



Big Sandy Plant Unit 2
ORDER-OF-MAGNITUDE FGD COST ESTIMATE

Prepared for:
Kentucky Power Company (Owner)
and American Electric Power Service Corporation

Project No. 12721-000
September 29, 2010

Report for WFGD, DFGD, IAQCS
and NID Technologies

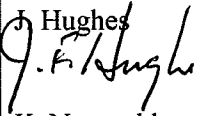
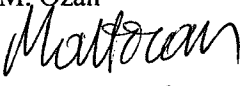
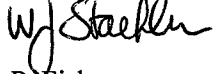
Volume 3 – DFGD Technology



55 East Monroe Street
Chicago, IL 60603-5780 USA



Issue Summary Page

Revision Number	Date	Purpose	Prepared By	Reviewed By	Approved By	Pages Affected
0	9/29/10	Use	D. Anderson  J. Hughes  K. Nomanbhoy  M. Ozan  C. Woods 	D. F. Franczak  W. J. Staehlin  P. Fisher 	S. R. Bertheau 	All



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* - Estimates 2A and 2B contain only accounts whose costs are different from the corresponding base estimates 1A and 1B.

1.0 INTRODUCTION

The purpose of this document was to establish the Basis of the Order-of-Magnitude Dry FGD (DFGD) Cost Estimate to assist American Electric Power (AEP) with the selection of an FGD technology for Big Sandy Plant Unit 2. It was also intended to organize and present the deliverables for the DFGD technology that were used to develop the Order-of-Magnitude FGD Cost Estimates. This document defines the project scope of work for the DFGD technology and the organization of the capital cost estimate structure. The technical and commercial basis used to develop the Capital and O&M Cost Estimates and the assumptions used in preparing them are defined in Volume 1, Summary Report.

The Order-of-Magnitude FGD Cost Estimate Report is comprised of five (5) volumes as follows:

<u>Volume</u>	<u>Description</u>
1	Summary Report
2	WFGD Technology
3	DFGD Technology
4	IAQCS Technology
5	NID Technology

Order-of-Magnitude FGD Cost Estimates were prepared for the following four FGD Technologies:

- **Wet (WFGD):** Wet FGD Spray Tower and Integrated Wet ESP
- **Dry (DFGD):** Dry FGD Spray Dryer Absorber (SDA) and Fabric Filter (FF)
- **IAQCS:** Integrated Air Quality Control System (IAQCS) Dry SDA/FF and Wet FGD Spray Tower
- **NID:** Dry FGD NID and Fabric Filter

For the DFGD technology, cost estimates were prepared considering fuel specifications with sulfur content of 1.7 and 3.0 lb SO₂/MMBtu. A base fuel was selected and a capital cost estimate was prepared for each assuming an Engineer, Procure, Construct (EPC) contracting approach. Adjustments were then

made to the base cost estimate to develop the remaining fuel estimates for that specific technology. The cost estimates also consider both the existing ESP in and removed from service. In order to reduce the size of the report the non-base cost estimates contain only those cost accounts that were different from the corresponding base estimate 1A or 1B.

The cost estimates were based upon conceptual design deliverables prepared by S&L for each technology and the AEP Order of Magnitude/Relative Capital Installed Cost Estimate Specification (BS2-FGDSCE-052010, Rev. 2) which provided design basis and performance requirements. The conceptual deliverables, consisting of project general arrangements, process flow diagrams, mass balances, water balances and single lines, formed the basis for development of preliminary major equipment sizes and commodity estimates. Attention was focused on the significant elements that changed from one fuel to another, such as storage, handling and disposal of reagent and byproduct materials. The OEM equipment costs were taken from recent vendor quotes and adjusted for Big Sandy specifications, unit capacity, and escalated to 2010 dollars.

Table 1-1 illustrates the total of four (4) cost estimates that were prepared for the DFGD.

Table 1-1
EPC COST ESTIMATES

Technology	1.7 lb SO₂/MMbtu	3.0 lb SO₂/MMbtu	4.5 lb SO₂/MMbtu	7.5 lb SO₂/MMbtu
Dry (ESP)	Dry Est-2A	Dry Base Est-1A	N/A	N/A
Dry (N/ESP)	Dry Est-2B	Dry Base Est-1B	N/A	N/A

ESP= ESP In Service

N/ESP = ESP Out of Service

For details of the Technical and Commercial Basis of the entire study and the various technology cost comparisons, see Volume 1, Summary Report.



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
Volume 3 – DFGD Technology
September 29, 2010

EXHIBIT 3-1

DFGD Project Deliverable Index

VOLUME 3 - EXHIBIT 3-1
Project Deliverable Index
Dry FGD Technology

Document No.	Description	Attachment No.
MSK-DFGD-PFD-001_C	Dry FGD Process Flow Diagram – Sheet 1	3-1
MSK-DFGD-PFD-002_C	Dry FGD Process Flow Diagram – Sheet 2	3-1
MSK-DFGD-GA-001_C	Dry FGD Site Plan	3-2
MSK-DFGD-GA-002_B	Dry FGD General Arrangement - Plan	3-2
MSK-DFGD-GA-003_B	Dry FGD General Arrangement – Ductwork Elevations	3-2
MSK-DFGD-MB-001_C	Dry FGD Mass Balance Diagram – (1.7 lb/MMBtu Coal w/o ESP)	3-3
MSK-DFGD-MB-002_C	Dry FGD Mass Balance Diagram – (3.0 lb/MMBtu Coal w/o ESP)	3-3
MSK-DFGD-MB-003_C	Dry FGD Mass Balance Diagram – (1.7 lb/MMBtu Coal w/ESP)	3-3
MSK-DFGD-MB-004_C	Dry FGD Mass Balance Diagram – (3.0 lb/MMBtu Coal w/ESP)	3-3
MSK-DFGD-WB-NOTES-001_C	DFGD Water Balance Assumptions with ESP	3-4
MSK-DFGD-WB-001_D	Dry FGD Water Balance Diagram – (1.7 lb/MMBtu Coal w/ESP)	3-4
MSK-DFGD-WB-002_C	Dry FGD Water Balance Diagram – (3.0 lb/MMBtu Coal w/ESP)	3-4
MSK-DFGD-WB-NOTES-002_C	DFGD Water Balance Assumptions without ESP	3-4
MSK-DFGD-WB-003_D	Dry FGD Water Balance Diagram – (1.7 lb/MMBtu Coal w/o ESP)	3-4
MSK-DFGD-WB-004_C	Dry FGD Water Balance Diagram – (3.0 lb/MMBtu Coal w/o ESP)	3-4
ESK-DFGD-SL-Notes-001_B	Dry FGD Single Line Diagram Basic Description	3-4
ESK-DFGD-SL-001_B	Dry FGD Single Line Diagram – ESP Out	3-5
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EXHIBIT 3-2

DFGD Capital Cost Estimate Outline

EXHIBIT 3-2

DFGD CAPITAL COST ESTIMATE OUTLINE

DIRECT COSTS

PROJECT DIRECT COSTS					
ACCT	COST ESTIMATE CATEGORY	EQUIPMENT/MATERIAL COST RESPONSIBILITY	CONSTRUCTION/ERECTION COST RESPONSIBILITY	ESTIMATE BASIS	NOTES
1.0	ID FANS	S&L	S&L	Previous OEM proposals and S&L Estimates	1
2.0	FABRIC FILTERS	S&L	S&L	Previous OEM proposals and S&L Estimates	
3.0	NEW STACK	AEP	AEP	Previous AEP Projects	
4.0	LIME HANDLING SYSTEM	S&L	S&L	Previous OEM proposals and S&L Estimates	
5.0	LIME SLAKER BUILDING	S&L	S&L	Previous OEM proposals and S&L Estimates	
6.0	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS	S&L	S&L	Previous OEM proposals and S&L Estimate	
7.0	ABSORBER ISLAND	S&L	S&L	Previous OEM proposals and S&L Estimates	1, 2
8.0	ACTIVATED CARBON INJECTION	AEP	AEP	Previous AEP Projects	
9.0	COMPRESSED AIR SYSTEM	S&L	S&L	Past & Current S&L Projects	
10.0	SERVICE WATER SYSTEM	S&L	S&L	Past & Current S&L Projects	
11.0	POTABLE WATER SYSTEM	S&L	S&L	Past & Current S&L Projects	

EXHIBIT 3-2

DFGD CAPITAL COST ESTIMATE OUTLINE

DIRECT COSTS

PROJECT DIRECT COSTS					
ACCT	COST ESTIMATE CATEGORY	EQUIPMENT/MATERIAL COST RESPONSIBILITY	CONSTRUCTION/ERECTION COST RESPONSIBILITY	ESTIMATE BASIS	NOTES
12.0	FGD SUBSTATION	S&L	S&L	Past & Current S&L Projects	
13.0	FGD DCS SYSTEM	S&L	S&L	Past S&L Projects Adjusted to Meet AEP Design Criteria	
14.0	CEM SYSTEM	AEP	AEP	Previous AEP Projects	
15.0	RAIL INFRASTRUCTURE	S&L	S&L	Past & Current S&L Projects	
16.0	SITE IMPROVEMENTS - CIVIL WORK	S&L	S&L	Past & Current S&L Projects	
17.0	BOP ITEMS	S&L	S&L	Past & Current S&L Projects	
18.0	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE	S&L	S&L	Site Plans	
19.0	ARSENIC, ASBESTOS , LEAD ABATEMENT	AEP	AEP	Previous AEP Projects	

Notes: 1) Noise Mitigation costs were considered for ID fan insulation and lagging and blower bldg construction.
2) Ductwork costs are based upon general arrangement layouts.

EXHIBIT 3-2

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Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
Volume 3 – DFGD Technology
September 29, 2010

EXHIBIT 3-3

DFGD Contingency Analysis

AEP
BIG SANDY UNIT 2
FGD PROJECT - DFGD EST (ESP)-1A - 3.0 LB/MM/BTU

@RISK
Risk Analysis and Simulation Add-In for Microsoft EXCEL
Version 5.0
Palisade Corporation

ANALYSIS INPUT

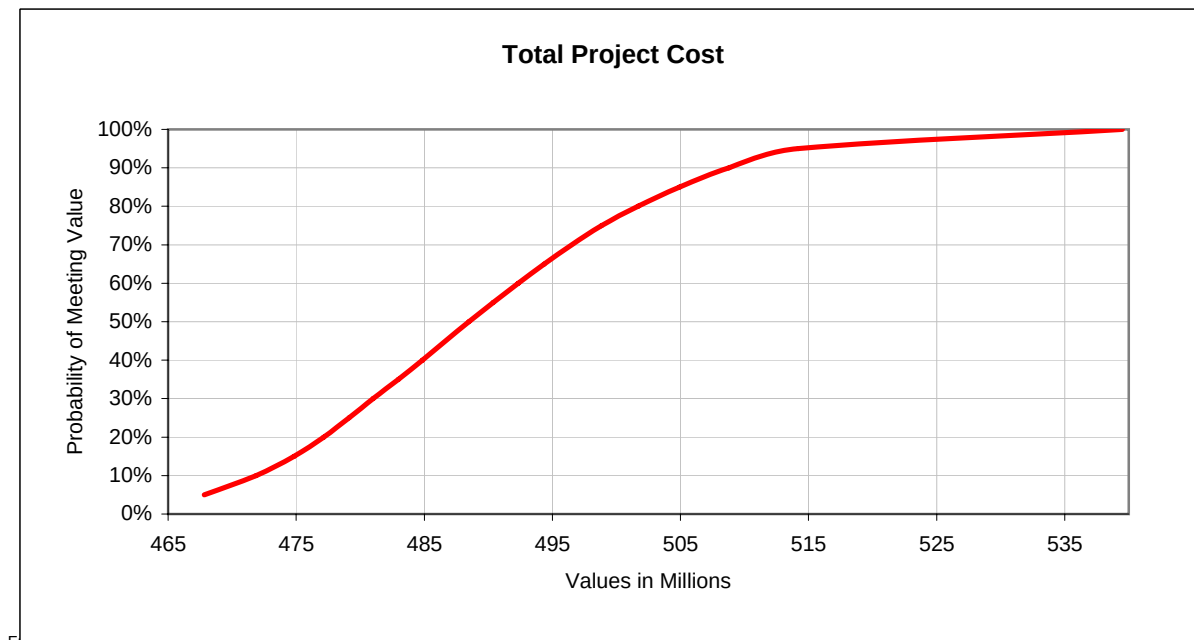
Values in Thousands

Accnt. No.	Cost Elements	Target Value \$k	Minimum	Maximum	Minimum	Maximum
1.0	ID FANS	\$31,284,200	95%	130%	\$29,719,990	\$40,669,460
2.0	FABRIC FILTERS	\$42,323,100	95%	130%	\$40,206,945	\$55,020,030
3.0	NEW STACK	\$19,350,000	95%	130%	\$18,382,500	\$25,155,000
4.0	LIME HANDLING SYSTEM	\$17,169,900	95%	125%	\$16,311,405	\$21,462,375
5.0	LIME SLAKER BUILDING	\$16,827,400	95%	130%	\$15,986,030	\$21,875,620
6.0	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS	\$16,028,600	95%	130%	\$15,227,170	\$20,837,180
7.0	ABSORBER ISLAND	\$128,347,900	95%	130%	\$121,930,505	\$166,852,270
8.0	ACTIVATED CARBON INJECTION SYSTEM	\$5,381,600	95%	130%	\$5,112,520	\$6,996,080
9.0	COMPRESSED AIR SYSTEM	\$3,562,300	95%	135%	\$3,384,185	\$4,809,105
10.0	SERVICE WATER SYSTEM	\$3,511,800	95%	135%	\$3,336,210	\$4,740,930
11.1	POTABLE WATER SYSTEM	\$901,900	95%	135%	\$856,805	\$1,217,565
12.0	FGD SUBSTATION	\$7,685,100	95%	135%	\$7,300,845	\$10,374,885
13.0	FGD DCS SYSTEM	\$5,153,600	95%	135%	\$4,895,920	\$6,957,360
14.0	CEM SYSTEM	\$2,110,000	95%	130%	\$2,004,500	\$2,743,000
15.0	RAIL INFRASTRUCTURE	\$4,340,700	95%	140%	\$4,123,665	\$6,076,980
16.0	SITE IMPROVEMENTS - CIVIL WORK	\$12,459,800	95%	140%	\$11,836,810	\$17,443,720
17.0	BOP ITEMS	\$3,234,100	95%	160%	\$3,072,395	\$5,174,560
18.0	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE	\$3,509,200	95%	200%	\$3,333,740	\$7,018,400
19.0	ARSENIC, ASBESTOS , LEAD ABATEMENT	\$750,000	95%	150%	\$712,500	\$1,125,000
99.0	OVERALL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS	\$74,862,300	95%	140%	\$71,119,185	\$104,807,220
	OVERALL PROJECT INDIRECT COSTS	\$47,245,600	95%	130%	\$44,883,320	\$61,419,280
	SPARE PARTS	\$1,811,700	95%	130%	\$1,721,115	\$2,355,210
	Total Base Case	\$447,850,800				

ANALYSIS OUTPUT

Probability of meeting "Total Base Case" value: 447,850,800 0.0%

Total Budget Required (\$k)	% Confidence Level	Confidence Level Risk	Contingency % of Base
539,509,846	100.0%	91,659,000	20.466%
514,191,996	95.0%	66,341,200	14.813%
508,785,541	90.0%	60,934,700	13.606%
504,959,090	85.0%	57,108,300	12.752%
501,710,575	80.0%	53,859,800	12.026%
498,829,038	75.0%	50,978,200	11.383%
496,493,618	70.0%	48,642,800	10.861%
494,358,341	65.0%	46,507,500	10.385%
492,325,330	60.0%	44,474,500	9.931%
490,385,854	55.0%	42,535,100	9.498%
488,477,359	50.0%	40,626,600	9.071%
486,661,813	45.0%	38,811,000	8.666%
484,865,004	40.0%	37,014,200	8.265%
482,982,176	35.0%	35,131,400	7.844%
481,009,911	30.0%	33,159,100	7.404%
479,145,884	25.0%	31,295,100	6.988%
477,147,750	20.0%	29,297,000	6.542%
474,829,752	15.0%	26,979,000	6.024%
471,878,380	10.0%	24,027,600	5.365%
467,815,320	5.0%	19,964,500	4.458%



AEP
BIG SANDY UNIT 2
FGD PROJECT - DFGD EST (ESP)-2A - 1.7 LB/MM/BTU

@RISK
Risk Analysis and Simulation Add-In for Microsoft EXCEL
Version 5.0
Palisade Corporation

ANALYSIS INPUT

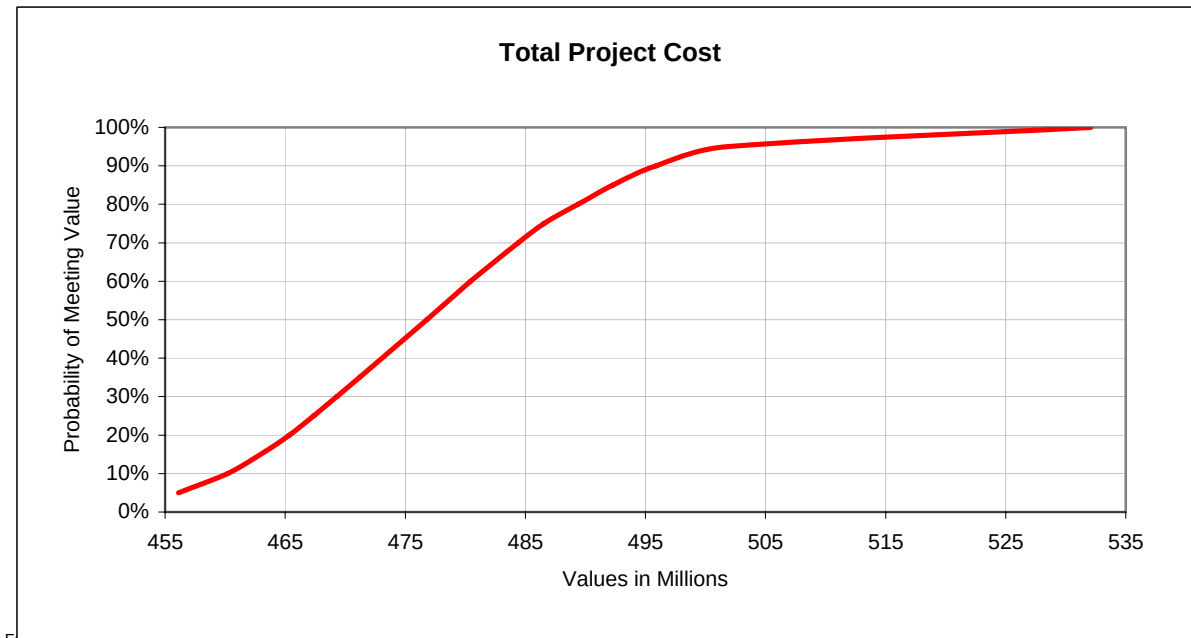
Values in Thousands

Accnt. No.	Cost Elements	Target Value \$k	Minimum	Maximum	Minimum	Maximum
1.0	ID FANS	\$31,284,200	95%	130%	\$29,719,990	\$40,669,460
2.0	FABRIC FILTERS	\$42,507,200	95%	130%	\$40,381,840	\$55,259,360
3.0	NEW STACK	\$19,350,000	95%	130%	\$18,382,500	\$25,155,000
4.0	LIME HANDLING SYSTEM	\$11,970,100	95%	125%	\$11,371,595	\$14,962,625
5.0	LIME SLAKER BUILDING	\$13,084,300	95%	130%	\$12,430,085	\$17,009,590
6.0	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS	\$15,361,000	95%	130%	\$14,592,950	\$19,969,300
7.0	ABSORBER ISLAND	\$128,347,900	95%	130%	\$121,930,505	\$166,852,270
8.0	ACTIVATED CARBON INJECTION SYSTEM	\$5,381,600	95%	130%	\$5,112,520	\$6,996,080
9.0	COMPRESSED AIR SYSTEM	\$3,562,300	95%	135%	\$3,384,185	\$4,809,105
10.0	SERVICE WATER SYSTEM	\$3,511,800	95%	135%	\$3,336,210	\$4,740,930
11.1	POTABLE WATER SYSTEM	\$901,900	95%	135%	\$856,805	\$1,217,565
12.0	FGD SUBSTATION	\$7,685,100	95%	135%	\$7,300,845	\$10,374,885
13.0	FGD DCS SYSTEM	\$5,153,600	95%	135%	\$4,895,920	\$6,957,360
14.0	CEM SYSTEM	\$2,110,000	95%	130%	\$2,004,500	\$2,743,000
15.0	RAIL INFRASTRUCTURE	\$4,340,700	95%	140%	\$4,123,665	\$6,076,980
16.0	SITE IMPROVEMENTS - CIVIL WORK	\$12,459,800	95%	140%	\$11,836,810	\$17,443,720
17.0	BOP ITEMS	\$3,234,100	95%	160%	\$3,072,395	\$5,174,560
18.0	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE	\$3,509,200	95%	200%	\$3,333,740	\$7,018,400
19.0	ARSENIC, ASBESTOS , LEAD ABATEMENT	\$750,000	95%	150%	\$712,500	\$1,125,000
99.0	OVERALL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS	\$73,792,800	95%	140%	\$70,103,160	\$103,309,920
	OVERALL PROJECT INDIRECT COSTS	\$46,772,100	95%	130%	\$44,433,495	\$60,803,730
	SPARE PARTS	\$1,699,800	95%	130%	\$1,614,810	\$2,209,740
	Total Base Case	\$436,769,500				

ANALYSIS OUTPUT

Probability of meeting "Total Base Case" value: 436,769,500 0.0%

Total Budget Required (\$k)	% Confidence Level	Confidence Level Risk	Contingency % of Base
532,088,444	100.0%	95,318,900	21.824%
501,873,852	95.0%	65,104,400	14.906%
495,898,874	90.0%	59,129,400	13.538%
492,309,756	85.0%	55,540,300	12.716%
489,394,975	80.0%	52,625,500	12.049%
486,529,302	75.0%	49,759,800	11.393%
484,398,427	70.0%	47,628,900	10.905%
482,396,626	65.0%	45,627,100	10.446%
480,410,300	60.0%	43,640,800	9.992%
478,601,081	55.0%	41,831,600	9.578%
476,811,910	50.0%	40,042,400	9.168%
474,922,617	45.0%	38,153,100	8.735%
473,061,872	40.0%	36,292,400	8.309%
471,195,787	35.0%	34,426,300	7.882%
469,316,054	30.0%	32,546,600	7.452%
467,381,890	25.0%	30,612,400	7.009%
465,333,073	20.0%	28,563,600	6.540%
462,951,587	15.0%	26,182,100	5.994%
460,206,924	10.0%	23,437,400	5.366%
456,121,994	5.0%	19,352,500	4.431%



AEP
BIG SANDY UNIT 2
FGD PROJECT - DFGD EST (N/ESP)-1B - 3.0 LB/MM/BTU

@RISK
Risk Analysis and Simulation Add-In for Microsoft EXCEL
Version 5.0
Palisade Corporation

ANALYSIS INPUT

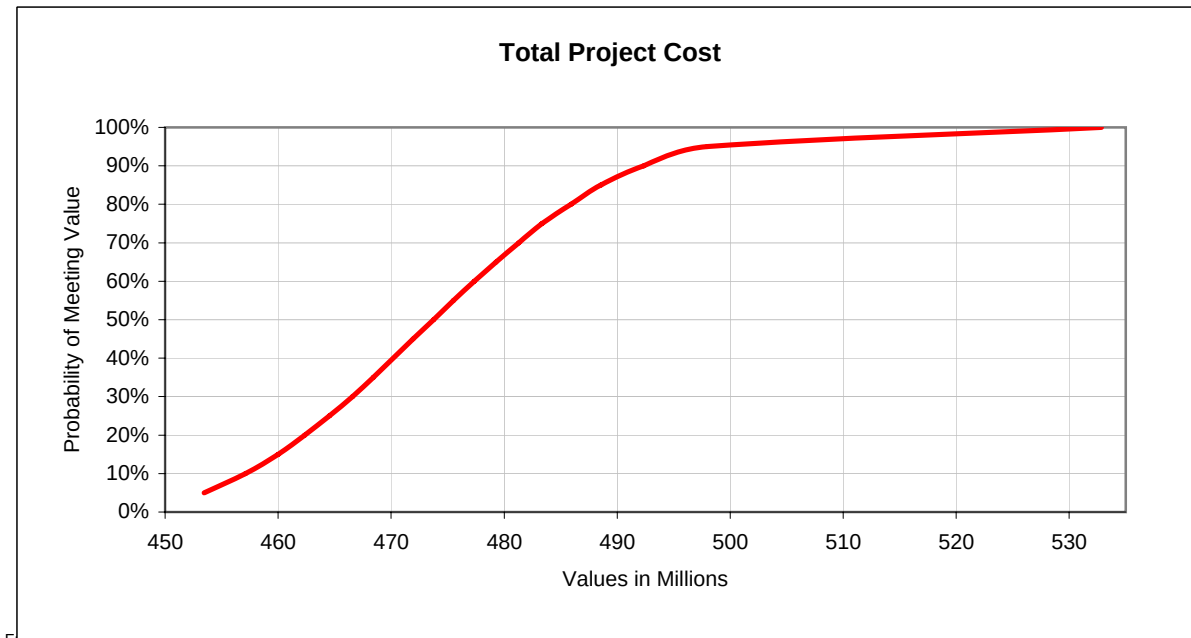
Values in Thousands

Acct. No.	Cost Elements	Target Value \$k	Minimum	Maximum	Minimum	Maximum
1.0	ID FANS	\$31,775,100	95%	130%	\$30,186,345	\$41,307,630
2.0	FABRIC FILTERS	\$42,992,100	95%	130%	\$40,842,495	\$55,889,730
3.0	NEW STACK	\$19,350,000	95%	130%	\$18,382,500	\$25,155,000
4.0	LIME HANDLING SYSTEM	\$15,896,900	95%	125%	\$15,102,055	\$19,871,125
5.0	LIME SLAKER BUILDING	\$15,968,000	95%	130%	\$15,169,600	\$20,758,400
6.0	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS	\$12,869,700	95%	130%	\$12,226,215	\$16,730,610
7.0	ABSORBER ISLAND	\$121,897,500	95%	130%	\$115,802,625	\$158,466,750
8.0	ACTIVATED CARBON INJECTION SYSTEM	\$5,381,600	95%	130%	\$5,112,520	\$6,996,080
9.0	COMPRESSED AIR SYSTEM	\$3,562,300	95%	135%	\$3,384,185	\$4,809,105
10.0	SERVICE WATER SYSTEM	\$3,511,800	95%	135%	\$3,336,210	\$4,740,930
11.1	POTABLE WATER SYSTEM	\$901,900	95%	135%	\$856,805	\$1,217,565
12.0	FGD SUBSTATION	\$7,786,000	95%	135%	\$7,396,700	\$10,511,100
13.0	FGD DCS SYSTEM	\$5,153,600	95%	135%	\$4,895,920	\$6,957,360
14.0	CEM SYSTEM	\$2,110,000	95%	130%	\$2,004,500	\$2,743,000
15.0	RAIL INFRASTRUCTURE	\$4,340,700	95%	140%	\$4,123,665	\$6,076,980
16.0	SITE IMPROVEMENTS - CIVIL WORK	\$12,459,800	95%	140%	\$11,836,810	\$17,443,720
17.0	BOP ITEMS	\$3,234,100	95%	160%	\$3,072,395	\$5,174,560
18.0	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE	\$3,509,200	95%	200%	\$3,333,740	\$7,018,400
19.0	ARSENIC, ASBESTOS , LEAD ABATEMENT	\$750,000	95%	150%	\$712,500	\$1,125,000
99.0	OVERALL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS	\$72,130,000	95%	140%	\$68,523,500	\$100,982,000
	OVERALL PROJECT INDIRECT COSTS	\$46,611,100	95%	130%	\$44,280,545	\$60,594,430
	SPARE PARTS	1,780,600	95%	130%	\$1,691,570	\$2,314,780
	Total Base Case	\$433,972,000				

ANALYSIS OUTPUT

Probability of meeting "Total Base Case" value: 433,972,000 0.0%

Total Budget Required (\$k)	% Confidence Level	Confidence Level Risk	Contingency % of Base
532,858,795	100.0%	98,886,800	22.786%
497,925,835	95.0%	63,953,800	14.737%
492,356,128	90.0%	58,384,100	13.453%
488,563,329	85.0%	54,591,300	12.579%
485,940,181	80.0%	51,968,200	11.975%
483,312,482	75.0%	49,340,500	11.370%
481,286,595	70.0%	47,314,600	10.903%
479,267,018	65.0%	45,295,000	10.437%
477,349,614	60.0%	43,377,600	9.995%
475,525,147	55.0%	41,553,100	9.575%
473,747,966	50.0%	39,776,000	9.166%
471,944,267	45.0%	37,972,300	8.750%
470,196,815	40.0%	36,224,800	8.347%
468,432,562	35.0%	34,460,600	7.941%
466,583,638	30.0%	32,611,600	7.515%
464,555,983	25.0%	30,584,000	7.047%
462,332,298	20.0%	28,360,300	6.535%
460,002,208	15.0%	26,030,200	5.998%
457,106,003	10.0%	23,134,000	5.331%
453,450,633	5.0%	19,478,600	4.488%



AEP
BIG SANDY UNIT 2
FGD PROJECT - DFGD EST (N/ESP)-2B - 1.7 LB/MM/BTU

@RISK
Risk Analysis and Simulation Add-In for Microsoft EXCEL
Version 5.0
Palisade Corporation

ANALYSIS INPUT

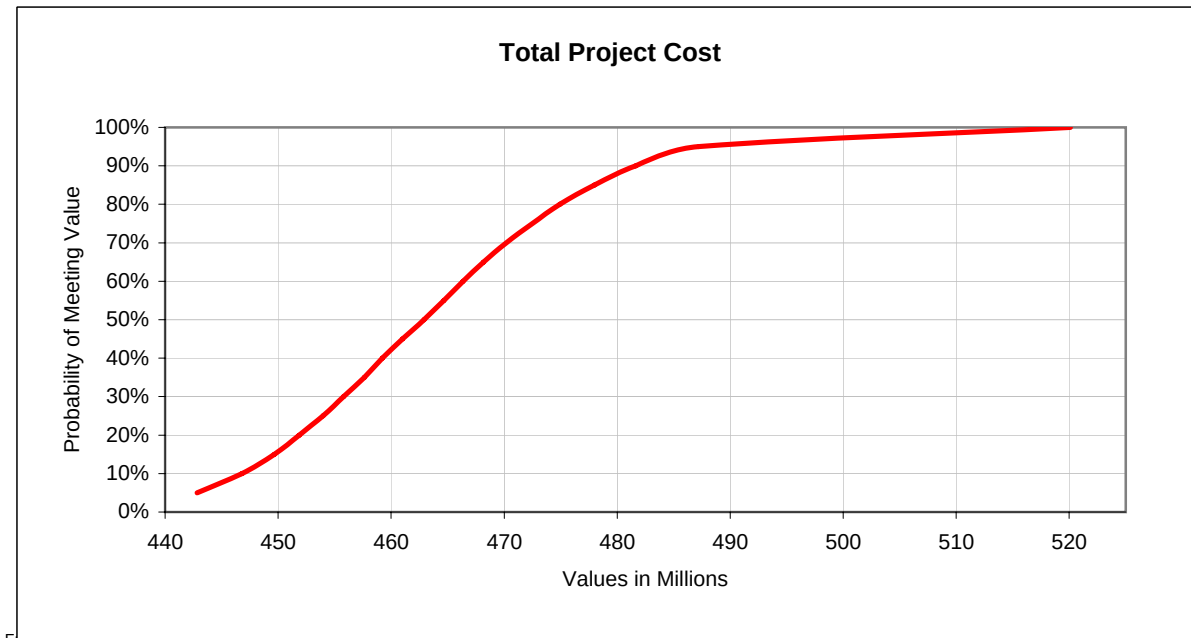
Values in Thousands

Accnt. No.	Cost Elements	Target Value \$k	Minimum	Maximum	Minimum	Maximum
1.0	ID FANS	\$31,775,100	95%	130%	\$30,186,345	\$41,307,630
2.0	FABRIC FILTERS	\$43,292,800	95%	130%	\$41,128,160	\$56,280,640
3.0	NEW STACK	\$19,350,000	95%	130%	\$18,382,500	\$25,155,000
4.0	LIME HANDLING SYSTEM	\$11,565,100	95%	125%	\$10,986,845	\$14,456,375
5.0	LIME SLAKER BUILDING	\$12,577,000	95%	130%	\$11,948,150	\$16,350,100
6.0	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS	\$11,889,300	95%	130%	\$11,294,835	\$15,456,090
7.0	ABSORBER ISLAND	\$121,897,500	95%	130%	\$115,802,625	\$158,466,750
8.0	ACTIVATED CARBON INJECTION SYSTEM	\$5,381,600	95%	130%	\$5,112,520	\$6,996,080
9.0	COMPRESSED AIR SYSTEM	\$3,562,300	95%	135%	\$3,384,185	\$4,809,105
10.0	SERVICE WATER SYSTEM	\$3,511,800	95%	135%	\$3,336,210	\$4,740,930
11.1	POTABLE WATER SYSTEM	\$901,900	95%	135%	\$856,805	\$1,217,565
12.0	FGD SUBSTATION	\$7,786,000	95%	135%	\$7,396,700	\$10,511,100
13.0	FGD DCS SYSTEM	\$5,153,600	95%	135%	\$4,895,920	\$6,957,360
14.0	CEM SYSTEM	\$2,110,000	95%	130%	\$2,004,500	\$2,743,000
15.0	RAIL INFRASTRUCTURE	\$4,340,700	95%	140%	\$4,123,665	\$6,076,980
16.0	SITE IMPROVEMENTS - CIVIL WORK	\$12,459,800	95%	140%	\$11,836,810	\$17,443,720
17.0	BOP ITEMS	\$3,234,100	95%	160%	\$3,072,395	\$5,174,560
18.0	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE	\$3,509,200	95%	200%	\$3,333,740	\$7,018,400
19.0	ARSENIC, ASBESTOS , LEAD ABATEMENT	\$750,000	95%	150%	\$712,500	\$1,125,000
99.0	OVERALL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS	\$71,096,200	95%	140%	\$67,541,390	\$99,534,680
	OVERALL PROJECT INDIRECT COSTS	\$46,185,900	95%	130%	\$43,876,605	\$60,041,670
	SPARE PARTS	\$1,679,600	95%	130%	\$1,595,620	\$2,183,480
	Total Base Case	\$424,009,500				

ANALYSIS OUTPUT

Probability of meeting "Total Base Case" value: 424,009,500 0.0%

Total Budget Required (\$k)	% Confidence Level	Confidence Level Risk	Contingency % of Base
520,101,653	100.0%	96,092,200	22.663%
487,201,904	95.0%	63,192,400	14.904%
481,661,333	90.0%	57,651,800	13.597%
477,988,894	85.0%	53,979,400	12.731%
474,942,982	80.0%	50,933,500	12.012%
472,473,248	75.0%	48,463,700	11.430%
470,188,224	70.0%	46,178,700	10.891%
468,182,029	65.0%	44,172,500	10.418%
466,351,237	60.0%	42,341,700	9.986%
464,659,738	55.0%	40,650,200	9.587%
462,906,370	50.0%	38,896,900	9.174%
460,999,965	45.0%	36,990,500	8.724%
459,234,935	40.0%	35,225,400	8.308%
457,652,136	35.0%	33,642,600	7.934%
455,788,824	30.0%	31,779,300	7.495%
453,997,217	25.0%	29,987,700	7.072%
451,849,616	20.0%	27,840,100	6.566%
449,649,435	15.0%	25,639,900	6.047%
446,807,126	10.0%	22,797,600	5.377%
442,819,540	5.0%	18,810,000	4.436%





Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
Volume 3 – DFGD Technology
September 29, 2010

EXHIBIT 3-4

OEM Cost and Capital Cost Estimate Comparison Summaries - Dry FGD Options

EXHIBIT 3-4
Capital Cost Estimate Comparison Summary
Dry FGD Options

Attached are the capital cost estimate comparison summaries for the dry FGD options. The differences between these options are related to the following issues:

- The sulfur content of the coal impacts the following equipment and processes:
 - The lime stoichiometric ratio increases with increasing sulfur. Therefore, the lime reagent rates increase quickly with increases in fuel sulfur. The higher lime reagent rates for the 3.0 lb/MMBtu fuel correlates to increases in lime handling equipment costs.
 - A higher byproduct rate results from an increase in fuel sulfur because the mass of sulfur removed and the mass of unreacted reagent increases. As more byproduct is produced, the costs for transport, storage and disposal are increased.
- The ESP in-service case versus without ESP in-service will result in the following:

ESP In	ESP Out
• Added cost for flyash transport, storage and blending system to stabilize the FGD byproduct.	• Added cost for the economizer ash handling system. • Slightly larger fabric filter costs. • Improved lime utilization resulting in lower silo and silo foundation costs and lower slaking equipment costs. • Slightly higher electrical capital costs due to higher ID fan motor HP.

Exhibit 3-4. DFGD OEM Cost Summary (Engineer and Furnish Materials Only)

	1.7 w/o ESP	3 w/o ESP	1.7 w/ESP	3 w/ESP	Comments
Reagent Prep	\$ 5,560,000	\$ 7,985,000	\$ 5,914,000	\$ 8,616,000	Vendor scope: - Rotary feeders, chain conveyors, and slakers through the lime slurry pumps and lime slurry storage tanks - Structural steel integral to the support of the vendor's equipment - Piping inside buildings to terminal point - All pumps and all motors required by vendor scope of supply - Process instruments and control logic - Trolleys and Hoists By others: - Piping from terminal points out to the plant - Conduit, cables, etc... to vendor's motors - Site grading, roads, foundations, etc... - Lime conveying, storage silo, etc... - All required DCS upgrades
Absorber Island	\$ 39,438,000	\$ 39,438,000	\$ 39,438,000	\$ 39,438,000	Vendor scope: - Absorber modules and atomizers with lube oil system - Duct work from the absorber inlets to the fabric filter outlet - Recycle storage silo, recycle slurry mix tanks, slurry storage tanks, and all ancillary systems with piping inside FGD buildings - Structural steel integral to the support of the vendor's equipment - Piping inside buildings to terminal point - All pumps and all motors required by vendor scope of supply - Process instruments and control logic - Trolleys and Hoists By others: - Conduit, cables, etc... to vendor's motors - Site grading, roads, foundations, etc... - All required DCS upgrades
Fabric Filter	\$ 19,980,000	\$ 19,761,000	\$ 19,409,000	\$ 19,276,000	Vendor scope: - A single fabric filter unit for all of the flue gas - All internal fabric filter elements such as bags, cages, ash hoppers, 2 broken bag detectors per compartment - Ash conveying system from the fabric filter to the recycle silo - Structural steel integral to the support of the vendor's equipment - Piping inside buildings to terminal point - All motors required by vendor scope of supply - Process instruments and control logic - Trolleys and Hoists By others: - Air compressors for the pulse-jet cleaning system - New ID fans - Duct from fabric filter to new ID fans - Piping from terminal points out to the plant - Conduit, cables, etc... to vendor's motors - Site grading, roads, foundations, etc... - Byproduct conveying, storage, etc... - All required DCS upgrades
Total	\$ 64,978,000	\$ 67,184,000	\$ 64,761,000	\$ 67,330,000	

Costs for the reagent preparation, absorber island, and fabric filter equipment are based on a 2009 quote from Alstom. The previous quote was factored for the AEP Big Sandy Unit 2 capacity (865 MW) and adjusted for each sulfur and ESP operation. It should be noted that the previous Alstom quote was slightly higher than the other two budgetary quotes received for the same scope of supply.

