Appendix 3A

Summary Sheets for Phase III MCWM and DMC Testing

Summary Sheet
Phase III MCWM Testing

TEST/DESCRIPTION:				
Date	4/28/98	4/29/98	5/21/98	5/28/98
Filtering device	Fabric	Fabric	Ceramic	Ceramic
Coal seam	Hiawatha	Hiawatha	Hiawatha	Hiawatha
Cleaning tech.	Oil Agglomeration	Oil Agglomeration	Oil Agglomeration	Oil Agglomeration
Natural gas support	31%	30%	30%	30%
WATER/STEAM SIDE				
Steam flow rate; lb/h	12,171	12,431	11,871	11,542
Water temperature into boiler; ° F	230	232	218	219
Drum pressure; psig	227	226	228	228
Calorimeter temperature; ° F	315	318	318	318
Steam temperature; ° F	393	397	397	397
Steam quality; %	99.9	100.1	100.1	100.1
Blowdown rate; lb/h	3,329	3,344	3,332	3,155
Air, Fuel, Flue Gas Side				
Total firing rate; MM Btu/h	15.6	15.8	15.0	14.9
Natural gas flow rate; lb/h; MM Btu/h	206; 4.8	194; 4.5	193; 4.	193; 4.5
CWSF flow rate; lb/h; MM Btu/h	1,478;10.5	1,560;10.5	1,322;10.5	1,289;10.5
Gas support (%)	30.8	28.8	30.1	30.2
Air temperature entering air heater; ° F	163	165	175	179
Air temperature leaving air heater; ° F	400	396	406	404
Air temperature into boiler; ° F	385	385	397	395
Furnace outlet temperature; ° F	596	591	594	596
Gas temperature leaving air heater; ° F	385	383	384	387
Bagfilter inlet temperature; ° F	389	385	381	386
Bagfilter outlet temperature; ° F	344	338	354	367
Ash content of fly ash;%	48.99	41.66	54.62	55.5
Combustion air flow; acfm	3,870	3,877	3,973	4,048
Boiler draft; in. W.C.	-0.06	-0.07	-0.06	-0.06
Boiler efficiency; %	76.71	76.74	79.57	79.39
Atomizing air pressure; psig	135	135	135	135
Atomizing air flow rate; lbs/h	756	657	756	720
A/F ratio; lb/lb	0.51	0.42	0.57	0.56
CWSF temperature; ° F	137	117	141	138
Natural gas temperature; ° F	90	90	90	90
Coal combustion efficiency; %	97.0	96.6	98.2	97.9
Overall combustion efficiency; %	97.3	97.0	98.4	98.2
EMISSIONS (Dry Basis)				
O2; %	3.8	3.5	3.5	3.8
CO; ppm	15	44	N/A	N/A
CO2; %	13.0	12.8	14.0	13.9
SO2; ppm	496	610	N/A	N/A
NOx ppm	586	540	691	453
FUEL ANALYSIS DATA				
Solids Content; %	51.5%	50.3%	55.5%	57.0%

Summary Sheet
Phase III MCWM Testing

TEST/DESCRIPTION:				
Date	6/1/98	6/3/98	6/9/98	6/16/98
Filtering device	Fabric	Fabric	Fabric	Fabric
Coal seam	Hiawatha	Hiawatha	Taggart	Taggart
Cleaning tech.	Oil Agglomeration	Oil Agglomeration	Oil Agglomeration	Oil Agglomeration
Natural gas support	30%	26%	30%	30%
WATER/STEAM SIDE				
Steam flow rate; lb/h	11,996	13,110	11,645	11,302
Water temperature into boiler; ° F	231	232	226	231
Drum pressure; psig	232	234	231	229
Calorimeter temperature; ° F	318	319	318	318
Steam temperature; ° F	397	398	397	397
Steam quality; %	100.1	100.1	100.1	100.1
Blowdown rate; lb/h	3,339	3,357	3,330	3,320
Air, Fuel, Flue Gas Side				
Total firing rate; MM Btu/h	14.8	14.6	14.7	14.8
Natural gas flow rate; lb/h; MM Btu/h	192; 4.5	168; 3.9	192; 4.5	194; 4.5
CWSF flow rate; lb/h; MM Btu/h	1,332; 10.5	1,428; 11.0	1,178; 10.5	1,152; 10.5
Gas support (%)	30.4	26.7	30.7	30.5
Air temperature entering air heater; ° F	173	158	171	177
Air temperature leaving air heater; ° F	413	410	415	415
Air temperature into boiler; ° F	389	386	391	391
Furnace outlet temperature; ° F	600	611	597	591
Gas temperature leaving air heater; ° F	377	379	370	360
Bagfilter inlet temperature; ° F	390	395	381	375
Bagfilter outlet temperature; ° F	363	371	354	345
Ash content of fly ash;%	61.16	58.20	37.61	24.02
Combustion air flow; acfm	4,259	4,438	3,732	3,835
Boiler draft; in. W.C.	-0.05	-0.04	-0.05	-0.05
Boiler efficiency; %	79.97	80.16	80.11	79.41
Atomizing air pressure; psig	135	135	135	80
Atomizing air flow rate; lbs/h	754	768	781	389
A/F ratio; lb/lb	0.57	0.54	0.66	0.34
CWSF temperature; ° F	141	147	141	155
Natural gas temperature; ° F	89	82	86	93
Coal combustion efficiency; %	98.7	98.4	97.7	95.1
Overall combustion efficiency; %	98.9	98.6	98.0	95.8
EMISSIONS (Dry Basis)				
O2; %	3.7	3.2	3.7	3.4
CO; ppm	N/M	N/M	N/M	212.8
CO2; %	14.1	15.0	14.4	15.9
SO2; ppm	669	828	599	368
NOx ppm	242	224	188	488
FUEL ANALYSIS DATA				
Solids Content; %	55.5%	56.4%	59.5%	59.9%

Summary Sheet
Phase III MCWM Testing

TEST/DESCRIPTION:				
Date	6/18/98	6/23/98	6/24/98	7/21/98
Filtering device	Fabric	Ceramic	Fabric	Fabric
Coal seam	Taggart	Hiawatha	Hiawatha	Taggart
Cleaning tech.	Oil Agglomeration	Oil Agglomeration	Oil Agglomeration	Froth Floatation
Natural gas support	23%	30%	23%	30%
WATER/STEAM SIDE				
Steam flow rate; lb/h	11,143	11,476	9,446	10,073
Water temperature into boiler; ° F	231	231	231	229
Drum pressure; psig	230	230	229	231
Calorimeter temperature; ° F	318	318	316	318
Steam temperature; ° F	397	397	397	398
Steam quality; %	100.1	100.1	100.0	100.1
Blowdown rate; lb/h	3,322	3,327	3,320	3,332
Air, Fuel, Flue Gas Side				
Total firing rate; MM Btu/h	15.0	14.7	14.0	14.5
Natural gas flow rate; lb/h; MM Btu/h	150; 3.5	195; 4.5	145; 3.5	190; 4.5
CWSF flow rate; lb/h; MM Btu/h	1,272; 11.5	1,353; 10.5	1,428; 11.6	1,200; 10.5
Gas support (%)	23.4	30.6	25.0	31.0
Air temperature entering air heater; ° F	179	180	184	186
Air temperature leaving air heater; ° F	424	423	402	415
Air temperature into boiler; ° F	398	399	379	391
Furnace outlet temperature; ° F	597	600	559	582
Gas temperature leaving air heater; ° F	372	378	359	370
Bagfilter inlet temperature; ° F	381	388	368	442
Bagfilter outlet temperature; ° F	353	366	344	347
Ash content of fly ash;%	29.00	52.27	48.30	20.84
Combustion air flow; acfm	3,774	3,859	3,806	3,657
Boiler draft; in. W.C.	-0.05	-0.05	-0.05	-0.05
Boiler efficiency; %	79.13	77.86	76.95	76.75
Atomizing air pressure; psig	135	135	135	135
Atomizing air flow rate; lbs/h	761	728	573	628
A/F ratio; lb/lb	0.60	0.54	0.40	0.52
CWSF temperature; ° F	156	140	147	130
Natural gas temperature; ° F	98	97	95	97
Coal combustion efficiency; %	96.4	96.5	97.7	93.7
Overall combustion efficiency; %	96.8	97.0	97.9	94.6
EMISSIONS (Dry Basis)				
O2; %	3.8	3.6	4.7	4.2
CO; ppm	N/M	N/M	N/M	N/M
CO2; %	13.9	13.9	13.4	12.6
SO2; ppm	204	N/M	N/M	250
NOx ppm	584	610.2	525	227
FUEL ANALYSIS DATA				
Solids Content; %	60.3%	54.3%	56.0%	59.1%

Summary Sheet
Phase III MCWM Testing

TEST/DESCRIPTION:					
Date	8/11/98	8/12/98	8/17/98	8/19/98	8/26/98
Filtering device	Fabric	Fabric	Fabric	Fabric	Fabric
Coal seam	Taggart	Taggart	Hiawatha	Hiawatha	Middle Kittaning
Cleaning tech.	Froth Floatation	Froth Floatation	Froth Floatation	Froth Floatation	None
Natural gas support	30%	30%	30%	27%	30%
WATER/STEAM SIDE					
Steam flow rate; lb/h	11,342	10,855	11,582	9,949	10,633
Water temperature into boiler; ° F	229	229	234	233	233
Drum pressure; psig	N/M	237	233	232	231
Calorimeter temperature; ° F	319	317	319	317	318
Steam temperature; ° F	398	398	398	397	397
Steam quality; %	N/M	100.0	100.1	100.0	100.1
Blowdown rate; lb/h	3,443	3,372	3,347	3,339	3,328
Air, Fuel, Flue Gas Side					
Total firing rate; MM Btu/h	15.1	14.9	15.3	14.6	15
Natural gas flow rate; lb/h; MM Btu/h	198; 4.6	192; 4.5	195; 4.5	174; 4.0	187; 4.5
CWSF flow rate; lb/h; MM Btu/h	1,210; 10.5	1,182; 10.5	1,392; 10.5	1,440; 11.0	1,176; 10.5
Gas support (%)	29.8	30.2	29.4	27.3	30.0
Air temperature entering air heater; ° F	186	184	180	177	182
Air temperature leaving air heater; ° F	421	412	419	410	419
Air temperature into boiler; ° F	398	387	396	386	396
Furnace outlet temperature; ° F	598	576	599	577	592
Gas temperature leaving air heater; ° F	373	365	379	365	379
Bagfilter inlet temperature; ° F	380	369	386	369	376
Bagfilter outlet temperature; ° F	366	343	364	348	353
Ash content of fly ash;%	16.06	14.92	50.72	53.74	42.50
Combustion air flow; acfm	3,775	3,610	3,979	3,943	3,885
Boiler draft; in. W.C.	-0.05	-0.05	-0.05	-0.06	-0.05
Boiler efficiency; %	75.58	77.45	78.59	77.52	77.41
Atomizing air pressure; psig	80	135	135	135	135
Atomizing air flow rate; lbs/h	453	681	706	632	690
A/F ratio; lb/lb	0.38	0.58	0.51	0.44	0.59
CWSF temperature; ° F	158	152	141	110	152
Natural gas temperature; ° F	98	94	96	89	99
Coal combustion efficiency; %	90.9	92.5	97.5	97.4	93.6
Overall combustion efficiency; %	92.1	93.6	97.8	97.7	94.5
EMISSIONS (Dry Basis)					
O2; %	3.6	3.6	3.6	4.4	4.0
CO; ppm	N/M	N/M	N/M	N/M	N/M
CO2; %	14.1	14.2	13.9	12.6	13.2
SO2; ppm	437	417	211	442	290
NOx ppm	276	282	734	475	N/M
FUEL ANALYSIS DATA					
Solids Content; %	57.7%	59.3%	55.0%	54.5%	60.6%

Summary Sheet
Phase III MCWM Testing

TEST/DESCRIPTION:	
Date	9/9/98
Filtering device	Fabric
Coal seam	Taggart
Cleaning tech.	Oil Agglomeration
Natural gas support	30%
WATER/STEAM SIDE	
Steam flow rate; lb/h	10,474
Water temperature into boiler; ° F	234
Drum pressure; psig	233
Calorimeter temperature; ° F	317
Steam temperature; ° F	397
Steam quality; %	100.0
Blowdown rate; lb/h	3,348
Air, Fuel, Flue Gas Side	
Total firing rate; MM Btu/h	14.8
Natural gas flow rate; lb/h; MM Btu/h	186; 4.5
CWSF flow rate; lb/h; MM Btu/h	1,170; 10.3
Gas support (%)	30.5
Air temperature entering air heater; ° F	168
Air temperature leaving air heater; ° F	406
Air temperature into boiler; ° F	383
Furnace outlet temperature; ° F	570
Gas temperature leaving air heater; ° F	359
Bagfilter inlet temperature; ° F	354
Bagfilter outlet temperature; ° F	339
Ash content of fly ash;%	16.40
Combustion air flow; acfm	3,706
Boiler draft; in. W.C.	-0.05
Boiler efficiency; %	77.99
Atomizing air pressure; psig	80
Atomizing air flow rate; lbs/h	370
A/F ratio; lb/lb	0.32
CWSF temperature; ° F	158
Natural gas temperature; ° F	86
Coal combustion efficiency; %	93.0
Overall combustion efficiency; %	94.0
EMISSIONS (Dry Basis)	
O_2; %	4.0
CO; ppm	N/M
CO_2; %	N/M
SO_2; ppm	150
NO_x ppm	490
FUEL ANALYSIS DATA	
Solids Content; %	59.9%

Summary Sheet
DMC Testing

TEST/DESCRIPTION:	5/5/98	7/8/98	7/13/98	7/15/98	9/27/99	9/28/99	9/29/99	9/30/99	10/21/99	10/25/99	10/26/99	10/27/99
Filtering Device:					Sleeve 0.5	Sleeve 3.5	Sleeve 3.5	Sleeve 4.5		Sleeve 3.5	Sleeve 3.5	Sleeve 3.5
Burner Settings:	Prim 0	Prim 0	Prim 0	Prim 0	Center 1	Center 0	Center 0	Center 0		Center 2	Outer 7.5	Center 0
	Sec 100	Sec 100	Sec 100	Sec 100	Inner Max	Inner 6.5	Inner 6.5	Inner Max		Inner Max	Inner 6.5	Inner 6.5
	Tert 50	Tert 50	Tert 50	Tert 50	Outer Max	Outer	Outer 7.5	Outer Max		Outer Max	Outer 7.5	Outer 7.5
	Coal Gun +2	Coal Gun +2	Coal Gun +2	Coal Gun +2	Coal Gun -7	Coal Gun -7	Coal Gun -7	Coal Gun -7	Coal Gun	Coal Gun -6	Coal Gun -6	Coal Gun -6
	Gas Gun +2	Gas Gun +2	Gas Gun +2	Gas Gun +2	Gas Gun -2	Gas Gun -2	Gas Gun -2	Gas Gun -2	Gas Gun	Gas Gun -2	Gas Gun -2	Gas Gun -2
WATER/STEAM SIDE												
Steam flow rate; lb/h	11,700	11,505	11,066	11,360	10,867	10,492	11,107	10,496	10,809	10,875	10,714	10,067
Water temperature into boiler; °F	233	231	230	230	236	236	236	236	236	236	236	236
Drum pressure; psig	226	229	227	229	246	244	244	245	246	246	244	243
Calorimeter temperature; °F	318	318	317	318	319	319	319	319	319	319	319	320
Steam temperature; °F	397	398	398	398	402	402	402	401	402	402	402	401
Steam quality; %	100.1	100.1	100.0	100.1	100.3	100.4	100.3	100.3	100.3	100.3	100.3	100.4
Blowdown rate; lb/h	3,332	3,345	3,379	3,337	3,439	3,425	3,423	3,429	3,440	3,438	3,429	3,415
AIR,FUEL, FLUE GAS SIDE												
Coal Flow rate; lb/h	1,080	1,080	1,080	1,080	1,050	1,050	1,044	1,044	1,080	1,050	1,050	1,050
Coal flow rate; MMBtu/h	14.9	15.5	15.4	15.5	15.0	15.0	14.9	14.9	15.5	15.1	15.3	14.9
Boiler outlet temperature; °F	614	605	604	612	612	587	602	595	586	602	603	604
Gas temperature leaving air heater; °F	384	382	380	386	369	363	367	365	360	364	366	358
Air temperature entering air heater; °F	173	182	179	186	166	183	178	170	171	166	174	137
Air temperature leaving air heater; °F	417	417	411	421	421	428	427	420	412	422	430	416
Air temperature into boiler; °F	403	405	397	409	400	566	545	400	390	400	409	395
Ash content of particulate; %	44.70	38.94	45.16	39.41	47.36	47.66	58.53	47.84	48.47	46.79	45.23	54.48
Coal combustion efficiency; %	94.6	92.4	95.6	94.1	95.2	94.6	96.6	94.7	96.0	95.7	95.6	95.5
Combustion air flow; acfm	3,208	3,227	3,234	3,120	3,082	2,887	3,126	2,809	3,029	2,956	2,901	3,022
Boiler draft; inches W.C.	-0.06	-0.06	-0.09	-0.09	-0.08	-0.07	-0.07	-0.07	-0.07	-0.06	-0.06	-0.06
Boiler efficiency; %	83.4	81.6	83.8	83.0	84.9	85.0	86.6	84.6	84.8	85.2	84.9	84.4
Mill air flow rate; acfm	401	405	396	400	397	409	403	361	402	403	408	382
Mill outlet temperature; °F	243	251	322	239	257	239	235	220	231	235	235	216
Filter type	Fabric	Fabric	Ceramic	Ceramic	Fabric	Fabric	Fabric	Fabric	Ceramic	Ceramic	Ceramic	Ceramic
Pressure drop; in W.C.	4.2	3.9	13.1	14.0	1.8	1.5	1.7	1.6	1.5	1.8	2.1	2.1
Filter inlet; ° F	381	383	380	387	384	377	385	384	383	381	389	374
Filter outlet; ° F	330	338	354	384	455	461	438	460	360	355	387	345
EMISSIONS												
O2 %	3.4	3.9	4.0	3.4	4.0	3.4	3.9	3.9	3.2	3.3	3.7	4.5
CO ppm	40	79	26	69	169	163	228	137	214	348	595	384
CO2 %	14.5	15.7	14.9	15.6	14.5	15.0	15.1	14.3	15.5	15.4	15.3	14.0
SO2 ppm	N/A	504	494	506	440	362	455	357	469	456	475	427
NOx ppm	413	355	375	397	192	402	411	351	399	336	236	306
MISCELLANEOUS DATA												
Maximum load (based on 14,700 lb steam/h); %	79.6	78.3	75.3	77.3	73.9	71.4	75.6	71.4	73.5	74.0	72.9	68.5

NOTES

Flue gas temperature leaving air heater and boiler efficiencies from 9/27/99 through 4/26/00 are incorrect. The expansion joint between the air heater and outlet ducting developed a leak and ambient air was drawn into the system. First noticeable leak was observed starting 9/27/99, second and more serious leak was observed starting 3/15/00, and expansion joint was replaced between the 4/27/00 and 5/15/00 testing.

