

Appendix A
Analytical Data

COAL

Coal Type: Bituminous

<u>Coal analysis, wt% as received</u>		<u>Ash analysis, wt% ash</u>	
Carbon	73.68	Li ₂ O	0.02
Hydrogen	4.77	Na ₂ O	0.65
Nitrogen	1.47	K ₂ O	1.73
Oxygen	5.18	MgO	0.78
Sulfur	1.75	CaO	2.83
Moisture	6.46	Fe ₂ O ₃	18.26
Ash	6.69	Al ₂ O ₃	23.47
HHV	13,096 Btu / lb	SiO ₂	47.44
		TiO ₂	0.96
HHV	13,344 Btu / lb	P ₂ O ₅	0.50
	<i>(Calculated by ESPert)</i>	SO ₃	2.48
		Unknown	0.87

Average of the analyses of the daily cumulative samples.

ASH

<u>Ash analysis, wt% as received</u>		<u>Ash analysis, wt% ash</u>	
Carbon	2.40	Li ₂ O	0.02
Sulfur	0.45	Na ₂ O	0.66
Moisture	0.46	K ₂ O	1.70
Ash	96.87	MgO	0.75
		CaO	2.66
		Fe ₂ O ₃	17.37
		Al ₂ O ₃	23.19
		SiO ₂	47.63
		TiO ₂	1.07
		P ₂ O ₅	0.49
		SO ₃	1.13
		Unknown	3.32

Average of the analyses of the test samples.

FLY ASH RESISTIVITY

<u>Port</u>	<u>Samples Collected from North-Side</u>				<u>Samples Collected from South-Side</u>			
	<u>October 17</u>		<u>October 18</u>		<u>October 19</u>		<u>October 20</u>	
	<u>Temp, °F</u>	<u>Resistivity 10¹⁰ Ohm</u>	<u>Temp, °F</u>	<u>Resistivity 10¹⁰ Ohm</u>	<u>Temp, °F</u>	<u>Resistivity 10¹⁰ Ohm</u>	<u>Temp, °F</u>	<u>Resistivity 10¹⁰ Ohm</u>
B	297	4.49	302	13.9	289	2.02	295	2.20
D	291	3.90	293	4.74	299	2.93	302	4.67
F	288	2.09	297	4.23	293	3.87	292	1.98
H	299	2.68	305	3.86	277	2.07	280	2.29
J	289	3.02	297	3.30	295	3.43	300	2.25
L	278	1.72	278	1.37	304	3.69	300	2.58

PARTICLE SIZE DATA

Date: October 17, 1995
 Time: 1240 to 1655 hours
 Source: North-Side, "B"

<u>ESP Inlet</u>			<u>ESP Exit</u>		
<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>	<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>
1	7.5	75.36	Pre	7.6	20.69
2	3.5	94.14	1	4.5	38.28
3	2.5	97.60	2	2.8	55.86
4	1.1	98.90	3	1.8	76.55
5	0.64	99.35	4	1.1	80.69
Filter	0.32	100.00	5	0.73	86.55
			6	0.44	90.00
			7	0.19	92.76
			Filter	0.09	100.00

Date: October 18, 1995
 Time: 1018 to 1724 hours
 Source: North-Side, "B"

<u>ESP Inlet</u>			<u>ESP Exit</u>		
<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>	<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>
1	7.5	79.26	Pre	7.3	14.52
2	3.5	95.60	1	4.3	24.19
3	2.5	98.42	2	2.7	38.31
4	1.1	99.10	3	1.8	60.48
5	0.62	99.42	4	1.1	66.94
Filter	0.31	100.00	5	0.69	74.19
			6	0.42	79.44
			7	0.17	85.08
			Filter	0.08	100.00

Date: October 19, 1955
 Time: 1120 to 1540 hours
 Source: South-Side, "A"

<u>ESP Inlet</u>			<u>ESP Exit</u>		
<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>	<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>
1	7.2	85.19	Pre	7.3	15.42
2	3.3	95.56	1	4.3	23.35
3	2.3	98.10	2	2.7	37.89
4	1.0	99.11	3	1.8	54.19
5	0.59	99.42	4	1.1	66.52
Filter	0.30	100.00	5	0.69	73.13
			6	0.42	76.21
			7	0.17	83.26
			Filter	0.09	100.00

Date: October 20, 1995
 Time: 1121 to 1430 hours
 Source: South-Side, "A"

<u>ESP Inlet</u>			<u>ESP Exit</u>		
<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>	<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>
1	7.3	81.43	Pre	6.9	14.29
2	3.4	96.80	1	4.0	23.67
3	2.4	98.94	2	2.5	36.73
4	1.1	99.40	3	1.7	60.82
5	0.60	99.57	4	1.0	78.78
Filter	0.30	100.00	5	0.63	88.98
			6	0.39	95.51
			7	0.15	97.96
			Filter	0.07	100.00

Appendix A
Analytical Data

COAL

Coal Type: Bituminous

<u>Coal analysis, wt% as received</u>		<u>Ash analysis, wt% ash</u>	
Carbon	73.68	Li ₂ O	0.02
Hydrogen	4.77	Na ₂ O	0.65
Nitrogen	1.47	K ₂ O	1.73
Oxygen	5.18	MgO	0.78
Sulfur	1.75	CaO	2.83
Moisture	6.46	Fe ₂ O ₃	18.26
Ash	6.69	Al ₂ O ₃	23.47
HHV	13,096 Btu / lb	SiO ₂	47.44
		TiO ₂	0.96
HHV	13,344 Btu / lb	P ₂ O ₅	0.50
	<i>(Calculated by ESPert)</i>	SO ₃	2.48
		Unknown	0.87

Average of the analyses of the daily cumulative samples.

ASH

<u>Ash analysis, wt% as received</u>		<u>Ash analysis, wt% ash</u>	
Carbon	2.40	Li ₂ O	0.02
Sulfur	0.45	Na ₂ O	0.66
Moisture	0.46	K ₂ O	1.70
Ash	96.87	MgO	0.75
		CaO	2.66
		Fe ₂ O ₃	17.37
		Al ₂ O ₃	23.19
		SiO ₂	47.63
		TiO ₂	1.07
		P ₂ O ₅	0.49
		SO ₃	1.13
		Unknown	3.32

Average of the analyses of the test samples.