Sargent & Lundy, LLC	30713C DFGD Base Estimate 1B N/ESP 3.0 lb SO2/MMBTU	EXHIBIT 3-4 CAPITAL COST ESTIMATE COMPARISON SUMMARY DRY FGD OPTIONS				30713C	30712C	30711C	30710C	Est 2B (N/ESP 1.7 lb SO2/MMBTU) Delta Base Est 1B	Est 1A (ESP 3.0 lb SO2/MMBTU) Delta Base Est 1B	Est 2A (ESP 1.7 lb SO2/MMBTU) Delta Base Est 1B	
						Base Est 1B - N/ESP 3.0 lb SO2/MMBTU	Est 2B - N/ESP 1.7 lb SO2/MMBTU	Est 1A - ESP 3.0 lb SO2/MMBTU	Est 2A - ESP 1.7 lb SO2/MMBTU				Remarks
Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost	Total Projected Cost	Total Projected Cost	Total Projected Cost				
1.0	ID FANS												The ID Fans without the ESP are larger (i.e. cost more) because they replace the existing Booster Fans.
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 7,995,600	\$ 8,982,100	\$ 14,797,400	\$ 31,775,100	\$ 31,775,100	\$ 31,284,200	\$ 31,284,200	\$ -	\$ (490,900)	\$ (490,900)	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 399,800	\$ 2,290,400	\$ 5,329,900	\$ 8,020,100	\$ 8,020,100	\$ 7,982,700	\$ 7,982,700	\$ -	\$ (37,400)	\$ (37,400)	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ID FANS	\$ 8,395,400	\$ 11,272,500	\$ 20,127,300	\$ 39,795,200	\$ 39,795,200	\$ 39,266,900	\$ 39,266,900	\$ -	\$ (528,300)	\$ (528,300)	
2.0	FABRIC FILTERS												The Fabric Filter equipment costs are slightly larger at the lower coal sulfur levels because there is more actual flow rate i.e. there is more bag area in the same footprint.
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 22,389,400	\$ 3,078,100	\$ 17,524,600	\$ 42,992,100	\$ 43,292,800	\$ 42,323,100	\$ 42,507,200	\$ 300,700	\$ (669,000)	\$ (484,900)	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 1,119,500	\$ 784,900	\$ 6,510,000	\$ 8,414,400	\$ 8,455,100	\$ 8,321,700	\$ 8,347,200	\$ 40,700	\$ (92,700)	\$ (67,200)	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FABRIC FILTERS	\$ 23,508,900	\$ 3,863,000	\$ 24,034,600	\$ 51,406,500	\$ 51,747,900	\$ 50,644,800	\$ 50,854,400	\$ 341,400	\$ (761,700)	\$ (552,100)	
3.0	NEW STACK												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ -	\$ -	\$ -	\$ 19,350,000	\$ 19,350,000	\$ 19,350,000	\$ 19,350,000	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ -	\$ -	\$ 2,902,500	\$ 2,902,500	\$ 2,902,500	\$ 2,902,500	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	NEW STACK	\$ -	\$ -	\$ -	\$ 22,252,500	\$ 22,252,500	\$ 22,252,500	\$ 22,252,500	\$ -	\$ -	\$ -	
4.0	LIME HANDLING SYSTEM												The lime consumption rate is almost double for 3.0 vs. 1.7 with ESP. There is also a difference in lime consumptions between ESP and No ESP. Without the ESP the approach to saturation temperature is reduced which improves the lime utilization thereby leading to slightly less lime consumption. The lime equipment (blowers etc.) is the same regardless. The main delta is the storage equipment (i.e. Storage silo).
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 7,259,600	\$ 2,831,000	\$ 5,806,300	\$ 15,896,900	\$ 11,565,100	\$ 17,169,900	\$ 11,970,100	\$ (4,331,800)	\$ 1,273,000	\$ (3,926,800)	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 363,000	\$ 721,900	\$ 2,120,800	\$ 3,205,700	\$ 2,705,400	\$ 3,346,200	\$ 2,734,900	\$ (500,300)	\$ 140,500	\$ (470,800)	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	LIME HANDLING SYSTEM	\$ 7,622,600	\$ 3,552,900	\$ 7,927,100	\$ 19,102,600	\$ 14,270,500	\$ 20,516,100	\$ 14,705,000	\$ (4,832,100)	\$ 1,413,500	\$ (4,397,600)	
5.0	LIME SLAKER BUILDING												
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 8,183,300	\$ 1,200,300	\$ 6,584,400	\$ 15,968,000	\$ 12,577,000	\$ 16,827,400	\$ 13,084,300	\$ (3,391,000)	\$ 859,400	\$ (2,883,700)	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 409,200	\$ 306,100	\$ 2,456,800	\$ 3,172,000	\$ 2,690,900	\$ 3,288,000	\$ 2,765,100	\$ (481,100)	\$ 116,000	\$ (406,900)	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	LIME SLAKER BUILDING	\$ 8,592,500	\$ 1,506,400	\$ 9,041,200	\$ 19,140,000	\$ 15,267,900	\$ 20,115,400	\$ 15,849,400	\$ (3,872,100)	\$ 975,400	\$ (3,290,600)	
6.0	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS												With the ESP in service additional Fly Ash equipment is required including a silo for blending the fly ash with the byproduct. The silo sizes with the ESP in service are significantly smaller than without the ESP. This results from the fly ash being removed prior the waste being sent to the silo.
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 5,489,600	\$ 2,330,200	\$ 5,049,900	\$ 12,869,700	\$ 11,889,300	\$ 16,028,600	\$ 15,361,000	\$ (980,400)	\$ 3,158,900	\$ 2,491,300	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 274,500	\$ 594,200	\$ 1,883,600	\$ 2,752,300	\$ 2,659,200	\$ 3,441,100	\$ 3,367,800	\$ (93,100)	\$ 688,800	\$ 615,500	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS	\$ 5,764,100	\$ 2,924,400	\$ 6,933,500	\$ 15,622,000	\$ 14,548,500	\$ 19,469,700	\$ 18,728,800	\$ (1,073,500)	\$ 3,847,700	\$ 3,106,800	
7.0	ABSORBER ISLAND												The absorber itself is sized on the actual flue gas flow rates which are roughly equivalent.
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 45,252,500	\$ 16,422,100	\$ 60,222,900	\$ 121,897,500	\$ 121,897,500	\$ 128,347,900	\$ 128,347,900	\$ -	\$ 6,450,400	\$ 6,450,400	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 3,072,600	\$ 4,187,600	\$ 23,578,100	\$ 30,838,300	\$ 30,838,300	\$ 32,876,800	\$ 32,876,800	\$ -	\$ 2,038,500	\$ 2,038,500	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ABSORBER ISLAND	\$ 48,325,100	\$ 20,609,700	\$ 83,801,000	\$ 152,735,800	\$ 152,735,800	\$ 161,224,700	\$ 161,224,700	\$ -	\$ 8,488,900	\$ 8,488,900	
8.0	ACTIVATED CARBON INJECTION SYSTEM												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 3,169,500	\$ 326,600	\$ 1,885,500	\$ 5,381,600	\$ 5,381,600	\$ 5,381,600	\$ 5,381,600	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 158,500	\$ 83,300	\$ 694,500	\$ 936,300	\$ 936,300	\$ 936,300	\$ 936,300	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ACTIVATED CARBON INJECTION SYSTEM	\$ 3,328,000	\$ 409,900	\$ 2,580,000	\$ 6,317,900	\$ 6,317,900	\$ 6,317,900	\$ 6,317,900	\$ -	\$ -	\$ -	
9.0	COMPRESSED AIR SYSTEM												
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 1,000,100	\$ 1,060,300	\$ 1,501,900	\$ 3,562,300	\$ 3,562,300	\$ 3,562,300	\$ 3,562,300	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 50,000	\$ 270,400	\$ 551,500	\$ 871,800	\$ 871,800	\$ 871,800	\$ 871,800	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	COMPRESSED AIR SYSTEM	\$ 1,050,100	\$ 1,330,700	\$ 2,053,400	\$ 4,434,100	\$ 4,434,100	\$ 4,434,100	\$ 4,434,100	\$ -	\$ -	\$ -	

Sargent & Lundy, LLC	30713C DFGD Base Estimate 1B N/ESP 3.0 lb SO2/MMBTU	EXHIBIT 3-4 CAPITAL COST ESTIMATE COMPARISON SUMMARY DRY FGD OPTIONS				30713C	30712C	30711C	30710C	Est 2B (N/ESP 1.7 lb SO2/MMBTU) Delta Base Est 1B	Est 1A (ESP 3.0 lb SO2/MMBTU) Delta Base Est 1B	Est 2A (ESP 1.7 lb SO2/MMBTU) Delta Base Est 1B	
						Base Est 1B - N/ESP 3.0 lb SO2/MMBTU	Est 2B - N/ESP 1.7 lb SO2/MMBTU	Est 1A - ESP 3.0 lb SO2/MMBTU	Est 2A - ESP 1.7 lb SO2/MMBTU				Remarks
Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost	Total Projected Cost	Total Projected Cost	Total Projected Cost				
10.0	SERVICE WATER SYSTEM												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 568,600	\$ 1,046,500	\$ 1,896,700	\$ 3,511,800	\$ 3,511,800	\$ 3,511,800	\$ 3,511,800	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 28,400	\$ 266,900	\$ 690,700	\$ 986,000	\$ 986,000	\$ 986,000	\$ 986,000	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	SERVICE WATER SYSTEM	\$ 597,000	\$ 1,313,400	\$ 2,587,400	\$ 4,497,800	\$ 4,497,800	\$ 4,497,800	\$ 4,497,800	\$ -	\$ -	\$ -	
11.0	POTABLE WATER SYSTEM												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 129,500	\$ 214,100	\$ 558,300	\$ 901,900	\$ 901,900	\$ 901,900	\$ 901,900	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 6,500	\$ 54,600	\$ 203,000	\$ 264,100	\$ 264,100	\$ 264,100	\$ 264,100	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	POTABLE WATER SYSTEM	\$ 136,000	\$ 268,700	\$ 761,300	\$ 1,166,000	\$ 1,166,000	\$ 1,166,000	\$ 1,166,000	\$ -	\$ -	\$ -	
12.0	FGD SUBSTATION												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 3,277,700	\$ 774,200	\$ 3,734,100	\$ 7,786,000	\$ 7,786,000	\$ 7,685,100	\$ 7,685,100	\$ -	\$ (100,900)	\$ (100,900)	Larger auxiliary transformers are required for the ESP Out case due to the ID Fan's increase in size. A larger switchgear is required for the ESP In case due to the increased number of required feeder breakers to accommodate the relocated feeds to the existing booster fans. The net difference results in a higher ESP out cost.
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 163,900	\$ 197,400	\$ 1,350,042	\$ 1,711,300	\$ 1,711,300	\$ 1,702,600	\$ 1,702,600	\$ -	\$ (8,700)	\$ (8,700)	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FGD SUBSTATION	\$ 3,441,600	\$ 971,600	\$ 5,084,100	\$ 9,497,300	\$ 9,497,300	\$ 9,387,700	\$ 9,387,700	\$ -	\$ (109,600)	\$ (109,600)	
13.0	FGD DCS SYSTEM												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 2,700,000	\$ 709,500	\$ 1,744,100	\$ 5,153,600	\$ 5,153,600	\$ 5,153,600	\$ 5,153,600	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 135,000	\$ 180,900	\$ 650,900	\$ 966,800	\$ 966,800	\$ 966,800	\$ 966,800	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FGD DCS SYSTEM	\$ 2,835,000	\$ 890,400	\$ 2,395,000	\$ 6,120,400	\$ 6,120,400	\$ 6,120,400	\$ 6,120,400	\$ -	\$ -	\$ -	
14.0	CEM SYSTEM												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 1,260,000	\$ 540,000	\$ 310,000	\$ 2,110,000	\$ 2,110,000	\$ 2,110,000	\$ 2,110,000	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ -	\$ -	\$ 316,500	\$ 316,500	\$ 316,500	\$ 316,500	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	CEM SYSTEM	\$ -	\$ -	\$ -	\$ 2,426,500	\$ 2,426,500	\$ 2,426,500	\$ 2,426,500	\$ -	\$ -	\$ -	
15.0	TRUCK & RAIL INFRASTRUCTURE												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 212,500	\$ 2,044,200	\$ 2,084,100	\$ 4,340,800	\$ 4,340,800	\$ 4,340,800	\$ 4,340,800	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 10,600	\$ 521,300	\$ 779,600	\$ 1,311,500	\$ 1,311,500	\$ 1,311,500	\$ 1,311,500	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	TRUCK & RAIL INFRASTRUCTURE	\$ 223,100	\$ 2,565,500	\$ 2,863,700	\$ 5,652,300	\$ 5,652,300	\$ 5,652,300	\$ 5,652,300	\$ -	\$ -	\$ -	
16.0	SITE IMPROVEMENTS - CIVIL WORK												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 3,242,500	\$ 3,289,300	\$ 5,928,000	\$ 12,459,800	\$ 12,459,800	\$ 12,459,800	\$ 12,459,800	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 162,100	\$ 838,800	\$ 2,156,500	\$ 3,157,400	\$ 3,157,400	\$ 3,157,400	\$ 3,157,400	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	SITE IMPROVEMENTS - CIVIL WORK	\$ 3,404,600	\$ 4,128,100	\$ 8,084,500	\$ 15,617,200	\$ 15,617,200	\$ 15,617,200	\$ 15,617,200	\$ -	\$ -	\$ -	
17.0	BOP ITEMS												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 210,000	\$ 1,052,000	\$ 1,972,100	\$ 3,234,100	\$ 3,234,100	\$ 3,234,100	\$ 3,234,100	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 10,500	\$ 268,260	\$ 750,694	\$ 1,029,454	\$ 1,029,454	\$ 1,029,454	\$ 1,029,454	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	BOP ITEMS	\$ 220,500	\$ 1,320,300	\$ 2,722,800	\$ 4,263,600	\$ 4,263,600	\$ 4,263,600	\$ 4,263,600	\$ -	\$ -	\$ -	
18.0	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ -	\$ 917,200	\$ 2,592,000	\$ 3,509,200	\$ 3,509,200	\$ 3,509,200	\$ 3,509,200	\$ -	\$ -	\$ -	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ 233,900	\$ 927,100	\$ 1,161,000	\$ 1,161,000	\$ 1,161,000	\$ 1,161,000	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE	\$ -	\$ 1,151,100	\$ 3,519,100	\$ 4,670,200	\$ 4,670,200	\$ 4,670,200	\$ 4,670,200	\$ -	\$ -	\$ -	

Sargent & Lundy, LLC	30713C DFGD Base Estimate 1B N/ESP 3.0 lb SO2/MMBTU	EXHIBIT 3-4 CAPITAL COST ESTIMATE COMPARISON SUMMARY DRY FGD OPTIONS				30713C	30712C	30711C	30710C	Est 2B (N/ESP 1.7 lb SO2/MMBTU) Delta Base Est 1B	Est 1A (ESP 3.0 lb SO2/MMBTU) Delta Base Est 1B	Est 2A (ESP 1.7 lb SO2/MMBTU) Delta Base Est 1B	Remarks
						Base Est 1B - N/ESP 3.0 lb SO2/MMBTU	Est 2B - N/ESP 1.7 lb SO2/MMBTU	Est 1A - ESP 3.0 lb SO2/MMBTU	Est 2A - ESP 1.7 lb SO2/MMBTU				
Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost	Total Projected Cost	Total Projected Cost	Total Projected Cost				
19.0	ARSENIC, ASBESTOS , LEAD ABATEMENT												
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$	\$	\$	\$ 750,000	\$ 750,000	\$ 750,000	\$ 750,000	\$	\$	\$	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ -	\$ -	\$ 112,500	\$ 112,500	\$ 112,500	\$ 112,500	\$ -	\$ -	\$ -	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ARSENIC, ASBESTOS , LEAD ABATEMENT	\$ -	\$ -	\$ -	\$ 862,500	\$ 862,500	\$ 862,500	\$ 862,500	\$ -	\$ -	\$ -	
99.0	OVERALL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 112,340,400	\$ 46,817,700	\$ 134,192,300	\$ 313,450,400	\$ 305,047,900	\$ 323,931,300	\$ 314,504,900	\$ (8,402,500)	\$ 10,480,900	\$ 1,054,500	
	OVERALL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 6,364,000	\$ 11,881,800	\$ 50,633,700	\$ 72,130,000	\$ 71,096,200	\$ 74,862,300	\$ 73,792,800	\$ (1,033,800)	\$ 2,732,300	\$ 1,662,800	
	OVERALL TOTAL DIRECT & CONSTRUCTION INDIRECT COST		\$ 118,704,400	\$ 58,699,500	\$ 184,826,000	\$ 385,580,400	\$ 376,144,100	\$ 398,793,600	\$ 388,297,700	\$ (9,436,300)	\$ 13,213,200	\$ 2,717,300	
	OVERALL PROJECT INDIRECT COSTS												
	ENGINEERING, PROCUREMENT, & PROJECT SERVICES					\$ 25,000,000	\$ 25,000,000	\$ 25,000,000	\$ 25,000,000	\$ -	\$ -	\$ -	
	CONSTRUCTION MANAGEMENT					\$ 11,567,400	\$ 11,284,300	\$ 11,963,800	\$ 11,648,900	\$ (283,100)	\$ 396,400	\$ 81,500	
	S-U / COMMISSIONING					\$ 3,855,800	\$ 3,761,400	\$ 3,987,900	\$ 3,883,000	\$ (94,400)	\$ 132,100	\$ 27,200	
	CRAFT START-UP SUPPORT					\$ 1,581,200	\$ 1,561,800	\$ 1,647,500	\$ 1,625,300	\$ (19,400)	\$ 66,300	\$ 44,100	
	INITIAL FILLS					\$ 1,156,700	\$ 1,128,400	\$ 1,196,400	\$ 1,164,900	\$ (28,300)	\$ 39,700	\$ 8,200	
	OPERATOR & TRAINING MANUALS					\$ 300,000	\$ 300,000	\$ 300,000	\$ 300,000	\$ -	\$ -	\$ -	
	SUBCONTRACTORS (NOISE & DUCTWORK CONSULTANT, GEOTECHNICAL INVESTIGATION)					\$ 400,000	\$ 400,000	\$ 400,000	\$ 400,000	\$ -	\$ -	\$ -	
	NOISE ABATEMENT FOR 85 DBA REQUIREMENT					\$ 2,750,000	\$ 2,750,000	\$ 2,750,000	\$ 2,750,000	\$ -	\$ -	\$ -	
	SUBTOTAL - INDIRECT COSTS					\$ 46,611,100	\$ 46,185,900	\$ 47,245,600	\$ 46,772,100	\$ (425,200)	\$ 634,500	\$ 161,000	
	TOTAL PROJECT DIRECT AND INDIRECT COSTS					\$ 432,191,500	\$ 422,330,000	\$ 446,039,200	\$ 435,069,800	\$ (9,861,500)	\$ 13,847,700	\$ 2,878,300	
	SPARE PARTS:					\$ 1,780,600	\$ 1,679,600	\$ 1,811,700	\$ 1,699,800	\$ (101,000)	\$ 31,100	\$ (80,800)	
	SPARE PARTS - CAPITALIZED	0.90				\$ 1,068,360	\$ 1,007,760	\$ 1,087,020	\$ 1,019,880	\$ (60,600)	\$ 18,660	\$ (48,480)	
	SPARE PARTS - FIRST YEAR OF OPERATION	0.60				\$ 712,240	\$ 671,840	\$ 724,680	\$ 679,920	\$ (40,400)	\$ 12,440	\$ (32,320)	
	CONTINGENCY	14.7				\$ 63,953,800	\$ 63,192,400	\$ 66,341,200	\$ 65,104,400	\$ (761,400)	\$ 2,387,400	\$ 1,150,600	
	ESCALATION					\$ 54,885,900	\$ 53,852,622	\$ 56,364,359	\$ 55,362,000	\$ (1,033,278)	\$ 1,478,459	\$ 476,100	
	EQUIPMENT					\$ 18,902,600	\$ 17,831,166	\$ 19,053,039	\$ 18,045,600	\$ (1,071,434)	\$ 150,439	\$ (857,000)	
	MATERIAL					\$ 6,044,500	\$ 6,065,206	\$ 6,346,908	\$ 6,368,900	\$ 20,706	\$ 302,408	\$ 324,400	
	LABOR					\$ 24,477,200	\$ 24,525,149	\$ 25,434,287	\$ 25,447,500	\$ 47,949	\$ 957,087	\$ 970,300	
	INDIRECTS					\$ 5,461,600	\$ 5,431,101	\$ 5,530,125	\$ 5,500,000	\$ (30,499)	\$ 68,525	\$ 38,400	
	TOTAL PROJECT COST					\$ 552,811,800	\$ 541,054,622	\$ 570,556,459	\$ 557,236,000	\$ (11,757,178)	\$ 17,744,659	\$ 4,424,200	



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
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EXHIBIT 3-5

DFGD O&M Cost Estimate Summary

AEP

Order-of-Magnitude EPC Cost Estimate

Big Sandy Station – Unit 2

Project No. 12721-000

September 29, 2010

Revision 0

Exhibit 3-5. DFGD O&M Cost Estimate Summary (2010 dollars)

Fuel	DFGD			
	1.7 w/o ESP	3.0 w/o ESP	1.7 w/ ESP	3.0 w/ ESP
Fixed O&M (\$/year)				
Operating Labor	832,000	832,000	832,000	832,000
Maintenance Material	2,076,000	2,136,000	2,076,000	2,136,000
Maintenance Labor	1,384,000	1,424,000	1,384,000	1,424,000
Total Fixed O&M (\$/year)	4,292,000	4,392,000	4,292,000	4,392,000
Variable O&M (\$/year)				
Reagent Cost	8,601,000	19,605,000	9,924,000	23,281,000
Activated Carbon	2,344,000	2,319,000	2,267,000	2,243,000
FGD Byproduct Disposal Cost	4,148,000	5,612,000	1,793,000	3,817,000
Makeup Water Cost	509,000	521,000	464,000	482,000
Wastewater Treatment Chemicals	NA	NA	NA	NA
Bags and Cages Replacement	651,000	651,000	651,000	651,000
Total Variable O&M excluding Auxiliary Power (\$/year)	16,253,000	28,708,000	15,099,000	30,474,000
Auxiliary Power at Full Load (MW)				
Overall Draft [in WC]	23 [49]	23 [49]	17 [39]	17 [39]
FGD Draft Only [in WC]	8 [16]	8 [16]	8 [16]	8 [16]
FGD Equipment Load	4	5	4	5
Existing Booster Fans	-10	-10	0	0
Existing ESP	-4	-4	0	0
WESP	NA	NA	NA	NA
Total Auxiliary Power at Full Load (MW)	13	14	21	22

Note: NA = Not Applicable for the technology



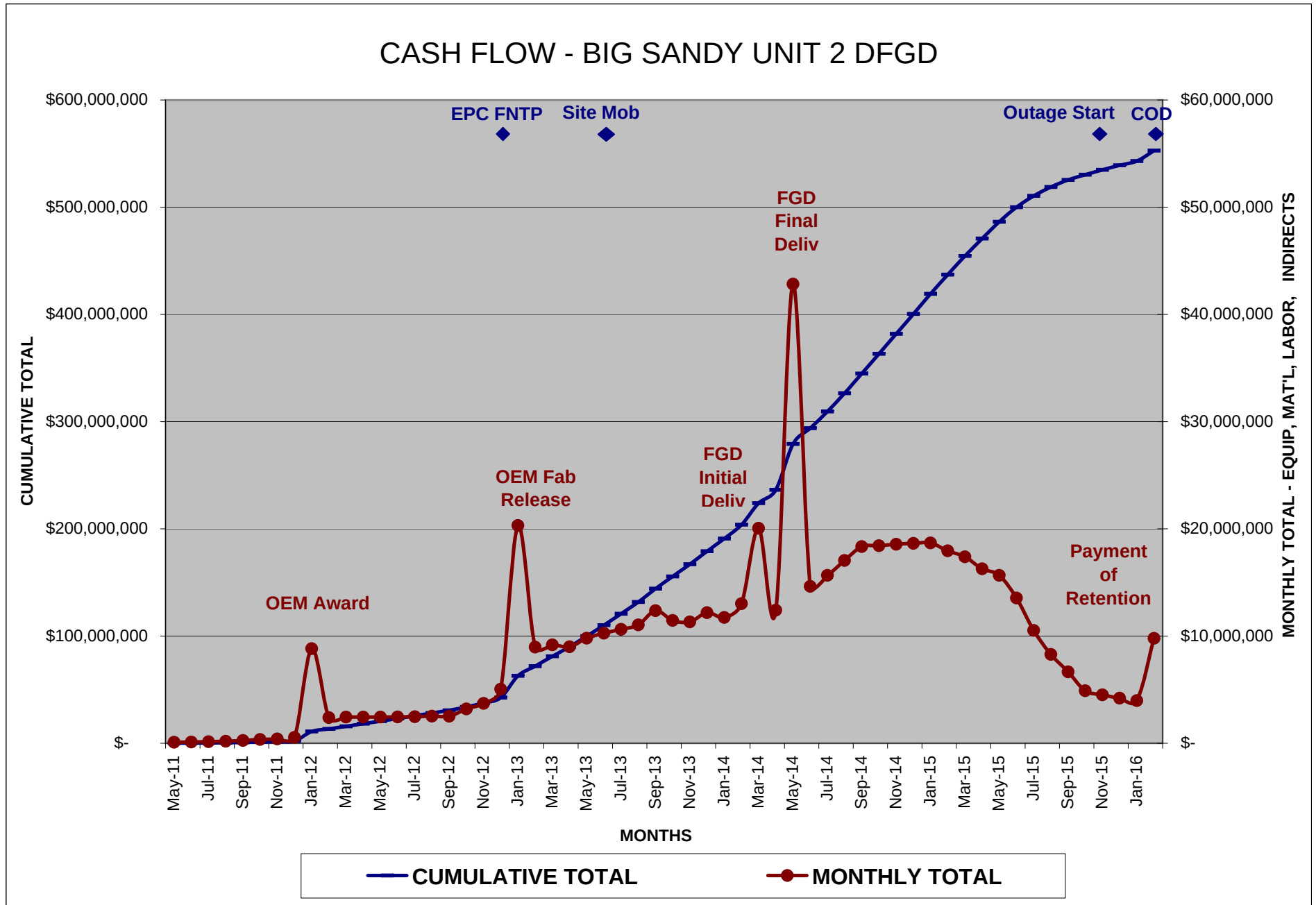
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EXHIBIT 3-6

DFGD Project Cash Flow

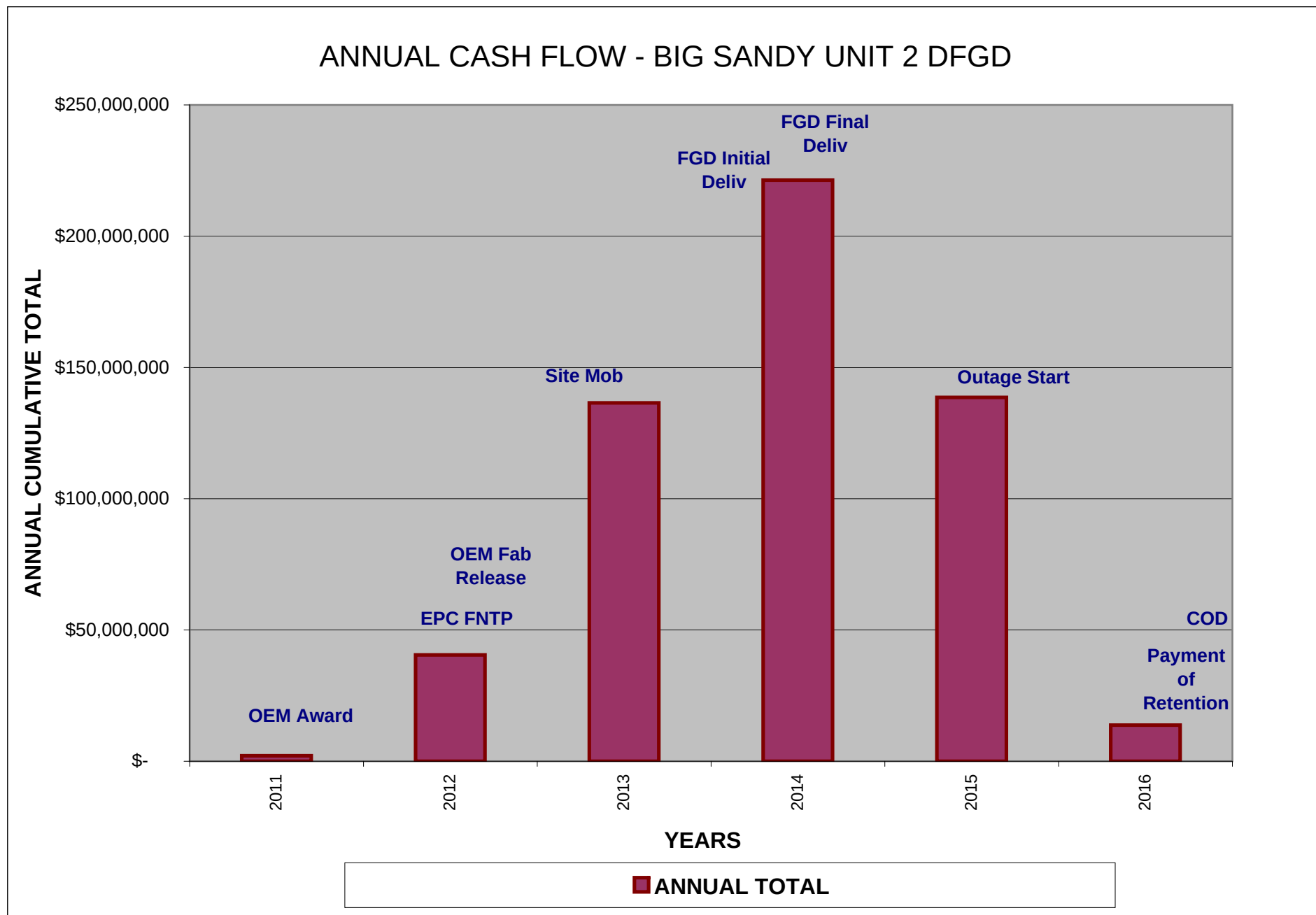
Kentucky Power Company & American Electric Power Service Corporation
Big Sandy Unit 2
Dry FGD Base (N/ESP - 3.0 Lb/MMBtu)
Cash Flows - Cumulative Total and Monthly Totals

Sargent & Lundy
Date: 9/29/10
Rev: 0



Kentucky Power Company & American Electric Power Service Corporation
Big Sandy Unit 2
Dry FGD Base (N/ESP - 3.0 Lb/MMBtu)
Cash Flows - Cumulative Total and Monthly Totals

Sargent & Lundy
Date: 9/29/10
Rev: 0



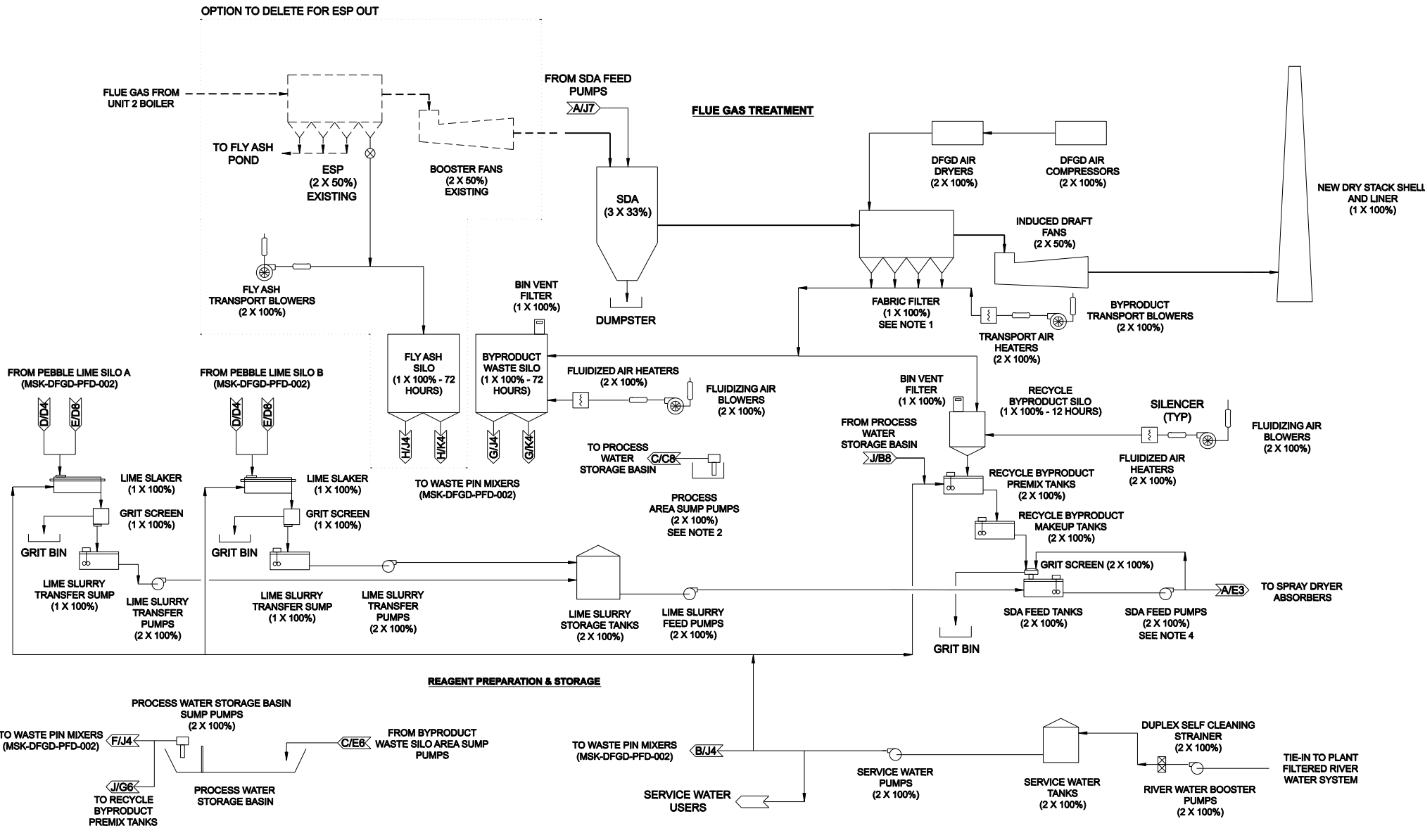


Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
Volume 3 – DFGD Technology
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ATTACHMENT 3-1

DFGD Process Flow Diagrams

MSK-DFGD-PFD-001.B



AMERICAN ELECTRIC POWER
BIG SANDY PLANT FGD PROJECT
ORDER-OF-MAGNITUDE COST ESTIMATE
DRY FGD (DFGD) TECHNOLOGY

- NOTES
1. FABRIC FILTER WILL INCLUDE 2 BROKEN BAG DETECTORS PER COMPARTMENT.
 2. DFGD SYSTEM INCLUDES LIME AREA, RECYCLE AREA, BYPRODUCT WASTE AREA, AND SDA AREA SUMPS. EACH SUMP HAS 2 X 100% REDUNDANT PUMPS AND PIPING TO THE PROCESS WATER STORAGE BASIN.
 3. EACH SLAKER AND PRE-MIX TANK WILL INCLUDE VAPOR CANISTERS AND DUST VAPOR SCRUBBERS (1 X 100%).
 4. THE SDA FEED WILL INCLUDE TWO 100% FEED LOOPS.

DATE	NO.	DESCRIPTION	APPR.
		REVISIONS	

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KENTUCKY POWER CO.
BIG SANDY PLANT
UNIT 2

BIG SANDY FGD PROJECT
PROCESS FLOW DIAGRAM
DRY FGD (DFGD)

DWG. NO. MSK-DFGD-PFD-001.C

SCALE: NONE
DATE: 06/25/2010
APPROVED BY: [Signature]
DATE: 06/25/2010

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

SYSTEM DATE: DD-MMM-YYYY
SYSTEM TIME: HOUR-MINUTE

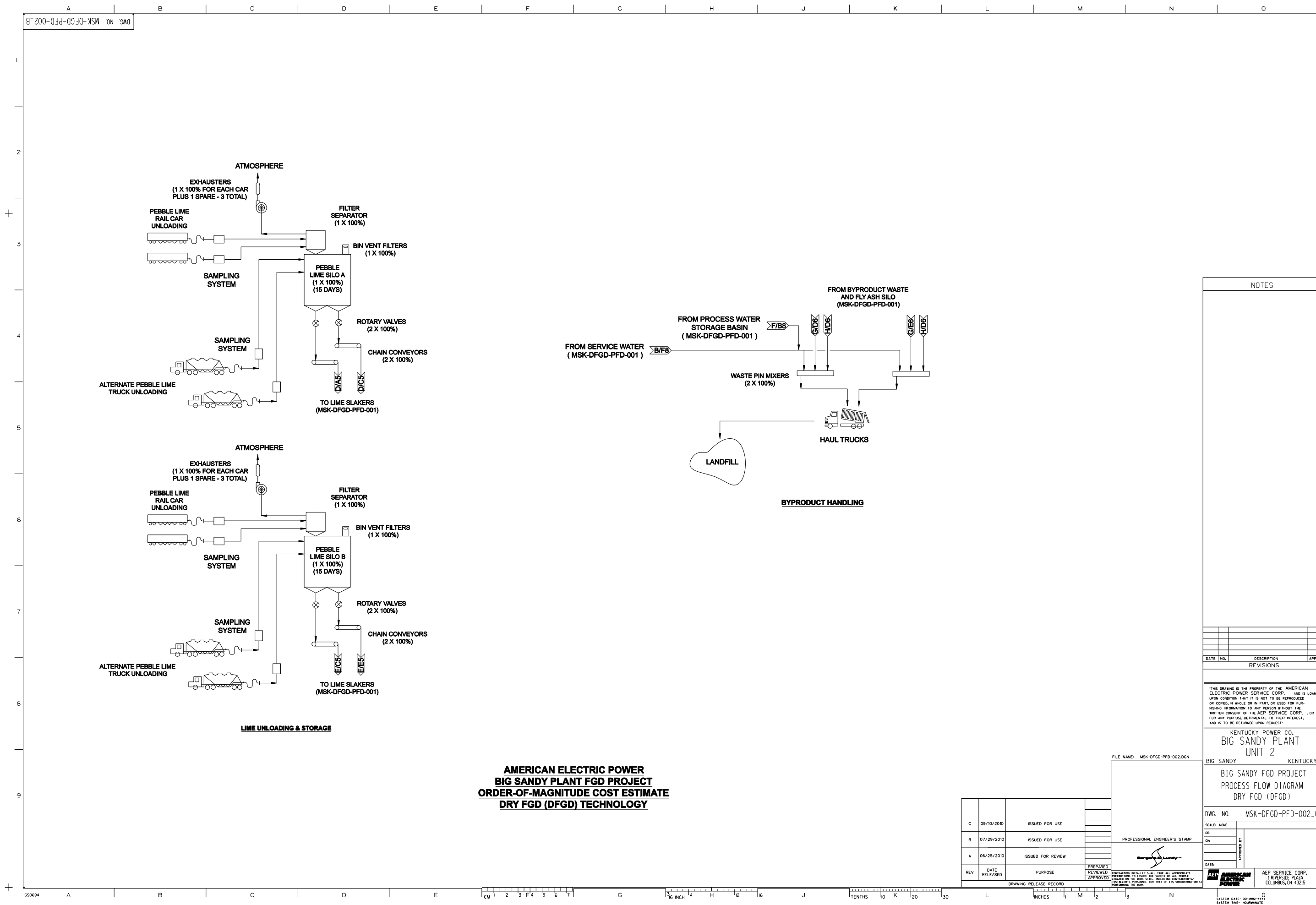
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AMERICAN ELECTRIC POWER
BIG SANDY PLANT FGD PROJECT
ORDER-OF-MAGNITUDE COST ESTIMATE
DRY FGD (DFGD) TECHNOLOGY

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KENTUCKY POWER CO.
BIG SANDY PLANT
UNIT 2
BIG SANDY KENTUCKY
BIG SANDY FGD PROJECT
PROCESS FLOW DIAGRAM
DRY FGD (DFGD)

DWG. NO. MSK-DFGD-PFD-002.C

SCALE: NONE

DR: CH: APPROVED BY: DATE:

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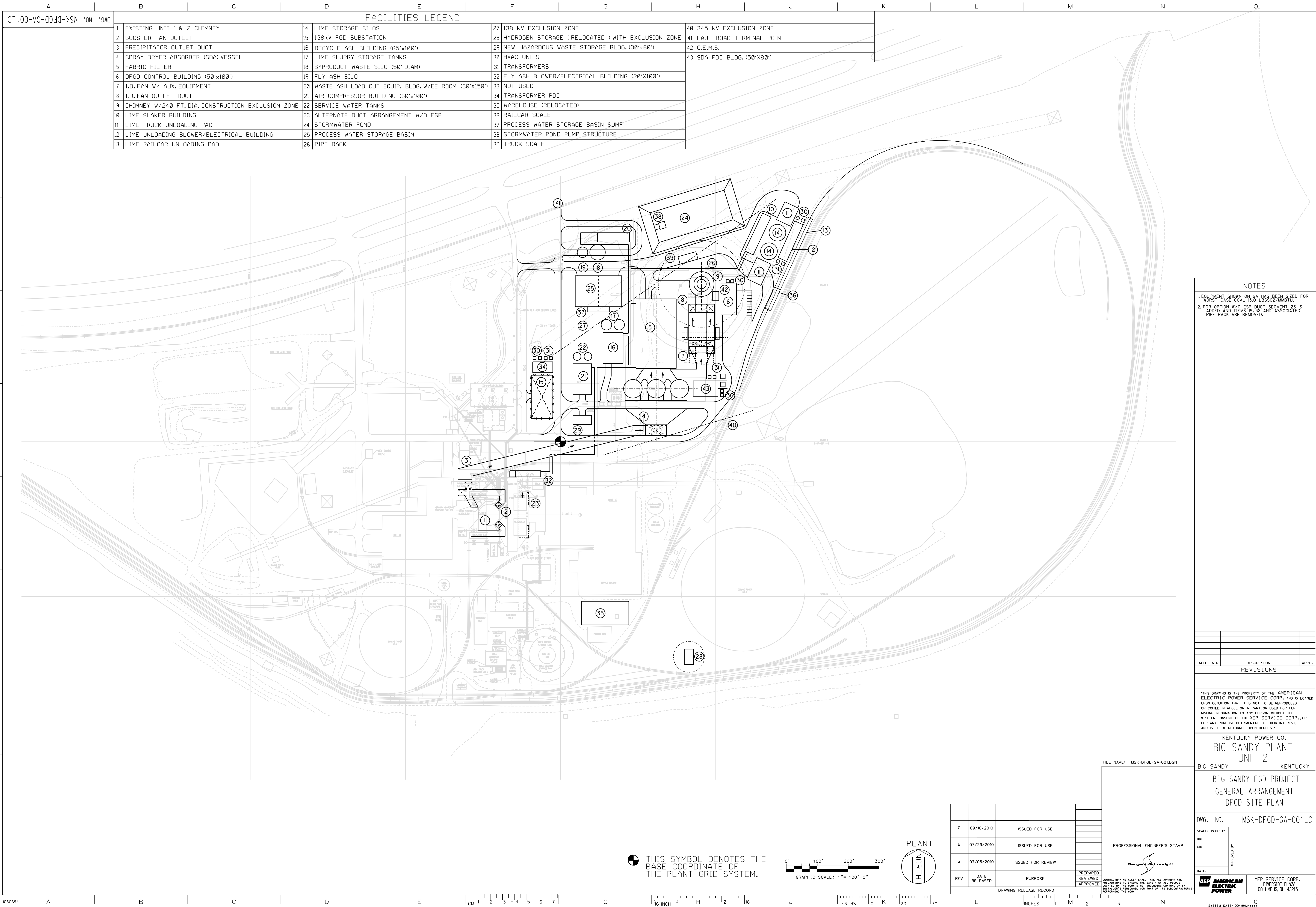
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SYSTEM TIME: HOUR-MINUTE



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
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ATTACHMENT 3-2

DFGD Site Plan and General Arrangement Drawings



FACILITIES LEGEND			
1	EXISTING UNIT 1 & 2 CHIMNEY	14	LIME STORAGE SILOS
2	BOOSTER FAN OUTLET	15	138kV FGD SUBSTATION
3	PRECIPITATOR OUTLET DUCT	16	RECYCLE ASH BUILDING (65'x100')
4	SPRAY DRYER ABSORBER (SDA) VESSEL	17	LIME SLURRY STORAGE TANKS
5	FABRIC FILTER	18	BYPRODUCT WASTE SILO (50' DIAM)
6	DFGD CONTROL BUILDING (50'x100')	19	FLY ASH SILO
7	I.D. FAN W/ AUX. EQUIPMENT	20	WASTE ASH LOAD OUT EQUIP. BLDG. W/EE ROOM (30'x150')
8	I.D. FAN OUTLET DUCT	21	AIR COMPRESSOR BUILDING (60'x100')
9	CHIMNEY W/240 FT. DIA. CONSTRUCTION EXCLUSION ZONE	22	SERVICE WATER TANKS
10	LIME SLAKER BUILDING	23	ALTERNATE DUCT ARRANGEMENT W/O ESP
11	LIME TRUCK UNLOADING PAD	24	STORMWATER POND
12	LIME UNLOADING BLOWER/ELECTRICAL BUILDING	25	PROCESS WATER STORAGE BASIN
13	LIME RAILCAR UNLOADING PAD	26	PIPE RACK
27	138 kV EXCLUSION ZONE	31	TRANSFORMERS
28	HYDROGEN STORAGE (RELOCATED) WITH EXCLUSION ZONE	32	FLY ASH BLOWER/ELECTRICAL BUILDING (20'x100')
29	NEW HAZARDOUS WASTE STORAGE BLDG. (30'x60')	33	NOT USED
30	HVAC UNITS	34	TRANSFORMER PDC
31	TRANSFORMERS	35	WAREHOUSE (RELOCATED)
32	FLY ASH BLOWER/ELECTRICAL BUILDING (20'x100')	36	RAILCAR SCALE
33	NOT USED	37	PROCESS WATER STORAGE BASIN SUMP
34	TRANSFORMER PDC	38	STORMWATER POND PUMP STRUCTURE
35	WAREHOUSE (RELOCATED)	39	TRUCK SCALE
40	345 kV EXCLUSION ZONE		
41	HAUL ROAD TERMINAL POINT		
42	C.E.M.S.		
43	SDA PDC BLDG. (50'x80')		