Summary Sheet
DMC Testing

TEST/DESCRIPTION:	10/28/99	10/29/99	11/1/99	11/2/99	11/3/99	11/4/99	3/15/00	3/16/00	3/17/00	3/20/00	3/21/00	4/5/00
Filtering Device:	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 5.5	Sleeve 3.5	Sleeve 3.5
Burner Settings:	Center 0	Center 0	Center 0	Center 0	Center 0	Center 0	Center 1	Center 1	Center 1	Center 0	Center 1	Center 1
	Inner 6.5	Inner 6.5	Inner Max	Inner Max	Inner Max	Inner Max	Inner 6.5	Inner 6.5	Inner 6.5	Inner Max	Inner 6.5	Inner 6.5
	Outer 7.5	Outer 7.5	Outer Max	Outer Max	Outer Max	Outer Max	Outer 7.5	Outer 7.5	Outer 7.5	Outer Max	Outer 7.5	Outer 7.5
	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6
	Gas Gun -2	Gas Gun -2	Gas Gun -2	Gas Gun -2	Gas Gun -2	Gas Gun -2	Gas Gun -2	Gas Gun -2	Gas Gun -6	Gas Gun -2	Gas Gun -2	Gas Gun -2
WATER/STEAM SIDE												
Steam flow rate; lb/h	10,630	10,766	10,879	10,688	10,833	10,739	10,203	10,572	10,400	10,417	10,484	10,922
Water temperature into boiler; °F	236	235	235	235	235	236	236	235	236	235	236	234
Drum pressure; psig	241	242	242	241	238	240	253	251	250	249	248	231
Calorimeter temperature; °F	319	319	320	319	320	319	320	320	318	319	319	318
Steam temperature; °F	401	401	401	401	400	401	404	404	403	403	402	398
Steam quality; %	100.3	100.3	100.4	100.3	100.4	100.3	100.4	100.4	100.3	100.3	100.3	100.3
Blowdown rate; lb/h	3,402	3,409	3,411	3,407	3,382	3,397	3,491	3,477	3,465	3,459	3,453	3,330
AIR,FUEL, FLUE GAS SIDE												
Coal Flow rate; lb/h	1,050	1,050	1,050	1,050	1,050	1,050	1,055	1,055	1,055	1,055	1,055	1,055
Coal flow rate; MMBtu/h	15.0	14.9	15.0	14.7	14.7	14.8	14.8	14.8	14.8	15.1	14.7	13.5
Boiler outlet temperature; °F	605	611	611	612	618	609	588	623	637	646	593	604
Gas temperature leaving air heater; °F	367	369	367	357	359	361	340	344	337	347	316	313
Air temperature entering air heater; °F	160	171	176	167	147	159	179	175	150	157	152	157
Air temperature leaving air heater; °F	421	431	430	429	424	420	415	439	443	452	407	420
Air temperature into boiler; °F	398	409	408	408	404	398	390	414	417	424	381	398
Ash content of particulate; %	48.78	53.17	51.19	47.48	56.75	64.42	39.26	37.08	31.61	31.52	42.48	44.11
Coal combustion efficiency; %	95.3	95.7	95.8	95.9	96.8	97.6	93.0	91.9	91.1	91.1	93.2	85.6
Combustion air flow; acfm	3,163	2,679	3,133	3,012	2,987	3,125	3,011	3,047	2,929	2,946	3,056	3,132
Boiler draft; inches W.C.	-0.06	-0.04	-0.04	-0.11	-0.05	-0.08	-0.07	-0.07	-0.06	-0.08	-0.07	-0.06
Boiler efficiency; %	84.3	84.6	84.4	84.7	85.4	85.8	83.4	82.8	82.0	81.5	83.4	79.2
Mill air flow rate; acfm	406	404	404	412	407	406	403	403	392	407	324	405
Mill outlet temperature; °F	218	230	238	223	221	209	220	238	220	230	170	223
Filter type	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Pressure drop; in W.C.	4.6	4.6	4.8	5.0	5.0	5.5	4.7	5.4	5.6	5.9	5.6	5.9
Filter inlet; ° F	377	386	388	378	372	375	358	374	356	389	346	342
Filter outlet; ° F	343	375	374	362	385	351	419	396	369	378	315	360
EMISSIONS												
O_2 %	3.3	3.4	3.3	3.8	3.7	3.2	3.5	3.5	4.0	3.2	3.9	3.9
CO ppm	268	305	291	432	225	152	319	511	1,068	1,045	367	515
CO_2 %	14.9	15.2	15.1	15.1	15.4	15.0	15.1	15.7	15.4	15.8	13.6	15.4
SO_2 ppm	469	478	461	465	470	462	463	471	445	488	312	88
NO_x ppm	342	325	353	500	338	371	367	355	342	373	317	343
MISCELLANEOUS DATA												
Maximum load												
(based on 14,700 lb steam/h); %	72.3	73.2	74.0	72.7	73.7	73.1	69.4	71.9	70.7	70.9	71.3	74.3
NOTES												
Flue gas temperature leaving air heater and b												
expansion joint between the air heater and ou												
system. First noticeable leak was observed st												
3/15/00, and expansion joint was replaced be												

Summary Sheet
DMC Testing

TEST/DESCRIPTION:	4/6/00	4/7/00	4/11/00	4/12/00	4/18/00	4/19/00	4/20/00	4/21/00	4/24/00	4/25/00	4/26/00	7/5/00
Filtering Device:	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5
Burner Settings:	Center 1	Center 1	Center 1	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2
	Inner Max	Inner Max	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner Max	Inner 6.5	Inner 6.5	Inner 6.5
	Outer Max	Outer Max	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer Max	Outer 7.5	Outer 7.5	Outer 7.5
	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6
	Gas Gun -2	Gas Gun -2	Gas Gun -6	Gas Gun -6	Gas Gun -2	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -2	Gas Gun -6	Gas Gun -6	Gas Gun -6
					Corning	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*
WATER/STEAM SIDE					*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*
Steam flow rate; lb/h	11,137	11,397	11,468	11,540	11,456	11,863	11,709	11,698	11,387	11,383	11,671	10,477
Water temperature into boiler; °F	233	233	234	234	234	233	233	233	233	233	233	231
Drum pressure; psig	231	232	226	226	222	221	219	219	225	225	222	226
Calorimeter temperature; °F	318	318	317	317	317	318	319	318	318	319	319	318
Steam temperature; °F	398	396	396	396	395	394	394	394	396	396	395	396
Steam quality; %	100.3	100.3	100.2	100.2	100.2	100.3	100.3	100.3	100.3	100.3	100.3	100.3
Blowdown rate; lb/h	3,329	3,339	3,294	3,296	3,264	3,255	3,241	3,239	3,283	3,289	3,267	3,293
AIR,FUEL, FLUE GAS SIDE												
Coal Flow rate; lb/h	1,055	1,055	1,055	1,055	1,055	1,055	1,055	1,055	1,055	1,055	1,055	1,080
Coal flow rate; MMBtu/h	14.3	14.6	14.7	14.4	14.5	14.5	14.5	14.5	14.4	14.4	14.4	14.5
Boiler outlet temperature; °F	613	619	626	625	607	618	608	635	608	626	627	602
Gas temperature leaving air heater; °F	320	284	266	257	263	272	274	260	277	281	287	396
Air temperature entering air heater; °F	178	166	160	157	161	167	168	169	175	171	158	191
Air temperature leaving air heater; °F	431	430	430	429	404	415	421	423	414	426	422	424
Air temperature into boiler; °F	409	408	406	407	383	395	400	404	393	406	402	404
Ash content of particulate; %	49.63	50.71	61.75	68.90	50.10	61.02	76.25	78.38	53.74	56.27	55.93	61.89
Coal combustion efficiency; %	84.8	94.8	96.5	97.6	94.7	96.6	99.0	98.6	95.5	95.6	96.3	96.5
Combustion air flow; acfm	3,051	3,012	3,149	2,868	3,147	3,172	3,253	3,243	3,203	3,267	3,306	2,777
Boiler draft; inches W.C.	-0.07	-0.07	-0.07	-0.06	-0.07	-0.06	-0.07	-0.06	-0.07	-0.06	-0.07	-0.07
Boiler efficiency; %	78.5	87.0	88.8	90.1	87.1	88.3	90.0	90.1	87.1	87.1	87.3	83.7
Mill air flow rate; acfm	403	405	404	401	401	401	408	404	407	404	401	317
Mill outlet temperature; °F	222	224	219	221	222	228	217	223	216	220	224	224
Filter type	Ceramic	Ceramic	Ceramic	Ceramic	Fabric	Fabric	Fabric	Fabric	Fabric	Fabric	Fabric	Ceramic
Pressure drop; in W.C.	6.2	6.7	7.2	7.3	2.8	1.4	1.4	1.7	1.2	1.2	1.2	4.3
Filter inlet; °F	352	343	340	335	323	328	343	335	332	339	343	296
Filter outlet; °F	354	334	327	323	287	295	308	299	299	304	306	270
EMISSIONS												
O2 %	3.7	3.6	3.8	3.8	4.0	3.6	3.8	3.8	4.0	3.9	3.7	4.7
CO ppm	228	236	179	100	156	179	133	116	252	306	227	849
CO2 %	15.3	15.4	15.2	15.3	15.1	15.6	15.5	15.3	15.1	15.2	15.4	12.4
SO2 ppm	90	88	88	253	341	426	472	526	412	442	444	30
NOx ppm	325	339	397	419	368	425	469	469	392	436	466	374
MISCELLANEOUS DATA												
Maximum load												
(based on 14,700 lb steam/h); %	75.8	77.5	78.0	78.5	77.9	80.7	79.7	79.6	77.5	77.4	79.4	71.3
NOTES												
Flue gas temperature leaving air heater and b												
expansion joint between the air heater and ou												
system. First noticeable leak was observed st												
3/15/00, and expansion joint was replaced be												

Summary Sheet
DMC Testing

TEST/DESCRIPTION:	7/6/00	7/7/00	7/10/00	7/11/00	7/13/00	7/14/00	7/17/00	7/18/00	7/19/00	7/20/00	7/21/00	7/24/00
Filtering Device:	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5
Burner Settings:	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2
	Inner 6.5	Inner Max	Inner Max	Inner Max	Inner Max	Inner Max	Inner Max	Inner Max	Inner Max	Inner Max	Inner Max	Inner Max
	Outer 7.5	Outer Max	Outer Max	Outer Max	Outer Max	Outer Max	Outer Max	Outer Max	Outer Max	Outer Max	Outer Max	Outer Max
	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6
	Gas Gun -6	Gas Gun -2	Gas Gun -6	Gas Gun -2	Gas Gun -2	Gas Gun -6	Gas Gun -2	Gas Gun -2	Gas Gun -6	Gas Gun -2	Gas Gun -2	Gas Gun -6
	Corning	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*
WATER/STEAM SIDE	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*
Steam flow rate; lb/h	11,278	11,069	11,360	11,255	7,849	11,303	11,613	11,448	11,179	11,955	11,605	11,616
Water temperature into boiler; °F	231	231	231	231	222	231	231	231	231	231	231	232
Drum pressure; psig	226	225	228	225	216	218	217	217	217	214	213	214
Calorimeter temperature; °F	306	318	317	318	317	317	317	317	316	318	317	317
Steam temperature; °F	396	396	397	396	393	394	394	394	393	393	393	392
Steam quality; %	99.6	100.3	100.3	100.3	100.2	100.2	100.2	100.2	100.2	100.3	100.2	100.2
Blowdown rate; lb/h	3,295	3,285	3,309	3,289	3,222	3,235	3,230	3,228	3,228	3,205	3,197	3,202
AIR,FUEL, FLUE GAS SIDE												
Coal Flow rate; lb/h	1,080	1,080	1,080	1,110	1,110	1,110	1,110	1,080	1,101	1,101	1,101	1,091
Coal flow rate; MMBtu/h	14.7	14.6	14.5	15.0	15.1	15.0	15.1	14.6	14.9	15.1	15.1	14.4
Boiler outlet temperature; °F	617	617	625	600	548	603	614	585	589	602	613	606
Gas temperature leaving air heater; °F	404	406	413	396	360	392	398	383	382	391	397	392
Air temperature entering air heater; °F	186	182	188	190	202	191	191	187	182	188	188	189
Air temperature leaving air heater; °F	429	427	432	423	412	431	438	416	419	433	438	437
Air temperature into boiler; °F	407	406	411	403	388	408	414	394	396	411	416	413
Ash content of particulate; %	62.03	59.45	52.39	47.33	39.28	42.69	42.52	41.79	34.88	36.00	38.98	58.77
Coal combustion efficiency; %	96.6	96.2	94.6	94.2	91.7	92.7	92.2	92.8	89.4	90.4	92.0	94.7
Combustion air flow; acfm	3,241	3,160	3,329	3,186	2,515	3,060	3,114	3,133	3,228	3,111	3,136	2,983
Boiler draft; inches W.C.	-0.06	-0.07	-0.07	-0.02	-0.08	-0.07	-0.07	-0.05	-0.05	-0.07	-0.07	-0.05
Boiler efficiency; %	85.1	83.7	80.2	83.3	79.4	81.8	81.6	82.2	79.7	80.3	81.4	83.8
Mill air flow rate; acfm	400	403	402	405	294	416	418	411	414	425	422	410
Mill outlet temperature; °F	242	243	257	191	125	137	140	141	141	144	143	142
Filter type	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Pressure drop; in W.C.	6.5	6.7	6.6	5.9	3.9	5.3	5.4	5.4	5.4	5.7	6.3	5.8
Filter inlet; ° F	383	386	395	377	340	372	378	363	361	375	377	372
Filter outlet; ° F	353	357	363	347	321	340	345	331	329	345	347	342
EMISSIONS												
O2 %	3.9	4.8	8.5	4.5	8.9	5.2	4.2	4.5	4.5	4.1	4.5	3.3
CO ppm	412	811	345	275	424	424	405	273	537	786	666	463
CO2 %	15.5	13.9	10.0	14.8	10.1	14.1	15.0	14.4	14.5	15.0	14.6	15.7
SO2 ppm	50	94	59	105	71	98	89	88	99	91	91	97
NOx ppm	578	330	210	417	288	409	435	419	517	499	506	620
MISCELLANEOUS DATA												
Maximum load												
(based on 14,700 lb steam/h); %	76.7	75.3	77.3	76.6	53.4	76.9	79.0	77.9	76.0	81.3	78.9	79.0
NOTES												
Flue gas temperature leaving air heater and b												
expansion joint between the air heater and ou												
system. First noticeable leak was observed st												
3/15/00, and expansion joint was replaced be												

