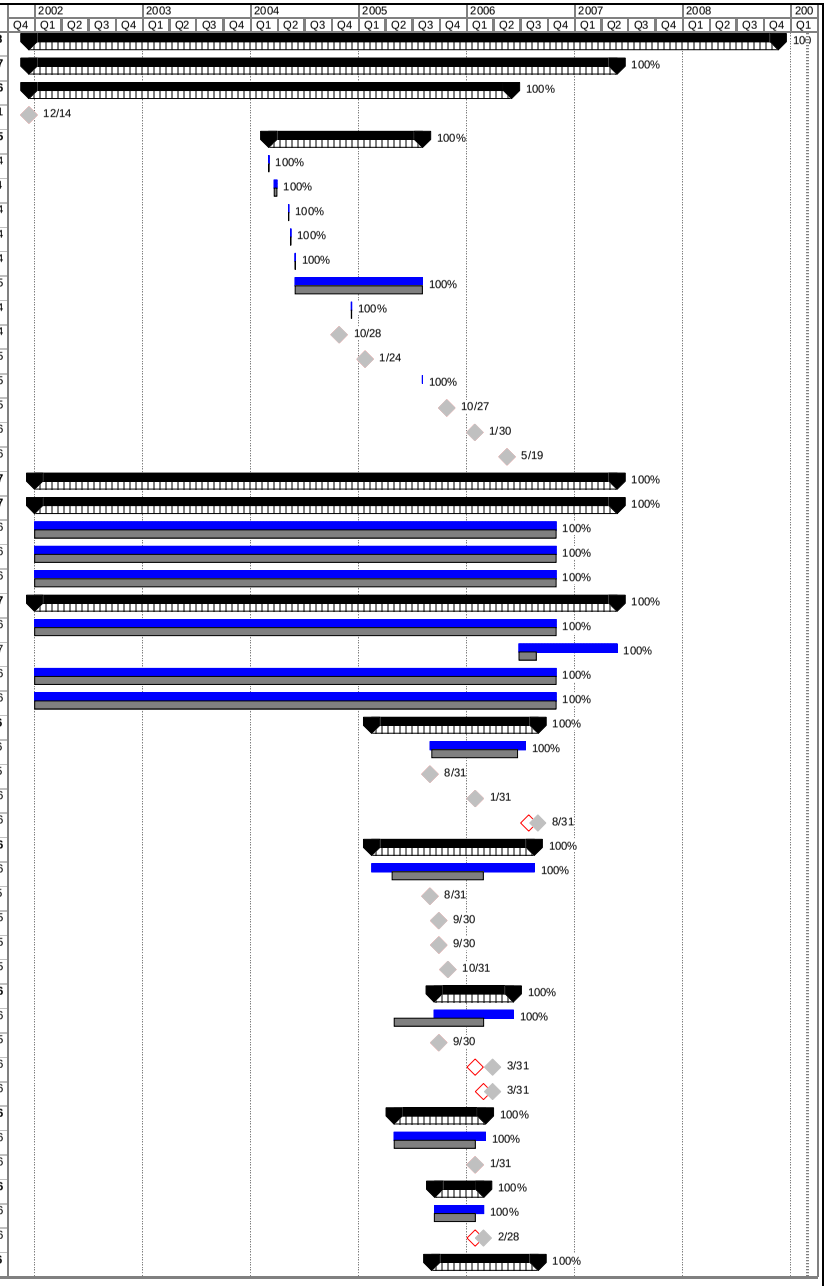
APPENDIX A
PROJECT SCHEDULE

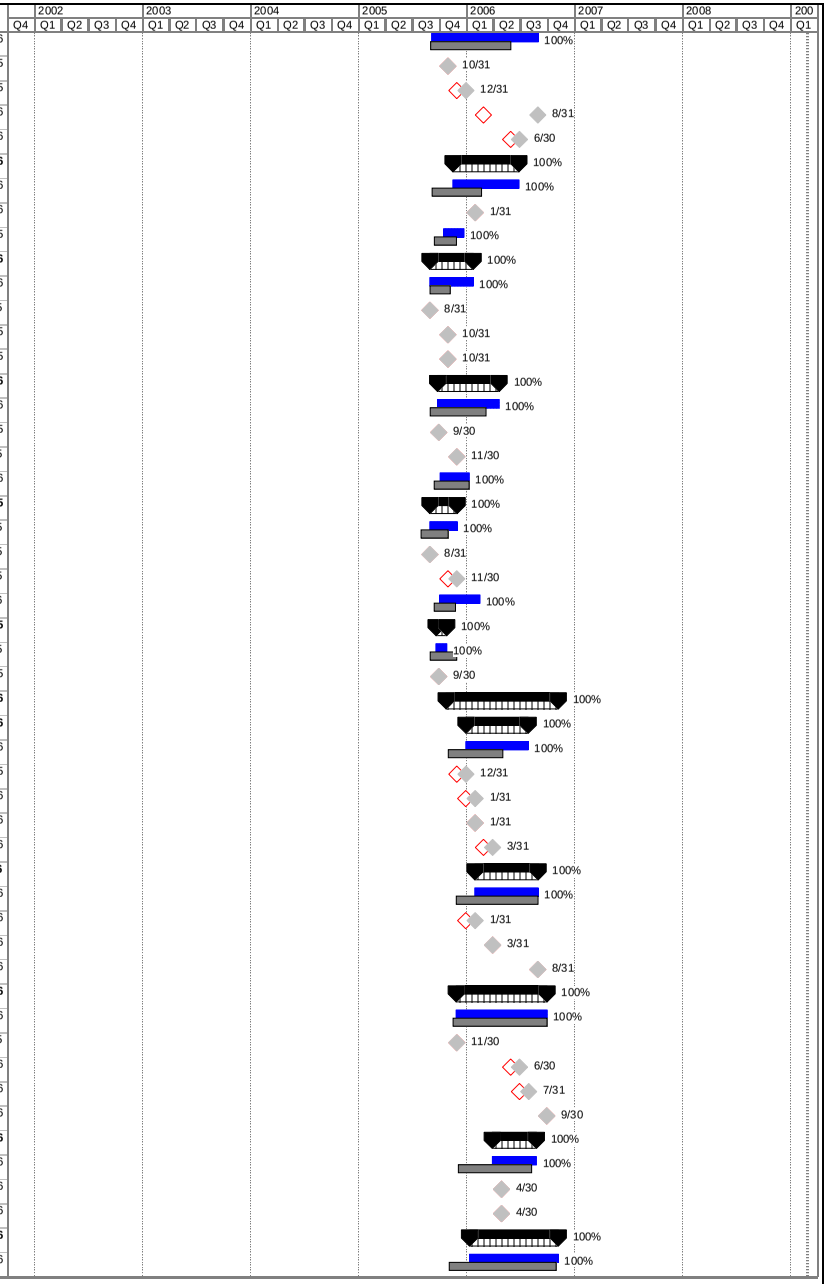
ID	WBS	Task Name	Baseline Start	Baseline Finish	Actual Start	Actual Finish
1	**1**	**Budget Period 1**	**Fri 12/14/01**	**Fri 3/30/07**	**Fri 12/14/01**	**Thu 11/20/08**
2	**1.1**	**Phase 1: Design and Procurement**	**Fri 12/14/01**	**Tue 10/31/06**	**Fri 12/14/01**	**Fri 5/25/07**
3	**1.1.0**	**Pre-Award Activities**	**Fri 12/14/01**	**Fri 6/2/06**	**Fri 12/14/01**	**Fri 6/2/06**
4	1.1.0.1	Obtain DOE Permission to Begin Pre-Award Activities	Fri 12/14/01	Fri 12/14/01	Fri 12/14/01	Fri 12/14/01
5	**1.1.0.2**	**EPC Bid and Negotiation**	**Thu 3/4/04**	**Fri 8/5/05**	**Thu 3/4/04**	**Fri 8/5/05**
6	1.1.0.2.1	EPC RFQ Issued	Thu 3/4/04	Thu 3/4/04	Thu 3/4/04	Thu 3/4/04
7	1.1.0.2.2	EPC Bidders Site Visit	Mon 3/22/04	Wed 3/31/04	Mon 3/22/04	Wed 3/31/04
8	1.1.0.2.3	EPC Proposals Due	Mon 5/10/04	Mon 5/10/04	Mon 5/10/04	Mon 5/10/04
9	1.1.0.2.4	Selection of Finalists	Mon 5/17/04	Mon 5/17/04	Mon 5/17/04	Mon 5/17/04
10	1.1.0.2.5	Selection of Vendor	Tue 6/1/04	Tue 6/1/04	Tue 6/1/04	Tue 6/1/04
11	1.1.0.2.6	Negotiate EPC Agreement	Tue 6/1/04	Fri 8/5/05	Tue 6/1/04	Fri 8/5/05
12	1.1.0.2.7	Executive Office / AES Board Approval	Wed 12/8/04	Thu 12/9/04	Wed 12/8/04	Thu 12/9/04
13	1.1.0.3	Obtain DOE Permission to Conduct Baseline Testing	Thu 10/28/04	Thu 10/28/04	Thu 10/28/04	Thu 10/28/04
14	1.1.0.4	Obtain DOE Permission to Begin Detailed Design / Engineering	Mon 1/24/05	Mon 1/24/05	Mon 1/24/05	Mon 1/24/05
15	1.1.0.5	Issuance of EPC Preliminary Notice to Proceed	Fri 8/5/05	Fri 8/5/05	Fri 8/5/05	Fri 8/5/05
16	1.1.0.6	Obtain DOE Permission to Begin Procurement / Civil Construction / Construction Mobilization	Thu 10/27/05	Thu 10/27/05	Thu 10/27/05	Thu 10/27/05
17	1.1.0.7	Obtain DOE Permission to Begin Baghouse, Absorber, and Ash Recirculation Construction	Mon 1/30/06	Mon 1/30/06	Mon 1/30/06	Mon 1/30/06
18	1.1.0.8	Sign Cooperative Agreement	Fri 5/19/06	Fri 6/2/06	Fri 5/19/06	Fri 6/2/06
19	**1.1.1**	**Task 1.1 - Phase 1 Project Management**	**Wed 1/2/02**	**Tue 10/31/06**	**Wed 1/2/02**	**Fri 5/25/07**
20	**1.1.1.1**	**Project Administration / Management / Reporting**	**Wed 1/2/02**	**Tue 10/31/06**	**Wed 1/2/02**	**Fri 5/25/07**
21	1.1.1.1.1	Integrate/Compile Overall Project Schedule	Wed 1/2/02	Tue 10/31/06	Wed 1/2/02	Tue 10/31/06
22	1.1.1.1.2	Track/Forecast Overall Project Costs	Wed 1/2/02	Tue 10/31/06	Wed 1/2/02	Tue 10/31/06
23	1.1.1.1.3	Interface with DOE Personnel	Wed 1/2/02	Tue 10/31/06	Wed 1/2/02	Tue 10/31/06
24	**1.1.1.1.4**	**Complete/Submit All Project Reports**	**Wed 1/2/02**	**Tue 10/31/06**	**Wed 1/2/02**	**Fri 5/25/07**
25	1.1.1.1.4.1	General Progress Reporting	Wed 1/2/02	Tue 10/31/06	Wed 1/2/02	Tue 10/31/06
26	1.1.1.1.4.2	Write Preliminary Public Design Report	Wed 6/28/06	Fri 8/25/06	Wed 6/28/06	Fri 5/25/07
27	1.1.1.1.5	Administrate Project Meetings	Wed 1/2/02	Tue 10/31/06	Wed 1/2/02	Tue 10/31/06
28	1.1.1.2	Site Management / Engineering	Wed 1/2/02	Tue 10/31/06	Wed 1/2/02	Tue 10/31/06
29	**1.1.2**	**Task 1.2 - Total Process Definition and Design**	**Mon 4/25/05**	**Mon 7/31/06**	**Tue 2/15/05**	**Thu 8/31/06**
30	1.1.2.1	Provide Loads / GAs / Vendor information	Tue 9/6/05	Fri 6/23/06	Thu 9/1/05	Wed 7/19/06
31	1.1.2.2	Mechanical Contractor Contract in Place	Wed 8/31/05	Wed 8/31/05	Wed 8/31/05	Wed 8/31/05
32	1.1.2.3	Prepare Updated Instrument Location Drawing	Tue 1/31/06	Tue 1/31/06	Tue 1/31/06	Tue 1/31/06
33	1.1.2.4	AES Review Analog/Digital Logic Control Diagrams	Mon 7/31/06	Mon 7/31/06	Thu 8/31/06	Thu 8/31/06
34	**1.1.2.5**	**Civil Engineering**	**Mon 4/25/05**	**Mon 2/27/06**	**Tue 2/15/05**	**Fri 8/18/06**
35	1.1.2.5.1	Civil Engineering Period of Performance	Mon 4/25/05	Mon 2/27/06	Tue 2/15/05	Fri 8/18/06
36	1.1.2.5.2	IEA Contract in Place	Wed 8/31/05	Wed 8/31/05	Wed 8/31/05	Wed 8/31/05
37	1.1.2.5.3	Civil Site Preparation Design Commenced	Fri 9/30/05	Fri 9/30/05	Fri 9/30/05	Fri 9/30/05
38	1.1.2.5.4	Civil Foundation Design Commenced	Fri 9/30/05	Fri 9/30/05	Fri 9/30/05	Fri 9/30/05
39	1.1.2.5.5	Release Table of Rebar for Fabrication	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05
40	**1.1.2.6**	**Structual Steel Engineering**	**Mon 5/2/05**	**Tue 2/28/06**	**Wed 9/14/05**	**Thu 6/8/06**
41	1.1.2.6.1	Structural Steel Engineering Period of Performance	Mon 5/2/05	Tue 2/28/06	Wed 9/14/05	Thu 6/8/06
42	1.1.2.6.2	Structural Steel Design Commenced	Fri 9/30/05	Fri 9/30/05	Fri 9/30/05	Fri 9/30/05
43	1.1.2.6.3	Issue RFQ for Quick Lime Structural Steel	Tue 1/31/06	Tue 1/31/06	Fri 3/31/06	Fri 3/31/06
44	1.1.2.6.4	IEA Drawings Initial Construction Release at 90% for SNCR Struct. Steel	Tue 2/28/06	Tue 2/28/06	Fri 3/31/06	Fri 3/31/06
45	**1.1.2.7**	**Ductwork Engineering**	**Mon 5/2/05**	**Tue 1/31/06**	**Mon 5/2/05**	**Mon 3/6/06**
46	1.1.2.7.1	Ductwork Engineering Period of Performance	Mon 5/2/05	Tue 1/31/06	Mon 5/2/05	Mon 3/6/06
47	1.1.2.7.2	Issue RFQ for FGD Dampers & Expansion Joints	Tue 1/31/06	Tue 1/31/06	Tue 1/31/06	Tue 1/31/06
48	**1.1.2.8**	**SNCR Equipment Engineering**	**Thu 9/15/05**	**Tue 1/31/06**	**Fri 9/16/05**	**Tue 2/28/06**
49	1.1.2.8.1	SNCR Engineering Period of Performance	Thu 9/15/05	Tue 1/31/06	Fri 9/16/05	Tue 2/28/06
50	1.1.2.8.2	Conduct CFD Furnace Modeling and Receive SNCR Predicted NH3 Distribution	Tue 1/31/06	Tue 1/31/06	Tue 2/28/06	Tue 2/28/06
51	**1.1.2.9**	**SCR Engineering**	**Fri 9/2/05**	**Wed 5/31/06**	**Tue 9/6/05**	**Thu 8/31/06**



Project: Greenidge MPC Project
Date: Mon 2/23/09

Critical | Critical Split | Critical Progress | Task | Split | Task Progress | Baseline | Baseline Split | Baseline Milestone | Milestone | Summary Progress | Summary | Project Summary | External Tasks | External Milestone | Deadline

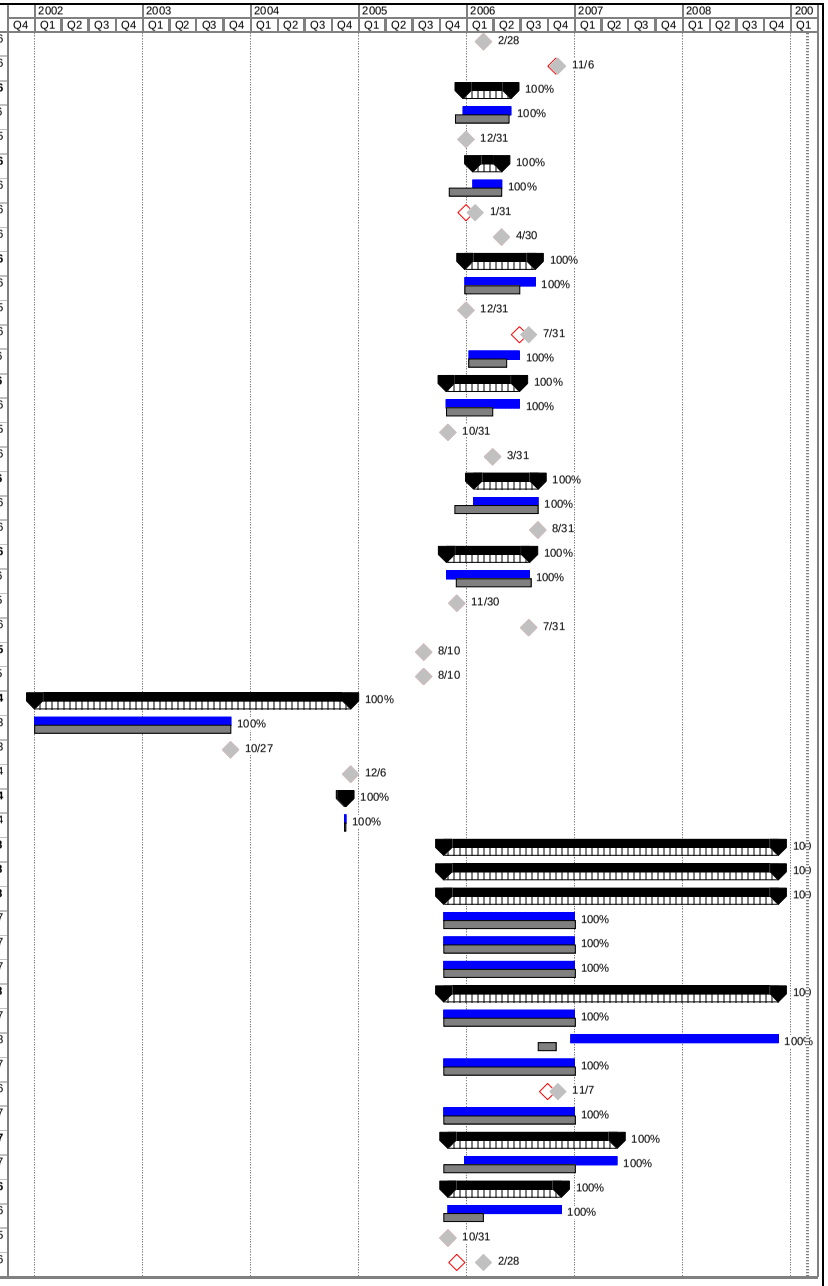
ID	WBS	Task Name	Baseline Start	Baseline Finish	Actual Start	Actual Finish
52	1.1.2.9.1	SCR Engineering Period of Performance	Fri 9/2/05	Wed 5/31/06	Tue 9/6/05	Thu 8/31/06
53	1.1.2.9.2	Issue Post Retrofit CFD Data Input Back to Hules	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05
54	1.1.2.9.3	Issue RFQ for SCR Flow & Dust Model Study	Wed 11/30/05	Wed 11/30/05	Sat 12/31/05	Sat 12/31/05
55	1.1.2.9.4	AES Witness SCR Flows & Dust Model	Tue 2/28/06	Tue 2/28/06	Thu 8/31/06	Thu 8/31/06
56	1.1.2.9.5	SCR Flow & Dust Model Study Report	Wed 5/31/06	Wed 5/31/06	Fri 6/30/06	Fri 6/30/06
57	**1.1.2.10**	**Catalyst & Assoc Equipment Engineering**	**Wed 9/7/05**	**Tue 2/21/06**	**Thu 11/17/05**	**Tue 6/27/06**
58	1.1.2.10.1	Catalyst Engineering Period of Performance	Wed 9/7/05	Tue 2/21/06	Thu 11/17/05	Tue 6/27/06
59	1.1.2.10.2	Issue RFQ for SCR Catalyst	Tue 1/31/06	Tue 1/31/06	Tue 1/31/06	Tue 1/31/06
60	1.1.2.11	Powdered Activated Carbon Silo Engineering	Thu 9/15/05	Mon 11/28/05	Mon 10/17/05	Fri 12/23/05
61	**1.1.2.12**	**Absorber Engineering**	**Wed 8/31/05**	**Mon 11/7/05**	**Wed 8/31/05**	**Mon 1/23/06**
62	1.1.2.12.1	Absorber Engineering Period of Performance	Wed 8/31/05	Mon 11/7/05	Wed 8/31/05	Mon 1/23/06
63	1.1.2.12.2	Austrian Energy Contract in Place	Wed 8/31/05	Wed 8/31/05	Wed 8/31/05	Wed 8/31/05
64	1.1.2.12.3	Draw/Check DFGD General Arrangement - Rev 00	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05
65	1.1.2.12.4	Absorber Foundation Drawings	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05
66	**1.1.2.13**	**Quick Lime & Hydrated Lime Equimpent Engineering**	**Thu 9/1/05**	**Wed 3/8/06**	**Mon 9/26/05**	**Fri 4/21/06**
67	1.1.2.13.1	Quick & Hydr Lime Equipment Engineering Period of Performance	Thu 9/1/05	Wed 3/8/06	Mon 9/26/05	Fri 4/21/06
68	1.1.2.13.2	Quick and Hydrated Lime Equipment RFPs Released	Fri 9/30/05	Fri 9/30/05	Fri 9/30/05	Fri 9/30/05
69	1.1.2.13.3	Issue RFQ for Quick & Hydr. Lime System	Wed 11/30/05	Wed 11/30/05	Wed 11/30/05	Wed 11/30/05
70	1.1.2.14	Process Water System Engineering	Wed 9/14/05	Tue 1/10/06	Wed 10/5/05	Tue 1/10/06
71	**1.1.2.15**	**Baghouse Engineering**	**Mon 8/1/05**	**Mon 10/31/05**	**Wed 8/31/05**	**Wed 11/30/05**
72	1.1.2.15.1	Baghouse Engineering Period of Performance	Mon 8/1/05	Mon 10/31/05	Wed 8/31/05	Wed 11/30/05
73	1.1.2.15.2	Baghouse RFP Released	Wed 8/31/05	Wed 8/31/05	Wed 8/31/05	Wed 8/31/05
74	1.1.2.15.3	Baghouse Foundation Drawings	Mon 10/31/05	Mon 10/31/05	Wed 11/30/05	Wed 11/30/05
75	1.1.2.16	Ash Recirculation Equipment Engineering	Wed 9/14/05	Fri 11/25/05	Mon 10/3/05	Wed 2/15/06
76	**1.1.2.17**	**Booster ID Fan Engineering**	**Thu 9/1/05**	**Tue 11/29/05**	**Wed 9/21/05**	**Wed 10/26/05**
77	1.1.2.17.1	Booster ID Fan Engineering	Thu 9/1/05	Tue 11/29/05	Wed 9/21/05	Wed 10/26/05
78	1.1.2.17.2	Booster Fan RFP Released	Fri 9/30/05	Fri 9/30/05	Fri 9/30/05	Fri 9/30/05
79	**1.1.3**	**Task 1.3 - Equipment Procurement**	**Mon 10/24/05**	**Tue 10/31/06**	**Tue 10/25/05**	**Tue 11/7/06**
80	**1.1.3.1**	**Structual Steel Procurement**	**Tue 11/1/05**	**Thu 5/4/06**	**Sat 12/31/05**	**Fri 7/28/06**
81	1.1.3.1.1	Structural Steel Procurement Period of Performance	Tue 11/1/05	Thu 5/4/06	Sat 12/31/05	Fri 7/28/06
82	1.1.3.1.2	Neg/Validate VD Bids for Baghouse Struct Steel	Wed 11/30/05	Wed 11/30/05	Sat 12/31/05	Sat 12/31/05
83	1.1.3.1.3	Issue PO for Baghouse Struct Steel	Fri 12/30/05	Fri 12/30/05	Tue 1/31/06	Tue 1/31/06
84	1.1.3.1.4	Issue Change Order for Turbosorp Reactor Struct Steel	Tue 1/31/06	Tue 1/31/06	Tue 1/31/06	Tue 1/31/06
85	1.1.3.1.5	Detail/Fabricate/Ship Baghouse Struct Steel	Tue 2/28/06	Tue 2/28/06	Fri 3/31/06	Fri 3/31/06
86	**1.1.3.2**	**Ductwork Procurement**	**Mon 11/28/05**	**Thu 8/31/06**	**Mon 1/30/06**	**Thu 8/31/06**
87	1.1.3.2.1	Ductwork Procurement Period of Performance	Mon 11/28/05	Thu 8/31/06	Mon 1/30/06	Thu 8/31/06
88	1.1.3.2.2	Issue PO for Outlet Duct to Baghouse Ductwork	Fri 12/30/05	Fri 12/30/05	Tue 1/31/06	Tue 1/31/06
89	1.1.3.2.3	Issue FGD and SCR Expansion Joint POs	Fri 3/31/06	Fri 3/31/06	Fri 3/31/06	Fri 3/31/06
90	1.1.3.2.4	Ductwork & expansion joints delivered	Thu 8/31/06	Thu 8/31/06	Thu 8/31/06	Thu 8/31/06
91	**1.1.3.3**	**SNCR Equipment Procurement**	**Thu 11/17/05**	**Sat 9/30/06**	**Mon 11/28/05**	**Sat 9/30/06**
92	1.1.3.3.1	SNCR Procurement Period of Performance	Thu 11/17/05	Sat 9/30/06	Mon 11/28/05	Sat 9/30/06
93	1.1.3.3.2	Issue PO for SNCR System	Wed 11/30/05	Wed 11/30/05	Wed 11/30/05	Wed 11/30/05
94	1.1.3.3.3	Fab SNCR System	Wed 5/31/06	Wed 5/31/06	Fri 6/30/06	Fri 6/30/06
95	1.1.3.3.4	Ship SNCR Skids	Fri 6/30/06	Fri 6/30/06	Mon 7/31/06	Mon 7/31/06
96	1.1.3.3.5	Ship SNCR Tank / Pumps	Sat 9/30/06	Sat 9/30/06	Sat 9/30/06	Sat 9/30/06
97	**1.1.3.4**	**SCR Procurement**	**Mon 12/5/05**	**Wed 8/9/06**	**Thu 3/30/06**	**Fri 8/25/06**
98	1.1.3.4.1	SCR Procurement Period of Performance	Mon 12/5/05	Wed 8/9/06	Thu 3/30/06	Fri 8/25/06
99	1.1.3.4.2	Issue SCR Reactor PO	Sun 4/30/06	Sun 4/30/06	Sun 4/30/06	Sun 4/30/06
100	1.1.3.4.3	Issue SCR Inlet and Outlet Breeching PO	Sun 4/30/06	Sun 4/30/06	Sun 4/30/06	Sun 4/30/06
101	**1.1.3.5**	**Catalyst & Assoc Equipment Procurement**	**Fri 11/4/05**	**Tue 10/31/06**	**Thu 1/12/06**	**Tue 11/7/06**
102	1.1.3.5.1	Catalyst Procurement Period of Performance	Fri 11/4/05	Tue 10/31/06	Thu 1/12/06	Tue 11/7/06



Project: Greenidge MPC Project
Date: Mon 2/23/09

Critical | Task | Baseline | Milestone | Project Summary | Deadline
Critical Split | Split | Baseline Split | Summary Progress | External Tasks
Critical Progress | Task Progress | Baseline Milestone | Summary | External Milestone

