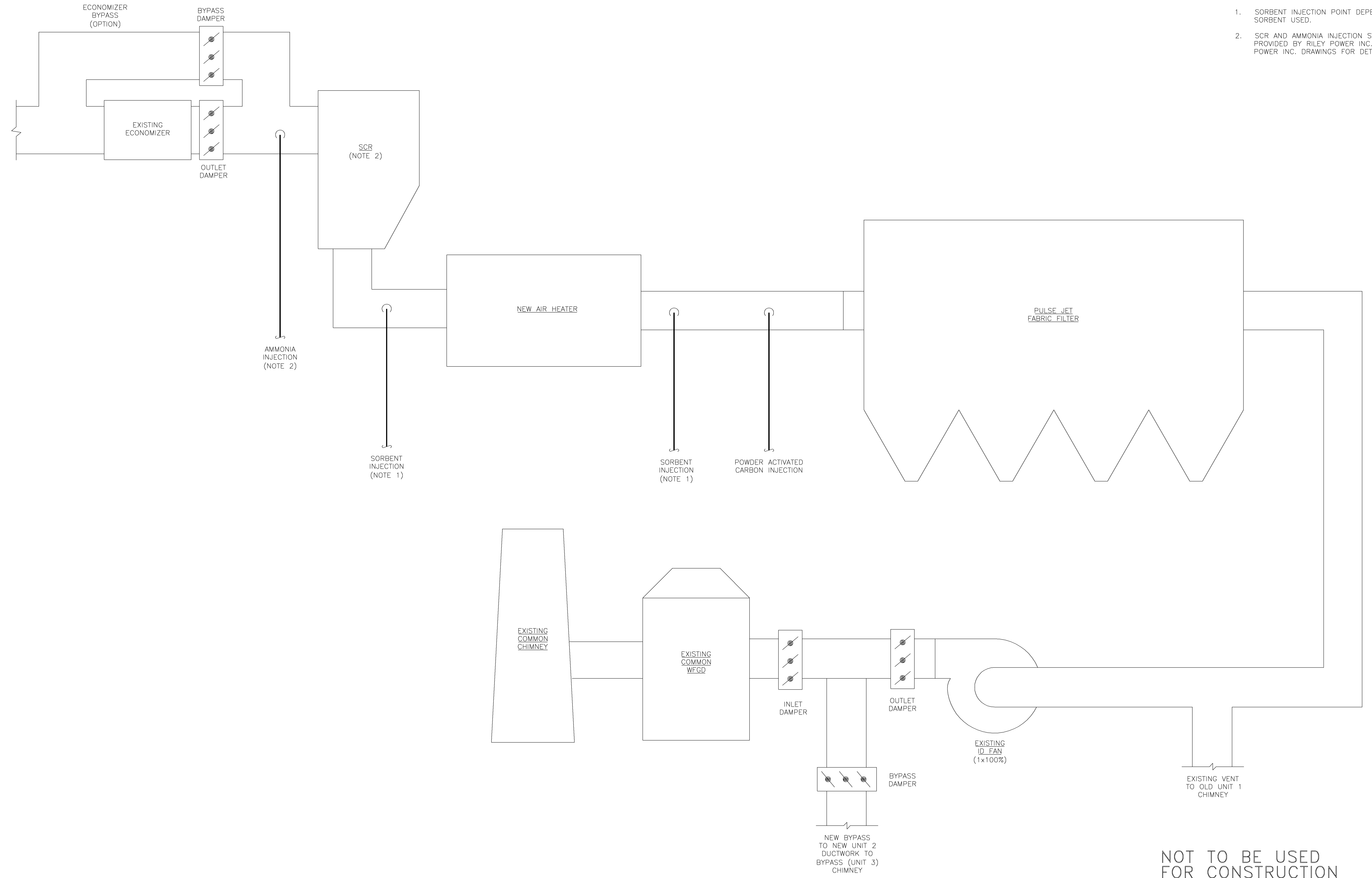
BLACK & VEATCH CORPORATION		
ENGINEER	DRAWN	PRP
CHECKED	DATE	

LG&E/KU – E.W. BROWN STATION
 PHASE II: AIR QUALITY CONTROL STUDY

UNIT 1 PROCESS FLOW DIAGRAM
 FLY ASH HANDLING

PROJECT	DRAWING NUMBER	REV
168908-B1ASB-M2022		B
CODE		
AREA		

- NOTES:**
1. SORBENT INJECTION POINT DEPENDENT ON SORBENT USED.
 2. SCR AND AMMONIA INJECTION SYSTEMS ARE PROVIDED BY RILEY POWER INC. REFER TO RILEY POWER INC. DRAWINGS FOR DETAILS.



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B	6/APR/11	ISSUED FOR CLIENT REVIEW	PMW	SAT	MRW		
A	16/MAR/11	ISSUED FOR IN HOUSE REVIEW	PRP	SAT	MRW		

BLACK & VEATCH CORPORATION

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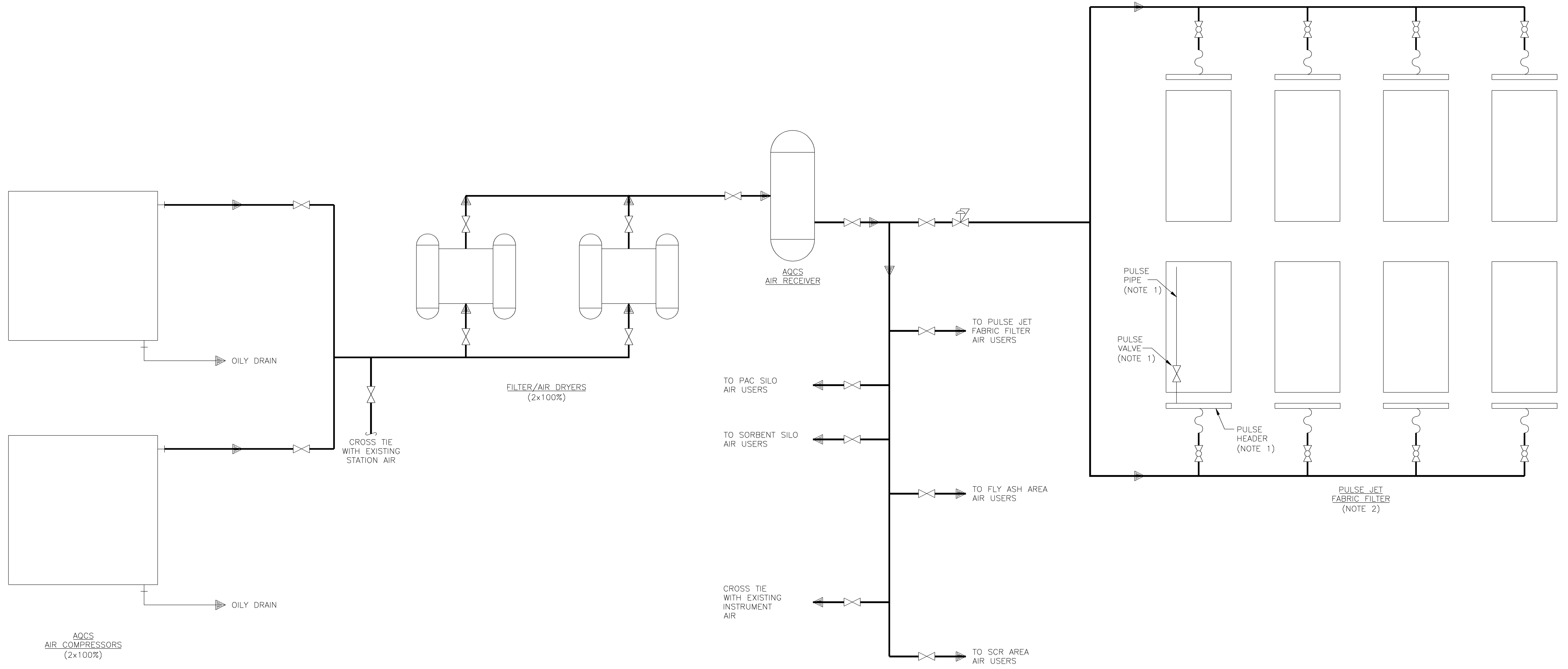
DRAWN: PRP