Summary Sheet
DMC Testing

TEST/DESCRIPTION:	8/21/00	8/22/00	8/23/00	8/24/00	8/25/00	8/29/00	8/30/00	8/31/00	9/1/00	9/5/00	9/6/00	9/7/00
Filtering Device:	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5
Burner Settings:	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2
	Inner Max	Inner Max	Inner 6.5	Inner Max	Inner Max	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5
	Outer Max	Outer Max	Outer 7.5	Outer Max	Outer MaX	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5
	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6
	Gas Gun -2	Gas Gun -2	Gas Gun -6	Gas Gun -2	Gas Gun -2	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6
	Corning	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*
WATER/STEAM SIDE	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*
Steam flow rate; lb/h	11,940	12,110	11,881	12,371	12,470	12,370	12,463	12,606	12,189	11,448	11,912	11,747
Water temperature into boiler; °F	232	232	231	231	230	230	230	230	231	231	231	231
Drum pressure; psig	213	212	213	212	211	211	212	211	211	211	213	213
Calorimeter temperature; °F	318	316	318	317	313	319	319	318	318	317	317	318
Steam temperature; °F	393	392	392	392	392	392	392	392	392	391	392	392
Steam quality; %	100.3	100.2	100.3	100.2	100.0	100.3	100.3	100.3	100.3	100.2	100.3	100.3
Blowdown rate; lb/h	1,244	3,191	3,195	3,190	3,182	3,186	1,245	3,182	1,243	3,182	3,198	1,247
AIR,FUEL, FLUE GAS SIDE												
Coal Flow rate; lb/h	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091
Coal flow rate; MMBtu/h	14.4	14.5	14.4	14.5	14.7	15.1	15.0	15.1	14.1	14.2	14.1	14.1
Boiler outlet temperature; °F	613	621	588	611	600	598	609	616	609	597	610	618
Gas temperature leaving air heater; °F	404	411	388	407	399	402	408	409	402	392	406	411
Air temperature entering air heater; °F	187	182	185	184	184	183	182	183	183	183	177	178
Air temperature leaving air heater; °F	450	447	432	443	432	435	438	440	436	432	436	441
Air temperature into boiler; °F	410	408	390	404	394	397	401	404	398	393	397	403
Ash content of particulate; %	70.27	79.94	60.26	77.22	75.00	71.79	81.36	80.69	77.59	69.98	90.61	92.73
Coal combustion efficiency; %	96.4	98.2	95.5	98.1	98.0	98.5	98.9	98.7	98.4	95.7	98.9	99.3
Combustion air flow; acfm	3,102	3,172	3,103	3,215	3,228	3,260	3,286	3,270	3,206	3,106	3,213	3,185
Boiler draft; inches W.C.	-0.09	-0.09	-0.07	-0.09	-0.10	-0.07	-0.08	-0.09	-0.09	-0.10	-0.09	-0.08
Boiler efficiency; %	85.1	86.1	84.6	90.9	86.3	86.8	86.9	86.8	86.6	84.7	86.8	87.2
Mill air flow rate; acfm	405	408	408	411	405	405	410	414	406	391	404	408
Mill outlet temperature; °F	217	212	207	212	207	214	214	210	208	208	219	212
Filter type	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Pressure drop; in W.C.	6.4	6.9	6.3	7.0	7.0	7.6	8.0	8.1	7.5	6.4	7.5	7.7
Filter inlet; ° F	386	392	370	389	382	388	390	392	385	375	387.2	392
Filter outlet; ° F	364	389	373	410	368	367	374	376	364	351	363	367
EMISSIONS												
O2 %	3.1	3.5	3.5	3.3	3.5	3.4	3.5	3.5	3.3	4.1	3.8	3.7
CO ppm	368	261	198	134	98	115	104	164	201	148	98	86
CO2 %	16.1	15.7	15.5	74.2	15.6	15.7	15.5	15.7	15.6	15.2	15.4	15.8
SO2 ppm	453	409	509	422	221	402	414	424	415	404	387	384
NOx ppm	545	541	441	569	561	613	666	677	590	461	615	670
MISCELLANEOUS DATA												
Maximum load (based on 14,700 lb steam/h); %	81.2	82.4	80.8	84.2	84.8	84.1	84.8	85.8	82.9	77.9	81.0	79.9
NOTES												
Flue gas temperature leaving air heater and b												
expansion joint between the air heater and ou												
system. First noticeable leak was observed st												
3/15/00, and expansion joint was replaced be												

Summary Sheet
DMC Testing

TEST/DESCRIPTION:	9/8/00	9/11/00	9/12/00	9/13/00	9/14/00	9/15/00	9/18/00	9/19/00	9/20/00	9/21/00	9/22/00	9/25/00
Filtering Device:	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5
Burner Settings:	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2
	Inner 6.5	Inner 6.5	Inner Max	Inner Max	Inner Max	Inner Max	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner Max
	Outer 7.5	Outer 7.5	Outer Max	Outer Max	Outer Max	Outer Max	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer Max
	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6
	Gas Gun -6	Gas Gun -6	Gas Gun -2	Gas Gun -2	Gas Gun -2	Gas Gun -2	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -2
	Corning	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*	*Corning*
WATER/STEAM SIDE	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*	*Slipstream*
Steam flow rate; lb/h	11,861	11,544	11,934	12,048	12,303	12,044	11,479	11,981	12,099	11,975	11,793	11,345
Water temperature into boiler; °F	231	231	230	230	231	230	231	230	230	230	201	231
Drum pressure; psig	213	211	209	211	219	214	213	212	211	212	201	211
Calorimeter temperature; °F	318	318	318	318	318	318	318	317	318	317	314	317
Steam temperature; °F	392	392	392	392	392	392	392	391	391	391	391	423
Steam quality; %	100.3	100.3	100.3	100.3	100.3	100.3	100.3	100.2	100.3	100.2	100.0	100.2
Blowdown rate; lb/h	1,246	3,184	3,168	3,184	3,197	3,206	3,199	3,191	3,181	3,190	3,082	3,186
AIR,FUEL, FLUE GAS SIDE												
Coal Flow rate; lb/h	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091
Coal flow rate; MMBtu/h	14.1	14.3	14.5	14.5	14.6	14.6	14.4	14.5	14.4	14.5	14.4	14.5
Boiler outlet temperature; °F	618	587	606	614	622	615	589	606	610	617	583	592
Gas temperature leaving air heater; °F	409	388	406	408	410	404	386	401	406	407	389	385
Air temperature entering air heater; °F	182	182	187	185	182	181	186	183	183	179	187	173
Air temperature leaving air heater; °F	442	429	441	443	449	444	431	440	440	440	430	424
Air temperature into boiler; °F	404	388	401	407	412	407	389	403	403	403	397	381
Ash content of particulate; %	91.71	82.20	86.63	80.50	76.37	72.51	64.41	79.33	86.93	89.99	89.66	72.01
Coal combustion efficiency; %	99.3	97.8	98.5	98.3	98.5	97.9	95.6	98.0	98.9	99.2	99.3	96.9
Combustion air flow; acfm	3,189	3,032	3,150	3,183	3,232	3,239	3,047	3,125	3,217	3,219	2,840	3,071
Boiler draft; inches W.C.	-0.09	-0.13	-0.10	-0.09	-0.09	-0.08	-0.08	-0.08	-0.09	-0.09	-0.15	-0.08
Boiler efficiency; %	87.1	86.0	86.7	86.2	86.2	85.8	84.5	86.1	86.7	86.8	86.0	85.3
Mill air flow rate; acfm	403	400	410	414	414	406	404	407	409	414	354	404
Mill outlet temperature; °F	213	197	174	147	142	142	172	177	174	165	151	158
Filter type	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Pressure drop; in W.C.	7.9	6.0	7.0	7.1	6.8	7.1	6.4	6.5	7.4	8.2	6.8	5.7
Filter inlet; ° F	391	368	386	388	390	383	369	385	390	388	388	367
Filter outlet; ° F	366	342	362	361	360	352	346	357	377	384	385	330
EMISSIONS												
O2 %	3.6	4.6	3.5	3.6	3.1	3.7	3.9	3.3	3.5	3.9	4.8	4.2
CO ppm	9079	186	95	150	197	411	235	219	116	87	82	174
CO2 %	15.5	14.6	15.6	15.7	16.1	15.5	15.3	15.9	15.7	15.6	13.3	15.0
SO2 ppm	375	380	421	416	428	402	434	412	401	455	353	377
NOx ppm	698	543	662	674	720	690	485	648	717	765	683	385
MISCELLANEOUS DATA												
Maximum load (based on 14,700 lb steam/h); %	80.7	78.5	81.2	82.0	83.7	81.9	78.1	81.5	82.3	81.5	80.2	77.2
NOTES												
Flue gas temperature leaving air heater and b												
expansion joint between the air heater and ou												
system. First noticeable leak was observed st												
3/15/00, and expansion joint was replaced be												

Summary Sheet
DMC Testing

TEST/DESCRIPTION:	9/26/00	9/27/00	9/28/00	4/17/01	4/19/01	4/20/01	4/23/01	4/24/01	4/25/01	4/26/01	4/27/01	4/30/01
Filtering Device:	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5
Burner Settings:	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2
	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner max	Inner 6.5
	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer max	Outer 7.5
	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6.5	Coal Gun -6.5	Coal Gun -6.5	Coal Gun -6.5	Coal Gun -6
	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6
	Corning	*Corning*	*Corning*									
WATER/STEAM SIDE	*Slipstream*	*Slipstream*	*Slipstream*									
Steam flow rate; lb/h	11,916	11,780	11,944	11,241	12,205	12,625	12,437	11,597	12,259	12,884	12,993	12,546
Water temperature into boiler; °F	231	231	231	231	230	230	230	230	231	231	230	231
Drum pressure; psig	210	210	210	213	215	214	216	217	215	215	215	213
Calorimeter temperature; °F	317	317	317	316	317	317	318	317	316	316	317	317
Steam temperature; °F	324	463	400	391	392	392	393	393	391	391	392	391
Steam quality; %	100.2	100.2	100.2	100.0	100.1	100.1	100.1	100.1	100.0	100.0	100.1	100.1
Blowdown rate; lb/h	3,177	3,177	3,176	3,196	3,217	3,207	3,218	3,229	3,217	3,215	3,213	3,200
AIR,FUEL, FLUE GAS SIDE												
Coal Flow rate; lb/h	1,091	1,091	1,091	1,091	1,140	1,164	1,158	1,158	1,158	1,158	1,158	1,158
Coal flow rate; MMBtu/h	14.6	14.5	14.6	14.3	14.6	15	15.0	15.2	15.3	15.5	15.7	15.5
Boiler outlet temperature; °F	609	617	620	588	605	602	600	587	603	604	605	591
Gas temperature leaving air heater; °F	398	401	402	379	395	396	403	391	393	397	406	399
Air temperature entering air heater; °F	175	122	176	157	164	160	189	174	161	164	179	179
Air temperature leaving air heater; °F	435	438	441	421	431	428	439	432	424	425	434	431
Air temperature into boiler; °F	395	401	176	378	389	388	397	388	387	387	395	391
Ash content of particulate; %	83.84	84.54	83.58	64.36	69.34	72.29	70.54	48.73	62.89	72.78	66.77	75.61
Coal combustion efficiency; %	94.8	98.7	98.6	95.5	96.1	96.9	96.8	91.5	94.5	97.5	96.6	97.1
Combustion air flow; acfm	3,140	3,153	3,148	3,023	3,202	3,273	3,300	3,222	3,284	3,310	3,288	3,213
Boiler draft; inches W.C.	-0.09	-0.09	-0.09	-0.08	-0.1	-0.09	-0.08	-0.09	-0.07	-0.07	-0.07	-0.07
Boiler efficiency; %	83.7	86.2	86.3	84.3	80.6	84.8	85.0	81.7	83.2	85.4	84.7	85.2
Mill air flow rate; acfm	396	392	411	406	412	411	415	404	403	405	397	404
Mill outlet temperature; °F	172	141	149	133	124	125	132	133	167	164	177	180
Filter type	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Pressure drop; in W.C.	6.8	7.2	7.5	9.2	7.8	8.2	8.2	10.2	9.9	11.5	12	11.9
Filter inlet; ° F	381	384	386	561	403	434	386	371	372	377	476	385
Filter outlet; ° F	356	367	368	321	355	341	356	335	347	339	354	346
EMISSIONS												
O2 %	3.6	3.7	3.6	3.8	3.5	3.4	3.2	3.6	3.6	3.6	3.2	3.5
CO ppm	112	255	140	105	69	82	75	N.M.	335	68	N.M.	54
CO2 %	15.6	15.0	15.6	15.4	15.8	15.8	16.0	15.4	15.5	15.7	15.6	15.6
SO2 ppm	391	364	396	461	448	460	434	456	458	457	452	486
NOx ppm	646	628	721	571	545	634	630	508	591	607	559	627
MISCELLANEOUS DATA												
Maximum load (based on 14,700 lb steam/h); %	81.1	80.1	81.3	76.5	83.0	85.9	84.6	78.9	83.4	87.6	88.4	85.3

NOTES

Flue gas temperature leaving air heater and b
expansion joint between the air heater and ou
system. First noticeable leak was observed st
3/15/00, and expansion joint was replaced be

Summary Sheet
DMC Testing

TEST/DESCRIPTION:	5/1/01	5/3/01	5/9/01	5/15/01	5/17/01	5/22/01	5/24/01	5/31/01	6/5/01	6/12/01	4/26/02	4/29/02
Filtering Device:	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5
Burner Settings:	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2
	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5
	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5
	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6
	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Gas Gun -6	Coal Gun -6	Gas Gun -6	Coal Gun -6	Gas Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6
WATER/STEAM SIDE												
Steam flow rate; lb/h	12,320	11,967	11,735	12,186	12,019	9,107	9,158	11,870	9,063	11,950	12,025	12,442
Water temperature into boiler; °F	230	231	230	231	230	231	231	231	231	230	234	234
Drum pressure; psig	210	210	211	210	210	214	214	215	212	211	234	229
Calorimeter temperature; °F	316	317	316	316	316	316	316	317	316	317	319	320
Steam temperature; °F	391	391	391	390	390	392	392	392	391	392	397.7	395.9
Steam quality; %	100.1	100.1	100.1	100.1	100.1	100.0	100.0	100.1	100.0	100.1	100.0	100.0
Blowdown rate; lb/h	3,176	3,177	3,180	3,176	3,178	3,208	3,208	3,211	3,190	3,183	3,351	3,317
AIR,FUEL, FLUE GAS SIDE												
Coal Flow rate; lb/h	1,091	1,091	1,091	1,091	1,091	830	829.8	1,091	830	1,091	1,158	1,158
Coal flow rate; MMBtu/h	14.6	13.6	14.5	14.1	14.2	10.5	10.7	14.3	10.7	13.9	15.3	15.4
Boiler outlet temperature; °F	599	592	587	598	589	591	575	602	569	615	598	596
Gas temperature leaving air heater; °F	409	404	398	400	397	395	387	409	383	414	393	388
Air temperature entering air heater; °F	189	190	187	179	174	194	199	170	197	196	168	148
Air temperature leaving air heater; °F	442	433	429	435	428	442	439	428	434	448	421	412
Air temperature into boiler; °F	401	395	387	393	388	396	394	389	390	409	381	374
Ash content of particulate; %	75.78	77.61	N.M.	77.20	79.96	80.82	80.71	83.38	80.90	76.03	74.30	65.00
Coal combustion efficiency; %	96.9	96.1	N.M.	97.1	97.6	97.3	97.8	98.2	97.5	96.6	97.2	96.1
Combustion air flow; acfm	3,179	3,128	3,133	3,123	3,202	2,707	2,475	3,462	2,456	3,118	3,145	3,300
Boiler draft; inches W.C.	-0.08	-0.09	-0.1	-0.09	-0.09	-0.09	-0.09	-0.11	-0.09	-0.09	-0.09	-0.09
Boiler efficiency; %	84.9	84.2	N.D.	85.3	85.6	85.0	85.9	85.8	85.8	83.5	85.3	84.2
Mill air flow rate; acfm	406	404	402	403	391	393	355	406	403	402	404	403
Mill outlet temperature; °F	171	163	159	161	163	165	170	179	172	175	184	185
Filter type	Ceramic	Ceramic	Ceramic	Ceramic	Fabric	Fabric	Fabric	Fabric	Fabric	Ceramic	Ceramic	Ceramic
Pressure drop; in W.C.	11.5	10.9	10.9	11.4	2.6	2	1.8	2.9	1.8	9.5	10.07	10.6
Filter inlet; ° F	390	387	380	382	380	378	370	394	366	397	370	364
Filter outlet; ° F	359	352	338	344	324	319	311	344	308	356	333.8	327
EMISSIONS												
O2 %	3.8	3.8	3.6	3.4	3.9	4.8	3.3	5.0	3.7	6.5	3.3	3.5
CO ppm	72	62	74	92	104	95	59	97	60	78	59	109
CO2 %	15.4	15.5	15.5	15.6	15.2	14.7	15.8	14.4	15.4	12.4	14.7	14.4
SO2 ppm	417	447	421	407	391	359	484	331	405	335	N/A	N/A
NOx ppm	611	664	N.M.	585	622	598	640	628	670	431	N/A	N/A
MISCELLANEOUS DATA												
Maximum load												
(based on 14,700 lb steam/h); %	83.8	81.4	79.8	82.9	81.8	62.0	62.3	80.7	61.7	81.3	81.8	84.6

NOTES

Flue gas temperature leaving air heater and b
expansion joint between the air heater and ou
system. First noticeable leak was observed st
3/15/00, and expansion joint was replaced be