NOTES

1. EQUIPMENT SHOWN ON GA HAS BEEN SIZED FOR WORST CASE COAL (30.0 LBSS02/MMBTU).

2. FOR OPTION W/O ESP OUTLET SEGMENT 23 IS ADDED AND ITEMS 19, 32 AND ASSOCIATED PIPE RACK ARE REMOVED.

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KENTUCKY POWER CO.
BIG SANDY PLANT
UNIT 2
BIG SANDY KENTUCKY
BIG SANDY FGD PROJECT
GENERAL ARRANGEMENT
DFGD SITE PLAN

DWG. NO. MSK-DFGD-GA-001_C

SCALE: 1"=100'-0"

DATE: 07/06/2010

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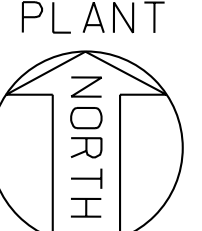
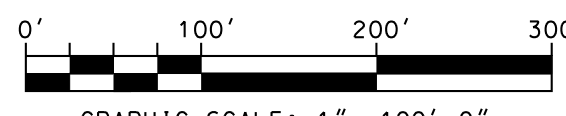
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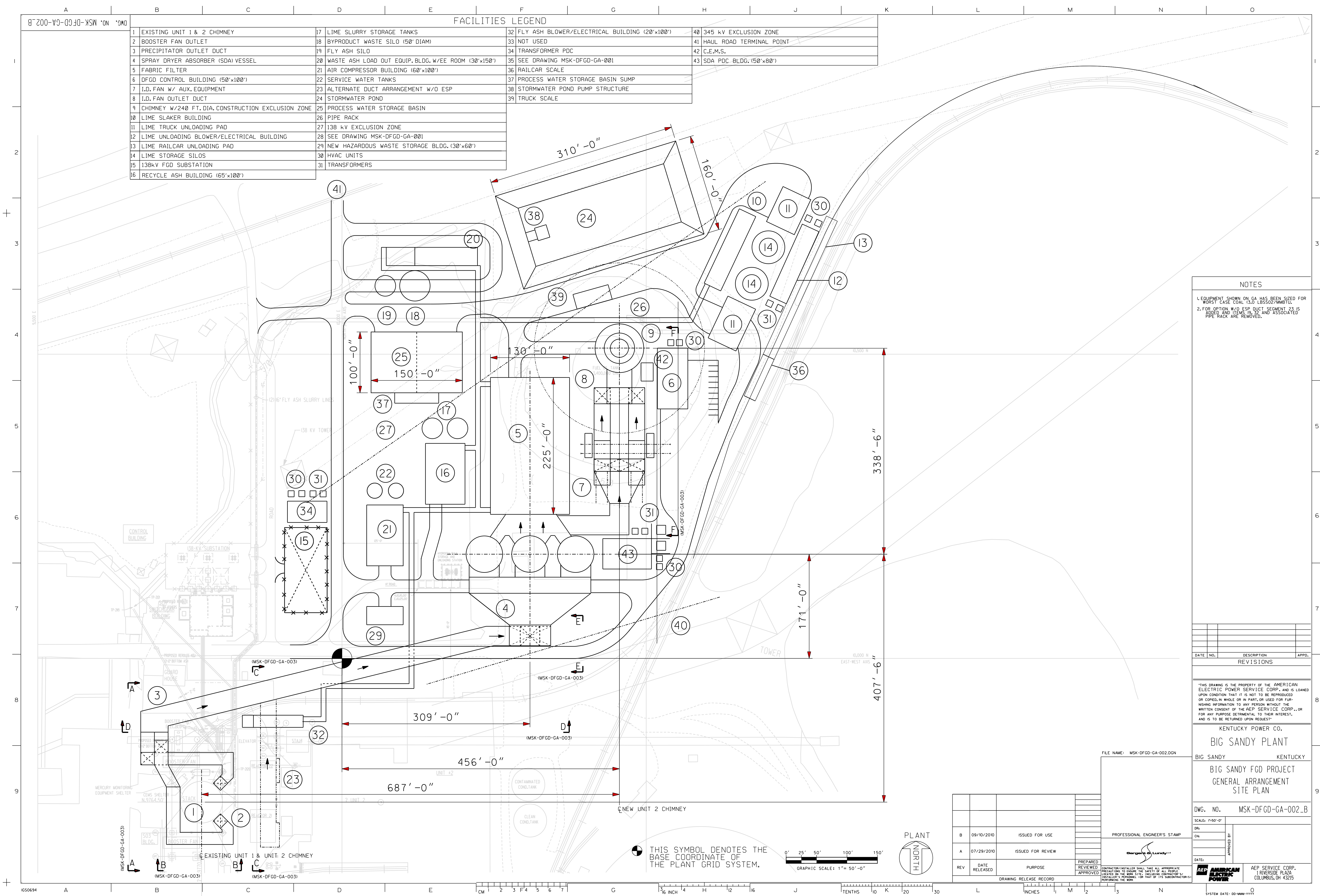
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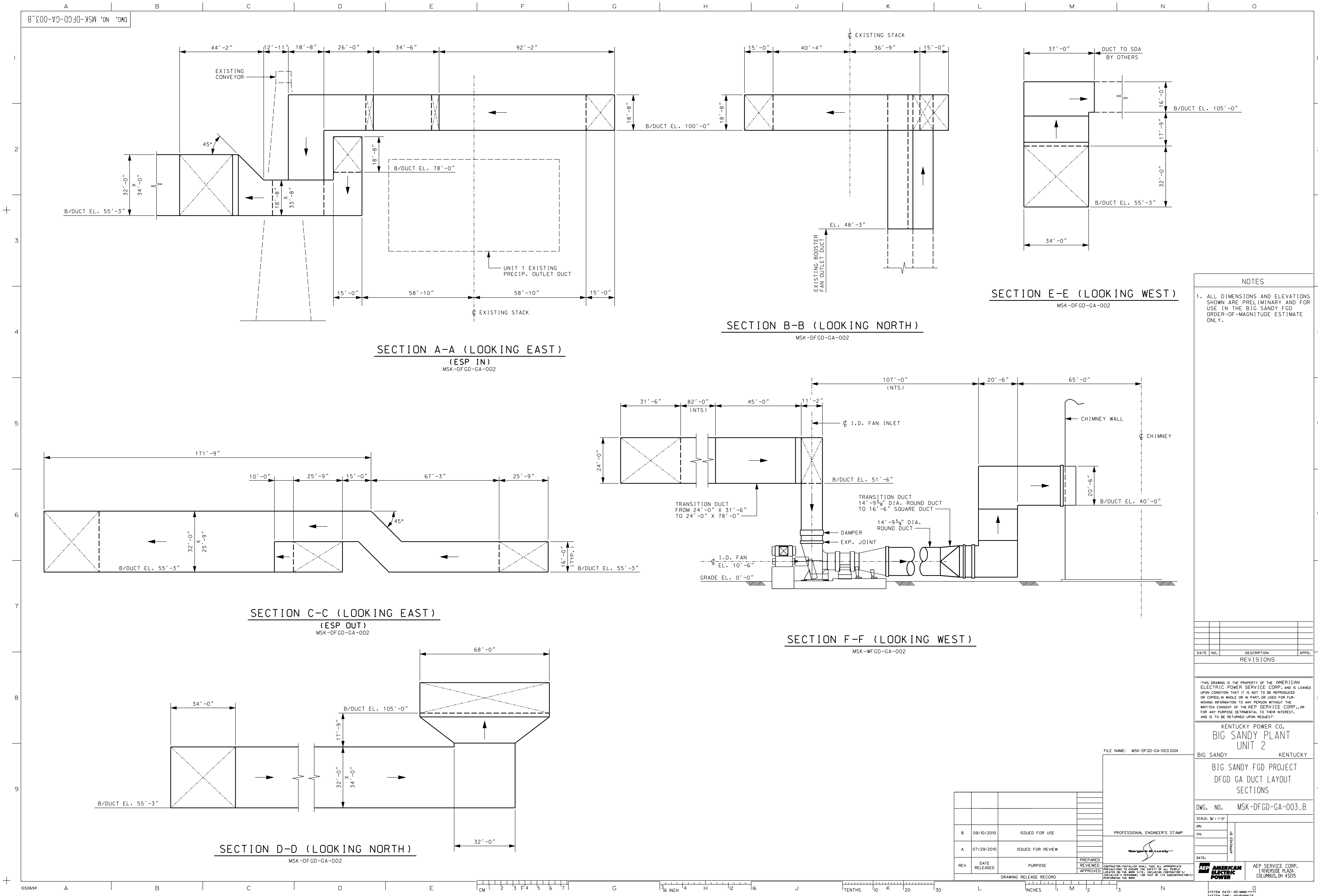
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CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S, INSTALLER'S PERSONNEL AND THAT OF ALL SUBCONTRACTORS' PERSONNEL, THE WORK.

THIS SYMBOL DENOTES THE BASE COORDINATE OF THE PLANT GRID SYSTEM.





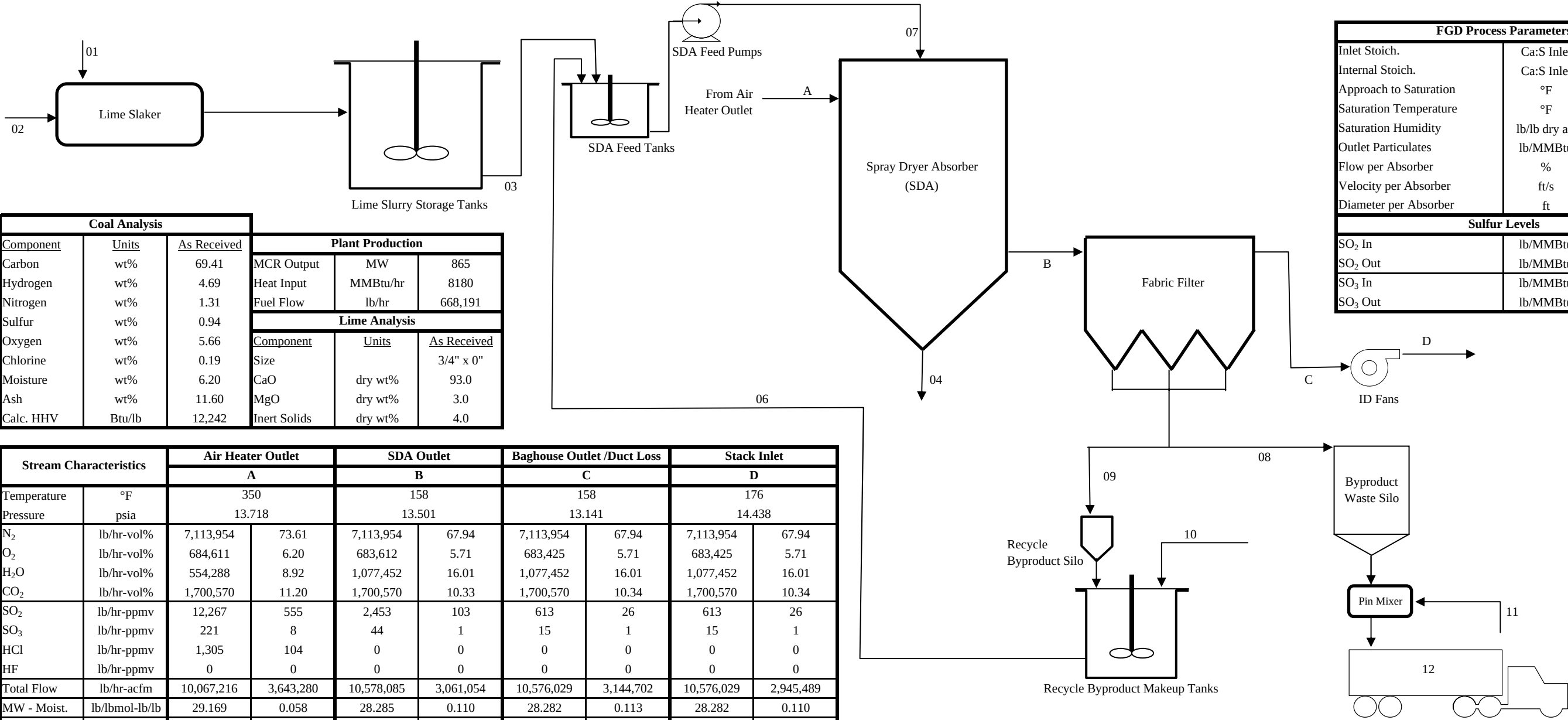




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ATTACHMENT 3-3 DFGD Mass Balances

Mass Balance Dry FGD (DFGD) Technology -
1.7 lb SO₂/MMBtu Coal (w/o ESP)



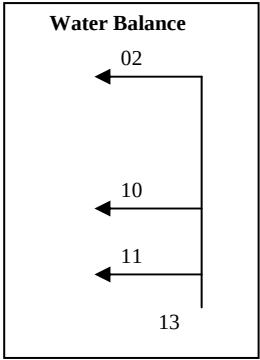
Coal Analysis			Plant Production		
Component	Units	As Received	MCR Output	MW	865
Carbon	wt%	69.41	Heat Input	MMBtu/hr	8180
Hydrogen	wt%	4.69	Fuel Flow	lb/hr	668,191
Nitrogen	wt%	1.31	Lime Analysis		
Sulfur	wt%	0.94	Component	Units	As Received
Oxygen	wt%	5.66	Size		3/4" x 0"
Chlorine	wt%	0.19	CaO	dry wt%	93.0
Moisture	wt%	6.20	MgO	dry wt%	3.0
Ash	wt%	11.60	Inert Solids	dry wt%	4.0
Calc. HHV	Btu/lb	12,242			

Stream Characteristics		Air Heater Outlet		SDA Outlet		Baghouse Outlet /Duct Loss		Stack Inlet	
		A		B		C		D	
Temperature	°F	350		158		158		176	
Pressure	psia	13.718		13.501		13.141		14.438	
N ₂	lb/hr-vol%	7,113,954	73.61	7,113,954	67.94	7,113,954	67.94	7,113,954	67.94
O ₂	lb/hr-vol%	684,611	6.20	683,612	5.71	683,425	5.71	683,425	5.71
H ₂ O	lb/hr-vol%	554,288	8.92	1,077,452	16.01	1,077,452	16.01	1,077,452	16.01
CO ₂	lb/hr-vol%	1,700,570	11.20	1,700,570	10.33	1,700,570	10.34	1,700,570	10.34
SO ₂	lb/hr-ppmv	12,267	555	2,453	103	613	26	613	26
SO ₃	lb/hr-ppmv	221	8	44	1	15	1	15	1
HCl	lb/hr-ppmv	1,305	104	0	0	0	0	0	0
HF	lb/hr-ppmv	0	0	0	0	0	0	0	0
Total Flow	lb/hr-acfm	10,067,216	3,643,280	10,578,085	3,061,054	10,576,029	3,144,702	10,576,029	2,945,489
MW - Moist.	lb/lbmol-lb/lb	29.169	0.058	28.285	0.110	28.282	0.113	28.282	0.110
Ash	lb/hr-gr/acf	62,008	1.986	227,100	8.656	114	0.004	114	0.004

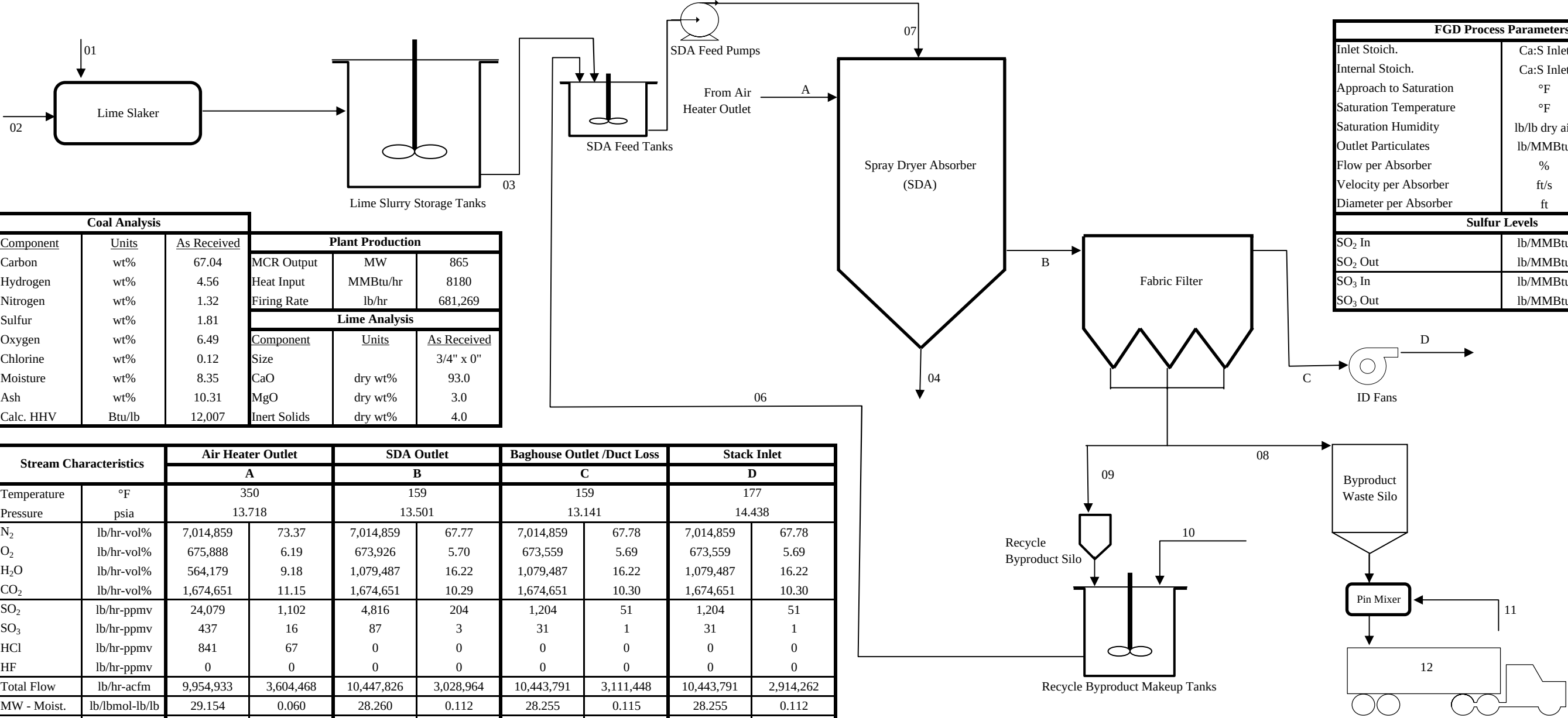
Stream Characteristics		Fresh Lime	Slaker H2O	Lime Slurry	Abs. Solids
		01	02	03	04
Inert Solids	lb/hr	665	0	665	
CaO	lb/hr	15,457	0	0	
Ca(OH) ₂	lb/hr	0	0	20,425	
MgO	lb/hr	499	0	499	
CaSO ₃ *0.5H ₂ O	lb/hr	0	0	0	
CaSO ₄ *2H ₂ O	lb/hr	0	0	0	
CaCl ₂ + CaF ₂	lb/hr	0	0	0	
Total Solids	lb/hr	16,620	0	21,589	
Water	lb/hr	0	91,323	86,355	
Total Flow	lb/hr	16,620	91,323	107,944	TBD
Total Flow	gpm	---	182	189	
Solids	wt%	100	0	20	

Recycle	SDA Inlet	Waste Solids	Recycle Solids	Recycle H2O	Dust Control	Landfill	Total Water
06	07	08	09	10	11	12	13
164,541	165,206	62,559	164,541	0	0	62,559	0
0	0	0	0	0	0	0	0
14,300	34,726	5,437	14,300	0	0	5,437	0
1,311	1,810	499	1,311	0	0	499	0
37,593	37,593	14,293	37,593	0	0	14,293	0
33,416	33,416	12,705	33,416	0	0	12,705	0
5,220	5,220	1,985	5,220	0	0	1,985	0
256,381	277,970	97,478	256,381	0	0	97,478	0
476,137	562,492	10,831	28,487	447,650	30,945	41,776	569,919
732,518	840,462	108,309	284,868	447,650	30,945	139,254	569,919
1,174	1,365	---	---	894	62	---	1,139
35	33	90	90	0	0	70	0

FGD Process Parameters		
Inlet Stoich.	Ca:S Inlet	1.3
Internal Stoich.	Ca:S Inlet	2.14
Approach to Saturation	°F	30
Saturation Temperature	°F	128
Saturation Humidity	lb/lb dry air	0.118
Outlet Particulates	lb/MMBtu	0.014
Flow per Absorber	%	33.3
Velocity per Absorber	ft/s	6.4
Diameter per Absorber	ft	64
Sulfur Levels		
SO ₂ In	lb/MMBtu	1.500
SO ₂ Out	lb/MMBtu	0.075
SO ₃ In	lb/MMBtu	0.027
SO ₃ Out	lb/MMBtu	0.002



Mass Balance Dry FGD (DFGD) Technology - 3.0 lb SO₂/MMBtu Coal (Base Case w/o ESP)



Coal Analysis			Plant Production		
Component	Units	As Received			
Carbon	wt%	67.04	MCR Output	MW	865
Hydrogen	wt%	4.56	Heat Input	MMBtu/hr	8180
Nitrogen	wt%	1.32	Firing Rate	lb/hr	681,269
Sulfur	wt%	1.81	Lime Analysis		
Oxygen	wt%	6.49	Component	Units	As Received
Chlorine	wt%	0.12	Size		3/4" x 0"
Moisture	wt%	8.35	CaO	dry wt%	93.0
Ash	wt%	10.31	MgO	dry wt%	3.0
Calc. HHV	Btu/lb	12,007	Inert Solids	dry wt%	4.0

Stream Characteristics		Air Heater Outlet		SDA Outlet		Baghouse Outlet /Duct Loss		Stack Inlet	
		A		B		C		D	
Temperature	°F	350		159		159		177	
Pressure	psia	13.718		13.501		13.141		14.438	
N ₂	lb/hr-vol%	7,014,859	73.37	7,014,859	67.77	7,014,859	67.78	7,014,859	67.78
O ₂	lb/hr-vol%	675,888	6.19	673,926	5.70	673,559	5.69	673,559	5.69
H ₂ O	lb/hr-vol%	564,179	9.18	1,079,487	16.22	1,079,487	16.22	1,079,487	16.22
CO ₂	lb/hr-vol%	1,674,651	11.15	1,674,651	10.29	1,674,651	10.30	1,674,651	10.30
SO ₂	lb/hr-ppmv	24,079	1,102	4,816	204	1,204	51	1,204	51
SO ₃	lb/hr-ppmv	437	16	87	3	31	1	31	1
HCl	lb/hr-ppmv	841	67	0	0	0	0	0	0
HF	lb/hr-ppmv	0	0	0	0	0	0	0	0
Total Flow	lb/hr-acfm	9,954,933	3,604,468	10,447,826	3,028,964	10,443,791	3,111,448	10,443,791	2,914,262
MW - Moist.	lb/lbmol-lb/lb	29.154	0.060	28.260	0.112	28.255	0.115	28.255	0.112
Ash	lb/hr-gr/acf	56,191	1.819	141,022	5.432	113	0.004	113	0.005

Stream Characteristics		Fresh Lime	Slaker H2O	Lime Slurry	Abs. Solids
		01	02	03	04
Inert Solids	lb/hr	1,515	0	1,515	
CaO	lb/hr	35,232	0	0	
Ca(OH) ₂	lb/hr	0	0	46,557	
MgO	lb/hr	1,137	0	1,137	
CaSO ₃ *0.5H ₂ O	lb/hr	0	0	0	
CaSO ₄ *2H ₂ O	lb/hr	0	0	0	
CaCl ₂ + CaF ₂	lb/hr	0	0	0	
Total Solids	lb/hr	37,884	0	49,209	
Water	lb/hr	0	208,159	196,834	
Total Flow	lb/hr	37,884	208,159	246,043	TBD
Total Flow	gpm	---	416	430	
Solids	wt%	100	0	20	

Recycle	SDA Inlet	Waste Solids	Recycle Solids	Recycle H2O	Dust Control	Landfill	Total Water
06	07	08	09	10	11	12	13
83,429	84,944	57,594	83,429	0	0	57,594	0
0	0	0	0	0	0	0	0
27,348	73,904	18,879	27,348	0	0	18,879	0
1,646	2,783	1,137	1,646	0	0	1,137	0
40,644	40,644	28,058	40,644	0	0	28,058	0
36,128	36,128	24,940	36,128	0	0	24,940	0
1,851	1,851	1,278	1,851	0	0	1,278	0
191,046	240,255	131,886	191,046	0	0	131,886	0
354,801	551,635	14,654	21,227	333,573	41,869	56,522	583,600
545,847	791,890	146,540	212,274	333,573	41,869	188,408	583,600
875	1,311	---	---	667	84	---	1,166
35	30	90	90	0	0	70	0

FGD Process Parameters		
Inlet Stoich.	Ca:S Inlet	1.6
Internal Stoich.	Ca:S Inlet	2.32
Approach to Saturation	°F	30
Saturation Temperature	°F	129
Saturation Humidity	lb/lb dry air	0.120
Outlet Particulates	lb/MMBtu	0.014
Flow per Absorber	%	33.3
Velocity per Absorber	ft/s	6.3
Diameter per Absorber	ft	63
Sulfur Levels		
SO ₂ In	lb/MMBtu	2.944
SO ₂ Out	lb/MMBtu	0.147
SO ₃ In	lb/MMBtu	0.053
SO ₃ Out	lb/MMBtu	0.004

Water Balance

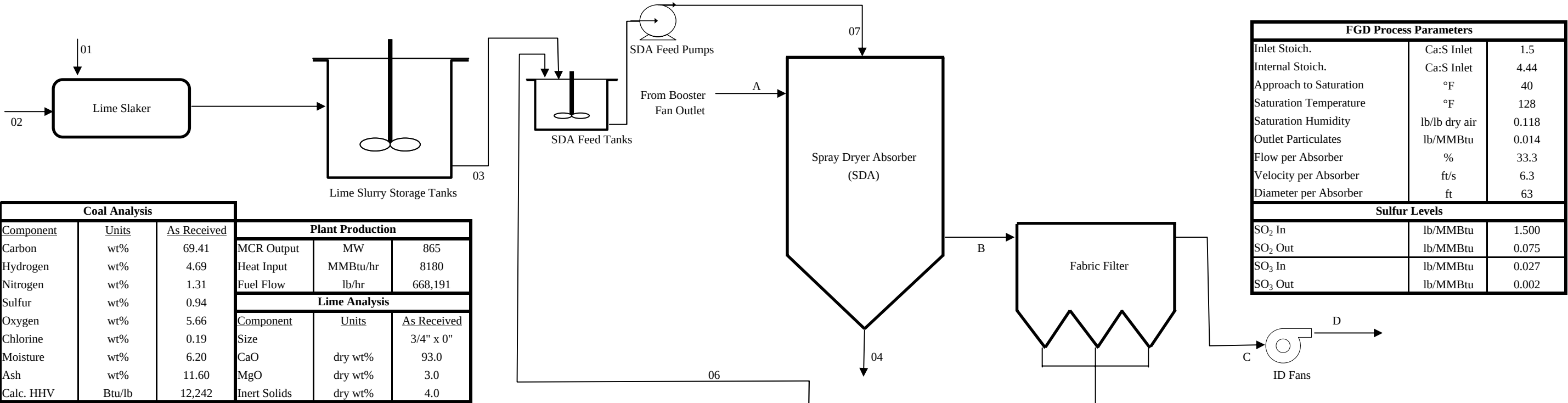
02

10

11

13

Mass Balance Dry FGD (DFGD) Technology -
1.7 lb SO₂/MMBtu Coal (w/ESP)

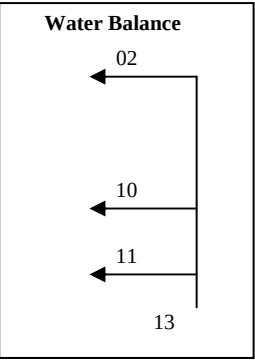


Coal Analysis			Plant Production		
Component	Units	As Received	MCR Output	MW	865
Carbon	wt%	69.41	Heat Input	MMBtu/hr	8180
Hydrogen	wt%	4.69	Fuel Flow	lb/hr	668,191
Nitrogen	wt%	1.31	Lime Analysis		
Sulfur	wt%	0.94	Component	Units	As Received
Oxygen	wt%	5.66	Size		3/4" x 0"
Chlorine	wt%	0.19	CaO	dry wt%	93.0
Moisture	wt%	6.20	MgO	dry wt%	3.0
Ash	wt%	11.60	Inert Solids	dry wt%	4.0
Calc. HHV	Btu/lb	12,242			

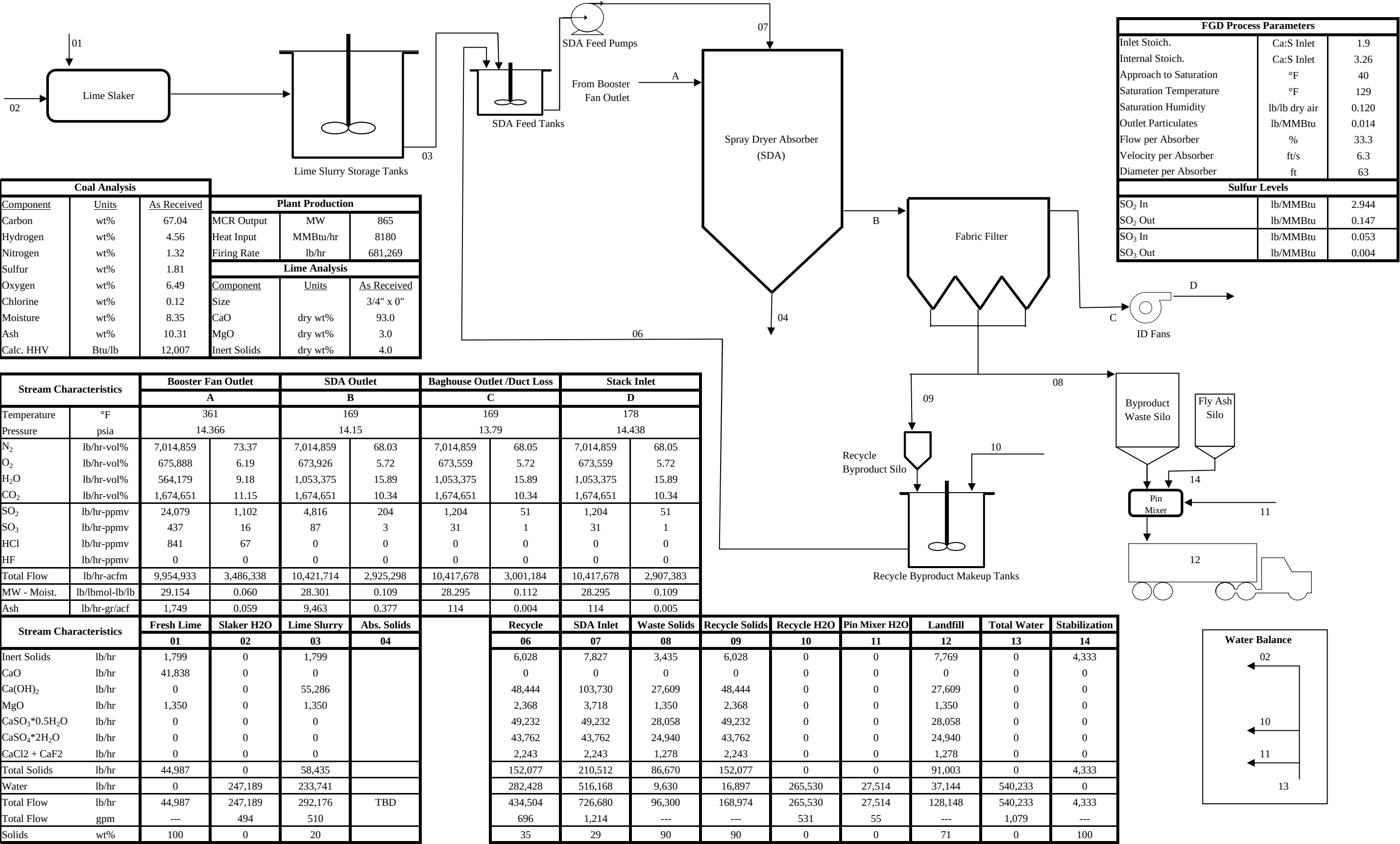
Stream Characteristics		Booster Fan Outlet		SDA Outlet		Baghouse Outlet /Duct Loss		Stack Inlet	
		A		B		C		D	
Temperature	°F	361		168		168		177	
Pressure	psia	14.366		14.15		13.79		14.438	
N ₂	lb/hr-vol%	7,113,954	73.61	7,113,954	68.20	7,113,954	68.21	7,113,954	68.21
O ₂	lb/hr-vol%	684,611	6.20	683,612	5.73	683,425	5.73	683,425	5.73
H ₂ O	lb/hr-vol%	554,288	8.92	1,051,042	15.67	1,051,042	15.68	1,051,042	15.68
CO ₂	lb/hr-vol%	1,700,570	11.20	1,700,570	10.38	1,700,570	10.38	1,700,570	10.38
SO ₂	lb/hr-ppmv	12,267	555	2,453	103	613	26	613	26
SO ₃	lb/hr-ppmv	221	8	44	1	15	1	15	1
HCl	lb/hr-ppmv	1,305	104	0	0	0	0	0	0
HF	lb/hr-ppmv	0	0	0	0	0	0	0	0
Total Flow	lb/hr-acfm	10,067,216	3,523,878	10,551,675	2,956,338	10,549,620	3,033,310	10,549,620	2,938,544
MW - Moist.	lb/lbmol-lb/lb	29.169	0.058	28.326	0.107	28.323	0.111	28.323	0.107
Ash	lb/hr-gr/acf	1,930	0.064	17,193	0.678	112	0.004	112	0.004

Stream Characteristics		Fresh Lime	Slaker H2O	Lime Slurry	Abs. Solids
		01	02	03	04
Inert Solids	lb/hr	767	0	767	
CaO	lb/hr	17,835	0	0	
Ca(OH) ₂	lb/hr	0	0	23,568	
MgO	lb/hr	575	0	575	
CaSO ₃ *0.5H ₂ O	lb/hr	0	0	0	
CaSO ₄ *2H ₂ O	lb/hr	0	0	0	
CaCl ₂ + CaF ₂	lb/hr	0	0	0	
Total Solids	lb/hr	19,177	0	24,910	
Water	lb/hr	0	105,373	99,641	
Total Flow	lb/hr	19,177	105,373	124,551	TBD
Total Flow	gpm	---	211	218	
Solids	wt%	100	0	20	

Recycle	SDA Inlet	Waste Solids	Recycle Solids	Recycle H2O	Pin Mixer H2O	Landfill	Total Water	Stabilization
06	07	08	09	10	11	12	13	14
14,607	15,374	2,586	14,607	0	0	4,622	0	2,036
0	0	0	0	0	0	0	0	0
48,463	72,031	8,579	48,463	0	0	8,579	0	0
3,250	3,825	575	3,250	0	0	575	0	0
80,737	80,737	14,293	80,737	0	0	14,293	0	0
71,767	71,767	12,705	71,767	0	0	12,705	0	0
11,212	11,212	1,985	11,212	0	0	1,985	0	0
230,035	254,945	40,723	230,035	0	0	42,759	0	2,036
427,208	526,849	4,525	25,559	401,649	12,928	17,453	519,950	0
657,244	781,794	45,248	255,595	401,649	12,928	60,212	519,950	2,036
1,053	1,274	---	---	803	26	---	1,039	---
35	33	90	90	0	0	71	0	100



Mass Balance Dry FGD (DFGD) Technology -
3.0 lb SO₂/MMBtu Coal (Base Case w/ESP)





Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
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ATTACHMENT 3-4 DFGD Water Balances

MSK-DFGD-WB-NOTES-001_C

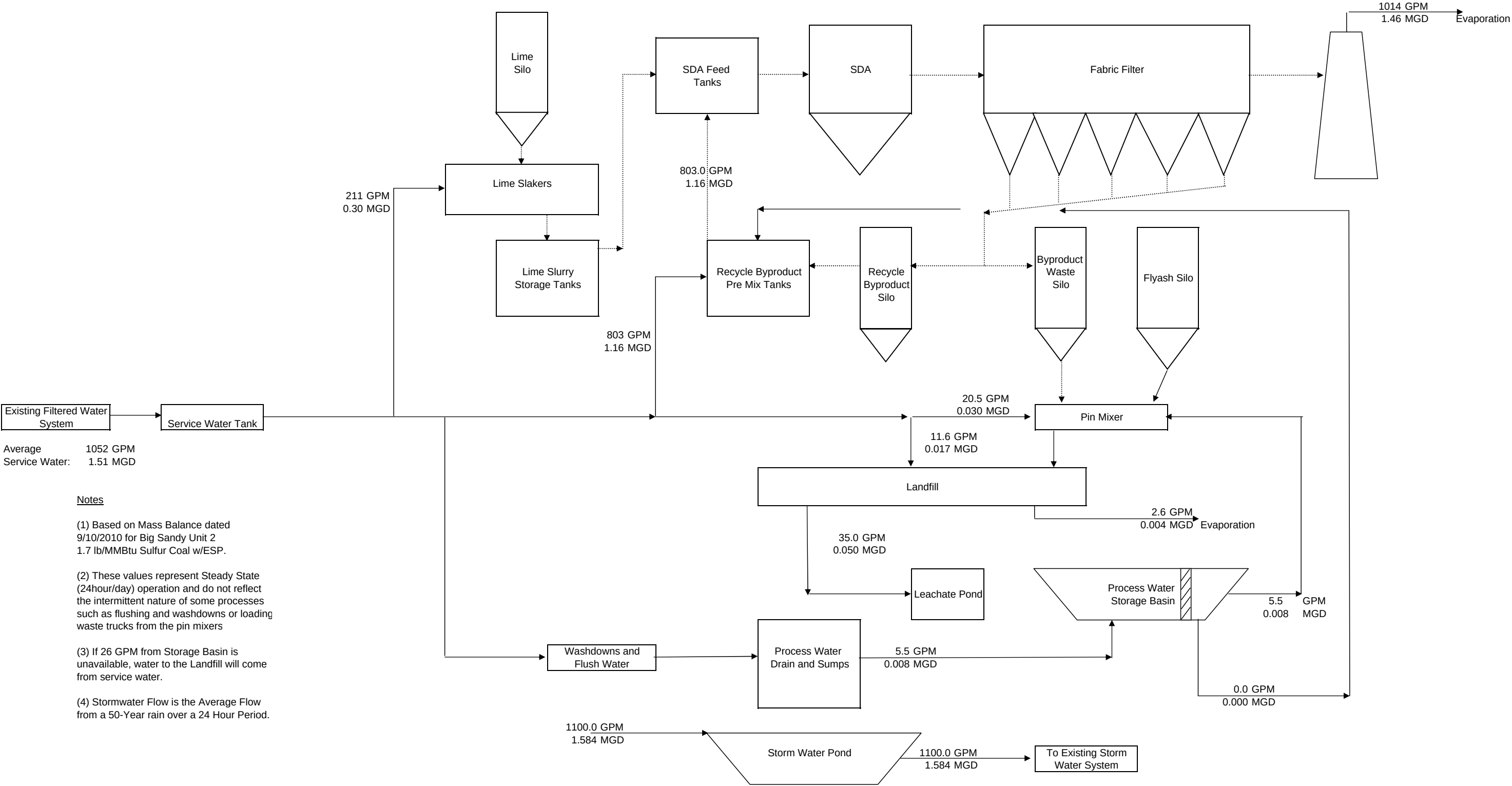
Water Balance Assumptions (with ESP)

- (1) Service Water within the Dry FGD Island (to Lime Slaker, to Recycle Ash Pre Mix tank, and from the Waste Silo) are from Mass Balances Dated 9/10/10
- (2) Water for washdowns and flushes are based on assumed instantaneous flowrates and usages of 1230 GPM three times a week for 15 minutes, and will be drained/pumped to the process water storage basin.
- (3) Water from the process water storage basin will be used in the pin mixer and DFGD Recycle System. A filtering system will be in place in the basin to limit particle size to 1/32".
- (4) Leachate would be pumped from the landfill to the Leachate Collection Pond for Disposal.
- (5) 10% of the water sprayed for dust suppression is lost to evaporation.
- (6) Storm Water Pond Flow is a 24 hour average of the 50-Year Rain.