LG&E/KU – E.W. BROWN STATION
PHASE II: AIR QUALITY CONTROL STUDY

UNIT 1 PROCESS FLOW DIAGRAM
INDUCED DRAFT

PROJECT	DRAWING NUMBER	REV
168908-B1CCE-M2145		B
CODE	AREA	

- NOTES:**
1. EACH COMPARTMENT WILL HAVE MORE THAN ONE PULSE HEADER AND MULTIPLE PULSE VALVES AND PULSE PIPES. ONE SET IS SHOWN FOR CLARITY.
 2. NUMBER OF COMPARTMENTS TO BE CONFIRMED DURING DETAILED DESIGN.



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NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
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A	16/MAR/11	ISSUED FOR IN HOUSE REVIEW	PRR	SAT	MRW		

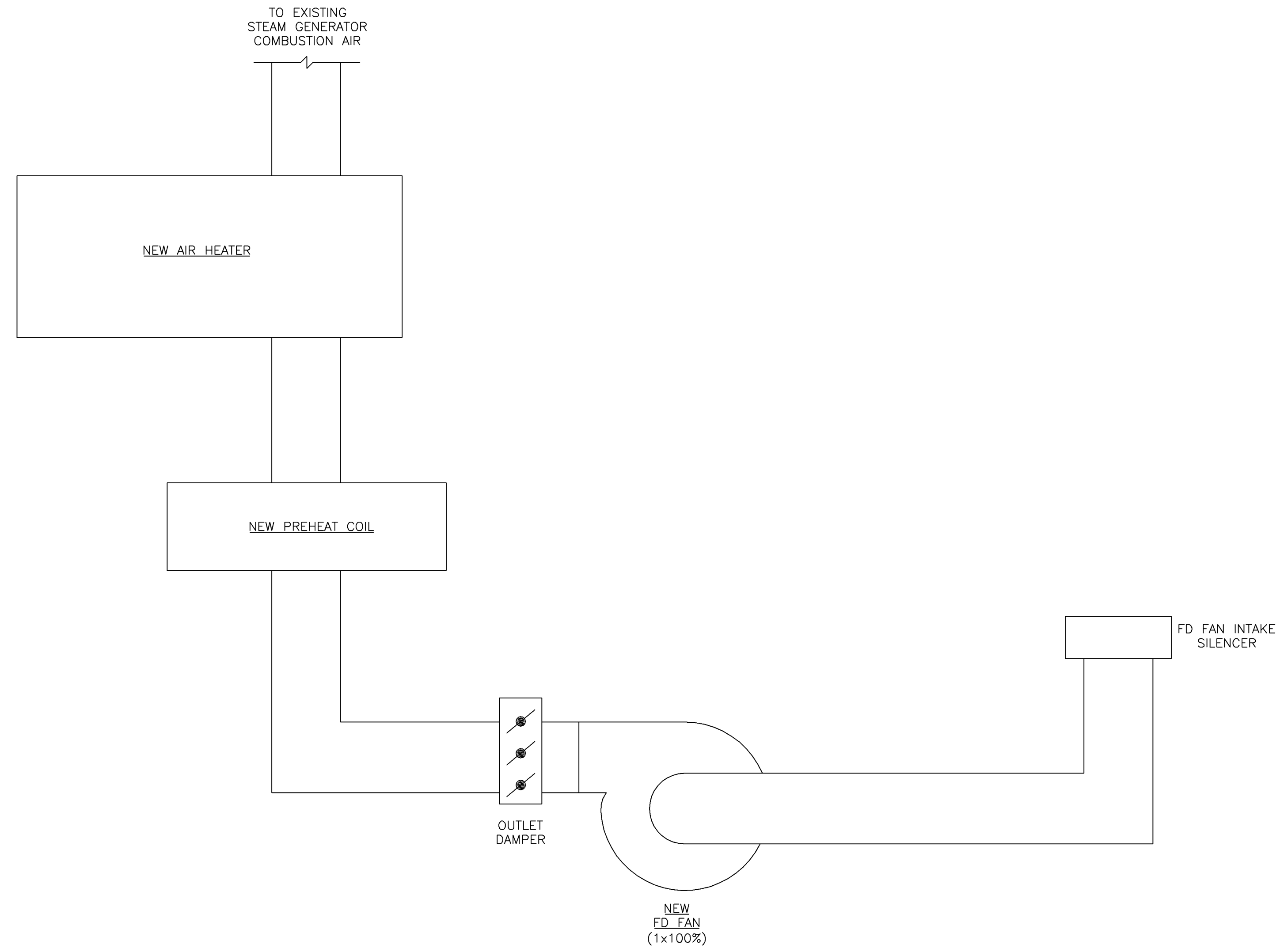
BLACK & VEATCH CORPORATION

CHECKED: _____ DATE: _____
 DRAWN: PRP

LG&E/KU - E.W. BROWN STATION
PHASE II: AIR QUALITY CONTROL STUDY

UNIT 1 PROCESS FLOW DIAGRAM
 AQCS COMPRESSED AIR

PROJECT	DRAWING NUMBER	REV
168908-B1CAB-M2182		B
CODE	AREA	



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NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
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A	16/MAR/11	ISSUED FOR IN HOUSE REVIEW	PRP	SAT	MRW		