Summary Sheet
DMC Testing

TEST/DESCRIPTION:	8/28/02	8/30/02	9/5/02	9/26/02	10/7/02	10/14/02	5/15/03	6/17/03
Filtering Device:	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5	Sleeve 3.5
Burner Settings:	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2	Center 2
	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5	Inner 6.5
	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5	Outer 7.5
	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6
	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6	Coal Gun -6
WATER/STEAM SIDE								
Steam flow rate; lb/h	12,721	12,663	12,644	11,059	11,962	11,757	12,160	12,338
Water temperature into boiler; °F	230	232	231	235	235	232	232	222
Drum pressure; psig	225	223	221	223	231	229	228	223
Calorimeter temperature; °F	317	319	314	318	319	318	319	319
Steam temperature; °F	395.8	395	395	399	397	396	397	395
Steam quality; %	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Blowdown rate; lb/h	3,279	3,271	3,262	3,388	3,334	3,317	3,309	3,274
AIR,FUEL, FLUE GAS SIDE								
Coal Flow rate; lb/h	1,164	1,164	1,164	1,164	1,152	1,152	1,152	1,152
Coal flow rate; MMBtu/h	15.5	15.7	15.2	15.2	15.4	15.4	15.2	15.0
Boiler outlet temperature; °F	606	620	608	584	613	616	630	618
Gas temperature leaving air heater; °F	395	404	412	378	404	401	419	409
Air temperature entering air heater; °F	177	166	182	157	169	150	177	168
Air temperature leaving air heater; °F	418	436	439	407	429	426	447	432
Air temperature into boiler; °F	376	396	402	366	391	388	406	391
Ash content of particulate; %	64.01	62.70	73.30	60.21	68.20	65.40	69.50	70.90
Coal combustion efficiency; %	95.2	95.7	96.8	94.3	95.9	94.7	96.6	96.5
Combustion air flow; acfm	3,443	3,589	3,250	3,273	3,227	3,731	3,139	3,240
Boiler draft; inches W.C.	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.07	-0.09
Boiler efficiency; %	83.0	83.0	84.8	83.2	83.9	82.9	83.4	84.0
Mill air flow rate; acfm	399	400	406	397	404	402	401	406
Mill outlet temperature; °F	188	180.2	182.8	164	174	163	172	189
Filter type	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Pressure drop; in W.C.	10.3	9.4	9.8	9.8	9.8	9.7	10.8	11.2
Filter inlet; ° F	389	388	392	357	394	N/A	396	393
Filter outlet; ° F	357	355	362	315	348	341	364	360
EMISSIONS								
O2 %	4.3	4.7	3.3	4.0	3.5	3.7	3.3	3.5
CO ppm	37	53	27	143	50	47	70	47
CO2 %	14.1	13.4	15.2	14.4	14.5	14.7	14.7	14.4
SO2 ppm	431	384	484	436	416	470	465	476
NOx ppm	459	444	514	358	523	483	581	527
MISCELLANEOUS DATA								
Maximum load								
(based on 14,700 lb steam/h); %	86.5	86.1	86.0	75.2	81.4	80.0	82.7	83.9

NOTES

Flue gas temperature leaving air heater and b
expansion joint between the air heater and ou
system. First noticeable leak was observed st
3/15/00, and expansion joint was replaced be