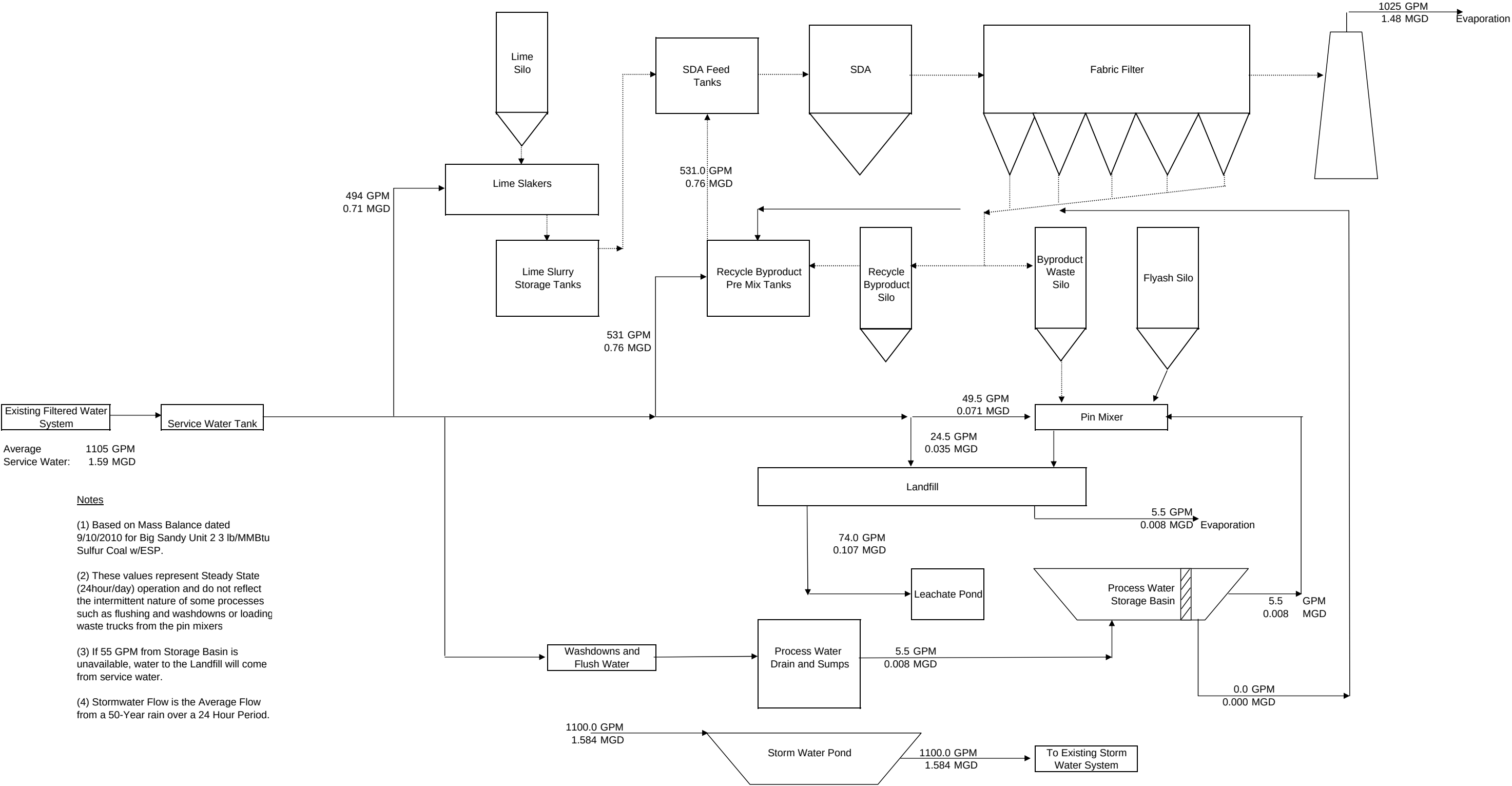
Steady State vs. Instantaneous Service Water Requirements

The average service water required is a steady state (or average) amount over the course of a year. Actual operation will occur in more of a batch mode, and as such, higher demands of service water will be needed over the course of a day (i.e., the lime slaker requires a maximum of flow of service water on an instantaneous basis but only an average basis is depicted on the water balance).

Big Sandy DFGD Water Balance
1.7 lb/mmbtu Sulfur Coal w/ESP



Big Sandy DFGD Water Balance
3 lb/mmmbtu Sulfur Coal w/ESP



MSK-DFGD-WB-NOTES-002_C

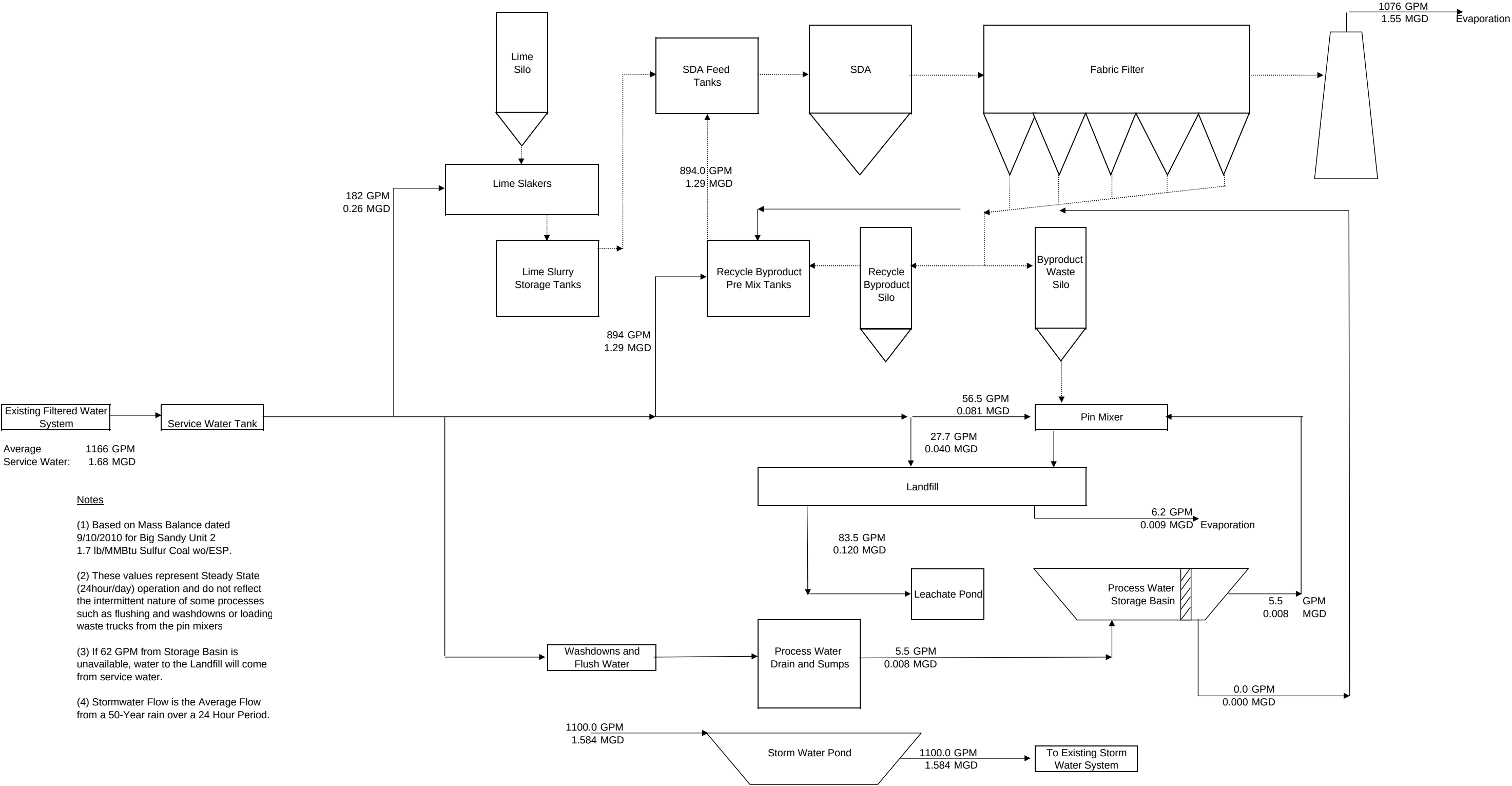
Water Balance Assumptions (without ESP)

- (1) Service Water within the Dry FGD Island (to Lime Slaker, to Recycle Ash Pre Mix tank, and from the Waste Silo) are from Mass Balances Dated 9/10/2010
- (2) Water for washdowns and flushes are based on assumed instantaneous flowrates and usages of 1230 GPM three times a week for 15 minutes, and will be drained/pumped to the process water storage basin.
- (3) Water from the process water storage basin will be used in DFGD Recycle System. A filtering system will be in place in the basin to limit particle size to 1/32".
- (4) Leachate would be pumped from the landfill to the Leachate Collection Pond for Disposal.
- (5) 10% of the water sprayed for dust suppression is lost to evaporation.
- (6) Storm Water Pond Flow is a 24 hour average of the 50-Year Rain.

Steady State vs Instantaneous Service Water Requirements

The average service water required is a steady state (or average) amount over the course of a year. Actual operation will occur in more of a batch mode, and as such, higher demands of service water will be needed over the course of a day (i.e., the lime slaker requires a maximum of flow of service water on an instantaneous basis but only an average basis is depicted on the water balance).

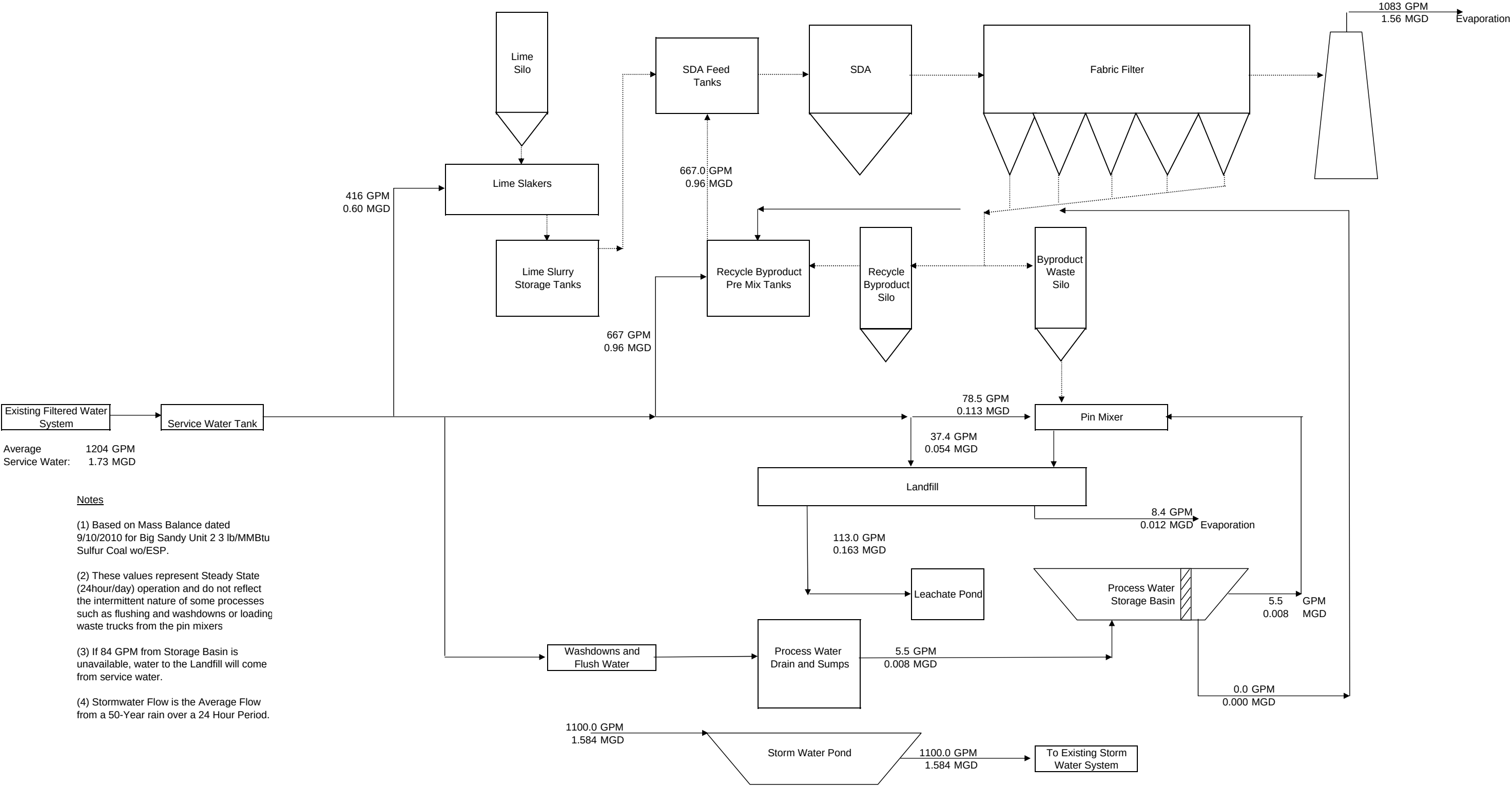
Big Sandy DFGD Water Balance
1.7 lb/mmmbtu Sulfur Coal wo/ESP



Notes

- (1) Based on Mass Balance dated 9/10/2010 for Big Sandy Unit 2 1.7 lb/MMBtu Sulfur Coal wo/ESP.
- (2) These values represent Steady State (24hour/day) operation and do not reflect the intermittent nature of some processes such as flushing and washdowns or loading waste trucks from the pin mixers
- (3) If 62 GPM from Storage Basin is unavailable, water to the Landfill will come from service water.
- (4) Stormwater Flow is the Average Flow from a 50-Year rain over a 24 Hour Period.

Big Sandy DFGD Water Balance
3 lb/mmbtu Sulfur Coal wo/ESP





Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
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ATTACHMENT 3-5

DFGD Electrical One-Lines

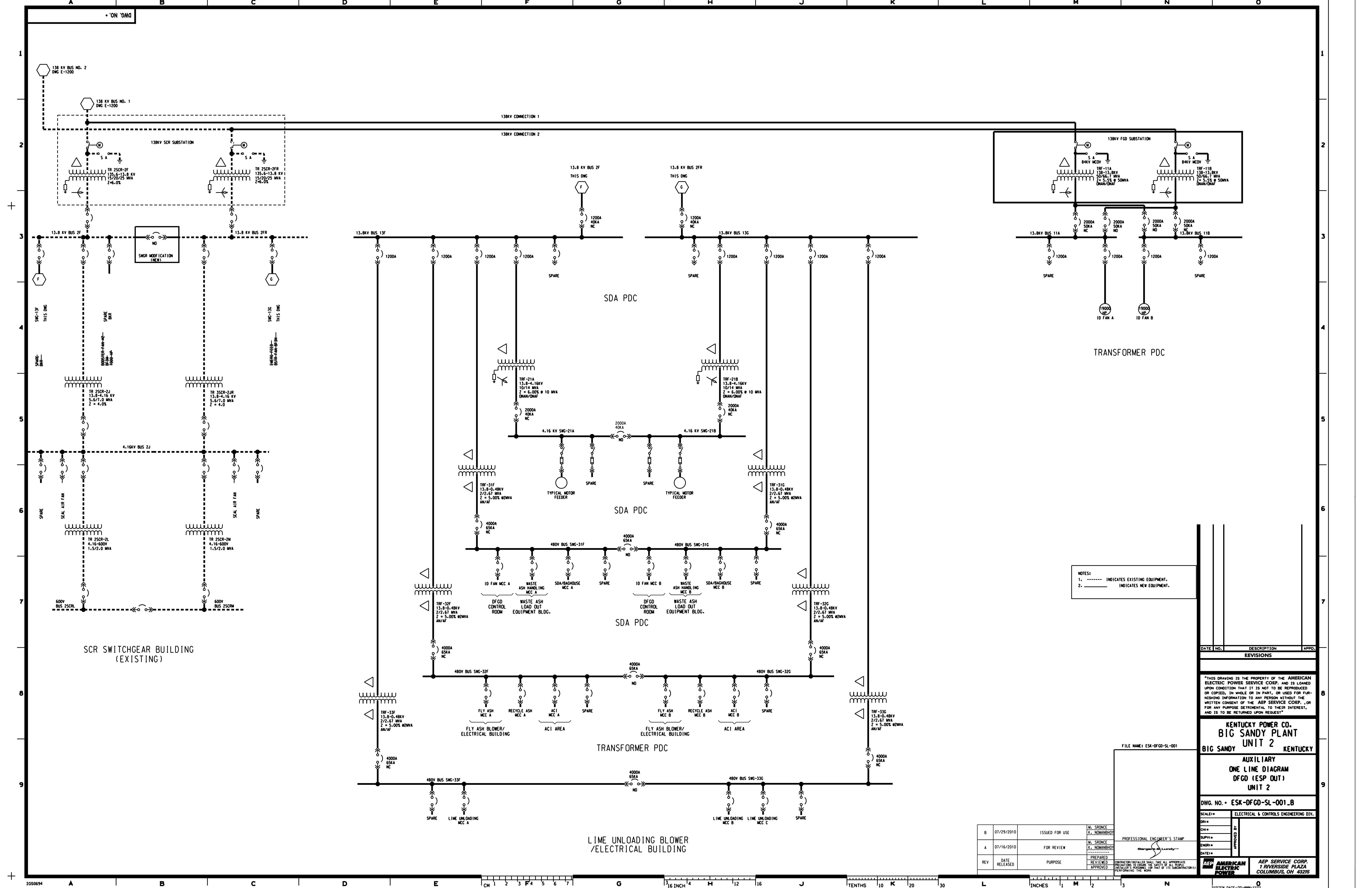
BASIC DESCRIPTION OF ONE LINES - DFGD

A. DRY FGD SYSTEM (ESP OUT)

1. The preliminary ID fan size on which the one line has been developed is 19,200 HP.
2. The 138 kV voltage used in the study is 1.009 PU based on information received from the system planning group.
3. The 138 kV line to the existing SCR transformers will be tapped to feed new 138 kV – 13.8 kV FGD transformers..
4. The existing SCR switchgear which is fed from existing 138 kV – 13.8 kV transformers will be modified to include a tie breaker and will feed the 4.16 kV and 480 volt FGD loads.
5. The existing ID booster fans will be de-commissioned and their associated circuit breakers will be used to service the FGD loads as indicated on the one lines.

B. DRY FGD SYSTEM (ESP IN)

1. The preliminary ID fan size on which the one line has been developed is 14,300 HP.
2. The existing ID Booster Fans will be retained. Due to loading considerations, the existing ID booster fans will be fed from the new ID fan switchgear.
3. The 138 kV voltage used in the study is 1.009 PU based on information received from the system planning group.
4. The 138 kV line to the SCR transformers will be tapped to feed new 138 kV – 13.8 kV FGD transformers.
5. The existing SCR switchgear which is fed from existing 138 kV – 13.8 kV transformers will be modified to include a tie breaker and will feed the 4.16 kV and 480 volt FGD loads.

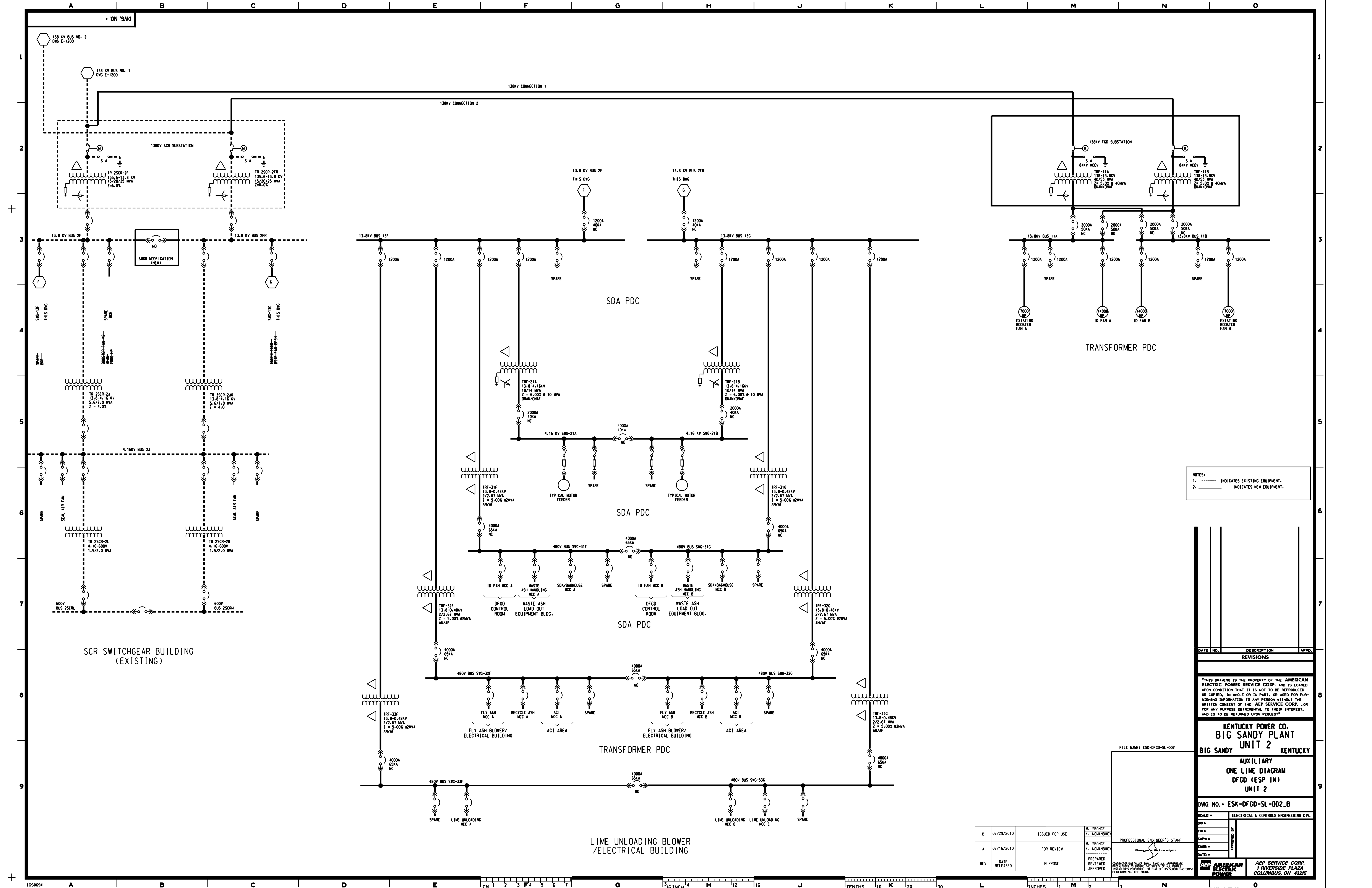


NOTES:
1. ----- INDICATES EXISTING EQUIPMENT.
2. _____ INDICATES NEW EQUIPMENT.

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REVISIONS			
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KENTUCKY POWER CO. BIG SANDY PLANT BIG SANDY UNIT 2 KENTUCKY			
AUXILIARY ONE LINE DIAGRAM DFGD (ESP OUT) UNIT 2			
DWG. NO. - ESK-DFGD-SL-001_B			
SCALE: 1" = 100'		ELECTRICAL & CONTROLS ENGINEERING DIV.	
DRW:	BY: M. SRONCE	PROFESSIONAL ENGINEER'S STAMP <i>Shirley A. Lundy</i> Shirley A. Lundy, P.E. ELECTRICAL ENGINEER	
CHK:	BY: K. NOMANSHOHY		
APPV:	BY: M. SRONCE		
ENGR:	BY: K. NOMANSHOHY		
DATE:	07/29/2010	ISSUED FOR USE	
REV:	07/16/2010	FOR REVIEW	
DATE RELEASED		PURPOSE	
PREPARED		REVIEWED	
APPROVED		APPROVED	
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO PROTECT THE SAFETY OF ALL PEOPLE. INSTALLER'S PERSONNEL FOR THAT OF THE SUBCONTRACTOR'S PERSONNEL.			
AEP SERVICE CORP. 1 RIVERSIDE PLAZA COLUMBUS, OH 43215			

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REV	DATE	PURPOSE	PREPARED REVIEWED APPROVED

FILE NAME: ESK-DFGD-SL-001



- NOTES:
- 1. - - - - - INDICATES EXISTING EQUIPMENT.
 - 2. _____ INDICATES NEW EQUIPMENT.

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REVISIONS			

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KENTUCKY POWER CO.
BIG SANDY PLANT
UNIT 2

AUXILIARY
ONE LINE DIAGRAM
DFGD (ESP IN)
UNIT 2

DWG. NO. - ESK-DFGD-SL-002_B

ELECTRICAL & CONTROLS ENGINEERING DIV.

SCALE: 1"=10'

DATE: 07/29/2010

APPROVED BY: [Signature]

PREPARED BY: M. SRONCE

REVIEWED BY: K. NOMANHOY

APPROVED BY: [Signature]

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE EMPLOYED BY THE WORK.

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

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A	07/16/2010	FOR REVIEW	M. SRONCE K. NOMANHOY
REV	DATE	PURPOSE	PREPARED REVIEWED APPROVED

FILE NAME: ESK-DFGD-SL-002

PROFESSIONAL ENGINEER'S STAMP
[Signature]
[Stamp]



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
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WFGD, DFGD, IAQCS & NID Technologies
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ATTACHMENT 3-6
DFGD Detailed Capital Cost Estimate No. 30713 Base Est-1B ESP not in Service
(3.0 lb SO₂/MMbtu)

30713C - BIG SANDY DRY FGD EST BASE (N0 ESP)-1B - 3.0 LB-MMBTU
Project Cost Estimate

30713C - BIG SANDY DRY FGD EST BASE (N0 ESP)-1B - 3.0 LB-MMBTU
Project Cost Estimate

[illegible]



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
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ATTACHMENT 3-7
DFGD Detailed Capital Cost Estimate No. 30711 Base Est-1A ESP in Service
(3.0 lb SO₂/MMbtu)

30711C - BIG SANDY DRY FGD - BASE (ESP)-1A - 3.0 LB-MMBTU
Project Cost Estimate

30711C - BIG SANDY DRY FGD - BASE (ESP)-1A - 3.0 LB-MMBTU
Project Cost Estimate

			AEP												Estimate No.:	30711C
			BIG SANDY UNIT 2												Project No.:	12721-000
			FGD PROJECT - DRY FGD BASE EST (ESP)-1A - 3.0 LB/MM BTU												Date:	9/29/2010
			ORDER OF MAGNITUDE COST ESTIMATE												Preparer:	MNO
		Cost Type:												Reviewer:	JMK	
		Est=Estimated												Approver:	PEP	
		Allow.=Allowance														
		Q=Vendor Quote														
														</		



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
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ATTACHMENT 3-8
DFGD Detailed Capital Cost Estimate No. 30710 Est-2A ESP in Service*
(1.7 lb SO₂/MMbtu)

* - Estimates 2A and 2B contain only accounts whose costs are different from the corresponding base estimates 1A and 1B.

30710C - BIG SANDY DRY FGD EST (ESP)-2A- 1.7 LB-MMBTU_Mod
Project Cost Estimate Mod

30710C - BIG SANDY DRY FGD EST (ESP)-2A- 1.7 LB-MMBTU_Mod
Project Cost Estimate Mod



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
Volume 3 – DFGD Technology
September 29, 2010

ATTACHMENT 3-9
DFGD Detailed Capital Cost Estimate No. 30712 Est-2B ESP not in Service*
(1.7 lb SO₂/MMbtu)

* - Estimates 2A and 2B contain only accounts whose costs are different from the corresponding base estimates 1A and 1B.

30712C - BIG SANDY DRY FGD EST (NO ESP)-2B- 1.7 LB-MMBTU_Mod
Project Cost Estimate Mod



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
Volume 3 – DFGD Technology
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ATTACHMENT 3-10
DFGD Summary Capital Cost Estimate No. 30713 Base Est-1B ESP not in Service
(3.0 lb SO₂/MMbtu)

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST BASE (N/ESP)-1B - 3.0 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30713C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
1.0	ID FANS					
1.1	ID FANS - OEM EQUIPMENT	1,870,000 ACFM WITH 19,200 HP MOTORS (\$750,000 EACH). INCLUDES HYDRAULIC OIL UNITS, SEAL AIR FAN SKIDS, VIBRATION MONITORING EQUIPMENT, FAN STALL EQUIPMENT, FIELD SERVICE REP FOR 140 DAYS	\$ 6,738,000	\$ -	\$ 1,635,600	\$ 8,373,600
1.2	PIPING & SUPPORTS - MECHANICAL		\$ 21,800	\$ 28,700	\$ 120,500	\$ 171,000
1.3	DAMPERS		\$ 781,000	\$ -	\$ 352,600	\$ 1,133,600
1.4	EXPANSION JOINTS		\$ -	\$ 131,100	\$ 116,500	\$ 247,600
1.5	DUCTWORK	FABRIC FILTER OUTLET TO ID FANS AND FROM ID FANS TO STACK - INCLUDES INTERNAL BRACING AND TURNING VANES	\$ -	\$ 2,600,000	\$ 4,966,200	\$ 7,566,200
1.6	DUCT SUPPORT STEEL	THREE COAT SHOP PAINT	\$ -	\$ 1,160,000	\$ 1,167,000	\$ 2,327,000
1.7	ID FAN INSULATION & LAGGING	TOTAL FOR TWO FANS. PRICING REFLECTS STANDARD ACOUSTICAL INSULATION	\$ -	\$ 168,000	\$ 217,200	\$ 385,200
1.8	DUCTWORK INSULATION & LAGGING	INCLUDES INSULATION FOR SPRAY DRYER OUTLET DUCT TO FABRIC FILTERS SUPPLIED WITH THE OEM EQUIPMENT	\$ -	\$ 864,000	\$ 1,692,200	\$ 2,556,200
1.9	DUCT SUPPORT STEEL - FOUNDATIONS		\$ -	\$ 295,500	\$ 574,000	\$ 869,500
1.10	ID FAN FOUNDATIONS INCLUDING ID FAN AUX EQUIPMENT		\$ -	\$ 106,000	\$ 198,700	\$ 304,700

Sargent & Lundy, LLC			AEP BIG SANDY UNIT 2 FGD PROJECT - DRY FGD EST BASE (N/ESP)-1B - 3.0 LB/MM BTU COST ESTIMATE SUMMARY			Estimate No.: 30713C Project No.: 12721-000 Date: 9/29/2010 Preparer: MNO Reviewer: JMK Approver: PEF	
Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost	
1.11	ID FAN DFGD CONTROL ROOM - FOUNDATIONS		\$ -	\$ 122,100	\$ 206,200	\$ 328,300	
1.12	ID FAN DFGD CONTROL ROOM	SUBCONTRACT PRICE INCLUDES LABOR. COMPLETE WITH HVAC, FINISHES AND SANITARY FACILITIES	\$ -	\$ 2,500,000	\$ -	\$ 2,500,000	
1.13	MCC		\$ 120,000	\$ -	\$ 7,200	\$ 127,200	
1.14	HIGH VOLTAGE POWER CABLE & TERMINATION	1/C # 500KCMIL-15KV - 6600 ID FAN	\$ -	\$ 61,200	\$ 172,500	\$ 233,700	
1.15	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 121,000	\$ 339,400	\$ 460,400	
1.16	EMERGENCY POWER SYSTEM		\$ 285,500	\$ -	\$ 38,900	\$ 324,400	
1.17	GROUNDING		\$ 23,300	\$ -	\$ 59,100	\$ 82,400	
1.18	LIGHTING/ TRANSFORMERS & PANELS		\$ 26,000	\$ 30,000	\$ 29,500	\$ 85,500	
1.19	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 352,900	\$ 1,988,800	\$ 2,341,700	
1.20	LOW VOLTAGE POWER CABLE & TERMINATIONS		\$ -	\$ 229,800	\$ 547,600	\$ 777,400	
1.21	DUCT BANK		\$ -	\$ 186,800	\$ 347,700	\$ 534,500	
1.22	COMMUNICATIONS		\$ -	\$ 17,000	\$ 13,000	\$ 30,000	
1.23	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000	
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 7,995,600	\$ 8,982,100	\$ 14,797,400	\$ 31,775,100	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 399,800	\$ 2,290,400	\$ 5,329,900	\$ 8,020,100	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ID FANS	\$ 8,395,400	\$ 11,272,500	\$ 20,127,300	\$ 39,795,200	

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
2.0	FABRIC FILTERS					
2.1	MECHANICAL EQUIPMENT	A SINGLE FABRIC FILTER (225' X 130') UNIT INCLUDING ALL INTERNAL FABRIC FILTER ELEMENTS SUCH AS BAGS, CAGES, ASH HOPPERS, 2 BROKEN BAG DETECTORS PER COMPARTMENT	\$ 19,761,000	\$ -	\$ 12,604,200	\$ 32,365,200
2.2	INSULATION FOR FABRIC FILTER	SUBCONTRACT COST INCLUDES LABOR	\$ 2,430,000	\$ -	\$ -	\$ 2,430,000
2.3	PENTHOUSE FOR FABRIC FILTER	SUPPORT STEEL AND PURLINS INCLUDED WITH OEM EQUIPMENT	\$ 70,200	\$ 787,000	\$ 1,007,600	\$ 1,864,800
2.4	BOTTOM ENCLOSURE FOR BAGHOUSE		\$ 60,000	\$ 1,204,000	\$ 1,359,800	\$ 2,623,800
2.5	PIPING & SUPPORTS - MECHANICAL		\$ 30,900	\$ 101,400	\$ 209,500	\$ 341,800
2.6	FABRIC FILTER - FOUNDATIONS		\$ -	\$ 550,700	\$ 1,081,100	\$ 1,631,800
2.7	FABRIC FILTER - SUPPORT STEEL AND ACCESS GALLERY		\$ -	\$ 360,000	\$ 1,186,700	\$ 1,546,700
2.8	RACEWAY, CABLE TRAY, & CONDUIT	INCLUDED IN ABSORBER ISLAND 7.0	\$ -	\$ -	\$ -	\$ -
2.9	LIGHTING/ TRANSFORMERS & PANELS		\$ 30,000	\$ 75,000	\$ 58,200	\$ 163,200
2.10	GROUNDING		\$ 7,300	\$ -	\$ 17,500	\$ 24,800
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 22,389,400	\$ 3,078,100	\$ 17,524,600	\$ 42,992,100
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 1,119,500	\$ 784,900	\$ 6,510,000	\$ 8,414,400
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FABRIC FILTERS	\$ 23,508,900	\$ 3,863,000	\$ 24,034,600	\$ 51,406,500
3.0	NEW STACK					
3.1	CONCRETE STACK (DRY)	PROVIDED BY AEP	\$ -	\$ -	\$ -	\$ 19,350,000

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90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ -	\$ -	\$ -	\$ 19,350,000
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ -	\$ -	\$ 2,902,500
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	NEW STACK	\$ -	\$ -	\$ -	\$ 22,252,500
4.0	LIME HANDLING SYSTEM					
4.1	LIME STORAGE SILO		\$ 5,762,000	\$ -	\$ -	\$ 5,762,000
4.2	LIME UNLOADING SYSTEM	INCLUDES PNEUMATIC HANDLING SYSTEM, THREE VACUUM EXHAUSTER, TWO FILTER SEPARATORS	\$ 640,000	\$ -	\$ 408,900	\$ 1,048,900
4.3	PIPING - MECHANICAL		\$ 29,000	\$ 15,600	\$ 77,900	\$ 122,500
4.4	LIME STORAGE SILO ACCESS STAIR TOWER	THREE COAT SHOP PAINT	\$ -	\$ 145,000	\$ 145,900	\$ 290,900
4.5	PIPE RACK FOR LIME HANDLING, WASTE ASH HANDLING AND MISC MECHANICAL PIPING	THREE COAT SHOP PAINT	\$ -	\$ 783,000	\$ 787,800	\$ 1,570,800
4.6	RAIL CAR UNLOADING AREA - FOUNDATIONS	20 X 250 - NO SIDING	\$ -	\$ 85,300	\$ 180,200	\$ 265,500
4.7	LIME UNLOADING BLOWER / ELECTRICAL BUILDING - FOUNDATIONS		\$ -	\$ 74,500	\$ 187,800	\$ 262,300
4.8	LIME UNLOADING BLOWER / ELECTRICAL BUILDING	130' L X 30' W X 30' H	\$ 75,000	\$ 351,500	\$ 24,400	\$ 450,900
4.9	CONCRETE PIT FOR THE ELEVATOR		\$ -	\$ 2,300	\$ 6,900	\$ 9,200
4.10	LIME STORAGE SILO - FOUNDATIONS		\$ -	\$ 469,600	\$ 852,500	\$ 1,322,100
4.11	LIME STORAGE SILO ACCESS STAIR TOWER - FOUNDATIONS		\$ -	\$ 14,200	\$ 28,600	\$ 42,800
4.12	PIPE RACK - FOUNDATIONS		\$ -	\$ 94,200	\$ 237,800	\$ 332,000
4.13	TRANSFORMERS	SUS TRANSFORMERS: 33F, 33G, 13.8KV-480V	\$ 170,000	\$ -	\$ 54,600	\$ 224,600
4.14	SWITCHGEAR	480V LOW VOLTAGE (33F/G), SWITCHGEAR	\$ 196,000	\$ -	\$ 104,700	\$ 300,700
4.15	CABLE BUS DUCT		\$ 134,700	\$ 10,800	\$ 200,200	\$ 345,700
4.16	MCC		\$ 61,800	\$ -	\$ 3,600	\$ 65,400
4.17	MIMIC PANELS		\$ 17,500	\$ -	\$ 1,400	\$ 18,900
4.18	EMERGENCY POWER SYSTEM		\$ 108,300	\$ -	\$ 24,400	\$ 132,700
4.19	GROUNDING		\$ 13,300	\$ -	\$ 41,300	\$ 54,600

Sargent & Lundy, LLC

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
4.20	LIGHTING/ TRANSFORMERS & PANELS		\$ 52,000	\$ 135,000	\$ 104,500	\$ 291,500
4.21	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 310,900	\$ 1,537,100	\$ 1,848,000
4.22	HIGH VOLTAGE POWER CABLE & TERMINATION	1/C # 500KCMIL-15KV	\$ -	\$ 50,100	\$ 141,200	\$ 191,300
4.23	MEDIUM VOLTAGE POWER CABLE & TERMINATION	1/C # 350KCMIL-5KV	\$ -	\$ 66,200	\$ 282,300	\$ 348,500
4.24	LOW VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 93,000	\$ 143,200	\$ 236,200
4.25	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 26,200	\$ 73,600	\$ 99,800
4.26	DUCT BANK	DUCT BANK WITH 4-5" & 4-3" CONDUITS, 2.38' H X 3.79' W	\$ -	\$ 61,100	\$ 116,200	\$ 177,300
4.27	FOUNDATIONS FOR TRANSFORMERS	FOR XFMR 33F, 33G, INCLUDES MUD MAT	\$ -	\$ 3,500	\$ 10,300	\$ 13,800
4.28	COMMUNICATIONS	0.00	\$ -	\$ 17,000	\$ 13,000	\$ 30,000
4.29	LIGHTNING PROTECTION	0.00	\$ -	\$ 14,000	\$ 9,000	\$ 23,000
4.30	SECURITY SYSTEM	0.00	\$ -	\$ 8,000	\$ 7,000	\$ 15,000
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 7,259,600	\$ 2,831,000	\$ 5,806,300	\$ 15,896,900
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 363,000	\$ 721,900	\$ 2,120,800	\$ 3,205,700
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	LIME HANDLING SYSTEM	\$ 7,622,600	\$ 3,552,900	\$ 7,927,100	\$ 19,102,600
5.0	LIME SLAKER BUILDING					
5.1	MECHANICAL EQUIPMENT	INCLUDES:CHAIN CONVEYOR, SLAKERS THROUGH THE LIME SLURRY PUMPS, PIPING, AND LIME SLURRY STORAGE TANKS.	\$ 7,985,000	\$ -	\$ 4,942,500	\$ 12,927,500
5.2	LIME SLAKER BUILDING SUMP PUMPS	DUPLEX. INCLUDES CHECK & ISOLATION VALVES	\$ 28,000	\$ -	\$ 12,300	\$ 40,300
5.3	AGITATOR FOR SUMP PUMPS	5 HP	\$ 12,000	\$ -	\$ 4,600	\$ 16,600

Sargent & Lundy, LLC

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5.4	PIPING - MECHANICAL		\$ 117,800	\$ 111,400	\$ 381,100	\$ 610,300
5.5	LIME SLURRY TANKS - FOUNDATIONS		\$ -	\$ 166,400	\$ 299,400	\$ 465,800
5.6	LIME SLAKER BUILDING - FOUNDATIONS		\$ -	\$ 119,200	\$ 204,000	\$ 323,200
5.7	LIME SLAKER BUILDING	135' L X 30' W X 50' H	\$ 40,500	\$ 803,300	\$ 740,500	\$ 1,584,300
5.8	ELECTRICAL	INCLUDED WITH LIME HANDLING SYSTEM, ACCOUNT 4.0	\$ -	\$ -	\$ -	\$ -
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 8,183,300	\$ 1,200,300	\$ 6,584,400	\$ 15,968,000
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 409,200	\$ 306,100	\$ 2,456,800	\$ 3,172,000
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	LIME SLAKER BUILDING	\$ 8,592,500	\$ 1,506,400	\$ 9,041,200	\$ 19,140,000
6.0	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS					
6.1	BYPRODUCT WASTE ASH HANDLING - MECHANICAL EQUIPMENT	INCLUDES PNEUMATIC HANDLING SYSTEM, THREE PRESSURE BLOWERS, ONE BIN VENT FILTER, ASH UNLOADING SYSTEM	\$ 2,047,000	\$ -	\$ 1,380,000	\$ 3,427,000
6.2	ECONOMIZER ASH HANDLING - MECHANICAL EQUIPMENT	INCLUDES JET PUMPS AND PIPING / SUPPORTS TO THE BOTTOM ASH POND	\$ 400,000	\$ -	\$ 296,400	\$ 696,400
6.3	BUILDING SUMP PUMPS	FOR BUILDINGS - DUPLEX. INCLUDES CHECK & ISOLATION VALVES.	\$ 28,000	\$ -	\$ 12,300	\$ 40,300

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6.4	AGITATOR FOR SUMP PUMPS	5 HP	\$ 12,000	\$ -	\$ 4,600	\$ 16,600
6.5	PIPING - MECHANICAL		\$ 142,800	\$ 240,900	\$ 759,100	\$ 1,142,800
6.6	BYPRODUCT WASTE SILO	CONCRETE SILO 65' DIA X 111' H - 4700 TONS - SUBCONTRACT COST INCLUDES LABOR	\$ 2,630,000	\$ -	\$ -	\$ 2,630,000
6.7	SDA RECYCLE SILO	INCLUDED WITH OEM EQUIPMENT	\$ -	\$ -	\$ -	\$ -
6.8	SDA FLY ASH SILO	NOT REQUIRED - ECONOMIZER FLY ASH SLUICED TO BOTTOM ASH POND	\$ -	\$ -	\$ -	\$ -
6.9	WASTE ASH STORAGE SILO - FOUNDATIONS		\$ -	\$ 186,400	\$ 343,900	\$ 530,300
6.10	FLY ASH SILO - FOUNDATIONS	NOT REQUIRED	\$ -	\$ -	\$ -	\$ -
6.11	FLY ASH BLOWER AND ELECTRICAL BUILDING - FOUNDATIONS	NOT REQUIRED	\$ -	\$ -	\$ -	\$ -
6.12	FLY ASH BLOWER AND ELECTRICAL BUILDING	NOT REQUIRED	\$ -	\$ -	\$ -	\$ -
6.13	RECYCLE ASH BUILDING - FOUNDATIONS		\$ -	\$ 234,300	\$ 393,800	\$ 628,100
6.14	RECYCLE ASH BUILDING	100' L X 65' W X 50' H	\$ 58,500	\$ 1,306,700	\$ 1,194,500	\$ 2,559,700
6.15	MCC	480V MCC PER LINE UP	\$ 60,000	\$ -	\$ 3,600	\$ 63,600
6.16	EMERGENCY POWER SYSTEM		\$ 92,800	\$ -	\$ 19,900	\$ 112,700
6.17	LIGHTING/ TRANSFORMERS & PANELS		\$ 18,500	\$ 60,000	\$ 44,100	\$ 122,600
6.18	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 32,500	\$ 189,100	\$ 221,600
6.19	LOW VOLTAGE POWER CABLE & TERMINATION	#4/0 - #12 AWG-600V	\$ -	\$ 64,700	\$ 80,500	\$ 145,200
6.20	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 30,700	\$ 86,200	\$ 116,900
6.21	GROUNDING		\$ -	\$ 4,500	\$ 10,900	\$ 15,400