BLACK & VEATCH CORPORATION

CHECKED: _____ DATE: _____

DRAWN: PRP

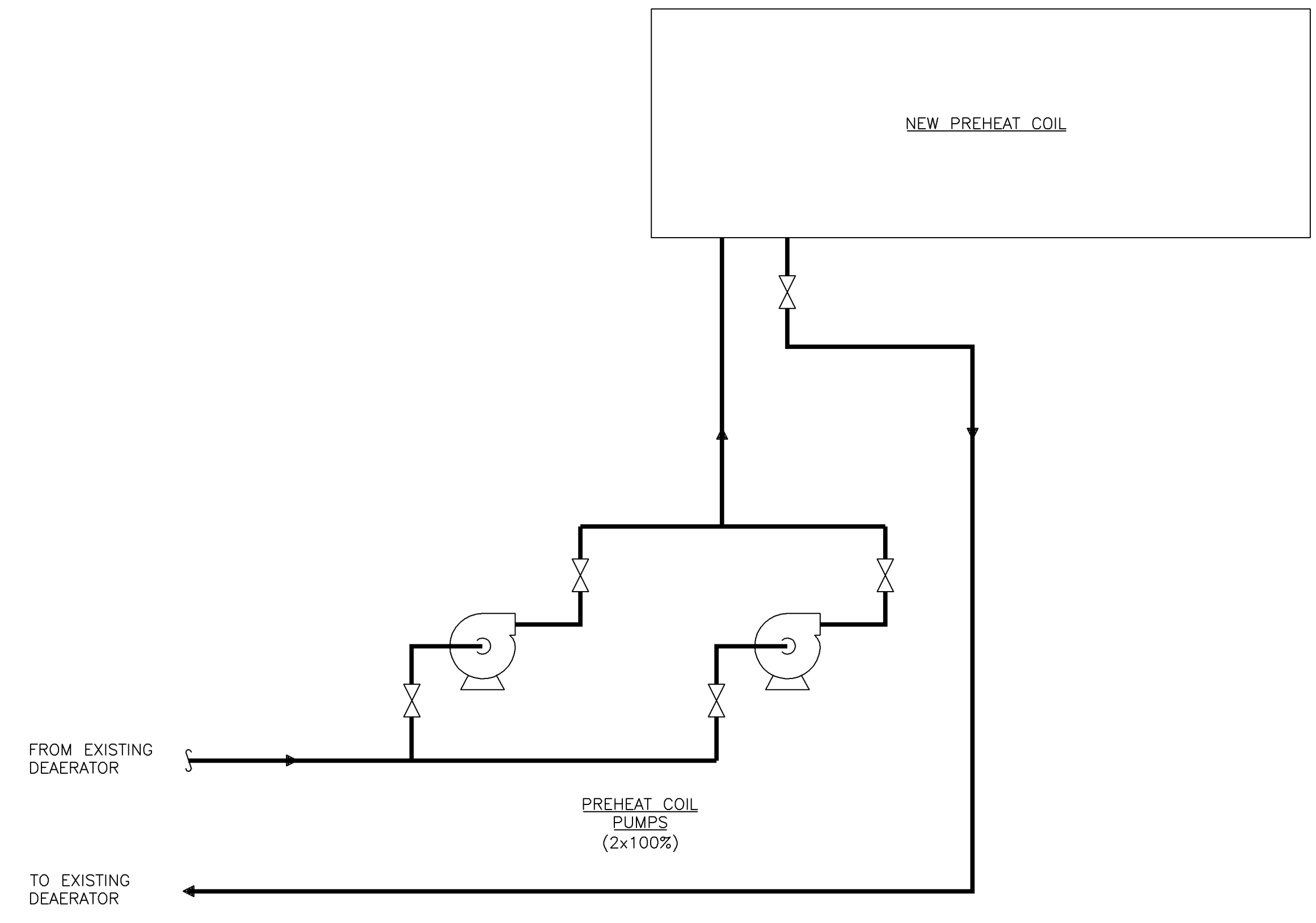
LG&E/KU – E.W. BROWN STATION
PHASE II: AIR QUALITY CONTROL STUDY

UNIT 1 PROCESS FLOW DIAGRAM
 COMBUSTION AIR

PROJECT	DRAWING NUMBER	REV
168908-B1SGB-M2582		B
CODE	AREA	

1 2 3 4 5 6 7 8 9 10

A
B
C
D
E
F



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NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
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A	16/MAR/11	ISSUED FOR IN HOUSE REVIEW	PRP	SAT		MRW	

BLACK & VEATCH CORPORATION

CHECKED: _____ DATE: _____

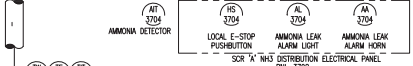
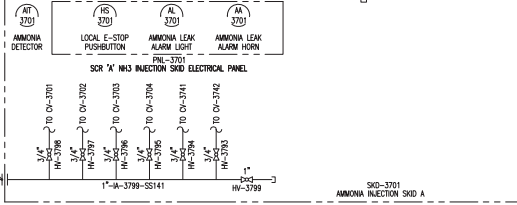
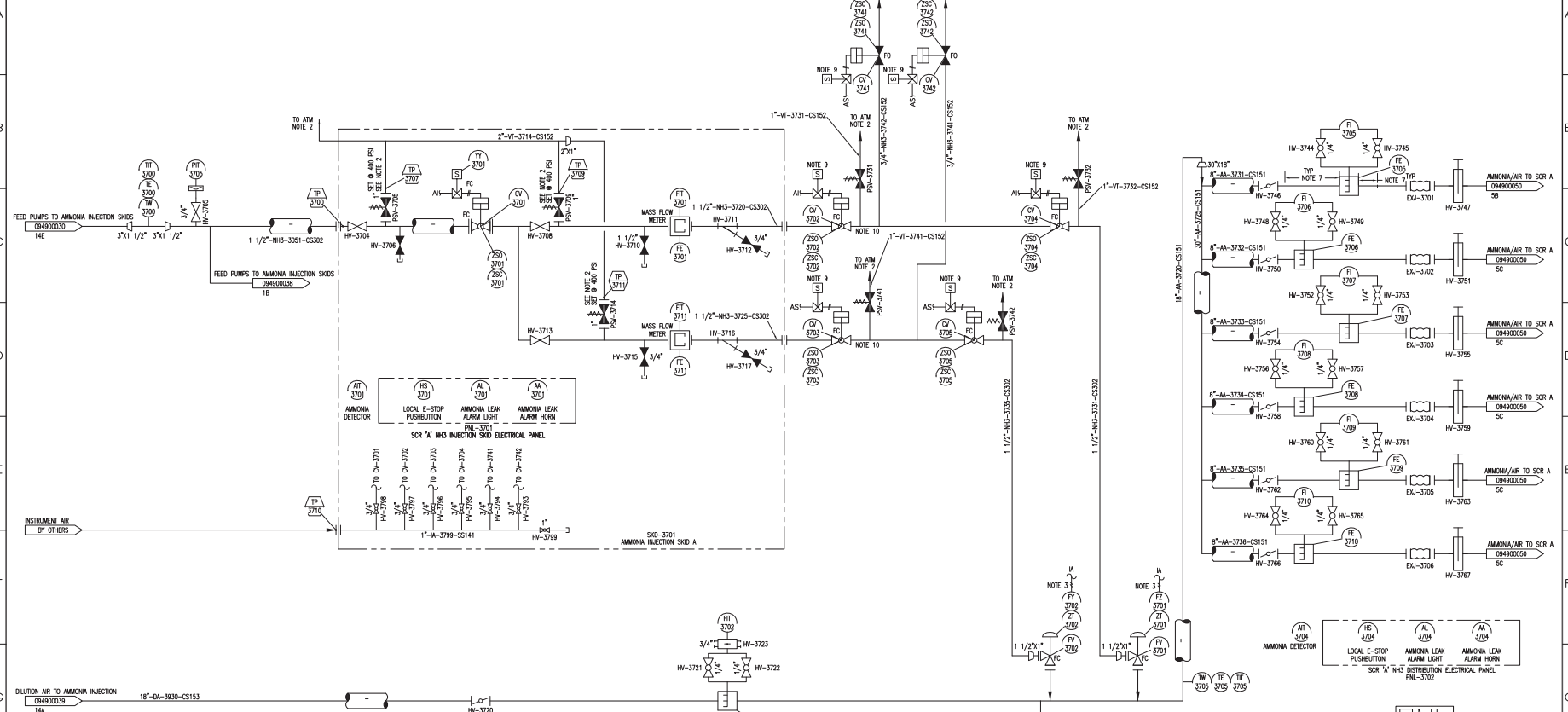
DRAWN: PRP