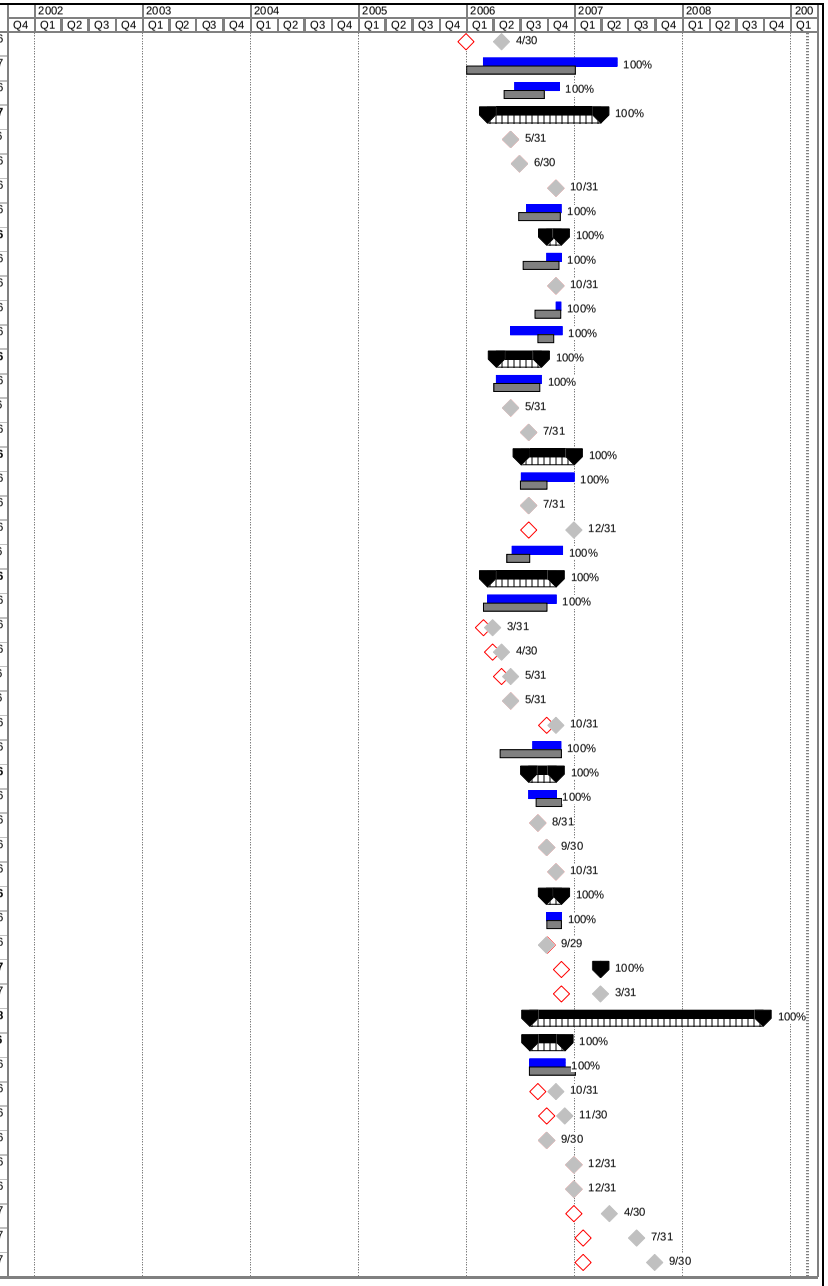
ID	WBS	Task Name	Baseline Start	Baseline Finish	Actual Start	Actual Finish
103	1.1.3.5.2	Issue Catalyst PO	Tue 2/28/06	Tue 2/28/06	Tue 2/28/06	Tue 2/28/06
104	1.1.3.5.3	Commence Shipment of Catalyst Modules	Tue 10/31/06	Tue 10/31/06	Mon 11/6/06	Mon 11/6/06
105	**1.1.3.6**	**Powdered Activated Carbon Silo Procurement**	**Fri 11/25/05**	**Thu 5/25/06**	**Wed 12/21/05**	**Wed 5/31/06**
106	1.1.3.6.1	PAC Silo Procurement Period of Performance	Fri 11/25/05	Thu 5/25/06	Wed 12/21/05	Wed 5/31/06
107	1.1.3.6.2	Issue PO for Activated Carbon System	Sat 12/31/05	Sat 12/31/05	Sat 12/31/05	Sat 12/31/05
108	**1.1.3.7**	**Absorber Procurement**	**Fri 11/4/05**	**Sun 4/30/06**	**Mon 1/23/06**	**Sun 4/30/06**
109	1.1.3.7.1	Absorber Procurement Period of Performance	Fri 11/4/05	Sun 4/30/06	Mon 1/23/06	Sun 4/30/06
110	1.1.3.7.2	Issue PO for Turbosorp Reactor	Sat 12/31/05	Sat 12/31/05	Tue 1/31/06	Tue 1/31/06
111	1.1.3.7.3	Fab/Ship Turbosorp Reactor	Sun 4/30/06	Sun 4/30/06	Sun 4/30/06	Sun 4/30/06
112	**1.1.3.8**	**Quick Lime & Hydrated Lime Equipment Procurement**	**Tue 12/27/05**	**Fri 6/30/06**	**Tue 12/27/05**	**Mon 8/21/06**
113	1.1.3.8.1	Quick & Hydr Lime Equip Procurement Period of Performance	Tue 12/27/05	Fri 6/30/06	Tue 12/27/05	Mon 8/21/06
114	1.1.3.8.2	Issue PO for Quick & Hydr. Lime System	Sat 12/31/05	Sat 12/31/05	Sat 12/31/05	Sat 12/31/05
115	1.1.3.8.3	Ship Quick Lime & Hydr Lime System	Fri 6/30/06	Fri 6/30/06	Mon 7/31/06	Mon 7/31/06
116	1.1.3.9	Process Water System Procurement	Mon 1/9/06	Wed 5/17/06	Tue 1/10/06	Wed 6/28/06
117	**1.1.3.10**	**Baghouse Procurement**	**Wed 10/26/05**	**Fri 3/31/06**	**Tue 10/25/05**	**Thu 6/29/06**
118	1.1.3.10.1	Baghouse Procurement Period of Performance	Wed 10/26/05	Fri 3/31/06	Tue 10/25/05	Thu 6/29/06
119	1.1.3.10.2	PO for Baghouse	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05
120	1.1.3.10.3	Baghouse Deliveries Commence	Fri 3/31/06	Fri 3/31/06	Fri 3/31/06	Fri 3/31/06
121	**1.1.3.11**	**Ash Recirculation Equipment Procurement**	**Wed 11/23/05**	**Thu 8/31/06**	**Thu 1/26/06**	**Thu 8/31/06**
122	1.1.3.11.1	Ash Recirculation Equip Procurement Period of Performance	Wed 11/23/05	Thu 8/31/06	Thu 1/26/06	Thu 8/31/06
123	1.1.3.11.2	Ash recirculation system delivered	Thu 8/31/06	Thu 8/31/06	Thu 8/31/06	Thu 8/31/06
124	**1.1.3.12**	**Booster ID Fan Procurement**	**Mon 11/28/05**	**Tue 8/8/06**	**Wed 10/26/05**	**Wed 8/2/06**
125	1.1.3.12.1	Booster ID Fan Procurement Period of Performance	Mon 11/28/05	Tue 8/8/06	Wed 10/26/05	Wed 8/2/06
126	1.1.3.12.2	Issue PO for Booster Fan	Wed 11/30/05	Wed 11/30/05	Wed 11/30/05	Wed 11/30/05
127	1.1.3.12.3	Ship Booster Fan	Mon 7/31/06	Mon 7/31/06	Mon 7/31/06	Mon 7/31/06
128	**1.1.4**	**Task 1.4 - Environmental/Regulatory/Permitting**	**Wed 8/10/05**	**Wed 8/10/05**	**Wed 8/10/05**	**Wed 8/10/05**
129	1.1.4.1	Obtain Building Permit	Wed 8/10/05	Wed 8/10/05	Wed 8/10/05	Wed 8/10/05
130	**1.1.5**	**Task 1.5 - Environmental Information Volume**	**Wed 1/2/02**	**Mon 12/6/04**	**Wed 1/2/02**	**Mon 12/6/04**
131	1.1.5.1	Prepare Enivronmental Information Volume	Wed 1/2/02	Mon 10/27/03	Wed 1/2/02	Mon 10/27/03
132	1.1.5.2	Submit Environmental Information Volume	Mon 10/27/03	Mon 10/27/03	Mon 10/27/03	Mon 10/27/03
133	1.1.5.3	Receive Notice of FONSI from DOE	Mon 12/6/04	Mon 12/6/04	Mon 12/6/04	Mon 12/6/04
134	**1.1.6**	**Task 1.6 - Baseline Testing**	**Mon 11/15/04**	**Fri 11/19/04**	**Mon 11/15/04**	**Fri 11/19/04**
135	1.1.6.1	Perform Baseline Testing	Mon 11/15/04	Fri 11/19/04	Mon 11/15/04	Fri 11/19/04
136	**1.2**	**Phase 2: Construction**	**Mon 10/17/05**	**Fri 3/30/07**	**Mon 10/17/05**	**Thu 11/20/08**
137	**1.2.1**	**Task 2.1 - Phase 2 Project Management**	**Mon 10/17/05**	**Thu 1/4/07**	**Mon 10/17/05**	**Thu 11/20/08**
138	**1.2.1.1**	**Project Administration / Management / Reporting**	**Mon 10/17/05**	**Thu 1/4/07**	**Mon 10/17/05**	**Thu 11/20/08**
139	1.2.1.1.1	Integrate/Compile Overall Project Schedule	Mon 10/17/05	Thu 1/4/07	Mon 10/17/05	Mon 1/1/07
140	1.2.1.1.2	Track/Forecast Overall Project Costs	Mon 10/17/05	Thu 1/4/07	Mon 10/17/05	Mon 1/1/07
141	1.2.1.1.3	Interface with DOE Personnel	Mon 10/17/05	Thu 1/4/07	Mon 10/17/05	Mon 1/1/07
142	**1.2.1.1.4**	**Complete/Submit All Project Reports**	**Mon 10/17/05**	**Thu 1/4/07**	**Mon 10/17/05**	**Thu 11/20/08**
143	1.2.1.1.4.1	General Progress Reporting	Mon 10/17/05	Thu 1/4/07	Mon 10/17/05	Mon 1/1/07
144	1.2.1.1.4.2	Write Final Public Design Report	Fri 9/1/06	Tue 10/31/06	Wed 12/20/06	Thu 11/20/08
145	1.2.1.1.5	Administrate Project Meetings	Mon 10/17/05	Thu 1/4/07	Mon 10/17/05	Mon 1/1/07
146	1.2.1.1.6	Submit Continuation Application to DOE	Tue 10/3/06	Tue 10/3/06	Tue 11/7/06	Tue 11/7/06
147	1.2.1.2	Site Management/Engineering	Mon 10/17/05	Thu 1/4/07	Mon 10/17/05	Mon 1/1/07
148	**1.2.2**	**Task 2.2 - General Civil / Structural Construction**	**Mon 10/17/05**	**Thu 1/4/07**	**Mon 10/31/05**	**Fri 5/25/07**
149	1.2.2.1	Construction Mobilization / Set up Job	Mon 10/17/05	Thu 1/4/07	Tue 12/27/05	Fri 5/25/07
150	**1.2.2.2**	**Civil Work**	**Mon 10/17/05**	**Mon 2/27/06**	**Mon 10/31/05**	**Fri 11/17/06**
151	1.2.2.2.1	Civil Work Period of Performance	Mon 10/17/05	Mon 2/27/06	Mon 10/31/05	Fri 11/17/06
152	1.2.2.2.2	Issue Civil Engineer for Excavation	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05	Mon 10/31/05
153	1.2.2.2.3	Trench/Excavate Site in Equipment Areas	Wed 11/30/05	Wed 11/30/05	Tue 2/28/06	Tue 2/28/06



Project: Greenidge MPC Project
Date: Mon 2/23/09

Critical | Task | Baseline | Milestone | Project Summary | Deadline
Critical Split | Split | Baseline Split | Summary Progress | External Tasks
Critical Progress | Task Progress | Baseline Milestone | Summary | External Milestone

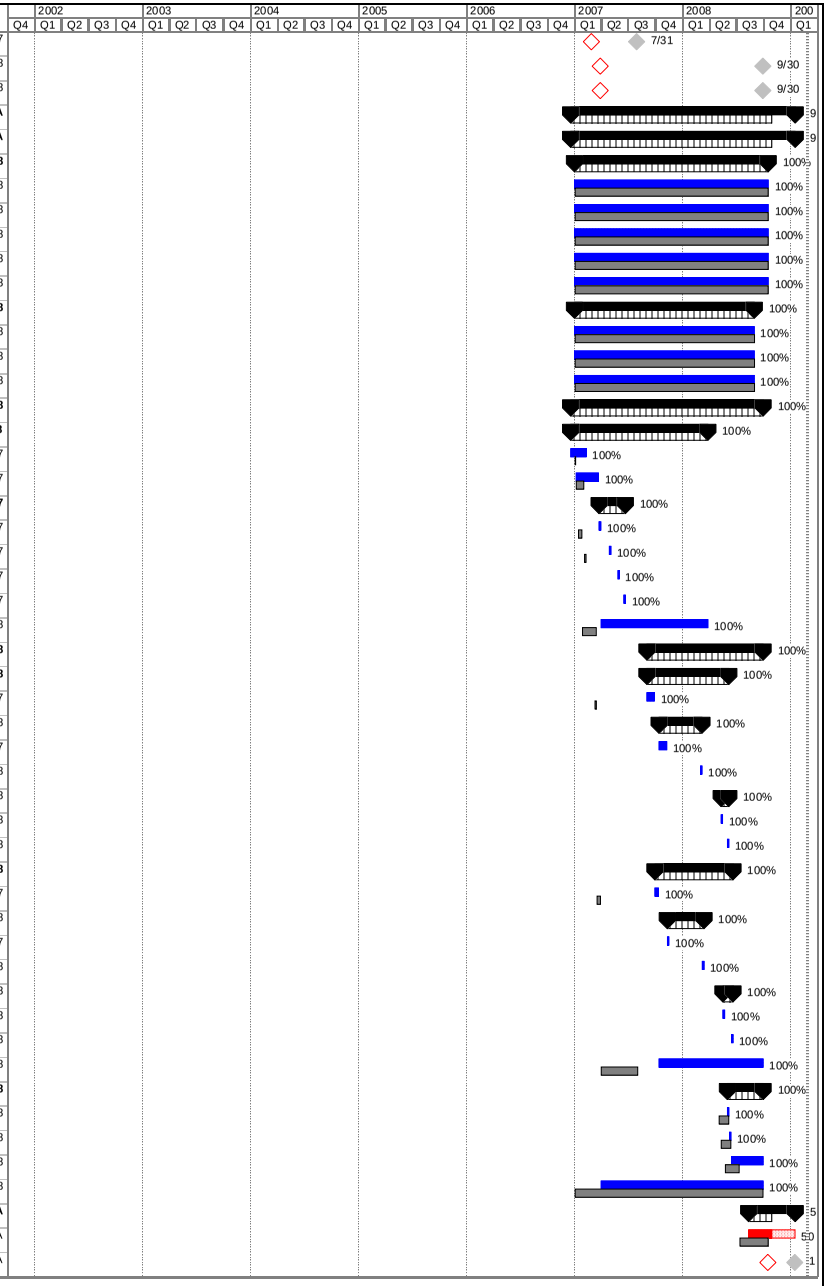
ID	WBS	Task Name	Baseline Start	Baseline Finish	Actual Start	Actual Finish
154	1.2.2.2.4	Install Formwork, Rebar, & Concrete (Baghouse, Absorber, Booster Fan)	Sat 12/31/05	Sat 12/31/05	Sun 4/30/06	Sun 4/30/06
155	1.2.2.3	Misc. Cranes on Site	Mon 1/2/06	Thu 1/4/07	Tue 2/28/06	Fri 5/25/07
156	1.2.2.4	Ductwork Construction	Tue 5/9/06	Thu 9/21/06	Wed 6/14/06	Fri 11/10/06
157	**1.2.3**	**Task 2.3 - Process System Construction**	**Tue 2/28/06**	**Sun 11/19/06**	**Tue 3/14/06**	**Sat 3/31/07**
158	1.2.3.1	Issue Electrical Installation Subcontract	Wed 5/31/06	Wed 5/31/06	Wed 5/31/06	Wed 5/31/06
159	1.2.3.2	Mobilize Electrical Subcontractor	Fri 6/30/06	Fri 6/30/06	Fri 6/30/06	Fri 6/30/06
160	1.2.3.3	Complete Major Electrical Equipment Wiring	Tue 10/31/06	Tue 10/31/06	Tue 10/31/06	Tue 10/31/06
161	1.2.3.4	SNCR Equipment Construction	Tue 6/27/06	Tue 11/14/06	Mon 7/24/06	Fri 11/17/06
162	**1.2.3.5**	**SCR Construction**	**Wed 7/12/06**	**Fri 11/10/06**	**Sat 9/30/06**	**Fri 11/17/06**
163	1.2.3.5.1	SCR Construction Period of Performance	Wed 7/12/06	Fri 11/10/06	Sat 9/30/06	Fri 11/17/06
164	1.2.3.5.2	Rem Ductwork from Bottom of Econ to Top of AH & Complete Installation of SCR Support Steel	Tue 10/31/06	Tue 10/31/06	Tue 10/31/06	Tue 10/31/06
165	1.2.3.6	Catalyst & Assoc Equipment Construction	Mon 8/21/06	Thu 11/16/06	Wed 11/1/06	Thu 11/16/06
166	1.2.3.7	Powdered Activated Carbon Silo Construction	Thu 8/31/06	Mon 10/23/06	Wed 5/31/06	Mon 11/20/06
167	**1.2.3.8**	**Absorber Construction**	**Tue 4/4/06**	**Wed 9/6/06**	**Thu 4/13/06**	**Mon 9/11/06**
168	1.2.3.8.1	Absorber Construction Period of Performance	Tue 4/4/06	Wed 9/6/06	Thu 4/13/06	Mon 9/11/06
169	1.2.3.8.2	Absorber structural steel complete	Wed 5/31/06	Wed 5/31/06	Wed 5/31/06	Wed 5/31/06
170	1.2.3.8.3	Install Absorber	Mon 7/31/06	Mon 7/31/06	Mon 7/31/06	Mon 7/31/06
171	**1.2.3.9**	**Quick Lime & Hydrated Lime Equipment Construction**	**Mon 7/3/06**	**Sat 9/30/06**	**Thu 7/6/06**	**Sun 12/31/06**
172	1.2.3.9.1	Quick & Hydr Lime Equip Constr Period of Performance	Mon 7/3/06	Sat 9/30/06	Thu 7/6/06	Sun 12/31/06
173	1.2.3.9.2	Install Quick & Hydrated Lime Support Steel	Mon 7/31/06	Mon 7/31/06	Mon 7/31/06	Mon 7/31/06
174	1.2.3.9.3	Install Ball Mill/Charge Mill	Mon 7/31/06	Mon 7/31/06	Sun 12/31/06	Sun 12/31/06
175	1.2.3.10	Process Water System Construction	Thu 5/18/06	Thu 8/3/06	Mon 6/5/06	Wed 11/22/06
176	**1.2.3.11**	**Baghouse Construction**	**Tue 2/28/06**	**Sat 9/30/06**	**Tue 3/14/06**	**Tue 10/31/06**
177	1.2.3.11.1	Baghouse Construction Period of Performance	Tue 2/28/06	Sat 9/30/06	Tue 3/14/06	Tue 10/31/06
178	1.2.3.11.2	Baghouse structural frame erection commences	Tue 2/28/06	Tue 2/28/06	Fri 3/31/06	Fri 3/31/06
179	1.2.3.11.3	Complete baghouse structural steel erection	Fri 3/31/06	Fri 3/31/06	Sun 4/30/06	Sun 4/30/06
180	1.2.3.11.4	Install baghouse hoppers	Sun 4/30/06	Sun 4/30/06	Wed 5/31/06	Wed 5/31/06
181	1.2.3.11.5	Install baghouse modules / weld seams	Wed 5/31/06	Wed 5/31/06	Wed 5/31/06	Wed 5/31/06
182	1.2.3.11.6	Complete baghouse construction	Sat 9/30/06	Sat 9/30/06	Tue 10/31/06	Tue 10/31/06
183	1.2.3.12	Ash Recirculation Equipment Construction	Tue 4/25/06	Sat 11/18/06	Mon 8/14/06	Thu 11/16/06
184	**1.2.3.13**	**Booster ID Fan Construction**	**Fri 8/25/06**	**Sun 11/19/06**	**Mon 7/31/06**	**Tue 10/31/06**
185	1.2.3.13.1	Booster ID Fan Construction Period of Performance	Fri 8/25/06	Sun 11/19/06	Mon 7/31/06	Tue 10/31/06
186	1.2.3.13.2	Install Booster ID Fan & Inlet Vane Controls	Thu 8/31/06	Thu 8/31/06	Thu 8/31/06	Thu 8/31/06
187	1.2.3.13.3	Alignment of Booster Fan and Motor	Sat 9/30/06	Sat 9/30/06	Sat 9/30/06	Sat 9/30/06
188	1.2.3.13.4	Bump Booster Fan	Tue 10/31/06	Tue 10/31/06	Tue 10/31/06	Tue 10/31/06
189	**1.2.3.14**	**Tie-in Outage**	**Sat 9/30/06**	**Sat 11/18/06**	**Fri 9/29/06**	**Sat 11/18/06**
190	1.2.3.14.1	Tie-in Outage Period	Sat 9/30/06	Sat 11/18/06	Fri 9/29/06	Sat 11/18/06
191	1.2.3.14.2	Outage Commence	Mon 10/2/06	Mon 10/2/06	Fri 9/29/06	Fri 9/29/06
192	**1.2.3.15**	**Turnover Mechanically Complete**	**Sun 11/19/06**	**Sun 11/19/06**	**Sat 3/31/07**	**Sat 3/31/07**
193	1.2.3.15.1	Mechanical Completion Achieved	Sun 11/19/06	Sun 11/19/06	Sat 3/31/07	Sat 3/31/07
194	**1.2.4**	**Task 2.4 - Plant Start-Up and Commissioning**	**Wed 8/2/06**	**Fri 3/30/07**	**Fri 8/4/06**	**Tue 9/30/08**
195	**1.2.4.1**	**Safety Review and Training**	**Wed 8/2/06**	**Thu 1/4/07**	**Fri 8/4/06**	**Thu 11/30/06**
196	1.2.4.1.1	Safety Review and Training Period of Performance	Wed 8/2/06	Thu 1/4/07	Fri 8/4/06	Thu 11/30/06
197	1.2.4.1.2	Instruction & operating manuals complete	Thu 8/31/06	Thu 8/31/06	Tue 10/31/06	Tue 10/31/06
198	1.2.4.1.3	Training complete	Sat 9/30/06	Sat 9/30/06	Thu 11/30/06	Thu 11/30/06
199	1.2.4.2	Submit Final Performance Test Procedures to AES	Sat 9/30/06	Sat 9/30/06	Sat 9/30/06	Sat 9/30/06
200	1.2.4.3	Preliminary Testing and Tuning of Systems Commenced	Sun 12/31/06	Sun 12/31/06	Sun 12/31/06	Sun 12/31/06
201	1.2.4.4	Post Outage Clean-Up of Areas Completed	Sun 12/31/06	Sun 12/31/06	Sun 12/31/06	Sun 12/31/06
202	1.2.4.5	Required Notices for Performance Test Submitted	Sun 12/31/06	Sun 12/31/06	Mon 4/30/07	Mon 4/30/07
203	1.2.4.6	Substantial Completion Achieved	Wed 1/31/07	Wed 1/31/07	Tue 7/31/07	Tue 7/31/07
204	1.2.4.7	Final Release and Waivers Issued per Section 2.1.22.1 of EPC	Wed 1/31/07	Wed 1/31/07	Sun 9/30/07	Sun 9/30/07



Project: Greenidge MPC Project
Date: Mon 2/23/09

Critical | Critical Split | Critical Progress | Task | Split | Task Progress | Baseline | Baseline Split | Baseline Milestone | Milestone | Summary Progress | Summary | Project Summary | External Tasks | External Milestone | Deadline

ID	WBS	Task Name	Baseline Start	Baseline Finish	Actual Start	Actual Finish
205	1.2.4.8	Reliability Run Completed	Wed 2/28/07	Wed 2/28/07	Tue 7/31/07	Tue 7/31/07
206	1.2.4.9	Final Completion Achieved	Fri 3/30/07	Fri 3/30/07	Tue 9/30/08	Tue 9/30/08
207	1.2.4.10	Final Documentation Submitted per Sec. 17.2 of EPC	Fri 3/30/07	Fri 3/30/07	Tue 9/30/08	Tue 9/30/08
208	**2**	**Budget Period 2**	**Thu 1/4/07**	**Fri 10/17/08**	**Wed 12/20/06**	**NA**
209	**2.1**	**Phase 3: Operation and Testing**	**Thu 1/4/07**	**Fri 10/17/08**	**Wed 12/20/06**	**NA**
210	**2.1.1**	**Task 3.1 - Phase 3 Project Management**	**Thu 1/4/07**	**Fri 10/17/08**	**Tue 1/2/07**	**Fri 10/17/08**
211	2.1.1.1	Integrate/Compile Overall Project Schedule	Thu 1/4/07	Fri 10/17/08	Tue 1/2/07	Fri 10/17/08
212	2.1.1.2	Track/Forecast Overall Project Costs	Thu 1/4/07	Fri 10/17/08	Tue 1/2/07	Fri 10/17/08
213	2.1.1.3	Interface with DOE Personnel	Thu 1/4/07	Fri 10/17/08	Tue 1/2/07	Fri 10/17/08
214	2.1.1.4	Complete/Submit All Project Reports	Thu 1/4/07	Fri 10/17/08	Tue 1/2/07	Fri 10/17/08
215	2.1.1.5	Administrate Project Meetings	Thu 1/4/07	Fri 10/17/08	Tue 1/2/07	Fri 10/17/08
216	**2.1.2**	**Task 3.2 - Plant Operations**	**Thu 1/4/07**	**Mon 9/1/08**	**Tue 1/2/07**	**Sun 8/31/08**
217	2.1.2.1	Routine Plant Operation and Data Logging	Thu 1/4/07	Mon 9/1/08	Tue 1/2/07	Sun 8/31/08
218	2.1.2.2	Routine Plant Maintenance and Data Logging	Thu 1/4/07	Mon 9/1/08	Tue 1/2/07	Sun 8/31/08
219	2.1.2.3	Routine Monitoring and Data Collection	Thu 1/4/07	Mon 9/1/08	Tue 1/2/07	Sun 8/31/08
220	**2.1.3**	**Task 3.3 - Testing and Evaluation**	**Thu 1/4/07**	**Tue 9/30/08**	**Wed 12/20/06**	**Tue 9/30/08**
221	**2.1.3.1**	**Guarantee Tests**	**Thu 1/4/07**	**Fri 3/16/07**	**Wed 12/20/06**	**Thu 3/27/08**
222	2.1.3.1.1	Pre-Sampling Site Visit	Thu 1/4/07	Fri 1/5/07	Wed 12/20/06	Fri 2/9/07
223	2.1.3.1.2	Pre-Sampling Work	Mon 1/8/07	Fri 2/2/07	Mon 1/8/07	Fri 3/23/07
224	**2.1.3.1.3**	**Sampling**	**Mon 1/15/07**	**Fri 2/9/07**	**Mon 3/26/07**	**Fri 6/22/07**
225	2.1.3.1.3.1	Trip 1 - Initial Tests	Mon 1/15/07	Fri 1/26/07	Mon 3/26/07	Sat 3/31/07
226	2.1.3.1.3.2	Trip 2 - Re-Tests	Mon 2/5/07	Fri 2/9/07	Mon 4/30/07	Fri 5/4/07
227	2.1.3.1.3.3	Trip 3 - NH3 Slip and NOx Re-Tests 1	NA	NA	Tue 5/29/07	Fri 6/1/07
228	2.1.3.1.3.4	Trip 4 - NH3 Slip and NOx Re-Tests 2	NA	NA	Mon 6/18/07	Fri 6/22/07
229	2.1.3.1.4	Post-Sampling Analyses / Reporting	Mon 1/29/07	Fri 3/16/07	Mon 4/2/07	Thu 3/27/08
230	**2.1.3.2**	**Process Performance Tests**	**Mon 3/12/07**	**Fri 8/3/07**	**Tue 9/4/07**	**Tue 9/30/08**
231	**2.1.3.2.1**	**Pre-Sampling Work**	**Mon 3/12/07**	**Fri 5/11/07**	**Tue 9/4/07**	**Fri 6/6/08**
232	2.1.3.2.1.1	Pre-Sampling Work - Test Series 1	Mon 3/12/07	Fri 3/16/07	Tue 9/4/07	Fri 9/28/07
233	2.1.3.2.1.2	Pre-Sampling Work - Test Series 2	Mon 4/9/07	Fri 4/13/07	Mon 10/15/07	Fri 3/7/08
234	2.1.3.2.1.2.1	Pre-Sampling Work - Test Series 2a	NA	NA	Mon 10/15/07	Fri 11/9/07
235	2.1.3.2.1.2.2	Pre-Sampling Work - Test Series 2b	NA	NA	Mon 3/3/08	Fri 3/7/08
236	2.1.3.2.1.3	Pre-Sampling Work - Test Series 3	Mon 5/7/07	Fri 5/11/07	Mon 5/12/08	Fri 6/6/08
237	2.1.3.2.1.3.1	Pre-Sampling Work - Test Series 3a	NA	NA	Mon 5/12/08	Fri 5/16/08
238	2.1.3.2.1.3.2	Pre-Sampling Work - Test Series 3b	NA	NA	Mon 6/2/08	Fri 6/6/08
239	**2.1.3.2.2**	**Sampling**	**Mon 3/19/07**	**Fri 5/25/07**	**Mon 10/1/07**	**Fri 6/20/08**
240	2.1.3.2.2.1	Sampling - Test Series 1	Mon 3/19/07	Fri 3/30/07	Mon 10/1/07	Fri 10/12/07
241	2.1.3.2.2.2	Sampling - Test Series 2	Mon 4/16/07	Fri 4/27/07	Mon 11/12/07	Fri 3/14/08
242	2.1.3.2.2.2.1	Sampling - Test Series 2a	NA	NA	Mon 11/12/07	Fri 11/16/07
243	2.1.3.2.2.2.2	Sampling - Test Series 2b	NA	NA	Sun 3/9/08	Fri 3/14/08
244	2.1.3.2.2.3	Sampling - Test Series 3	Mon 5/14/07	Fri 5/25/07	Sun 5/18/08	Fri 6/20/08
245	2.1.3.2.2.3.1	Sampling - Test Series 3a	NA	NA	Sun 5/18/08	Fri 5/23/08
246	2.1.3.2.2.3.2	Sampling - Test Series 3b	NA	NA	Mon 6/16/08	Fri 6/20/08
247	2.1.3.2.3	Post-Sampling Analyses / Reporting	Mon 4/2/07	Fri 8/3/07	Mon 10/15/07	Tue 9/30/08
248	**2.1.3.3**	**Follow-up Tests**	**Mon 5/5/08**	**Fri 7/11/08**	**Mon 6/2/08**	**Tue 9/30/08**
249	2.1.3.3.1	Pre-Sampling Work	Mon 5/5/08	Fri 6/6/08	Mon 6/2/08	Fri 6/6/08
250	2.1.3.3.2	Sampling	Mon 5/12/08	Fri 6/13/08	Mon 6/9/08	Fri 6/13/08
251	2.1.3.3.3	Post-Sampling Analyses / Reporting	Mon 5/26/08	Fri 7/11/08	Mon 6/16/08	Tue 9/30/08
252	2.1.3.4	Database Development for System Performance, Economics	Thu 1/4/07	Tue 9/30/08	Mon 4/2/07	Tue 9/30/08
253	**2.1.4**	**Task 3.4 - Final Reporting**	**Mon 7/14/08**	**Fri 10/17/08**	**Wed 8/13/08**	**NA**
254	2.1.4.1	Write Final Report	Mon 7/14/08	Fri 10/17/08	Wed 8/13/08	NA
255	2.1.4.2	Submit Final Report to DOE	Fri 10/17/08	Fri 10/17/08	NA	NA