Sargent & Lundy, LLC			AEP BIG SANDY UNIT 2 FGD PROJECT - DRY FGD EST BASE (N/ESP)-1B - 3.0 LB/MM BTU COST ESTIMATE SUMMARY			Estimate No.: 30713C Project No.: 12721-000 Date: 9/29/2010 Preparer: MNO Reviewer: JMK Approver: PEF	
Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost	
6.22	DUCT BANK	DUCT BANK WITH 12-5" & 6-3" CONDUITS, 5.2' H X 2.08" W	\$ -	\$ 111,500	\$ 184,000	\$ 295,500	
6.23	COMMUNICATIONS		\$ -	\$ 34,000	\$ 26,000	\$ 60,000	
6.24	LIGHTNING PROTECTION		\$ -	\$ 16,000	\$ 14,000	\$ 30,000	
6.25	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000	
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 5,489,600	\$ 2,330,200	\$ 5,049,900	\$ 12,869,700	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 274,500	\$ 594,200	\$ 1,883,600	\$ 2,752,300	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS	\$ 5,764,100	\$ 2,924,400	\$ 6,933,500	\$ 15,622,000	
7.0	ABSORBER ISLAND						
7.1	MECHANICAL EQUIPMENT	INCLUDES: ABSORBER MODULES AND ATOMIZERS WITH LUBE OIL, DUCT WORK FROM THE ABSORBERS TO THE FABRIC FILTER, AND COMPLETE RECYCLE SYSTEM WITH PIPING INSIDE FGD BUILDINGS.	\$ 39,438,000	\$ -	\$ 24,186,100	\$ 63,624,100	

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7.2	ELEVATOR	MAINTENANCE ELEVATOR - SUBCONTRACT COST INCLUDES LABOR	\$ 325,000	\$ -	\$ -	\$ 325,000
7.3	BUILDING SUMP PUMPS	FOR BUILDINGS - DUPLEX. INCLUDES CHECK & ISOLATION VALVES.	\$ 28,000	\$ -	\$ 12,300	\$ 40,300
7.4	AGITATOR FOR SUMP PUMPS	5 HP	\$ 12,000	\$ -	\$ 4,600	\$ 16,600
7.5	PIPING - MECHANICAL		\$ 142,800	\$ 36,900	\$ 227,900	\$ 407,600
7.6	SDA SUPERSTRUCTURE		\$ 75,000	\$ 764,900	\$ 1,227,300	\$ 2,067,200
7.7	SDA BOTTOM ENCLOSURE - SUPPORT STEEL, GIRTS AND SIDING	TOTAL FOR THREE ABSORBERS	\$ -	\$ 362,100	\$ 385,200	\$ 747,300
7.8	SDA SHELL / ROOF INSULATION	61,000 SF. SUBCONTRACT COST INCLUDES LABOR	\$ 1,830,000	\$ -	\$ -	\$ 1,830,000
7.9	SDA - SUPPORT STEEL & ACCESS GALLERY		\$ -	\$ 711,000	\$ 1,884,100	\$ 2,595,100
7.10	EXPANSION JOINTS		\$ -	\$ 195,500	\$ 173,800	\$ 369,300
7.11	DUCTWORK		\$ -	\$ 4,797,000	\$ 10,481,700	\$ 15,278,700
7.12	DUCT SUPPORT STEEL	THREE COAT SHOP PAINT	\$ -	\$ 2,140,200	\$ 2,153,200	\$ 4,293,400
7.13	DUCTWORK INSULATION & LAGGING		\$ -	\$ 1,632,000	\$ 3,196,400	\$ 4,828,400
7.14	CONCRETE PIT FOR ELEVATOR		\$ -	\$ 2,800	\$ 8,200	\$ 11,000
7.15	SPRAY DRYER ABSORBER - FOUNDATIONS	TOTAL FOR THREE TOWERS	\$ -	\$ 1,678,600	\$ 3,323,400	\$ 5,002,000
7.16	SDA PDC - FOUNDATION		\$ -	\$ 85,600	\$ 169,000	\$ 254,600
7.17	SDA PDC BUILDING	60' L X 40' W X 13' H. SUBCONTRACT PRICE INCLUDES LABOR	\$ -	\$ 1,200,000	\$ -	\$ 1,200,000
7.18	FOUNDATIONS FOR SUPPORT STEEL		\$ -	\$ 69,000	\$ 143,000	\$ 212,000
7.19	TRANSFORMERS		\$ 770,000	\$ -	\$ 145,600	\$ 915,600
7.20	SWITCHGEAR		\$ 1,082,000	\$ -	\$ 569,000	\$ 1,651,000

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7.21	CABLE BUS & TERMINATIONS		\$ 1,082,500	\$ 35,800	\$ 1,853,300	\$ 2,971,600
7.22	MCC		\$ 185,400	\$ -	\$ 8,200	\$ 193,600
7.23	MIMIC PANELS		\$ 17,500	\$ -	\$ 4,500	\$ 22,000
7.24	GROUNDING		\$ -	\$ 16,000	\$ 46,100	\$ 62,100
7.25	LIGHTING/ TRANSFORMERS & PANELS		\$ 156,000	\$ 150,000	\$ 159,100	\$ 465,100
7.26	EMERGENCY POWER SYSTEM		\$ 108,300	\$ -	\$ 24,400	\$ 132,700
7.27	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 1,658,100	\$ 8,154,700	\$ 9,812,800
7.28	HIGH VOLTAGE POWER CABLE & TERMINATION	1/C # 500KCMIL- 15KV	\$ -	\$ 53,300	\$ 150,300	\$ 203,600
7.29	MEDIUM VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 82,500	\$ 243,200	\$ 325,700
7.30	LOW VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 409,900	\$ 537,400	\$ 947,300
7.31	CONTROL & INSTRUMENT CABLE		\$ -	\$ 99,200	\$ 278,400	\$ 377,600
7.32	DUCT BANK		\$ -	\$ 137,900	\$ 278,600	\$ 416,500
7.33	FOUNDATION FOR TRANSFORMERS		\$ -	\$ 49,800	\$ 145,800	\$ 195,600
7.34	TRANSFORMER FIRE WALLS	FOR 21A & 21B	\$ -	\$ 3,500	\$ 9,600	\$ 13,100
7.35	COMMUNICATIONS		\$ -	\$ 17,000	\$ 13,000	\$ 30,000
7.36	LIGHTNING PROTECTION		\$ -	\$ 25,500	\$ 18,500	\$ 44,000
7.37	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 45,252,500	\$ 16,422,100	\$ 60,222,900	\$ 121,897,500
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 3,072,600	\$ 4,187,600	\$ 23,578,100	\$ 30,838,300
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ABSORBER ISLAND	\$ 48,325,100	\$ 20,609,700	\$ 83,801,000	\$ 152,735,800
8.0	ACTIVATED CARBON INJECTION SYSTEM					
8.1	ACI MECHANICAL EQUIPMENT:		\$ 3,046,400	\$ -	\$ 1,012,000	\$ 4,058,400
8.2	PIPING - MECHANICAL		\$ 29,800	\$ 149,800	\$ 377,100	\$ 556,700
8.3	ACI SYSTEM - FOUNDATIONS		\$ -	\$ 41,500	\$ 88,000	\$ 129,500
8.4	MCC		\$ 61,800	\$ -	\$ 3,600	\$ 65,400
8.5	GROUNDING		\$ 5,500	\$ -	\$ 18,600	\$ 24,100
8.6	LIGHTING / TRANSFORMERS & PANELS		\$ 26,000	\$ 15,000	\$ 20,400	\$ 61,400
8.7	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 89,900	\$ 302,900	\$ 392,800
8.8	LOW VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 30,400	\$ 18,000	\$ 32,400

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	COST ESTIMATE SUMMARY	Preparer:	MNO
		Reviewer:	JMK
		Approver:	PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
8.9	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 16,000	\$ 44,900	\$ 60,900
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 3,169,500	\$ 326,600	\$ 1,885,500	\$ 5,381,600
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 158,500	\$ 83,300	\$ 694,500	\$ 936,300
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ACTIVATED CARBON INJECTION SYSTEM	\$ 3,328,000	\$ 409,900	\$ 2,580,000	\$ 6,317,900
9.0	COMPRESSED AIR SYSTEM					
9.1	AIR COMPRESSOR & AUXILIARIES		\$ 664,000	\$ -	\$ 155,400	\$ 819,400
9.2	PIPING - MECHANICAL		\$ 320,600	\$ 399,200	\$ 1,096,000	\$ 1,815,800
9.3	AIR COMPRESSOR BUILDING - FOUNDATIONS		\$ -	\$ 96,100	\$ 194,700	\$ 290,800
9.4	AIR COMPRESSOR BUILDING	100' L X 60' W X 20' H	\$ -	\$ 510,000	\$ -	\$ 510,000
9.5	LIGHTING/ TRANSFORMERS & PANELS		\$ 11,000	\$ 10,500	\$ 11,400	\$ 32,900
9.6	RACEWAY, CABLE TRAY, & CONDUIT	INCLUDED IN ABSORBER ISLAND 7.0	\$ -	\$ -	\$ -	\$ -
9.7	GROUNDING		\$ 4,500	\$ -	\$ 10,900	\$ 15,400
9.8	COMMUNICATIONS		\$ -	\$ 34,000	\$ 26,000	\$ 60,000
9.9	LIGHTNING PROTECTION		\$ -	\$ 10,500	\$ 7,500	\$ 18,000
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 1,000,100	\$ 1,060,300	\$ 1,501,900	\$ 3,562,300
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 50,000	\$ 270,400	\$ 551,500	\$ 871,800
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	COMPRESSED AIR SYSTEM	\$ 1,050,100	\$ 1,330,700	\$ 2,053,400	\$ 4,434,100

Sargent & Lundy, LLC			AEP BIG SANDY UNIT 2 FGD PROJECT - DRY FGD EST BASE (N/ESP)-1B - 3.0 LB/MM BTU COST ESTIMATE SUMMARY			Estimate No.: 30713C Project No.: 12721-000 Date: 9/29/2010 Preparer: MNO Reviewer: JMK Approver: PEF	
Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost	
10.0	SERVICE WATER SYSTEM						
10.1	PUMPS	INCLUDES SELF-CLEANING STRAINERS	\$ 204,000	\$ -	\$ 90,000	\$ 294,000	
10.2	PIPING - MECHANICAL		\$ 183,400	\$ 624,600	\$ 1,092,000	\$ 1,900,000	
10.3	PIPING - FIRE PROTECTION SYSTEM		\$ 181,200	\$ 284,600	\$ 673,300	\$ 1,139,100	
10.4	TANKS		\$ -	\$ 120,000	\$ -	\$ 120,000	
10.5	SERVICE WATER TANK & PUMP - FOUNDATIONS		\$ -	\$ 17,300	\$ 41,400	\$ 58,700	
10.6	ELECTRICAL	INCLUDED IN ABSORBER ISLAND 7.0	\$ -	\$ -	\$ -	\$ -	
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 568,600	\$ 1,046,500	\$ 1,896,700	\$ 3,511,800	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 28,400	\$ 266,900	\$ 690,700	\$ 986,000	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	SERVICE WATER SYSTEM	\$ 597,000	\$ 1,313,400	\$ 2,587,400	\$ 4,497,800	
11.0	POTABLE WATER SYSTEM						
11.1	PUMPS		\$ 30,000	\$ -	\$ 18,400	\$ 48,400	
11.2	PIPING - MECHANICAL		\$ 99,500	\$ 200,400	\$ 530,700	\$ 830,600	
11.3	TANKS		\$ -	\$ 8,500	\$ -	\$ 8,500	
11.4	POTABLE WATER TANK & PUMP - FOUNDATIONS		\$ -	\$ 5,200	\$ 9,200	\$ 14,400	
11.5	ELECTRICAL	INCLUDED IN ABSORBER ISLAND 7.0	\$ -	\$ -	\$ -	\$ -	
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 129,500	\$ 214,100	\$ 558,300	\$ 901,900	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 6,500	\$ 54,600	\$ 203,000	\$ 264,100	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	POTABLE WATER SYSTEM	\$ 136,000	\$ 268,700	\$ 761,300	\$ 1,166,000	

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12.0	FGD SUBSTATION					
12.1	TRANSFORMERS		\$ 1,560,000	\$ -	\$ 273,100	\$ 1,833,100
12.2	TRANSFORMER PDC	15W X 45' X 10'H. SUBCONTRACT PRICE INCLUDES LABOR	\$ 202,500	\$ -	\$ -	\$ 202,500
12.3	TRANSFORMER PDC - FOUNDATION		\$ -	\$ 73,200	\$ 146,900	\$ 220,100
12.4	138KV MAIN FEEDER & TERMINATIONS		\$ 264,000	\$ -	\$ 254,000	\$ 518,000
12.5	SWITCHGEAR		\$ 710,000	\$ -	\$ 121,600	\$ 831,600
12.6	MCC	480V MCC, PER LINE UP	\$ 60,000	\$ -	\$ 3,600	\$ 63,600
12.7	CABLE BUS		\$ 181,100	\$ 18,000	\$ 290,200	\$ 489,300
12.8	PANELS - RELAY		\$ 100,000	\$ -	\$ 9,100	\$ 109,100
12.9	MIMIC PANELS		\$ 17,500	\$ -	\$ 4,500	\$ 22,000
12.10	UPS SYSTEM		\$ 108,300	\$ -	\$ 24,400	\$ 132,700
12.11	GROUNDING		\$ 23,300	\$ -	\$ 59,100	\$ 82,400
12.12	LIGHTING/ TRANSFORMERS & PANELS		\$ 26,000	\$ 30,000	\$ 29,500	\$ 85,500
12.13	OUTDOOR LIGHTING	NEW AUX YARD LIGHTING ALLOWANCE	\$ 25,000	\$ -	\$ 56,800	\$ 81,800
12.14	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 390,600	\$ 1,918,600	\$ 2,309,200
12.15	DUCT BANK		\$ -	\$ 26,200	\$ 54,300	\$ 80,500
12.16	LOW VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 112,200	\$ 194,700	\$ 306,900
12.17	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 21,800	\$ 61,100	\$ 82,900
12.18	FOUNDATION FOR AUX TRANSFORMER		\$ -	\$ 70,200	\$ 205,400	\$ 275,600
12.19	FIREWALL FOR TRANSFORMERS		\$ -	\$ 3,000	\$ 5,200	\$ 8,200
12.20	COMMUNICATIONS		\$ -	\$ 17,000	\$ 13,000	\$ 30,000
12.21	LIGHTNING PROTECTION		\$ -	\$ 4,000	\$ 2,000	\$ 6,000
12.22	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 3,277,700	\$ 774,200	\$ 3,734,100	\$ 7,786,000
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 163,900	\$ 197,400	\$ 1,350,042	\$ 1,711,300
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FGD SUBSTATION	\$ 3,441,600	\$ 971,600	\$ 5,084,100	\$ 9,497,300

Sargent & Lundy, LLC

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13.0	FGD DCS SYSTEM					
13.1	DCS	3200 I/O POINTS	\$ 2,400,000	\$ -	\$ 813,600	\$ 3,213,600
13.2	DCS - VENDOR FIELD SUPPORT	200 MANDAYS @ \$1500/DAY - SHOWN AS SUBCONTRACT COST	\$ 300,000	\$ -	\$ -	\$ 300,000
13.3	LOCALLY MOUNTED INSTRUMENTS		\$ -	\$ 709,500	\$ 930,500	\$ 1,640,000
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 2,700,000	\$ 709,500	\$ 1,744,100	\$ 5,153,600
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 135,000	\$ 180,900	\$ 650,900	\$ 966,800
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FGD DCS SYSTEM	\$ 2,835,000	\$ 890,400	\$ 2,395,000	\$ 6,120,400
14.0	CEM SYSTEM					
14.1	CEM	PROVIDED BY AEP	\$ 1,260,000	\$ 540,000	\$ 310,000	\$ 2,110,000
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 1,260,000	\$ 540,000	\$ 310,000	\$ 2,110,000
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ -	\$ -	\$ 316,500
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	CEM SYSTEM	\$ -	\$ -	\$ -	\$ 2,426,500
15.0	TRUCK & RAIL INFRASTRUCTURE					
15.1	EXISTING RAILROAD IMPROVEMENTS	FOR FULL RAILCAR STORAGE TRACK IMPROVEMENTS - 3250 LF	\$ -	\$ 660,200	\$ 689,200	\$ 1,349,400
15.2	EXISTING RAILROAD IMPROVEMENTS	FOR LOOP TRACK UPGRADE - 5000 LF	\$ -	\$ 1,008,800	\$ 1,055,600	\$ 2,064,400

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15.3	NEW RAILROAD TRACK	INCLUDES, 132LB RAIL, 7" TIMBERS, TIE PLATES, SPIKES, BOLTS, 12: SUBBALLAST, 12" BALLAST, 12 OZ/SY GEOTEXTILE MEMBRANE, 12" SUBGRADE PREP	\$ -	\$ 252,000	\$ 213,100	\$ 465,100
15.4	FIELD FABRICATED TURNOUTS	#8 TURNOUT	\$ -	\$ 90,000	\$ 54,800	\$ 144,800
15.5	RAIL SCALE	SUBCONTRACT COST, INCLUDES FOUNDATIONS	\$ 212,500	\$ -	\$ -	\$ 212,500
15.6	NEW CONCRETE ENCASEMENT	OVER AND AROUND DUCT BANK CONNECTING THE PLANT TO SWITCHYARD. THIS IS UNDER THE NEW TRACKWORK EXTENSION	\$ -	\$ 33,200	\$ 71,400	\$ 104,600
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 212,500	\$ 2,044,200	\$ 2,084,100	\$ 4,340,800
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 10,600	\$ 521,300	\$ 779,600	\$ 1,311,500
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	TRUCK & RAIL INFRASTRUCTURE	\$ 223,100	\$ 2,565,500	\$ 2,863,700	\$ 5,652,300
16.0	SITE IMPROVEMENTS - CIVIL WORK					
16.1	SITE GRADING		\$ -	\$ -	\$ 538,800	\$ 538,800
16.2	ROADS & SURFACING		\$ -	\$ 918,600	\$ 1,237,000	\$ 2,155,600
16.3	NEW CONCRETE ENCASEMENT	16' X 4' X 40' - FOR EXISTING ASH PIPE HAUL ROAD CROSSING	\$ -	\$ 144,300	\$ 286,600	\$ 430,900
16.4	TRUCK WASH AREA		\$ -	\$ 47,300	\$ 83,100	\$ 130,400
16.5	TRUCK SCALE & CONCRETE APPROACH		\$ 170,000	\$ 27,300	\$ 92,000	\$ 289,300

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16.6	PROCESS WATER STORAGE BASIN		\$ 60,000	\$ 110,400	\$ 312,600	\$ 483,000
16.7	PROCESS WATER STORAGE BASIN PUMP STRUCTURE - CONCRETE		\$ -	\$ 47,000	\$ 105,400	\$ 152,400
16.8	STORMWATER DRAINAGE TRENCH	2' W X 3' DEEP CAST-IN-PLACE CONCRETE TRENCH W/REINFORCING & HS-20 RATED GRATE COVERS	\$ -	\$ 499,500	\$ 508,300	\$ 1,007,800
16.9	STORMWATER RUNOFF POND		\$ -	\$ 15,000	\$ 122,600	\$ 137,600
16.10	STORM WATER POND PUMP STRUCTURE - CONCRETE		\$ 90,000	\$ 42,300	\$ 182,200	\$ 314,500
16.11	OILY WATER SEWER		\$ 4,500	\$ 105,000	\$ 223,600	\$ 333,100
16.12	OIL SEPARATOR	500 GPM W/ INTEGRAL LIFT STATION	\$ 100,000	\$ -	\$ 116,100	\$ 216,100
16.13	SANITARY SEWER		\$ -	\$ 22,200	\$ 96,900	\$ 119,100
16.14	SANITARY LIFT STATION	PACKAGED TYPE COMPLETE WITH PUMPS, 100,000 GPD	\$ 150,000	\$ -	\$ 49,200	\$ 199,200
16.15	CONSTRUCTION LAYDOWN AREA	ALLOWANCE FOR 10 ACRES, DOES NOT INCLUDE LAND ACQUISITION, IF REQUIRED	\$ -	\$ 700,000	\$ 828,000	\$ 1,528,000
16.16	CRAFT PARKING	DOES NOT INCLUDE LAND ACQUISITION, IF REQUIRED. ALLOWANCE FOR 20,000 SY INCLUDES: 6" BASE COURSE 10 OZ/SY GEOTEXTILE 12" SUBGRADE PREP	\$ -	\$ 180,000	\$ 414,200	\$ 594,200

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16.17	CONTRACTOR OFFICES (AREA)	DOES NOT INCLUDE LAND ACQUISITION, IF REQUIRED. ALLOWANCE FOR 5,000 SY AREA (TRAILERS BY CONTRACTORS) INCLUDES: 6" BASE COURSE 10 OZ/SY GEOTEXTILE 12" SUBGRADE PREP	\$ -	\$ 45,000	\$ 103,600	\$ 148,600
16.18	NEW PERMANENT STORAGE	INCLUDES LIGHTING AND H&V. SUBCONTRACT	\$ 850,000	\$ -	\$ -	\$ 850,000
16.19	FOUNDATIONS FOR THE NEW WAREHOUSE		\$ -	\$ 273,500	\$ 450,200	\$ 723,700
16.20	NEW TEMPORARY STORAGE	WEATHER TIGHT CANVAS ENCLOSURE. INCLUDES	\$ 450,000	\$ -	\$ -	\$ 450,000
16.21	FOUNDATIONS FOR TEMPORARY STORAGE		\$ -	\$ 99,500	\$ 157,200	\$ 256,700
16.22	LABOR BUS SERVICE FROM PARKING LOT TO CONSTRUCTION AREA AND ACCESS CONTROL	ALLOWANCE FOR 36 MONTHS BASED ON 2	\$ 1,368,000	\$ -	\$ -	\$ 1,368,000
16.23	EROSION & SEDIMENT CONTROL		\$ -	\$ 12,400	\$ 20,400	\$ 32,800
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 3,242,500	\$ 3,289,300	\$ 5,928,000	\$ 12,459,800
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 162,100	\$ 838,800	\$ 2,156,500	\$ 3,157,400
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	SITE IMPROVEMENTS - CIVIL WORK	\$ 3,404,600	\$ 4,128,100	\$ 8,084,500	\$ 15,617,200
17.0	BOP ITEMS					
17.1	PIPE INSULATION	AVERAGE 6" PIPE SIZE	\$ -	\$ 34,000	\$ 106,000	\$ 140,000

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17.2	HEAT TRACING		\$ -	\$ 175,600	\$ 248,500	\$ 424,100
17.3	TOUCH UP PAINT (INCLUDES PAINTING CS PIPE)		\$ -	\$ 134,400	\$ 515,600	\$ 650,000
17.4	HOISTS & TROLLEYS		\$ 180,000	\$ 210,000	\$ 245,300	\$ 635,300
17.5	MISC AUX STEEL FOR PIPE SUPPORTS	FIELD FABRICATED	\$ -	\$ 122,500	\$ 510,600	\$ 633,100
17.6	MISC PIPE SUPPORT FOUNDATIONS		\$ -	\$ 10,500	\$ 21,000	\$ 31,500
17.7	EYE WASH STATIONS		\$ 30,000	\$ 5,000	\$ 30,700	\$ 65,700
17.8	FIRE PROTECTION FOR MISC BUILDINGS & AREAS		\$ -	\$ 360,000	\$ 294,400	\$ 654,400
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 210,000	\$ 1,052,000	\$ 1,972,100	\$ 3,234,100
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 10,500	\$ 268,260	\$ 750,694	\$ 1,029,454
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	BOP ITEMS	\$ 220,500	\$ 1,320,300	\$ 2,722,800	\$ 4,263,600
18.0	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE					
18.1	RELOCATE HYDROGEN STORAGE TANK		\$ -	\$ 15,600	\$ 86,800	\$ 102,400
18.2	NEW HYDROGEN LINE TO PLANT		\$ -	\$ 62,100	\$ 150,600	\$ 212,700
18.3	RELOCATE MISC. UNDERGROUND UTILITIES	ALLOWANCE	\$ -	\$ 125,000	\$ 170,500	\$ 295,500
18.4	OUTAGE TIE-IN DUCTWORK	ALLOWANCE FOR 85 TON DUCTWORK	\$ -	\$ 276,300	\$ 527,700	\$ 804,000
18.5	RELOCATED WAREHOUSE - FOUNDATIONS		\$ -	\$ 342,600	\$ 534,900	\$ 877,500
18.6	RELOCATE EXISTING WAREHOUSE BUILDING	150' L X 75' W X 25' H	\$ -	\$ 95,600	\$ 1,121,500	\$ 1,217,100
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ -	\$ 917,200	\$ 2,592,000	\$ 3,509,200

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	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ 233,900	\$ 927,100	\$ 1,161,000
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE	\$ -	\$ 1,151,100	\$ 3,519,100	\$ 4,670,200
19.0	ARSENIC, ASBESTOS , LEAD ABATEMENT					
19.1	ARSENIC, ASBESTOS , LEAD ABATEMENT	PROVIDED BY AEP	\$ -	\$ -	\$ -	\$ 750,000
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ -	\$ -	\$ -	\$ 750,000
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ -	\$ -	\$ 112,500
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ARSENIC, ASBESTOS , LEAD ABATEMENT	\$ -	\$ -	\$ -	\$ 862,500
99.0	OVERALL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 112,340,400	\$ 46,817,700	\$ 134,192,300	\$ 313,450,400
	OVERALL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 6,364,000	\$ 11,881,800	\$ 50,633,700	\$ 72,130,000
	OVERALL TOTAL DIRECT & CONSTRUCTION INDIRECT COST		\$ 118,704,400	\$ 58,699,500	\$ 184,826,000	\$ 385,580,400
	OVERALL PROJECT INDIRECT COSTS					
	ENGINEERING, PROCUREMENT, & PROJECT SERVICES					\$ 25,000,000
	CONSTRUCTION MANAGEMENT					\$ 11,567,400

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	S-U / COMMISSIONING					\$ 3,855,800
	CRAFT START-UP SUPPORT					\$ 1,581,200
	INITIAL FILLS					\$ 1,156,700
	OPERATOR & TRAINING MANUALS					\$ 300,000
	SUBCONTRACTORS (NOISE & DUCTWORK CONSULTANT, GEOTECHNICAL INVESTIGATION)					\$ 400,000
	NOISE ABATEMENT FOR 85 DBA REQUIREMENT					\$ 2,750,000
	SUBTOTAL - INDIRECT COSTS					\$ 46,611,100
	TOTAL PROJECT DIRECT AND INDIRECT COSTS					\$ 432,191,500
	SPARE PARTS:					\$ 1,780,600
	SPARE PARTS - CAPITALIZED	0.90				\$ 1,068,360
	SPARE PARTS - FIRST YEAR OF OPERATION	0.60				\$ 712,240
	CONTINGENCY	14.7				\$ 63,953,800
	ESCALATION					\$ 54,885,900
	EQUIPMENT					\$ 18,902,600
	MATERIAL					\$ 6,044,500
	LABOR					\$ 24,477,200
	INDIRECTS					\$ 5,461,600
	TOTAL PROJECT COST					\$ 552,811,800
	REFERENCE COSTS:					
A	ESP DEMOLITION	ALLOWANCE FOR 1000T STRUCTURE	\$ -	\$ -	\$ 832,300	\$ 832,300

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B	REMOVE BOOSTER AIR FANS	ALLOWANCE FOR 150 TON FRAMING REINFORCEMENT	\$ -	\$ -	\$ 111,000	\$ 111,000	
C	REMOVAL OF FUEL OIL TANK	LABOR COST IS FOR REMOVAL OF TANK ONLY. ALLOWANCE FOR SOIL REMEDIATION AND DISPOSAL IN AN EPA APPROVED LANDFILL. SUBCONTRACT COST INCLUDES LABOR. USED LOWER END OF THE RANGE \$118-355/CY. COST COULD BE LOWER (\$59-118/CY) IF SOLD TO A BITUMINOUS CONCRETE BATCH PLANT	\$ 1,200,000	\$ 80,000	\$ 469,400	\$ 1,749,400	



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
Volume 3 – DFGD Technology
September 29, 2010

ATTACHMENT 3-11
DFGD Summary Capital Cost Estimate No. 30711 Base Est-1A ESP in Service
(3.0 lb SO₂/MMbtu)

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD BASE EST (ESP)-1A - 3.0 LB/MM BTU

Estimate No.: 30711C
Project No.: 12721-000
Date: 9/29/2010

COST ESTIMATE SUMMARY

Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
1.0	ID FANS					
1.1	ID FANS - OEM EQUIPMENT	1,785,000 ACFM WITH 14,300 HP MOTORS (\$625,000 EACH). INCLUDES HYDRAULIC OIL UNITS, SEAL AIR FAN SKIDS, VIBRATION MONITORING EQUIPMENT, FAN STALL EQUIPMENT, FIELD SERVICE REP FOR 140 DAYS	\$ 6,288,000	\$ -	\$ 1,594,700	\$ 7,882,700
1.2	PIPING & SUPPORTS - MECHANICAL		\$ 21,800	\$ 28,700	\$ 120,500	\$ 171,000
1.3	DAMPERS		\$ 781,000	\$ -	\$ 352,600	\$ 1,133,600
1.4	EXPANSION JOINTS		\$ -	\$ 131,100	\$ 116,500	\$ 247,600
1.5	DUCTWORK	FABRIC FILTER OUTLET TO ID FANS AND FROM ID FANS TO STACK - INCLUDES INTERNAL BRACING AND TURNING VANES	\$ -	\$ 2,600,000	\$ 4,966,200	\$ 7,566,200
1.6	DUCT SUPPORT STEEL	THREE COAT SHOP PAINT	\$ -	\$ 1,160,000	\$ 1,167,000	\$ 2,327,000
1.7	ID FAN INSULATION & LAGGING	TOTAL FOR TWO FANS. PRICING REFLECTS STANDARD ACOUSTICAL INSULATION	\$ -	\$ 168,000	\$ 217,200	\$ 385,200
1.8	DUCTWORK INSULATION & LAGGING	INCLUDES INSULATION FOR SPRAY DRYER OUTLET DUCT TO FABRIC FILTERS SUPPLIED WITH THE OEM EQUIPMENT	\$ -	\$ 864,000	\$ 1,692,200	\$ 2,556,200
1.9	DUCT SUPPORT STEEL - FOUNDATIONS		\$ -	\$ 295,500	\$ 574,000	\$ 869,500
1.10	ID FAN FOUNDATIONS INCLUDING ID FAN AUX EQUIPMENT		\$ -	\$ 106,000	\$ 198,700	\$ 304,700

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1.11	ID FAN DFGD CONTROL ROOM - FOUNDATIONS		\$ -	\$ 122,100	\$ 206,200	\$ 328,300
1.12	ID FAN DFGD CONTROL ROOM	SUBCONTRACT PRICE INCLUDES LABOR. COMPLETE WITH HVAC, FINISHES AND SANITARY FACILITIES	\$ -	\$ 2,500,000	\$ -	\$ 2,500,000
1.13	MCC		\$ 120,000	\$ -	\$ 7,200	\$ 127,200
1.14	HIGH VOLTAGE POWER CABLE & TERMINATION	1/C # 500KCMIL-15KV - 6600' ID FAN	\$ -	\$ 61,200	\$ 172,500	\$ 233,700
1.15	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 121,000	\$ 339,400	\$ 460,400
1.16	EMERGENCY POWER SYSTEM		\$ 285,500	\$ -	\$ 38,900	\$ 324,400
1.17	GROUNDING		\$ 23,300	\$ -	\$ 59,100	\$ 82,400
1.18	LIGHTING/ TRANSFORMERS & PANELS		\$ 26,000	\$ 30,000	\$ 29,500	\$ 85,500
1.19	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 352,900	\$ 1,988,800	\$ 2,341,700
1.20	LOW VOLTAGE POWER CABLE & TERMINATIONS		\$ -	\$ 229,800	\$ 547,600	\$ 777,400
1.21	DUCT BANK		\$ -	\$ 186,800	\$ 347,700	\$ 534,500
1.22	COMMUNICATIONS		\$ -	\$ 17,000	\$ 13,000	\$ 30,000
1.23	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 7,545,600	\$ 8,982,100	\$ 14,756,500	\$ 31,284,200
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 377,300	\$ 2,290,400	\$ 5,315,000	\$ 7,982,700
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ID FANS	\$ 7,922,900	\$ 11,272,500	\$ 20,071,500	\$ 39,266,900

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2.0	FABRIC FILTERS						
2.1	MECHANICAL EQUIPMENT	A SINGLE FABRIC FILTER (225' X 130') UNIT INCLUDING ALL INTERNAL FABRIC FILTER ELEMENTS SUCH AS BAGS, CAGES, ASH HOPPERS, 2 BROKEN BAG DETECTORS PER COMPARTMENT	\$ 19,276,000	\$ -	\$ 12,420,200	\$ 31,696,200	
2.2	INSULATION FOR FABRIC FILTER	SUBCONTRACT COST INCLUDES LABOR	\$ 2,430,000	\$ -	\$ -	\$ 2,430,000	
2.3	PENTHOUSE FOR FABRIC FILTER	SUPPORT STEEL AND PURLINS INCLUDED WITH OEM EQUIPMENT	\$ 70,200	\$ 787,000	\$ 1,007,600	\$ 1,864,800	
2.4	BOTTOM ENCLOSURE FOR BAGHOUSE		\$ 60,000	\$ 1,204,000	\$ 1,359,800	\$ 2,623,800	
2.5	PIPING & SUPPORTS - MECHANICAL		\$ 30,900	\$ 101,400	\$ 209,500	\$ 341,800	
2.6	FABRIC FILTER - FOUNDATIONS		\$ -	\$ 550,700	\$ 1,081,100	\$ 1,631,800	
2.7	FABRIC FILTER - SUPPORT STEEL AND ACCESS GALLERY		\$ -	\$ 360,000	\$ 1,186,700	\$ 1,546,700	
2.8	RACEWAY, CABLE TRAY, & CONDUIT	INCLUDED IN ABSORBER ISLAND 7.0	\$ -	\$ -	\$ -	\$ -	
2.9	LIGHTING/ TRANSFORMERS & PANELS		\$ 30,000	\$ 75,000	\$ 58,200	\$ 163,200	
2.10	GROUNDING		\$ 7,300	\$ -	\$ 17,500	\$ 24,800	
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 21,904,400	\$ 3,078,100	\$ 17,340,600	\$ 42,323,100	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 1,095,200	\$ 784,900	\$ 6,441,500	\$ 8,321,700	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FABRIC FILTERS	\$ 22,999,600	\$ 3,863,000	\$ 23,782,100	\$ 50,644,800	

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3.0	NEW STACK					
3.1	CONCRETE STACK (DRY)	PROVIDED BY AEP	\$ -	\$ -	\$ -	\$ 19,350,000
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ -	\$ -	\$ -	\$ 19,350,000
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ -	\$ -	\$ 2,902,500
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	NEW STACK	\$ -	\$ -	\$ -	\$ 22,252,500
4.0	LIME HANDLING SYSTEM					
4.1	LIME STORAGE SILO		\$ 6,770,000	\$ -	\$ -	\$ 6,770,000
4.2	LIME UNLOADING SYSTEM	INCLUDES PNEUMATIC HANDLING SYSTEM, THREE VACUUM EXHAUSTER, TWO FILTER SEPARATORS	\$ 640,000	\$ -	\$ 408,900	\$ 1,048,900
4.3	PIPING - MECHANICAL		\$ 29,000	\$ 15,600	\$ 77,900	\$ 122,500
4.4	LIME STORAGE SILO ACCESS STAIR TOWER	THREE COAT SHOP PAINT	\$ -	\$ 145,000	\$ 145,900	\$ 290,900
4.5	PIPE RACK FOR LIME HANDLING, WASTE ASH HANDLING AND MISC MECHANICAL PIPING	THREE COAT SHOP PAINT	\$ -	\$ 783,000	\$ 787,800	\$ 1,570,800
4.6	RAIL CAR UNLOADING AREA - FOUNDATIONS	20 X 250 - NO SIDING	\$ -	\$ 85,300	\$ 180,200	\$ 265,500
4.7	LIME UNLOADING BLOWER / ELECTRICAL BUILDING - FOUNDATIONS		\$ -	\$ 74,500	\$ 187,800	\$ 262,300
4.8	LIME UNLOADING BLOWER / ELECTRICAL BUILDING	130' L X 30' W X 30' H	\$ 75,000	\$ 351,500	\$ 24,400	\$ 450,900
4.9	CONCRETE PIT FOR THE ELEVATOR		\$ -	\$ 2,300	\$ 6,900	\$ 9,200
4.10	LIME STORAGE SILO - FOUNDATIONS		\$ -	\$ 563,700	\$ 1,023,400	\$ 1,587,100
4.11	LIME STORAGE SILO ACCESS STAIR TOWER - FOUNDATIONS		\$ -	\$ 14,200	\$ 28,600	\$ 42,800
4.12	PIPE RACK - FOUNDATIONS		\$ -	\$ 94,200	\$ 237,800	\$ 332,000
4.13	TRANSFORMERS	SUS TRANSFORMERS: 33F, 33G, 13.8KV-480V,3PHASE, 3 WINDING XFMR 2/2.24/3- 2MVA (DELTA TO DELTA)	\$ 170,000	\$ -	\$ 54,600	\$ 224,600
4.14	SWITCHGEAR	480V LOW VOLTAGE (33F/G), SWITCHGEAR WITH 1-4000A BRKR & 3-600A BRKR & 1-4000A TIE BRKR-2-5 VER SEC	\$ 196,000	\$ -	\$ 104,700	\$ 300,700

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4.15	CABLE BUS DUCT		\$ 134,700	\$ 10,800	\$ 200,200	\$ 345,700	
4.16	MCC		\$ 61,800	\$ -	\$ 3,600	\$ 65,400	
4.17	MIMIC PANELS		\$ 17,500	\$ -	\$ 1,400	\$ 18,900	
4.18	EMERGENCY POWER SYSTEM		\$ 108,300	\$ -	\$ 24,400	\$ 132,700	
4.19	GROUNDING		\$ 13,300	\$ -	\$ 41,300	\$ 54,600	
4.20	LIGHTING/ TRANSFORMERS & PANELS		\$ 52,000	\$ 135,000	\$ 104,500	\$ 291,500	
4.21	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 310,900	\$ 1,537,100	\$ 1,848,000	
4.22	HIGH VOLTAGE POWER CABLE & TERMINATION	1/C # 500KCMIL-15KV, 12000' UNIT 2 + 3600' LIME UNLOAD	\$ -	\$ 50,100	\$ 141,200	\$ 191,300	
4.23	MEDIUM VOLTAGE POWER CABLE & TERMINATION	1/C # 350KCMIL-5KV	\$ -	\$ 66,200	\$ 282,300	\$ 348,500	
4.24	LOW VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 93,000	\$ 143,200	\$ 236,200	
4.25	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 26,200	\$ 73,600	\$ 99,800	
4.26	DUCT BANK	DUCT BANK WITH 4-5" & 4-3" CONDUITS, 2.38' H X 3.79' W	\$ -	\$ 61,100	\$ 116,200	\$ 177,300	
4.27	FOUNDATIONS FOR TRANSFORMERS	FOR XFMR 33F, 33G, INCLUDES MUD MAT	\$ -	\$ 3,500	\$ 10,300	\$ 13,800	
4.28	COMMUNICATIONS		\$ -	\$ 17,000	\$ 13,000	\$ 30,000	
4.29	LIGHTNING PROTECTION		\$ -	\$ 14,000	\$ 9,000	\$ 23,000	
4.30	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000	
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 8,267,600	\$ 2,925,100	\$ 5,977,200	\$ 17,169,900	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 413,400	\$ 745,900	\$ 2,186,900	\$ 3,346,200	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	LIME HANDLING SYSTEM	\$ 8,681,000	\$ 3,671,000	\$ 8,164,100	\$ 20,516,100	

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5.0	LIME SLAKER BUILDING					
5.1	MECHANICAL EQUIPMENT	INCLUDES:CHAIN CONVEYOR, SLAKERS THROUGH THE LIME SLURRY PUMPS, PIPING, AND LIME SLURRY STORAGE TANKS.	\$ 8,616,000	\$ -	\$ 5,170,900	\$ 13,786,900
5.2	LIME SLAKER BUILDING SUMP PUMPS	DUPLEX. INCLUDES CHECK & ISOLATION VALVES	\$ 28,000	\$ -	\$ 12,300	\$ 40,300
5.3	AGITATOR FOR SUMP PUMPS	5 HP	\$ 12,000	\$ -	\$ 4,600	\$ 16,600
5.4	PIPING - MECHANICAL		\$ 117,800	\$ 111,400	\$ 381,100	\$ 610,300
5.5	LIME SLURRY TANKS - FOUNDATIONS		\$ -	\$ 166,400	\$ 299,400	\$ 465,800
5.6	LIME SLAKER BUILDING - FOUNDATIONS		\$ -	\$ 119,200	\$ 204,000	\$ 323,200
5.7	LIME SLAKER BUILDING	135' L X 30' W X 50' H	\$ 40,500	\$ 803,300	\$ 740,500	\$ 1,584,300
5.8	ELECTRICAL	INCLUDED WITH LIME HANDLING SYSTEM, ACCOUNT 4.0	\$ -	\$ -	\$ -	\$ -
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 8,814,300	\$ 1,200,300	\$ 6,812,800	\$ 16,827,400
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 440,700	\$ 306,100	\$ 2,541,200	\$ 3,288,000
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	LIME SLAKER BUILDING	\$ 9,255,000	\$ 1,506,400	\$ 9,354,000	\$ 20,115,400
6.0	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS					
6.1	BYPRODUCT WASTE ASH HANDLING - MECHANICAL EQUIPMENT	INCLUDES PNEUMATIC HANDLING SYSTEM, THREE PRESSURE BLOWERS, ONE BIN VENT FILTER, ASH UNLOADING SYSTEM	\$ 2,047,000	\$ -	\$ 1,380,000	\$ 3,427,000