LG&E/KU – E.W. BROWN STATION
 PHASE II: AIR QUALITY CONTROL STUDY

UNIT 1 PROCESS FLOW DIAGRAM
 AIR PREHEAT

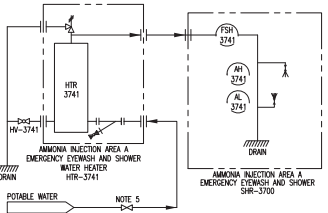
PROJECT	DRAWING NUMBER	REV
168908-B1SGC-M2583		B
CODE	AREA	

DWG NO: 502651-094900037



PNL-3703
NH3 INJECTION/DILUTION AIR A REACTOR TES

- NOTE:
1. IF AMMONIA INJECTION SKIDS ARE IN CLOSE PROXIMITY TO EACH OTHER, ONLY ONE EMERGENCY SHOWER SKID IS REQUIRED.
 2. NH3 VENTS ARE FIELD INSTALLED BY CONTRACTOR IN ACCORDANCE TO CGA CODE G-2 Sec 19.4 AND ANSI M1.1 Sec 4.3. LOCATE ALL VENTS 10' ABOVE NEAREST WORKING PLATFORM WITHIN 40'.
 3. INSTRUMENT AIR PROVIDED VIA SKID CONNECTION TP-3710.
 4. EACH PNEUMATIC VALVE IS EQUIPPED WITH A FILTER REGULATOR (NOT SHOWN FOR CLARITY).
 5. POTABLE WATER ISOLATION VALVE IS BY OTHERS.
 6. ALL PIPE SIZES AND NUMBER OF LANCES PRELIMINARY.
 7. ALLOW A QUARTER TURN FROM STRAIGHT PIPE RUN AND 1" DIAMETER STRAIGHT PIPE RUN CONSTRUCTION FROM FLOW ELONG.
 8. ALL INTERCONNECTING AMMONIA PIPING BY OTHERS.
 9. VALVE SOLENOID SHALL BE WIRED DIRECTLY TO MFT RELAY CONTACTS.
 10. MINIMIZE DISTANCE FROM THIS VALVE TO CORRESPONDING INJECTION VALVE.



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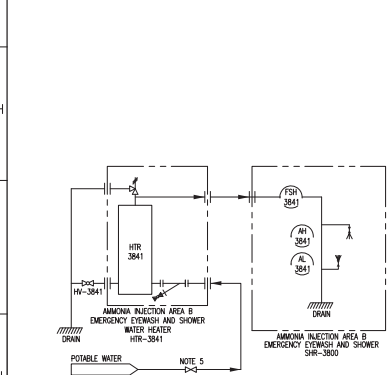
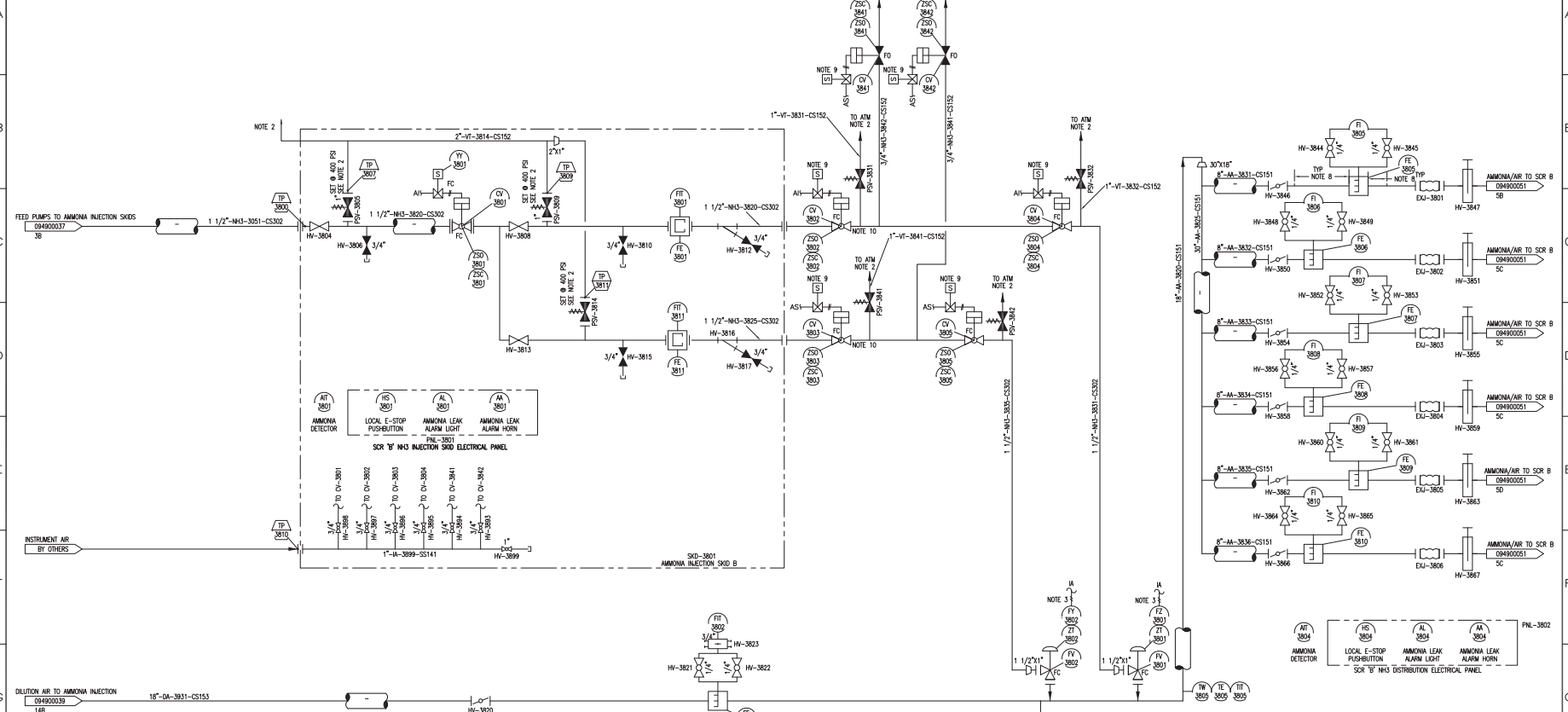
REVISION	NO.	BY	CHK	DATE	APPRO.	DATE