FLY ASH RESISTIVITY

<u>Port</u>	<u>Samples Collected from North-Side</u>				<u>Samples Collected from South-Side</u>			
	<u>October 17</u>		<u>October 18</u>		<u>October 19</u>		<u>October 20</u>	
	<u>Temp, °F</u>	<u>Resistivity 10¹⁰ Ohm</u>	<u>Temp, °F</u>	<u>Resistivity 10¹⁰ Ohm</u>	<u>Temp, °F</u>	<u>Resistivity 10¹⁰ Ohm</u>	<u>Temp, °F</u>	<u>Resistivity 10¹⁰ Ohm</u>
B	297	4.49	302	13.9	289	2.02	295	2.20
D	291	3.90	293	4.74	299	2.93	302	4.67
F	288	2.09	297	4.23	293	3.87	292	1.98
H	299	2.68	305	3.86	277	2.07	280	2.29
J	289	3.02	297	3.30	295	3.43	300	2.25
L	278	1.72	278	1.37	304	3.69	300	2.58

PARTICLE SIZE DATA

Date: October 17, 1995
 Time: 1240 to 1655 hours
 Source: North-Side, "B"

<u>ESP Inlet</u>			<u>ESP Exit</u>		
<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>	<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>
1	7.5	75.36	Pre	7.6	20.69
2	3.5	94.14	1	4.5	38.28
3	2.5	97.60	2	2.8	55.86
4	1.1	98.90	3	1.8	76.55
5	0.64	99.35	4	1.1	80.69
Filter	0.32	100.00	5	0.73	86.55
			6	0.44	90.00
			7	0.19	92.76
			Filter	0.09	100.00

Date: October 18, 1995
 Time: 1018 to 1724 hours
 Source: North-Side, "B"

<u>ESP Inlet</u>			<u>ESP Exit</u>		
<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>	<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>
1	7.5	79.26	Pre	7.3	14.52
2	3.5	95.60	1	4.3	24.19
3	2.5	98.42	2	2.7	38.31
4	1.1	99.10	3	1.8	60.48
5	0.62	99.42	4	1.1	66.94
Filter	0.31	100.00	5	0.69	74.19
			6	0.42	79.44
			7	0.17	85.08
			Filter	0.08	100.00

Date: October 19, 1955
 Time: 1120 to 1540 hours
 Source: South-Side, "A"

<u>ESP Inlet</u>			<u>ESP Exit</u>		
<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>	<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>
1	7.2	85.19	Pre	7.3	15.42
2	3.3	95.56	1	4.3	23.35
3	2.3	98.10	2	2.7	37.89
4	1.0	99.11	3	1.8	54.19
5	0.59	99.42	4	1.1	66.52
Filter	0.30	100.00	5	0.69	73.13
			6	0.42	76.21
			7	0.17	83.26
			Filter	0.09	100.00

Date: October 20, 1995
 Time: 1121 to 1430 hours
 Source: South-Side, "A"

<u>ESP Inlet</u>			<u>ESP Exit</u>		
<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>	<u>Stage</u>	<u>D₅₀</u>	<u>Cumulative Percent</u>
1	7.3	81.43	Pre	6.9	14.29
2	3.4	96.80	1	4.0	23.67
3	2.4	98.94	2	2.5	36.73
4	1.1	99.40	3	1.7	60.82
5	0.60	99.57	4	1.0	78.78
Filter	0.30	100.00	5	0.63	88.98
			6	0.39	95.51
			7	0.15	97.96
			Filter	0.07	100.00

Appendix B

Operating Data Collected by the Plant Data Logger

BOILER / OPACITY DATA

Conditions at time of test.

Date: Oct. 17, 1996
 Time: 0935 - 1225
 ESP: North "B"

Generator gross load 158 (79) MW
 Coal rate 54 (27) ton / h
 Heat rate 8,964 Btu / kWh

Electrical Data

TR Set # 2B-1
 Primary voltage 301 V
 Primary current 39.2 A
 Secondary voltage 64.8 kV
 Secondary current 226 mA

Sparking: Yes No
 If Yes, Spark rate 0 sparks / min
 Arcing: Yes No
 Back corona: Yes No
 TR status: On Off Tripped

TR Set # 2B-2
 Primary voltage 397 V
 Primary current 88.5 A
 Secondary voltage 64.8 kV
 Secondary current 477 mA

Sparking: Yes No
 If Yes, Spark rate 0 sparks / min
 Arcing: Yes No
 Back corona: Yes No
 TR status: On Off Tripped

TR Set # 2B-3
 Primary voltage 428 V
 Primary current 123.0 A
 Secondary voltage 62.6 kV
 Secondary current 688 mA

Sparking: Yes No
 If Yes, Spark rate 0.6 sparks / min
 Arcing: Yes No
 Back corona: Yes No
 TR status: On Off Tripped

* Indicated values were measured during the performance testing.

() Enclosed value was used in *ESPerT* for proper sizing since parallel units were tested and evaluated separately.

[] Used enclosed value per recommendation of *ESPerT* developer.

Physical Data / Particle Size

Particle density	<u>2,300</u> kg / m ³	Gas sneakage factor	<u>[0.05]</u>
TR set peak to ave. voltage ratio	<u>[1.2]</u> (Typically 1.2 for full wave / 1.6 for half wave)	Gas velocity sigma	<u>[0.15]</u>
No. of size band end points	<u>6 [21]</u> (No. of particle size fractions)	Particle size data: Mass Mean	<input checked="" type="checkbox"/>
		Cumulative %	<input type="checkbox"/>
		Mass mean diameter	<u>11.0</u> micron
		Standard deviation	<u>2.3</u>

Particle Size Data (ESPerT Default Values)

	Mass Mean, <u>micron</u>		Mass Mean, <u>micron</u>
1.	<u>0.01</u>	12.	<u>2.80</u>
2.	<u>0.10</u>	13.	<u>3.80</u>
3.	<u>0.14</u>	14.	<u>5.00</u>
4.	<u>0.20</u>	15.	<u>7.00</u>
5.	<u>0.28</u>	16.	<u>10.00</u>
6.	<u>0.38</u>	17.	<u>14.00</u>
7.	<u>0.50</u>	18.	<u>20.00</u>
8.	<u>0.70</u>	19.	<u>28.00</u>
9.	<u>1.00</u>	20.	<u>38.00</u>
10.	<u>1.40</u>	21.	<u>100.00</u>
11.	<u>2.00</u>		