Project: Greenidge MPC Project
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Critical | Task | Baseline | Milestone | Project Summary | Deadline
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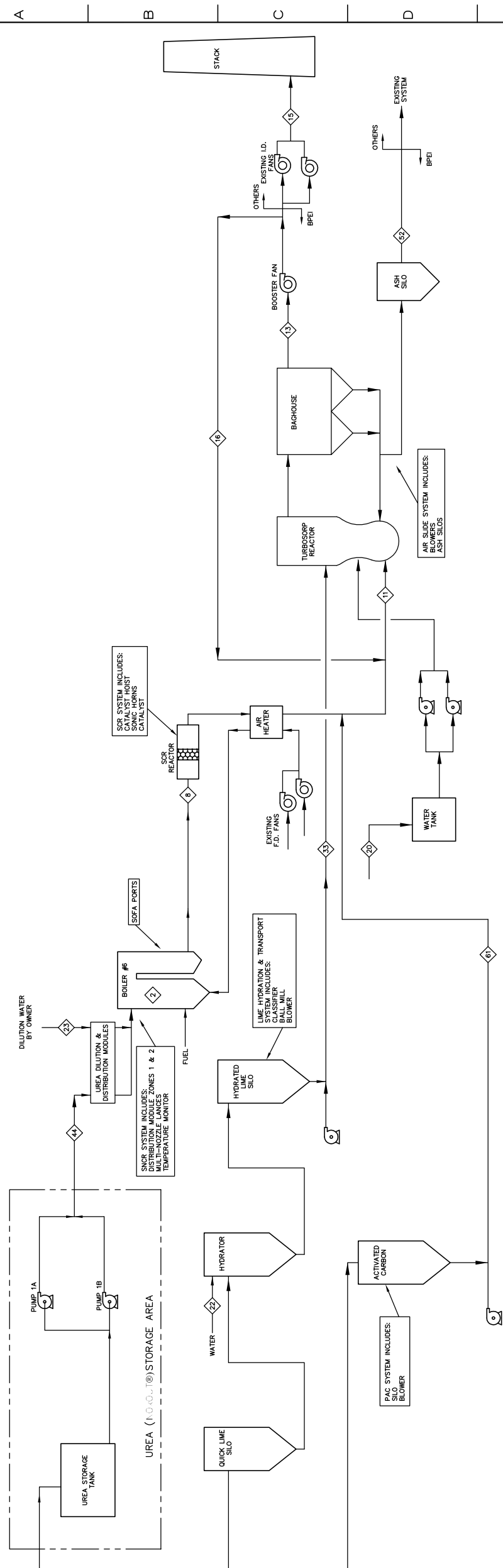
APPENDIX B
ENGINEERING DRAWINGS

CONTENTS

Drawing	Description
100276-SK081706-05	Process Flow Diagram – Design Load
100276-SK101206-03	Process Flow Diagram – Low Load
Fuel Tech (not numbered)	AES Greenidge #4, Dresden, New York, NOxOUT Utility System, System Overview Sheet 1
100276-SK4900050	Selective Catalytic Reactor System
100276-SK4900065	Sonic Horn System
100276-SK4900090	Powdered Activated Carbon System
100276-SK4900091	Lime Preparation System
100276-SK4900092	Hydrated Lime Transport System
100276-SK4900093	Process Water System
100276-SK4900095	SO_2 Reduction System (Turbosorp® System and Baghouse)
100276-SK4900096	Booster Fan
100276-SK4900097	Air Slide 1
100276-SK4900098	Air Slide 2
100276-SK4900099	Plant Air, Plant Water, and Potable Water
100276-GA200-01	Plan View
100276-GA100-01	Elevation View Looking North
100276-GA101-01	Elevation View Looking East
100276-ISO100-01	Isometric View Looking Northwest
100276-ISO101-01	Isometric View Looking Southeast



WATER

DESCRIPTION	WATER TO TANK	WATER HYDRATION	DILUTION WATER
STREAM #	20	22	23
TEMP, DEG F	54	54	54
PRESS, PSIG	2	60	2
FLOW, GPM	89	8.0	32
FLOW, LB/HR	44,385	3,951	15,934

LIME

DESCRIPTION	FROM TRUCK	TO INJECTION
STREAM #	30	33
COMP, LB/HR		
CaO	6,262	62
Ca(OH)2	0	8,192
CaCO3	59	59
OTHER SOLIDS	276	276
TSS	6,597	8,589
H20	0	35
TOTAL	6,597	8,623
FLOW, FT3/HR	106	345
TEMP, DEG F	AMB	AMB

ACTIVATED CARBON

DESCRIPTION	TO SILO	TO REACTOR
STREAM #	60	61
COMP, LB/HR		
CARBON	10,080	75
ASH	1,560	11.6
H20	360	2.7
TOTAL	12,000	89.3
FLOW, FT3/HR	353	2.6
TEMP, DEG F	AMB	AMB

UREA (NOxOUT®) SOLUTION

DESCRIPTION	TRUCK UNLOADING	TO SNCR
STREAM #	40	44
Temp, F	80	80
Press, psig	15	200
Flow, GPM	N/A	1.12
Flow, lb/hr	N/A	638

SOLID PRODUCTS

DESCRIPTION	TO EXISTING SYSTEM
STREAM #	52
COMP, LB/HR	
CaO	62
Ca(OH)2	1,702
CaCO3	2,373
CaSO3*0.5 H2O	6,088
CaSO4*0.5 H2O	2,282
CaCl2	177
CaF2	35
OTHER SOLIDS	276
FLYASH	4,676
TSS	17,671
H20	178
TOTAL	17,850
FLOW, FT3/HR	440
TEMP, DEG F	140-170

FLUE GAS

DESCRIPTION	UNITS	FURNACE	TO SCR	TO TURBO-REACTOR	FG FROM BAG-HOUSE	TO STACK	FG RECYCLE
STREAM #		2	8	11	13	15	16
TEMP	F		662	304	162	177	
PRESS	IWG		-7.6	-13.5		0.5	
FLOW	ACFM		490,161	423,700	382,389	362,899	0
	SCFM, WET		222,094	277,807	295,603	295,603	0
MASS FLOW	LB/HR		1,025,253	1,278,722	1,326,133	1,326,133	0
SO2	PPMVD @ 3% O2	2114	2,108	2,097	105	105	
SO3	PPMVD @ 3% O2		6	17	0.9	0.9	
NH3	PPMVD @ 3% O2		47			2	
NOX AS NO2	PPMVD @ 3% O2	190	110			76	
HCL	PPMVD @ 3% O2			80	4	4.0	
HF	PPMVD @ 3% O2			29.0	2	1.5	
ASH	GR/SCF, DRY			2.1	0.01	0.01	

FUEL

DESCRIPTION	COAL	WOOD	BLENDED FUEL
HHV	13,097	8,592	12,426
CARBON, wt%	72.17	45.13	68.14
HYDROGEN, wt%	4.79	5.78	4.94
NITROGEN, wt%	1.36	2.8	1.57
CHLORINE, wt%	0.1	0.22	0.12
SULFUR, wt%	2.9	0.2	2.5
OXYGEN, wt%	5.04	38.72	10.05
MOISTURE, wt%	5.8	6.3	5.87
ASH, wt%	7.85	0.82	6.8
MASS FLOW, LB/HR			85,692

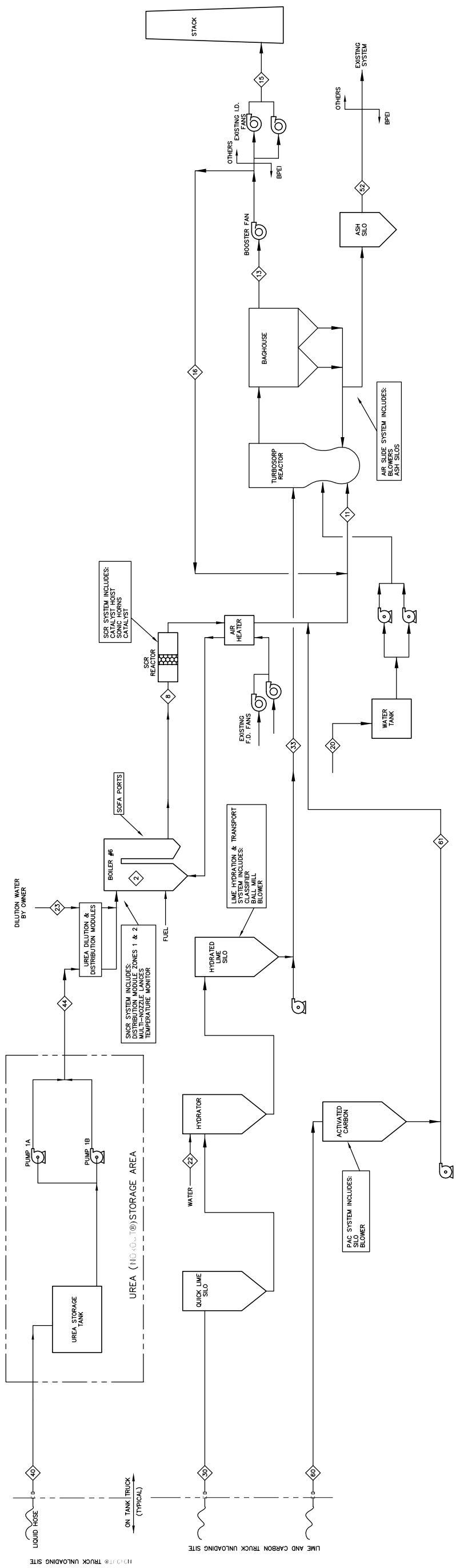
STANDARD CONDITIONS:
SCF: 68°F, 1 ATM AND ACTUAL MOISTURE

BABCOCK POWER ENVIRONMENTAL INC.

PROCESS FLOW DIAGRAM
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
CLAYTON A. ERICKSON
08/18/06

DWG. NO. 100276–SK081706–05

DWG. NO. 100276–SK081706–05



WATER

DESCRIPTION	WATER TO TANK	WATER HYDRATION	DILUTION WATER
STREAM #	20	22	23
TEMP, DEG F	54	54	54
PRESS, PSIG	2	60	2
FLOW, GPM	34	3.2	0
FLOW, LB/HR	16,982	1,580	0

LIME

DESCRIPTION	FROM TRUCK	TO INJECTION
STREAM #	30	33
COMP, LB/HR		
CaO	2,482	25
Ca(OH)2	0	3,277
CaCO3	24	24
OTHER SOLIDS	110	110
TSS	2,616	3,436
H20	0	14
TOTAL	2,616	3,450
FLOW, FT3/HR	1,472	1,136
TEMP, DEG F	AMB	AMB

ACTIVATED CARBON

DESCRIPTION	TO SILO	TO REACTOR
STREAM #	60	61
COMP, LB/HR		
CARBON	1,0080	45
ASH	1,560	7.0
H20	360	1.6
TOTAL	1,2000	53.6
FLOW, FT3/HR	353	1.6
TEMP, DEG F	AMB	AMB

UREA (NOxOUT®) SOLUTION

DESCRIPTION	TRUCK UNLOADING	TO SNCR
STREAM #	40	44
Temp, F	80	80
Press, psig	15	200
Flow, GPM	N/A	0.00
Flow, lb/hr	N/A	0

SOLID PRODUCTS

DESCRIPTION	TO EXISTING SYSTEM
STREAM #	52
COMP, LB/HR	
CaO	25
Ca(OH)2	681
CaCO3	949
CaSO3*0.5 H2O	2,435
CaSO4*0.5 H2O	913
CaCl2	71
CaF2	14
OTHER SOLIDS	110
FLYASH	1,870
TSS	7,068
H20	71
TOTAL	7,140
FLOW, FT3/HR	176
TEMP, DEG F	140-170

FLUE GAS

DESCRIPTION	UNITS	FURNACE	TO SCR	TO TURBO. REACTOR	FG FROM BAG-HOUSE	TO STACK	FG RECYCLE
STREAM #		2	8	11	13	15	16
TEMP	F		508	251	162	168	168
PRESS	IWG		2.2	4	1	1	1
FLOW	ACFM		212,413	250,239	231,961	172,518	52,558
	SCFM, WET		115,236	180,574	169,169	145,403	43,766
MASS FLOW	LB/HR		522,203	823,334	849,403	655,689	193,714
SO2	PPMVD @ 3% O2	2114	2108	1615	105	105	105
SO3	PPMVD @ 3% O2		6	13	0.4	0.4	0.4
NH3	PPMVD @ 3% O2		2		2	2	
NOX AS NO2	PPMVD @ 3% O2	190	190			190	
HCL	PPMVD @ 3% O2			6.2	3	3	3
HF	PPMVD @ 3% O2			2.2	1	1	1
ASH	GR/SCF, DRY			1.5	0.01	0.01	0.01

FUEL

DESCRIPTION	COAL	WOOD	BLENDED FUEL
HHV	13,097	8,592	12,405
CARBON, wt%	72.17	45.13	68.14
HYDROGEN, wt%	4.79	5.78	4.94
NITROGEN, wt%	1.36	2.8	1.57
CHLORINE, wt%	0.1	0.22	0.12
SULFUR, wt%	2.9	0.2	2.5
OXYGEN, wt%	5.04	38.72	10.05
MOISTURE, wt%	5.8	6.3	5.87
ASH, wt%	7.85	0.82	6.8
MASS FLOW, LB/HR			33,571

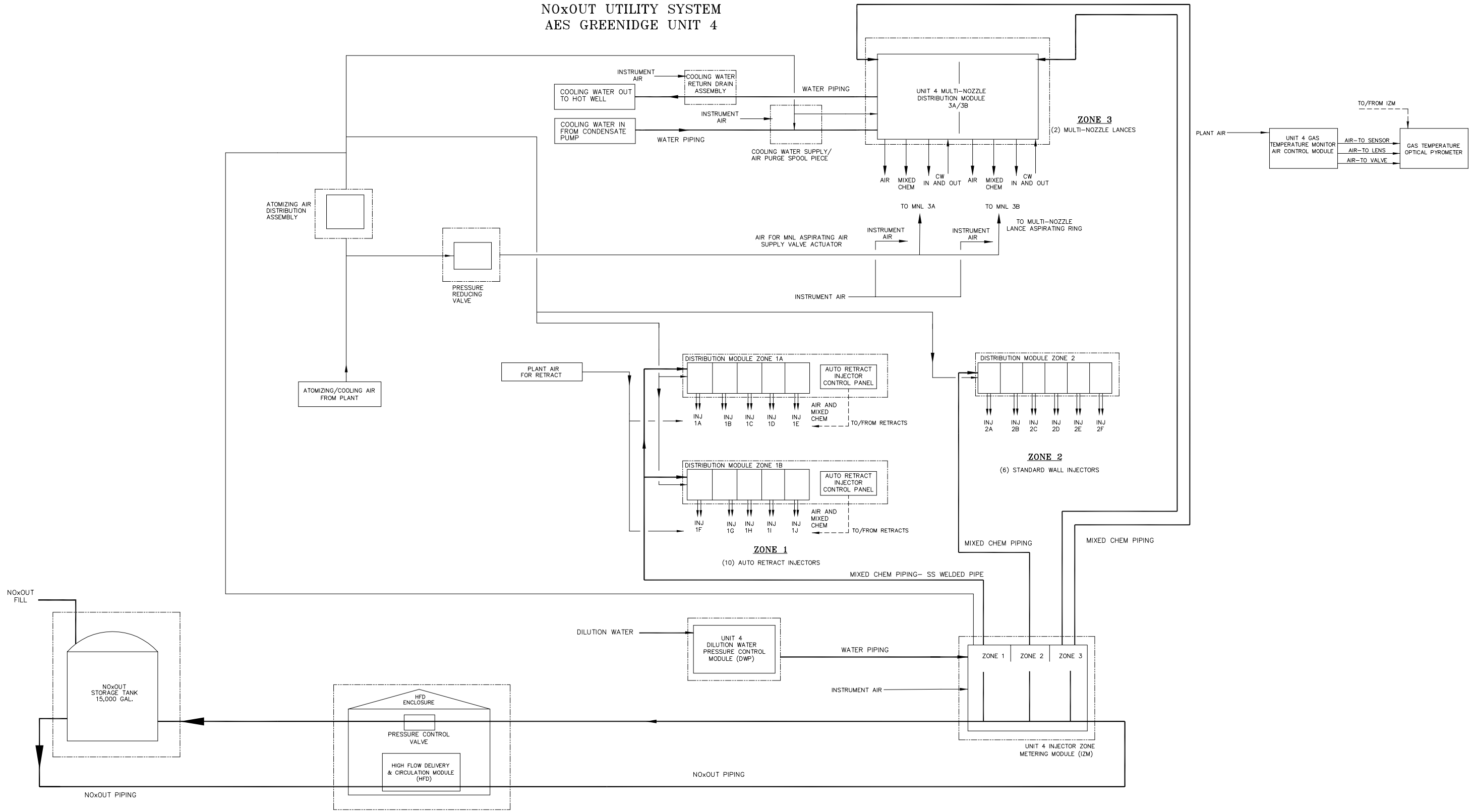
STANDARD CONDITIONS:
SCF: 68°F, 1 ATM AND ACTUAL MOISTURE

BABCOCK POWER ENVIRONMENTAL INC.

PROCESS FLOW DIAGRAM – LOW LOAD
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
CLAYTON A. ERICKSON
10/12/06

DWG. NO. 100276-SK101206-03

GENERAL OVERVIEW OF PROCESS FLOW
NOxOUT UTILITY SYSTEM
AES GREENIDGE UNIT 4



NO.	DATE	REVISIONS	DRAWN BY	CHECKED BY

FUEL TECH™
Technology for a renewed environment™
FUEL TECH, Inc. 27601 BELLA VISTA PKWY WARRENVILLE, IL 60555

AES GREENIDGE #4
DRESDEN, NEW YORK

NOxOUT UTILITY SYSTEM
SYSTEM OVERVIEW SHEET 1

APPROVED BY:
DESIGNED BY:
DRAWN BY:
CHECKED BY:
DATE:
SCALE: NONE
SIZE: D
DRAWING NO.

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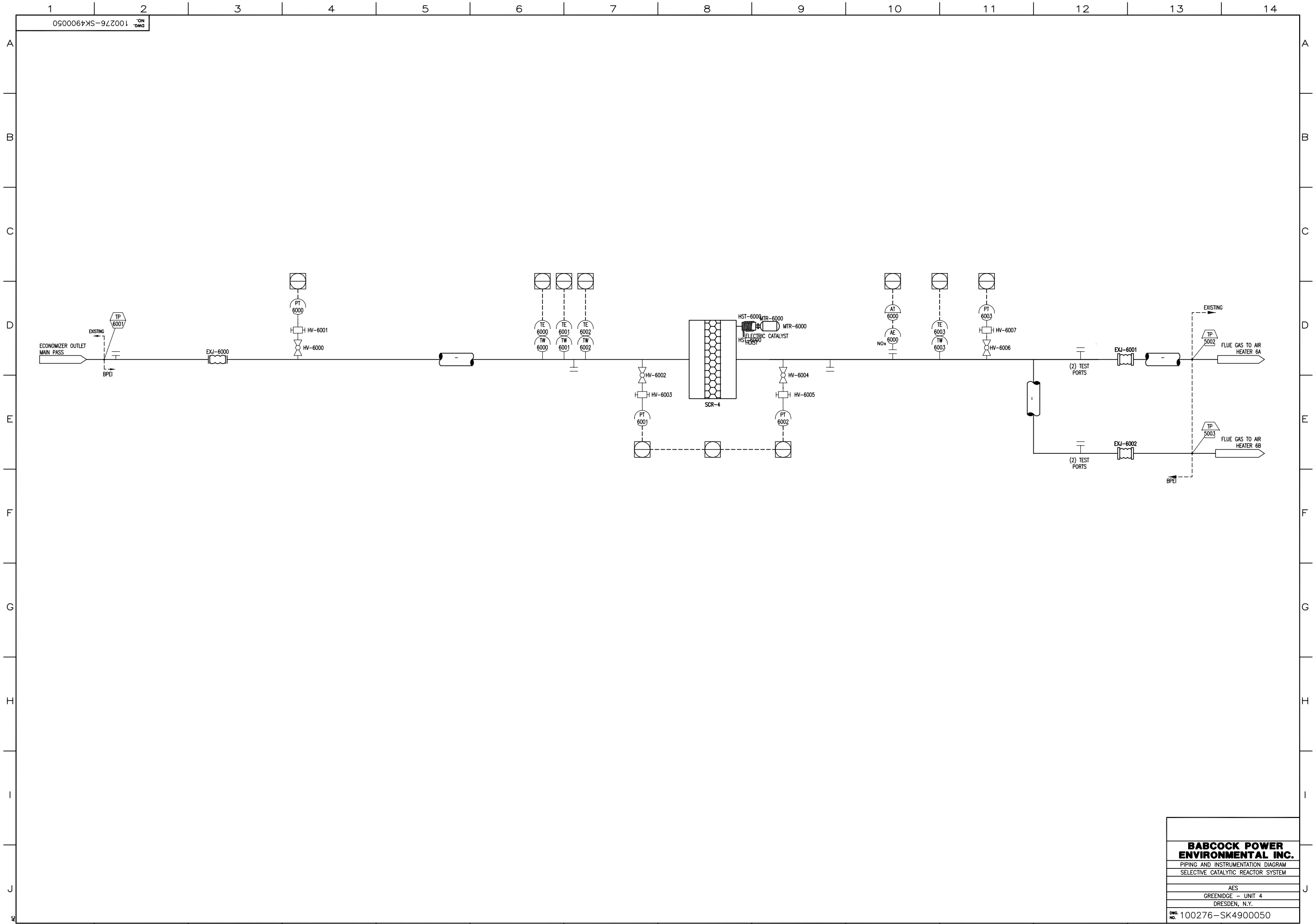
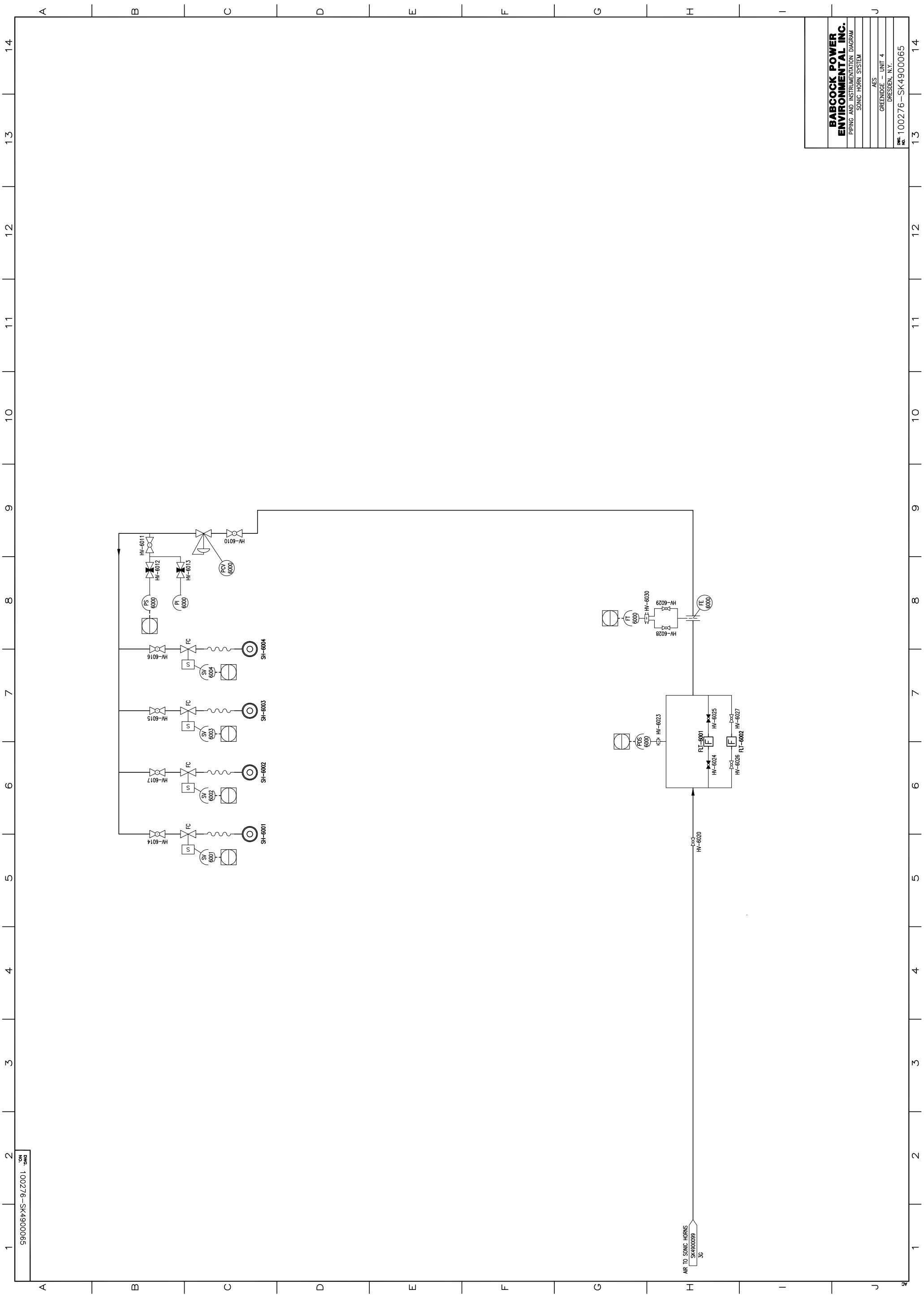
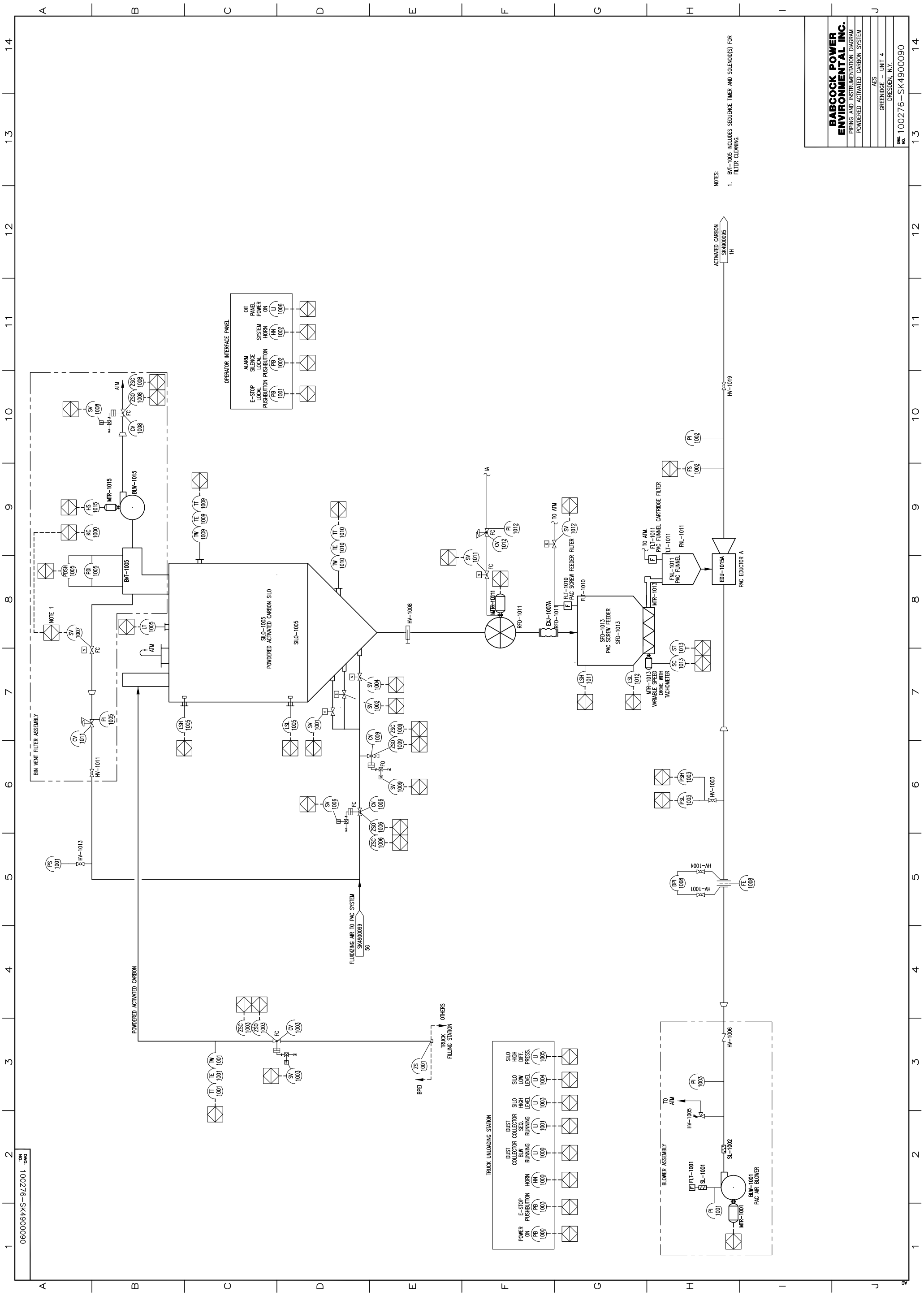
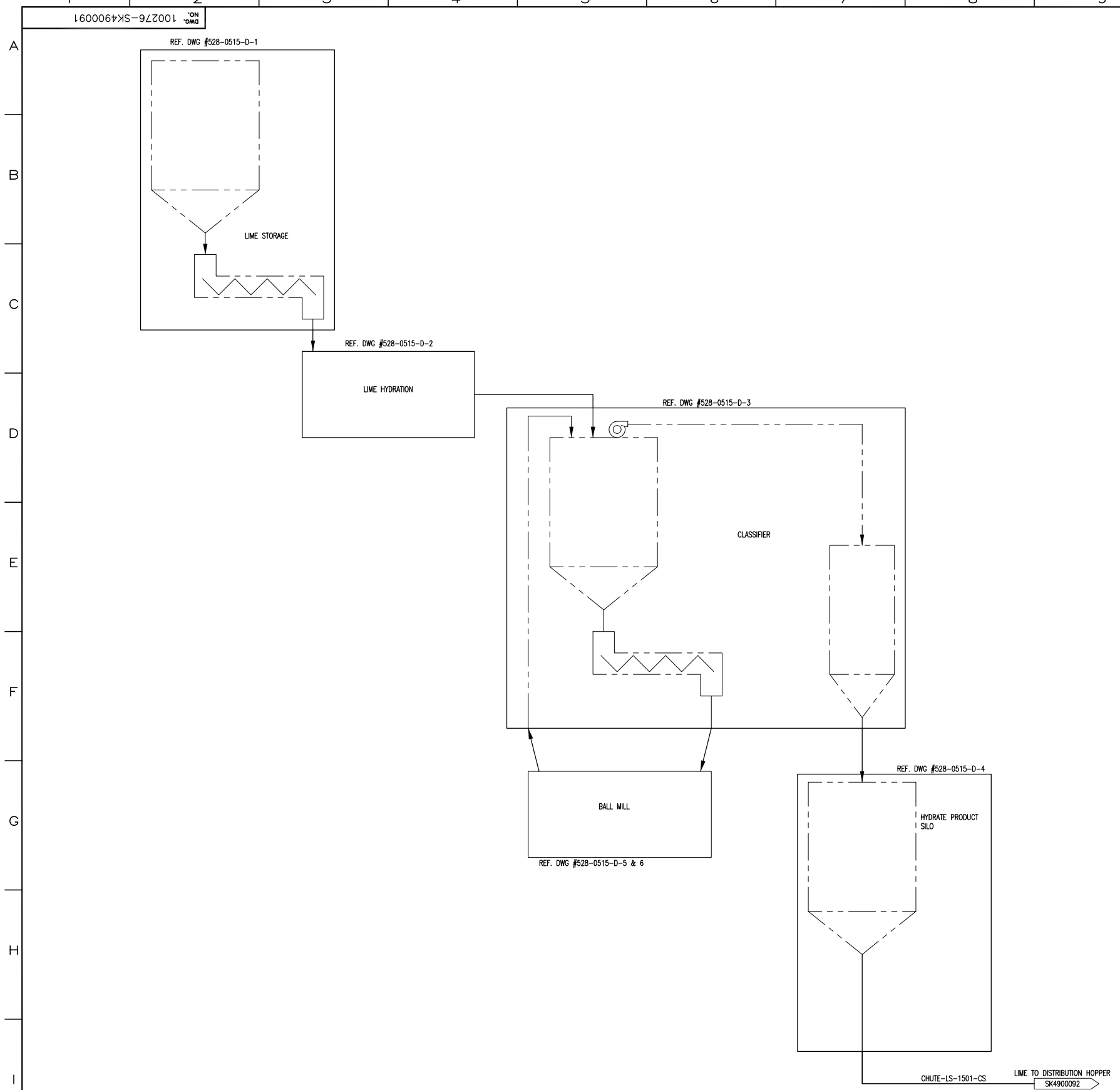