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RILEY POWER INC.
 PIPING AND INSTRUMENTATION DIAGRAMS
 AMMONIA INJECTION SYSTEM A
 LG&E/KU
 BROWN STATION - UNITS 1 & 2
 HERRINGTON LAKE, KENTUCKY
 DATE: 02/17/11
 SCALE: AS SHOWN
 DWG NO: 502651-094900037-PO

DWG NO: 502651-094900038



AMMONIA DETECTOR
LOCAL E-STOP PUSHBUTTON
AMMONIA LEAK ALARM LIGHT
AMMONIA LEAK ALARM HORN
PNL-3801
SCR 'B' NH3 INJECTION SKID ELECTRICAL PANEL

AMMONIA DETECTOR
LOCAL E-STOP PUSHBUTTON
AMMONIA LEAK ALARM LIGHT
AMMONIA LEAK ALARM HORN
PNL-3802
SCR 'B' NH3 DISTRIBUTION ELECTRICAL PANEL

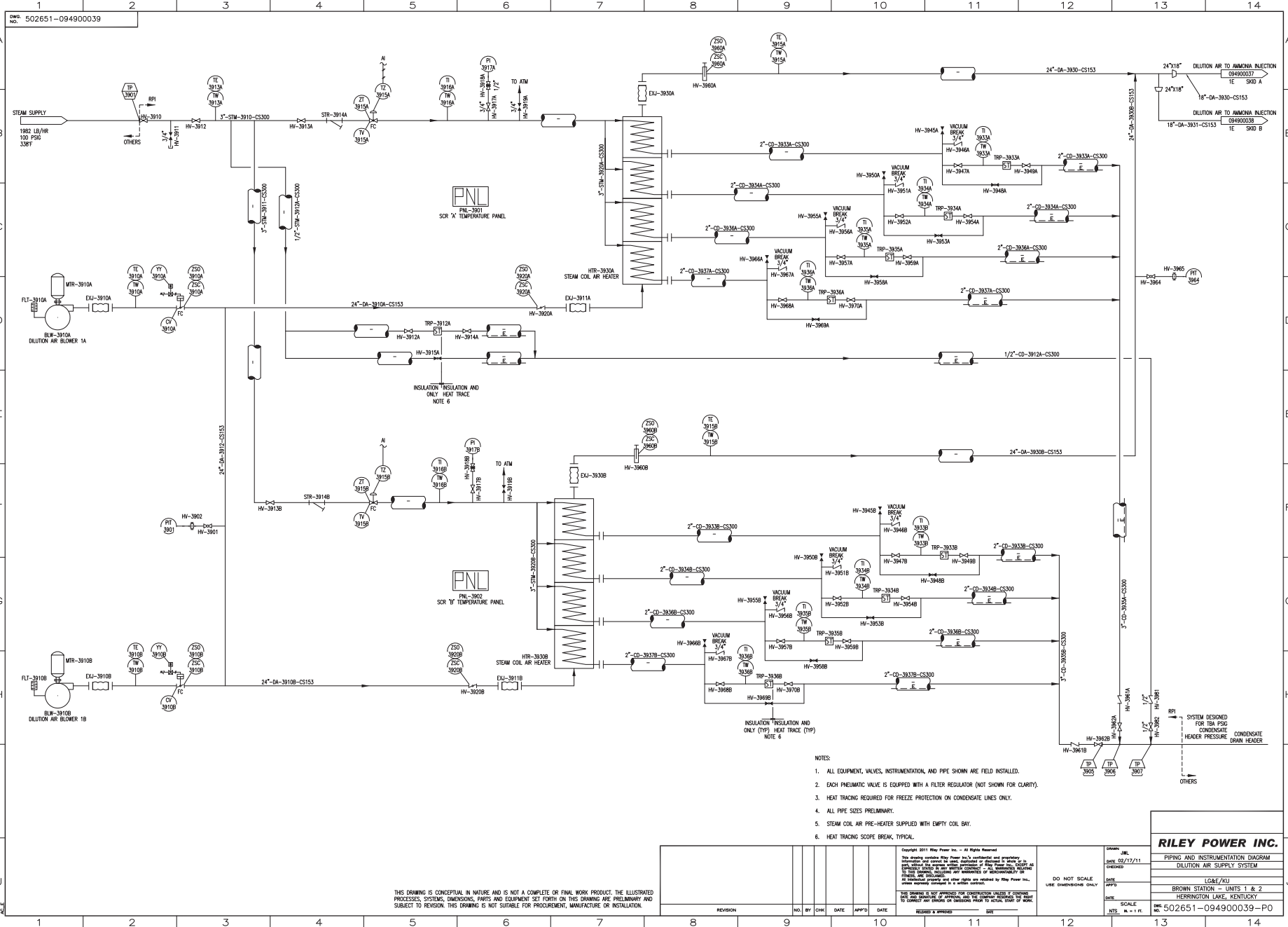
PNL-3803
SCR 'B' NH3 INJECTION/DILUTION AIR TEMPERATURE PANEL

NOTE:

1. IF AMMONIA INJECTION SKIDS ARE IN CLOSE PROXIMITY TO EACH OTHER, ONLY ONE EMERGENCY SHOWER STATION IS REQUIRED.
2. NH3 VENTS ARE FIELD INSTALLED BY CONTRACTOR IN ACCORDANCE TO CGA CODE 2-2-26: 18A AND 400 811.56 4.3. LOCATE ALL VENTS AT LEAST 10 FEET ABOVE WORKING PLATFORM WITHIN 40'.
3. INSTRUMENT AIR PROVIDED VIA SHD CONNECTION 3P-2110.
4. EACH PNEUMATIC VALVE IS EQUIPPED WITH A FILTER REGULATOR (NOT SHOWN FOR CLARITY).
5. POTABLE WATER ISOLATION VALVE BY OTHERS.
6. ALL PIPE SIZES AND NUMBER OF LANCES PRELIMINARY.
7. ALLOW 4 DIAMETER UPSTREAM STRAIGHT PIPE RUN AND 1 DIAMETER STRAIGHT PIPE RUN DOWNSTREAM FROM FLOW ELEMENT.
8. ALL INSTRUMENTING AMMONIA PIPING BY OTHERS.
9. VALVE SIZING SHALL BE MADE DIRECTLY TO MET RELAY CONTACTS.
10. MINIMIZE DISTANCE FROM THIS VALVE TO CORRESPONDING INJECTION VALVE.

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<p>DO NOT SCALE USE DIMENSIONS ONLY</p>					
<p>RILEY POWER INC. PIPING AND INSTRUMENTATION DIAGRAM AMMONIA INJECTION SYSTEM B LGE/KU BROWN STATION - UNITS 1 & 2 HERRINGSON LAKE, KENTUCKY NO: 502651-094900038-PO</p>					



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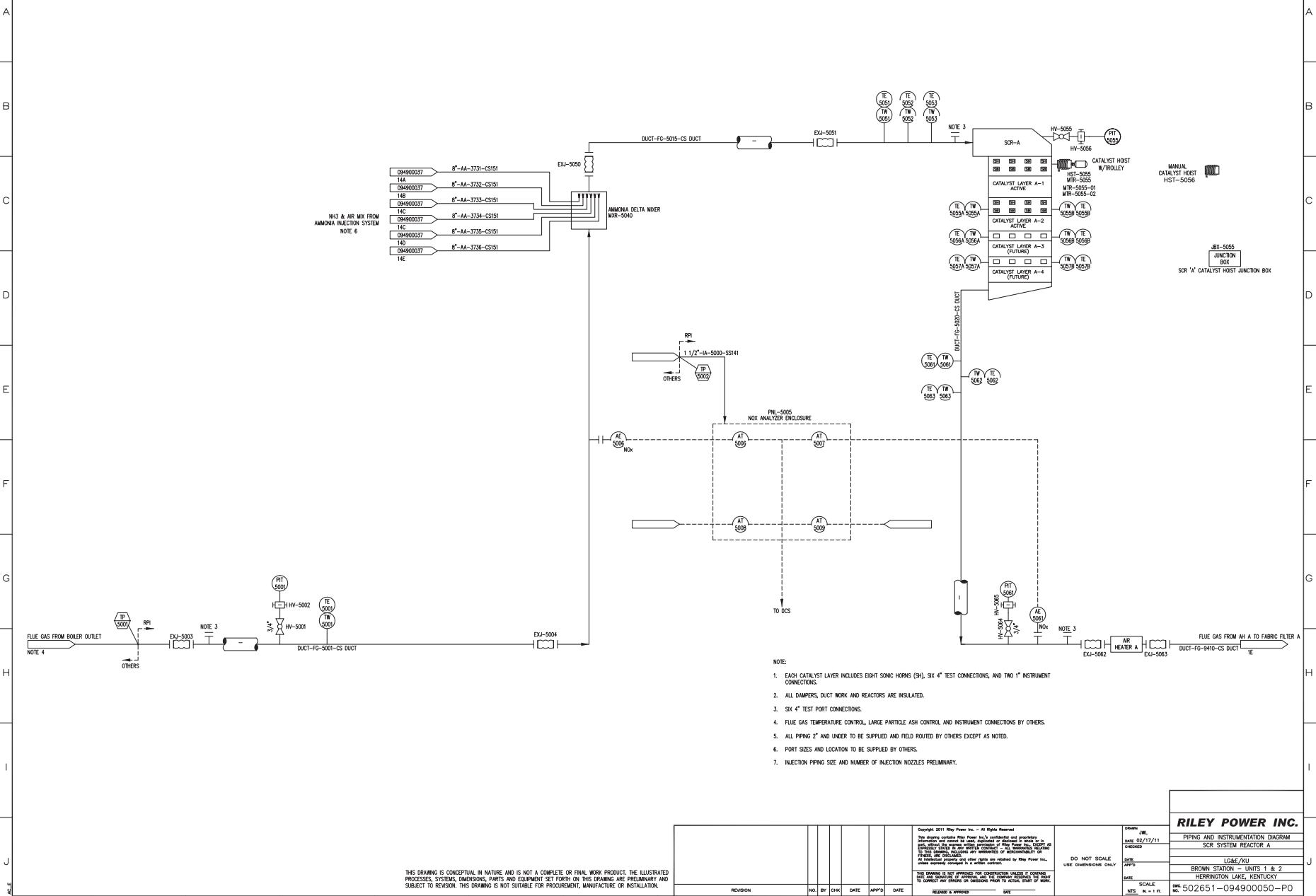
- NOTES:
1. ALL EQUIPMENT, VALVES, INSTRUMENTATION, AND PIPE SHOWN ARE FIELD INSTALLED.
 2. EACH PNEUMATIC VALVE IS EQUIPPED WITH A FILTER REGULATOR (NOT SHOWN FOR CLARITY).
 3. HEAT TRACING REQUIRED FOR FREEZE PROTECTION ON CONDENSATE LINES ONLY.
 4. ALL PIPE SIZES PRELIMINARY.
 5. STEAM COIL AIR PRE-HEATER SUPPLIED WITH EMPTY COIL BAY.
 6. HEAT TRACING SCOPE BREWM, TYPICAL.