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6.2	FLY ASH HANDLING - MECHANICAL EQUIPMENT	INCLUDES PNEUMATIC HANDLING SYSTEM, TWO PRESSURE EXHAUSTERS, TRANSFER STATION, ONE BIN VENT FILTER, ASH UNLOADING SYSTEM	\$ 2,285,000	\$ -	\$ 1,431,100	\$ 3,716,100
6.3	BUILDING SUMP PUMPS	FOR BUILDINGS - DUPLEX. INCLUDES CHECK & ISOLATION VALVES.	\$ 28,000	\$ -	\$ 12,300	\$ 40,300
6.4	AGITATOR FOR SUMP PUMPS	5 HP	\$ 12,000	\$ -	\$ 4,600	\$ 16,600
6.5	PIPING - MECHANICAL		\$ 142,800	\$ 240,900	\$ 759,100	\$ 1,142,800
6.6	BYPRODUCT WASTE SILO	CONCRETE SILO 60' DIA X 98' H - 3475 TONS -SUBCONTRACT COST INCLUDES LABOR	\$ 1,885,000	\$ -	\$ -	\$ 1,885,000
6.7	SDA RECYCLE SILO	INCLUDED WITH OEM EQUIPMENT	\$ -	\$ -	\$ -	\$ -
6.8	SDA FLY ASH SILO	46T STEEL -STORAGE SILO, 15' DIA X 19' H	\$ 45,000	\$ 23,200	\$ 64,300	\$ 132,500
6.9	BYPRODUCT WASTE SILO - FOUNDATIONS		\$ -	\$ 144,100	\$ 259,100	\$ 403,200
6.10	FLY ASH SILO - FOUNDATIONS		\$ -	\$ 10,800	\$ 24,500	\$ 35,300
6.11	FLY ASH BLOWER AND ELECTRICAL BUILDING - FOUNDATIONS		\$ -	\$ 49,600	\$ 105,700	\$ 155,300
6.12	FLY ASH BLOWER AND ELECTRICAL BUILDING	90' L X 30' W X 25' H	\$ 28,000	\$ 244,500	\$ 16,200	\$ 288,700
6.13	RECYCLE ASH BUILDING - FOUNDATIONS		\$ -	\$ 234,300	\$ 393,800	\$ 628,100
6.14	RECYCLE ASH BUILDING	100' L X 65' W X 50' H	\$ 58,500	\$ 1,306,700	\$ 1,194,500	\$ 2,559,700
6.15	MCC	480V MCC PER LINE UP	\$ 120,000	\$ -	\$ 7,300	\$ 127,300
6.16	EMERGENCY POWER SYSTEM		\$ 185,500	\$ -	\$ 40,000	\$ 225,500

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6.17	LIGHTING/ TRANSFORMERS & PANELS		\$ 18,500	\$ 75,000	\$ 53,200	\$ 146,700	
6.18	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 40,700	\$ 236,200	\$ 276,900	
6.19	LOW VOLTAGE POWER CABLE & TERMINATION	#4/0 - #12 AWG-600V	\$ -	\$ 80,900	\$ 100,600	\$ 181,500	
6.20	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 38,400	\$ 107,800	\$ 146,200	
6.21	GROUNDING		\$ -	\$ 4,500	\$ 10,900	\$ 15,400	
6.22	DUCT BANK	DUCT BANK WITH 12-5" & 6-3" CONDUITS, 5.2' H X 2.08" W	\$ -	\$ 111,500	\$ 184,000	\$ 295,500	
6.23	COMMUNICATIONS		\$ -	\$ 70,000	\$ 50,000	\$ 120,000	
6.24	LIGHTNING PROTECTION		\$ -	\$ 19,000	\$ 14,000	\$ 33,000	
6.25	SECURITY SYSTEM		\$ -	\$ 16,000	\$ 14,000	\$ 30,000	
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 6,855,300	\$ 2,710,100	\$ 6,463,200	\$ 16,028,600	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 342,800	\$ 691,100	\$ 2,407,300	\$ 3,441,100	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS	\$ 7,198,100	\$ 3,401,200	\$ 8,870,500	\$ 19,469,700	
7.0	ABSORBER ISLAND						
7.1	MECHANICAL EQUIPMENT	INCLUDES: ABSORBER MODULES AND ATOMIZERS WITH LUBE OIL, DUCT WORK FROM THE ABSORBERS TO THE FABRIC FILTER, AND COMPLETE RECYCLE SYSTEM WITH PIPING INSIDE FGD BUILDINGS.	\$ 39,438,000	\$ -	\$ 24,186,100	\$ 63,624,100	

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7.2	ELEVATOR	MAINTENANCE ELEVATOR - SUBCONTRACT COST INCLUDES LABOR	\$ 325,000	\$ -	\$ -	\$ 325,000
7.3	BUILDING SUMP PUMPS	FOR BUILDINGS - DUPLEX. INCLUDES CHECK & ISOLATION VALVES.	\$ 28,000	\$ -	\$ 12,300	\$ 40,300
7.4	AGITATOR FOR SUMP PUMPS	5 HP	\$ 12,000	\$ -	\$ 4,600	\$ 16,600
7.5	PIPING - MECHANICAL		\$ 142,800	\$ 36,900	\$ 227,900	\$ 407,600
7.6	SDA SUPERSTRUCTURE		\$ 75,000	\$ 764,900	\$ 1,227,300	\$ 2,067,200
7.7	SDA BOTTOM ENCLOSURE - SUPPORT STEEL, GIRTS AND SIDING	TOTAL FOR THREE ABSORBERS	\$ -	\$ 362,100	\$ 385,200	\$ 747,300
7.8	SDA SHELL / ROOF INSULATION	61,000 SF. SUBCONTRACT COST INCLUDES LABOR	\$ 1,830,000	\$ -	\$ -	\$ 1,830,000
7.9	SDA - SUPPORT STEEL & ACCESS GALLERY		\$ -	\$ 711,000	\$ 1,884,100	\$ 2,595,100
7.10	EXPANSION JOINTS		\$ -	\$ 195,500	\$ 173,800	\$ 369,300
7.11	DUCTWORK		\$ -	\$ 6,175,000	\$ 13,113,700	\$ 19,288,700
7.12	DUCT SUPPORT STEEL	THREE COAT SHOP PAINT	\$ -	\$ 2,755,000	\$ 2,771,700	\$ 5,526,700
7.13	DUCTWORK INSULATION & LAGGING		\$ -	\$ 2,040,000	\$ 3,995,500	\$ 6,035,500
7.14	CONCRETE PIT FOR ELEVATOR		\$ -	\$ 2,800	\$ 8,200	\$ 11,000
7.15	SPRAY DRYER ABSORBER - FOUNDATIONS	TOTAL FOR THREE TOWERS	\$ -	\$ 1,678,600	\$ 3,323,400	\$ 5,002,000
7.16	SDA PDC - FOUNDATION		\$ -	\$ 85,600	\$ 169,000	\$ 254,600
7.17	SDA PDC BUILDING	60' L X 40' W X 13' H. SUBCONTRACT PRICE INCLUDES LABOR	\$ -	\$ 1,200,000	\$ -	\$ 1,200,000
7.18	FOUNDATIONS FOR SUPPORT STEEL		\$ -	\$ 69,000	\$ 143,000	\$ 212,000
7.19	TRANSFORMERS		\$ 770,000	\$ -	\$ 145,600	\$ 915,600
7.20	SWITCHGEAR		\$ 1,082,000	\$ -	\$ 569,000	\$ 1,651,000
7.21	CABLE BUS & TERMINATIONS		\$ 1,082,500	\$ 35,800	\$ 1,853,300	\$ 2,971,600
7.22	MCC		\$ 185,400	\$ -	\$ 8,200	\$ 193,600
7.23	MIMIC PANELS		\$ 17,500	\$ -	\$ 4,500	\$ 22,000

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7.24	GROUNDING		\$ -	\$ 16,000	\$ 46,100	\$ 62,100
7.25	LIGHTING/ TRANSFORMERS & PANELS		\$ 156,000	\$ 150,000	\$ 159,100	\$ 465,100
7.26	EMERGENCY POWER SYSTEM		\$ 108,300	\$ -	\$ 24,400	\$ 132,700
7.27	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 1,658,100	\$ 8,154,700	\$ 9,812,800
7.28	HIGH VOLTAGE POWER CABLE & TERMINATION	1/C # 500KCMIL- 15KV	\$ -	\$ 53,300	\$ 150,300	\$ 203,600
7.29	MEDIUM VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 82,500	\$ 243,200	\$ 325,700
7.30	LOW VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 409,900	\$ 537,400	\$ 947,300
7.31	CONTROL & INSTRUMENT CABLE		\$ -	\$ 99,200	\$ 278,400	\$ 377,600
7.32	DUCT BANK		\$ -	\$ 137,900	\$ 278,600	\$ 416,500
7.33	FOUNDATION FOR TRANSFORMERS		\$ -	\$ 49,800	\$ 145,800	\$ 195,600
7.34	TRANSFORMER FIRE WALLS		\$ -	\$ 3,500	\$ 9,600	\$ 13,100
7.35	COMMUNICATIONS		\$ -	\$ 17,000	\$ 13,000	\$ 30,000
7.36	LIGHTNING PROTECTION		\$ -	\$ 25,500	\$ 18,500	\$ 44,000
7.37	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 45,252,500	\$ 18,822,900	\$ 64,272,500	\$ 128,347,900
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 3,072,600	\$ 4,799,800	\$ 25,004,300	\$ 32,876,800
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ABSORBER ISLAND	\$ 48,325,100	\$ 23,622,700	\$ 89,276,800	\$ 161,224,700
8.0	ACTIVATED CARBON INJECTION SYSTEM					
8.1	ACI MECHANICAL EQUIPMENT:		\$ 3,046,400	\$ -	\$ 1,012,000	\$ 4,058,400
8.2	PIPING - MECHANICAL		\$ 29,800	\$ 149,800	\$ 377,100	\$ 556,700
8.3	ACI SYSTEM - FOUNDATIONS		\$ -	\$ 41,500	\$ 88,000	\$ 129,500
8.4	MCC		\$ 61,800	\$ -	\$ 3,600	\$ 65,400
8.5	GROUNDING		\$ 5,500	\$ -	\$ 18,600	\$ 24,100
8.6	LIGHTING / TRANSFORMERS & PANELS		\$ 26,000	\$ 15,000	\$ 20,400	\$ 61,400
8.7	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 89,900	\$ 302,900	\$ 392,800

Sargent & Lundy, LLC			AEP BIG SANDY UNIT 2 FGD PROJECT - DRY FGD BASE EST (ESP)-1A - 3.0 LB/MM BTU			Estimate No.: 30711C Project No.: 12721-000 Date: 9/29/2010	
COST ESTIMATE SUMMARY						Preparer: MNO Reviewer: JMK Approver: PEF	
Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost	
8.8	LOW VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 14,400	\$ 18,000	\$ 32,400	
8.9	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 16,000	\$ 44,900	\$ 60,900	
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 3,169,500	\$ 326,600	\$ 1,885,500	\$ 5,381,600	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 158,500	\$ 83,300	\$ 694,500	\$ 936,300	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ACTIVATED CARBON INJECTION SYSTEM	\$ 3,328,000	\$ 409,900	\$ 2,580,000	\$ 6,317,900	
9.0	COMPRESSED AIR SYSTEM						
9.1	AIR COMPRESSOR & AUXILIARIES		\$ 664,000	\$ -	\$ 155,400	\$ 819,400	
9.2	PIPING - MECHANICAL		\$ 320,600	\$ 399,200	\$ 1,096,000	\$ 1,815,800	
9.3	AIR COMPRESSOR BUILDING - FOUNDATIONS		\$ -	\$ 96,100	\$ 194,700	\$ 290,800	
9.4	AIR COMPRESSOR BUILDING	100' L X 60' W X 20' H	\$ -	\$ 510,000	\$ -	\$ 510,000	
9.5	LIGHTING/ TRANSFORMERS & PANELS		\$ 11,000	\$ 10,500	\$ 11,400	\$ 32,900	
9.6	RACEWAY, CABLE TRAY, & CONDUIT	INCLUDED IN ABSORBER ISLAND 7.0	\$ -	\$ -	\$ -	\$ -	
9.7	GROUNDING		\$ 4,500	\$ -	\$ 10,900	\$ 15,400	
9.8	COMMUNICATIONS		\$ -	\$ 34,000	\$ 26,000	\$ 60,000	
9.9	LIGHTNING PROTECTION		\$ -	\$ 10,500	\$ 7,500	\$ 18,000	
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 1,000,100	\$ 1,060,300	\$ 1,501,900	\$ 3,562,300	

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	BIG SANDY UNIT 2	Project No.:	12721-000
	FGD PROJECT - DRY FGD BASE EST (ESP)-1A - 3.0 LB/MM BTU	Date:	9/29/2010
	COST ESTIMATE SUMMARY	Preparer:	MNO
		Reviewer:	JMK
		Approver:	PEP

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 50,000	\$ 270,400	\$ 551,500	\$ 871,800
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	COMPRESSED AIR SYSTEM	\$ 1,050,100	\$ 1,330,700	\$ 2,053,400	\$ 4,434,100
10.0	SERVICE WATER SYSTEM					
10.1	PUMPS	INCLUDES SELF-CLEANING STRAINERS	\$ 204,000	\$ -	\$ 90,000	\$ 294,000
10.2	PIPING - MECHANICAL		\$ 183,400	\$ 624,600	\$ 1,092,000	\$ 1,900,000
10.3	PIPING - FIRE PROTECTION SYSTEM		\$ 181,200	\$ 284,600	\$ 673,300	\$ 1,139,100
10.4	TANKS		\$ -	\$ 120,000	\$ -	\$ 120,000
10.5	SERVICE WATER TANK & PUMP - FOUNDATIONS		\$ -	\$ 17,300	\$ 41,400	\$ 58,700
10.6	ELECTRICAL	INCLUDED IN ABSORBER ISLAND 7.0	\$ -	\$ -	\$ -	\$ -
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 568,600	\$ 1,046,500	\$ 1,896,700	\$ 3,511,800
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 28,400	\$ 266,900	\$ 690,700	\$ 986,000
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	SERVICE WATER SYSTEM	\$ 597,000	\$ 1,313,400	\$ 2,587,400	\$ 4,497,800
11.0	POTABLE WATER SYSTEM					
11.1	PUMPS		\$ 30,000	\$ -	\$ 18,400	\$ 48,400
11.2	PIPING - MECHANICAL		\$ 99,500	\$ 200,400	\$ 530,700	\$ 830,600
11.3	TANKS		\$ -	\$ 8,500	\$ -	\$ 8,500
11.4	POTABLE WATER TANK & PUMP - FOUNDATIONS		\$ -	\$ 5,200	\$ 9,200	\$ 14,400
11.5	ELECTRICAL	INCLUDED IN ABSORBER ISLAND 7.0	\$ -	\$ -	\$ -	\$ -
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 129,500	\$ 214,100	\$ 558,300	\$ 901,900

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD BASE EST (ESP)-1A - 3.0 LB/MM BTU

Estimate No.: 30711C
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Date: 9/29/2010

COST ESTIMATE SUMMARY

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Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 6,500	\$ 54,600	\$ 203,000	\$ 264,100
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	POTABLE WATER SYSTEM	\$ 136,000	\$ 268,700	\$ 761,300	\$ 1,166,000
12.0	FGD SUBSTATION					
12.1	TRANSFORMERS		\$ 1,370,000	\$ -	\$ 254,900	\$ 1,624,900
12.2	TRANSFORMER PDC	15W X 45' X 10'H. SUBCONTRACT PRICE INCLUDES LABOR	\$ 202,500	\$ -	\$ -	\$ 202,500
12.3	TRANSFORMER PDC - FOUNDATION		\$ -	\$ 73,200	\$ 146,900	\$ 220,100
12.4	138KV MAIN FEEDER & TERMINATIONS		\$ 264,000	\$ -	\$ 254,000	\$ 518,000
12.5	SWITCHGEAR		\$ 810,000	\$ -	\$ 128,900	\$ 938,900
12.6	MCC	480V MCC, PER LINE UP	\$ 60,000	\$ -	\$ 3,600	\$ 63,600
12.7	CABLE BUS		\$ 181,100	\$ 18,000	\$ 290,200	\$ 489,300
12.8	PANELS - RELAY		\$ 100,000	\$ -	\$ 9,100	\$ 109,100
12.9	MIMIC PANELS		\$ 17,500	\$ -	\$ 4,500	\$ 22,000
12.10	UPS SYSTEM		\$ 108,300	\$ -	\$ 24,400	\$ 132,700
12.11	GROUNDING		\$ 23,300	\$ -	\$ 59,100	\$ 82,400
12.12	LIGHTING/ TRANSFORMERS & PANELS		\$ 26,000	\$ 30,000	\$ 29,500	\$ 85,500
12.13	OUTDOOR LIGHTING	NEW AUX YARD LIGHTING - ALLOWANCE	\$ 25,000	\$ -	\$ 56,800	\$ 81,800
12.14	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 390,600	\$ 1,918,600	\$ 2,309,200
12.15	DUCT BANK		\$ -	\$ 26,200	\$ 54,300	\$ 80,500
12.16	LOW VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 112,200	\$ 194,700	\$ 306,900
12.17	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 21,800	\$ 61,100	\$ 82,900
12.18	FOUNDATION FOR AUX TRANSFORMER		\$ -	\$ 70,200	\$ 205,400	\$ 275,600
12.19	FIREWALL FOR TRANSFORMERS		\$ -	\$ 3,000	\$ 5,200	\$ 8,200
12.20	COMMUNICATIONS		\$ -	\$ 17,000	\$ 13,000	\$ 30,000

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COST ESTIMATE SUMMARY						Preparer: MNO Reviewer: JMK Approver: PEF	
Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost	
12.21	LIGHTNING PROTECTION		\$ -	\$ 4,000	\$ 2,000	\$ 6,000	
12.22	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000	
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 3,187,700	\$ 774,200	\$ 3,723,200	\$ 7,685,100	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 159,400	\$ 197,400	\$ 1,345,755	\$ 1,702,600	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FGD SUBSTATION	\$ 3,347,100	\$ 971,600	\$ 5,069,000	\$ 9,387,700	
13.0	FGD DCS SYSTEM						
13.1	DCS	3200 I/O POINTS	\$ 2,400,000	\$ -	\$ 813,600	\$ 3,213,600	
13.2	DCS - VENDOR FIELD SUPPORT	200 MANDAYS @ \$1500/DAY - SHOWN AS SUBCONTRACT COST	\$ 300,000	\$ -	\$ -	\$ 300,000	
13.3	LOCALLY MOUNTED INSTRUMENTS		\$ -	\$ 709,500	\$ 930,500	\$ 1,640,000	
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 2,700,000	\$ 709,500	\$ 1,744,100	\$ 5,153,600	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 135,000	\$ 180,900	\$ 650,900	\$ 966,800	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FGD DCS SYSTEM	\$ 2,835,000	\$ 890,400	\$ 2,395,000	\$ 6,120,400	
14.0	CEM SYSTEM						
14.1	CEM	PROVIDED BY AEP	\$ 1,260,000	\$ 540,000	\$ 310,000	\$ 2,110,000	
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 1,260,000	\$ 540,000	\$ 310,000	\$ 2,110,000	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ -	\$ -	\$ 316,500	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	CEM SYSTEM	\$ -	\$ -	\$ -	\$ 2,426,500	

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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost	
15.0	TRUCK & RAIL INFRASTRUCTURE						
15.1	EXISTING RAILROAD IMPROVEMENTS	FOR FULL RAILCAR STORAGE TRACK IMPROVEMENTS - 3250 LF	\$ -	\$ 660,200	\$ 689,200	\$ 1,349,400	
15.2	EXISTING RAILROAD IMPROVEMENTS	FOR LOOP TRACK UPGRADE - 5000 LF	\$ -	\$ 1,008,800	\$ 1,055,600	\$ 2,064,400	
15.3	NEW RAILROAD TRACK	INCLUDES, 132LB RAIL, 7" TIMBERS, TIE PLATES, SPIKES, BOLTS, 12" SUBBALLAST, 12" BALLAST, 12 OZ/SY GEOTEXTILE MEMBRANE, 12" SUBGRADE PREP	\$ -	\$ 252,000	\$ 213,100	\$ 465,100	
15.4	FIELD FABRICATED TURNOUTS	#8 TURNOUT	\$ -	\$ 90,000	\$ 54,800	\$ 144,800	
15.5	RAIL SCALE	SUBCONTRACT COST, INCLUDES FOUNDATIONS	\$ 212,500	\$ -	\$ -	\$ 212,500	
15.6	NEW CONCRETE ENCASEMENT	OVER AND AROUND DUCT BANK CONNECTING THE PLANT TO SWITCHYARD. THIS IS UNDER THE NEW TRACKWORK EXTENSION	\$ -	\$ 33,200	\$ 71,400	\$ 104,600	
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 212,500	\$ 2,044,200	\$ 2,084,100	\$ 4,340,800	
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 10,600	\$ 521,300	\$ 779,600	\$ 1,311,500	
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	TRUCK & RAIL INFRASTRUCTURE	\$ 223,100	\$ 2,565,500	\$ 2,863,700	\$ 5,652,300	

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16.0	SITE IMPROVEMENTS - CIVIL WORK					
16.1	SITE GRADING		\$ -	\$ -	\$ 538,800	\$ 538,800
16.2	ROADS & SURFACING		\$ -	\$ 918,600	\$ 1,237,000	\$ 2,155,600
16.3	NEW CONCRETE ENCASEMENT	16' X 4' X 40' - FOR EXISTING ASH PIPE HAUL ROAD CROSSING	\$ -	\$ 144,300	\$ 286,600	\$ 430,900
16.4	TRUCK WASH AREA		\$ -	\$ 47,300	\$ 83,100	\$ 130,400
16.5	TRUCK SCALE & CONCRETE APPROACH		\$ 170,000	\$ 27,300	\$ 92,000	\$ 289,300
16.6	PROCESS WATER STORAGE BASIN		\$ 60,000	\$ 110,400	\$ 312,600	\$ 483,000
16.7	PROCESS WATER STORAGE BASIN PUMP STRUCTURE - CONCRETE		\$ -	\$ 47,000	\$ 105,400	\$ 152,400
16.8	STORMWATER DRAINAGE TRENCH	2' W X 3' DEEP CAST-IN-PLACE CONCRETE TRENCH W/REINFORCING & HS-20 RATED GRATE COVERS	\$ -	\$ 499,500	\$ 508,300	\$ 1,007,800
16.9	STORMWATER RUNOFF POND		\$ -	\$ 15,000	\$ 122,600	\$ 137,600
16.10	STORM WATER POND PUMP STRUCTURE - CONCRETE		\$ 90,000	\$ 42,300	\$ 182,200	\$ 314,500
16.11	OILY WATER SEWER		\$ 4,500	\$ 105,000	\$ 223,600	\$ 333,100
16.12	OIL SEPARATOR	500 GPM W/ INTEGRAL LIFT STATION	\$ 100,000	\$ -	\$ 116,100	\$ 216,100
16.13	SANITARY SEWER		\$ -	\$ 22,200	\$ 96,900	\$ 119,100
16.14	SANITARY LIFT STATION	PACKAGED TYPE COMPLETE WITH PUMPS, 100,000 GPD	\$ 150,000	\$ -	\$ 49,200	\$ 199,200

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16.15	CONSTRUCTION LAYDOWN AREA	ALLOWANCE FOR 10 ACRES, DOES NOT INCLUDE LAND ACQUISITION, IF REQUIRED	\$ -	\$ 700,000	\$ 828,000	\$ 1,528,000	
16.16	CRAFT PARKING	DOES NOT INCLUDE LAND ACQUISITION, IF REQUIRED. ALLOWANCE FOR 20,000 SY INCLUDES: 6" BASE COURSE 10 OZ/SY GEOTEXTILE 12" SUBGRADE PREP	\$ -	\$ 180,000	\$ 414,200	\$ 594,200	
16.17	CONTRACTOR OFFICES (AREA)	DOES NOT INCLUDE LAND ACQUISITION, IF REQUIRED. ALLOWANCE FOR 5,000 SY AREA (TRAILERS BY CONTRACTORS) INCLUDES: 6" BASE COURSE 10 OZ/SY GEOTEXTILE 12" SUBGRADE PREP	\$ -	\$ 45,000	\$ 103,600	\$ 148,600	
16.18	NEW PERMANENT STORAGE	INCLUDES LIGHTING AND H&V. SUBCONTRACT PRICE INCLUDES ELECTRICAL AND H&V	\$ 850,000	\$ -	\$ -	\$ 850,000	
16.19	FOUNDATIONS FOR THE NEW WAREHOUSE		\$ -	\$ 273,500	\$ 450,200	\$ 723,700	

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16.20	NEW TEMPORARY STORAGE	WEATHER TIGHT CANVAS ENCLOSURE. INCLUDES LIGHTING AND H&V. SUBCONTRACT PRICE INCLUDES ELECTRICAL AND H&V	\$ 450,000	\$ -	\$ -	\$ 450,000
16.21	FOUNDATIONS FOR TEMPORARY STORAGE		\$ -	\$ 99,500	\$ 157,200	\$ 256,700
16.22	LABOR BUS SERVICE FROM PARKING LOT TO CONSTRUCTION AREA AND ACCESS CONTROL	ALLOWANCE FOR 36 MONTHS BASED ON 2 BUSES OPERATING CONTINUOUSLY FOR 5X10 WORKWEEK. SUBCONTRACT COST INCLUDES EQUIPMENT, MATERIAL AND LABOR	\$ 1,368,000	\$ -	\$ -	\$ 1,368,000
16.23	EROSION & SEDIMENT CONTROL		\$ -	\$ 12,400	\$ 20,400	\$ 32,800
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 3,242,500	\$ 3,289,300	\$ 5,928,000	\$ 12,459,800
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 162,100	\$ 838,800	\$ 2,156,500	\$ 3,157,400
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	SITE IMPROVEMENTS - CIVIL WORK	\$ 3,404,600	\$ 4,128,100	\$ 8,084,500	\$ 15,617,200
17.0	BOP ITEMS					
17.1	PIPE INSULATION	AVERAGE 6" PIPE SIZE	\$ -	\$ 34,000	\$ 106,000	\$ 140,000
17.2	HEAT TRACING		\$ -	\$ 175,600	\$ 248,500	\$ 424,100
17.3	TOUCH UP PAINT (INCLUDES PAINTING CS PIPE)		\$ -	\$ 134,400	\$ 515,600	\$ 650,000
17.4	HOISTS & TROLLEYS		\$ 180,000	\$ 210,000	\$ 245,300	\$ 635,300
17.5	MISC AUX STEEL FOR PIPE SUPPORTS	FIELD FABRICATED	\$ -	\$ 122,500	\$ 510,600	\$ 633,100
17.6	MISC PIPE SUPPORT FOUNDATIONS		\$ -	\$ 10,500	\$ 21,000	\$ 31,500

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17.7	EYE WASH STATIONS		\$ 30,000	\$ 5,000	\$ 30,700	\$ 65,700
17.8	FIRE PROTECTION FOR MISC BUILDINGS & AREAS		\$ -	\$ 360,000	\$ 294,400	\$ 654,400
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 210,000	\$ 1,052,000	\$ 1,972,100	\$ 3,234,100
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 10,500	\$ 268,260	\$ 750,694	\$ 1,029,454
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	BOP ITEMS	\$ 220,500	\$ 1,320,300	\$ 2,722,800	\$ 4,263,600
18.0	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE					
18.1	RELOCATE HYDROGEN STORAGE TANK		\$ -	\$ 15,600	\$ 86,800	\$ 102,400
18.2	NEW HYDROGEN LINE TO PLANT		\$ -	\$ 62,100	\$ 150,600	\$ 212,700
18.3	RELOCATE MISC. UNDERGROUND UTILITIES	ALLOWANCE	\$ -	\$ 125,000	\$ 170,500	\$ 295,500
18.4	OUTAGE TIE-IN DUCTWORK	ALLOWANCE FOR 85 TON DUCTWORK	\$ -	\$ 276,300	\$ 527,700	\$ 804,000
18.5	RELOCATED WAREHOUSE - FOUNDATIONS		\$ -	\$ 342,600	\$ 534,900	\$ 877,500
18.6	RELOCATE EXISTING WAREHOUSE BUILDING	150' L X 75' W X 25' H	\$ -	\$ 95,600	\$ 1,121,500	\$ 1,217,100
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ -	\$ 917,200	\$ 2,592,000	\$ 3,509,200

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	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ 233,900	\$ 927,100	\$ 1,161,000
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE	\$ -	\$ 1,151,100	\$ 3,519,100	\$ 4,670,200
19.0	ARSENIC, ASBESTOS , LEAD ABATEMENT					
19.1	ARSENIC, ASBESTOS , LEAD ABATEMENT	PROVIDED BY AEP	\$ -	\$ -	\$ -	\$ 750,000
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ -	\$ -	\$ -	\$ 750,000
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ -	\$ -	\$ -	\$ 112,500
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	ARSENIC, ASBESTOS , LEAD	\$ -	\$ -	\$ -	\$ 862,500
99.0	OVERALL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 114,320,100	\$ 49,692,500	\$ 139,818,700	\$ 323,931,300
	OVERALL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 6,463,000	\$ 12,614,900	\$ 52,646,400	\$ 74,862,300
	OVERALL TOTAL DIRECT & CONSTRUCTION INDIRECT COST		\$ 120,783,100	\$ 62,307,400	\$ 192,465,100	\$ 398,793,600
	OVERALL PROJECT INDIRECT COSTS					
	ENGINEERING, PROCUREMENT, & PROJECT SERVICES					\$ 25,000,000
	CONSTRUCTION MANAGEMENT					\$ 11,963,800
	S-U / COMMISSIONING					\$ 3,987,900
	CRAFT START-UP SUPPORT					\$ 1,647,500
	INITIAL FILLS					\$ 1,196,400

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	OPERATOR & TRAINING MANUALS					\$ 300,000
	SUBCONTRACTORS (NOISE & DUCTWORK CONSULTANT, GEOTECHNICAL INVESTIGATION)					\$ 400,000
	NOISE ABATEMENT FOR 85 DBA REQUIREMENT					\$ 2,750,000
	SUBTOTAL - INDIRECT COSTS					\$ 47,245,600
	TOTAL PROJECT DIRECT AND INDIRECT COSTS					\$ 446,039,200
	SPARE PARTS:					\$ 1,811,700
	SPARE PARTS - CAPITALIZED	0.90				\$ 1,087,020
	SPARE PARTS - FIRST YEAR OF OPERATION	0.60				\$ 724,680
	CONTINGENCY	14.8				\$ 66,341,200
	ESCALATION					\$ 56,364,359
	EQUIPMENT					\$ 19,053,039
	MATERIAL					\$ 6,346,908
	LABOR					\$ 25,434,287
	INDIRECTS					\$ 5,530,125
	TOTAL PROJECT COST					\$ 570,556,459

Sargent & Lundy, LLC			AEP BIG SANDY UNIT 2 FGD PROJECT - DRY FGD BASE EST (ESP)-1A - 3.0 LB/MM BTU		Estimate No.: 30711C Project No.: 12721-000 Date: 9/29/2010	
COST ESTIMATE SUMMARY					Preparer: MNO Reviewer: JMK Approver: PEF	
Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
	REFERENCE COSTS:					
A	REMOVAL OF FUEL OIL TANK	LABOR COST IS FOR REMOVAL OF TANK ONLY. ALLOWANCE FOR SOIL REMEDIATION AND DISPOSAL IN AN EPA APPROVED LANDFILL. SUBCONTRACT COST INCLUDES LABOR. USED LOWER END OF THE RANGE \$118-355/CY. COST COULD BE LOWER (\$59-118/CY) IF SOLD TO A BITUMINOUS CONCRETE BATCH PLANT	\$ 1,200,000	\$ 80,000	\$ 469,400	\$ 1,749,400



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
Volume 3 – DFGD Technology
September 29, 2010

ATTACHMENT 3-12
DFGD Summary Capital Cost Estimate No. 30710 Est-2A ESP in Service*
(1.7 lb SO₂/MMbtu)

* - Estimates 2A and 2B contain only accounts whose costs are different from the corresponding base estimates 1A and 1B.

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (ESP)-2A - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30710C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
1.0	ID FANS					
2.0	FABRIC FILTERS					
2.1	MECHANICAL EQUIPMENT	A SINGLE FABRIC FILTER (225' X 130') UNIT INCLUDING ALL INTERNAL FABRIC FILTER ELEMENTS SUCH AS BAGS, CAGES, ASH HOPPERS, 2 BROKEN BAG DETECTORS PER COMPARTMENT	\$ 19,409,000	\$ -	\$ 12,471,300	\$ 31,880,300
2.2	INSULATION FOR FABRIC FILTER	SUBCONTRACT COST INCLUDES LABOR	\$ 2,430,000	\$ -	\$ -	\$ 2,430,000
2.3	PENTHOUSE FOR FABRIC FILTER	SUPPORT STEEL AND PURLINS INCLUDED WITH OEM EQUIPMENT	\$ 70,200	\$ 787,000	\$ 1,007,600	\$ 1,864,800
2.4	BOTTOM ENCLOSURE FOR BAGHOUSE		\$ 60,000	\$ 1,204,000	\$ 1,359,800	\$ 2,623,800
2.5	PIPING & SUPPORTS - MECHANICAL		\$ 30,900	\$ 101,400	\$ 209,500	\$ 341,800
2.6	FABRIC FILTER - FOUNDATIONS		\$ -	\$ 550,700	\$ 1,081,100	\$ 1,631,800
2.7	FABRIC FILTER - SUPPORT STEEL AND ACCESS GALLERY		\$ -	\$ 360,000	\$ 1,186,700	\$ 1,546,700
2.8	RACEWAY, CABLE TRAY, & CONDUIT	INCLUDED IN ABSORBER ISLAND 7.0	\$ -	\$ -	\$ -	\$ -
2.9	LIGHTING/ TRANSFORMERS & PANELS		\$ 30,000	\$ 75,000	\$ 58,200	\$ 163,200
2.10	GROUNDING		\$ 7,300	\$ -	\$ 17,500	\$ 24,800
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 22,037,400	\$ 3,078,100	\$ 17,391,700	\$ 42,507,200
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 1,101,900	\$ 784,900	\$ 6,460,400	\$ 8,347,200
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FABRIC FILTERS	\$ 23,139,300	\$ 3,863,000	\$ 23,852,100	\$ 50,854,400

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (ESP)-2A - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30710C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
3.0	NEW STACK					
4.0	LIME HANDLING SYSTEM					
4.1	LIME STORAGE SILO		\$ 3,054,000	\$ -	\$ -	\$ 3,054,000
4.2	LIME UNLOADING SYSTEM	INCLUDES PNEUMATIC HANDLING SYSTEM, THREE VACUUM EXHAUSTER, TWO FILTER SEPARATORS	\$ 350,000	\$ -	\$ 281,100	\$ 631,100
4.3	PIPING - MECHANICAL		\$ 29,000	\$ 15,600	\$ 77,900	\$ 122,500
4.4	LIME STORAGE SILO ACCESS STAIR TOWER	THREE COAT SHOP PAINT	\$ -	\$ 145,000	\$ 145,900	\$ 290,900
4.5	PIPE RACK FOR LIME HANDLING, WASTE ASH HANDLING AND MISC MECHANICAL PIPING	THREE COAT SHOP PAINT	\$ -	\$ 783,000	\$ 787,800	\$ 1,570,800
4.6	RAIL CAR UNLOADING AREA - FOUNDATIONS	20 X 250 - NO SIDING	\$ -	\$ 85,300	\$ 180,200	\$ 265,500
4.7	LIME UNLOADING BLOWER / ELECTRICAL BUILDING - FOUNDATIONS		\$ -	\$ 74,500	\$ 187,800	\$ 262,300
4.8	LIME UNLOADING BLOWER / ELECTRICAL BUILDING	130' L X 30' W X 30' H	\$ 75,000	\$ 351,500	\$ 24,400	\$ 450,900
4.9	CONCRETE PIT FOR THE ELEVATOR		\$ -	\$ 2,300	\$ 6,900	\$ 9,200
4.10	LIME STORAGE SILO - FOUNDATIONS		\$ -	\$ 182,500	\$ 338,600	\$ 521,100
4.11	LIME STORAGE SILO ACCESS STAIR TOWER - FOUNDATIONS		\$ -	\$ 14,200	\$ 28,600	\$ 42,800
4.12	PIPE RACK - FOUNDATIONS		\$ -	\$ 94,200	\$ 237,800	\$ 332,000
4.13	TRANSFORMERS	SUS TRANSFORMERS: 33F, 33G, 13.8KV-480V	\$ 170,000	\$ -	\$ 54,600	\$ 224,600
4.14	SWITCHGEAR	480V LOW VOLTAGE (33F/G), SWITCHGEAR	\$ 196,000	\$ -	\$ 104,700	\$ 300,700
4.15	CABLE BUS DUCT		\$ 134,700	\$ 10,800	\$ 200,200	\$ 345,700
4.16	MCC		\$ 61,800	\$ -	\$ 3,600	\$ 65,400
4.17	MIMIC PANELS		\$ 17,500	\$ -	\$ 1,400	\$ 18,900
4.18	EMERGENCY POWER SYSTEM		\$ 108,300	\$ -	\$ 24,400	\$ 132,700
4.19	GROUNDING		\$ 13,300	\$ -	\$ 41,300	\$ 54,600
4.20	LIGHTING/ TRANSFORMERS & PANELS		\$ 52,000	\$ 135,000	\$ 104,500	\$ 291,500
4.21	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 310,900	\$ 1,537,100	\$ 1,848,000

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (ESP)-2A - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30710C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
4.22	HIGH VOLTAGE POWER CABLE & TERMINATION	1/C # 500KCMIL-15KV	\$ -	\$ 50,100	\$ 141,200	\$ 191,300
4.23	MEDIUM VOLTAGE POWER CABLE & TERMINATION	1/C # 350KCMIL-5KV	\$ -	\$ 66,200	\$ 282,300	\$ 348,500
4.24	LOW VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 93,000	\$ 143,200	\$ 236,200
4.25	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 26,200	\$ 73,600	\$ 99,800
4.26	DUCT BANK	DUCT BANK WITH 4-5" & 4-3" CONDUITS, 2.38' H X 3.79' W	\$ -	\$ 61,100	\$ 116,200	\$ 177,300
4.27	FOUNDATIONS FOR TRANSFORMERS	FOR XFMR 33F, 33G, INCLUDES MUD MAT	\$ -	\$ 3,500	\$ 10,300	\$ 13,800
4.28	COMMUNICATIONS		\$ -	\$ 17,000	\$ 13,000	\$ 30,000
4.29	LIGHTNING PROTECTION		\$ -	\$ 14,000	\$ 9,000	\$ 23,000
4.30	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 4,261,600	\$ 2,543,900	\$ 5,164,600	\$ 11,970,100
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 213,100	\$ 648,700	\$ 1,873,100	\$ 2,734,900
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	LIME HANDLING SYSTEM	\$ 4,474,700	\$ 3,192,600	\$ 7,037,700	\$ 14,705,000
5.0	LIME SLAKER BUILDING					
5.1	MECHANICAL EQUIPMENT	INCLUDES:CHAIN CONVEYOR, SLAKERS THROUGH THE LIME SLURRY PUMPS, PIPING, AND LIME SLURRY STORAGE TANKS.	\$ 5,914,000	\$ -	\$ 4,129,800	\$ 10,043,800
5.2	LIME SLAKER BUILDING SUMP PUMPS	DUPLEX. INCLUDES CHECK & ISOLATION VALVES	\$ 28,000	\$ -	\$ 12,300	\$ 40,300
5.3	AGITATOR FOR SUMP PUMPS	5 HP	\$ 12,000	\$ -	\$ 4,600	\$ 16,600
5.4	PIPING - MECHANICAL		\$ 117,800	\$ 111,400	\$ 381,100	\$ 610,300
5.5	LIME SLURRY TANKS - FOUNDATIONS		\$ -	\$ 166,400	\$ 299,400	\$ 465,800

Sargent & Lundy, LLC

AEP

Estimate No.: 30710C

BIG SANDY UNIT 2

Project No.: 12721-000

FGD PROJECT - DRY FGD EST (ESP)-2A - 1.7 LB/MM BTU

Date: 9/29/2010

COST ESTIMATE SUMMARY

Preparer: MNO

Reviewer: JMK

Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
5.6	LIME SLAKER BUILDING - FOUNDATIONS		\$ -	\$ 119,200	\$ 204,000	\$ 323,200
5.7	LIME SLAKER BUILDING	135' L X 30' W X 50' H	\$ 40,500	\$ 803,300	\$ 740,500	\$ 1,584,300
5.8	ELECTRICAL	INCLUDED WITH LIME HANDLING SYSTEM, ACCOUNT 4.0	\$ -	\$ -	\$ -	\$ -
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 6,112,300	\$ 1,200,300	\$ 5,771,700	\$ 13,084,300
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 305,600	\$ 306,100	\$ 2,153,500	\$ 2,765,100
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	LIME SLAKER BUILDING	\$ 6,417,900	\$ 1,506,400	\$ 7,925,200	\$ 15,849,400
6.0	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS					
6.1	BYPRODUCT WASTE ASH HANDLING - MECHANICAL EQUIPMENT	INCLUDES PNEUMATIC HANDLING SYSTEM, THREE PRESSURE BLOWERS, ONE BIN VENT FILTER, ASH UNLOADING SYSTEM	\$ 2,047,000	\$ -	\$ 1,380,000	\$ 3,427,000
6.2	FLY ASH HANDLING - MECHANICAL EQUIPMENT	INCLUDES PNEUMATIC HANDLING SYSTEM, TWO PRESSURE EXHAUSTERS, TRANSFER STATION, ONE BIN VENT FILTER, ASH UNLOADING SYSTEM	\$ 2,285,000	\$ -	\$ 1,431,100	\$ 3,716,100

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (ESP)-2A - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30710C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
6.3	BUILDING SUMP PUMPS	FOR BUILDINGS - DUPLEX. INCLUDES CHECK & ISOLATION VALVES.	\$ 28,000	\$ -	\$ 12,300	\$ 40,300
6.4	AGITATOR FOR SUMP PUMPS	5 HP	\$ 12,000	\$ -	\$ 4,600	\$ 16,600
6.5	PIPING - MECHANICAL		\$ 142,800	\$ 240,900	\$ 759,100	\$ 1,142,800
6.6	BYPRODUCT WASTE SILO	CONCRETE SILO 45' DIA X 80' H - 1625 TONS - SUBCONTRACT COST INCLUDES LABOR	\$ 1,375,000	\$ -	\$ -	\$ 1,375,000
6.7	SDA RECYCLE SILO	INCLUDED WITH OEM EQUIPMENT	\$ -	\$ -	\$ -	\$ -
6.8	SDA FLY ASH SILO	46T STEEL -STORAGE SILO, 15' DIA X 19' H	\$ 25,000	\$ 20,300	\$ 61,400	\$ 106,700
6.9	WASTE ASH STORAGE SILO - FOUNDATIONS		\$ -	\$ 92,200	\$ 179,200	\$ 271,400
6.10	FLY ASH SILO - FOUNDATIONS		\$ -	\$ 10,800	\$ 24,500	\$ 35,300
6.11	FLY ASH BLOWER AND ELECTRICAL BUILDING - FOUNDATIONS		\$ -	\$ 49,600	\$ 105,700	\$ 155,300
6.12	FLY ASH BLOWER AND ELECTRICAL BUILDING	90' L X 30' W X 25' H	\$ 28,000	\$ 244,500	\$ 16,200	\$ 288,700
6.13	RECYCLE ASH BUILDING - FOUNDATIONS		\$ -	\$ 234,300	\$ 393,800	\$ 628,100
6.14	RECYCLE ASH BUILDING	100' L X 65' W X 50' H	\$ 58,500	\$ 1,306,700	\$ 1,194,500	\$ 2,559,700
6.15	MCC	480V MCC PER LINE UP	\$ 120,000	\$ -	\$ 7,300	\$ 127,300
6.16	EMERGENCY POWER SYSTEM		\$ 185,500	\$ -	\$ 40,000	\$ 225,500
6.17	LIGHTING/ TRANSFORMERS & PANELS		\$ 18,500	\$ 75,000	\$ 53,200	\$ 146,700
6.18	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 40,700	\$ 236,200	\$ 276,900
6.19	LOW VOLTAGE POWER CABLE & TERMINATION	#4/0 - #12 AWG-600V	\$ -	\$ 80,900	\$ 100,600	\$ 181,500
6.20	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 38,400	\$ 107,800	\$ 146,200

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (ESP)-2A - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30710C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
6.21	GROUNDING		\$ -	\$ 4,500	\$ 10,900	\$ 15,400
6.22	DUCT BANK	DUCT BANK WITH 12-5" & 6-3" CONDUITS, 5.2' H X 2.08" W	\$ -	\$ 111,500	\$ 184,000	\$ 295,500
6.23	COMMUNICATIONS		\$ -	\$ 70,000	\$ 50,000	\$ 120,000
6.24	LIGHTNING PROTECTION		\$ -	\$ 19,000	\$ 14,000	\$ 33,000
6.25	SECURITY SYSTEM		\$ -	\$ 16,000	\$ 14,000	\$ 30,000
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 6,325,300	\$ 2,655,300	\$ 6,380,400	\$ 15,361,000
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 316,300	\$ 677,100	\$ 2,374,400	\$ 3,367,800
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS	\$ 6,641,600	\$ 3,332,400	\$ 8,754,800	\$ 18,728,800
7.0	ABSORBER ISLAND					
8.0	ACTIVATED CARBON INJECTION SYSTEM					
9.0	COMPRESSED AIR SYSTEM					
10.0	SERVICE WATER SYSTEM					
11.0	POTABLE WATER SYSTEM					
12.0	FGD SUBSTATION					
13.0	FGD DCS SYSTEM					
14.0	CEM SYSTEM					

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (ESP)-2A - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30710C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
15.0	TRUCK & RAIL INFRASTRUCTURE					
16.0	SITE IMPROVEMENTS - CIVIL WORK					
17.0	BOP ITEMS					
18.0	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE					
19.0	ARSENIC, ASBESTOS , LEAD ABATEMENT	0.0				
99.0	OVERALL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 107,215,100	\$ 49,256,500	\$ 137,933,300	\$ 314,504,900
	OVERALL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 6,107,800	\$ 12,503,700	\$ 51,930,900	\$ 73,792,800
	OVERALL TOTAL DIRECT & CONSTRUCTION INDIRECT COST		\$ 113,322,900	\$ 61,760,200	\$ 189,864,200	\$ 388,297,700
	OVERALL PROJECT INDIRECT COSTS					
	ENGINEERING, PROCUREMENT, & PROJECT SERVICES					\$ 25,000,000
	CONSTRUCTION MANAGEMENT					\$ 11,648,900
	S-U / COMMISSIONING					\$ 3,883,000
	CRAFT START-UP SUPPORT					\$ 1,625,300
	INITIAL FILLS					\$ 1,164,900
	OPERATOR & TRAINING MANUALS					\$ 300,000
	SUBCONTRACTORS (NOISE & DUCTWORK CONSULTANT, GEOTECHNICAL INVESTIGATION)					\$ 400,000
	NOISE ABATEMENT FOR 85 DBA REQUIREMENT					\$ 2,750,000
	SUBTOTAL - INDIRECT COSTS					\$ 46,772,100
	TOTAL PROJECT DIRECT AND INDIRECT COSTS					\$ 435,069,800

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (ESP)-2A - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30710C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
	SPARE PARTS:					\$ 1,699,800
	SPARE PARTS - CAPITALIZED	0.90				\$ 1,019,880
	SPARE PARTS - FIRST YEAR OF OPERATION	0.60				\$ 679,920
	CONTINGENCY	14.9				\$ 65,104,400
	ESCALATION					\$ 55,362,000
	EQUIPMENT					\$ 18,045,600
	MATERIAL					\$ 6,368,900
	LABOR					\$ 25,447,500
	INDIRECTS					\$ 5,500,000
	TOTAL PROJECT COST					\$ 557,236,000
	REFERENCE COSTS:					
A	REMOVAL OF FUEL OIL TANK	LABOR COST IS FOR REMOVAL OF TANK ONLY. ALLOWANCE FOR SOIL REMEDIATION AND DISPOSAL IN AN EPA APPROVED LANDFILL. SUBCONTRACT COST INCLUDES LABOR. USED LOWER END OF THE RANGE \$118-355/CY. COST COULD BE LOWER (\$59-118/CY) IF SOLD TO A BITUMINOUS CONCRETE BATCH PLANT	\$ 1,200,000	\$ 80,000	\$ 469,400	\$ 1,749,400



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
Volume 3 – DFGD Technology
September 29, 2010

ATTACHMENT 3-13
DFGD Summary Capital Cost Estimate No. 30712 Est-2B ESP not in Service*
(1.7 lb SO₂/MMbtu)

* - Estimates 2A and 2B contain only accounts whose costs are different from the corresponding base estimates 1A and 1B.