Test Conditions

Inlet gas flow	<u>(266,112)*</u> acfm	Pressure in duct	<u>28.55*</u> inches of Hg
Inlet mass loading	<u>2.11*</u> gr / acf	In-situ resistivity	<u>3 x 10¹⁰ *</u> Ohm-cm
Water	<u>6.15*</u> %	Efficiency	<u>99.88*</u> %
Oxygen	<u>5.9*</u> %	Outlet mass loading	<u>0.0025*</u> gr / acf

Boiler / Opacity Test Data

Inlet duct temp. at ESP	<u>291*</u> °F	Average opacity	<u>2.05</u> %
Average temp. leaving	<u>294.3</u> °F	Maximum opacity	<u>2.65</u> %
Air heater B		SO ₃ gas conditioning	<u>0</u> ppm
Average temp. exiting	<u>285.9</u> °F	Soot blowing: Operating	<input checked="" type="checkbox"/> Off <input type="checkbox"/>

Date: Oct. 18, 1996
Time: 0835 - 1142
ESP: North "B"

Generator gross load 158 (79) MW
Coal rate 54 (27) ton / h
Heat rate 8,985 Btu / kWh

* Indicated values were measured during the performance testing.

() Enclosed value was used in ESPerT for proper sizing since parallel units were tested and evaluated separately.

[] Used enclosed value per recommendation of ESPerT developer.

Electrical Data

TR Set # 2-B1
Primary voltage 291 V
Primary current 35.6 A
Secondary voltage 64.8 kV
Secondary current 205 mA

Sparking: Yes No
If Yes, Spark rate 0.1 sparks / min
Arcing: Yes No
Back corona: Yes No
TR status: On Off Tripped

TR Set # 2-B2
Primary voltage 394 V
Primary current 85.3 A
Secondary voltage 64.7 kV
Secondary current 461 mA

Sparking: Yes No
If Yes, Spark rate 0.6 sparks / min
Arcing: Yes No
Back corona: Yes No
TR status: On Off Tripped

TR Set # 2-B3
Primary voltage 422 V
Primary current 126.1 A
Secondary voltage 61.8 kV
Secondary current 672 mA

Sparking: Yes No
If Yes, Spark rate 14.3 sparks / min
Arcing: Yes No
Back corona: Yes No
TR status: On Off Tripped

Physical Data / Particle Size

Particle density 2.300 kg / m³
TR set peak to ave. voltage ratio [1.2]
(Typically 1.2 for full wave / 1.6 for half wave)

No. of size band end points 6 [21]
(No. of particle size fractions)

Gas sneakage factor [0.05]
Gas velocity sigma [0.15]
Particle size data: Mass Mean
Cumulative %
Mass mean diameter 11.5 micron
Standard deviation 2.4

* Indicated values were measured during the performance testing.

() Enclosed value was used in *ESPerT* for proper sizing since parallel units were tested and evaluated separately.

[] Used enclosed value per recommendation of *ESPerT* developer.

Particle Size Data (ESPerT Default Values)

	<u>Mass Mean, micron</u>		<u>Mass Mean, micron</u>
1.	<u>0.01</u>		12. <u>2.80</u>
2.	<u>0.10</u>		13. <u>3.80</u>
3.	<u>0.14</u>		14. <u>5.00</u>
4.	<u>0.20</u>		15. <u>7.00</u>
5.	<u>0.28</u>		16. <u>10.00</u>
6.	<u>0.38</u>		17. <u>14.00</u>
7.	<u>0.50</u>		18. <u>20.00</u>
8.	<u>0.70</u>		19. <u>28.00</u>
9.	<u>1.00</u>		20. <u>38.00</u>
10.	<u>1.40</u>		21. <u>100.00</u>
11.	<u>2.00</u>		

Test Conditions

Inlet gas flow	<u>(277,304)*</u> acfm	Pressure in duct	<u>28.27*</u> inches of Hg
Inlet mass loading	<u>1.38*</u> gr / acf	In-situ resistivity	<u>3×10^{10}*</u> Ohm-cm
Water	<u>7.14*</u> %	Efficiency	<u>99.85*</u> %
Oxygen	<u>5.6*</u> %	Outlet mass loading	<u>0.0021*</u> gr / acf

Boiler / Opacity Test Data

Inlet duct temp. at ESP	<u>292*</u> °F	Average opacity	<u>2.65</u> %
Average temp. leaving Air heater B	<u>298.1</u> °F	Maximum opacity	<u>2.84</u> %
Average temp. exiting	<u>291.2</u> °F	SO ₃ gas conditioning	<u>0</u> ppm
		Soot blowing:	Operating <input checked="" type="checkbox"/> Off <input type="checkbox"/>

Date: Oct. 18, 1996
Time: 1220 - 1520
ESP: North "B"

Generator gross load 158 (79) MW
Coal rate 54 (27) ton / h
Heat rate 8,985 Btu / kWh

Electrical Data

TR Set #	<u>2-B1</u>	Sparking:	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Primary voltage	<u>289</u> V	If Yes, Spark rate	<u>0.1</u> sparks / min
Primary current	<u>34.4</u> A	Arcing:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Secondary voltage	<u>64.8</u> kV	Back corona:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Secondary current	<u>199</u> mA	TR status:	On <input checked="" type="checkbox"/> Off <input type="checkbox"/> Tripped <input type="checkbox"/>

* Indicated values were measured during the performance testing.

() Enclosed value was used in ESPerT for proper sizing since parallel units were tested and evaluated separately.

[] Used enclosed value per recommendation of ESPerT developer.