Appendix 3B

Ceramic Filter Chamber Pressure Drop as a Function of Time Firing Coal

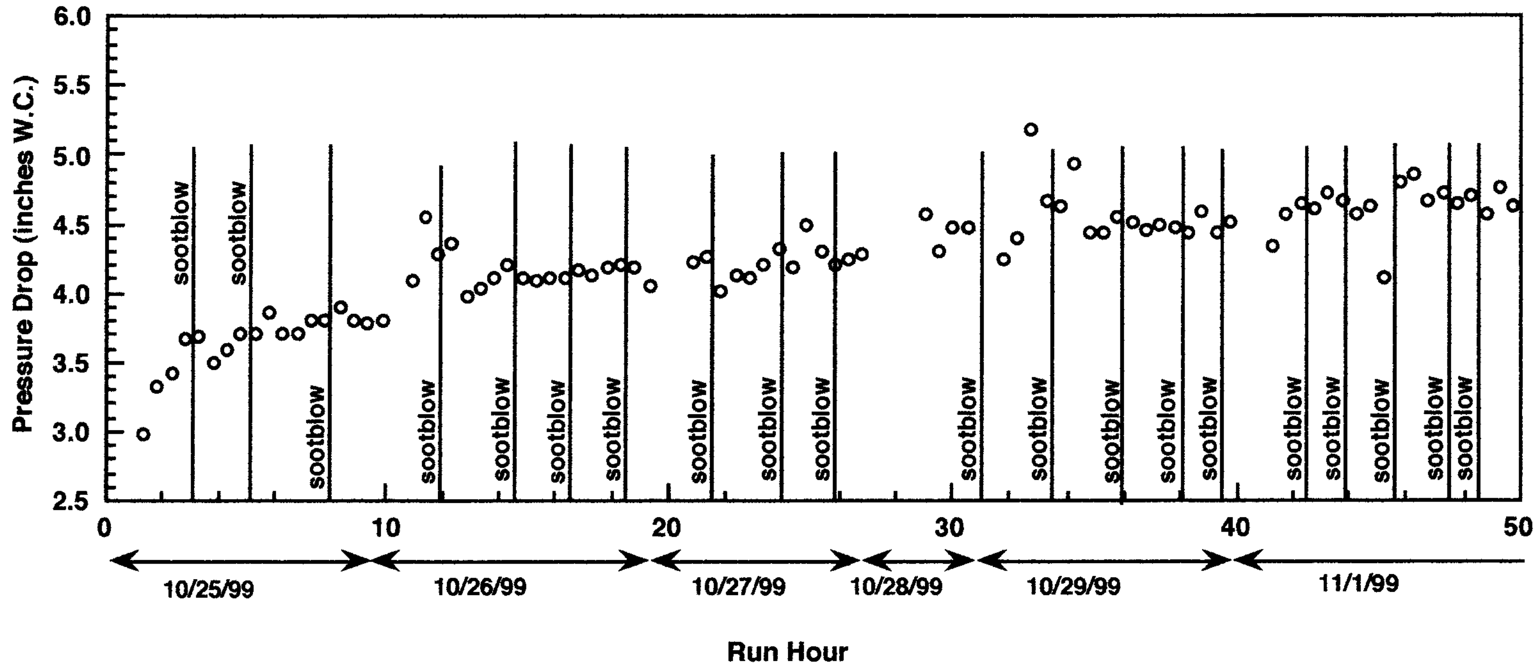

Figure 3B-1 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 0 TO 50

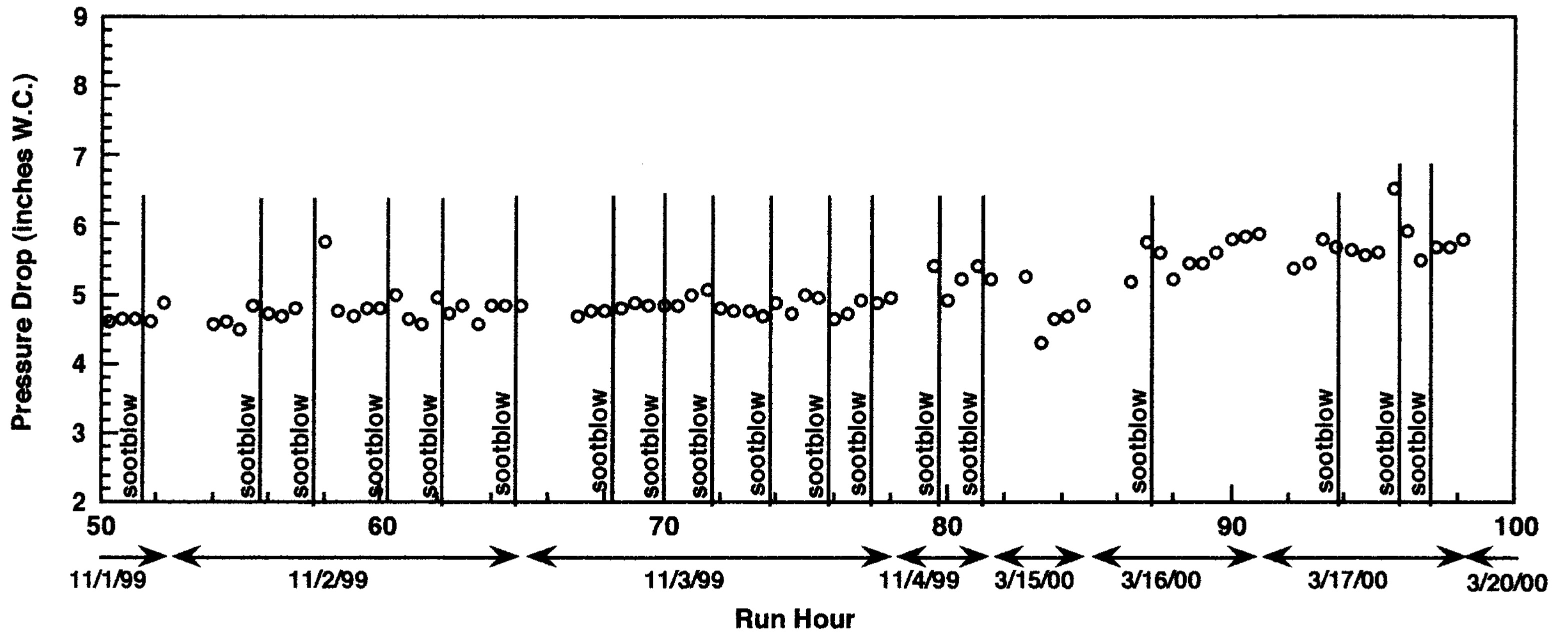

Figure 3B-2 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 50 TO 100

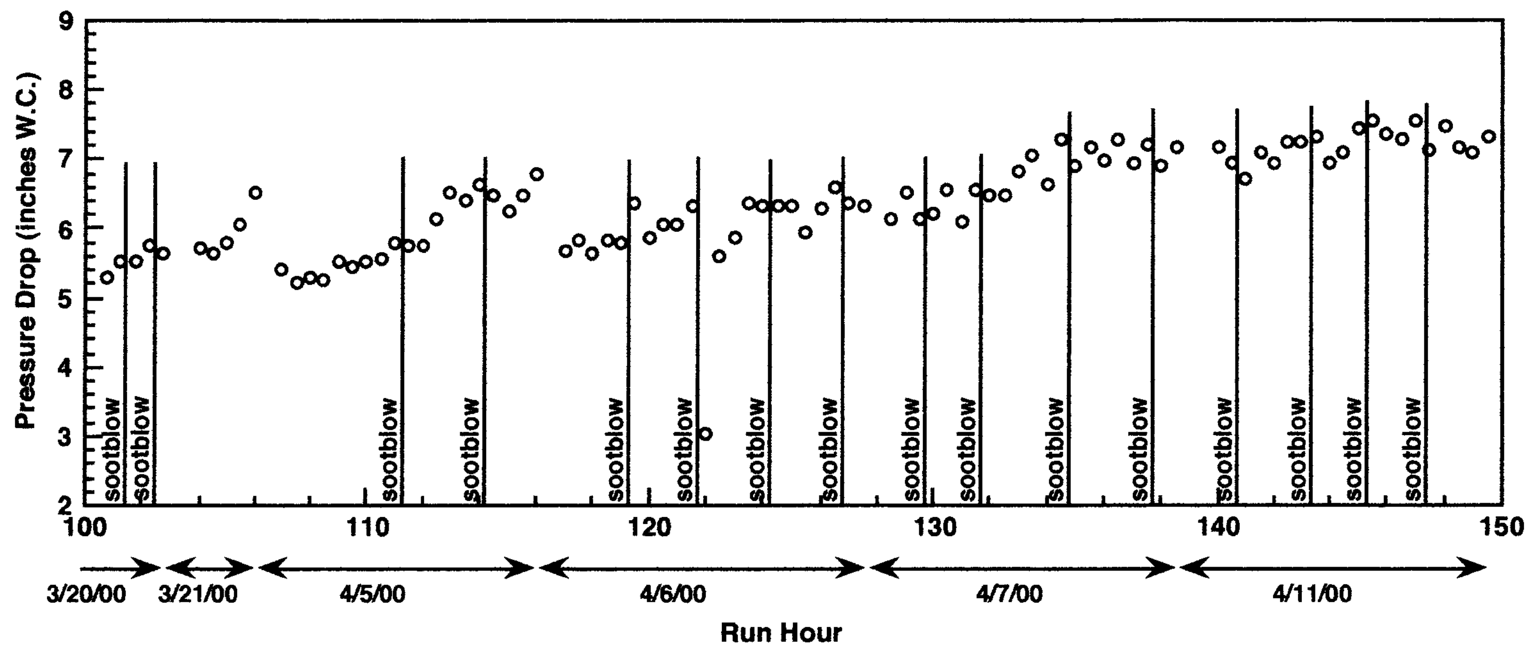

Figure 3B-3 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 100 TO 150

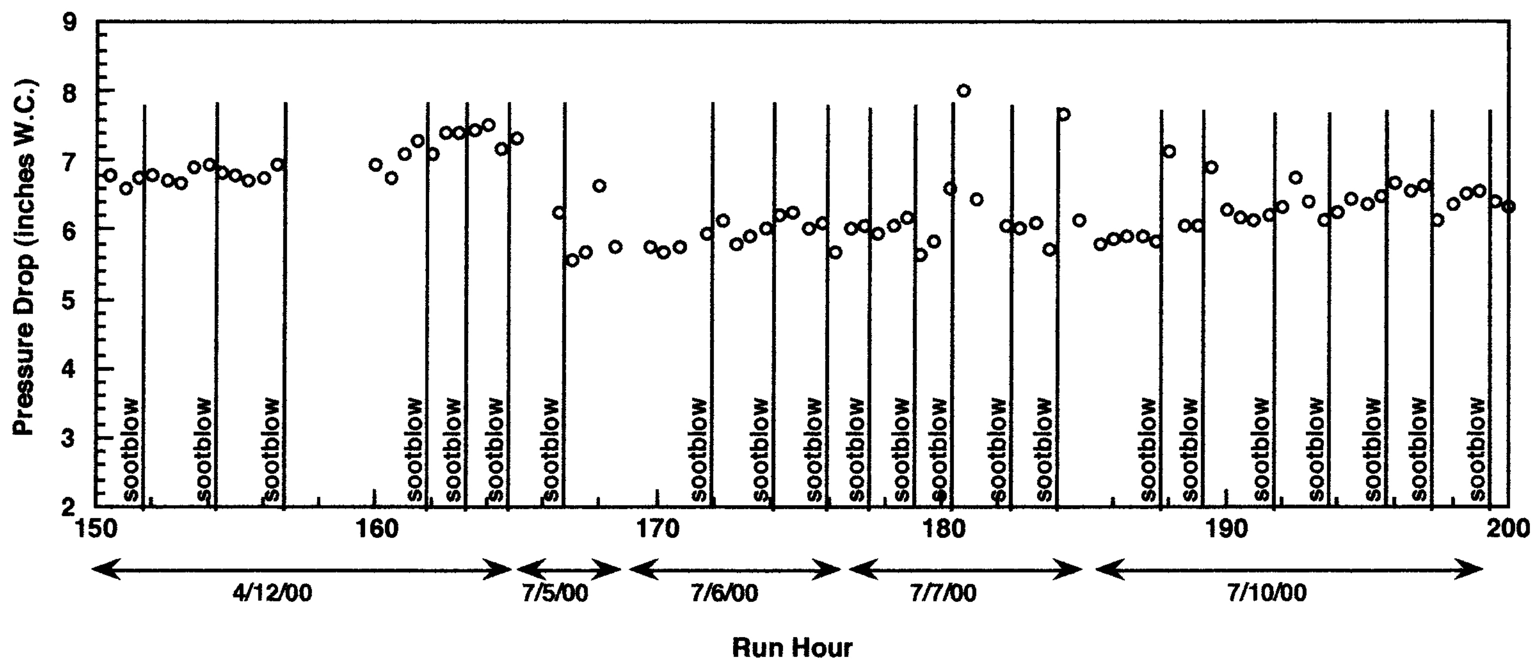

Figure 3B-4 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 150 TO 200

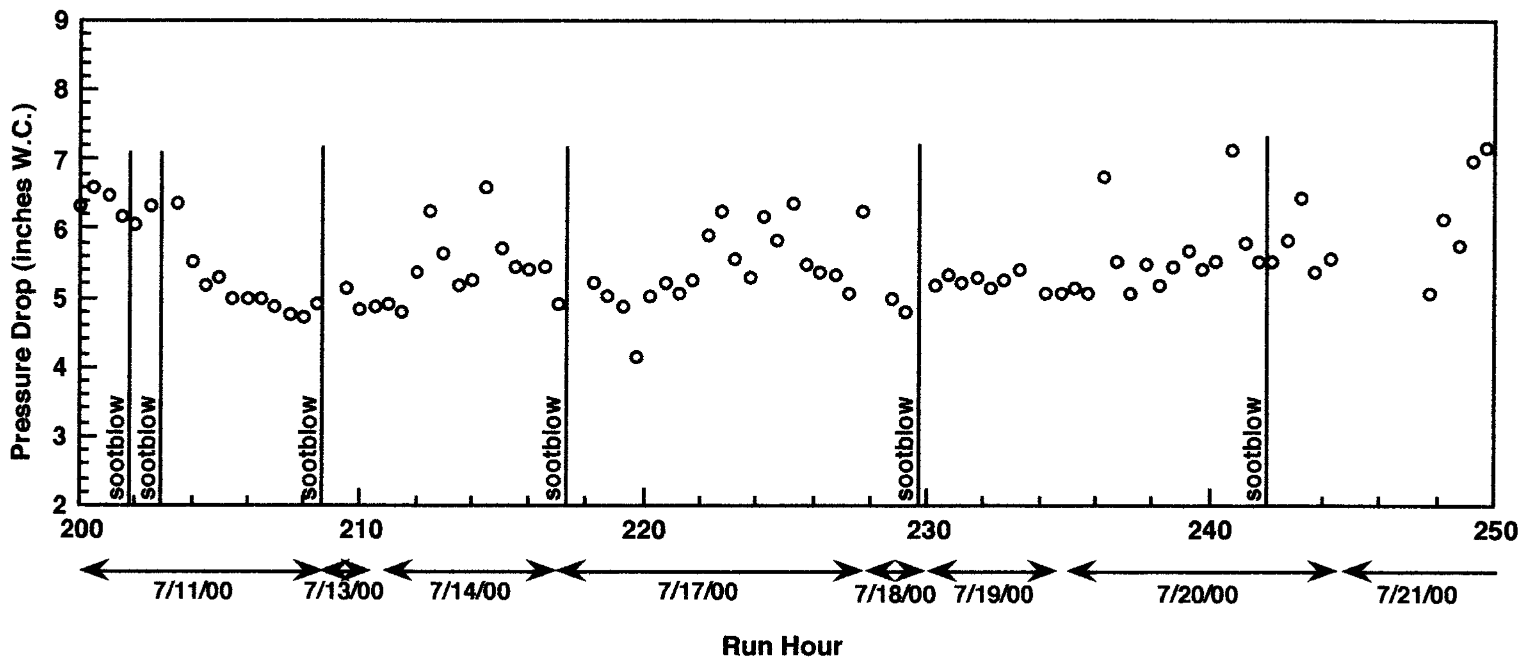

Figure 3B-5 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 200 TO 250