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (N/ESP)-2B - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30712C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
1.0	ID FANS					
2.0	FABRIC FILTERS					
2.1	MECHANICAL EQUIPMENT	A SINGLE FABRIC FILTER (225' X 130') UNIT INCLUDING ALL INTERNAL FABRIC FILTER ELEMENTS SUCH AS BAGS, CAGES, ASH HOPPERS, 2 BROKEN BAG DETECTORS PER COMPARTMENT	\$ 19,980,000	\$ -	\$ 12,685,900	\$ 32,665,900
2.2	INSULATION FOR FABRIC FILTER	SUBCONTRACT COST INCLUDES LABOR	\$ 2,430,000	\$ -	\$ -	\$ 2,430,000
2.3	PENTHOUSE FOR FABRIC FILTER	SUPPORT STEEL AND PURLINS INCLUDED WITH OEM EQUIPMENT	\$ 70,200	\$ 787,000	\$ 1,007,600	\$ 1,864,800
2.4	BOTTOM ENCLOSURE FOR BAGHOUSE		\$ 60,000	\$ 1,204,000	\$ 1,359,800	\$ 2,623,800
2.5	PIPING & SUPPORTS - MECHANICAL		\$ 30,900	\$ 101,400	\$ 209,500	\$ 341,800
2.6	FABRIC FILTER - FOUNDATIONS		\$ -	\$ 550,700	\$ 1,081,100	\$ 1,631,800
2.7	FABRIC FILTER - SUPPORT STEEL AND ACCESS GALLERY		\$ -	\$ 360,000	\$ 1,186,700	\$ 1,546,700
2.8	RACEWAY, CABLE TRAY, & CONDUIT	INCLUDED IN ABSORBER ISLAND 7.0	\$ -	\$ -	\$ -	\$ -
2.9	LIGHTING/ TRANSFORMERS & PANELS		\$ 30,000	\$ 75,000	\$ 58,200	\$ 163,200
2.10	GROUNDING		\$ 7,300	\$ -	\$ 17,500	\$ 24,800
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 22,608,400	\$ 3,078,100	\$ 17,606,300	\$ 43,292,800
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 1,130,400	\$ 784,900	\$ 6,539,800	\$ 8,455,100
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	FABRIC FILTERS	\$ 23,738,800	\$ 3,863,000	\$ 24,146,100	\$ 51,747,900

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (N/ESP)-2B - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30712C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
3.0	NEW STACK					
4.0	LIME HANDLING SYSTEM					
4.1	LIME STORAGE SILO		\$ 2,680,000	\$ -	\$ -	\$ 2,680,000
4.2	LIME UNLOADING SYSTEM	INCLUDES PNEUMATIC HANDLING SYSTEM, THREE VACUUM EXHAUSTER, TWO FILTER SEPARATORS	\$ 350,000	\$ -	\$ 281,100	\$ 631,100
4.3	PIPING - MECHANICAL		\$ 29,000	\$ 15,600	\$ 77,900	\$ 122,500
4.4	LIME STORAGE SILO ACCESS STAIR TOWER	THREE COAT SHOP PAINT	\$ -	\$ 145,000	\$ 145,900	\$ 290,900
4.5	PIPE RACK FOR LIME HANDLING, WASTE ASH HANDLING AND MISC MECHANICAL PIPING	THREE COAT SHOP PAINT	\$ -	\$ 783,000	\$ 787,800	\$ 1,570,800
4.6	RAIL CAR UNLOADING AREA - FOUNDATIONS	20 X 250 - NO SIDING	\$ -	\$ 85,300	\$ 180,200	\$ 265,500
4.7	LIME UNLOADING BLOWER / ELECTRICAL BUILDING - FOUNDATIONS		\$ -	\$ 74,500	\$ 187,800	\$ 262,300
4.8	LIME UNLOADING BLOWER / ELECTRICAL BUILDING	130' L X 30' W X 30' H	\$ 75,000	\$ 351,500	\$ 24,400	\$ 450,900
4.9	CONCRETE PIT FOR THE ELEVATOR		\$ -	\$ 2,300	\$ 6,900	\$ 9,200
4.10	LIME STORAGE SILO - FOUNDATIONS		\$ -	\$ 172,300	\$ 317,800	\$ 490,100
4.11	LIME STORAGE SILO ACCESS STAIR TOWER - FOUNDATIONS		\$ -	\$ 14,200	\$ 28,600	\$ 42,800
4.12	PIPE RACK - FOUNDATIONS		\$ -	\$ 94,200	\$ 237,800	\$ 332,000
4.13	TRANSFORMERS	SUS TRANSFORMERS: 33F, 33G, 13.8KV-480V	\$ 170,000	\$ -	\$ 54,600	\$ 224,600
4.14	SWITCHGEAR	480V LOW VOLTAGE (33F/G), SWITCHGEAR	\$ 196,000	\$ -	\$ 104,700	\$ 300,700
4.15	CABLE BUS DUCT		\$ 134,700	\$ 10,800	\$ 200,200	\$ 345,700
4.16	MCC		\$ 61,800	\$ -	\$ 3,600	\$ 65,400
4.17	MIMIC PANELS		\$ 17,500	\$ -	\$ 1,400	\$ 18,900
4.18	EMERGENCY POWER SYSTEM		\$ 108,300	\$ -	\$ 24,400	\$ 132,700
4.19	GROUNDING		\$ 13,300	\$ -	\$ 41,300	\$ 54,600
4.20	LIGHTING/ TRANSFORMERS & PANELS		\$ 52,000	\$ 135,000	\$ 104,500	\$ 291,500
4.21	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 310,900	\$ 1,537,100	\$ 1,848,000

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (N/ESP)-2B - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30712C
Project No.: 12721-000
Date: 9/29/2010
Preparer: MNO
Reviewer: JMK
Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
4.22	HIGH VOLTAGE POWER CABLE & TERMINATION	1/C # 500KCMIL-15KV	\$ -	\$ 50,100	\$ 141,200	\$ 191,300
4.23	MEDIUM VOLTAGE POWER CABLE & TERMINATION	1/C # 350KCMIL-5KV	\$ -	\$ 66,200	\$ 282,300	\$ 348,500
4.24	LOW VOLTAGE POWER CABLE & TERMINATION		\$ -	\$ 93,000	\$ 143,200	\$ 236,200
4.25	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 26,200	\$ 73,600	\$ 99,800
4.26	DUCT BANK	DUCT BANK WITH 4-5" & 4-3" CONDUITS, 2.38' H X 3.79' W	\$ -	\$ 61,100	\$ 116,200	\$ 177,300
4.27	FOUNDATIONS FOR TRANSFORMERS	FOR XFMR 33F, 33G, INCLUDES MUD MAT	\$ -	\$ 3,500	\$ 10,300	\$ 13,800
4.28	COMMUNICATIONS		\$ -	\$ 17,000	\$ 13,000	\$ 30,000
4.29	LIGHTNING PROTECTION		\$ -	\$ 14,000	\$ 9,000	\$ 23,000
4.30	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 3,887,600	\$ 2,533,700	\$ 5,143,800	\$ 11,565,100
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 194,400	\$ 646,100	\$ 1,864,900	\$ 2,705,400
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	LIME HANDLING SYSTEM	\$ 4,082,000	\$ 3,179,800	\$ 7,008,700	\$ 14,270,500
5.0	LIME SLAKER BUILDING					
5.1	MECHANICAL EQUIPMENT	INCLUDES:CHAIN CONVEYOR, SLAKERS THROUGH THE LIME SLURRY PUMPS, PIPING, AND LIME SLURRY STORAGE TANKS.	\$ 5,560,000	\$ -	\$ 3,976,500	\$ 9,536,500
5.2	LIME SLAKER BUILDING SUMP PUMPS	DUPLEX. INCLUDES CHECK & ISOLATION VALVES	\$ 28,000	\$ -	\$ 12,300	\$ 40,300
5.3	AGITATOR FOR SUMP PUMPS	5 HP	\$ 12,000	\$ -	\$ 4,600	\$ 16,600
5.4	PIPING - MECHANICAL		\$ 117,800	\$ 111,400	\$ 381,100	\$ 610,300
5.5	LIME SLURRY TANKS - FOUNDATIONS		\$ -	\$ 166,400	\$ 299,400	\$ 465,800

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AEP
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5.6	LIME SLAKER BUILDING - FOUNDATIONS		\$ -	\$ 119,200	\$ 204,000	\$ 323,200
5.7	LIME SLAKER BUILDING	135' L X 30' W X 50' H	\$ 40,500	\$ 803,300	\$ 740,500	\$ 1,584,300
5.8	ELECTRICAL	INCLUDED WITH LIME HANDLING SYSTEM, ACCOUNT 4.0	\$ -	\$ -	\$ -	\$ -
90.00	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 5,758,300	\$ 1,200,300	\$ 5,618,400	\$ 12,577,000
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 287,900	\$ 306,100	\$ 2,096,900	\$ 2,690,900
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	LIME SLAKER BUILDING	\$ 6,046,200	\$ 1,506,400	\$ 7,715,300	\$ 15,267,900
6.0	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS					
6.1	BYPRODUCT WASTE ASH HANDLING - MECHANICAL EQUIPMENT	INCLUDES PNEUMATIC HANDLING SYSTEM, THREE PRESSURE BLOWERS, ONE BIN VENT FILTER, ASH UNLOADING SYSTEM	\$ 2,047,000	\$ -	\$ 1,380,000	\$ 3,427,000
6.2	ECONOMIZER ASH HANDLING - MECHANICAL EQUIPMENT	INCLUDES JET PUMPS AND PIPING / SUPPORTS TO THE BOTTOM ASH POND	\$ 400,000	\$ -	\$ 296,400	\$ 696,400
6.3	BUILDING SUMP PUMPS	FOR BUILDINGS - DUPLEX. INCLUDES CHECK & ISOLATION VALVES.	\$ 28,000	\$ -	\$ 12,300	\$ 40,300
6.4	AGITATOR FOR SUMP PUMPS	5 HP	\$ 12,000	\$ -	\$ 4,600	\$ 16,600

Sargent & Lundy, LLC

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Estimate No.: 30712C

BIG SANDY UNIT 2

Project No.: 12721-000

FGD PROJECT - DRY FGD EST (N/ESP)-2B - 1.7 LB/MM BTU

Date: 9/29/2010

COST ESTIMATE SUMMARY

Preparer: MNO

Reviewer: JMK

Approver: PEF

Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
6.5	PIPING - MECHANICAL		\$ 142,800	\$ 240,900	\$ 759,100	\$ 1,142,800
6.6	BYPRODUCT WASTE SILO	CONCRETE SILO 55' DIA X 111' H - 4700 TONS - SUBCONTRACT COST INCLUDES LABOR	\$ 1,800,000	\$ -	\$ -	\$ 1,800,000
6.7	SDA RECYCLE SILO	INCLUDED WITH OEM EQUIPMENT	\$ -	\$ -	\$ -	\$ -
6.8	SDA FLY ASH SILO	NOT REQUIRED - ECONOMIZER FLY ASH SLUICED TO BOTTOM ASH POND	\$ -	\$ -	\$ -	\$ -
6.9	WASTE ASH STORAGE SILO - FOUNDATIONS	0.0	\$ -	\$ 132,100	\$ 247,800	\$ 379,900
6.10	FLY ASH SILO - FOUNDATIONS	NOT REQUIRED	\$ -	\$ -	\$ -	\$ -
6.11	FLY ASH BLOWER AND ELECTRICAL BUILDING - FOUNDATIONS	NOT REQUIRED	\$ -	\$ -	\$ -	\$ -
6.12	FLY ASH BLOWER AND ELECTRICAL BUILDING	NOT REQUIRED	\$ -	\$ -	\$ -	\$ -
6.13	RECYCLE ASH BUILDING - FOUNDATIONS		\$ -	\$ 234,300	\$ 393,800	\$ 628,100
6.14	RECYCLE ASH BUILDING	100' L X 65' W X 50' H	\$ 58,500	\$ 1,306,700	\$ 1,194,500	\$ 2,559,700
6.15	MCC	480V MCC PER LINE UP	\$ 60,000	\$ -	\$ 3,600	\$ 63,600
6.16	EMERGENCY POWER SYSTEM		\$ 92,800	\$ -	\$ 19,900	\$ 112,700
6.17	LIGHTING/ TRANSFORMERS & PANELS		\$ 18,500	\$ 60,000	\$ 44,100	\$ 122,600
6.18	RACEWAY, CABLE TRAY, & CONDUIT		\$ -	\$ 32,500	\$ 189,100	\$ 221,600
6.19	LOW VOLTAGE POWER CABLE & TERMINATION	#4/0 - #12 AWG-600V	\$ -	\$ 64,700	\$ 80,500	\$ 145,200
6.20	CONTROL & INSTRUMENT CABLE	#14, #16 & PR # 20 & SHLD WIRE	\$ -	\$ 30,700	\$ 86,200	\$ 116,900
6.21	GROUNDING		\$ -	\$ 4,500	\$ 10,900	\$ 15,400
6.22	DUCT BANK	DUCT BANK WITH 12-5" & 6-3" CONDUITS, 5.2' H X 2.08" W	\$ -	\$ 111,500	\$ 184,000	\$ 295,500
6.23	COMMUNICATIONS		\$ -	\$ 34,000	\$ 26,000	\$ 60,000
6.24	LIGHTNING PROTECTION		\$ -	\$ 16,000	\$ 14,000	\$ 30,000

Sargent & Lundy, LLC

AEP
BIG SANDY UNIT 2
FGD PROJECT - DRY FGD EST (N/ESP)-2B - 1.7 LB/MM BTU
COST ESTIMATE SUMMARY

Estimate No.: 30712C
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6.25	SECURITY SYSTEM		\$ -	\$ 8,000	\$ 7,000	\$ 15,000
90.0	SUBTOTAL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 4,659,600	\$ 2,275,900	\$ 4,953,800	\$ 11,889,300
	SUBTOTAL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 233,000	\$ 580,400	\$ 1,845,900	\$ 2,659,200
	TOTAL DIRECT & CONSTRUCTION INDIRECT COST	BYPRODUCT WASTE & FLY ASH HANDLING SYSTEMS	\$ 4,892,600	\$ 2,856,300	\$ 6,799,700	\$ 14,548,500
7.0	ABSORBER ISLAND					
8.0	ACTIVATED CARBON INJECTION SYSTEM					
9.0	COMPRESSED AIR SYSTEM					
10.0	SERVICE WATER SYSTEM					
11.0	POTABLE WATER SYSTEM					
12.0	FGD SUBSTATION					
13.0	FGD DCS SYSTEM					
14.0	CEM SYSTEM					
15.0	TRUCK & RAIL INFRASTRUCTURE					
16.0	SITE IMPROVEMENTS - CIVIL WORK					

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BIG SANDY UNIT 2
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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
17.0	BOP ITEMS					
18.0	CAPITAL REPLACEMENTS - REMOVAL AND RELOCATION OF EXISTING EQUIPMENT AND INFRASTRUCTURE					
19.0	ARSENIC, ASBESTOS , LEAD ABATEMENT					
99.0	OVERALL - EQUIPMENT, MATERIAL AND LABOR COSTS		\$ 105,932,400	\$ 46,466,100	\$ 132,549,400	\$ 305,047,900
	OVERALL - OTHER DIRECT & CONSTRUCTION INDIRECT COSTS		\$ 6,043,600	\$ 11,792,200	\$ 50,009,900	\$ 71,096,200
	OVERALL TOTAL DIRECT & CONSTRUCTION INDIRECT COST		\$ 111,976,000	\$ 58,258,300	\$ 182,559,300	\$ 376,144,100
	OVERALL PROJECT INDIRECT COSTS					
	ENGINEERING, PROCUREMENT, & PROJECT SERVICES					\$ 25,000,000
	CONSTRUCTION MANAGEMENT					\$ 11,284,300
	S-U / COMMISSIONING					\$ 3,761,400
	CRAFT START-UP SUPPORT					\$ 1,561,800
	INITIAL FILLS					\$ 1,128,400
	OPERATOR & TRAINING MANUALS					\$ 300,000
	SUBCONTRACTORS (NOISE & DUCTWORK CONSULTANT, GEOTECHNICAL INVESTIGATION)					\$ 400,000
	NOISE ABATEMENT FOR 85 DBA REQUIREMENT					\$ 2,750,000
	SUBTOTAL - INDIRECT COSTS					\$ 46,185,900
	TOTAL PROJECT DIRECT AND INDIRECT COSTS					\$ 422,330,000
	SPARE PARTS:					\$ 1,679,600
	SPARE PARTS - CAPITALIZED	0.90				\$ 1,007,760
	SPARE PARTS - FIRST YEAR OF OPERATION	0.60				\$ 671,840

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BIG SANDY UNIT 2
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Account No.	Item Description	Scope Definition	Total Equipment Cost	Total Material Cost	Total Construction & Erection Cost	Total Projected Cost
	CONTINGENCY	14.90				\$ 63,192,400
	ESCALATION					\$ 53,852,622
	EQUIPMENT					\$ 17,831,166
	MATERIAL					\$ 6,065,206
	LABOR					\$ 24,525,149
	INDIRECTS					\$ 5,431,101
	TOTAL PROJECT COST					\$ 541,054,622
	REFERENCE COSTS:					
A	ESP DEMOLITION	ALLOWANCE FOR 1000T STRUCTURE	\$ -	\$ -	\$ 832,300	\$ 832,300
B	REMOVE BOOSTER AIR FANS	ALLOWANCE FOR 150 TON FRAMING REINFORCEMENT	\$ -	\$ -	\$ 111,000	\$ 111,000
C	REMOVAL OF FUEL OIL TANK	LABOR COST IS FOR REMOVAL OF TANK ONLY. ALLOWANCE FOR SOIL REMEDIATION AND DISPOSAL IN AN EPA APPROVED LANDFILL. SUBCONTRACT COST INCLUDES LABOR. USED LOWER END OF THE RANGE \$118-355/CY. COST COULD BE LOWER (\$59-118/CY) IF SOLD TO A BITUMINOUS CONCRETE BATCH PLANT	\$ 1,200,000	\$ 80,000	\$ 469,400	\$ 1,749,400



Big Sandy Unit 2
Kentucky Power Company
American Electric Power Service Corporation
Order-of-Magnitude FGD Cost Estimate
WFGD, DFGD, IAQCS & NID Technologies
Volume 3 – DFGD Technology
September 29, 2010

ATTACHMENT 3-14
O&M Costs – Fixed and Variable (DFGD)

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Order-of-Magnitude EPC Cost Estimate – Attachment 3-14
Big Sandy Station – Unit 2

Project No. 12721-000
September 29, 2010

DFGD O&M Costs – Revision 0

GENERAL

The O&M costs are based on defined inputs from AEP and results of mass balance calculations. Unlike the capital costs that require estimation from previous project and scaling parameters, the O&M cost basis is well defined. Therefore, the O&M costs presented are expected to reflect the actual cost that will be incurred with little variance. The costs are affected by changes in labor rates, commodity pricing, and agreed to minimum staffing requirements. Although these inputs were confirmed by AEP, an uncertainty associated with this pricing is generally in the range of $\pm 10\%$. Based on the typical pricing uncertainty, it is expected that the O&M costs are accurate to $\pm 10\%$.

All O&M costs are presented in constant 2010 dollars.

VARIABLE O&M COSTS

The variable O&M costs include:

- Reagent and Disposal
- DFGD byproduct includes 30 wt% dust control water for weight of solids transported to the landfill
- Makeup water for the process only. The water consumption includes: lime slaking water, recycle slurry water, and dust control water only.
- Activated carbon injection rate is based on 2 lb/MMacfm into the DFGD system. The 2 lb/MMacfm injection rate should achieve a 90% mercury removal, based on current industry experience.
- Bag replacement every 3 years
- Cage replacement every 9 years
- Auxiliary Power (displayed as MW consumed)
- The draft power accounts for the DFGD system loss, new ductwork, and all other losses associated with the balance draft conversion (furnace to stack). In the cases where the ESP is left in service, the additional ESP pressure loss is included in the draft power estimate. For the cases with a booster fan, the booster fan power is added to the new ID fan power to fully account for the system requirement. This will provide a consistent basis for comparison of the various technologies. The operating power is 20% less than the test block power used for cost estimating purposes.

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Order-of-Magnitude EPC Cost Estimate – Attachment 3-14
Big Sandy Station – Unit 2

Project No. 12721-000
September 29, 2010

DFGD O&M Costs – Revision 0

- A second value for the draft power is provided that shows the estimated requirement for the FGD system only (absorber through baghouse). The FGD draft power is part of the overall draft power.
- No forced outages are anticipated due to equipment redundancy designed into the system.

FIXED O&M COSTS

The fixed O&M costs include:

- Operating Labor

The FGD system will require additional staff to operate the equipment. An absolute minimum number of additional staff was used for comparison purposes between the various technologies. Actual staffing requirements would be based on site specific operating experience. The DFGD estimate was based on:

Operation	Staff
Absorber Island Operation	1 person per shift for 5 shifts (5 operators total)
Recycle System	3 operators total
Total	8 operations staff

Depending on the workload of the balance of the plant operations staff, additional FGD operating labor may be required. Other areas to consider are:

Operation	Staff
Reagent Unloading	2 additional people if the coal handling staff cannot handle the additional duties.
Reagent Preparation	5 additional operations staff
Byproduct Loadout	2 additional operators
System Engineer	1 additional position
Total	10 additional operations staff

For FGD technology comparison purposes, the minimum operations staff required was used in the evaluation. Additional staff could be included; however, the difference in staff between the various technologies would be the same.

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Order-of-Magnitude EPC Cost Estimate – Attachment 3-14
Big Sandy Station – Unit 2

Project No. 12721-000
September 29, 2010

DFGD O&M Costs – Revision 0

- Maintenance Labor
Including: maintenance mechanics, I&C technicians, maintenance planner, supervision, and overhead.
- Maintenance Materials
Including: all preventative and corrective maintenance materials for the slakers, pumps, blowers/compressors, fans, atomizers, agitators, etc...

ECONOMIC BASIS

Table 1 shows the data used to generate the costs associated with the retrofit options.

Table 1. Economic Parameters

Unit Capacity Factor (%) ^{Note 1}	85
Operating Labor Rate (\$/hr) ^{Note 2}	50.00
Lime (\$/ton) ^{Note 5}	139 (Delivered by Rail Costs)
Activated Carbon (\$/ton) ^{Note 4}	1440 (Delivered by Truck Costs)
By-Product Disposal (\$/ton) ^{Note 3}	8
Makeup Water (\$/1000 gallons)	1.00
Fabric Filter Bag Costs (\$/bag) ^{Note 4}	80
Fabric Filter Cage Costs (\$/cage) ^{Note 4}	30

Notes:

- 1) Per Order of Magnitude/Relative Capital Installed Cost Estimate Specification (BS2-FGDSCE-052010) Revision 2 dated September 24, 2010 provided by AEP.
- 2) The labor rate is a total pay and benefits rate.
- 3) Disposal cost for by-product, trucking to landfill on private haul road.
- 4) Cost was provided by AEP in comments to Revision A.
- 5) Provided by AEP on the teleconference on 27-July-2010.

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Order-of-Magnitude EPC Cost Estimate – Attachment 3-14
Big Sandy Station – Unit 2

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DFGD O&M Costs – Revision 0

Table 3. O&M Costs for DFGD Systems (2010 dollars)

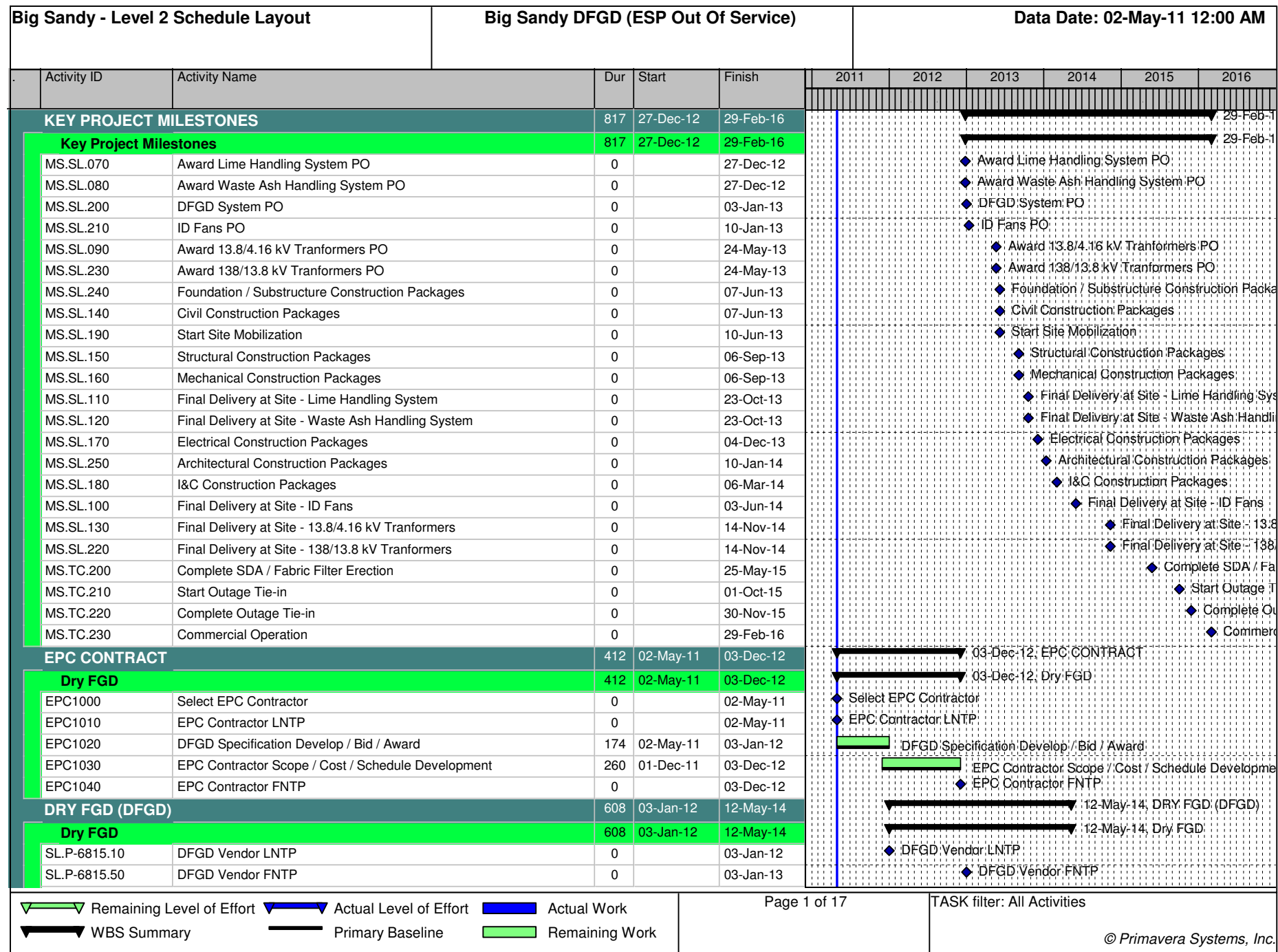
Fuel	1.7 w/o ESP	3.0 w/o ESP	1.7 w/ ESP	3.0 w/ ESP
Fixed O&M (\$/year)				
Operating Labor	832,000	832,000	832,000	832,000
Maintenance Material	2,076,000	2,136,000	2,076,000	2,136,000
Maintenance Labor	1,384,000	1,424,000	1,384,000	1,424,000
Total Fixed O&M (\$/year)	4,292,000	4,392,000	4,292,000	4,392,000
Variable O&M (\$/year)				
Reagent Cost	8,601,000	19,605,000	9,924,000	23,281,000
Activated Carbon	2,344,000	2,319,000	2,267,000	2,243,000
FGD Byproduct Disposal Cost	4,148,000	5,612,000	1,793,000	3,817,000
Makeup Water Cost	509,000	521,000	464,000	482,000
Wastewater Treatment Chemicals	NA	NA	NA	NA
Bags and Cages Replacement	651,000	651,000	651,000	651,000
Total Variable O&M excluding Auxiliary Power (\$/year)	16,253,000	28,708,000	15,099,000	30,474,000
Auxiliary Power at Full Load (MW)				
Overall Draft [in WC]	23 [49]	23 [49]	17 [39]	17 [39]
FGD Draft Only [in WC]	8 [16]	8 [16]	8 [16]	8 [16]
FGD Equipment Load	4	5	4	5
Existing Booster Fans	-10	-10	0	0
Existing ESP	-4	-4	0	0
WESP	NA	NA	NA	NA
Total Auxiliary Power at Full Load (MW)	13	14	21	22

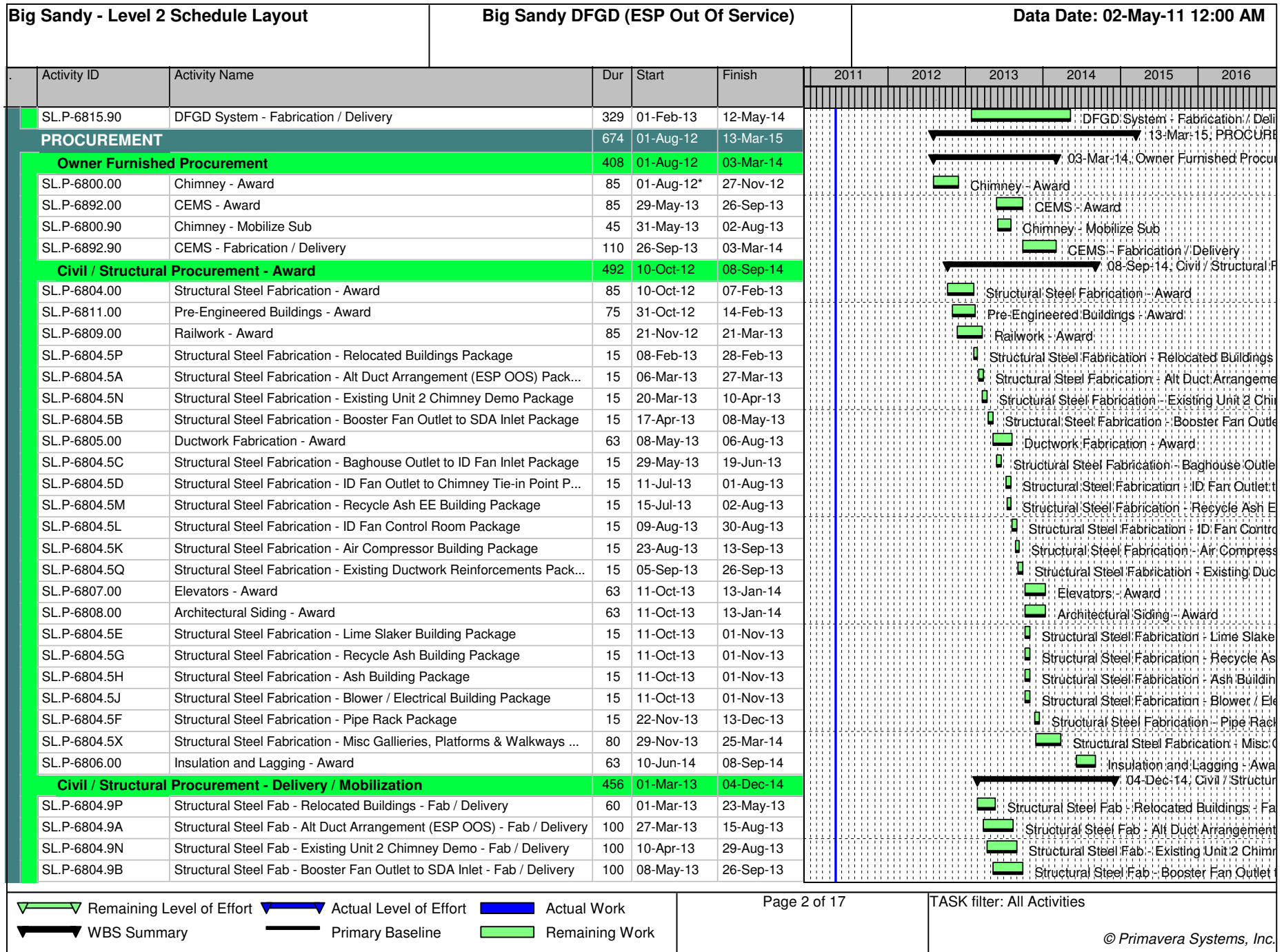
Note: NA = Not Applicable for the technology