TR Set # 2-B2
 Primary voltage 399 V
 Primary current 87.9 A
 Secondary voltage 64.7 kV
 Secondary current 473 mA

Sparking: Yes No
 If Yes, Spark rate 0.6 sparks / min
 Arcing: Yes No
 Back corona: Yes No
 TR status: On Off Tripped

TR Set # 2-B3
 Primary voltage 418 V
 Primary current 199.4 A
 Secondary voltage 61.2 kV
 Secondary current 668 mA

Sparking: Yes No
 If Yes, Spark rate 14.3 sparks / min
 Arcing: Yes No
 Back corona: Yes No
 TR status: On Off Tripped

Physical Data / Particle Size

Particle density 2.300 kg / m³
 TR set peak to ave. voltage ratio [1.2]
 (Typically 1.2 for full wave / 1.6 for half wave)

Gas sneakage factor [0.05]
 Gas velocity sigma [0.15]

No. of size band end points 6 [21]
 (No. of particle size fractions)

Particle size data: Mass Mean
 Cumulative %
 Mass mean diameter 11.5 micron
 Standard deviation 2.4

Particle Size Data (ESPert Default Values)

	Mass Mean, <u>micron</u>		Mass Mean, <u>micron</u>
1.	<u>0.01</u>	12.	<u>2.80</u>
2.	<u>0.10</u>	13.	<u>3.80</u>
3.	<u>0.14</u>	14.	<u>5.00</u>
4.	<u>0.20</u>	15.	<u>7.00</u>
5.	<u>0.28</u>	16.	<u>10.00</u>
6.	<u>0.38</u>	17.	<u>14.00</u>
7.	<u>0.50</u>	18.	<u>20.00</u>
8.	<u>0.70</u>	19.	<u>28.00</u>
9.	<u>1.00</u>	20.	<u>38.00</u>
10.	<u>1.40</u>	21.	<u>100.00</u>
11.	<u>2.00</u>		

* Indicated values were measured during the performance testing.
 () Enclosed value was used in ESPert for proper sizing since parallel units were tested and evaluated separately.
 [] Used enclosed value per recommendation of ESPert developer.

Test Conditions

Inlet gas flow	<u>(280,126)*</u> acfm	Pressure in duct	<u>28.24*</u> inches of Hg
Inlet mass loading	<u>1.35*</u> gr / acf	In-situ resistivity	<u>3×10^{10}*</u> Ohm-cm
Water	<u>7.69*</u> %	Efficiency	<u>99.89*</u> %
Oxygen	<u>6.0*</u> %	Outlet mass loading	<u>0.0015*</u> gr / acf

Boiler / Opacity Test Data

Inlet duct temp. at ESP	<u>296*</u> °F	Average opacity	<u>2.20</u> %
Average temp. leaving	<u>298.1</u> °F	Maximum opacity	<u>2.70</u> %
Air heater B		SO ₃ gas conditioning	<u>0</u> ppm
Average temp. exiting	<u>291.2</u> °F	Soot blowing: Operating	<input checked="" type="checkbox"/> Off <input type="checkbox"/>

Date: Oct. 19, 1996
Time: 0835 - 1150
ESP: South "A"

Generator gross load 157 (79) MW
Coal rate 54 (27) ton / h
Heat rate 8,984 Btu / kWh

* Indicated values were measured during the performance testing.

() Enclosed value was used in *ESPerT* for proper sizing since parallel units were tested and evaluated separately.

[] Used enclosed value per recommendation of *ESPerT* developer.

Electrical Data

TR Set # 2 - A1
Primary voltage 272 V
Primary current 36.2 A
Secondary voltage 64.8 kV
Secondary current 210 mA

Sparking: Yes No
If Yes, Spark rate -- sparks / min
Arcing: Yes No
Back corona: Yes No
TR status: On Off Tripped

TR Set # 2 - A2
Primary voltage 430 V
Primary current 101.7 A
Secondary voltage 64.4 kV
Secondary current 589 mA

Sparking: Yes No
If Yes, Spark rate 2.8 sparks / min
Arcing: Yes No
Back corona: Yes No
TR status: On Off Tripped

TR Set # 2 - A3
Primary voltage 472 V
Primary current 150.9 A
Secondary voltage 64.7 kV
Secondary current 787 mA

Sparking: Yes No
If Yes, Spark rate 1.2 sparks / min
Arcing: Yes No
Back corona: Yes No
TR status: On Off Tripped

Physical Data / Particle Size

Particle density 2.300 kg / m³
TR set peak to ave. voltage ratio [1.2]
(Typically 1.2 for full wave / 1.6 for half wave)

Gas sneackage factor [0.05]
Gas velocity sigma [0.15]
Particle size data: Mass Mean
Cumulative %
Mass mean diameter 11.5 micron
Standard deviation 2.3

No. of size band end points 6 [21]
(No. of particle size fractions)

* Indicated values were measured during the performance testing.

() Enclosed value was used in *ESPerT* for proper sizing since parallel units were tested and evaluated separately.

[] Used enclosed value per recommendation of *ESPerT* developer.

Particle size data (ESPert Default Values)

	<u>Mass Mean, micron</u>		<u>Mass Mean, micron</u>
1.	<u>0.01</u>	12.	<u>2.80</u>
2.	<u>0.10</u>	13.	<u>3.80</u>
3.	<u>0.14</u>	14.	<u>5.00</u>
4.	<u>0.20</u>	15.	<u>7.00</u>
5.	<u>0.28</u>	16.	<u>10.00</u>
6.	<u>0.38</u>	17.	<u>14.00</u>
7.	<u>0.50</u>	18.	<u>20.00</u>
8.	<u>0.70</u>	19.	<u>28.00</u>
9.	<u>1.00</u>	20.	<u>38.00</u>
10.	<u>1.40</u>	21.	<u>100.00</u>
11.	<u>2.00</u>		

Test Conditions

Inlet gas flow	<u>(267,876)*</u> acfm	Pressure in duct	<u>28.36*</u> inches of Hg
Inlet mass loading	<u>1.50*</u> gr / acf	In-situ resistivity	<u>3 x 10¹⁰ *</u> Ohm-cm
Water	<u>7.58*</u> %	Efficiency	<u>99.92*</u> %
Oxygen	<u>5.7*</u> %	Outlet mass loading	<u>0.0013*</u> gr / acf

Boiler / Opacity Test Data

Inlet duct temp. at ESP	<u>290^A</u> °F	Average opacity	<u>4.04</u> %
Average temp. leaving Air heater B	<u>294.2</u> °F	Maximum opacity	<u>4.62</u> %
Average temp. exiting	<u>283.5</u> °F	SO ₃ gas conditioning	<u>0</u> ppm
		Soot blowing:	Operating <input checked="" type="checkbox"/> Off <input type="checkbox"/>

Date: Oct. 19, 1996
Time: 1150 - 1550
ESP: South "A"

Generator gross load 158 (79) MW
Coal rate 54 (27) ton / h
Heat rate 8,967 Btu / kWh

Electrical Data

TR Set #	<u>2 - A1</u>	Sparking:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Primary voltage	<u>268</u> V	If Yes, Spark rate	<u>--</u> sparks / min
Primary current	<u>34.4</u> A	Arcing:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Secondary voltage	<u>64.8</u> kV	Back corona:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Secondary current	<u>200</u> mA	TR status:	On <input checked="" type="checkbox"/> Off <input type="checkbox"/> Tripped <input type="checkbox"/>

* Indicated values were measured during the performance testing.