DWG. NO. 100276-SK4900050
ECONOMIZER OUTLET MAIN PASS
EXISTING
TP 6001
BPEI
EXJ-6000
PT 6000
HV-6001
HV-6000
TE 6000
TW 6000
TE 6001
TW 6001
TE 6002
TW 6002
HV-6002
HV-6003
PT 6001
SCR-4
HST-6000
MTR-6000
ELECTRIC CATALYST HOIST
HS-6000
HV-6004
HV-6005
PT 6002
AT 6000
AE 6000
NOx
TE 6003
TW 6003
PT 6003
HV-6007
HV-6006
(2) TEST PORTS
EXJ-6001
EXJ-6002
TP 5002
TP 5003
FLUE GAS TO AIR HEATER 6A
FLUE GAS TO AIR HEATER 6B
BABCOCK POWER ENVIRONMENTAL INC.
PIPING AND INSTRUMENTATION DIAGRAM
SELECTIVE CATALYTIC REACTOR SYSTEM
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
DWG. NO. 100276-SK4900050


BABCOCK POWER ENVIRONMENTAL INC.
PIPING AND INSTRUMENTATION DIAGRAM
SONIC HORN SYSTEM
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
DWG. NO. 100276–SK4900065
HV-6010
PCV 6000
HV-6011
HV-6012
HV-6013
PS 6000
PI 6000
HV-6014
HV-6015
HV-6016
HV-6017
FC
S
SV 6001
SV 6002
SV 6003
SV 6004
SH-6001
SH-6002
SH-6003
SH-6004
HV-6020
PDS 6000
HV-6023
FLT-6001
FLT-6002
HV-6024
HV-6025
HV-6026
HV-6027
FT 6000
HV-6028
HV-6029
HV-6030
FE 6000
AIR TO SONIC HORNS
SK4900099
3G
DWG. NO. 100276–SK4900065


BABCOCK POWER ENVIRONMENTAL INC.
PIPING AND INSTRUMENTATION DIAGRAM
POWDERED ACTIVATED CARBON SYSTEM
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
DWG. NO. 100276-SK4900090
NOTES:
1. BVF-1005 INCLUDES SEQUENCE TIMER AND SOLENOID(S) FOR FILTER CLEANING.
BIN VENT FILTER ASSEMBLY
OPERATOR INTERFACE PANEL
E-STOP LOCAL PUSHBUTTON
ALARM SILENCE LOCAL PUSHBUTTON
SYSTEM HORN
OIT PANEL POWER ON
SILO-1005
POWDERED ACTIVATED CARBON SILO
BVF-1005
BLW-1015
MTR-1015
ACTIVATED CARBON
SK4900095
HV-1019
FLUIDIZING AIR TO PAC SYSTEM
SK4900099
POWDERED ACTIVATED CARBON
TRUCK FILLING STATION
OTHERS
BPEI
TRUCK UNLOADING STATION
POWER ON
E-STOP PUSHBUTTON
HORN
DUST COLLECTOR BLW RUNNING
DUST COLLECTOR SEQ. RUNNING
SILO HIGH LEVEL
SILO LOW LEVEL
SILO HIGH DIFF. PRESS.
BLOWER ASSEMBLY
BLW-1001
PAC AIR BLOWER
MTR-1001
FLT-1001
SL-1001
SL-1002
HV-1005
HV-1006
TO ATM
RFD-1011
EXJ-1007A
SFD-1013
PAC SCREW FEEDER
SFD-1013
FLT-1010
PAC SCREW FEEDER FILTER
MTR-1013
VARIABLE SPEED DRIVE WITH TACHOMETER
FNL-1011
PAC FUNNEL
FLT-1011
PAC FUNNEL CARTRIDGE FILTER
EDU-1015A
PAC EDUCTOR A
HV-1008
HV-1003
HV-1004
HV-1001
DWG. NO. 100276-SK4900090



NOTES:

1. FOR DETAILS REFER TO VENDOR DRAWINGS.

BABCOCK POWER ENVIRONMENTAL INC.

PIPING AND INSTRUMENTATION DIAGRAM

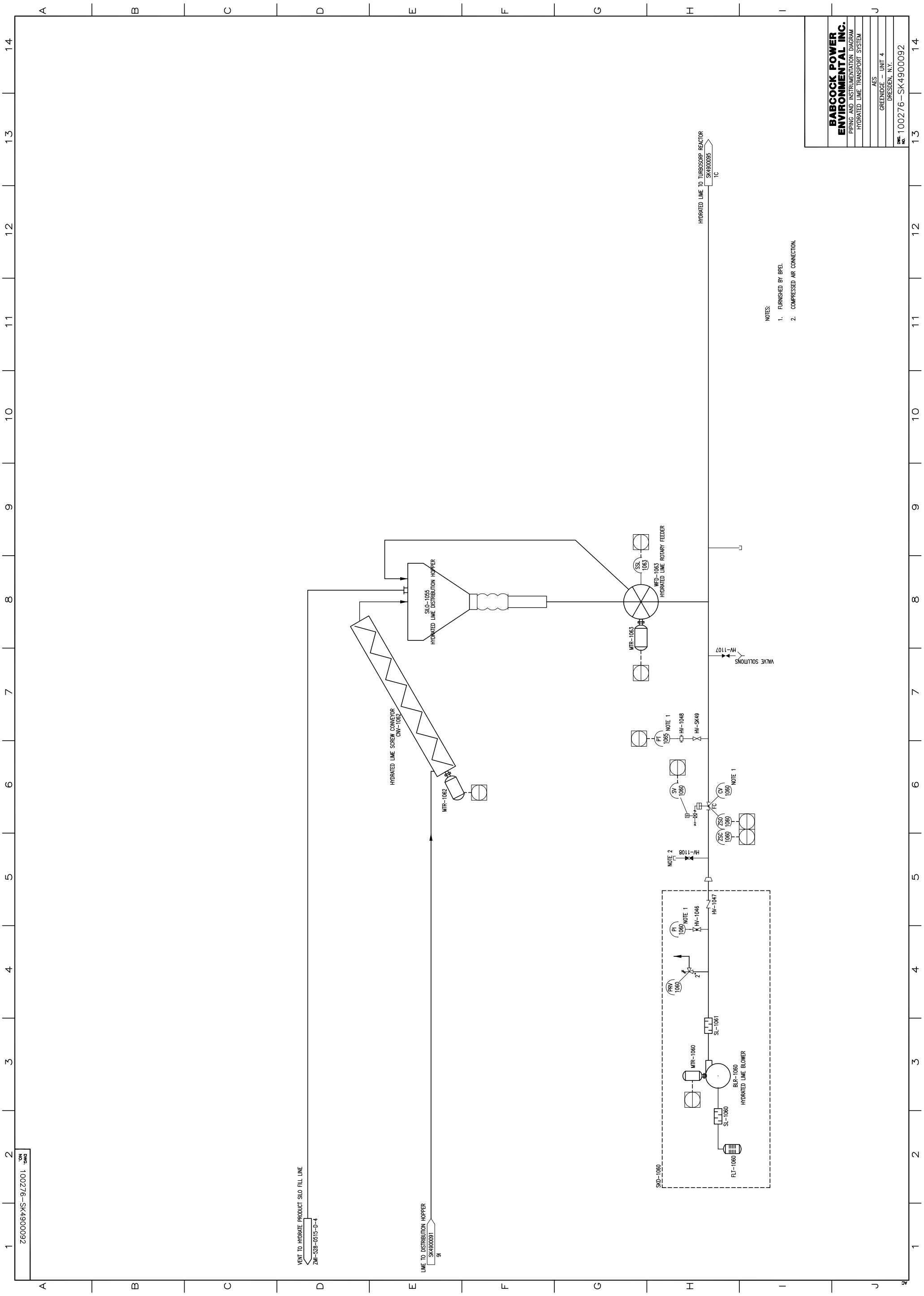
LIME PREPARATION SYSTEM

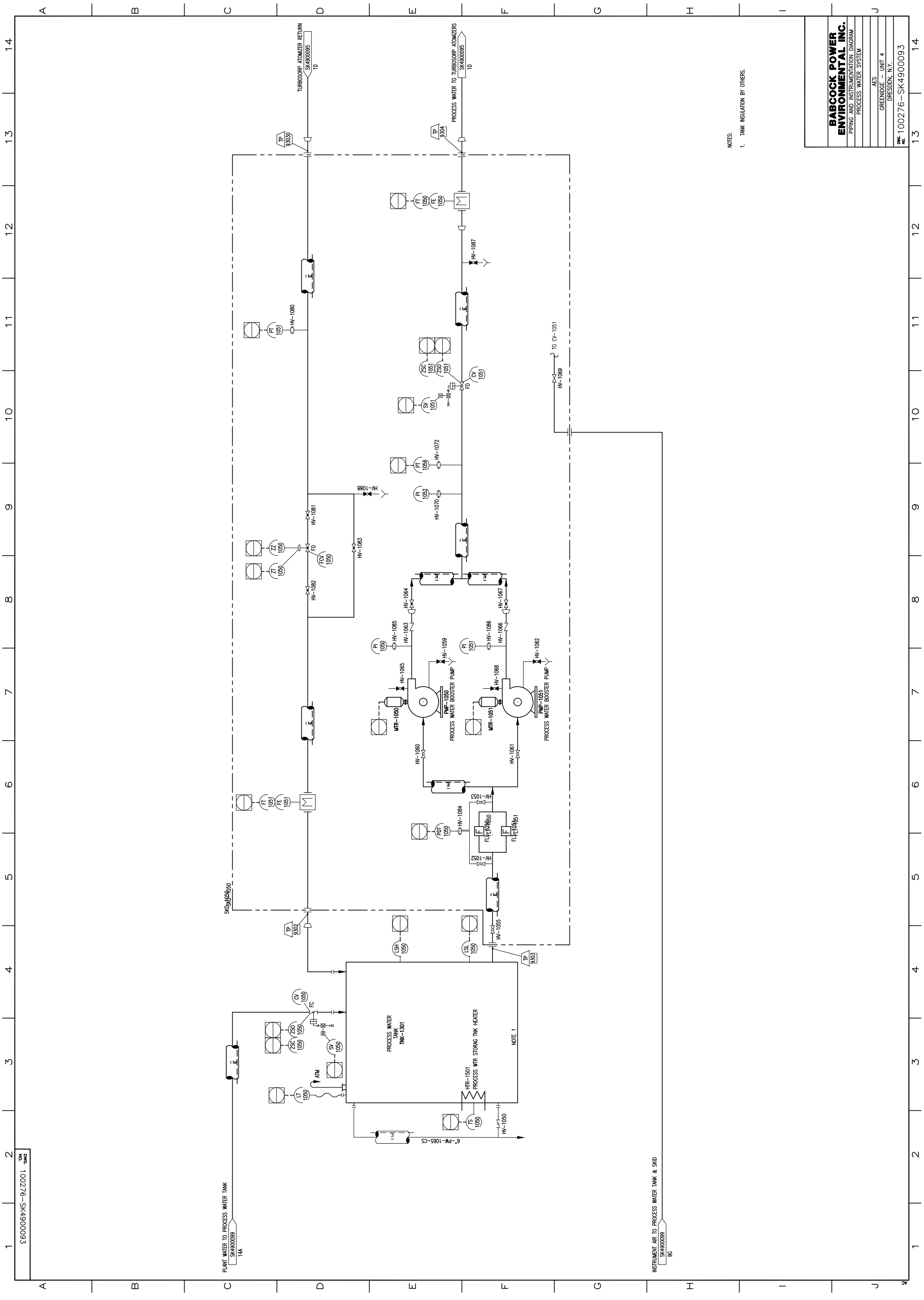
AES

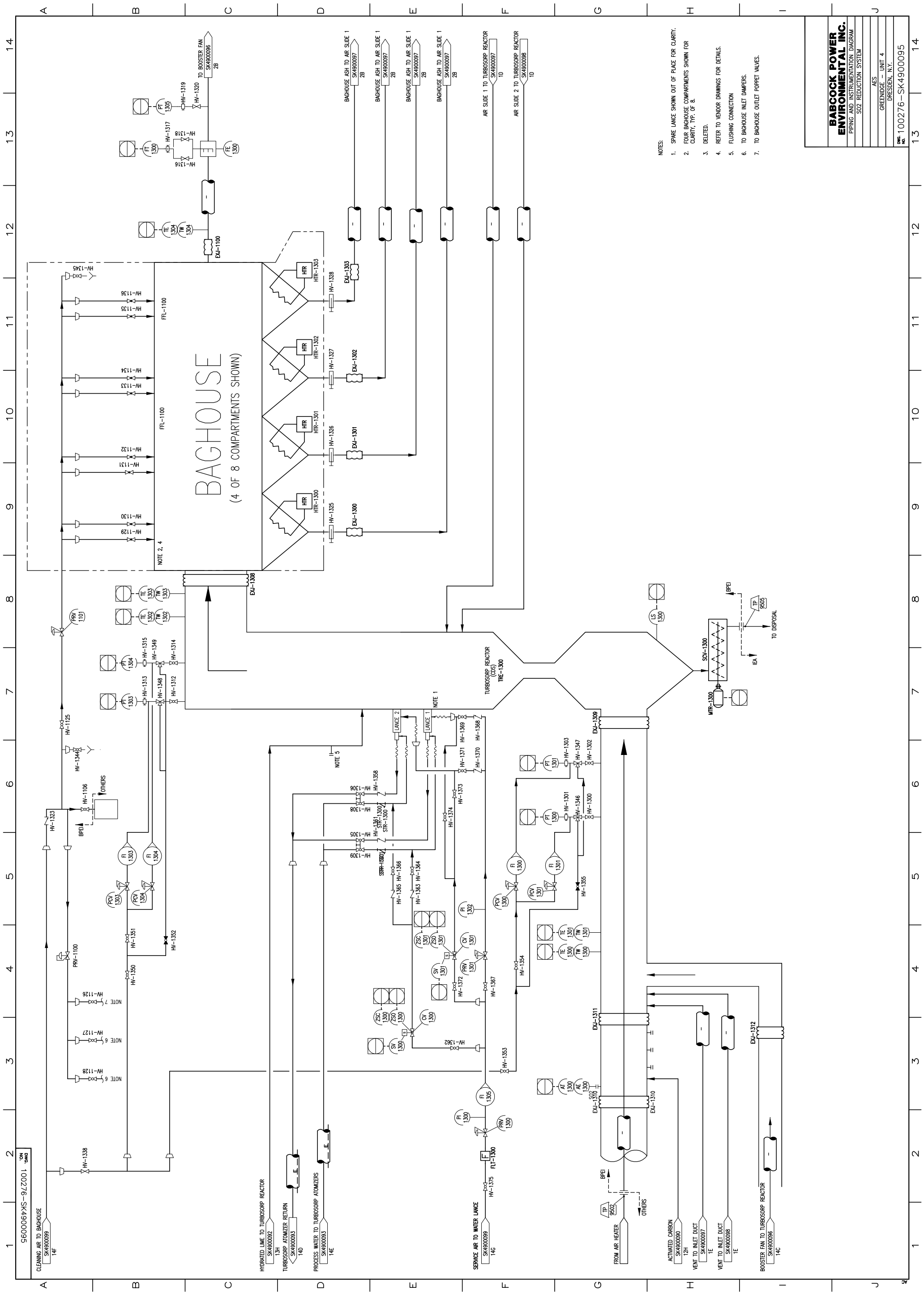
GREENIDGE – UNIT 4

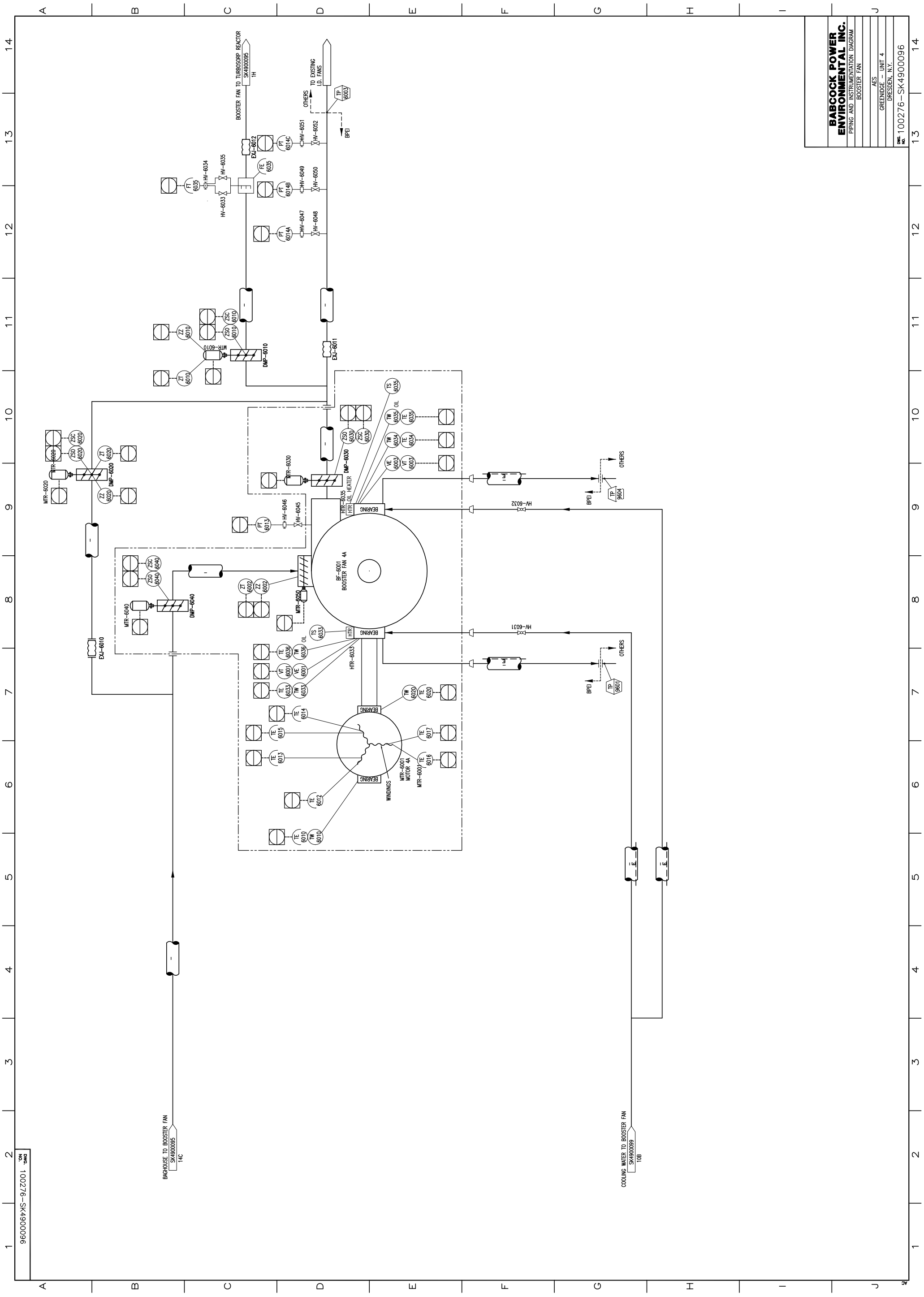
DRESDEN, N.Y.

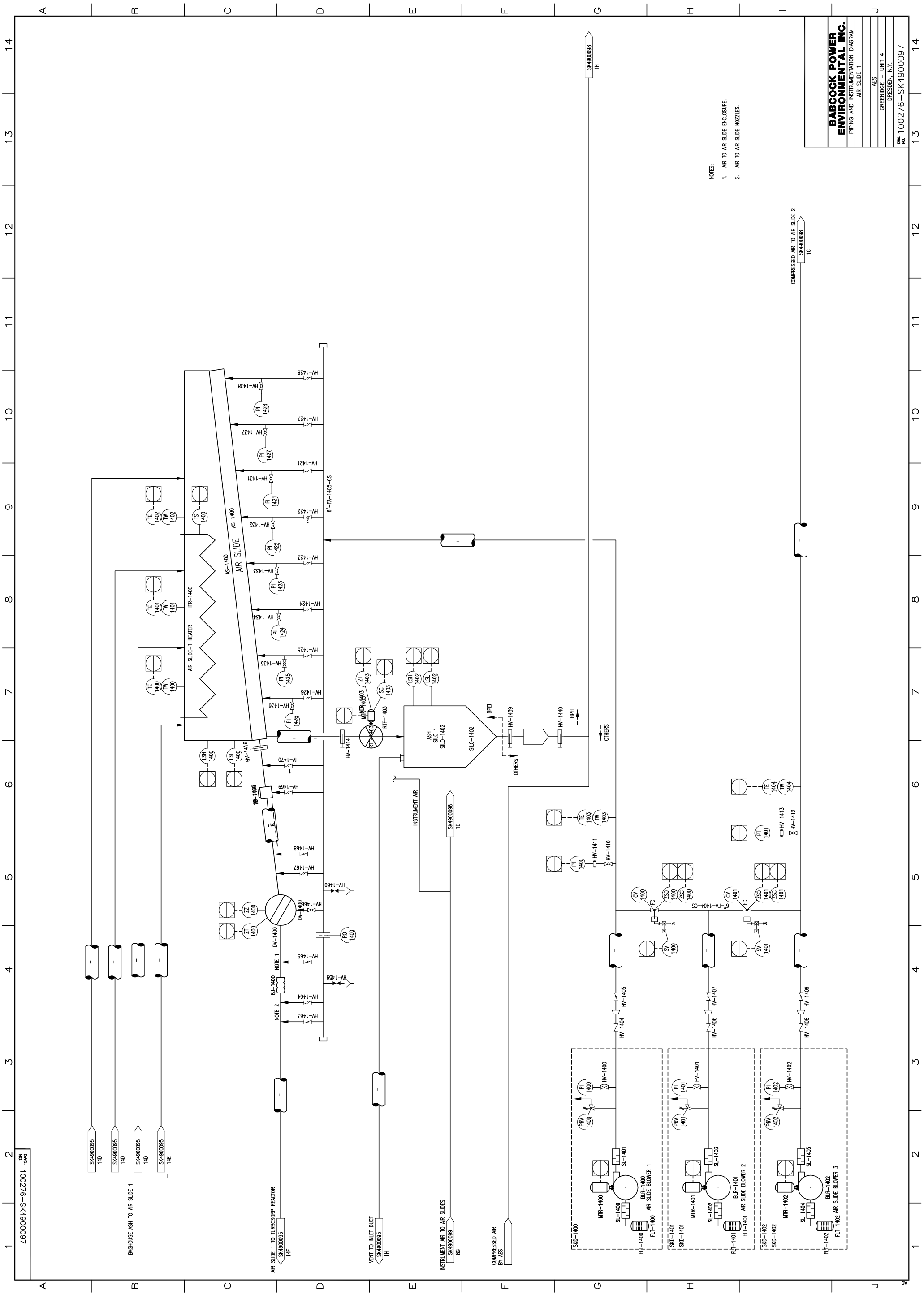
DWG. NO. 100276-SK4900091

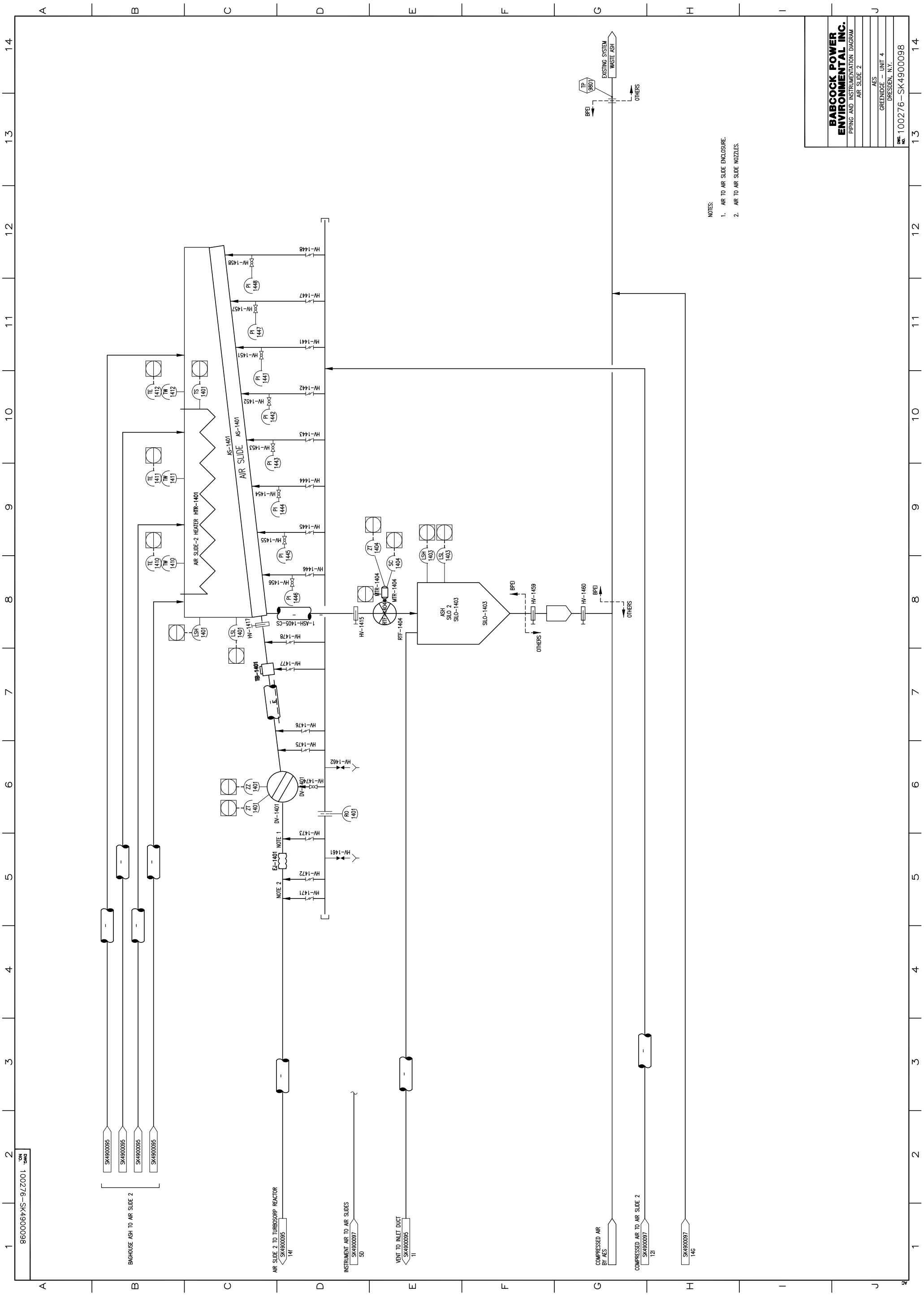

BABCOCK POWER ENVIRONMENTAL INC.
PIPING AND INSTRUMENTATION DIAGRAM
HYDRATED LIME TRANSPORT SYSTEM
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
DWG. NO. 100276–SK4900092
NOTES:
1. FURNISHED BY BPEI.
2. COMPRESSED AIR CONNECTION.
HYDRATED LIME TO TURBOSORP REACTOR
SK4900095
1C
SILO–1055
HYDRATED LIME DISTRIBUTION HOPPER
WFD–1063
HYDRATED LIME ROTARY FEEDER
SSL 1063
MTR–1063
HV–1107
VALVE SOLUTIONS
HYDRATED LIME SCREW CONVEYOR
CNV–1062
MTR–1062
PT 1065
NOTE 1
HV–1048
HV–SK49
SV 1060
CV 1060
NOTE 1
FC
ZSO 1060
ZSC 1060
NOTE 2
HV–1108
HV–1047
PI 1060
NOTE 1
HV–1046
PRV 1060
2"
SL–1061
MTR–1060
BLR–1060
HYDRATED LIME BLOWER
SL–1060
FLT–1060
SKID–1060
VENT TO HYDRATE PRODUCT SILO FILL LINE
ZMI–528–0515–D–4
LIME TO DISTRIBUTION HOPPER
SK4900091
9I
DWG. NO. 100276–SK4900092