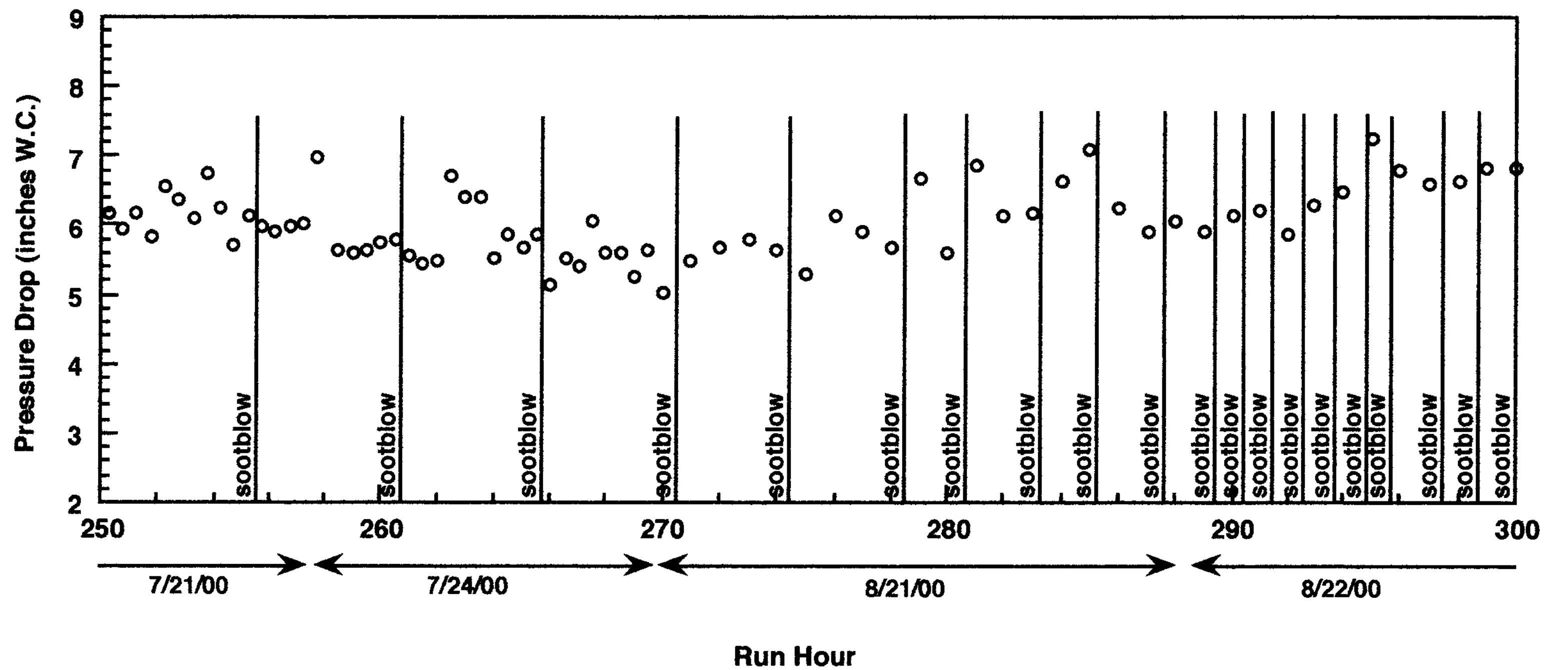

Figure 3B-6 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 250 TO 300

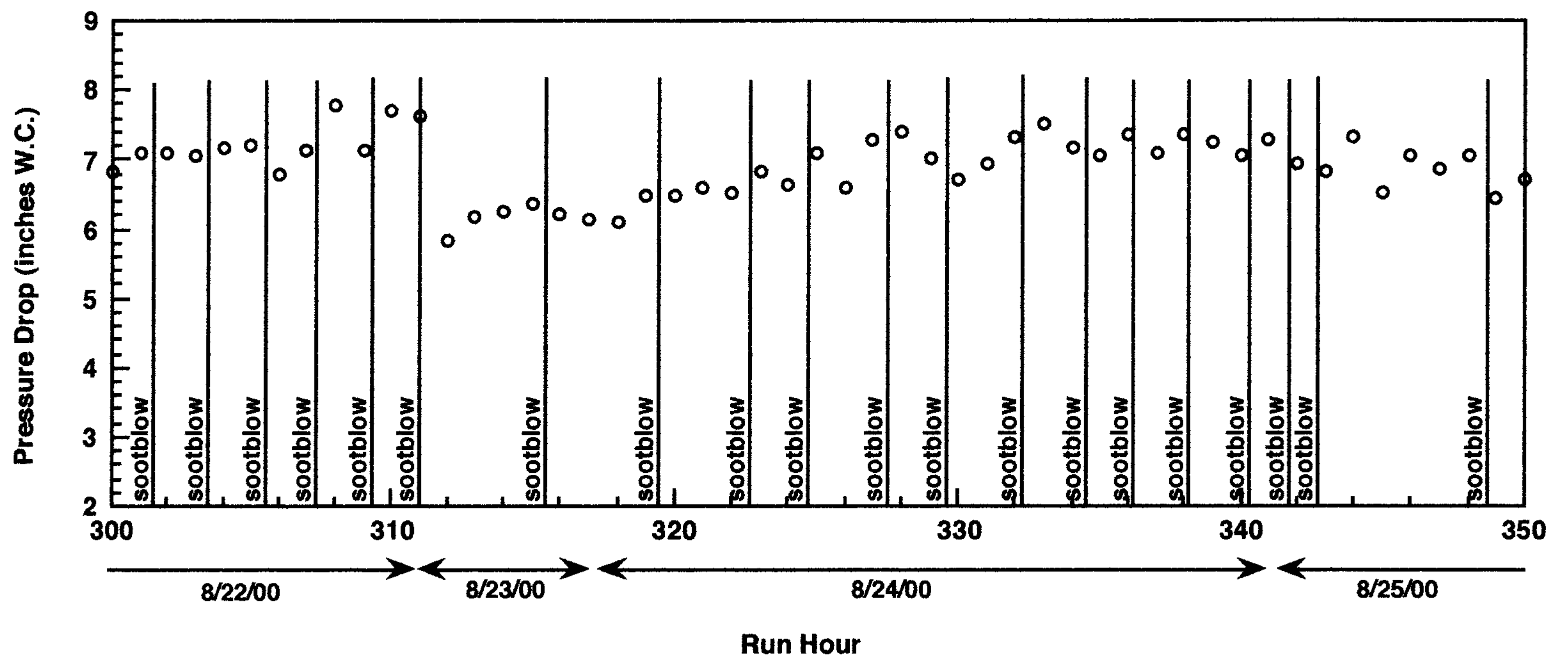

Figure 3B-7 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 300 TO 350

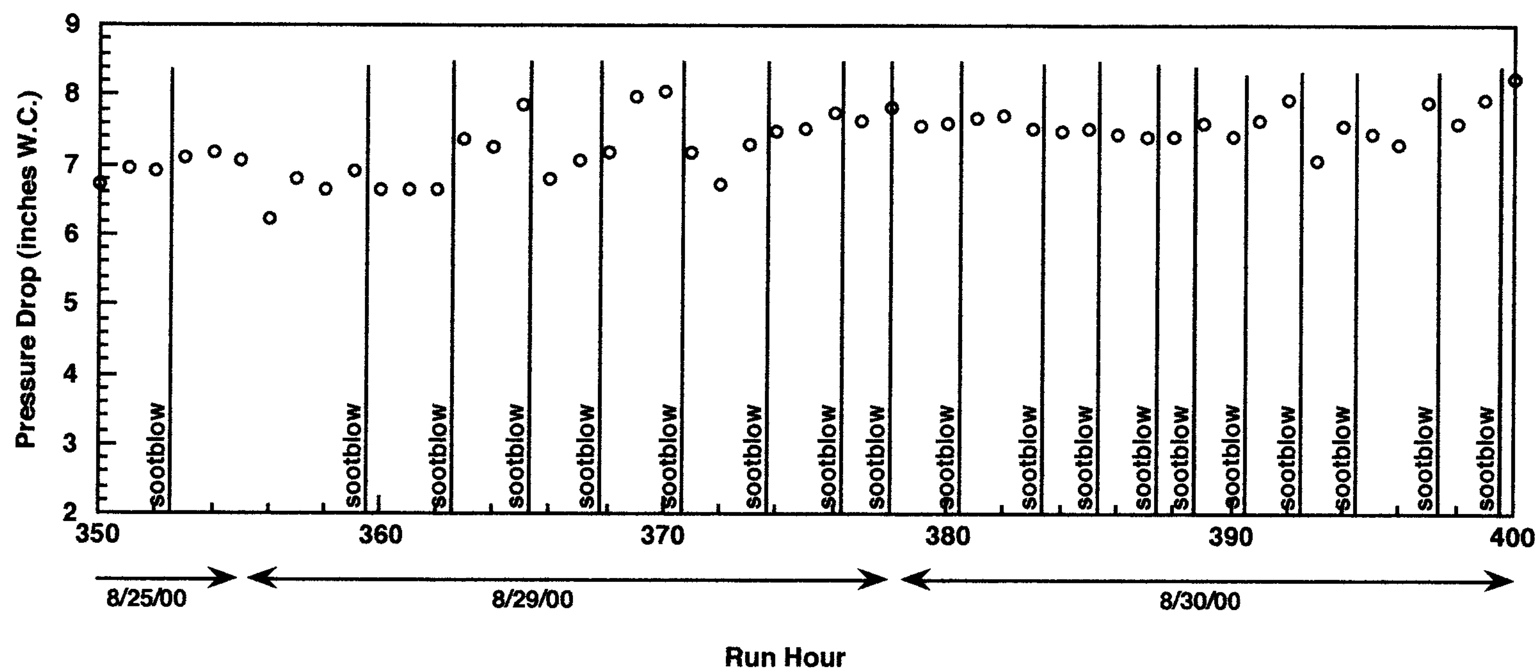

Figure 3B-8 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 350 TO 400

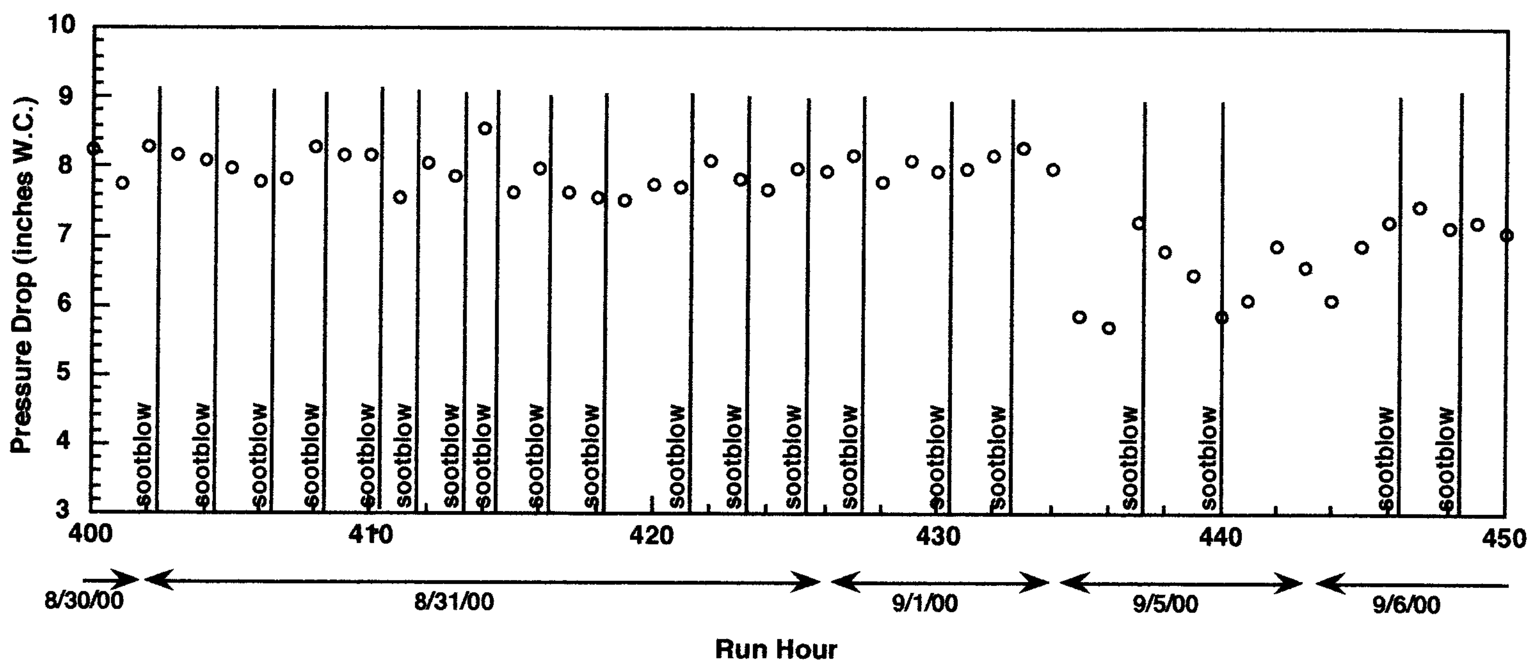

Figure 3B-9 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 400 TO 450

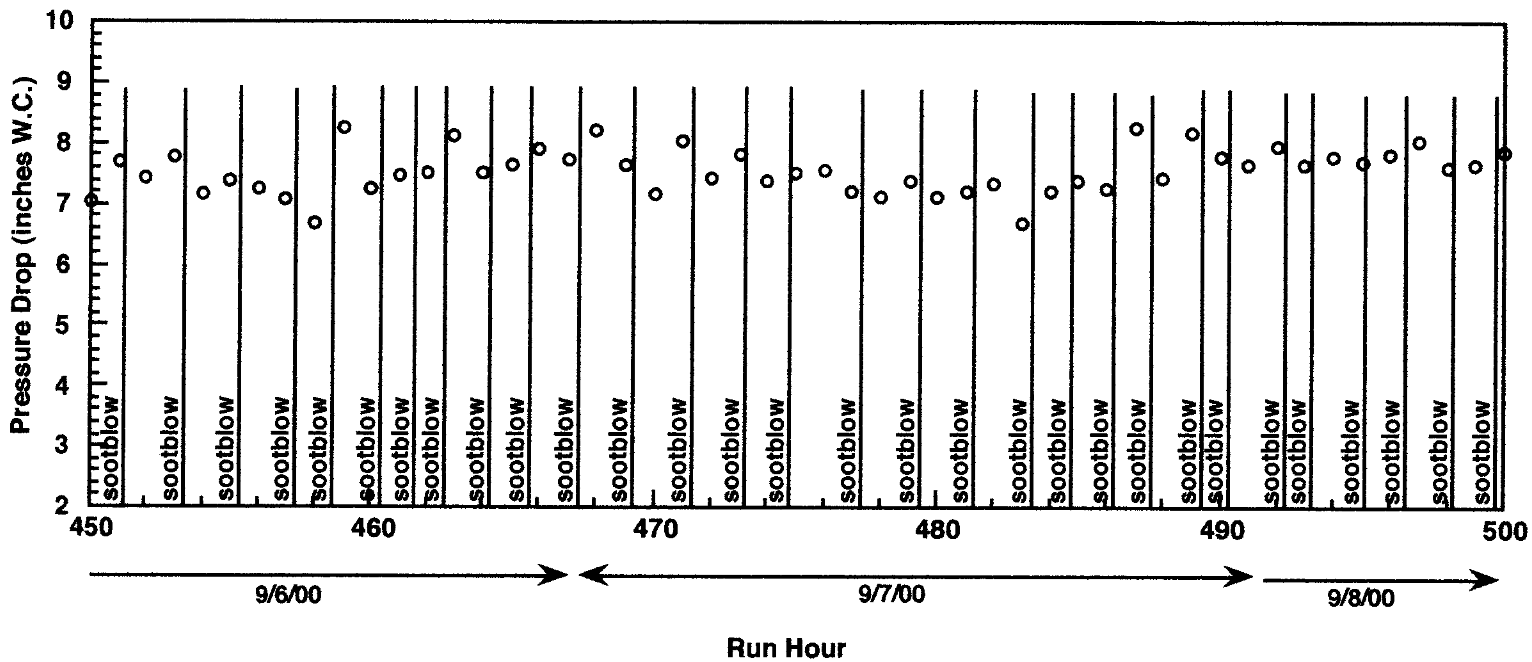

Figure 3B-10 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 450 TO 500

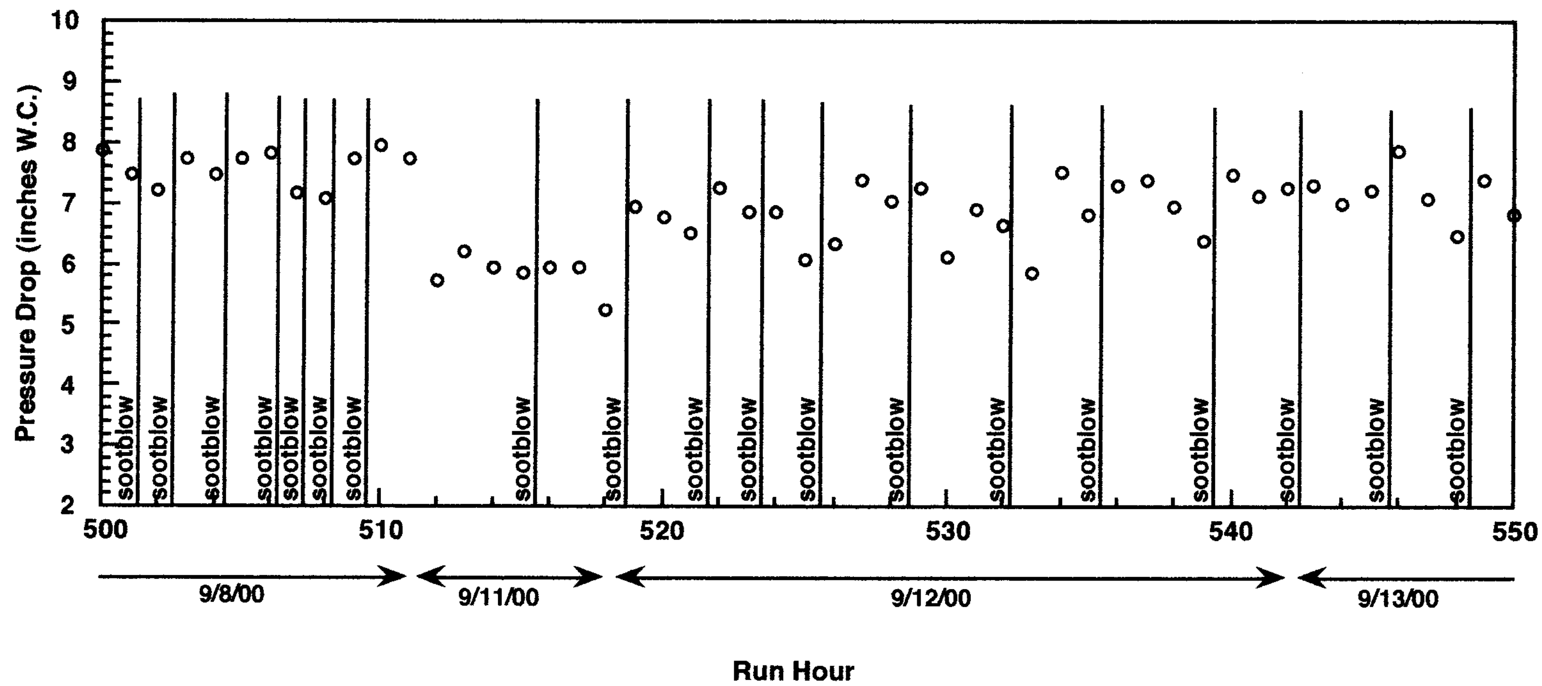