Page 55

() Enclosed value was used in ESPert for proper sizing since parallel units were tested and evaluated separately.

[] Used enclosed value per recommendation of ESPert developer.

TR Set # 2 - A2
 Primary voltage 432 V
 Primary current 103.5 A
 Secondary voltage 64.3 kV
 Secondary current 598 mA

Sparking: Yes No
 If Yes, Spark rate 3.2 sparks / min
 Arcing: Yes No
 Back corona: Yes No
 TR status: On Off Tripped

TR Set # 2 - A3
 Primary voltage 474 V
 Primary current 151.9 A
 Secondary voltage 64.6 kV
 Secondary current 792 mA

Sparking: Yes No
 If Yes, Spark rate 1.9 sparks / min
 Arcing: Yes No
 Back corona: Yes No
 TR status: On Off Tripped

Physical Data / Particle Size

Particle density 2,300 kg / m³
 TR set peak to ave. voltage ratio [1.2]
 (Typically 1.2 for full wave / 1.6 for half wave)

Gas sneakage factor [0.05]
 Gas velocity sigma [0.15]
 Particle size data: Mass Mean
 Cumulative %

No. of size band end points 6 [21]
 (No. of particle size fractions)

Mass mean diameter 11.5 micron
 Standard deviation 2.3

Particle Size Data (ESPerf Default Values)

	Mass Mean micron		Mass Mean micron
1.	<u>0.01</u>	12.	<u>2.80</u>
2.	<u>0.10</u>	13.	<u>3.80</u>
3.	<u>0.14</u>	14.	<u>5.00</u>
4.	<u>0.20</u>	15.	<u>7.00</u>
5.	<u>0.28</u>	16.	<u>10.00</u>
6.	<u>0.38</u>	17.	<u>14.00</u>
7.	<u>0.50</u>	18.	<u>20.00</u>
8.	<u>0.70</u>	19.	<u>28.00</u>
9.	<u>1.00</u>	20.	<u>38.00</u>
10.	<u>1.40</u>	21.	<u>100.00</u>
11.	<u>2.00</u>		

Test Conditions

Inlet gas flow (273,387)* acfm
 Inlet mass loading 1.33* gr / acf
 Water 7.90* %
 Oxygen 5.9* %

Pressure in duct 28.46* inches of Hg
 In-situ resistivity 3 x 10¹⁰* Ohm-cm
 Efficiency 99.91* %
 Outlet mass loading 0.0012* gr / acf

* Indicated values were measured during the performance testing.
 () Enclosed value was used in ESPerf for proper sizing since parallel units were tested and evaluated separately.
 [] Used enclosed value per recommendation of ESPerf developer.

Boiler / Opacity Test Data

Inlet duct temp. at ESP 298* °F
Average temp. leaving 299.6 °F
Air heater B
Average temp. exiting 287.6 °F

Average opacity 3.01 %
Maximum opacity 3.77 %
SO₃ gas conditioning 0 ppm
Soot blowing: Operating Off

Date: Oct. 20, 1996
Time: 0815 - 1030
ESP: South "A"

Generator gross load 158 (79) MW
Coal rate 54 (27) ton / h
Heat rate 8,970 Btu / kWh

* Indicated values were measured during the performance testing.
() Enclosed value was used in *ESPerT* for proper sizing since parallel units were tested and evaluated separately.
[] Used enclosed value per recommendation of *ESPerT* developer.

Electrical Data

TR Set # 2 - A1
Primary voltage 268 V
Primary current 34.8 A
Secondary voltage 64.8 kV
Secondary current 202 mA

Sparking: Yes No
If Yes, Spark rate 0 sparks / min
Arcing: Yes No
Back corona: Yes No
TR status: On Off Tripped

TR Set # 2 - A2
Primary voltage 429 V
Primary current 105.1 A
Secondary voltage 63.9 kV
Secondary current 601 mA

Sparking: Yes No
If Yes, Spark rate 5.1 sparks / min
Arcing: Yes No
Back corona: Yes No
TR status: On Off Tripped

TR Set # 2 - A3
Primary voltage 473 V
Primary current 153.8 A
Secondary voltage 64.4 kV
Secondary current 801 mA

Sparking: Yes No
If Yes, Spark rate 3.4 sparks / min
Arcing: Yes No
Back corona: Yes No
TR status: On Off Tripped

Physical Data / Particle Size

Particle density 2.300 kg / m³
TR set peak to ave. voltage ratio [1.2]
(Typically 1.2 for full wave / 1.6 for half wave)

No. of size band end points 6 [21]
(No. of particle size fractions)

Gas sneakage factor [0.05]
Gas velocity sigma [0.15]
Particle size data: Mass Mean
Cumulative %
Mass mean diameter 11.5 micron
Standard deviation 2.4

* Indicated values were measured during the performance testing.

() Enclosed value was used in *ESPerT* for proper sizing since parallel units were tested and evaluated separately.

[] Used enclosed value per recommendation of *ESPerT* developer.