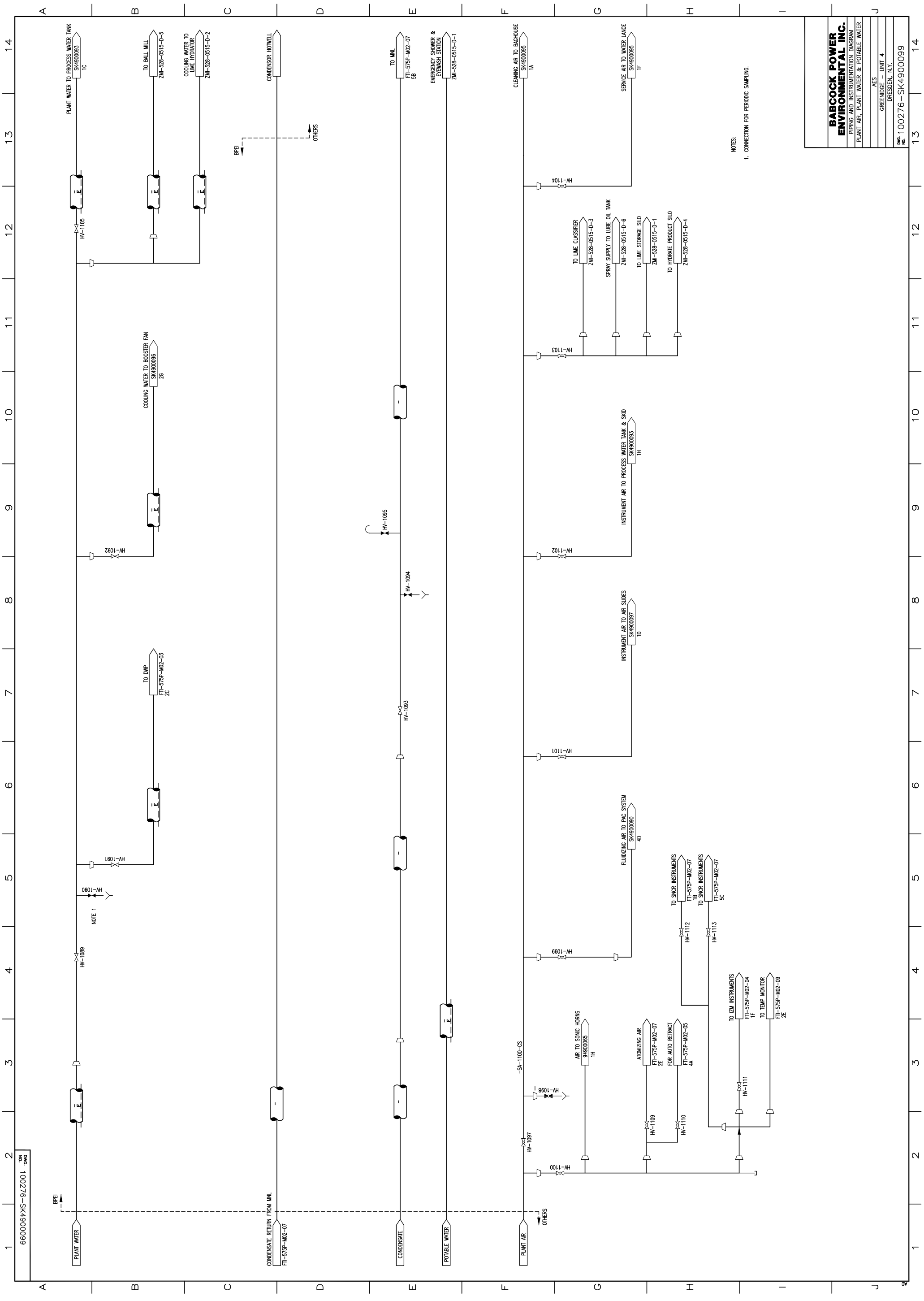

BABCOCK POWER ENVIRONMENTAL INC.
PIPING AND INSTRUMENTATION DIAGRAM
PROCESS WATER SYSTEM
AES
GREENIDGE - UNIT 4
DRESDEN, N.Y.
DWG. NO. 100276-SK4900093
NOTES:
1. TANK INSULATION BY OTHERS.
TURBOSORP ATOMIZER RETURN
SK4900095
1D
PROCESS WATER TO TURBOSORP ATOMIZERS
SK4900095
1D
TP 9303
TP 9302
TP 9304
TP 9303
PROCESS WATER TANK
TNK-1301
NOTE 1
HTR-1501
PROCESS WTR STORAG TNK HEATER
PROCESS WATER BOOSTER PUMP
PMP-1050
PMP-1051
MTR-1050
MTR-1051
PLANT WATER TO PROCESS WATER TANK
SK4900099
14A
INSTRUMENT AIR TO PROCESS WATER TANK & SKID
SK4900099
9G
6"-PW-1065-CS
TO CV-1051
DWG. NO. 100276-SK4900093

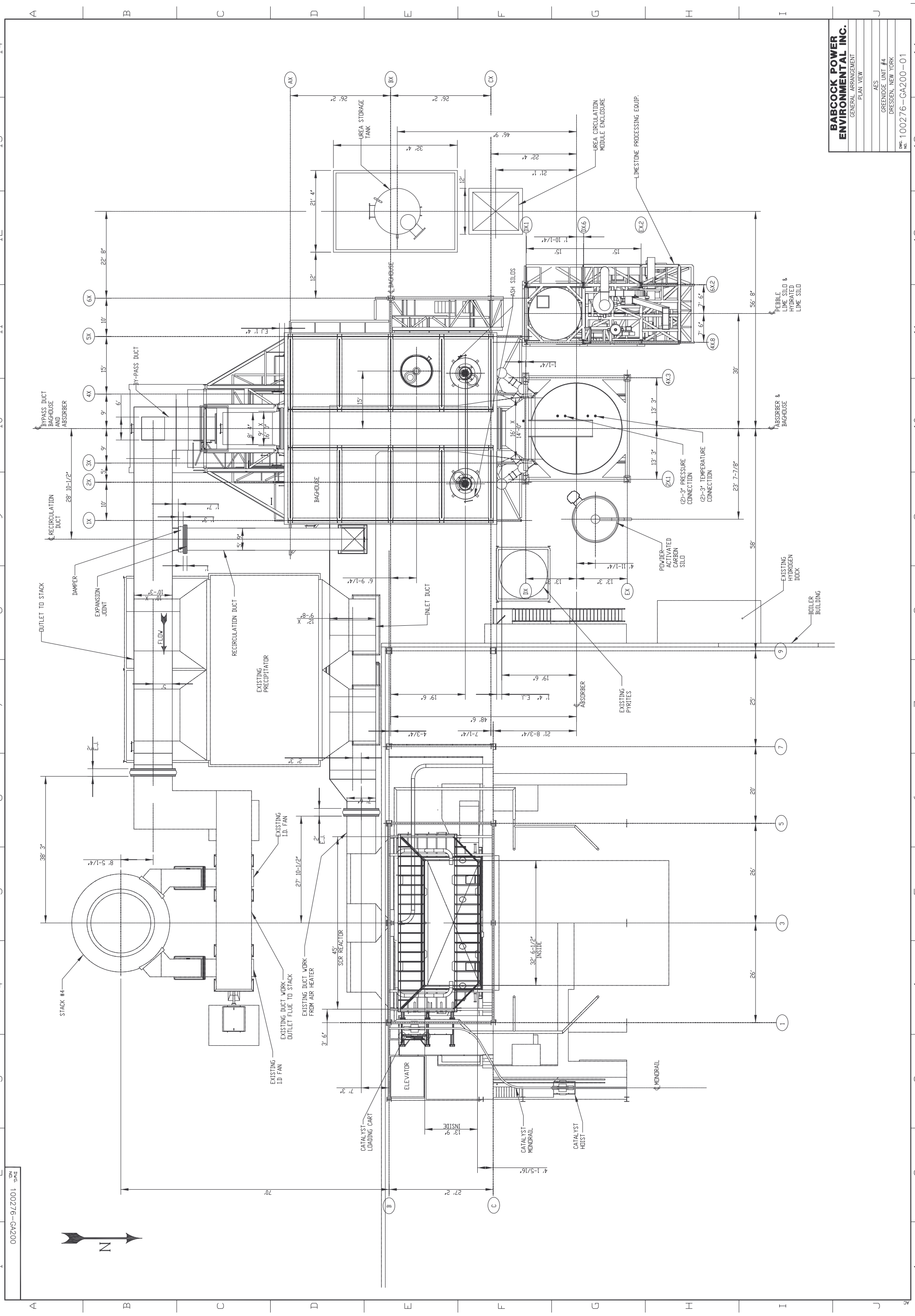

BABCOCK POWER ENVIRONMENTAL INC.
PIPING AND INSTRUMENTATION DIAGRAM
SO2 REDUCTION SYSTEM
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
DWG. NO. 100276-SK4900095
NOTES:
1. SPARE LANCE SHOWN OUT OF PLACE FOR CLARITY.
2. FOUR BAGHOUSE COMPARTMENTS SHOWN FOR CLARITY, TYP. OF 8.
3. DELETED.
4. REFER TO VENDOR DRAWINGS FOR DETAILS.
5. FLUSHING CONNECTION
6. TO BAGHOUSE INLET DAMPERS.
7. TO BAGHOUSE OUTLET POPPET VALVES.
BAGHOUSE
(4 OF 8 COMPARTMENTS SHOWN)
TURBOSORP REACTOR (CDS) TRE-1300
CLEANING AIR TO BAGHOUSE SK4900099 14F
HYDRATED LIME TO TURBOSORP REACTOR SK4900092 13H
TURBOSORP ATOMIZER RETURN SK4900093 14D
PROCESS WATER TO TURBOSORP ATOMIZERS SK4900093 14E
SERVICE AIR TO WATER LANCE SK4900099 14G
FROM AIR HEATER
ACTIVATED CARBON SK4900090 12H
VENT TO INLET DUCT SK4900097 1E
VENT TO INLET DUCT SK4900098 1E
BOOSTER FAN TO TURBOSORP REACTOR SK4900096 14C
TO BOOSTER FAN SK4900096 2B
BAGHOUSE ASH TO AIR SLIDE 1 SK4900097 2B
AIR SLIDE 1 TO TURBOSORP REACTOR SK4900097 1D
AIR SLIDE 2 TO TURBOSORP REACTOR SK4900098 1D
TO DISPOSAL
DWG. NO. 100276-SK4900095

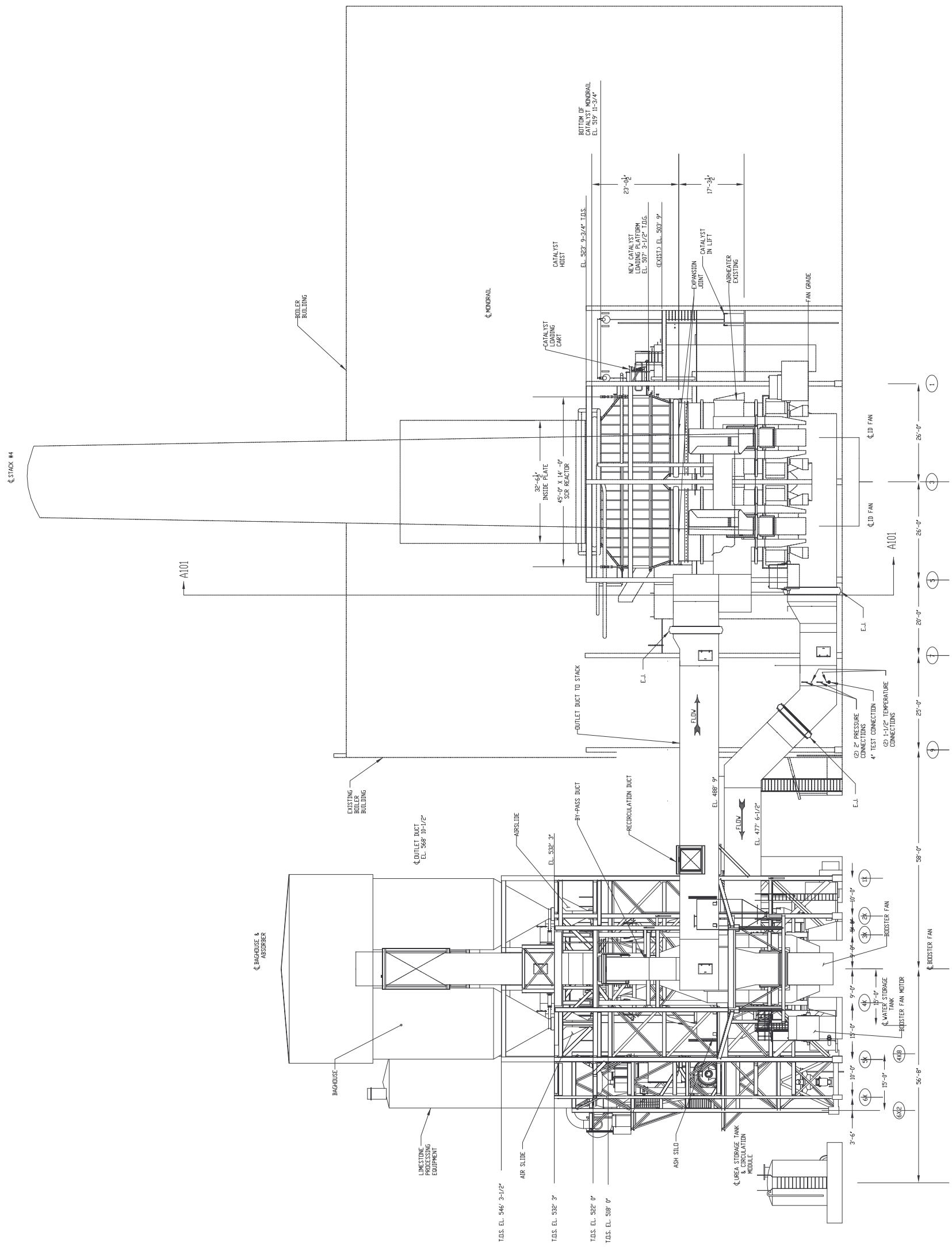

BABCOCK POWER ENVIRONMENTAL INC.
PIPING AND INSTRUMENTATION DIAGRAM
BOOSTER FAN
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
DWG. NO. 100276–SK4900096
BOOSTER FAN TO TURBOSORP REACTOR
SK4900095
1H
TO EXISTING I.D. FANS
OTHERS
TP 6003
BPEI
EXJ-6012
PT 6014C
HV-6051
HV-6052
FE 6035
PT 6014B
HV-6049
HV-6050
FT 6035
HV-6034
HV-6035
HV-6033
PT 6014A
HV-6047
HV-6048
ZSC 6010
ZSO 6010
ZZ 6010
ZT 6010
MTR-6010
DMP-6010
EXJ-6011
TS 6035
OIL
TW 6035
TE 6035
TW 6034
TE 6034
VE 6003
VT 6003
ZSO 6030
ZSC 6030
MTR-6030
DMP-6030
HTR-6035
HTR
OIL HEATER
BEARING
HV-6032
HV-6031
FT
TP 9604
TP 9601
ZSC 6020
ZSO 6020
ZT 6020
ZZ 6020
MTR-6020
DMP-6020
PT 6013
HV-6046
HV-6045
BF-6001
BOOSTER FAN 4A
ZSC 6040
ZSO 6040
MTR-6040
DMP-6040
ZT 6002
ZZ 6002
MTR-6050
EXJ-6010
TS 6033
TE 6036
TW 6036
VT 6001
VE 6001
TE 6033
TW 6033
HTR-6033
TW 6020
TE 6020
TE 6014
TE 6015
TE 6013
TE 6017
TE 6016
TE 6012
TE 6010
TW 6010
WINDINGS
MTR-6001
MOTOR 4A
MTR-6001
BAGHOUSE TO BOOSTER FAN
SK4900095
14C
COOLING WATER TO BOOSTER FAN
SK4900099
10B
DWG. NO. 100276–SK4900096

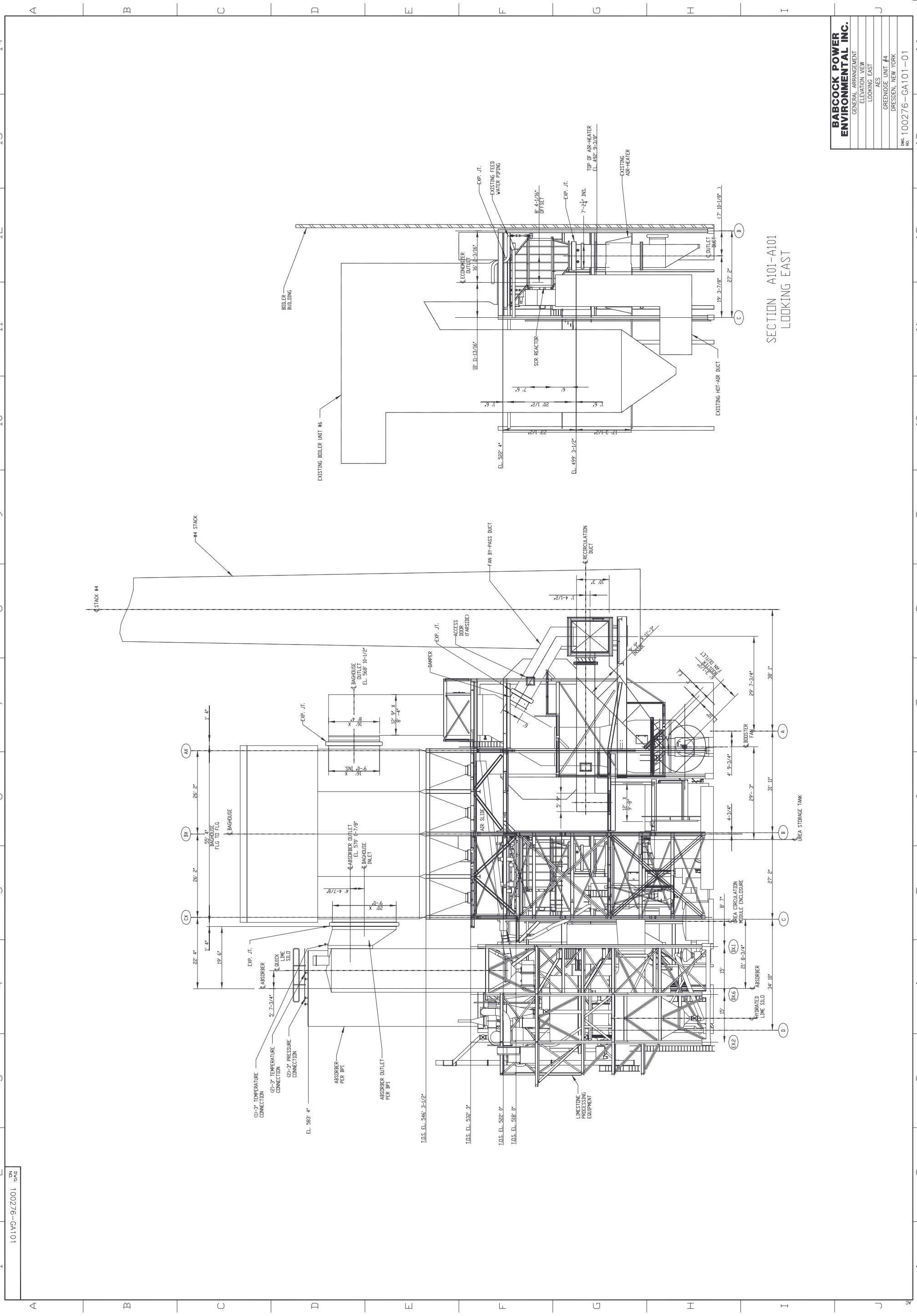

BABCOCK POWER ENVIRONMENTAL INC.
PIPING AND INSTRUMENTATION DIAGRAM
AIR SLIDE 1
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
DWG. NO. 100276–SK4900097
NOTES:
1. AIR TO AIR SLIDE ENCLOSURE.
2. AIR TO AIR SLIDE NOZZLES.
AIR SLIDE
AS–1400
AIR SLIDE–1 HEATER
HTR–1400
6"–FA–1405–CS
ASH SILO 1 SILO–1402
SILO–1402
RTF–1403
HV–1414
HV–1416
HV–1439
HV–1440
BPEI
OTHERS
INSTRUMENT AIR
COMPRESSED AIR TO AIR SLIDE 2
SK4900098 1G
SK4900098 1H
SK4900098 1D
SK4900095 14D
SK4900095 14E
BAGHOUSE ASH TO AIR SLIDE 1
AIR SLIDE 1 TO TURBOSORP REACTOR
SK4900095 14F
VENT TO INLET DUCT
SK4900095 1H
INSTRUMENT AIR TO AIR SLIDES
SK4900099 8G
COMPRESSED AIR BY AES
6"–FA–1404–CS
DV–1400
EJ–1400
NOTE 1
NOTE 2
SKD–1400
SKD–1401
SKD–1402
BLR–1400 AIR SLIDE BLOWER 1
BLR–1401 AIR SLIDE BLOWER 2
BLR–1402 AIR SLIDE BLOWER 3
MTR–1400
MTR–1401
MTR–1402
FLT–1400
FLT–1401
FLT–1402
HV–1404
HV–1405
HV–1406
HV–1407
HV–1408
HV–1409
HV–1410
HV–1411
HV–1412
HV–1413

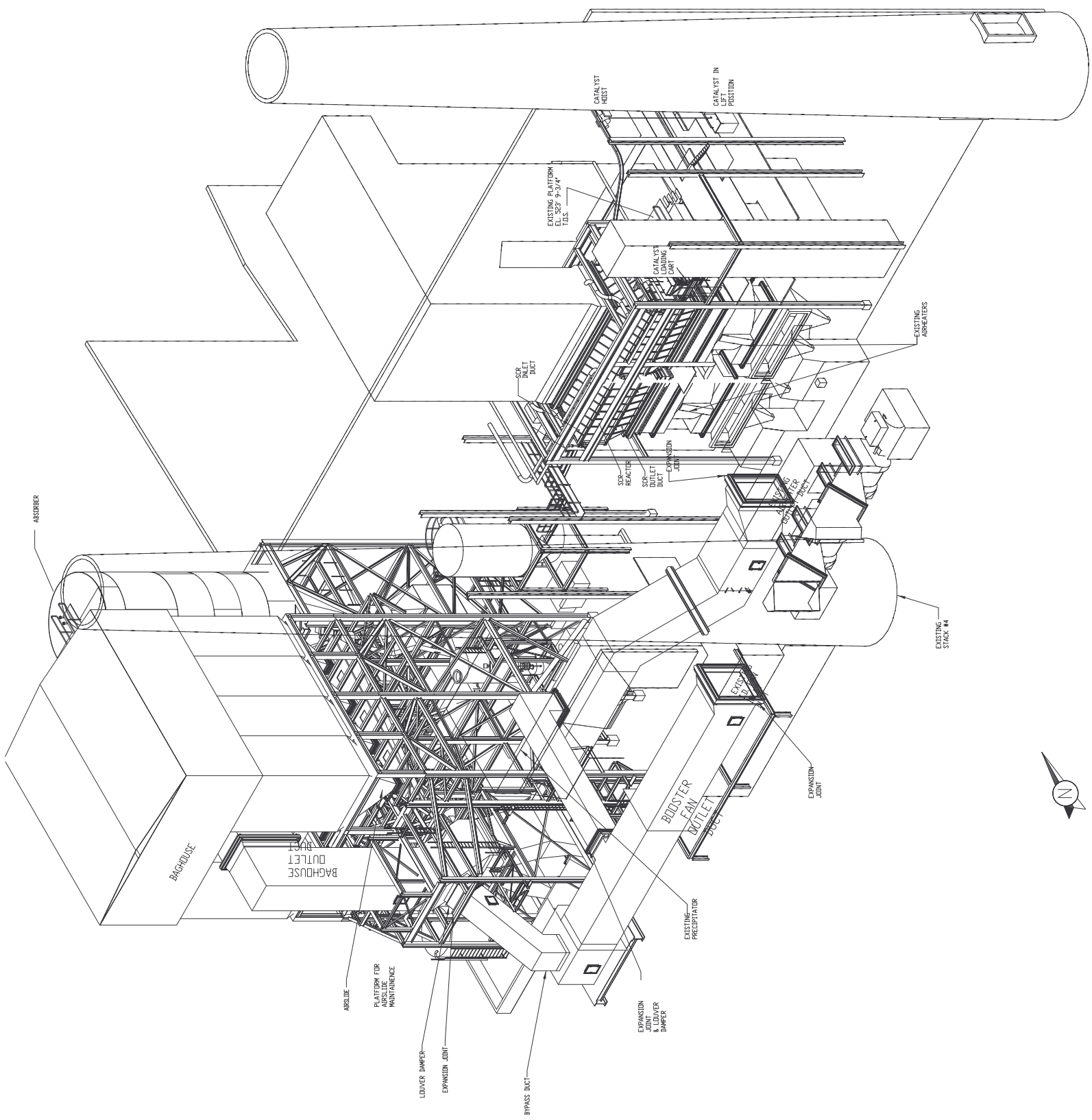

BABCOCK POWER ENVIRONMENTAL INC.
PIPING AND INSTRUMENTATION DIAGRAM
AIR SLIDE 2
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
DWG. NO. 100276–SK4900098
NOTES:
1. AIR TO AIR SLIDE ENCLOSURE.
2. AIR TO AIR SLIDE NOZZLES.
EXISTING SYSTEM WASTE ASH
TP 3801
BPEI
OTHERS
AIR SLIDE AS-1401
AIR SLIDE-2 HEATER HTR-1401
ASH SILO 2 SILO-1403
SILO-1403
HV-1459
HV-1460
HV-1415
RTF-1404
MTR-1404
1-ASH-1405-CS
DV-1401
EJ-1401
NOTE 1
NOTE 2
BAGHOUSE ASH TO AIR SLIDE 2
SK4900095
AIR SLIDE 2 TO TURBOSORP REACTOR
SK4900095
14F
INSTRUMENT AIR TO AIR SLIDES
SK4900097
5D
VENT TO INLET DUCT
SK4900095
1I
COMPRESSED AIR BY AES
COMPRESSED AIR TO AIR SLIDE 2
SK4900097
12I
SK4900097
14G
DWG. NO. 100276–SK4900098