REVISION	NO.	BY	CHK	DATE	APPRO.	DATE

RILEY POWER INC.
 PIPING AND INSTRUMENTATION DIAGRAM
 DILUTION AIR SUPPLY SYSTEM
 LGE/KU
 BROWN STATION - UNITS 1 & 2
 HERRINGTON LAKE, KENTUCKY
 HW: 502651-094900039-PO

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DWG No. 502651-094900050

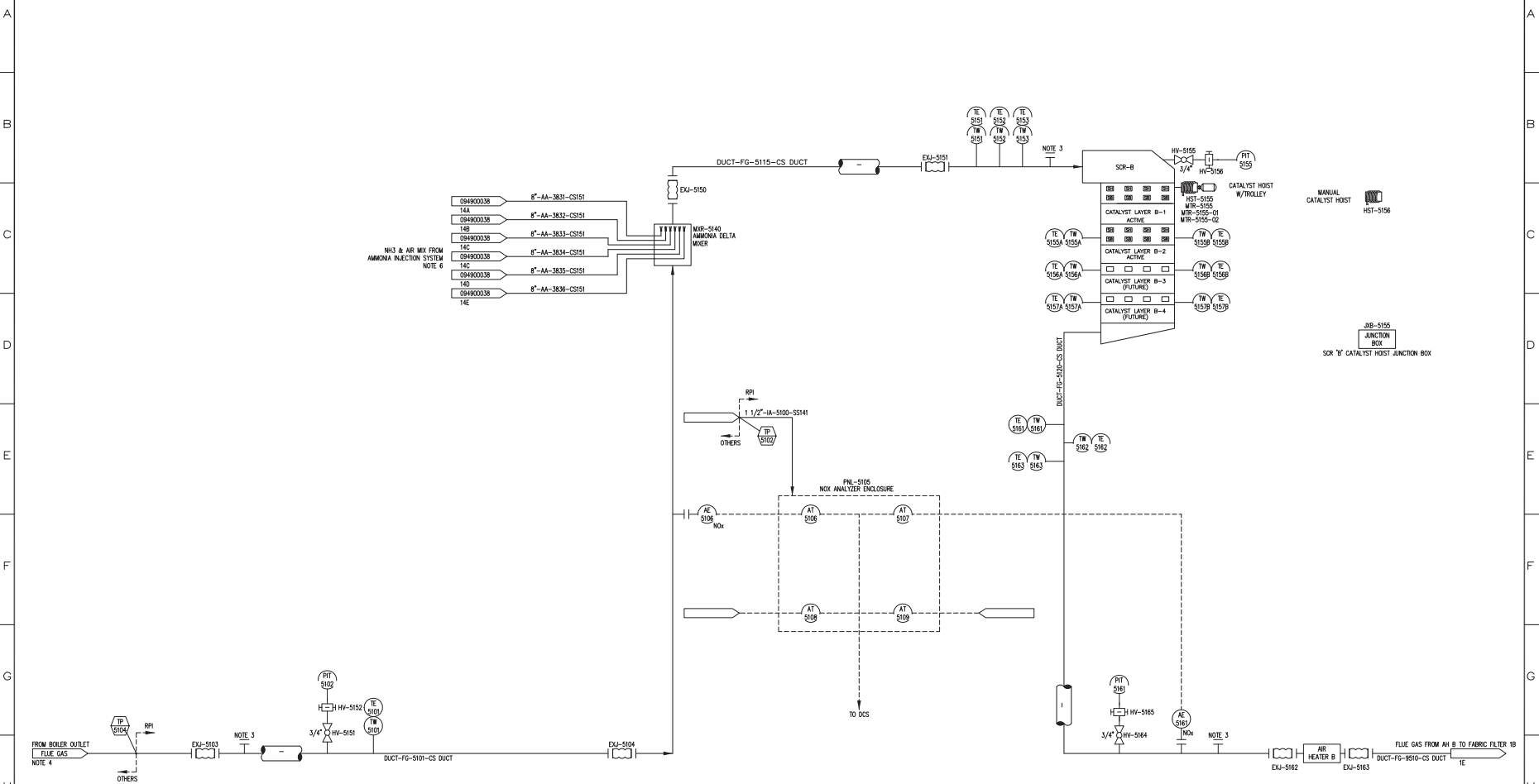


- NOTE:
1. EACH CATALYST LAYER INCLUDES EIGHT SONIC HORNS (SH), SIX 4" TEST CONNECTIONS, AND TWO 1" INSTRUMENT CONNECTIONS.
 2. ALL DAMPERS, DUCT WORK AND REACTORS ARE INSULATED.
 3. SIX 4" TEST PORT CONNECTIONS.
 4. FLUE GAS TEMPERATURE CONTROL, LARGE PARTICLE ASH CONTROL AND INSTRUMENT CONNECTIONS BY OTHERS.
 5. ALL PIPING 2" AND UNDER TO BE SUPPLIED AND FIELD ROUTED BY OTHERS EXCEPT AS NOTED.
 6. PORT SIZES AND LOCATION TO BE SUPPLIED BY OTHERS.
 7. INJECTION PIPING SIZE AND NUMBER OF INJECTION NOZZLES PRELIMINARY.

THIS DRAWING IS CONCEPTUAL IN NATURE AND IS NOT A COMPLETE OR FINAL WORK PRODUCT. THE ILLUSTRATED PROCESSES, SYSTEMS, DIMENSIONS, PARTS AND EQUIPMENT SET FORTH ON THIS DRAWING ARE PRELIMINARY AND SUBJECT TO REVISION. THIS DRAWING IS NOT SUITABLE FOR PROCUREMENT, MANUFACTURE OR INSTALLATION.

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RILEY POWER INC. PIPING AND INSTRUMENTATION DIAGRAM SCR SYSTEM REACTOR A				DO NOT SCALE USE DIMENSIONS ONLY		
DESIGNER: LG/E/KU PROJECT: BROWN STATION - UNITS 1 & 2 HERRINGTON LAKE, KENTUCKY				DWG No. 502651-094900050-PO		
REVISION	NO.	BY	CHK	DATE	APP'D	DATE

DWG No. 502651-094900051



- 094900038 8"-AA-3831-CS151 T43
 - 094900038 8"-AA-3832-CS151 T48
 - 094900038 8"-AA-3833-CS151 T4C
 - 094900038 8"-AA-3834-CS151 T4D
 - 094900038 8"-AA-3835-CS151 T4E
- NH3 & AIR MIX FROM AMMONIA INJECTION SYSTEM
NOTE 6