Particle Size Data (ESPerT Default Values)

	Mass Mean micron		Mass Mean micron
1.	<u>0.01</u>	12.	<u>2.80</u>
2.	<u>0.10</u>	13.	<u>3.80</u>
3.	<u>0.14</u>	14.	<u>5.00</u>
4.	<u>0.20</u>	15.	<u>7.00</u>
5.	<u>0.28</u>	16.	<u>10.00</u>
6.	<u>0.38</u>	17.	<u>14.00</u>
7.	<u>0.50</u>	18.	<u>20.00</u>
8.	<u>0.70</u>	19.	<u>28.00</u>
9.	<u>1.00</u>	20.	<u>38.00</u>
10.	<u>1.40</u>	21.	<u>100.00</u>
11.	<u>2.00</u>		

Test Conditions

Inlet gas flow	<u>(284,710)*</u> acfm	Pressure in duct	<u>28.21*</u> inches of Hg
Inlet mass loading	<u>1.44*</u> gr / acf	In-situ resistivity	<u>3×10^{10}*</u> Ohm-cm
Water	<u>7.63*</u> %	Efficiency	<u>99.93*</u> %
Oxygen	<u>5.8*</u> %	Outlet mass loading	<u>0.0012*</u> gr / acf

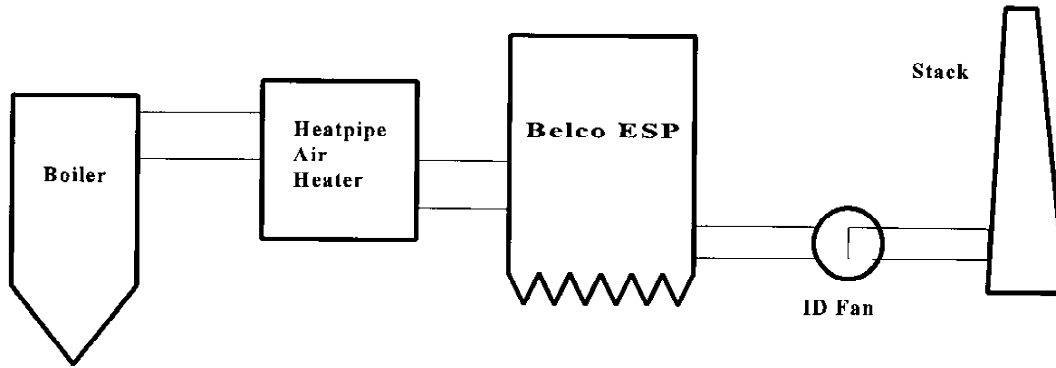
Boiler / Opacity Test Data

Inlet duct temp. at ESP	<u>300*</u> °F	Average opacity	<u>1.37</u> %
Average temp. leaving Air heater B	<u>300.4</u> °F	Maximum opacity	<u>1.67</u> %
Average temp. exiting	<u>288.0</u> °F	SO ₃ gas conditioning	<u>0</u> ppm
		Soot blowing:	Operating <input checked="" type="checkbox"/> Off <input type="checkbox"/>

* Indicated values were measured during the performance testing.

() Enclosed value was used in ESPerT for proper sizing since parallel units were tested and evaluated separately.

[] Used enclosed value per recommendation of ESPerT developer.



High voltage damping resistor between TR and ESP: Yes No

Manual override control available: Yes No

Alarms And Fault Detectors

TR high temperature: Yes No

TR high pressure: Yes No

Spark detection: Yes No

Console high temp.: Yes No

Arc detection: Yes No

Full conduction: Yes No

Energy management: Yes No

SCR high temperature: Yes No

SCR balance: Yes No

Primary over current: If yes, set point 200 A

Primary over voltage: If yes, set point 700 V

Primary under voltage: If yes, set point N/A V

Secondary over current: If yes, set point 1000 A

Secondary over voltage: If yes, set point 70 kV

Secondary under voltage: If yes, set point 10 kV

Circuit breaker trip: If yes, set point 250 A

DUCTING

Duct Layout

Duct Hardware

Air heater: Rotary Tubular Other (*Milliken Station Unit #2 has a heatpipe*)

Temperature ratio 2.3 (Inlet temp. / Outlet temp.)

Stack opacity meter: Yes No

() Enclosed value was used in *ESPerT* for proper sizing since parallel units were tested and evaluated separately.
 [] Used enclosed value per recommendation of *ESPerT* developer.

ESP CLEANING

Inlet Baffles

Rapper type: Swing/drop hammer Pneumatic Elect. impact Elect. vibrator
Number of rows of baffles 2 Number of rappers per baffle 4

	Row No.	1	2
Rapper cycle time, min		<u>3</u>	<u>3</u>

Outlet Baffles

Rapper type: Swing/drop hammer Pneumatic Elect. impact Elect. vibrator
Number of rows across of rappers 1 Number of rappers per baffle 4
Rapper cycle time, min 4

Collecting and Emitting Electrodes

Field Number 1 (Identical configurations for North and South units.)

Collecting Electrodes

Rapper type: Swing/drop hammer Pneumatic Elect. impact Elect. vibrator
Number of rows of baffles 1 Number of rappers per row 16 per gas path
Rapper cycle time, min 4

Emitting Electrodes

Rapper type: Swing/drop hammer Pneumatic Elect. impact Elect. vibrator
Number of rappers per row 8 per gas path
Rapper cycle time, min 3

Field Number 2 (Identical configurations for North and South units.)

Collecting Electrodes

Rapper type: Swing/drop hammer Pneumatic Elect. impact Elect. vibrator
Number of rows of baffles 1 Number of rappers per row 16 per gas path
Rapper cycle time, min 5

Emitting Electrodes

Rapper type: Swing/drop hammer Pneumatic Elect. impact Elect. vibrator
Number of rappers per row 8 per gas path
Rapper cycle time, min 5

Field Number 3

(Identical configurations for North and South units.)

Collecting Electrodes

Rapper type: Swing/drop hammer Pneumatic Elect. impact Elect. vibrator

Number of rows of baffles 1 Number of rappers per row 16 per gas path
Rapper cycle time, min 7

Emitting Electrodes

Rapper type: Swing/drop hammer Pneumatic Elect. impact Elect. vibrator

Number of rappers per row 8 per gas path
Rapper cycle time, min 6

DUST REMOVAL

Hopper layout

Total number of hoppers in the ESP 24
Number of hopper rows 3
in gas flow direction

	Row #	1	2	3
Hopper cycle time		<u> 10 </u>	<u> 5 </u>	<u> 4 </u>
for each row, min				

PERMIT LIMITS (FGD Scrubber outlet conditions)

<u>Outlet dust concentrations</u>	<u>lb/MMBtu</u>
Total	<u> 0.1 </u>
PM 10	<u> N/A </u>
PM 2.5	<u> N/A </u>