BABCOCK POWER ENVIRONMENTAL INC.
PIPING AND INSTRUMENTATION DIAGRAM
PLANT AIR, PLANT WATER & POTABLE WATER
AES
GREENIDGE – UNIT 4
DRESDEN, N.Y.
DWG. NO. 100276–SK4900099
NOTES:
1. CONNECTION FOR PERIODIC SAMPLING.
PLANT WATER
PLANT WATER TO PROCESS WATER TANK
SK4900093
1C
HV-1105
TO BALL MILL
ZMI-528-0515-D-5
COOLING WATER TO LIME HYDRATOR
ZMI-528-0515-D-2
CONDENSOR HOTWELL
BPEI
OTHERS
COOLING WATER TO BOOSTER FAN
SK4900096
2G
HV-1092
TO DMP
FTI-575P-M02-03
2C
HV-1091
HV-1090
NOTE 1
HV-1089
CONDENSATE RETURN FROM MNL
FTI-575P-M02-07
CONDENSATE
TO MNL
FTI-575P-M02-07
5B
HV-1095
HV-1094
HV-1093
POTABLE WATER
EMERGENCY SHOWER & EYEWASH STATION
ZMI-528-0515-D-1
PLANT AIR
CLEANING AIR TO BAGHOUSE
SK4900095
1A
SERVICE AIR TO WATER LANCE
SK4900095
1F
HV-1104
TO LIME CLASSIFIER
ZMI-528-0515-D-3
SPRAY SUPPLY TO LUBE OIL TANK
ZMI-528-0515-D-6
TO LIME STORAGE SILO
ZMI-528-0515-D-1
TO HYDRATE PRODUCT SILO
ZMI-528-0515-D-4
HV-1103
INSTRUMENT AIR TO PROCESS WATER TANK & SKID
SK4900093
1H
HV-1102
INSTRUMENT AIR TO AIR SLIDES
SK4900097
1D
HV-1101
FLUIDIZING AIR TO PAC SYSTEM
SK4900090
4D
HV-1099
TO SNCR INSTRUMENTS
FTI-575P-M02-07
1B
TO SNCR INSTRUMENTS
FTI-575P-M02-07
5C
HV-1112
HV-1113
-SA-1100-CS
AIR TO SONIC HORNS
94900065
1H
ATOMIZING AIR
FTI-575P-M02-07
2E
FOR AUTO RETRACT
FTI-575P-M02-05
4A
TO IZM INSTRUMENTS
FTI-575P-M02-04
1F
TO TEMP MONITOR
FTI-575P-M02-09
2E
HV-1111
HV-1109
HV-1110
HV-1098
HV-1097
HV-1100


BABCOCK POWER ENVIRONMENTAL INC.
GENERAL ARRANGEMENT
PLAN VIEW
AES
GREENIDGE UNIT #4
DRESDEN, NEW YORK
DWG. NO. 100276-GA200-01
UREA STORAGE TANK
UREA CIRCULATION MODULE ENCLOSURE
LIMESTONE PROCESSING EQUIP.
BAGHOUSE
ASH SILOS
PEBBLE LIME SILO & HYDRATED LIME SILO
BYPASS DUCT BAGHOUSE AND ABSORBER
BY-PASS DUCT
ABSORBER & BAGHOUSE
(2)-3" PRESSURE CONNECTION
(2)-3" TEMPERATURE CONNECTION
RECIRCULATION DUCT
POWDER ACTIVATED CARBON SILO
EXISTING HYDROGEN DOCK
BOILER BUILDING
DAMPER
EXPANSION JOINT
OUTLET TO STACK
FLOW
RECIRCULATION DUCT
EXISTING PRECIPITATOR
INLET DUCT
ABSORBER
EXISTING PYRITES
EXISTING I.D. FAN
EXISTING DUCT WORK FROM AIR HEATER
EXISTING DUCT WORK OUTLET FLUE TO STACK
SCR REACTOR
STACK #4
ELEVATOR
CATALYST LOADING CART
CATALYST MONORAIL
CATALYST HOIST
MONORAIL
N
DWG. NO. 100276-GA200


BABCOCK POWER ENVIRONMENTAL INC.
GENERAL ARRANGEMENT
ELEVATION VIEW
LOOKING NORTH
AES
GREENIDGE UNIT #4
DRESDEN, NEW YORK
DWG. NO. 100276-GA100-01
VIEW LOOKING NORTH
℄ STACK #4
BOILER BUILDING
℄ MONORAIL
CATALYST HOIST
CATALYST LOADING CART
BOTTOM OF CATALYST MONORAIL EL. 519' 11-3/4"
EL. 523' 9-3/4" T.O.S.
NEW CATALYST LOADING PLATFORM EL. 507' 3-1/2" T.O.G.
(EXIST.) EL. 503' 9"
EXPANSION JOINT
CATALYST IN LIFT
AIRHEATER EXISTING
FAN GRADE
℄ ID FAN
INSIDE PLATE
45'-0" X 14'-0" SCR REACTOR
A101
E.J.
OUTLET DUCT TO STACK
FLOW
(2) 2" PRESSURE CONNECTIONS
(2) 1-1/2" TEMPERATURE CONNECTIONS
4" TEST CONNECTION
EXISTING BOILER BUILDING
℄ OUTLET DUCT EL. 568' 10-1/2"
AIRSLIDE
EL. 532' 3"
BY-PASS DUCT
RECIRCULATION DUCT
EL. 488' 9"
EL. 477' 6-1/2"
℄ BAGHOUSE & ABSORBER
BAGHOUSE
BOOSTER FAN
℄ BOOSTER FAN
℄ WATER STORAGE TANK
BOOSTER FAN MOTOR
LIMESTONE PROCESSING EQUIPMENT
AIR SLIDE
ASH SILO
℄ UREA STORAGE TANK & CIRCULATION MODULE
T.O.S. EL. 546' 3-1/2"
T.O.S. EL. 532' 3"
T.O.S. EL. 522' 0"
T.O.S. EL. 518' 0"
58'-0"
56'-8"
DWG. NO. 100276-GA100


BABCOCK POWER ENVIRONMENTAL INC.
GENERAL ARRANGEMENT
ELEVATION VIEW
LOOKING EAST
AES
GREENIDGE UNIT #4
DRESDEN, NEW YORK
DWG. NO. 100276-GA101-01
SECTION A101-A101
LOOKING EAST
BOILER BUILDING
EXISTING BOILER UNIT #6
℄ ECONOMIZER OUTLET 16' 2-3/16"
10' 11-13/16"
EXP. JT.
EXISTING FEED WATER PIPING
8' 4-1/16" OFFSET
EXP. JT.
7'-2 1/4" INS.
TOP OF AIR-HEATER EL. 492' 9-3/8"
EXISTING AIR-HEATER
SCR REACTOR
℄ OUTLET DUCT
(7' 10-1/8")
19' 3-7/8"
27' 2"
EXISTING HOT-AIR DUCT
EL. 522' 4"
EL. 499' 3-1/2"
#4 STACK
℄ STACK #4
FAN BY-PASS DUCT
℄ RECIRCULATION DUCT
EXP. JT.
ACCESS DOOR (FARSIDE)
DAMPER
℄ BAGHOUSE OUTLET EL. 568' 10-1/2"
EXP. JT.
℄ BOOSTER FAN
℄ BAGHOUSE
55' 4" BAGHOUSE FLG TO FLG
℄ ABSORBER OUTLET EL. 570' 0-7/8"
℄ BAGHOUSE INLET
AIR SLIDE
℄ UREA STORAGE TANK
℄ UREA CIRCULATION MODULE ENCLOSURE
℄ ABSORBER
℄ QUICK LIME SILO
EXP. JT.
(1)-3" TEMPERATURE CONNECTION
(2)-3" TEMPERATURE CONNECTION
(2)-3" PRESSURE CONNECTION
EL. 583' 4"
ABSORBER PER BPI
ABSORBER OUTLET PER BPI
T.O.S. EL. 546' 3-1/2"
T.O.S. EL. 532' 3"
T.O.S. EL. 522' 0"
T.O.S. EL. 518' 0"
LIMESTONE PROCESSING EQUIPMENT
℄ HYDRATED LIME SILO
℄ ABSORBER
DWG. NO. 100276-GA101



BABCOCK POWER ENVIRONMENTAL INC.

ISO VIEW

LOOKING NORTH WEST

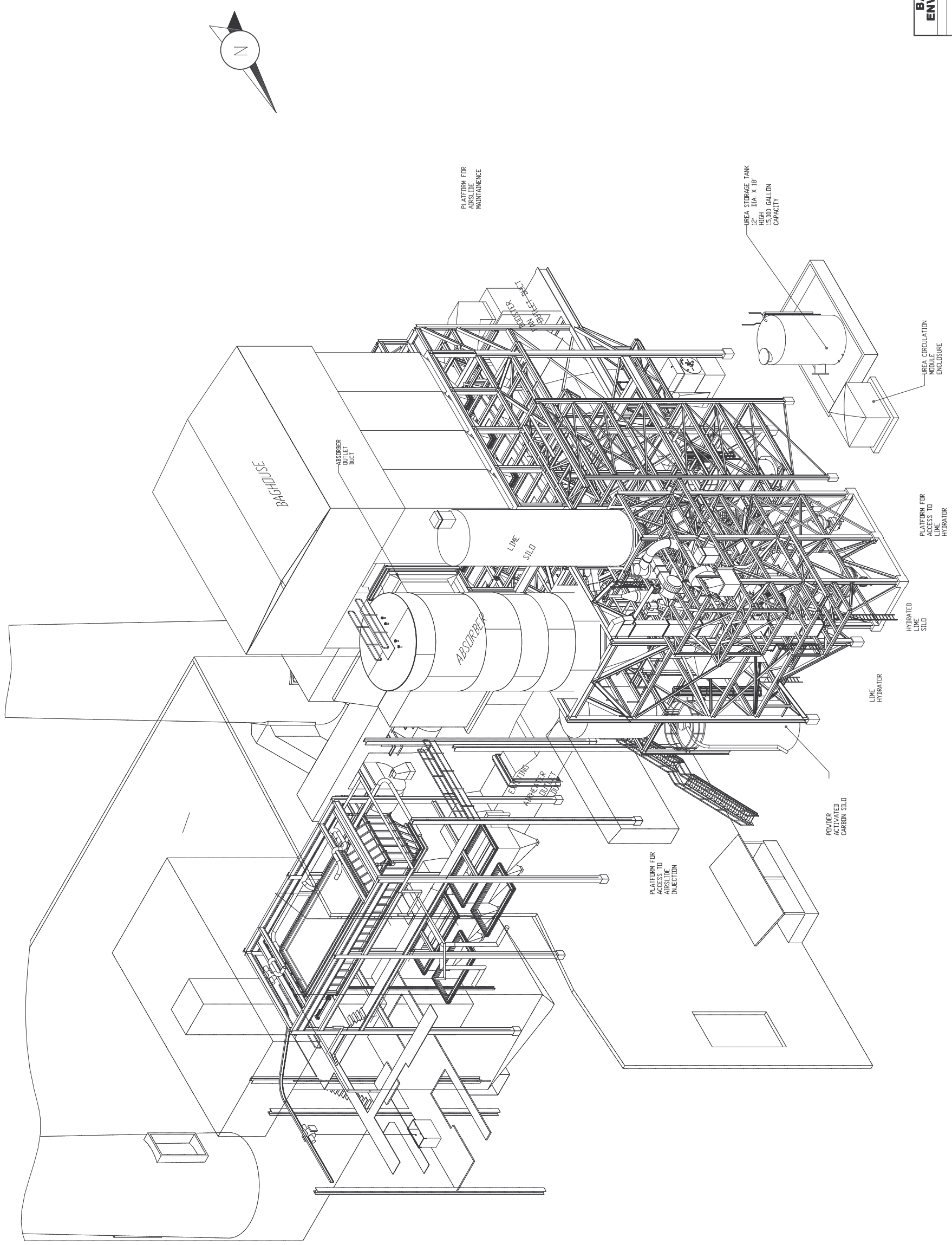
AES

GREENIDGE UNIT #4

DRESDEN, NEW YORK

DWG. NO. 100276-ISO100-01

DWG. NO. 100276-ISO100



BABCOCK POWER ENVIRONMENTAL INC.

ISO VIEW

LOOKING SOUTH EAST

AES

GREENIDGE UNIT #4

DRESDEN, NEW YORK

DWG. NO. 100276-ISO101-01

DWG. NO. 100276-ISO101

APPENDIX C
LIST OF MAJOR EQUIPMENT

Item	Quantity	Size	Manufacturer
SNCR System	1	N/A	Fuel Tech
Urea Storage Tank	1	15,000 gal	Fuel Tech
High Flow Delivery Module	1	96” x 48” x 30”(h)	Fuel Tech
Centrifugal Pump	2	5 hp / pump	Fuel Tech
Dilution Water Pressure Control Module	1	96” x 48” x 78”(h)	Fuel Tech
Centrifugal Pump	2	5 hp / pump	Fuel Tech
Injector Zone Metering Module	1	144” x 48” x 78”(h)	Fuel Tech
Distribution Module	2	67” x 24” x 72”(h)	Fuel Tech
Distribution Module	1	80” x 24” x 72”(h)	Fuel Tech
MNL Distribution Module	1	84” x 41” x 84”(h)	Fuel Tech
Wall Injector	6	3 ft	Fuel Tech
Auto Retract Injector	10	3 ft	Fuel Tech
Multiple Nozzle Lance	2	14-15 ft	Fuel Tech
SCR Reactor System	1	490,161 acfm	BPEI
SCR Reactor	1	27’-2” x 45’-5/8”	BPEI
Electric Catalyst Hoist	1	2 ton	American Crane
Catalyst Layer	1	1330 mm thick	Cormetech
Sonic Horn	4	N/A	BHA
Powdered Activated Carbon System	1	89.3 lb/h	Chemco
PAC Storage Silo	1	750 ft^3	Chemco
PAC Blower	1	80 scfm	Chemco
Lime Hydration and Injection System	1	8623 lb/h	ZMI Portec
Lime Storage Silo	1	7500 ft^3	ZMI Portec
Lime Hydrator	1	10 STPH	ZMI Portec

Item	Quantity	Size	Manufacturer
Bucket Elevator	1	20 STPH	ZMI Portec
Hydrated Lime Classifier	1	10 STPH	ZMI Portec
Hydrated Lime Fines Cyclone	1	10 STPH	ZMI Portec
Hydrated Lime Ball Mill	1	10 STPH	ZMI Portec
Hydrate Product Silo	1	2200 ft^3	ZMI Portec
Hydrated Lime Blower	1	630 acfm	FL Smidth
Process Water System	1	N/A	BPEI
Process Water Tank	1	6300 gal	Goodheart Sons
Process Water Booster Pump	2 x 100%	150 gpm / pump	Lechler
Water Injection Lance	2 x 100%	85 gpm / lance	Lechler
Turbosorp® System	1	423,700 acfm	BPEI
Turbosorp® Reactor	1	23’-9 1/2” dia. x 105’-9 1/2” height	BPEI
Baghouse	1	371,440 acfm	Dustex
Booster Fan	1	2,068 bhp	TLT Co-Vent
Air Slides	2	517,658 lb/h total	FL Smidth
Air Slide Blower	3 x 50%	891 icfm / blower	FL Smidth
Ash Silo	2	720 ft^3 / silo	Goodheart Sons

APPENDIX D
PROJECT LOG

January 2002 - May 2006 (Pre-Award Period)

The cooperative agreement for the Greenidge Multi-Pollutant Control Project was executed on May 19, 2006. However, in order to keep the project on pace to meet AES Greenidge's scheduled fall 2006 tie-in outage, the timing of which was driven by their Consent Decree with the State of New York and by their dispatch obligations during the peak power season, a substantial amount of Budget Period 1 work was performed prior to the signing of the cooperative agreement in accordance with pre-award authorizations granted by the Department of Energy. This pre-award work began in January 2002.

CONSOL prepared an Environmental Information Volume for the project and submitted it to DOE on October 27, 2003. DOE prepared an Environmental Assessment (DOE/EA-1493) and issued a Finding of No Significant Impact (FONSI) for the project on December 3, 2004.

CONSOL performed baseline testing at AES Greenidge Unit 4 on November 17-18, 2004, in order to obtain data for use in designing the multi-pollutant control facility and to establish a baseline against which the performance of the multi-pollutant controls could be compared.

AES Greenidge obtained a building permit for the multi-pollutant control facility from the Town of Torrey on August 10, 2005, and worked with the New York State Department of Environmental Conservation to determine that a Storm Water Discharge Permit was not required for construction of the facility, given the size of the construction site. AES Greenidge's Consent Decree with the State of New York, which was executed on January 11, 2005, authorized them to proceed with construction of the multi-pollutant control facility without a pre-construction permit from the State or any changes to their existing Title V permit.

CONSOL received authorization from DOE on January 24, 2005, to begin incurring pre-award costs associated with detailed design and engineering work. In August 2005, AES issued Babcock Power Environmental Inc. a Preliminary Notice to Proceed on the project, and BPEI began detailed schedule development and detailed process design activities. Detailed civil and structural design had commenced by the end of September 2005. The design of the multi-pollutant control process, including the development of process flow diagrams, piping and instrumentation diagrams, general arrangement drawings, equipment and material specifications, etc., was largely complete when the cooperative agreement was executed in May 2006.

Procurement of the multi-pollutant control system began in October 2005 under pre-award authorization from DOE. As of the signing of the cooperative agreement in May 2006, purchase orders had been issued for all major equipment items, including the SNCR system, SCR reactor, SCR catalyst, activated carbon system, Turbosorp reactor, lime hydration system, baghouse, and booster fan. Major purchase orders for structural steel and ductwork were also issued. The baghouse modules were delivered to the site beginning in March 2006, and the Turbosorp reactor was shipped in April 2006.

In October 2005, CONSOL received pre-award authorization from DOE to mobilize for construction and begin civil construction work. Trenching and excavation of the site for the new multi-pollutant control equipment were completed in February 2006, and formwork, rebar, and concrete were installed for the Turbosorp absorber, baghouse, and booster fan. The containment wall for the urea tank was also poured in late May 2006.

CONSOL received further authorization from DOE in January 2006 to begin certain process system construction activities. Consistent with this authorization, installation of structural steel for the baghouse began in March 2006, and the baghouse modules and hoppers had been raised into place by the end of May 2006. The structural steel frame for the Turbosorp was also erected in May.

June 2006

Design, procurement, and construction activities continued during June 2006 in preparation for the project's September 30 – November 18, 2006, tie-in outage. SCR flow modeling continued, and AES Greenidge and BPEI met to begin developing the control philosophy for the Turbosorp and baghouse so that it could be integrated into the plant's existing control logic.

Purchase orders for thermocouples, thermowells, pressure switches, pressure gauges, pressure and level transmitters, and NO_x and SO_2 monitors were finalized. The Turbosorp water tank, water injection pump skid, and ash silos were delivered, as were conduit, cable tray, and several sections of ductwork for the Turbosorp inlet and baghouse outlet. Issues regarding delays in the delivery of structural steel and of low- and medium-voltage switchgear were resolved with no anticipated effect on the project schedule.

Construction activities during June 2006 included installation and welding of the Turbosorp vessel (with the exception of the roof, which could not be installed until work on the inside of the vessel is complete). The concrete pad beneath the Turbosorp vessel was poured, and concrete was also poured for ductwork foundations and piers beneath the existing precipitator. The baghouse inlet duct and two sections of the Turbosorp inlet duct were lifted into place, and installation of the baghouse penthouse commenced. Work on insulating and lagging the baghouse and on installing structural steel, grating, and handrails proceeded throughout the month. The electrical subcontractor began mobilizing in preparation for the installation of conduit for baghouse lighting. Heavy rains in the northeastern U.S. resulted in one day of lost work on site during June; overall, however, site work was on track to meet the scheduled fall tie-in outage.

A project status review meeting including representatives from DOE, CONSOL, and AES Greenidge was held at AES Greenidge on June 7.

July 2006

Construction activities during July 2006 included installation of the roof of the Turbosorp vessel; installation of the expansion joint at the Turbosorp outlet; erection of structural steel for the lime hydration system, SNCR system, and baghouse penthouse; insulation of the Turbosorp vessel, ash silos, and baghouse; rigging and welding of ductwork around the Turbosorp and baghouse; completion of ductwork foundations; and installation of conduit, cable tray, junction boxes, and piping (e.g., condensate cooling water line to the multiple nozzle lance of the SNCR system and water and air lines to the Turbosorp vessel). Problems were encountered with fit-up of the baghouse penthouse such that all of the roof trusses had to be coped; however, these problems were resolved by the end of the month. Pieces of the lime hydration system (e.g., lime hydrator, quicklime storage silo, second-tier structural steel) and SNCR system (e.g., multiple nozzle lances, skid-mounted modules) were delivered to the site, and the hydrated lime silo and ball mill for the lime hydration system were lifted into place. Other deliveries during the month included the booster fan housing, the air slide blowers, and the low-voltage motor control center.

The National Energy Technology Laboratory in Pittsburgh hosted a project kickoff meeting on July 27. In addition, the Department of Energy's Office of Fossil Energy issued a Techline and CONSOL, AES, and Babcock Power Environmental Inc. each issued press releases on the project near the end of July.

August 2006

Construction activities at the Greenidge site intensified during the month of August as the project's fall tie-in outage drew nearer. The two ash recirculation slides that will be used to recycle solids from the baghouse to the Turbosorp absorber vessel were delivered to the Greenidge site, and these slides, as well as the lime hydrator, flue gas recirculation duct, and water injection pump skid for the Turbosorp system, were set into place. Contractors began assembling the booster fan and installing the booster fan outlet ductwork. Substantial progress was made in the delivery and installation of electrical equipment, which had been areas of concern because of their potential to cause schedule delays. The 480V motor control center was assembled; the 2300V motor control center was delivered to the site and positioned on the turbine floor, and the 2300V / 480 V transformer was set into place in the plant. Electricians continued to install cable tray in the plant and conduit and lighting in the baghouse structure, and ironworkers completed the erection of structural steel for the pipe and cable bridge. Further progress was made in insulating the Turbosorp vessel, Turbosorp inlet duct, baghouse inlet elbows, and ash silos; erecting second-tier structural steel for the lime hydration system; installing piping for the SNCR and Turbosorp systems; and siding and roofing the baghouse penthouse. AES Greenidge and Babcock Power Environmental Inc. began working on plans for start-up and commissioning of the multi-pollutant control system; BPEI's start-up and commissioning manager arrived on site.

September 2006

The tie-in outage for the multi-pollutant control system began at about 7:00 p.m. on Friday, September 29. In the days leading up to the outage, a substantial amount of construction work was accomplished. The urea tank was delivered to the Greenidge site and set into place, and the baghouse outlet duct, quick lime silo, and booster fan bypass duct were also lifted into place. Contractors completed the installation of all 3,200 baghouse bags, as well as the installation of poppet valve actuators and cleaning air headers in the baghouse. Electricians finished installing cable tray in the plant and began pulling cable, including the feeder cables for the 2300V transformer and 480V motor control center and the cables for the booster fan motor. Pipefitters continued to install large bore pipe to the Turbosorp vessel, to the air slides, and inside the plant; more than 1,400 of the 1,750 feet of large bore pipe have been installed. Contractors also continued assembling the booster fan, installing ductwork at the booster fan outlet, insulating and lagging various pieces of ductwork, installing grating and handrails in the lime hydration structure, and installing cable tray, conduit, and lighting. Moreover, they finished insulating and cladding the Turbosorp vessel and siding and roofing the baghouse penthouse. As of the end of September, mechanical installation of the Turbosorp system, lime hydration system, baghouse, and ash recirculation system was largely complete. Remaining construction work for these pieces of equipment predominantly consisted of electrical installation (especially in the lime hydration structure, where electrical work was just beginning), installation of insulation and lagging in various places, and tie-in to the existing plant. Inside the boiler building, work continued to focus on installing the SNCR and SCR systems.

A project status review meeting including representatives from DOE, CONSOL, and AES Greenidge was held at AES Greenidge on September 12.

October 2006

The tie-in outage continued throughout the month of October. Work at the Greenidge site in October focused primarily on installing the in-duct SCR reactor, installing the urea injection system for the SNCR process, tying the Turbosorp system and associated systems into the existing plant, and completing various electrical installation tasks. Contractors erected scaffolding around Boiler 6 and removed insulation in the areas where the SNCR and SCR systems were being installed. Demolition of ductwork at the economizer outlet was completed to allow for construction of the in-duct SCR reactor. The expansion joint at the economizer outlet was installed, and erection of support steel and casing for the reactor commenced. The SCR installation, which was the critical path activity of the tie-in outage, progressed without any major problems. Contractors also finished removing tubes and modifying the Boiler 6 water wall to permit installation of the multiple nozzle lances and urea injection nozzles for the SNCR system. Tubing was installed for the front wall injectors. Demolition of ductwork from around the existing ESP was completed to allow for tie-in of the Turbosorp system, and installation of the ductwork connecting the Turbosorp inlet to the existing plant commenced. The section of ductwork connecting the booster fan to the existing ID fans was also installed. Finally, electricians set the control panel and variable frequency drive panel for the hydrator in place, pulled cable in the baghouse penthouse, modified the old 2400V motor control centers to allow for connection of the new motor control centers, finished all remaining terminations for the 480V switchgear, completed hi-pot testing of the 2300V feeder cables, and successfully energized the 2300V transformer and bumped the booster fan motor.

On October 17, Dan Connell (CONSOL) gave a presentation on the project at the American Filtration and Separations Society's 2006 fall conference on Separations Processes for the Power Generation Industry, which was held in Pittsburgh, PA.

November 2006

The tie-in outage for the multi-pollutant control system at AES Greenidge was completed in mid-November, according to schedule. The Delta Wing static mixers were installed in the ductwork upstream of the SCR reactor in early November, and the SCR catalyst was delivered to the Greenidge site on November 6. By November 14, installation of the catalyst and of the SCR reactor casing had been completed. Contractors installed the urea injectors and multiple nozzle lances in Boiler 6 for the SNCR system, and successfully completed hydrostatic pressure testing of the boiler. The last section of ductwork connecting the Turbosorp inlet to the existing plant was also installed. Various pieces of equipment and ductwork, including the SCR reactor, Turbosorp inlet ductwork, and air slides, were insulated and lagged. The 200-ton crane was disassembled and removed from the site, and civil work for the urea and quicklime unloading area, which had been delayed until the demobilization of this crane, was completed. The tie-in outage ended at about 10:00 pm on Saturday, November 18, when Babcock Power released Boiler 6 to AES Greenidge for operation.

Two issues delayed start-up of Unit 4 and of the multi-pollutant control system, however. The Unit 4 turbine outage, which was conducted by AES outside of the scope of the DOE project, ran several days behind schedule. General Electric released the turbine to AES Greenidge on the evening of Wednesday, November 22. Problems with the turbine supervisory instrumentation and the hydraulic trip circuit delayed start-up of the turbine by another week.

These problems were resolved, though, and the generator was synchronized on Thursday, November 30.

In addition, there was a problem with the soft start for the booster fan. On Friday, November 24, an attempted start-up of the fan caused operation of the station service differential protection relay, blacking out the entire plant. Subsequent testing of the station service transformer and differential protection relay indicated no problems, and power to the plant was restored. As of the end of November, however, Babcock Power Environmental, IEA, and Rockwell Automation were still working to resolve the problem with the soft start. AES Greenidge was able to operate Unit 4 at reduced load while bypassing the booster fan, but actual start-up of the multi-pollutant control system could not occur until the booster fan was operational. In the meantime, commissioning activities were performed successfully for a number of equipment items (e.g., air slide blowers, various SNCR system components, process water pump, etc.) associated with the multi-pollutant control system. The baghouse filter bags were pre-coated on November 17 and 18.

A project status review meeting including representatives from DOE, CONSOL, and AES Greenidge was held at the Greenidge site on November 2. On November 2-3 and 6-7, Babcock Power Environmental conducted training sessions for AES Greenidge employees regarding operation and maintenance of the multi-pollutant control system.

December 2006

During December 2006, start-up and commissioning activities progressed at AES Greenidge. The problem with the booster fan soft start that had delayed start-up of the multi-pollutant control system was resolved in early December. On December 4, workers discovered that the soft start controller was not properly grounded and successfully corrected the problem and started the fan. Start-up and commissioning activities proceeded normally throughout the rest of the month. After synchronizing Unit 4 to the power grid on December 7, AES gradually ramped up the unit's load while Babcock Power commissioned the new combustion system. This work was conducted outside of the DOE scope, but had to be completed before start-up of the hybrid SNCR/SCR system could occur. As of late December, Unit 4 was operating at full load, and the new low-NO_x combustion system was achieving a NO_x emission rate of about 0.27 lb/mmBtu, close to the target rate of 0.25 lb/mmBtu. Combustion system optimization was scheduled to be completed in early January 2007. Regarding pollution control equipment within the DOE scope, the baghouse was in service throughout the month of December, and various commissioning activities were completed for the SNCR system, Turbosorp system, and lime hydration system, although none of these systems started up during the month. On December 15, workers established a fluidized bed in the Turbosorp absorber using accumulated fly ash (no hydrated lime was injected) and successfully operated the Turbosorp system for a time with water injection and baghouse ash recycling while Unit 4 was running at about 65 MW. On December 20, the first shipment of pebble lime was delivered to the Greenidge site; Babcock Power Environmental modified the lime unloading system in response to several problems that were encountered while transporting the lime from the delivery truck to the storage silo.

DOE approved continuation into the project's second budget period and issued a cooperative agreement modification authorizing funding for the balance of the project. On December 13, Bill Rady (AES Greenidge) gave a presentation on the project at the December luncheon of the Air & Waste Management Association's Genesee Finger Lakes Chapter, which was held in Rochester, NY. On December 20, CONSOL, AES Greenidge, and Babcock Power

Environmental met at the Greenidge site to plan for guarantee testing of the multi-pollutant control system.