Figure 3B-11 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 500 TO 550

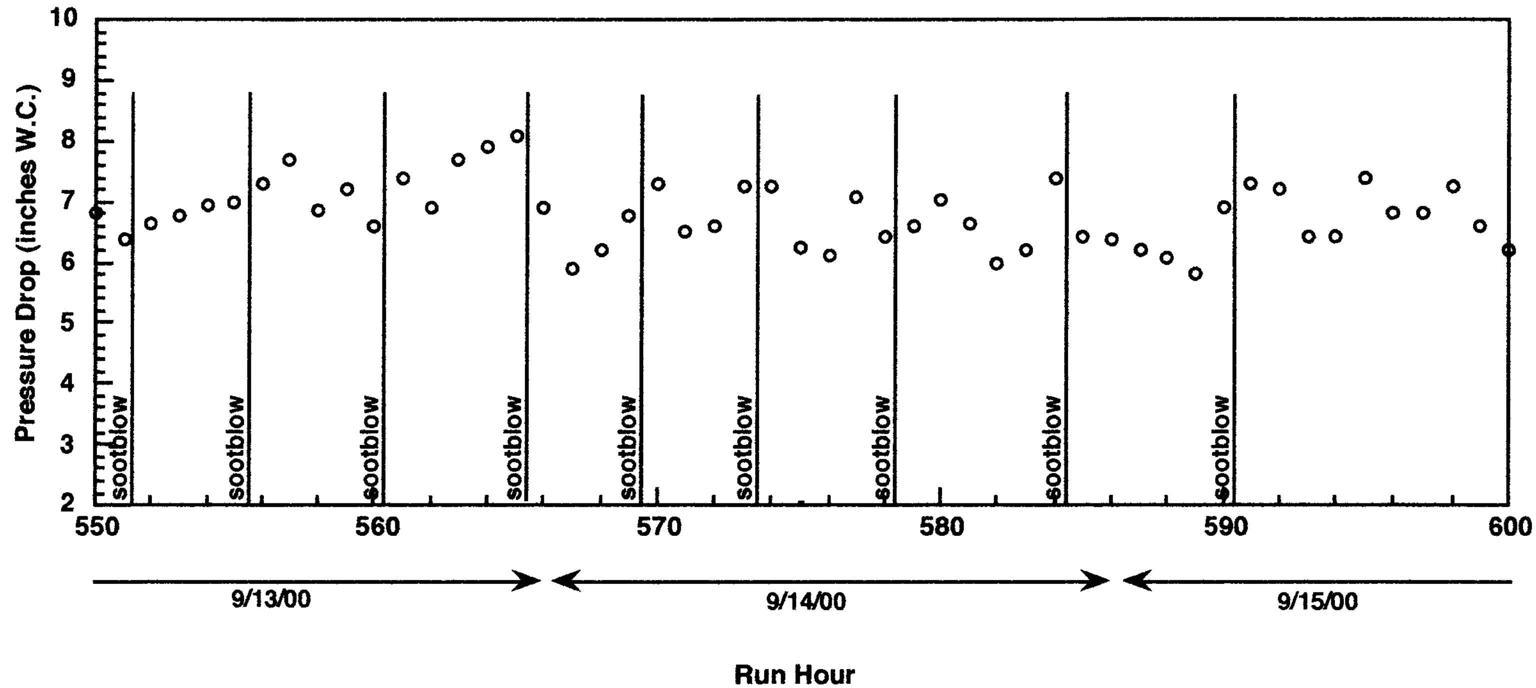

Figure 3B-12 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 550 TO 600

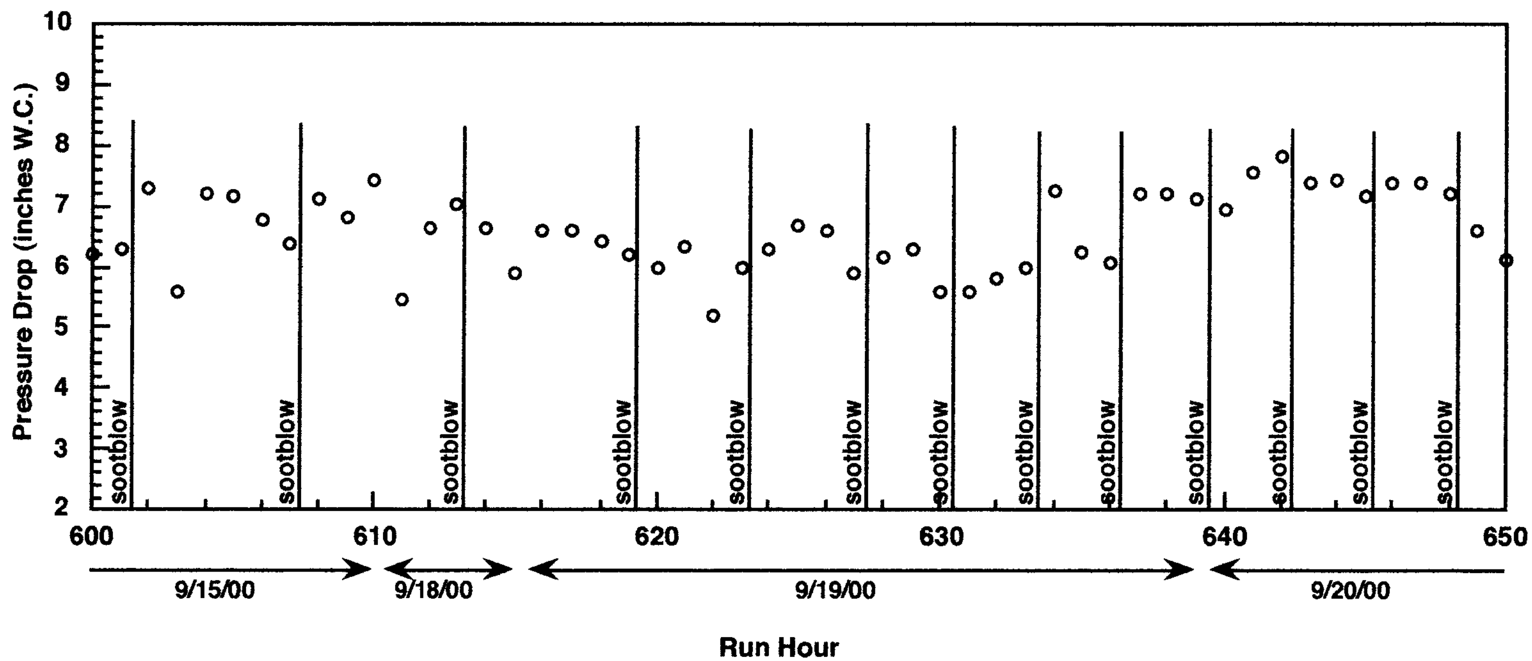

Figure 3B-13 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 600 TO 650

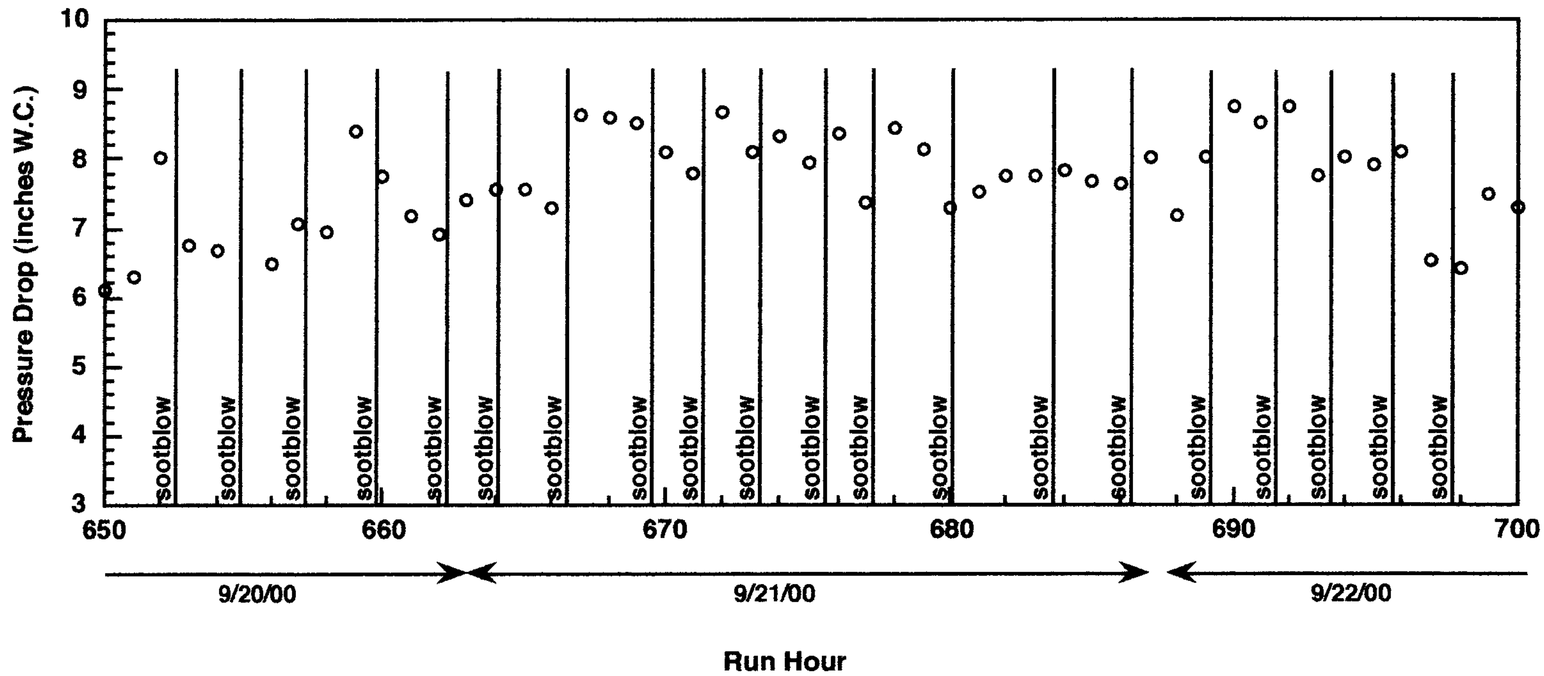

Figure 3B-14 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 650 TO 700

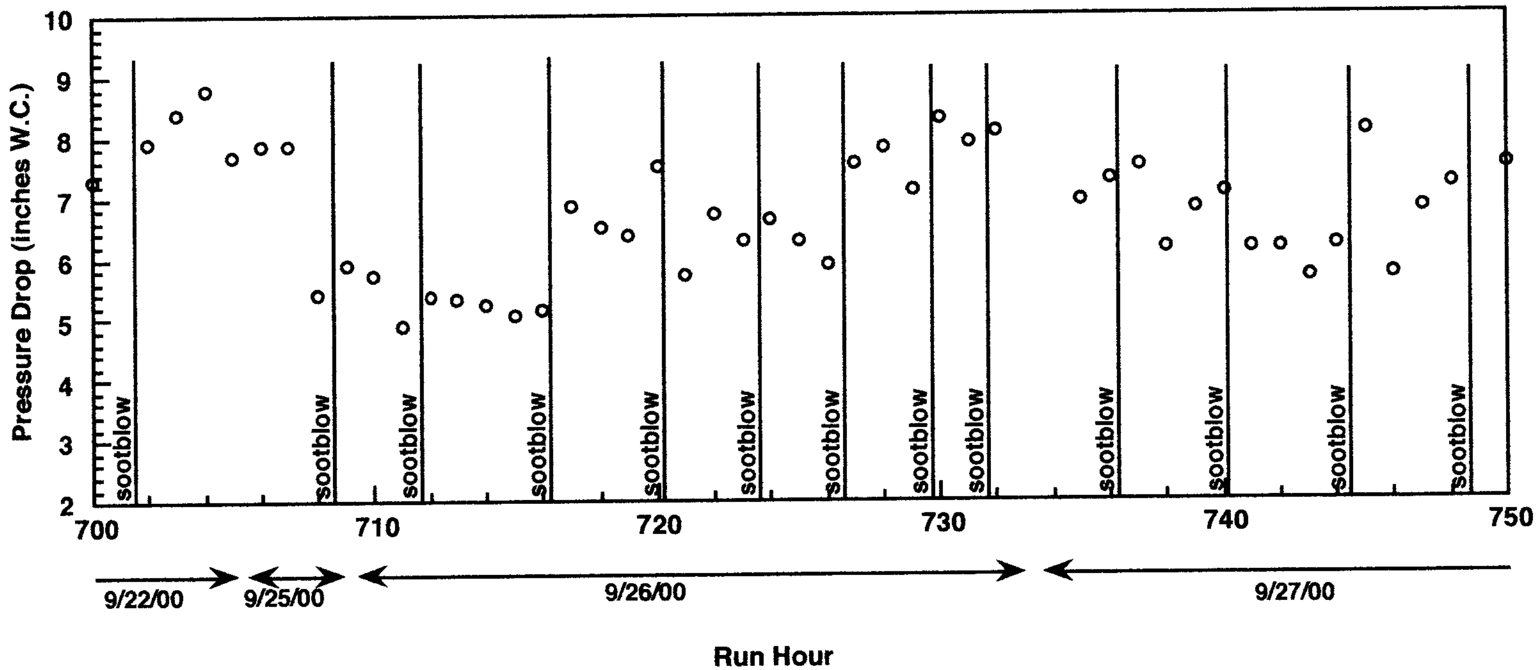

Figure 3B-15 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 700 TO 750

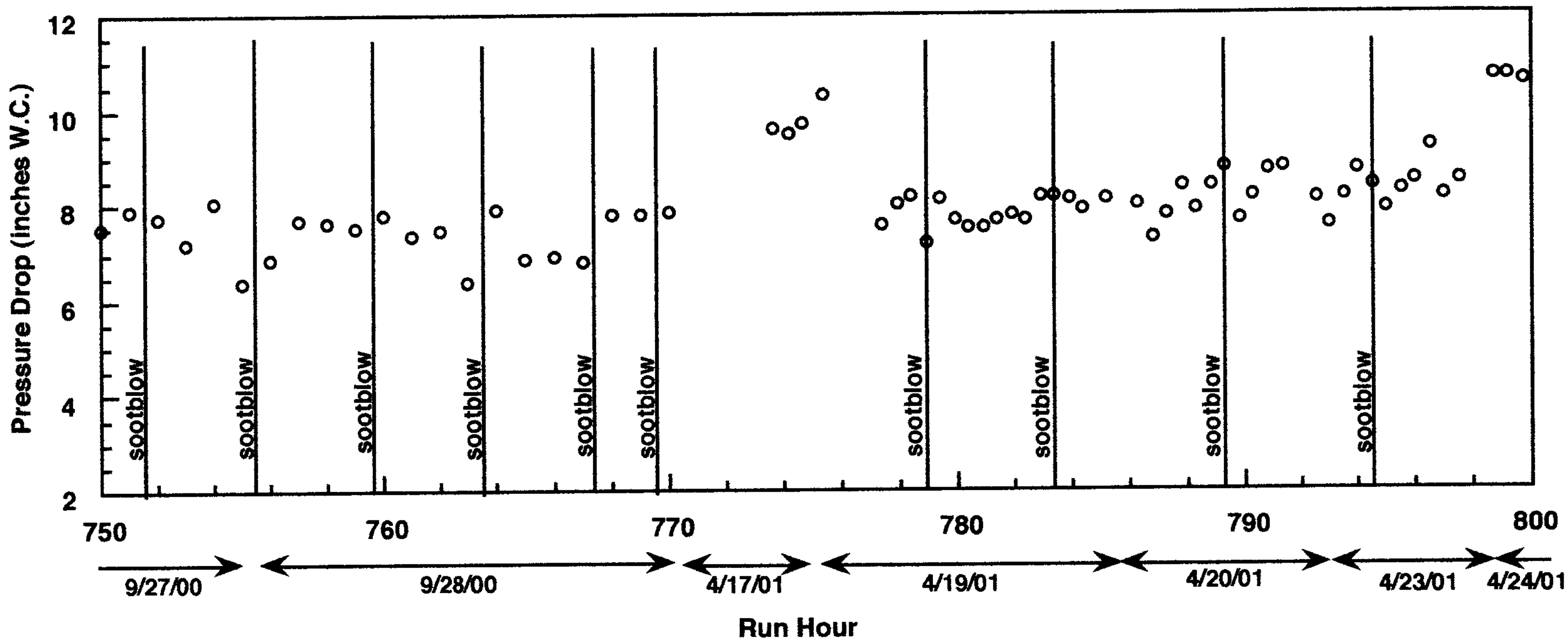

Figure 3B-16 **CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 750 TO 800**