<u>Opacity</u>	<u>%</u>	<u>Period, min</u>
Average	<u> 11 </u>	<u> 3 </u>
Max. puff	<u> 20 </u>	<u> <1 </u>

Appendix D

TR Set Voltage - Current Relationships

ESP Operating Characteristics -- TR Set 2-A1

Data Source: Air load Full load Operating

	Primary		Secondary (ESP)			Primary		Secondary (ESP)	
	Voltage	Current	Voltage	Current		Voltage	Current	Voltage	Current
	<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>		<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>
1.	80	1	29.6	16	21.	216	40	49.6	224
2.	88	4	30.8	24	22.	222	43	50.8	240
3.	92	4	31.6	24	23.	228	46	51.6	256
4.	96	5	32.8	32	24.	236	50	52.8	275
5.	104	6	33.6	40	25.	244	52	53.6	296
6.	108	8	34.8	48	26.	252	56	54.8	312
7.	116	10	35.6	56	27.	260	60	55.6	336
8.	124	10	36.8	64	28.	272	64	56.8	352
9.	128	12	37.6	72	29.	280	67	57.6	375
10.	136	14	38.8	80	30.	288	72	58.8	395
11.	144	16	39.6	88	31.	300	76	59.6	416
12.	150	18	40.8	102	32.	315	80	60.8	440
13.	156	20	41.6	112	33.	347	84	61.6	464
14.	164	22	42.8	122	34.	363	88	62.8	488
15.	172	24	43.6	136	35.	372	94	63.6	512
16.	177	26	44.8	150	36.	392	100	64.8	544
17.	184	28	45.6	160					
18.	192	32	46.6	176					
19.	200	34	47.6	192					
20.	208	38	48.8	208					

Voltage Curves Calculated by ESPer!

ESP voltage current curve ($V = a \cdot I^b$)	a = <u>14.3</u>	b = <u>0.234</u>	$r^2 =$ <u>0.98</u>
Secondary to primary current curve ($I_p = a \cdot I_s + b$)	a = <u>0.184</u>	b = <u>-1.12</u>	$r^2 =$ <u>1.00</u>
Secondary to primary voltage curve ($V_p = a \cdot V_s + b$)	a = <u>8.34</u>	b = <u>-186</u>	$r^2 =$ <u>0.97</u>

ESP Operating Characteristics -- TR Set 2-A2

Data Source: Air load Full load Operating

	Primary		Secondary (ESP)			Primary		Secondary (ESP)	
	Voltage	Current	Voltage	Current		Voltage	Current	Voltage	Current
	<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>		<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>
1.	84	3	29.6	40	21.	232	44	49.6	264
2.	92	4	30.8	43	22.	241	47	50.8	286
3.	96	6	31.6	48	23.	252	50	51.6	304
4.	104	6	32.8	56	24.	260	54	52.8	320
5.	112	8	33.7	64	25.	268	58	53.6	344
6.	116	9	34.8	73	26.	276	60	54.8	360
7.	124	10	35.6	80	27.	288	64	55.6	384
8.	132	12	36.8	88	28.	298	68	56.8	407
9.	140	14	37.6	96	29.	312	72	57.6	432
10.	148	16	38.8	80	30.	328	76	58.8	448
11.	156	18	39.6	112	31.	357	80	59.7	472
12.	164	20	40.8	129	32.	375	85	60.8	495
13.	171	22	41.6	144	33.	388	90	61.7	520
14.	176	24	42.8	160	34.	406	94	62.8	542
15.	184	27	43.7	168	35.	419	100	63.6	576
16.	192	30	44.8	184	36.	431	100	64.8	600
17.	200	32	45.7	200					
18.	208	34	46.8	216					
19.	216	38	47.6	232					
20.	224	40	48.8	248					

Voltage Curves Calculated by ESPert

ESP voltage current curve ($V = a \cdot I^b$)	a = <u>10.2</u>	b = <u>0.286</u>	$r^2 =$ <u>1.00</u>
Secondary to primary current curve ($I_p = a \cdot I_s + b$)	a = <u>0.177</u>	b = <u>-3.21</u>	$r^2 =$ <u>1.00</u>
Secondary to primary voltage curve ($V_p = a \cdot V_s + b$)	a = <u>9.65</u>	b = <u>-227</u>	$r^2 =$ <u>0.97</u>

ESP Operating Characteristics -- TR Set 2-A3

Data Source: Air load Full load Operating

	Primary		Secondary (ESP)			Primary		Secondary (ESP)	
	Voltage	Current	Voltage	Current		Voltage	Current	Voltage	Current
	<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>		<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>
1.	86	2	26.6	24	21.	232	46	46.8	248
2.	92	4	27.6	32	22.	241	50	47.6	264
3.	97	5	28.6	40	23.	252	54	48.8	280
4.	104	6	29.6	48	24.	260	57	49.6	304
5.	111	8	30.6	56	25.	268	60	50.8	320
6.	116	9	31.6	64	26.	277	64	51.6	344
7.	124	11	32.7	72	27.	288	69	52.8	360
8.	132	12	33.6	80	28.	298	74	53.6	384
9.	140	14	34.8	88	29.	308	78	54.8	407
10.	148	16	35.6	96	30.	324	82	55.6	432
11.	156	18	36.8	104	31.	365	86	56.8	452
12.	164	20	37.7	120	32.	376	92	57.7	480
13.	170	24	38.7	128	33.	387	96	58.8	501
14.	178	26	39.6	144	34.	406	102	59.7	528
15.	184	28	40.6	155	35.	416	106	60.8	550
16.	192	30	41.6	168	36.	424	112	61.6	576
17.	199	34	42.6	183	37.	439	117	62.8	600
18.	208	36	43.6	200	38.	448	123	63.6	647
19.	216	40	44.8	216	39.	460	128	64.8	665
20.	224	44	45.6	232					

NOTE: Overheating occurred during points 38 and 39. Not used in the correlation.