January 2007

Start-up and commissioning activities continued at AES Greenidge throughout January 2007. On Tuesday, January 2, plant personnel reported concerns about increasing pressure drop across the in-duct SCR catalyst. As a result, they decided to take the unit off line for its steam turbine screen outage on January 3, rather than on January 11 as originally scheduled, so that BPEI could inspect the SCR internals and determine the cause of the problem. This inspection indicated that the buildup in pressure drop was caused by refractory and miscellaneous construction debris that remained in the boiler after the tie-in outage and had blocked portions of the catalyst surface, as well as by large particle ash that had accumulated in the catalyst. The debris and ash were removed, and the unit returned to service on January 7. It operated normally until January 30, when plant personnel again observed an increase in pressure drop across the catalyst.

Start-up of the lime hydration system commenced on January 12. However, it was quickly determined that major modifications to the system were required to prevent excessive overflow of milk of lime. BPEI completed these modifications, which involved eliminating the hydrator's wet scrubber and milk of lime circuit and routing the hydrator exhaust to the Turbosorp system, during the second half of the month. As of the end of January, they were working to complete modifications to the control system for the hydrator. In the meantime, AES Greenidge purchased hydrated lime to allow start-up of the Turbosorp system to proceed. Hydrated lime and water injection tests were performed beginning on January 13. The system was operated for short periods of time on January 15 and 16, and then it was operated during a series of tests throughout the rest of the month as BPEI and Austrian Energy worked to tune its performance. SO_2 removal efficiencies between 90% and 100% were achieved consistently during these optimization tests.

Combustion system optimization was completed successfully in January. Fuel Tech representatives returned to the AES Greenidge site during the week of January 22 to begin start-up of the SNCR system, and the first load of urea was delivered to site on January 23. Urea injection tests were performed beginning on January 26.

February 2007

February was marked by continued progress with start-up and commissioning of the multi-pollutant control system.

On February 6, the hybrid SNCR/SCR system was operated in "cascade" mode (i.e., such that the SNCR is used to generate ammonia slip for the SCR) for the first time. This initial, approximately 3-hour test run was successful. The system was able to maintain stable emissions below the target rate of 0.10 lb/mmBtu throughout the test while Unit 4 was operating at ~108 MW_{gross}. Testing and optimization of the hybrid SNCR/SCR system at full load and at reduced load continued throughout the month. Tuning of the system was hindered in late February by high CO concentrations in the furnace, which are indicative of less-than-optimal combustion and can adversely affect SNCR performance. Adjustments were made to the unit's combustion system to correct this problem.

Progress on start-up of the lime hydration system and optimization of the Turbosorp system was hampered during early February by frigid temperatures and weather protection problems that caused frozen lines and valves. These problems were resolved by February 8, and the Turbosorp system was operated occasionally during the next few weeks using purchased hydrated lime (at a limited injection rate to reduce cost). The plant also experienced problems during the month with failing baghouse cleaning valves. A temporary air compressor was brought in to satisfy the increased demand caused by air leakage from the failed valves, and the design flaw that caused the valves to fail was corrected. Following the cold weather problems in early February, workers encountered and resolved several additional process control problems with the lime hydration system. That system was successfully started up during the week of February 19.

On February 27, AES Greenidge successfully operated all of the components of the multi-pollutant control system, with the exception of the activated carbon injection system, while Unit 4 was running at about 91 MW_{gross}.

The accumulation of large particle ash in the in-duct SCR catalyst continued to affect operation of Unit 4. The unit was taken off line on February 2-4 so that the catalyst could be cleaned and inspected. The catalyst was cleaned another time during a primary superheater tube leak outage on February 9-10. The plant again reported increasing pressure drop across the SCR at the end of February. The project team began working to develop a solution to this problem. Babcock Power Environmental Inc. proposed a solution consisting of a sloped screen passing through the static mixers above the SCR catalyst, and they began modeling this design to assess its feasibility.

A project status review meeting including representatives from DOE and CONSOL was held at NETL in Pittsburgh on February 15.

March 2007

During March 2007, all major remaining start-up and commissioning activities were completed at AES Greenidge. The Turbosorp® system, lime hydration system, and baghouse operated regularly throughout the month of March while AES Greenidge Unit 4 was in service. Tuning of the hybrid SNCR/SCR system was completed during the first half of the month. As of March 13, all components of the multi-pollutant control system, with the exception of the activated carbon injection system, were operating normally. The activated carbon injection system was commissioned during the week of March 19.

AES Greenidge continued to experience problems with large particle ash accumulation in the in-duct SCR catalyst; this forced several outages for catalyst cleaning in March. Unit 4 was taken off line on the evening of Friday, March 2, so that LPA could be removed from the catalyst. This was the first catalyst cleaning since the superheater tube leak outage on February 9-10. The unit returned to service on Sunday, March 4. Unit 4 was derated during the week of March 19 because of high pressure drop across the in-duct SCR; the unit was taken off line again at the end of that week so that the catalyst could be cleaned in preparation for guarantee testing. AES Greenidge and Babcock Power Environmental Inc. met on March 15 regarding the LPA problem and agreed conceptually to a solution consisting of a sloped screen to capture the LPA, soot blowers to clean the screen, and vacuum ports to remove the captured LPA from the base of the screen.

CONSOL conducted field sampling for guarantee testing of the multi-pollutant control system at AES Greenidge during the week of March 26. All sampling was carried out while the plant was operating at full load and firing coal similar to the design coal. Flue gas sampling included grid-point NO_x measurements at the SCR inlet and SCR outlet (March 28), SO_3 measurements at the SCR inlet and SCR outlet (March 30), NH_3 measurements at the SCR outlet (March 28), SO_2, SO_3, HCl, HF, and particulate measurements at the air heater outlet and stack (March 29), and Hg measurements at the air heater outlet and stack, including a set of three measurements on March 28 with no activated carbon injection and a set of three measurements on March 30 with activated carbon injection. (NO_x and SO_2 measurements were performed by Clean Air Engineering). Solid and liquid process samples were collected throughout the testing period to allow for an assessment of system performance during the period and for the completion of Hg mass balances. AES Greenidge and BPEI also monitored urea, lime, and carbon consumption rates and pressure drop across the system components to determine whether performance guarantees associated with these parameters were satisfied.

April 2007

The multi-pollutant control system operated regularly throughout the month of April. However, AES Greenidge Unit 4 was derated during the week of April 16 because of increasing pressure drop across the SCR reactor. An outage was held on April 19-22 so that large particle ash could be removed from the surface of the in-duct SCR catalyst and the unit's air heater baskets could be cleaned. This was the first outage for catalyst cleaning since March 22-24. Pressure drops across the in-duct SCR reactor and air heater returned to acceptable levels following the outage.

Preliminary results from the guarantee tests on March 28-30 became available by April 18. The March tests demonstrated attainment of the performance guarantees for NO_x, SO_2, and Hg, but the results for ammonia slip, SO_3, HCl, and HF were either inconsistent with the guarantees or inconclusive. A small CONSOL sampling crew traveled to AES Greenidge on April 23-27 to perform continuous CO, NO_x, O_2, and CO_2 measurements at the SCR inlet sampling grid (actual sampling was performed on April 24-26) for use in tuning the combustion system and hybrid SNCR/SCR system.

May 2007

On May 1-4, CONSOL repeated the guarantee tests for NH_3 slip at the SCR outlet and for SO_3, HCl, and HF removal across the Turbosorp system. Modifications were made to the methods used to sample NH_3 and SO_3 in an effort to improve the representativeness and sensitivity of the measurements. The re-tests confirmed attainment of the guarantees for SO_3 and HCl. However, the measured ammonia slip was still too high to satisfy the performance guarantee, and the HF removal efficiency across the Turbosorp system was indeterminate because of low measured concentrations at the Turbosorp inlet.

On May 3, the water feed to the lime hydrator was out of limits, causing the hydrator to plug and require cleaning. The control logic for the hydrator was modified to prevent this problem from occurring again in the future.

On May 4, several burners were affected by flame attachments, forcing them out of service. As a result, AES Greenidge Unit 4 was derated until these burners could be repaired during the large particle ash screen installation outage.

The large particle ash screen installation outage began on May 17. During the outage, a sloped screen was installed in the ductwork above the SCR catalyst (intersecting the Delta Wing static mixers) to capture LPA from the flue gas and prevent it from accumulating on the surface of the catalyst. Eight vacuum ports were installed through the wall of the SCR inlet duct at the base of the screen to remove the captured LPA from the system; two soot blowers were also installed below the screen to aid in transporting the LPA to the vacuum ports. In addition, during the outage, AES replaced the existing SCR catalyst layer with a new layer so that the existing layer could be professionally cleaned. (The cleaned layer was then stored on site as a spare). Moreover, the plant took advantage of the screen installation outage to complete various routine maintenance activities so that they would not have to hold their usual outage in September for these activities. The outage was completed on May 25.

On May 30-June 1, crews from CONSOL and Clean Air Engineering performed NH_3, NO_x, CO, CO_2, and O_2 sampling at the inlet and outlet of the in-duct SCR. These measurements were required to determine the effects of the LPA screen on the performance of the SCR, and in particular to determine whether installation of the screen and fresh catalyst layer enabled the hybrid SNCR/SCR process to meet its ammonia slip guarantee. Personnel from Babcock Power and Fuel Tech worked to tune the Unit 4 combustion system and SNCR system during the test period. The tests showed that the NO_x control system still was not meeting the ammonia slip guarantee.

Dan Connell (CONSOL) presented project results at the Electric Power Conference & Exhibition in Rosemont, IL, on May 3. A project status review meeting including representatives from DOE, CONSOL, and AES was held at AES Greenidge on May 22. The Preliminary Public Design Report for the project was submitted to DOE on May 25.

June 2007

During the first two weeks of June, Babcock Power and Fuel Tech continued to make adjustments to the hybrid NO_x control system in an effort to reduce the ammonia slip. CONSOL and Clean Air Engineering returned to AES Greenidge on the week of June 18 to perform additional ammonia slip testing and SCR grid point testing. These tests demonstrated attainment of the performance guarantee for ammonia slip, (although the measured ammonia slip exceeded the value that had been predicted for this stage of the SCR catalyst's life) thereby concluding the project's guarantee tests. Having satisfied the ammonia slip guarantee, AES, BPEI, and Fuel Tech worked on June 21 to establish a set of boiler operating conditions for routine operation. CONSOL and Clean Air Engineering provided ammonia slip and SCR grid point measurements to support this effort. As of the end of the day, Unit 4 was operating with NO_x emissions below 0.15 lb/mmBtu (thereby satisfying its permitted NO_x emission rate) and with ~2 ppmv of ammonia slip. Additional combustion system tuning and SCR grid point measurements were completed during the week of June 25.

The Turbosorp® system operated smoothly throughout the month of June and consistently achieved deep SO_2 removal efficiencies (e.g., >95%). The large particle ash screen that was installed above the SCR reactor in May generally operated without problem, although a small increase in pressure drop across the screen was observed in mid-June. The screen was inspected during an economizer tube leak outage on June 15-17; the inspection indicated that the soot blowers installed below the screen were missing several areas of the screen, allowing large particle ash to accumulate in those areas.

On June 27, Dan Connell (CONSOL) gave a presentation on the project at the Air & Waste Management Association's 100th Annual Conference & Exhibition, which was held in Pittsburgh.

July 2007

The multi-pollutant control system at AES Greenidge continued to operate within its permit limits for SO_2 and NO_x during July 2007. The plant continued to work on characterizing and optimizing the performance of the hybrid NO_x control system; AES, Babcock Power, and Fuel Tech completed another round of combustion system and SNCR/SCR tuning during the week of July 23. The process was informed by NO_x and CO grid point measurements performed by Clean Air Engineering at the SCR inlet and outlet. During the tuning period, the plant developed a set of full-load combustion and SNCR operating conditions that allowed them to achieve their desired steam temperatures and an acceptable NO_x removal distribution across the SCR catalyst (i.e., such that there were no areas of extremely high NO_x removal efficiency that would tend to indicate high NH_3 slip) while maintaining a NO_x emission rate of ~0.13-0.14 lb/mmBtu. These conditions required that zone two of the SNCR system was operated at its maximum capacity. Tuning and characterization of the combustion and SNCR/SCR systems were also completed at intermediate loads that produced economizer outlet temperatures near or just below the minimum operating temperature for the in-duct SCR. This work indicated that the system was capable of better-than-expected NO_x removal performance at moderate loads of around 70 MW.

AES Greenidge personnel continued to observe increasing pressure drop across the large particle ash screen. The screen was inspected and cleaned during an outage brought about by an ID fan cable failure; the inspection again indicated that the soot blowers installed beneath the screen were not affording adequate coverage to keep it clean. AES ordered four new rotary soot blowers to provide improved cleaning coverage.

AES Greenidge encountered some problems with the lime hydration system at the end of the month, as several balls escaped from the ball mill and caused minor damage to the system. As a result, they had to operate the Turbosorp system using purchased hydrated lime while the lime hydration system was repaired.

CONSOL and AES met on July 18 to develop plans for process performance testing of the multi-pollutant control system.

August 2007

In general, the multi-pollutant control system operated routinely during August 2007, although minor problems were encountered with the lime hydration system and with increasing pressure drop across the large particle ash screen and in-duct SCR reactor.

The ball mill and classifier again required maintenance in mid-August to overcome some minor operational problems. Also, during the week of August 20, the lime hydration system had to be taken offline because the bucket elevator shaft failed. The plant continued to operate the Turbosorp system using purchased hydrated lime while the shaft was replaced.

A short outage was held on August 10-11 to allow the plant to remove large particle ash that had accumulated on the LPA screen and in-duct SCR catalyst; the pressure drop across the SCR (including the screen) returned to normal following the outage, but was again increasing as

of the end of the month. The four new rotary soot blowers for the LPA removal system were delivered to the plant.

On August 2, Dan Connell (CONSOL) presented a paper on the project at the COAL-GEN conference in Milwaukee, WI.

September 2007

During September 2007, AES Greenidge completed an outage to modify the large particle ash (LPA) removal system that was installed above the in-duct SCR reactor in May. During the outage, which began on the evening of September 4, the two soot blowers that had been installed in May to clean the LPA screen were replaced with four rotary soot blowers to provide improved cleaning coverage, and a spring seal was installed to close the gap between the two sections of the LPA screen. (Because the top of the screen is affixed to the ductwork above an expansion joint, the screen was installed in two sections to allow it to move with the duct as furnace temperatures change – e.g., during start-up and shut-down. Based on the plant's observations during previous outages for LPA screen cleaning, it appeared that some LPA was traveling through the gap between the screen sections and accumulating on the surface of the catalyst. Hence, the seal was installed to prevent this from occurring in the future). The plant also installed a rake containing ~350 blow points immediately above the catalyst to aid in resuspending any fly ash that accumulates on its surface. (The rake is expected to keep the catalyst cleaner than the existing sonic horns). The outage ended at around 12:00 a.m. on September 10, and the plant successfully completed troubleshooting of a cam problem with the new soot blowers during the next several days.

The plant did not observe any increase in the pressure drop across the LPA screen during the first week of operation after the outage. Unit 4 was then taken offline again on September 18-21 so that plant personnel could find and repair the source of an oil leak that was unrelated to the multi-pollutant control system. An inspection of the in-duct SCR during this outage confirmed that only a minor amount of LPA was present on the LPA screen.

The Turbosorp scrubber and ancillary equipment operated routinely during September 2007, with no major problems reported by the plant.

A project status review meeting including representatives from DOE, CONSOL, and AES was held at AES Greenidge on September 5.

October 2007

CONSOL completed the first series of process performance tests at AES Greenidge on October 1-12, 2007. The tests during the week of October 1 were conducted to evaluate the performance of the multi-pollutant control system while AES Greenidge Unit 4 was firing a higher-than-normal sulfur coal. (The sulfur content of the coal was ~4.5-5.0 lb SO_2 / mmBtu during these tests). The Turbosorp scrubber proved capable of consistently achieving >95% SO_2 removal efficiency during the test period; however, the lime hydration system was often unable to keep up with the increased hydrated lime demand resulting from the higher-sulfur coal. The hydrated lime classifier plugged numerous times on October 3 and October 4, causing the lime hydration system to trip. This hindered the tests that were planned for those days; however, AES Greenidge was diligent in unplugging the hydrator and in taking deliveries of hydrated lime to allow the tests to proceed. Representatives from DOE-NETL visited AES Greenidge on October 3 to observe the testing. The tests during the week of October 8 were

conducted to examine the effects of changes in Ca/S ratio and approach temperature on the multi-pollutant removal performance of the Turbosorp system. (During these tests, Unit 4 fired coal with a sulfur content of ~4.0-4.3 lb SO_2 / mmBtu).

Routine commercial operation of the multi-pollutant control system continued during October 2007. Early in the month, however, AES Greenidge began to observe an increase in the pressure drop across the in-duct SCR catalyst (but not the large particle ash screen). The plant took several actions to try to alleviate this problem, including increasing the discharge pressure and frequency of operation of the rake soot blower that is installed above the catalyst and resuming operation of the sonic horn system, but these were unsuccessful in reversing the trend. As of the end of October, the plant was derated to about 95 MW_{net} in order to maintain sufficient pressure downstream of the reactor to avoid risk of ductwork collapse.

November 2007

The trend of increasing pressure drop across the in-duct SCR reactor at AES Greenidge Unit 4 continued into early November 2007. The unit was further derated in early November to allow it to continue to operate while AES completed an outage at another of its New York power plants. Then, on November 9-12, AES Greenidge held an outage to inspect and clean the in-duct SCR catalyst. Upon entering the SCR reactor, plant personnel discovered a substantial amount of modestly sized large particle ash distributed relatively evenly over the surface of the catalyst. (They did not observe mounding of the LPA as they had during previous outages). Some of the LPA was small enough to pass directly through the LPA screen's mesh, and some also likely reached the catalyst by passing through gaps where the screen meets the duct walls. In addition, the spring seal that was installed in September to close the gap between the two sections of LPA screen did not flex as it was designed to. The new rotary soot blowers that were installed in September to clean LPA from the LPA screen appeared to be working effectively. AES vacuumed the LPA from the surface of the catalyst, collected samples for evaluation, and installed a temporary fix for the spring seal. When the unit returned to service, the pressure drop across the SCR was greater than its normal baseline, likely because some LPA was lodged deep within the catalyst and could not be removed as part of the cleaning.

Apart from the SCR pressure drop problem and several minor issues with the lime hydration system, the multi-pollutant control system operated regularly throughout November. In late November, plant personnel slowed down the rotation speed of one of the rotary feeders in the lime hydration system in order to help prevent the system from plugging. They believed that the feeder had been rotating too rapidly to allow its pockets to fill, allowing fines to build up in the system.

Also during November, CONSOL completed a second round of process performance testing of the multi-pollutant control system at AES Greenidge. This round of tests, which was conducted on November 13-16 (just after the catalyst cleaning outage), was designed to evaluate the performance of the multi-pollutant control system when Unit 4 operates at reduced loads and when it co-fires biomass (waste wood from a furniture manufacturing process) with coal.

AES Greenidge Unit 4 began co-firing waste wood on November 15; however, one of the hydrated lime classifier fan bearings failed that day, forcing the plant to take the hydrator offline. AES continued to operate Unit 4 using hydrated lime from their onsite inventory, but waste wood co-firing was discontinued and the unit eventually had to be derated when the onsite supply of hydrate was depleted and the truck en route to replenish it broke down. The start of testing on November 16 was delayed until hydrated lime deliveries resumed.

December 2007

During December 2007, AES Greenidge continued to experience elevated pressure drop across the in-duct SCR reactor, which hampered operation of Unit 4. The unit was derated throughout the month in order to maintain sufficient pressure downstream of the reactor to avoid risk of ductwork implosion. At the end of the month, AES Greenidge held an outage to inspect and clean the SCR reactor and to replace the current SCR catalyst layer with the original catalyst layer (which had been removed from the reactor in May 2007 and sent for professional cleaning in early December). The outage began on December 27, and the work in the SCR reactor was completed successfully by December 30, but a problem with the unit's distributed control system (unrelated to the multi-pollutant control system) prevented it from returning to service by year's end.

Meanwhile, the project team continued to work on diagnosing the catalyst plugging problem so that a solution could be developed to overcome it. AES met with Dr. Carlos Romero from Lehigh University to solicit his ideas; Babcock Power dissected catalyst samples that were collected during the unit's November outage to evaluate the extent and mechanism of plugging, and CONSOL held a brainstorming session to discuss mechanisms that may be contributing to the problem. Upon inspecting the SCR reactor during the December outage, plant personnel reported that the SCR catalyst was plugged with small pieces of large particle ash and with substantial amounts of seemingly sticky fly ash. They collected samples of the various types of ash and other deposits found in the SCR reactor; these were sent to CONSOL for chemical analysis and to Lehigh University for X-ray diffraction analysis.

Apart from the SCR pressure drop problem, the multi-pollutant control system operated normally during December.

Dan Connell (CONSOL) presented a poster on the project at DOE/NETL's Mercury Control Technology Conference, which was held in Pittsburgh, PA, on December 11-13, and Rich Abrams (Babcock Power) presented a paper on the project at the POWER-GEN conference, which was held in New Orleans, LA, on the same dates.

January 2008

The DCS problem that was encountered at the end of the catalyst cleaning outage in December 2007 was resolved in early January 2008, and Unit 4 returned to service on the morning of January 3. AES decreased the intensity of the rake soot blower above the in-duct SCR catalyst to reduce catalyst erosion, which was observed during the outage, and they closely monitored the pressure drop across the catalyst to track the rate of plugging. As of January 28, about 3.5 weeks after the conclusion of the outage, the pressure drop across the SCR reactor had increased by only about 0.2 i.w.c. from its full-load baseline of 1.1 i.w.c.

CONSOL chemically analyzed 10 samples of large particle ash, fly ash, and other deposits that were collected in the SCR reactor and ductwork by AES Greenidge personnel during the late December outage. The results were discussed with DOE and AES Greenidge during a project status review meeting at the plant on January 17. The results did not immediately indicate any chemical mechanisms of plugging, although several interesting observations were noted with respect to the sulfur, ammonia, iron, and carbon content of the samples. AES Greenidge sent a similar set of samples to Lehigh University for X-ray diffraction (XRD) analysis. Notwithstanding any possible chemical mechanisms, it appeared that the catalyst plugging was due at least in

part to LPA that was small enough to pass through the LPA screen but large enough to lodge in the catalyst. This physical mechanism of plugging was supported by observations of LPA lodged in the catalyst and catalyst screen during the late December outage and by a Babcock Power Environmental report describing the dissection of a catalyst element that was pulled from the SCR reactor during the unit's November 2007 outage.

Routine commercial operation of the multi-pollutant control system continued in January 2008. Apart from several short-lived problems with the lime hydration system and air slides, the Turbosorp scrubber and ancillary equipment operated normally throughout the month. The lime hydration system required maintenance on January 15-16 and was offline for a time (among other things, a bolt fell out of the ball mill, allowing balls to spill out); AES continued to operate the Turbosorp system during this period using hydrated lime from its onsite inventory and purchased hydrated lime. The plant later encountered some problems with the air slides during the weekend of January 19-20. The problems appeared to result from the control strategy for disposing ash from the system, which biased the entire ash disposal to one of the air slides, causing the ash removal system on that side to plug. The unit had to be derated to about 50 MW for several hours while the blockage was cleared.

On January 30, Dan Connell (CONSOL) gave a presentation on the project at the EUEC Energy & Environment Conference in Tucson, AZ.

February 2008

The multi-pollutant control system at AES Greenidge Unit 4 operated routinely throughout February, although the unit was derated for much of the month due to coal quality issues. Unit 4 fired a lower-sulfur, lower-Btu coal than normal during part of February, and for a time, it had trouble maintaining a NO_x emission rate near the setpoint of 0.125 lb/mmBtu with this fuel. However, plant personnel succeeded in improving NO_x emissions by adjusting the burner tilts. Some problems were also encountered with freezing lines and valves in the lime hydration system and with freezing and clogging of the dosing valves in the Turbosorp system during periods of cold weather. Plant personnel succeeded in overcoming these problems by cleaning, heating, and/or insulating the problem areas, and they then operated the Turbosorp scrubber with a very low setpoint for SO_2 emissions to make up for the higher-than-normal emissions encountered during the problem period. AES found it to be relatively easy to achieve very low SO_2 emissions with the lower-sulfur coal (e.g., 2.8 lb SO_2/mmBtu) that they fired at times in February.

The pressure drop across the in-duct SCR catalyst at AES Greenidge increased very gradually throughout February. As of February 27, the pressure drop across the catalyst was approximately 1.8-2.0 i.w.c. when Unit 4 was operating just below full load. (This represents an increase of about 0.7-0.9 i.w.c. during the 8 weeks of operation since the clean catalyst layer was installed).

Results became available from Lehigh University's X-ray diffraction (XRD) analysis of samples that were collected in and around the in-duct SCR reactor during the December 2007 outage. On February 19, Dr. Carlos Romero from Lehigh met with personnel from AES, DOE, CONSOL, Fuel Tech, and Cormetech to discuss these results. Apart from typical ash components (e.g., Fe_2O_3, Al_2O_3, SiO_2), XRD analysis identified calcium sulfate, sodium nitrate, and calcium urate hexahydrate (a possible product of urea decomposition) in some of the samples; however, the abundance of these components was small relative to the ash components, and no clear evidence of a chemical mechanism of catalyst plugging was discovered. Hence, AES decided

to proceed with modifications to the LPA screen to address the catalyst plugging problem mechanically (i.e., by preventing large particle ash from penetrating the LPA screen and lodging in the catalyst).

March 2008

During March 2008, CONSOL completed a fourth week of process performance testing of the multi-pollutant control system at AES Greenidge Unit 4. This test series, which was conducted on March 10-13, was designed to evaluate the performance of the system while the unit co-fired biomass (sawmill waste wood) with coal.

The pressure drop across the in-duct SCR reactor at AES Greenidge Unit 4 continued to increase gradually throughout March 2008. At the beginning of the month, the pressure drop was approximately 2 i.w.c. when Unit 4 was operating just below full load. (The unit was derated by several megawatts in early March because of coal quality issues). By the end of March, the pressure drop across the SCR had increased to nearly 4 i.w.c., and plant personnel had to derate the unit to 95 MW_{net} to avoid the risk of ductwork collapse downstream of the air heaters. (Pressure drop arising from air heater fouling also contributed to the negative static pressure downstream of the air heaters, and hence, to the derate). Plant personnel sent the catalyst layer that was removed from the SCR in December 2007 for professional cleaning so that it could be installed during the May 2008 outage.

The Turbosorp scrubber and ancillary equipment generally operated routinely during March. Early in the month, AES Greenidge encountered some problems with frozen pressure transmitters in the Turbosorp system, which caused them to lose the fluidized bed several times. Plant personnel succeeded in thawing the transmitters, and the scrubber returned to normal operation. In addition, in early March, the plant experienced problems with balls escaping from the lime hydration system's ball mill and ultimately jamming the rotary feeder that removes heavies from the hydrated lime classifier. In mid-March, an escaped ball caused a screw conveyer failure, forcing the lime hydration system offline for repair. Plant personnel were able to continue to operate the Turbosorp scrubber using hydrated lime from their onsite storage tanker while the repairs were completed. They added magnets at the inlet and outlet of the bucket elevator to capture escaped balls and prevent them from damaging the system.

On March 20, Dan Connell (CONSOL) gave a presentation on the project to the Energy Technology Group of the American Chemical Society, Pittsburgh Section. A report and an addendum describing the results of the 2007 guarantee tests at AES Greenidge were submitted to DOE.

April 2008

AES Greenidge Unit 4 was derated throughout April 2008 because of elevated pressure drop across the in-duct SCR reactor and air preheaters. The derate was required to avoid the risk of collapse of the ductwork between the air preheaters and Turbosorp scrubber. The high pressure drop across the SCR likely resulted from the accumulation of large particle ash in the catalyst, and the high pressure drop across the air preheaters likely resulted from ammonium bisulfate formation on the air preheater baskets. As of Monday, April 28, Unit 4 was derated to about 85 MW_{net} because of the elevated pressure drop. (It was then further derated to 72 MW_{net} so that plant personnel could overhaul one of the coal mills; this was unrelated to the multi-pollutant control system). AES Greenidge worked throughout April to prepare for the unit's planned spring outage in May.

The Turbosorp system generally operated routinely throughout the month, although AES Greenidge experienced some problems with plugging in the ash recirculation and disposal system. The plugging occurred around the rotary air locks located downstream of the air slides and in the ash disposal lines that transport product ash to the ash silos. On at least one occasion, the plugging appeared to be caused by rain leakage around the knife gate valves downstream of the air slides. Plant personnel were able to resolve all of the plugging issues without having to derate the unit. They planned to install an enclosure around the gate valves to prevent recurrence of the rain leakage problem. AES Greenidge also raised the Turbosorp outlet temperature setpoint by one degree Fahrenheit to reduce the risk of condensation.

CONSOL R&D, AES Greenidge, and Babcock Power Environmental met on April 28 and 29 to plan for the project's remaining process performance tests and follow-up tests.

May 2008

AES Greenidge commenced its planned spring outage for Unit 4 on the evening of May 2, and the outage concluded during early afternoon on May 10. (The unit was derated in the days leading up to the outage because of elevated pressure drop across the SCR reactor and air heaters). Upon inspecting the SCR reactor at the start of the outage, plant personnel reported that the catalyst was plugged with substantial amounts of LPA and fly ash, and the catalyst was also severely eroded in places, presumably because of the rake soot blower. It also appeared that one of the rotary soot blowers on the western side of the LPA screen and one of the LPA vacuum ports were not functioning properly prior to the outage, based on observations of accumulated LPA near those pieces of equipment. Plant personnel attended to these issues.