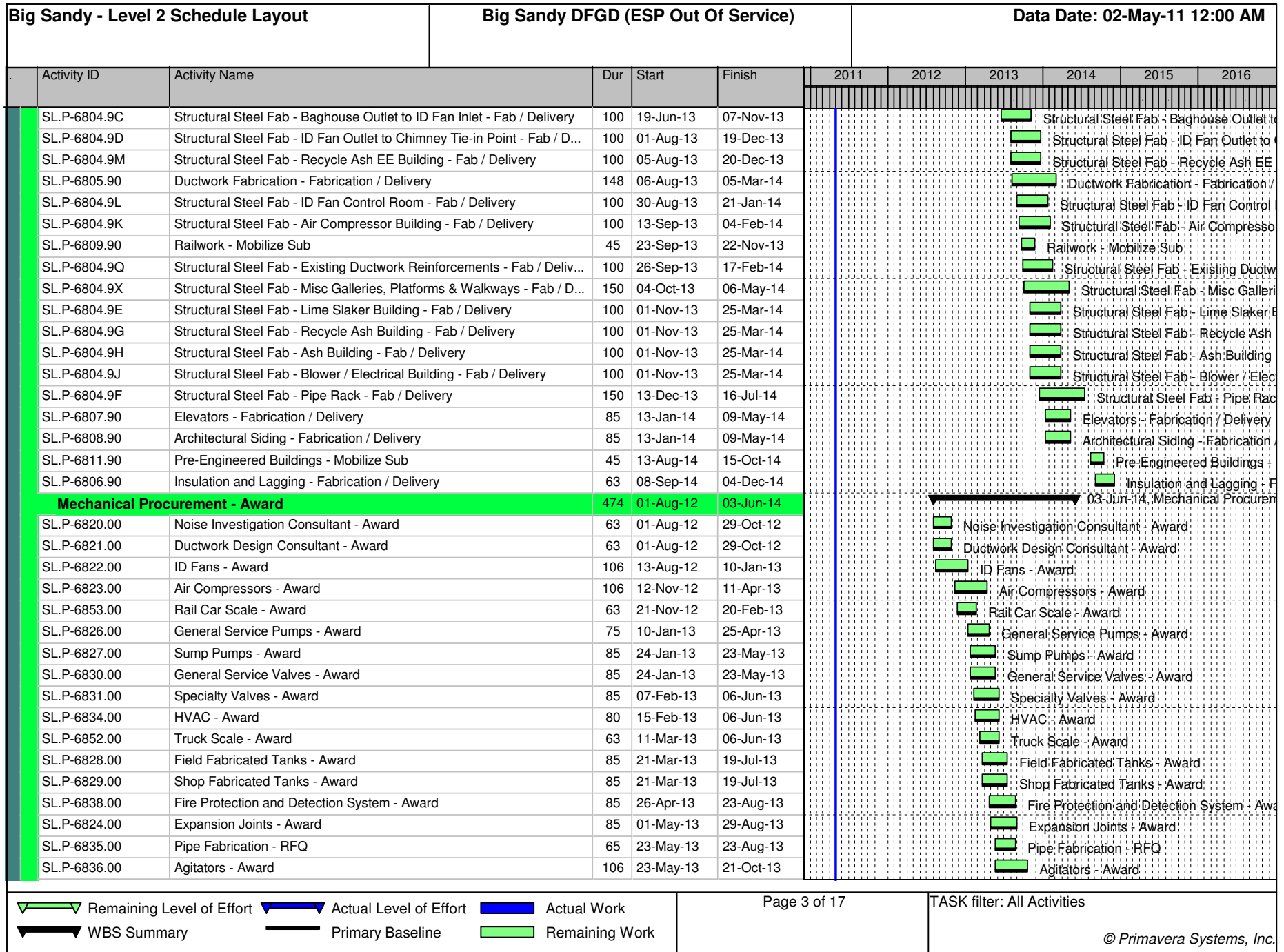


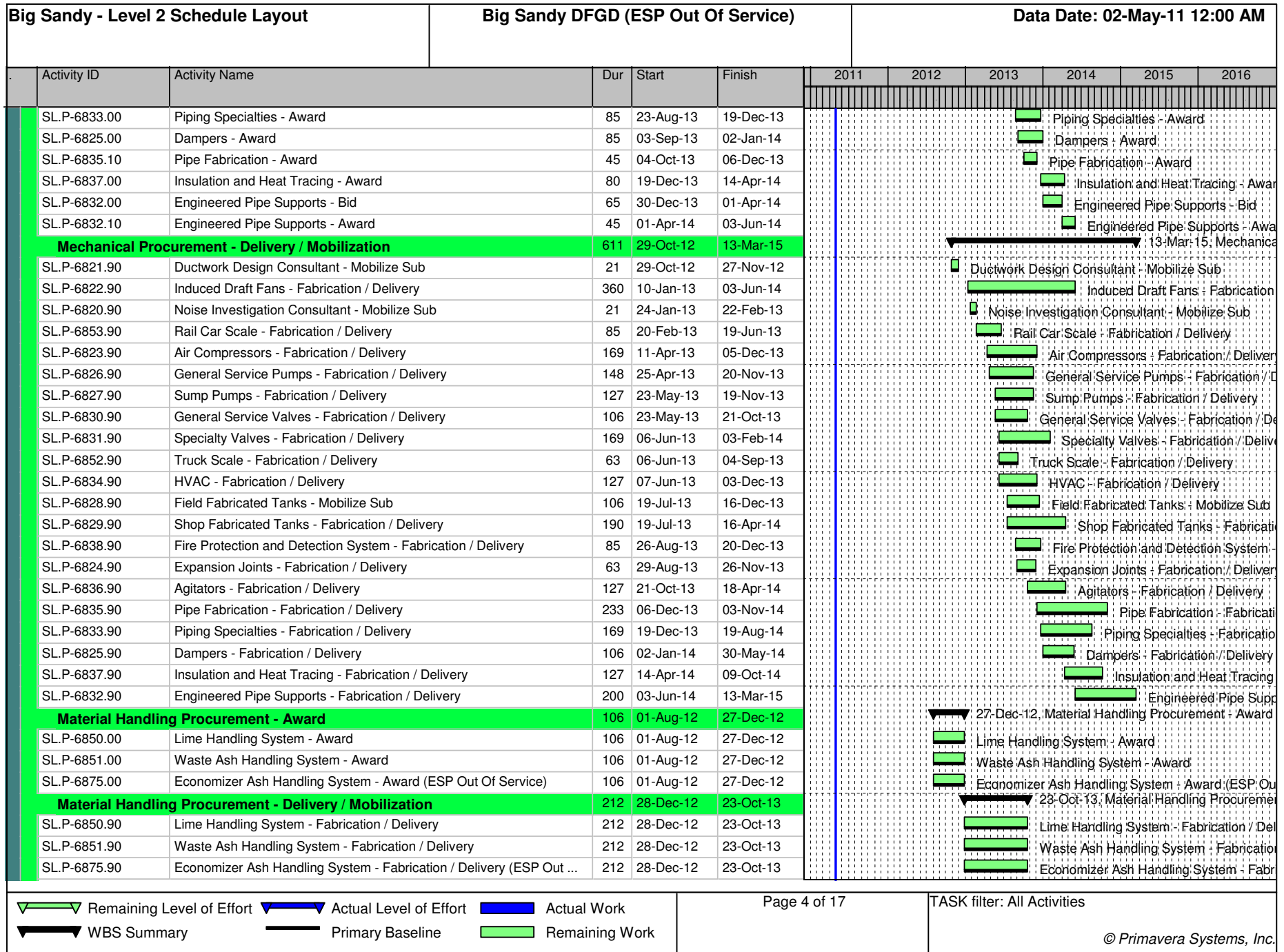
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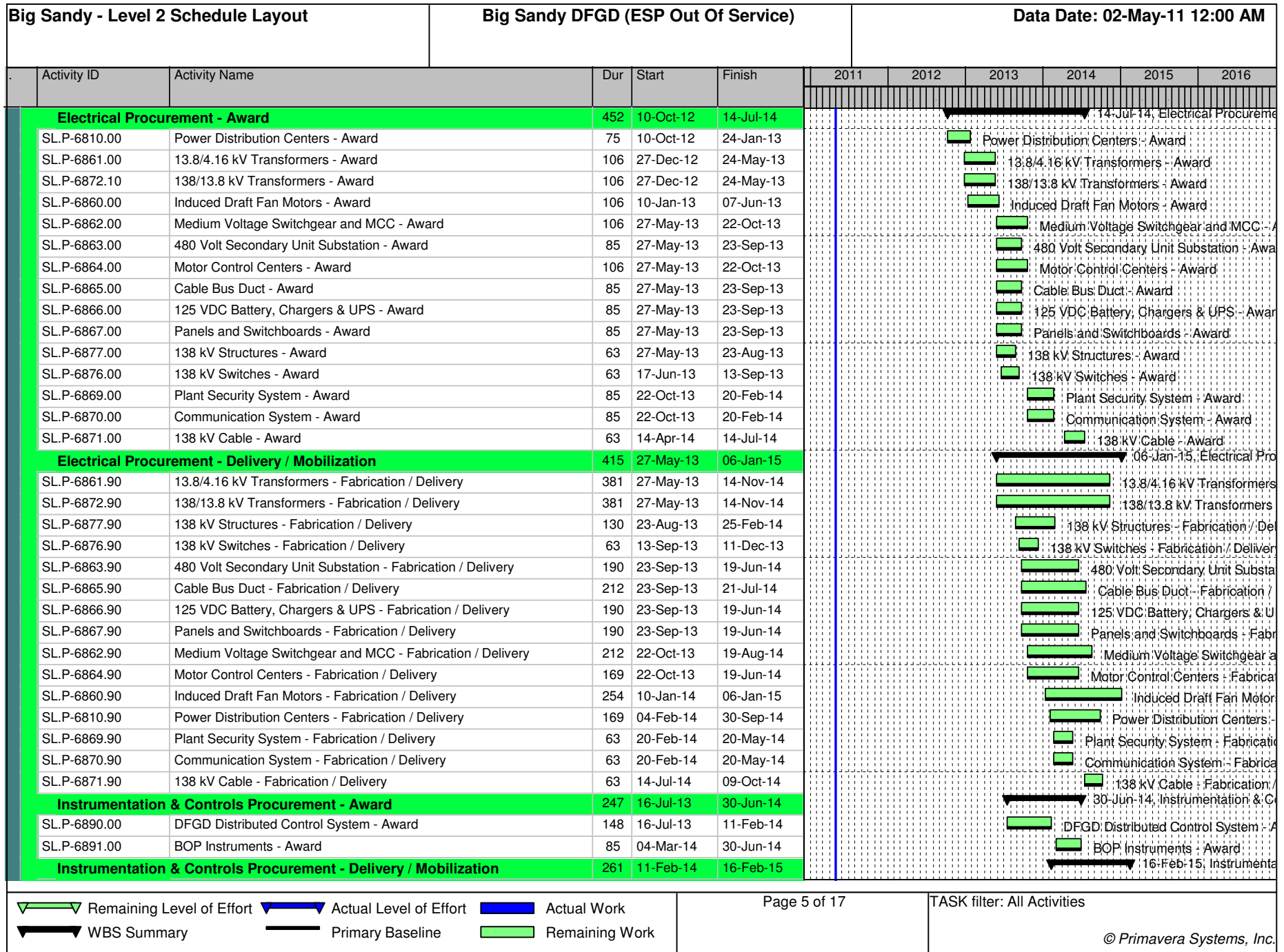
ATTACHMENT 3-15
Project Schedule (DFGD – ESP not in Service)

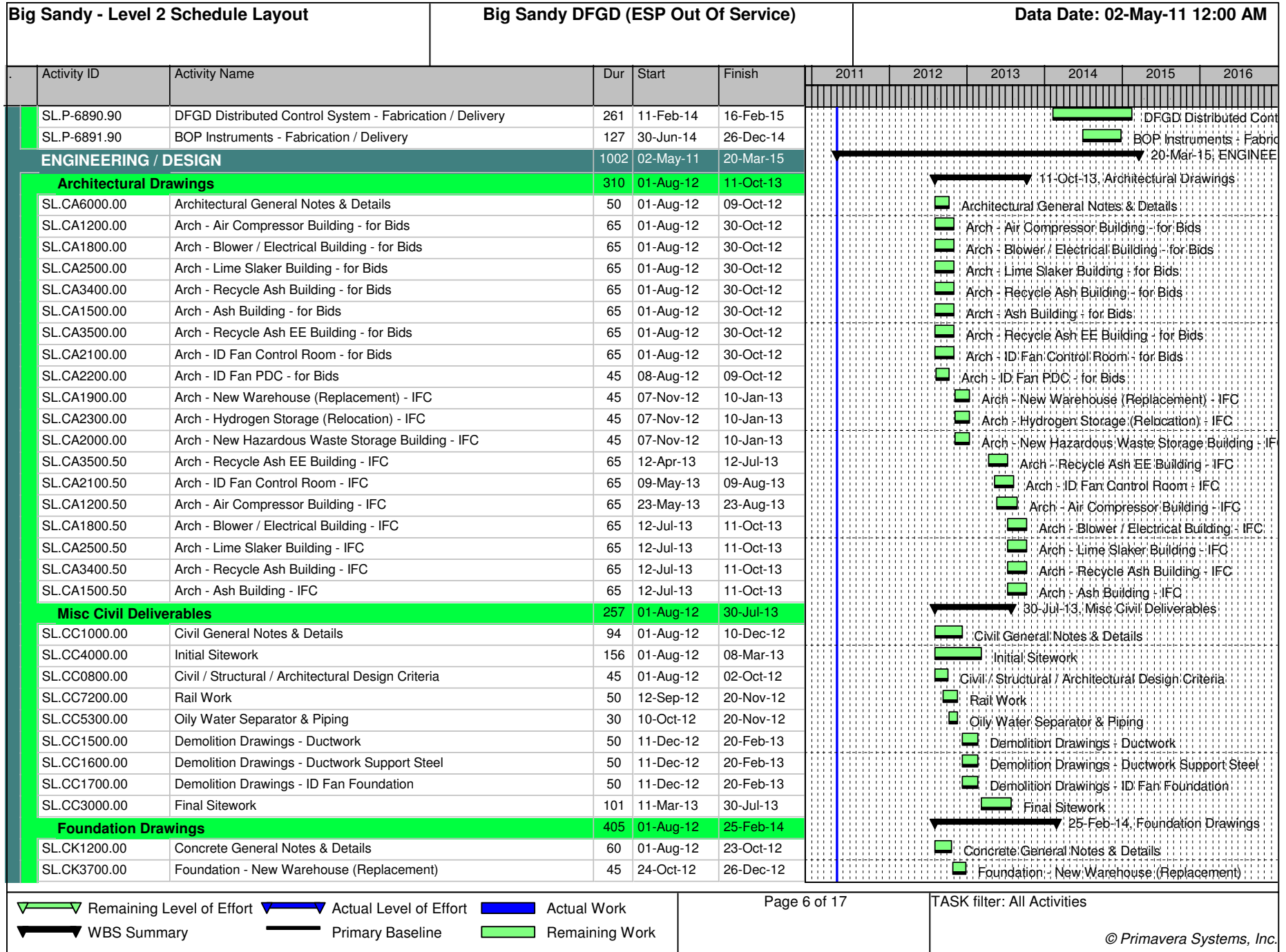


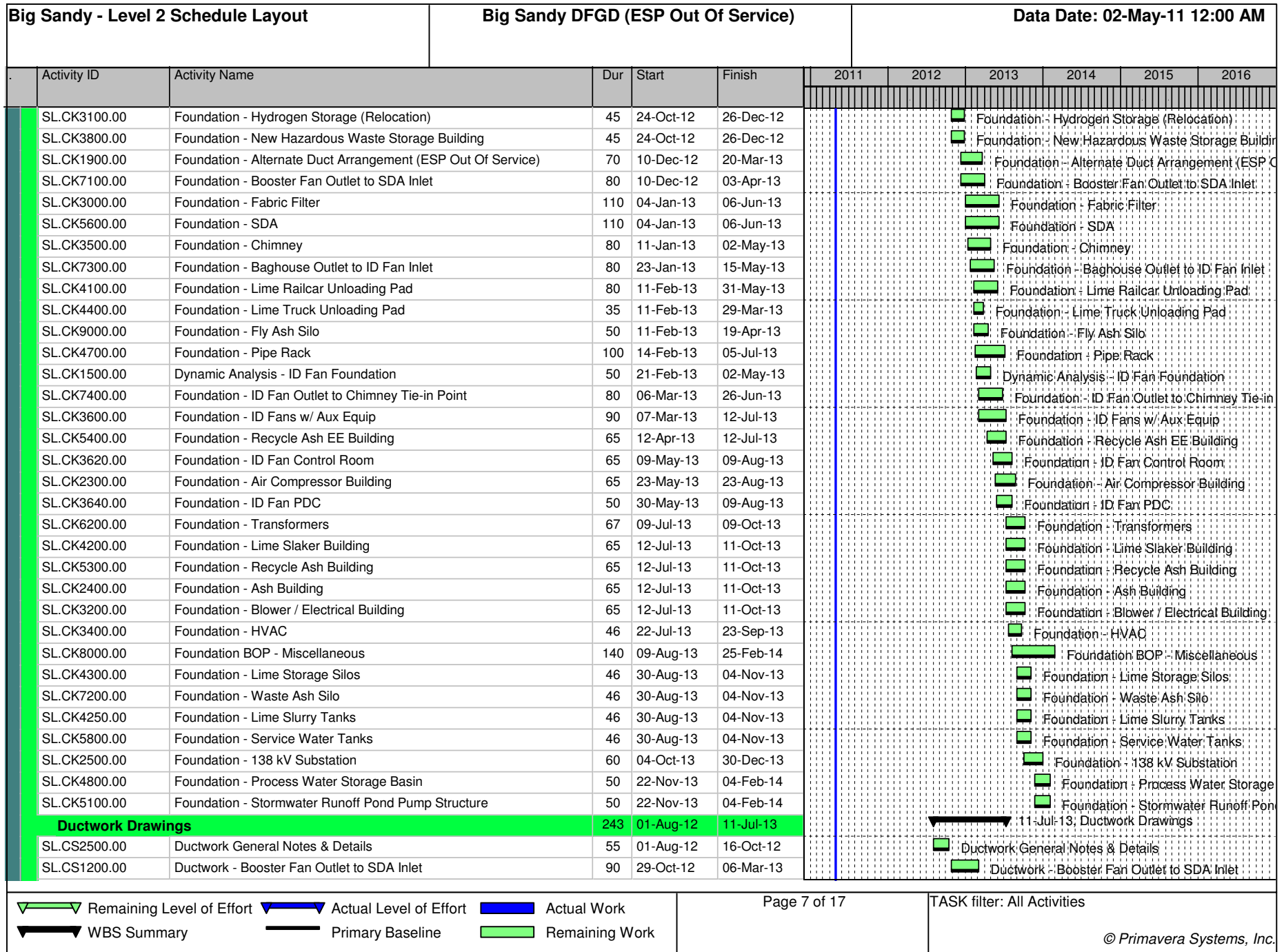


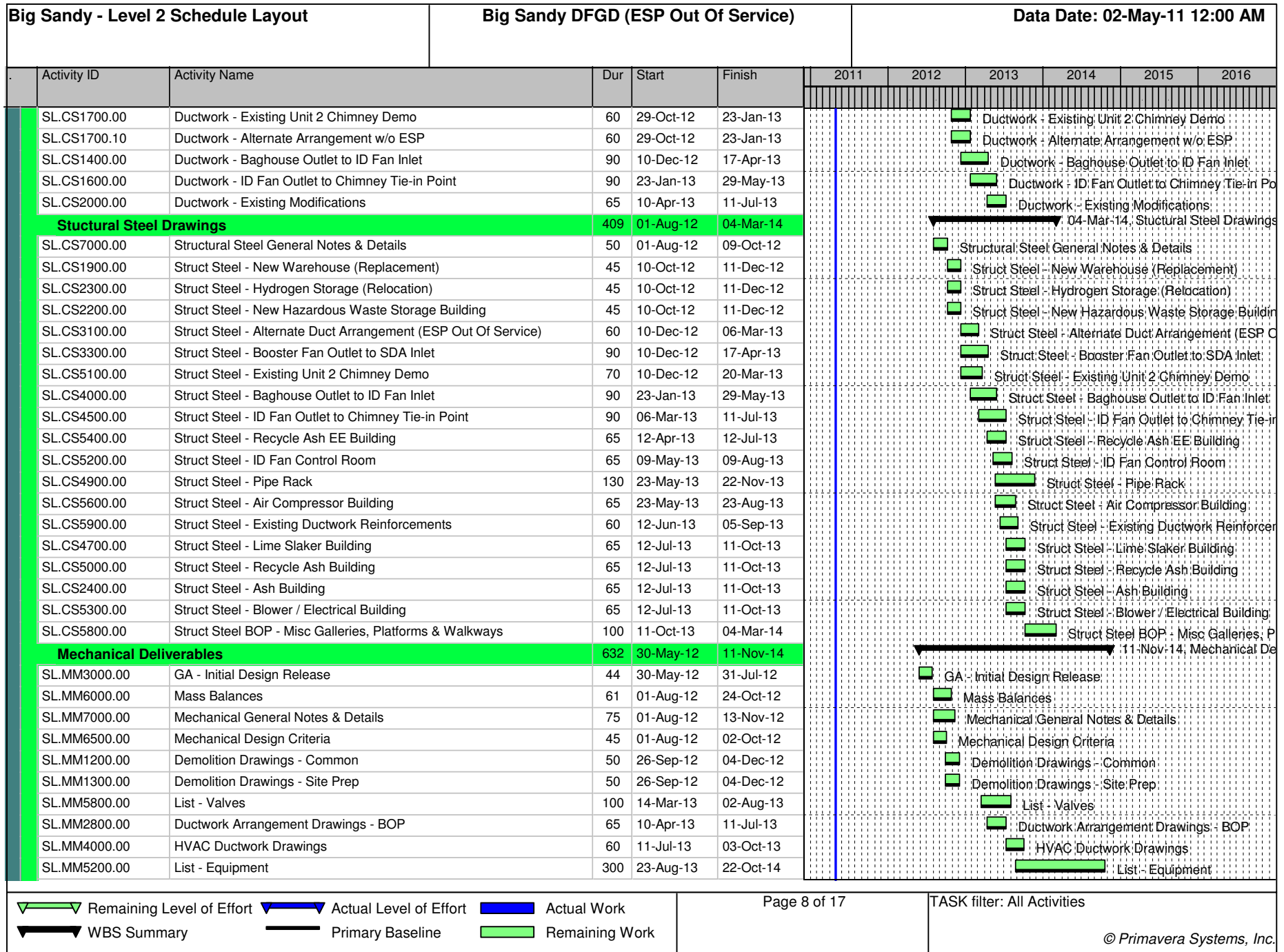


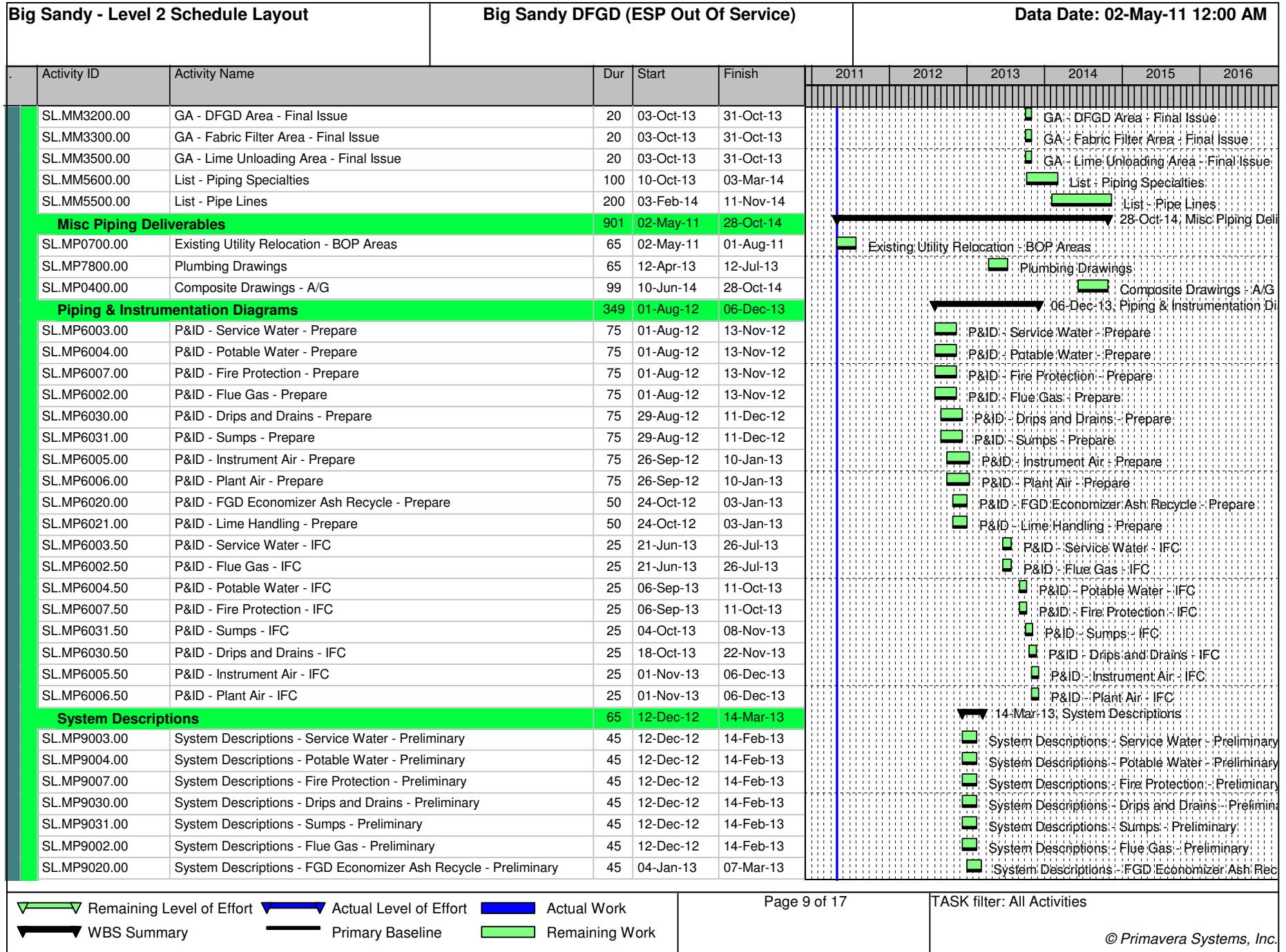


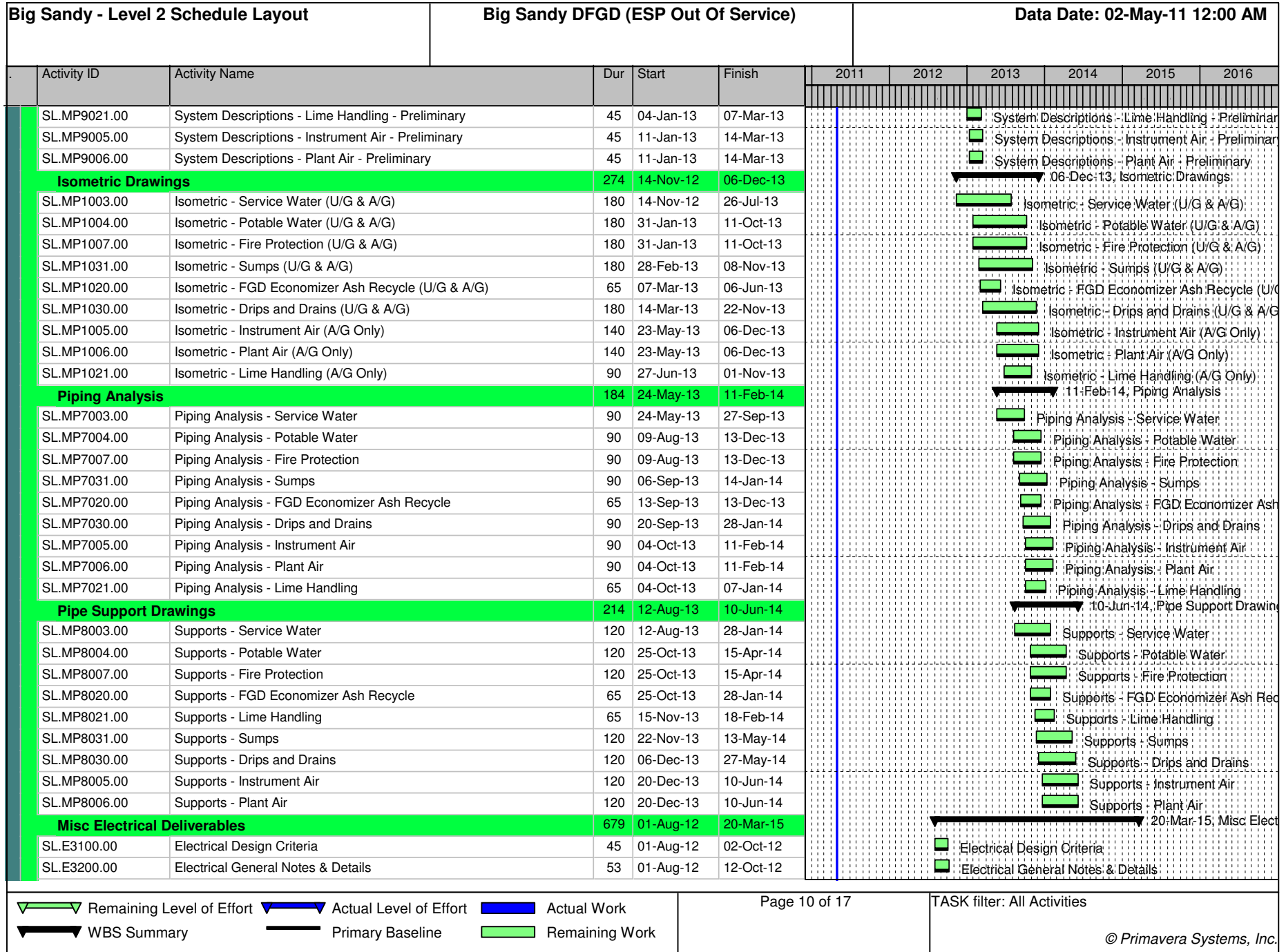


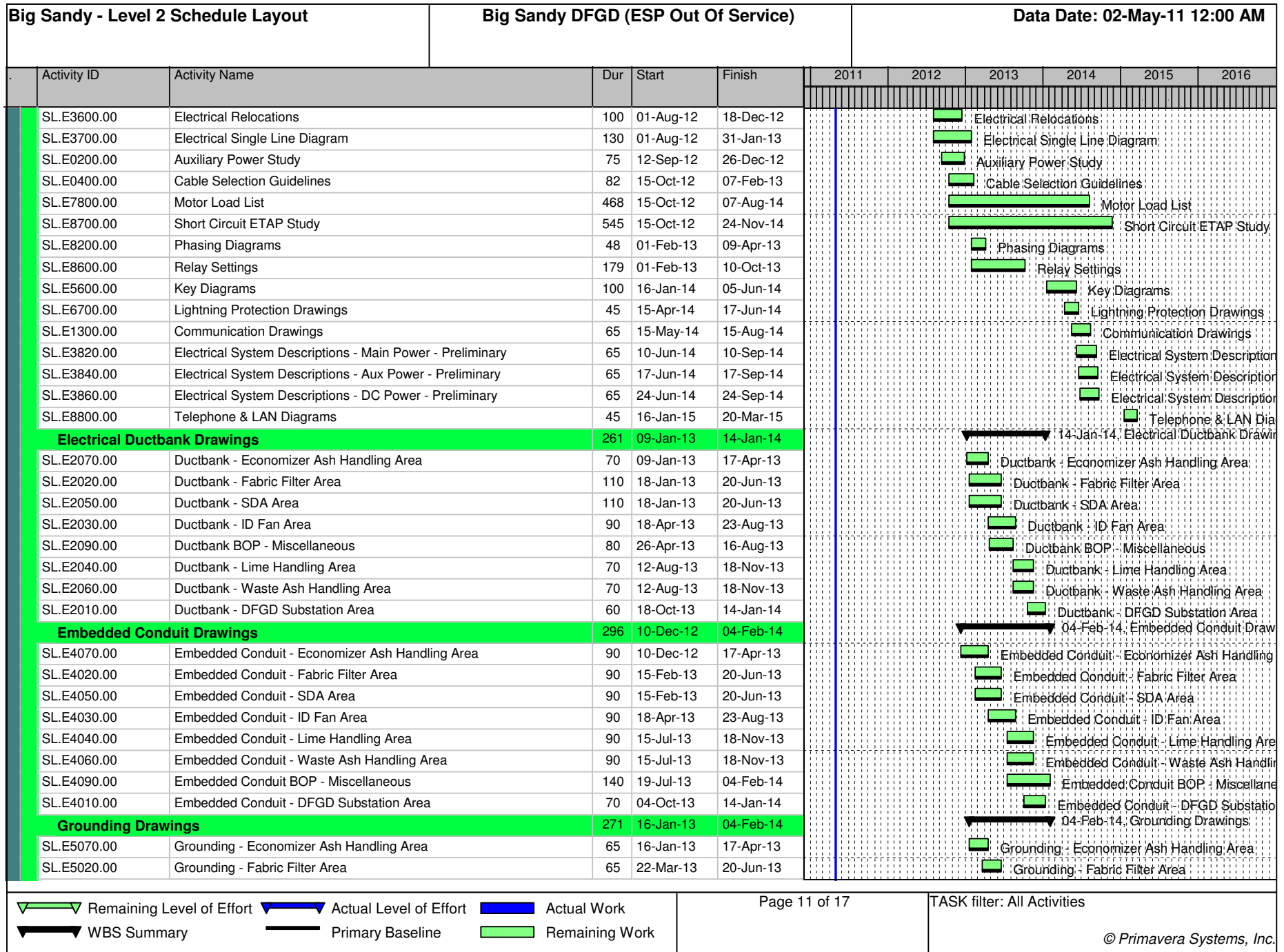


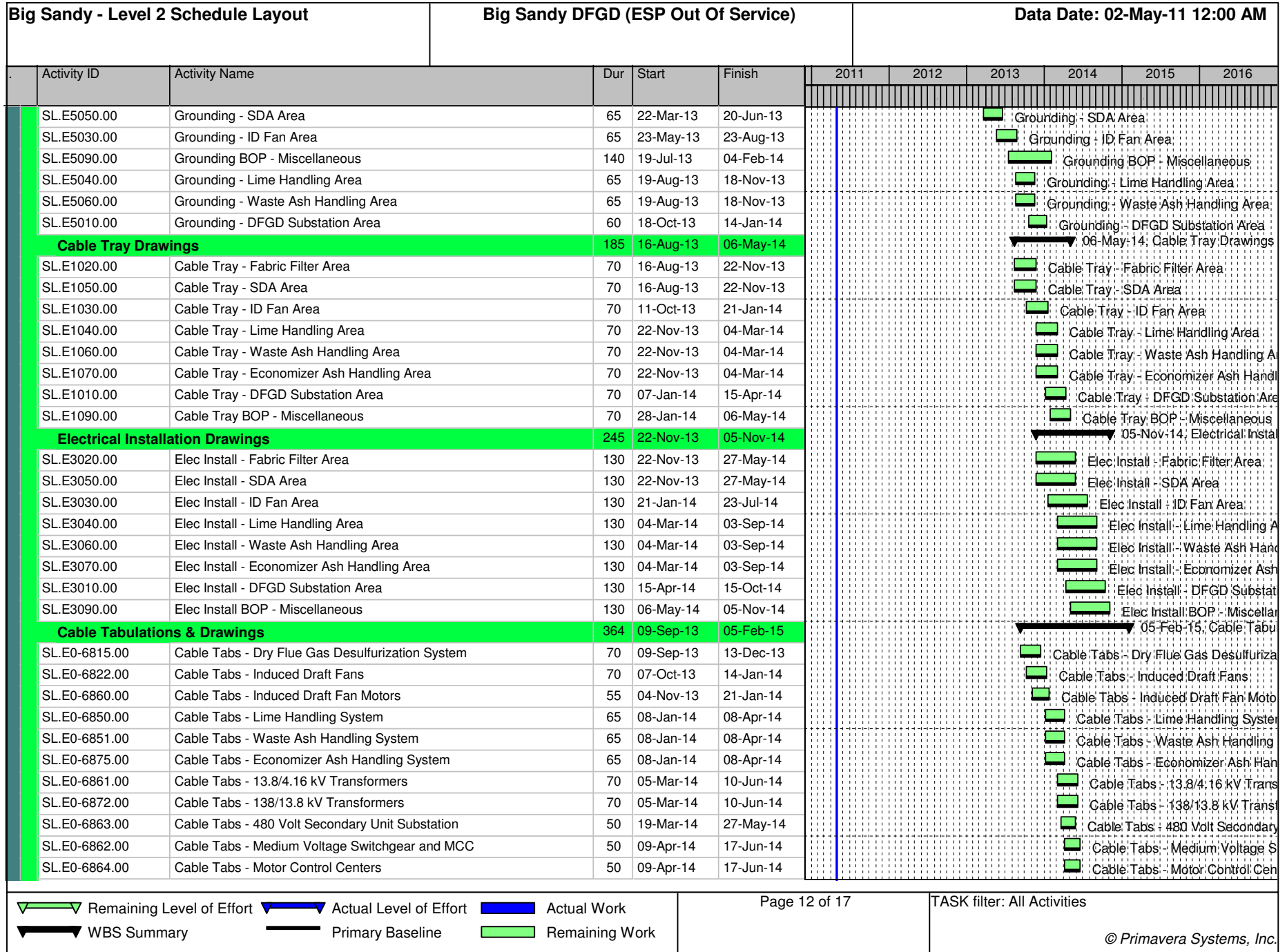


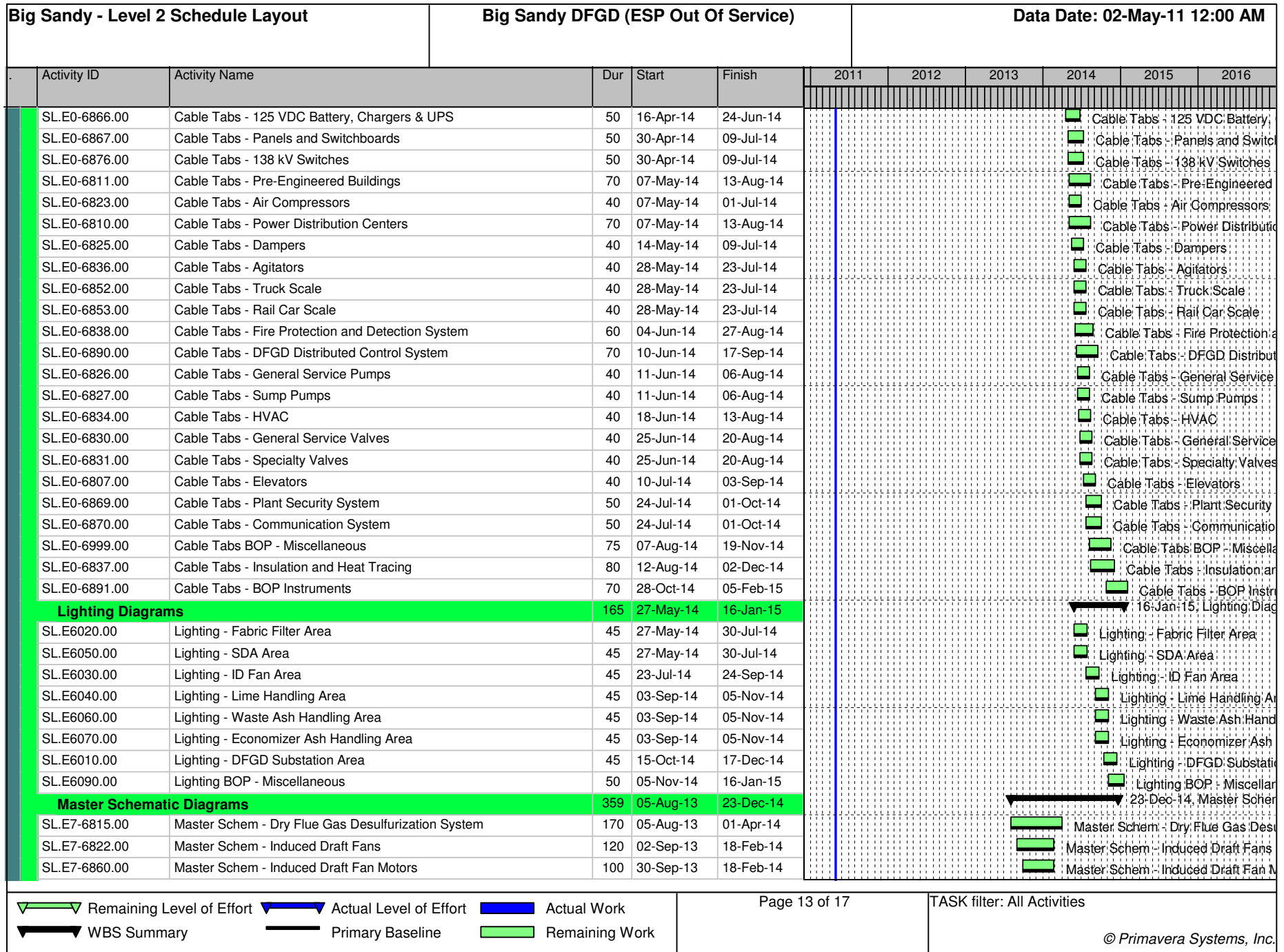












Big Sandy - Level 2 Schedule Layout			Big Sandy DFGD (ESP Out Of Service)			Data Date: 02-May-11 12:00 AM												
	Activity ID	Activity Name	Dur	Start	Finish	2011		2012		2013		2014		2015		2016		
	SL.E7-6850.00	Master Schem - Lime Handling System	100	02-Dec-13	22-Apr-14									Master Schem - Lime Handling Sy				
	SL.E7-6851.00	Master Schem - Waste Ash Handling System	100	02-Dec-13	22-Apr-14									Master Schem - Waste Ash Handl				
	SL.E7-6875.00	Master Schem - Economizer Ash Handling System	100	02-Dec-13	22-Apr-14									Master Schem - Economizer Ash				
	SL.E7-6861.00	Master Schem - 13.8/4.16 kV Transformers	90	29-Jan-14	03-Jun-14									Master Schem - 13.8/4.16 kV Tra				
	SL.E7-6872.00	Master Schem - 138/13.8 kV Transformers	90	29-Jan-14	03-Jun-14									Master Schem - 138/13.8 kV Tra				
	SL.E7-6863.00	Master Schem - 480 Volt Secondary Unit Substation	105	12-Feb-14	09-Jul-14									Master Schem - 480 Volt Secor				
	SL.E7-6862.00	Master Schem - Medium Voltage Switchgear and MCC	127	05-Mar-14	29-Aug-14									Master Schem - Medium Volta				
	SL.E7-6864.00	Master Schem - Motor Control Centers	105	05-Mar-14	30-Jul-14									Master Schem - Motor Control				
	SL.E7-6866.00	Master Schem - 125 VDC Battery, Chargers & UPS	120	12-Mar-14	27-Aug-14									Master Schem - 125 VDC Bat				
	SL.E7-6867.00	Master Schem - Panels and Switchboards	120	26-Mar-14	10-Sep-14									Master Schem - Panels and \$				
	SL.E7-6876.00	Master Schem - 138 kV Switches	75	26-Mar-14	09-Jul-14									Master Schem - 138 kV Switche				
	SL.E7-6810.00	Master Schem - Power Distribution Centers	90	02-Apr-14	06-Aug-14									Master Schem - Power Distrib				
	SL.E7-6823.00	Master Schem - Air Compressors	65	02-Apr-14	01-Jul-14									Master Schem - Air Compresso				
	SL.E7-6811.00	Master Schem - Pre-Engineered Buildings	90	02-Apr-14	06-Aug-14									Master Schem - Pre-Engineer				
	SL.E7-6825.00	Master Schem - Dampers	60	09-Apr-14	01-Jul-14									Master Schem - Dampers				
	SL.E7-6836.00	Master Schem - Agitators	60	23-Apr-14	16-Jul-14									Master Schem - Agitators				
	SL.E7-6852.00	Master Schem - Truck Scale	50	23-Apr-14	01-Jul-14									Master Schem - Truck Scale				
	SL.E7-6853.00	Master Schem - Rail Car Scale	50	23-Apr-14	01-Jul-14									Master Schem - Rail Car Scale				
	SL.E7-6838.00	Master Schem - Fire Protection and Detection System	90	30-Apr-14	03-Sep-14									Master Schem - Fire Protectio				
	SL.E7-6890.00	Master Schem - DFGD Distributed Control System	128	06-May-14	03-Nov-14									Master Schem - DFGD Dis				
	SL.E7-6826.00	Master Schem - General Service Pumps	65	07-May-14	06-Aug-14									Master Schem - General Servi				
	SL.E7-6827.00	Master Schem - Sump Pumps	77	07-May-14	22-Aug-14									Master Schem - Sump Pumps				
	SL.E7-6834.00	Master Schem - HVAC	60	14-May-14	06-Aug-14									Master Schem - HVAC				
	SL.E7-6830.00	Master Schem - General Service Valves	65	21-May-14	20-Aug-14									Master Schem - General Serv				
	SL.E7-6831.00	Master Schem - Specialty Valves	65	21-May-14	20-Aug-14									Master Schem - Specialty Val				
	SL.E7-6807.00	Master Schem - Elevators	55	04-Jun-14	20-Aug-14									Master Schem - Elevators				
	SL.E7-6869.00	Master Schem - Plant Security System	60	18-Jun-14	10-Sep-14									Master Schem - Plant Securit				
	SL.E7-6870.00	Master Schem - Communication System	60	18-Jun-14	10-Sep-14									Master Schem - Communicat				
	SL.E7-6999.00	Master Schem BOP - Miscellaneous	95	02-Jul-14	12-Nov-14									Master Schem BOP - Misc				
	SL.E7-6837.00	Master Schem - Insulation and Heat Tracing	60	08-Jul-14	30-Sep-14									Master Schem - Insulation a				
	SL.E7-6891.00	Master Schem - BOP Instruments	65	23-Sep-14	23-Dec-14									Master Schem - BOP Inst				
	Wiring Diagrams			259	19-Feb-14	19-Feb-15	 19-Feb-15, Wiring Diag											
	SL.E9-6822.00	Wiring - Induced Draft Fans	80	19-Feb-14	10-Jun-14										Wiring - Induced Draft Fans			
	SL.E9-6860.00	Wiring - Induced Draft Fan Motors	55	19-Feb-14	06-May-14										Wiring - Induced Draft Fan Motors			
SL.E9-6815.00	Wiring - Dry Flue Gas Desulfurization System	60	02-Apr-14	24-Jun-14										Wiring - Dry Flue Gas Desulfuriz				
SL.E9-6850.00	Wiring - Lime Handling System	45	23-Apr-14	24-Jun-14										Wiring - Lime Handling System				

 Remaining Level of Effort Actual Level of Effort Actual Work

 WBS Summary Primary Baseline Remaining Work

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TASK filter: All Activities

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