Voltage Curves Calculated by ESPert

ESP voltage current curve ($V = a \cdot I^b$)	a = <u>9.99</u>	b = <u>0.283</u>	$r^2 =$ <u>0.99</u>
Secondary to primary current curve ($I_p = a \cdot I_s + b$)	a = <u>0.198</u>	b = <u>-2.83</u>	$r^2 =$ <u>1.00</u>
Secondary to primary voltage curve ($V_p = a \cdot V_s + b$)	a = <u>9.71</u>	b = <u>-202</u>	$r^2 =$ <u>0.97</u>

ESP Operating Characteristics -- TR Set 2-B1

Data Source: Air load Full load Operating

	Primary		Secondary (ESP)			Primary		Secondary (ESP)	
	Voltage	Current	Voltage	Current		Voltage	Current	Voltage	Current
	<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>		<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>
1.	84	1	29.6	24	21.	236	46	49.6	264
2.	92	4	30.8	32	22.	244	50	50.6	287
3.	96	5	31.6	32	23.	252	54	51.6	304
4.	104	6	32.6	40	24.	264	58	52.8	328
5.	112	8	33.7	48	25.	272	62	53.7	352
6.	119	9	34.8	56	26.	280	65	54.7	365
7.	126	10	35.6	64	27.	291	69	55.7	336
8.	132	12	36.6	74	28.	303	74	56.8	391
9.	140	14	37.7	88	29.	315	78	57.6	413
10.	148	16	38.7	96	30.	336	83	58.8	468
11.	156	18	39.6	110	31.	368	88	59.7	496
12.	164	20	40.8	120	32.	382	92	60.3	519
13.	172	22	41.7	136	33.	392	99	59.6	549
14.	179	25	42.8	149					
15.	188	28	43.6	167					
16.	195	30	44.7	176					
17.	204	34	45.6	192					
18.	211	36	46.6	211					
19.	220	40	47.7	230					
20.	228	42	48.7	248					

NOTE: Sparking during points 35 and 36. Not used in the correlation.

Voltage Curves Calculated by ESPert

ESP voltage current curve ($V = a \cdot I^b$)	a = <u>13.4</u>	b = <u>0.236</u>	r ² = <u>0.99</u>
Secondary to primary current curve ($I_p = a \cdot I_s + b$)	a = <u>0.182</u>	b = <u>-1.86</u>	r ² = <u>1.00</u>
Secondary to primary voltage curve ($V_p = a \cdot V_s + b$)	a = <u>9.20</u>	b = <u>-207</u>	r ² = <u>0.96</u>

ESP Operating Characteristics -- TR Set 2-B2

Data Source: Air load Full load Operating

	Primary		Secondary (ESP)			Primary		Secondary (ESP)	
	Voltage	Current	Voltage	Current		Voltage	Current	Voltage	Current
	<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>		<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>
1.	84	2	30.6	24	21.	226	42	50.6	236
2.	91	4	31.6	32	22.	235	46	51.7	255
3.	96	6	32.6	34	23.	244	48	52.8	272
4.	103	6	33.6	40	24.	252	53	53.6	288
5.	108	8	34.8	48	25.	262	56	54.7	310
6.	115	9	35.5	56	26.	271	60	55.7	327
7.	124	10	36.6	64	27.	280	64	56.8	348
8.	130	12	37.6	72	28.	291	67	57.6	370
9.	136	14	38.6	80	29.	271	72	58.8	390
10.	143	16	39.6	91	30.	315	75	59.6	410
11.	151	18	40.6	104	31.	346	80	60.8	430
12.	159	20	41.6	112	32.	362	84	61.6	455
13.	167	22	42.6	125	33.	375	88	62.8	478
14.	173	24	43.6	136	34.	392	92	63.8	500
15.	180	26	44.8	148	35.	408	100	64.8	544
16.	188	30	45.7	160					
17.	194	32	46.6	172					
18.	204	34	47.7	192					
19.	211	36	48.8	206					
20.	220	40	49.6	224					

Voltage Curves Calculated by ESPert

ESP voltage current curve ($V = a \cdot I^b$)	a = <u>13.1</u>	b = <u>0.250</u>	$r^2 =$ <u>0.99</u>
Secondary to primary current curve ($I_p = a \cdot I_s + b$)	a = <u>0.187</u>	b = <u>-1.50</u>	$r^2 =$ <u>1.00</u>
Secondary to primary voltage curve ($V_p = a \cdot V_s + b$)	a = <u>9.72</u>	b = <u>-250</u>	$r^2 =$ <u>0.94</u>

ESP Operating Characteristics -- TR Set 2-B3

Data Source: Air load Full load Operating

	Primary		Secondary (ESP)			Primary		Secondary (ESP)	
	Voltage	Current	Voltage	Current		Voltage	Current	Voltage	Current
	<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>		<u>V</u>	<u>A</u>	<u>kV</u>	<u>mA</u>
1.	84	3	27.6	21	21.	224	44	47.6	256
2.	88	4	28.6	32	22.	231	47	48.6	270
3.	96	6	29.6	37	23.	242	52	49.6	290
4.	104	7	30.8	40	24.	251	54	50.8	312
5.	108	8	31.6	48	25.	260	58	51.7	328
6.	115	10	32.7	56	26.	268	62	52.8	352
7.	121	11	33.6	64	27.	276	66	53.6	373
8.	128	12	34.8	80	28.	285	69	54.6	388
9.	136	14	35.6	88	29.	299	74	55.6	414
10.	143	16	36.6	96	30.	312	78	56.8	440
11.	152	18	37.6	112	31.	346	82	57.8	464
12.	158	20	38.7	120	32.	361	86	58.8	488
13.	164	22	39.6	131	33.	375	90	59.6	512
14.	172	24	40.6	144	34.	394	95	60.8	535
15.	180	28	41.6	160	35.	404	100	61.7	560
16.	188	30	42.8	176	36.	412	104	62.8	584
17.	196	32	43.7	190	37.	424	110	63.6	614
18.	203	35	44.7	203	38.	436	115	64.8	640
19.	211	38	45.6	224					
20.	216	41	46.8	240					

Voltage Curves Calculated by ESPert

ESP voltage current curve ($V = a \cdot I^b$)	a = <u>11.2</u>	b = <u>0.266</u>	$r^2 =$ <u>0.99</u>
Secondary to primary current curve ($I_p = a \cdot I_s + b$)	a = <u>0.181</u>	b = <u>-1.54</u>	$r^2 =$ <u>1.00</u>
Secondary to primary voltage curve ($V_p = a \cdot V_s + b$)	a = <u>9.49</u>	b = <u>-207</u>	$r^2 =$ <u>0.96</u>