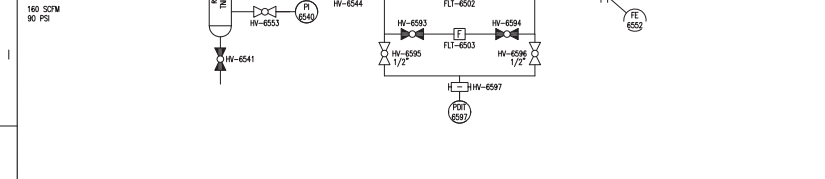
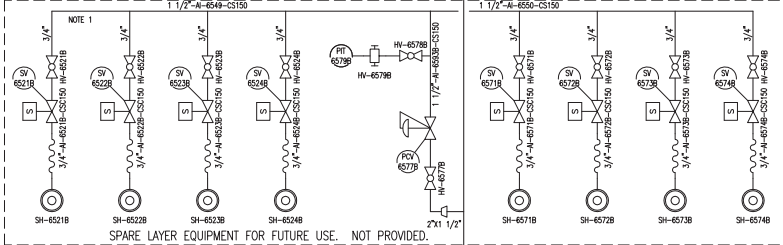
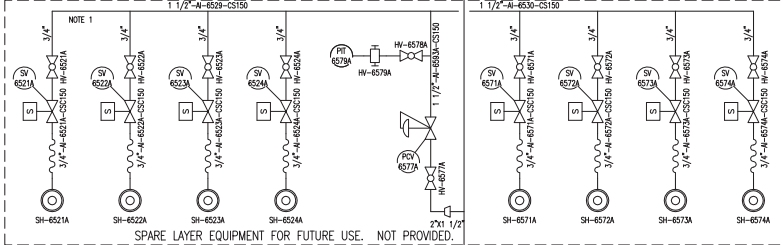
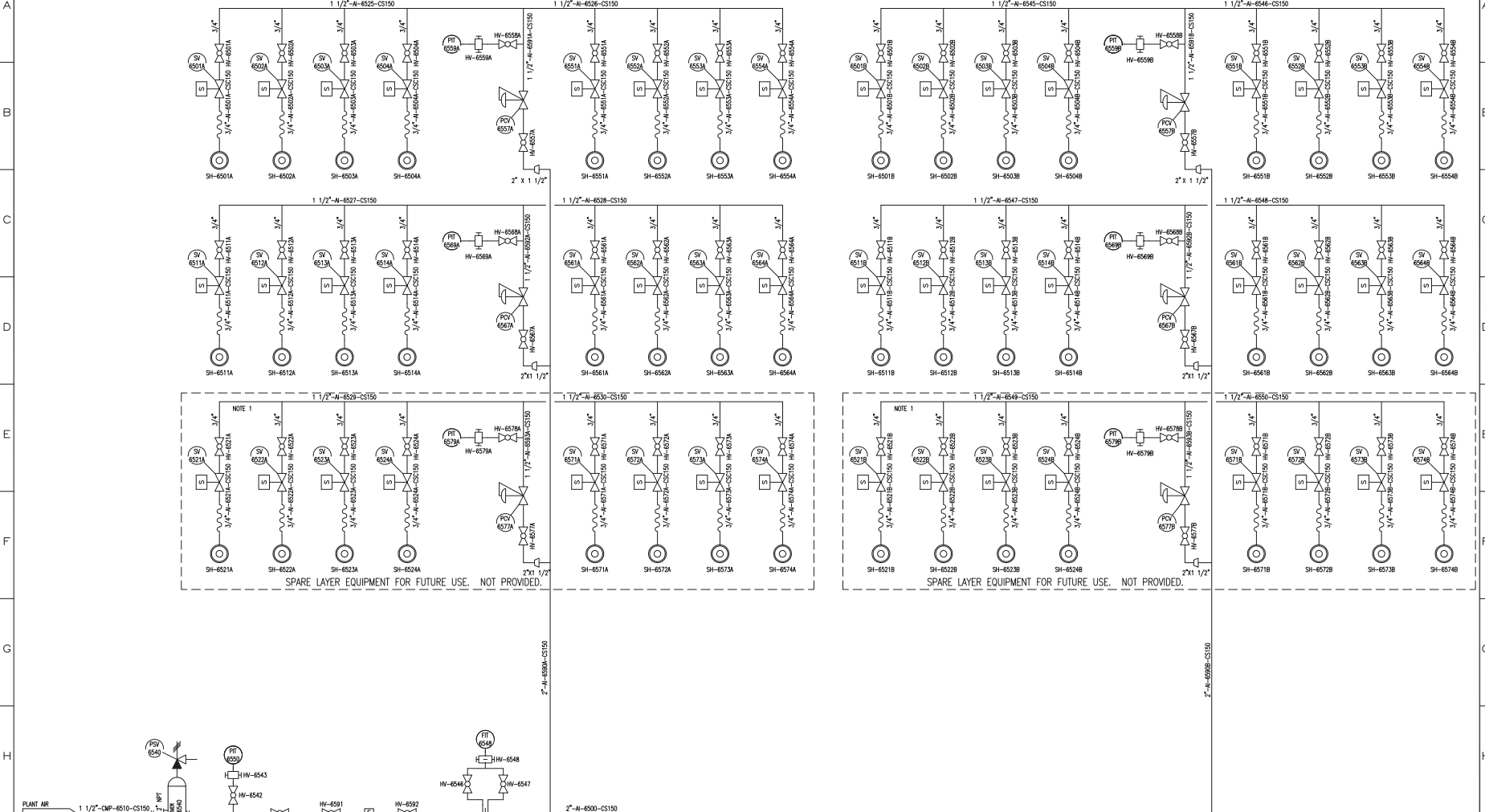
- NOTE:
1. EACH CATALYST LAYER INCLUDES EIGHT SONIC HORNS (SH), SIX 4" TEST CONNECTIONS, AND TWO 1" INSTRUMENT CONNECTIONS.
 2. ALL DAMPERS, DUCT WORK AND REACTORS ARE INSULATED.
 3. SIX 4" TEST PORT CONNECTIONS.
 4. FLUE GAS TEMPERATURE CONTROL, LARGE PARTICLE ASH CONTROL AND INSTRUMENT CONNECTIONS BY OTHERS.
 5. ALL PIPING 2" AND UNDER TO BE SUPPLIED AND FIELD ROUTED BY OTHERS EXCEPT AS NOTED.
 6. INJECTION PIPING SIZE AND NUMBER OF INJECTION NOZZLES PRELIMINARY.

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REVISIONS:						SCALE: M = 1 ft. DWG No. 502651-094900051-PO

SCR A

SCR B



- NOTES:
1. CAPPED CONNECTORS PROVIDED FOR FUTURE SONIC HORNS.
 2. ALL PIPING 2" AND UNDER SHALL BE SUPPLIED AND FIELD ROUTED BY OTHERS EXCEPT AS NOTED.
 3. ALL COMPRESSED AIR PIPING SHALL BE DESIGNED AND PROCURED BY OTHERS.

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REVISION				NO.	BY	CHK.	DATE	APPRO.	DATE	DESIGNER'S SYMBOL	DATE

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SCALE
NTE: 1" = 1'-0"

RILEY POWER INC.

PIPING AND INSTRUMENTATION DIAGRAM

SONIC HORN SYSTEM

LOGE/KU

BROWN STATION - UNITS 1 & 2

HERRINGTON LAKE, KENTUCKY

NO: 502651-094900065-PO