During the outage, the existing LPA screen above the in-duct SCR reactor was removed and replaced with a new, smaller-pitch LPA screen. In addition, the existing catalyst modules were removed and replaced with clean catalyst modules. Most of these replacement modules had been in service at AES Greenidge Unit 4 prior to its late December 2007 outage, and they were sent for professional cleaning before being reinstalled in the reactor. However, eight modules were refitted with larger-pitch catalyst (seven were refitted with honeycomb catalyst, and one was refitted with corrugated catalyst) so that the performance of this catalyst (i.e., its susceptibility to plugging) could be evaluated. Also during the outage, the rake soot blower was modified so that it blows at a 45-degree angle rather than perpendicularly to the catalyst surface (the discharge pressure of the rake was also reduced to lessen catalyst erosion), and a new seal was installed to close the gap between the two sections of the LPA screen. The new seal consists of a plate that is attached with hinges to each of the two screen sections.

In addition to the work performed in the in-duct SCR reactor, AES Greenidge washed the air heater baskets, removed ash from the Turbosorp hopper, and inspected the Turbosorp system during the outage. Plant personnel did not observe any evidence of significant ash deposition, scaling, or erosion in the Turbosorp absorber vessel. Several improvements were made to the Turbosorp system and ancillary equipment. AES installed a new, ceramic-lined hydrated lime classifier to replace the existing one, and they installed new 30-hp motors on the air slide blowers to replace the existing smaller motors. (The larger motors are expected to reduce the likelihood that the ash recirculation system will trip because of high air slide ash levels). Finally, plant personnel attended to immobile valves and painted corroded areas in the baghouse.

The multi-pollutant control system generally operated normally after returning to service on May 10. Immediately following the outage, the full-load pressure drop across the SCR catalyst bed

was about 1.0 - 1.2 i.w.c., and the pressure drop across the combined LPA screen and catalyst bed was about 1.3 - 1.5 i.w.c.. The pressure drop across the catalyst bed increased slightly by the end of the month.

The only noteworthy problem encountered with the Turbosorp system during May occurred when the SO_2 analyzer at the inlet to the absorber vessel malfunctioned. This analyzer, which provides one of the inputs to the control loop that governs how much hydrated lime is injected into the absorber, was out of service for several days while AES Greenidge waited for a replacement part. During that time, plant personnel had to operate the Turbosorp scrubber with the hydrated lime injection control system in manual mode, and they believe that they significantly overfed hydrated lime to the scrubber. (They had trouble scaling back the hydrated lime injection rate during load swings, and they were also erring on the cautious side to ensure that the unit's SO_2 emissions remained within its permit limits). The inlet SO_2 analyzer was repaired and reinstalled.

During May 19-22, CONSOL and Clean Air Engineering completed a fifth week of process performance testing of the multi-pollutant control system at AES Greenidge Unit 4. The test series was designed to generate additional information about the performance of the multi-pollutant control system at reduced unit loads, and in particular, to thoroughly characterize the performance of the NO_x control system (i.e., ammonia slip, NO_x and CO concentration profiles around the SCR) as a function of load.

On May 8, Doug Roll (AES Greenidge) gave a presentation on the project at the Electric Power Conference in Baltimore, MD. In addition, Modern Power Systems magazine published an article on the project in its May 2008 edition.

June 2008

During June 2008, CONSOL completed two weeks of performance testing of the multi-pollutant control system at AES Greenidge Unit 4. Follow-up testing was completed on the week of June 9, and parametric testing of the Turbosorp system was completed on the week of June 16. The follow-up tests were designed to reevaluate the performance of the multi-pollutant control system under guarantee test conditions after more than a year of operation. (The coal sulfur content during the follow-up testing period was slightly lower than it had been during the guarantee tests; however, CONSOL, DOE, and AES agreed to proceed with the tests as scheduled). The Turbosorp parametric tests were designed to evaluate the relationship between SO_2 removal efficiency, calcium-to-sulfur ratio, and approach to adiabatic saturation temperature in the Turbosorp system.

The multi-pollutant control system operated routinely during June 2008. The full-load pressure drop across the in-duct SCR reactor increased throughout the first half of the month, reaching ~2.4 i.w.c. on June 19. That day, plant personnel decided to manually operate the rake soot blower several times during the middle of day shift (they previously had been operating the soot blower only once per shift), and they realized that the rake's operating pressure was set to just 20 psi rather than the desired 60 psi. Upon increasing the pressure and operating the soot blower, the pressure drop across the SCR catalyst decreased to 1.4-1.5 i.w.c. (not far from the clean catalyst baseline pressure drop of ~1.1 i.w.c.). After attending to some problems with the rake's poppet valves, plant personnel resumed routine soot blowing at 60 psi. They were able to maintain the full-load pressure drop across the catalyst at ~1.5 i.w.c. during the rest of the month by operating the rake soot blower four times per day at this pressure.

The Turbosorp® system generally operated well throughout the month. Its performance was particularly commendable during the parametric tests on June 16-19, as it maintained SO_2 emission rates and temperatures that closely mirrored the set points while the unit operated at steady state. Two minor problems were encountered during the test period, however. On June 15 and 16, concrete-like deposits formed in one side of the ash disposal system, forcing one of the ash silos out of service. Plant personnel were able to continue to operate the Turbosorp system using the other silo while they cleared the deposits. Then, on June 19, the hydrated lime silo level transmitter failed, causing the hydrator (which is controlled automatically based on the silo level) to produce hydrated lime at a slower rate than required to keep up with demand. Upon realizing the problem, plant personnel had to fill the silo with hydrate from their onsite storage tanker to avoid running out of hydrated lime for the scrubber. The level transmitter was not able to be repaired onsite, and the lime hydration system was operated for several days by taking periodic, manual hydrate silo level measurements and adjusting the hydrator output accordingly. AES Greenidge received replacement electronics for the level transmitter during the following week, and the transmitter was repaired.

On June 4, Dan Connell (CONSOL) presented a paper on the project at the 2008 Clearwater Coal Conference in Clearwater, FL.

July 2008

Routine commercial operation of the multi-pollutant control system at AES Greenidge continued throughout July 2008.

On the evening of July 4, AES unexpectedly had to take Unit 4 offline to repair an economizer tube leak. Although unrelated to the multi-pollutant control system, the outage gave plant personnel an opportunity to inspect the in-duct SCR reactor. Just prior to the outage, the pressure drop across the SCR catalyst (excluding the large particle ash screen) had risen to about 1.7 i.w.c. at full load. Upon inspecting the reactor, plant personnel found that the large particle ash screen and catalyst screen were partially plugged with wet fly ash and some LPA. It was unclear how much the tube leak contributed to this plugging. Some catalyst channels were plugged, but these were fairly well distributed across the cross section of the catalyst. There were no piles of fly ash on top of the catalyst screen, as had been observed during some previous outages, and the extent of catalyst plugging appeared to be less than it would have been in the past after ~8 weeks of operation. Plant personnel vacuumed the LPA screen and catalyst screen (they did not remove the catalyst screen to vacuum the catalyst directly), and the unit returned to service on the morning of July 6. No discernible increase in the pressure drop across the in-duct SCR catalyst was observed for the rest of the month. As of July 28, the pressure drop across the catalyst (excluding the LPA screen) was 1.5-1.6 i.w.c. when Unit 4 was operating at about 109 MW_{gross}.

The only noteworthy problem encountered with the hybrid NO_x control system in July occurred on July 26, when the SNCR system tripped out of service while the urea tank was being filled. (The trip was triggered by the high level indicator on the urea tank). The system remained offline for several hours before plant personnel could restart it. (There was a problem with one of the set points in the control system, and it took several hours to diagnose this issue). The unit was operating at low load while the problem was being resolved, however, and its NO_x emission average was therefore impacted only minimally.

Apart from typical maintenance requirements, the Turbosorp system operated without problem during July 2008. In the lime hydration system, however, the hydrated lime silo level monitor

continued to perform less-than-optimally. Once during the month, a level monitor malfunction caused the hydrated lime silo level to drop to zero. Plant personnel were able to overcome the problem by increasing the rate of hydrated lime production to rebuild the silo inventory, without having to introduce any hydrated lime from their onsite storage tanker.

August 2008

The multi-pollutant control system at AES Greenidge operated routinely throughout August. Apart from typical maintenance requirements, no problems were encountered with the Turbosorp system or its ancillary equipment. Unit 4 experienced periodic problems with burner flame attachments, and it was derated by several megawatts throughout most of the month because 1-2 damaged burners had to be taken out of service. The pressure drop across the in-duct SCR reactor increased slightly during the month. As of August 2, the pressure drop across the SCR catalyst (excluding the LPA screen) was 1.6-1.7 i.w.c. when the unit was operating at ~108 MW_{gross}. By August 25, the pressure drop had increased to ~ 1.8-2.0 i.w.c. when the unit was operating at only ~ 105 MW_{gross}. Near the end of the month, plant personnel blew the rake soot blower above the catalyst several times at a higher-than-normal pressure in an effort to reverse the increasing trend in pressure drop. Although it is more difficult to track the full-load pressure drop when the unit is derated, operating the rake in this way appeared to have some effect. As of the beginning of September, the pressure drop across the SCR catalyst was ~1.5 i.w.c. when the unit was operating at 100 MW_{gross}.

On August 14, a project status review meeting including representatives from DOE, CONSOL, and AES was held at AES Greenidge. On August 6, Dan Connell (CONSOL) and Rod Beittel (Babcock Power) gave a presentation on the project at a WorleyParsons “Lunch and Learn” meeting in Reading, PA. On August 28, Dan Connell (CONSOL) presented project results at the 2008 Power Plant Air Pollutant Control "MEGA" Symposium in Baltimore, MD.

September 2008

The multi-pollutant control system at AES Greenidge Unit 4 operated routinely throughout September. Unit 4 was derated throughout the month to ~92 MW_{net} because two coal burners were out of service. These burners were damaged by flame attachments in August. AES Greenidge began co-firing Powder River Basin (PRB) coal with Northern Appalachian coal during mid-September, and Unit 4 was further derated to ~85-89 MW_{net} for the rest of the month because of the high moisture content of this PRB coal. Although it is more difficult to track the pressure drop across the in-duct SCR catalyst when the unit is derated, this pressure drop appeared to increase only slightly during September. On September 2, the pressure drop was ~1.5 i.w.c. when the unit was operating at ~92 MW_{net}, and on September 29, it was ~1.7 i.w.c. when the unit was operating at ~85 MW_{net}.

The Turbosorp system continued to perform commendably during the month. Apart from typical maintenance requirements, only two minor issues were encountered with operation of the system. Once during the month, plant personnel found it difficult to maintain an inventory of product ash in one of the air slides, but they easily overcame this problem by adjusting set points associated with the air slide level control. (The problem was encountered for the first time after PRB co-firing began, leading to speculation that it may have been associated with changes in the quantity and/or composition of the product ash resulting from this co-firing). Later, AES Greenidge experienced some minor problems with plugging in the hydrated lime feed pipe to the Turbosorp system, which may have been promoted by very misty weather conditions that were experienced at the plant.

A draft of the project's Final Public Design Report was submitted to DOE for review on September 25, and a draft of CONSOL's process performance and cost evaluations was submitted to DOE on September 30.

October 2008

AES Greenidge held an outage to repair the damaged coal burners that had caused Unit 4 to be derated in August and September. The outage began on the evening October 3 and ended on the morning of October 6. During the outage, plant personnel inspected the in-duct SCR reactor. Although some LPA had accumulated in the LPA screen, catalyst screen, and catalyst, the amount of accumulation appeared to be much less than was typically observed prior to May 2008, when the original, larger-pitch LPA screen was in service. Based on a visual inspection, the larger-pitch test catalyst modules appeared to have fewer plugged channels than the smaller-pitch catalyst modules. Plant personnel vacuumed LPA from the catalyst screen (they did not remove the screen to access the catalyst directly) and cleaned the catalyst from above using an air lance. The pressure drop across the SCR catalyst averaged about 1.7 i.w.c. (at high loads) following the outage.

Also during the outage, AES cleaned out the hydrated lime feed pipe and inspected the Turbosorp system and baghouse. The Turbosorp inlet cone was clean, but there appeared to be some small deposits higher in the absorber vessel. Significant ash accumulation was observed around the valves at the inlet to the baghouse modules, suggesting that some condensation had occurred in the baghouse. Plant personnel cleaned the ash from one of the eight modules; they will clean the other seven modules during a future outage.

Soon after Unit 4 returned to service on October 6, the hydrator mixer plugged, forcing the lime hydration system offline. Unit 4 was derated for a time to conserve hydrated lime, and AES took deliveries of hydrated lime so that the Turbosorp system could continue to operate while the mixer was cleaned. Plant personnel unplugged the hydrator and worked through problems with lime buildup in the lime belt feeder, and the lime hydration system returned to service on the evening of October 7.

On October 2, Dan Connell (CONSOL) presented project results at the 25th Annual International Pittsburgh Coal Conference in Pittsburgh, PA. On Friday, October 3, CONSOL, AES, and BPEI met at AES Greenidge to mark the conclusion of BPEI's EPC contract for the project and to discuss project close-out and final reporting.

The period of performance under the DOE cooperative agreement ended on October 18, as originally scheduled. During the rest of October, the project team focused on completing the final report and other project close-out requirements. Representatives from DOE, CONSOL, and AES met at AES Greenidge on October 24 to formulate the project's conclusions.

APPENDIX E
FLUE GAS SAMPLING SCHEDULES
FROM SPECIAL TEST SERIES

AES Greenidge Unit 4 Baseline Testing
Flue Gas Sampling Schedule
November 17-18, 2004

(1 of 1)

Date	Parameter Being Evaluated	Analyte	Testing Locations	# of Tests	Testing Method
Wednesday, November 17	Full Load, Normal Operating Conditions	SO_3	air heater inlet, air heater outlet, stack	2	Controlled Condensation; lab analysis by $BaCl_2$ titration
		HCl, HF, PM	stack	2	EPA Method 5 / 26A
		Hg	stack	2	Ontario Hydro (ASTM D6784-02); lab analysis by CVAAS
		SO_2	stack	Continuous	Plant stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Thursday, November 18	Low Load, Normal Operating Conditions	SO_3	air heater outlet	2	Controlled Condensation; lab analysis by $BaCl_2$ titration
	Full Load, Normal Operating Conditions	SO_3	air heater inlet, air heater outlet, stack	1	Controlled Condensation; lab analysis by $BaCl_2$ titration
		HCl, HF, PM	stack	1	EPA Method 5 / 26A
		Hg	stack	1	Ontario Hydro (ASTM D6784-02); lab analysis by CVAAS
		SO_2	stack	Continuous	Plant stack CEM
		NO_x	stack	Continuous	Plant stack CEM

AES Greenidge Unit 4 Guarantee Testing – Sampling Campaign # 1
Flue Gas Sampling Schedule
March 28-30, 2007

(1 of 1)

Date	Parameter Being Evaluated	Analyte	Testing Locations	# of Tests	Testing Method
Wednesday, March 28	Full Load, Design Conditions, No Activated Carbon Injection	Hg, PM	air heater outlet, stack	3	Ontario Hydro (ASTM D6784-02), EPA Method 17; Lab analysis by CVAAS
		NH_3	SCR outlet	3	EPA CTM 027
		NO_x	SCR inlet, SCR outlet (sampling grids)	Continuous	EPA Method 7E (MASS)
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Thursday, March 29	Full Load, Design Conditions	SO_3	air heater outlet, stack	3	Controlled Condensation; lab analysis by $BaCl_2$ titration
		HCl, HF, PM	air heater outlet, stack	3	EPA Method 17 / 26A
		SO_2	air heater outlet, baghouse outlet	Continuous	EPA Method 6C
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Friday, March 30	Full Load, Design Conditions, With Activated Carbon Injection	Hg, PM	air heater outlet, stack	3	Ontario Hydro (ASTM D6784-02), EPA Method 17; Lab analysis by CVAAS
		SO_3	SCR inlet, SCR outlet	3	Controlled Condensation; lab analysis by $BaCl_2$ titration
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM

AES Greenidge Unit 4 Guarantee Testing – Sampling Campaign # 2
Flue Gas Sampling Schedule
May 1-4, 2007

(1 of 1)

Date	Parameter Being Evaluated	Analyte	Testing Locations	# of Tests	Testing Method
Tuesday, May 1	Full Load, Design Conditions	NH_3	SCR outlet, air heater inlet	4	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Wednesday, May 2	Full Load, Design Conditions	SO_3	air heater outlet, stack	3	Controlled Condensation; lab analysis by IC
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Thursday, May 3	No Sampling				
Friday, May 4	Full Load, Design Conditions	HCl, HF	air heater outlet, stack	2	EPA Method 26A
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM

AES Greenidge Unit 4 Guarantee Testing – Sampling Campaign # 3
Flue Gas Sampling Schedule
May 30 – June 1, 2007

(1 of 1)

Date	Parameter Being Evaluated	Analyte	Testing Locations	# of Tests	Testing Method
Wednesday, May 30	Full Load, Combustion System and SNCR System Tuning	NO_x, CO	SCR inlet, SCR outlet (sampling grids)	Continuous	EPA Methods 7E, 10 (MASS)
		NO_x	stack	Continuous	Plant stack CEM
Thursday, May 31	Full Load, Combustion System and SNCR System Tuning	NH_3	air heater inlet, economizer outlet	1	EPA Method CTM 027 (air heater inlet included side-by-side sampling by CONSOL and Clean Air Engineering)
		NO_x, CO	SCR inlet, SCR outlet (sampling grids)	Continuous	EPA Methods 7E, 10 (MASS)
		NO_x	stack	Continuous	Plant stack CEM
Friday, June 1	Full Load, Design Conditions	NH_3	air heater inlet, economizer outlet	2	EPA Method CTM 027 (air heater inlet included side-by-side sampling by CONSOL and Clean Air Engineering)
		NO_x, CO	SCR inlet, SCR outlet (sampling grids)	Continuous	EPA Methods 7E, 10 (MASS)
		NO_x	stack	Continuous	Plant stack CEM

AES Greenidge Unit 4 Guarantee Testing – Sampling Campaign # 4
Flue Gas Sampling Schedule
June 20 – June 21, 2007

Date	Parameter Being Evaluated	Analyte	Testing Locations	# of Tests	Testing Method
Wednesday, June 20	Full Load, Design Conditions	NH_3	air heater inlet	3	EPA Method CTM 027
		NO_x	stack	Continuous	Plant stack CEM
Thursday, June 21	Full Load, Combustion System and SNCR System Tuning	NH_3	air heater inlet	2	EPA Method CTM 027
		NO_x	stack	Continuous	Plant stack CEM

AES Greenidge Unit 4 Process Performance Testing – Sampling Campaign # 1
Flue Gas Sampling Schedule
October 2 – 5, 2007

(1 of 1)

Date	Parameter Being Evaluated	Analyte	Testing Locations	# of Tests	Testing Method
Tuesday, October 2	High-Sulfur Coal, Full Load, No Carbon Injection	Hg, PM	SCR inlet (Hg only), SCR outlet (Hg only), air heater outlet, stack	1	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Wednesday, October 3	High-Sulfur Coal, Full Load, No Carbon Injection	Hg, PM	SCR inlet (Hg only), SCR outlet (Hg only), air heater outlet, stack	2	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS; cyclone used at air heater outlet for 1st test
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Thursday, October 4	High-Sulfur Coal, Full Load, Carbon Injection	SO_3	SCR inlet, SCR outlet, air heater outlet, stack	1	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	1	EPA Method 17 / 26A
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Friday, October 5	High-Sulfur Coal, Full Load, Carbon Injection	Hg, PM	air heater outlet, stack	2	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		SO_3	SCR inlet, SCR outlet, air heater outlet, stack	1	Controlled Condensation; lab analysis by IC
			SCR inlet, SCR outlet	2	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	1	EPA Method 17 / 26A
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM

AES Greenidge Unit 4 Process Performance Testing – Sampling Campaign # 2
Flue Gas Sampling Schedule
October 8 – 11, 2007

(1 of 2)

Date	Parameter Being Evaluated	Analyte	Testing Locations	Number of Tests	Testing Method
Monday, October 8	Turbosorp Ca/S Ratio #1, Outlet Temperature = 160F, Full Load	SO_3	air heater outlet, stack	1	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	1	EPA Method 17 / 26A
		Hg, PM	air heater outlet, stack	1	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		NH_3	air heater inlet	1	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Tuesday, October 9	Turbosorp Ca/S Ratio #2, Outlet Temperature = 160F, Full Load	SO_3	air heater outlet, stack	1	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	1	EPA Method 17 / 26A
		Hg, PM	air heater outlet, stack	1	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		NH_3	air heater inlet	1	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Wednesday, October 10	Turbosorp Ca/S Ratio #3, Outlet Temperature = 160F, Full Load	SO_3	air heater outlet, stack	1	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	1	EPA Method 17 / 26A
		Hg, PM	air heater outlet, stack	1	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		NH_3	air heater inlet	1	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM

Date	Parameter Being Evaluated	Analyte	Testing Locations	Number of Tests	Testing Method
Thursday, October 11	Turbosorp SO_2 Emission Set Point = 0.2 lb/mmBtu, Outlet Temperature = 165F, Full Load	SO_3	air heater outlet, stack	1	Controlled Condensation; lab analysis by IC
		Hg, PM	air heater outlet, stack	1	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		NH_3	air heater inlet	1	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM

AES Greenidge Unit 4 Process Performance Testing – Sampling Campaign # 3
Flue Gas Sampling Schedule
November 13 – 16, 2007

(1 of 1)

Date	Parameter Being Evaluated	Analyte	Testing Locations	Number of Tests	Testing Method
Tuesday-Wednesday, November 13-14 (Night Shift)	Low Load (~ 56 MW_g), 100% Coal	Hg, PM	stack	2	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		SO_3	air heater outlet, stack	3	Controlled Condensation; lab analysis by IC
		NH_3	air heater inlet	3	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Wednesday-Thursday, November 14-15 (Night Shift)	Intermediate Load (~ 79-84 MW_g), 100% Coal	Hg, PM	stack	2	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		SO_3	air heater outlet, stack	3	Controlled Condensation; lab analysis by IC
		NH_3	air heater inlet	4	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Friday, November 16 (Day Shift)	Full Load (102-103 MW_g), Coal with Waste Wood Co-Firing	Hg, PM	stack	1	Ontario Hydro (ASTM D6784-02), EPA Method 17; Lab analysis by CVAFS
		SO_3	air heater outlet, stack	2	Controlled Condensation; lab analysis by IC
		NH_3	air heater inlet	3	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM

AES Greenidge Unit 4 Process Performance Testing – Sampling Campaign # 4
Flue Gas Sampling Schedule
March 10 – 13, 2008

Date	Parameter Being Evaluated	Analyte	Testing Locations	Number of Tests	Testing Method
Monday, March 10	Full Load, Coal with Waste Wood Co-Firing	HCl, HF, PM	air heater outlet, stack	1	EPA Method 17 / 26A
		SO_3	economizer outlet, air heater inlet, air heater outlet, stack	1	Controlled Condensation; lab analysis by IC
		NH_3	air heater inlet	1	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Tuesday, March 11	Full Load, Coal with Waste Wood Co-Firing	Hg, PM	economizer outlet (Hg only), air heater inlet (Hg only), air heater outlet (Hg only), stack	2	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Wednesday, March 12	Full Load, Coal with Waste Wood Co-Firing	Hg, PM	economizer outlet (Hg only), air heater inlet (Hg only), air heater outlet (Hg only), stack	2	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Thursday, March 13	Full Load, Coal with Waste Wood Co-Firing	HCl, HF, PM	air heater outlet, stack	3	EPA Method 17 / 26A
		SO_3	economizer outlet, air heater inlet, air heater outlet, stack	3	Controlled Condensation; lab analysis by IC
		NH_3	air heater inlet	3	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM

AES Greenidge Unit 4 Process Performance Testing – Sampling Campaign # 5
Flue Gas Sampling Schedule
May 19 – 22, 2008

(1 of 2)

Date	Parameter Being Evaluated	Analyte	Testing Locations	Number of Tests	Testing Method
Monday-Tuesday, May 19-20 (Night Shift)	Low Load ~ 56-57 MW_g Urea Zone 1	Hg, PM	economizer outlet (Hg only), air heater inlet (Hg only), stack	2	Ontario Hydro (ASTM D6784-02), EPA Method 17; lab analysis by CVAFS
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Tuesday-Wednesday, May 20-21 (Night Shift)	Intermediate Load ~ 90-91 MW_g Urea Zones 2-3	SO_3	air heater outlet, stack	1	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	1	EPA Method 17 / 26A
		NH_3	air heater inlet	2	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
	Intermediate Load ~ 80-81 MW_g Urea Zones 1-2	SO_3	air heater outlet, stack	1	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	1	EPA Method 17 / 26A
		NH_3	air heater inlet	2	EPA CTM 027
		NO_x, CO	SCR inlet, SCR outlet (sampling grids)	Continuous	EPA Methods 7E, 10 (MASS)
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
	Full Load ~ 105 MW Urea Zones 2-3	NH_3	air heater inlet	3	EPA CTM 027
		NO_x, CO	SCR inlet, SCR outlet (sampling grids)	Continuous	EPA Methods 7E, 10 (MASS)
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM

Date	Parameter Being Evaluated	Analyte	Testing Locations	Number of Tests	Testing Method
Wednesday-Thursday, May 21-22 (Night Shift)	Low Load ~ 57 MW Urea Zone 1	SO_3	air heater outlet, stack	3	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	3	EPA Method 17 / 26A
		NH_3	air heater inlet	3	EPA CTM 027
		NO_x, CO	SCR inlet, SCR outlet (sampling grids)	Continuous	EPA Methods 7E, 10 (MASS)
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM

AES Greenidge Unit 4 Process Performance Testing – Sampling Campaign # 6
Flue Gas Sampling Schedule
June 16-19, 2008

Date	Parameter Being Evaluated	Analyte	Testing Locations	Number of Tests	Testing Method
Monday, June 16	92% SO_2 Removal Efficiency, 160F Turbosorp Outlet Temperature, Full Load	SO_3	air heater outlet, stack	3	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	2	EPA Method 17 / 26A
		Hg	stack	1	EPA Method 30B
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
Tuesday, June 17	95% SO_2 Removal Efficiency, 160F Turbosorp Outlet Temperature, Full Load	SO_3	air heater outlet, stack	3	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	2	EPA Method 17 / 26A
		Hg	stack	1	EPA Method 30B
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
Wednesday, June 18	98% SO_2 Removal Efficiency, 160F Turbosorp Outlet Temperature, Full Load	SO_3	air heater outlet, stack	3	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	2	EPA Method 17 / 26A
		Hg	stack	1	EPA Method 30B
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
Thursday, June 19	95% SO_2 Removal Efficiency, 165F Turbosorp Outlet Temperature, Full Load	SO_3	air heater outlet, stack	3	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	2	EPA Method 17 / 26A
		Hg	stack	1	EPA Method 30B
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM

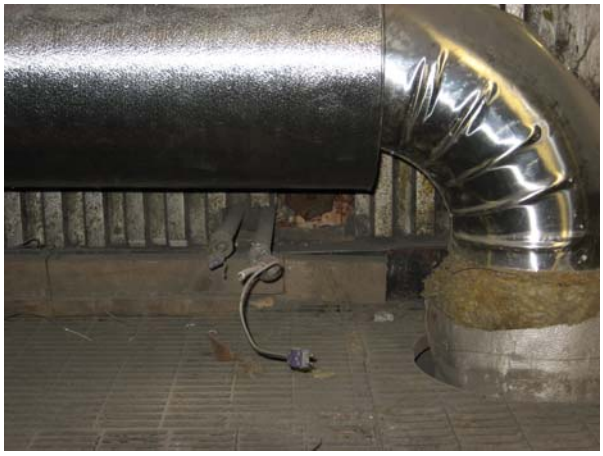
AES Greenidge Unit 4 Follow-Up Testing
Flue Gas Sampling Schedule
June 10-13, 2008

(1 of 1)

Date	Parameter Being Evaluated	Analyte	Testing Locations	# of Tests	Testing Method
Tuesday, June 10	Full Load, Normal Operating Conditions	SO_3	economizer outlet, air heater inlet, air heater outlet, stack	1	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	1	EPA Method 17 / 26A
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Wednesday, June 11	Full Load, Normal Operating Conditions	SO_3	economizer outlet, air heater inlet, air heater outlet, stack	3	Controlled Condensation; lab analysis by IC
		HCl, HF, PM	air heater outlet, stack	3	EPA Method 17 / 26A
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Thursday, June 12	Full Load, Normal Operating Conditions	Hg, PM	economizer outlet (Hg only), air heater inlet (Hg only), stack	2	Ontario Hydro (ASTM D6784-02), EPA Method 17, EPA Method 30B (stack only); Lab analysis by CVAFS
		NH_3	air heater inlet	2	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM
Friday, June 13	Full Load, Normal Operating Conditions	Hg, PM	economizer outlet (Hg only), air heater inlet (Hg only), stack	2	Ontario Hydro (ASTM D6784-02), EPA Method 17, EPA Method 30B (stack only); Lab analysis by CVAFS
		NH_3	air heater inlet	2	EPA CTM 027
		SO_2	air heater outlet, stack	Continuous	Plant Turbosorp inlet SO_2 analyzer, stack CEM
		NO_x	stack	Continuous	Plant stack CEM

APPENDIX F
PHOTOGRAPHS OF FLUE GAS SAMPLING LOCATIONS

Economizer Outlet Sampling Location



SCR Inlet Sampling Location

Grid Point Sampling

Manual Sampling

SCR Outlet Sampling Location

Air Heater Inlet Sampling Location

Air Heater Outlet Sampling Location

Two-Inch Ports and Plant SO_2 Analyzer

Four-Inch Ports

Baghouse Outlet Sampling Location

Stack Sampling Location