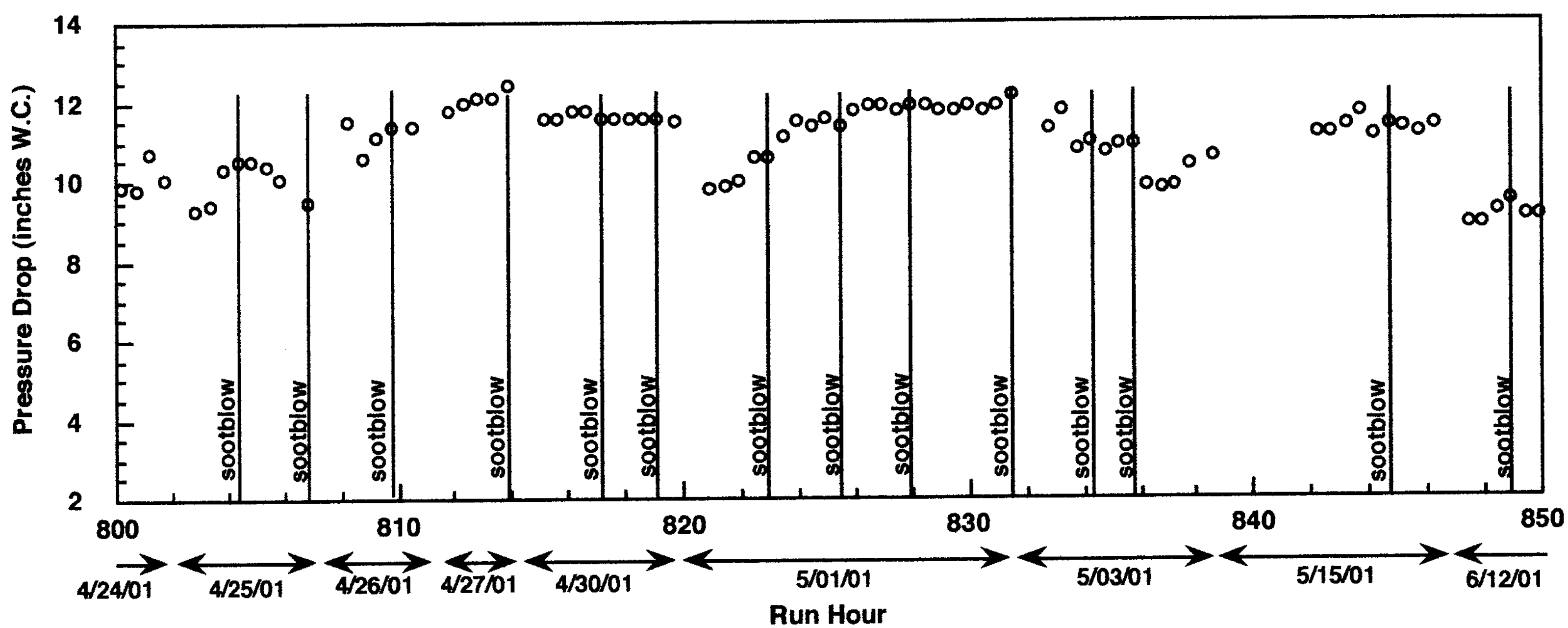

Figure 3B-17 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 800 TO 850

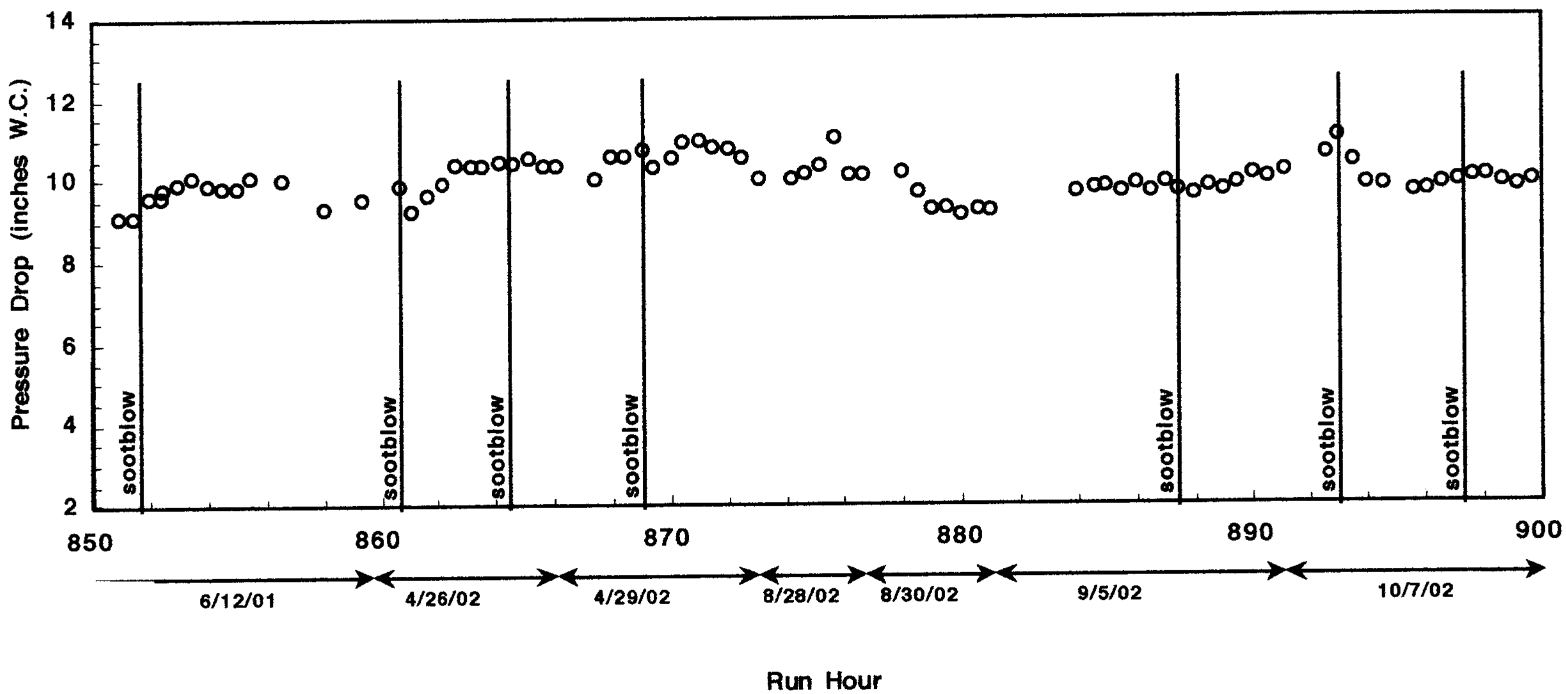

Figure 3B-18 CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 850 TO 900

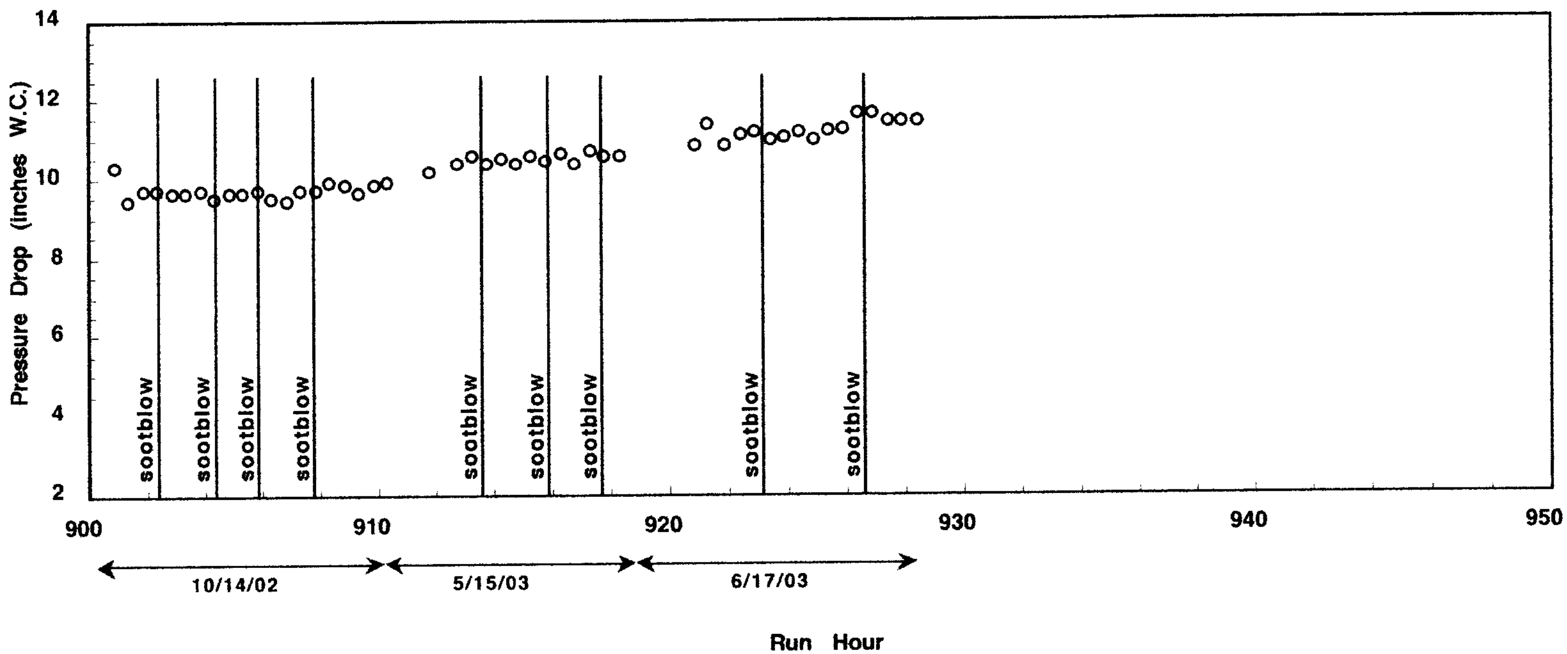

Figure 3B-19 **CERAMIC FILTER PRESSURE DROP AS A FUNCTION OF TIME FIRING COAL FOR RUN HOURS 900 TO 950**

Appendix 4A

Market Penetration Model Source Code Listing

```
$TITLE OPTIMAL ALLOCATION OF BOILER RETROFITS
$OFFUPPER
*  This model determines the optimal allocation of retrofitted boilers
*  in the Indiana and Cambria county region among the installed base
*  of water tube boilers.  The approach is to use a transportation model
*  that considers the costs to produce the boiler retrofit fuel, the costs
*  to transport MCWM to the retrofitted boilers, and the capital and
*  O&M costs of retrofitting.  The transportation model framework minimizes
*  the costs to boiler owners given the location of each boiler, and its
*  individual characteristics, and the location of each possible source of
*  MCWM.  The decision to retrofit is assumed to be made if the total costs
*  of retrofitting are less than the costs to continue firing oil or gas.
*
*        AUTHOR: A. Michael Schaal
*          DATE: March 3, 1995
*       Revised: April 17, 1995 -  Updated MCWM and retrofit cost curve
*

SETS
    i   fuel supply points      / GAS, COAL1 * COAL8 /
    j   boilers                 / BLR1 * BLR18 /
    k   mine characteristics    / ASH, SULFUR, OUTPUT /
    l   boiler locations        / 15701, 15901, 16330, 15931 /

    LABELS  for boiler plant data
        / BSIZE     boiler size in MMBtu per hour
          UTIL      average annual boiler utilization in %
          PGAS      boiler's price of gas
          BLOC      boiler location's zip code
          TCR       total capital requirement to retrofit boiler    /
    ;


*#####################  PARAMETER DECLARATION  ##########################

SCALARS
  MFACT     % additional mine output due to MCWM      /    100.0       /
  CMOIST    coal moisture content in %                 /      0.0       /
  PCOAL     price of chunk coal f.o.b. mine            /      0.0       /
  CHHV      coal higher heating value in Btu per lb    /    12810       /
  CWMHV    MCWM higher heating value in Btu per lb    /    14000       /
  STHV      heat content of steam in Btu per lb        /     1190       /
  ASHCST    coal ash disposal cost in $ per ton        /       5.60     /
  FXUNLD    fixed cost to unload MCWM in $ per MMBtu  /       0.168    /
  VARUNLD   transport cost in $ per MMBtu per mile     /       0.00373  /
  ASHPER    dry basis weight percent ash in MCWM      /       5.00     /
  PIFACT    annual P+I on $1000 at 4% and 20 years     /      73.582    /
  FXOMFACT  fixed O&M maint. cost as a % of capital    /       2.0      /
  ;


PARAMETERS
  ASHBCST           ash disposal cost in $ per MMBtu of coal burned
```

```
  MINE(i)              annual mine coal output in tons
  FS(i)                annual fuel available from each site in MMBtu
  DIST(i,l)            distance from ith fuel source to lth town in miles
  BDIST(i,j)           distance from ith fuel source to jth boiler in miles
  BOILER(j,LABELS)     boiler plant data
  BQ(j)                annual boiler demand for fuel in MMBtu
  ATCR(j)              annualized TCR to retrofit jth boiler
  FUELFC(i,j)          non-transport costs less production costs in $ per MMBtu
  PCOALM               price of chunk coal in $ per MMBtu
  TCOST(i,j)           MCWM transport cost in $ per MMBtu
  ;


*#####################  PARAMETER ASSIGNMENT  ############################

  PARAMETER  MINE(i)
*               tpy
      / COAL1  1686875
        COAL2   878230
        COAL3   870403
        COAL4   258030
        COAL5   188760
        COAL6   865017
        COAL7   485980
        COAL8   282732 /

  TABLE DIST(i,l)
               15701     15901     16330     15931
    GAS            0         0         0         0
    COAL1         30        23         9         3
    COAL2         22        35        32        20
    COAL3         20        40        33        25
    COAL4         40        44        32        22
    COAL5         45        15        35        29
    COAL6         30        42        57        51
    COAL7         14        44        43        36
    COAL8         23        19        33        26

  TABLE BOILER(j,LABELS)
               BSIZE      UTIL     PGAS      BLOC      TCR
*             MMBtu/hr     %     $/MMBtu     zip       $M
    BLR1        68.0       60      3.62     15701     5.01
    BLR2        50.4       53      3.62     15901     4.22
    BLR3        50.4       53      3.62     15901     4.22
    BLR4        50.4       53      3.62     15901     4.22
    BLR5        50.4       53      3.62     15901     4.22
    BLR6        68.0       60      3.62     15701     5.01
    BLR7        19.4       50      3.62     15901     2.43
    BLR8        19.4       50      3.62     15901     2.43
    BLR9        11.6        5      4.50     15901     1.81
    BLR10       11.6        5      4.50     15901     1.81
    BLR11       27.7       30      3.62     16330     2.99
    BLR12       27.7       30      3.62     16330     2.99
    BLR13       27.7       30      3.62     16330     2.99
    BLR14       11.6       30      3.62     15901     1.81
    BLR15       11.6       30      3.62     15901     1.81
    BLR16       11.6       30      3.62     15901     1.81
    BLR17       53.2        1      3.62     15901     4.35
    BLR18       94.5        5      3.62     15931     6.06
  ;

  BDIST(i,j) $ (BOILER(j,"BLOC") EQ 15701) = DIST(i,"15701") ;
  BDIST(i,j) $ (BOILER(j,"BLOC") EQ 15901) = DIST(i,"15901") ;
```

```
  BDIST(i,j) $ (BOILER(j,"BLOC") EQ 16330) = DIST(i,"16330") ;
  BDIST(i,j) $ (BOILER(j,"BLOC") EQ 15931) = DIST(i,"15931") ;
  ASHBCST    = (10000 * ASHPER * ASHCST ) / ( 2000 * CWMHV ) ;
  FS(i)      = ( 2000 * (MFACT/100) * MINE(i) * CHHV * (1-CMOIST/100) ) / 1e6 ;
  FS('GAS')  = 1e9 ;
  BQ(j)      = BOILER(j,"BSIZE") * (BOILER(j,"UTIL")/100) * 24*365.25 ;
  ATCR(j)    = PIFACT * BOILER(j,"TCR") * 1000 ;
  FUELFC(i,j)      = ASHBCST + FXUNLD +
                     ( ATCR(j) + (1e6*BOILER(j,"TCR")*FXOMFACT/100) )/BQ(j) ;
  FUELFC('GAS',j) = BOILER(j,'PGAS') ;
  PCOALM           = 1e6*(PCOAL/(2000*CHHV)) ;
  TCOST(i,j)       = VARUNLD * BDIST(i,j) ;

OPTION BQ:0:0:1 ;
OPTION FS:0:0:1 ;
OPTION ATCR:4:0:1 ;
DISPLAY PCOALM, FS, BOILER, BDIST, TCOST, BQ, ASHBCST, ATCR, FUELFC ;


*#####################  VARIABLE DECLARATION  ###########################

VARIABLES
  PMCWM(i)          MCWM production cost at supply point i
  QFUEL(i)           fuel demanded of zero marginal cost coal
  FUELCOST(i,j)      fuel costs less transport costs
  X(i,j)             annual flow of fuel from supply point i to boiler j
  Z                  total annual boiler costs
  ;

POSITIVE VARIABLES X, QFUEL, FUELCOST, PMCWM
  ;


*#####################  VARIABLE INITIALIZATION #########################

  PMCWM.L('GAS')      =  0.0 ;
  X.L(i,j)             =  0.0 ;
  X.L('COAL8',j)       =  BQ(j) ;
  X.L('GAS',j)         =  BQ(j) ;


*#####################  EQUATION DECLARATION  ###########################

EQUATIONS
  COST               define objective function
  FUELSPLY(i)        determine fuel demand for each supplier
  SUPPLY(i)          observe supply limits
  DEMAND(j)          satisfy boiler fuel demands
  SPLYCST(i)         total fuel preparation cost at each mine
  FUEL(i,j)          fuel cost less transportation
  FUELG(i,j)         gas price
  COALFX             coal mine fixed constraint
  ;
```

```
*#####################  EQUATION DEFINITION  #############################

COST ..         Z =E= SUM((i,j), FUELCOST(i,j)*X(i,j) + TCOST(i,j)*X(i,j) ) ;

FUELSPLY(i) ..          QFUEL(i) =E= SUM(j, X(i,j)) ;
SUPPLY(i) ..            QFUEL(i) =L= FS(i) ;
DEMAND(j) ..            SUM(i, X(i,j)) =E= BQ(j) ;
SPLYCST(i)$MINE(i) ..   PMCWM(i)*( (QFUEL(i)+1)**(0.969) ) -
                           0.6727*( (QFUEL(i)+1)**(0.969) ) =E= 211561 ;
FUEL(i,j)$MINE(i) ..    FUELCOST(i,j) =E= PMCWM(i) + FUELFC(i,j) ;
FUELG('GAS',j) ..       FUELCOST('GAS',j) =E= FUELFC('GAS',j) ;
COALFX ..               SUM( i, QFUEL(i)$MINE(i) ) - QFUEL('COAL8') =E= 0

MODEL RETROFIT /ALL/ ;

OPTION NLP = MINOS5 ;
OPTION ITERLIM = 4000 ;

SOLVE RETROFIT USING NLP MINIMIZING Z ;
SOLVE RETROFIT USING NLP MINIMIZING Z ;

DISPLAY X.L, PMCWM.L, QFUEL
```

Appendix 4B

MCWM Supply Cost Model

Introduction

This appendix describes basic economics for the supply of coal-based fuels for an industrial boiler that has been converted from firing fuel oil to firing a premium coal fuel. The boiler conversion technologies were studied by Penn State for DOE and DOD. The focus of Phase I activities were the development, design, and evaluation of two candidate technologies for boiler conversion. The boiler that was considered for conversion was a 25.2 MM Btu/h unit located at the Naval Surface Warfare Center at Crane, Indiana. The conversion technologies considered were to fire either, a micronized coal water mixture (MCWM) or a dry, micronized coal (DMC).

MCWM and DMC Conversion Technology Overview

The MCWM and DMC technologies utilize the particular form of the feed coal to minimize solids handling problems and minimize boiler derating. Both technologies require premium quality coal fuels, one difference between the two being the physical form of the fuel as delivered to the boiler. DMC is delivered to the boiler as a chunk coal (nominal 2" x 0) and reduced to the necessary micron size at the boiler site. MCWM, on the other hand, is transported, stored, handled, and fired in the boiler in slurry form. Both technologies use coal with the same basic qualities as listed in Table 4B-1.

The first three coal characteristics were determined by Penn State as minimums acceptable for either technology. The coal higher heating value (HHV) is an estimate for a coal of this quality. The estimated HHV is probably on the conservative side considering other DOE researchers use a value closer to 15,000 Btu/lb coal.

Table 4B-1 MCWM and DMC Coal Quality Specifications

Ash Content	≤ 5	wt.% (dry basis, d.b.)
Sulfur Content	≤ 1	wt. % (d.b.)
Volatile Matter	> 30	wt. % (d.b.)
Higher Heating Value	≈ 14,000	Btu/lb coal (d.b.)

Sufficient reserves of acceptable coal sources have been identified by Penn State to exist in the immediate area of Crane (within a radius of 40 miles, or closer) for either technology.

Crane Boiler Characteristics

The Crane boiler that was evaluated for retrofit to fire coal is one of three, roughly equivalent, boilers located within the same boiler house. These boilers are presently used for building heat, with occasional demands for process steam. The Phase I case study considered only six month operation of the retrofitted boiler corresponding to the heating season. The basic boiler retrofit requirements are listed in Table 4B-2.

Table 4B-2 Crane Boiler Specifications

Boiler Rated Capacity	25.2	MM Btu/h
Annual Hours of Operation	4,383	Hours
Boiler Load During Operation	100	%
Coal Requirement (Operating)	0.9	tons per hour (tph) coal (d.b.)
Annual Coal Requirement	3,945	tons per year (tpy) coal (d.b.)

The annual operating hours assumes that the retrofitted boiler is used during a typical six-month heating season at full rated capacity. Additional steam requirements for DOD users are met by adding boilers to the system. This arrangement of smaller, modular, boilers follows a normal DOD facilities planning philosophy that emphasizes maximization of system reliability under adverse conditions and standardized designs. Industrial- and commercial-scale boilers tend to be larger in order to minimize per unit cost of steam.

MCWM Supply

The MCWM fuel form, as a slurry, has some potential advantages as compared to the DMC fuel. First, since the fuel is handled as a slurry it can be easily pumped into the system, stored, and sent to the burner for atomization into the boiler. Also, the slurried fines pose little problem in the generation of airborne dust (as long as splashing and spillage is avoided). Supply of the slurry may, potentially, come from a variety of relatively low cost sources as compared to other coal-forms. Since the slurry is delivered to the boiler at the proper size, the relatively capital and O&M cost intensive grinding mills for each boiler that is converted to fire the coal fuel are not necessary. Finally, cost advantages could be derived from the installation of a single slurry preparation system to supply several converted boilers.

One disadvantage of MCWM is that boiler derating tends to be more severe with slurry fuels, ceteris paribus, due to; 1) fuel atomization forming droplets consisting of several coal particles requiring longer residence times for burnout, 2) ash deposition and erosion on boiler tubes, and 3) heat losses (latent and sensible) associated with the higher moisture content of the fuel. Storage of the slurry can also be problematic due to a tendency of the solids in the slurry to settle and form a 'hard' or 'soft' pack. This settlement problem requires the development of specialized slurry preparation techniques and chemical additive packages. Minimizing boiler derating and improving the handleability and storage of the slurry were goals of the technology development effort by Penn State.

A basic difference governing the economics of fuel supply between MCWM and DMC technologies is that the form of the fuel delivered to the boiler is not readily available from an existing market source. Coal is not generally produced for delivery to customers in slurry form. In fact, state-of-the-art production of a MCWM with the requisite handleability, storage, and atomizing qualities is limited in terms of total quantity produced annually and in the number of potential suppliers. In addition, there can be substantial variation in the quality of slurry produced by the different suppliers. For that reason, the MCWM retrofit option must consider the costs of production and delivery of slurry to the Crane boiler.

MCWM Factored Cost Estimate

A factored cost estimate for the production and transportation of MCWM to the Crane boiler was developed to aide in comparing this fuel to DMC. At the present time, no specific coal source has been identified. The production and transportation analysis presented here is loosely based on using AMAX Coal Company's Minnehaha operation (located about 40 miles from the Crane boiler) to site the MCWM preparation plant.

Creation of a market for MCWM potentially addresses a problem faced by nearly every coal preparation plant operation, namely the disposition of coal fines. Coal fines are difficult to clean and dry to a level of acceptable moisture content. Even when recovered and dried to acceptable levels, conventional handling methods tend to cause fines to become easily airborne, representing both a loss of product and the creation of a potential health hazard. Both the above problems can be addressed by producing and transporting the fines in a slurried fuel. Bearing this in mind, the feed to a MCWM production process can come from a variety of sources including; 1) existing coal impoundment, 2) existing operational coal preparation plant, and 3) conventionally produced chunk coal.

Considerable uncertainty surrounds the recovery of coal from existing coal impoundments due to the difficulties of locating appropriate impoundments, the adequate characterization of the distribution of coal (and potential contaminants), and the higher expected costs associated with reclamation/dredging of the coal. An impoundment must be able to provide an inexpensive product possessing the rather stringent quality specifications. Mixtures of the desired coal with other coals and contaminants in the impoundment complicates the beneficiation and slurry production process.

The surest method of providing the MCWM fuel is from coal obtained from the market in chunk form that already possesses the desired quality specifications. The size reduction and slurrying required can then be carried out in a straight-forward manner. The disadvantages of this method are the expected higher cost of coal, as compared to the alternatives, and the extra equipment and effort required to reduce the +2" x 0 coal the size required for MCWM.

A third option exists for producing MCWMs from slurry refuse streams in an existing coal preparation plant. Here, the characteristics of individual refuse streams in the conventional preparation plant can be utilized with little variation expected in the stream compositions over time (when cleaning the same coal). Since coal is recovered from process streams that would normally be discarded, the marginal cost of feed coal and refuse disposal for the slurry production plant would be zero. In fact, an economic benefit can be derived for reducing quantities of solids requiring disposal.

To date a particular site has not been selected, hence characterizing a preparation plant sufficiently to carry out a detailed design of the slurry preparation plant is not possible. The MCWM production plant speculated here, however, makes use of this last scenario by providing what may be considered typical slurry preparation plant equipment. A MCWM production plant for the Crane boiler may be sized as described in Table 4B-3.

Table 4B-3 MCWM Production Plant Characteristics

MCWM Plant Production Rate	2	tph (d.b.)
Slurry Plant Annual Operating Hours	1,972	
Annual Production (Crane)	3,945	tons coal (d.b.)
Annual Maximum Rated Capacity	14,026	tons slurry

As can be seen from Table 4B-3, the slurry plant is oversized relative to the boiler requirement. The MCWM sizing reflects, 1) difficulties associated with the problems in differentiating between processes of a capacity in the range of one to three tph, 2) a built-in margin for both the large uncertainty in the capital equipment requirement, and 3) a production rate sufficient to provide for preparation plant down time while the boiler operates 24 hours per day, seven days a week. The MCWM production plant maximum annual capacity assumes a plant availability of 80 percent and the existence of a market for all of the production.

A simple factored capital cost estimate is provided in $90.6/ton coal (d.b.) or $3.23/MM Btu. This cost includes all capital, operation and maintenance charges.

Table 4B-4. The equipment list provides allowances for a single mill, conventional flotation cells, spirals (or the equivalent in other cleaning equipment), pumps, and a 25,000 gallon slurry storage tank sized for a three day supply of Crane, with an additional 10% allowance for miscellaneous equipment items. The electrical load of the equipment was estimated at 94 horsepower. The estimated equipment costs and electrical loads were generated after reviewing several sources and applying standard cost estimation methodologies to account for inflation, at 4%, and scale. The slurry plant described here purposely avoids the use of advanced fine coal cleaning methods reflecting an emphasis upon locating refuse streams that require minimum efforts to recover coal fines of the required quality.

The total capital requirement is estimated to be $993 thousand dollars. As can be seen from the equipment list, by far the largest capital requirement is represented by the mill. This item also represents the greatest proportion of the estimated horsepower due to the demanding grinding regime expected. The equipment list, and associated costs, is considered speculative due to the incomplete knowledge regarding potential feed stream characteristics.

The plant cost factor used for determining the installed plant cost was generated using the Chilton method. The selection of this method was due to ease of use and consideration of the fact that the MCWM plant is an addition to an existing coal preparation facility. That advantage, along with the simple to implement approach, is somewhat offset by the relatively small size of the plant and the speculative nature of estimate. The factor derived and presented above of 3.39 is less than the simpler Lang factor of 3.63 for solid-fluid plants.

Annualized capital and operation & maintenance (O&M) costs are presented in the Table 4B-5. The MCWM cost, f.o.b. slurry preparation plant, is estimated to be $90.6/ton coal (d.b.) or $3.23/MM Btu. This cost includes all capital, operation and maintenance charges.

Table 4B-4 MCWM Factored Capital Costs ($K '93)

Mill	176
Flotation Cells	30
Spirals	14
Pumps	13
Tankage	33
Miscellaneous Items (@ 10%)	27
Equipment Cost (Delivered)	$293
Cost Factor (Chilton Method)	3.39
Total Installed Plant Cost	$993K

Table 4B-5 MCWM Annualized Capital and O&M Costs ($ '93)

	Annual Cost $	$/ton Clean Coal (d.b.)	$/MM Btu
FIXED O&M COSTS:			
O&M Labor	39,447	10.00	0.36
Maintenance Materials & Supplies	39,708	10.07	0.36
VARIABLE O&M COSTS:			
Feed Coal	-	-	-
Refuse Disposal	-	-	-
Grinding Media	1,341	0.34	0.01
Flotation Reagents Allowance	2,209	0.56	0.02
Additive Package	30,453	7.72	0.28
Electrical Power	5,509	1.40	0.05
Capital Charges:	238,606	60.49	2.16
TOTAL O&M AND CAPITAL CHARGES	357,273	90.57	3.23

O&M labor is assumed to be marginal to the existing coal preparation plant operation. An allowance of one person at $20/h is provided. Maintenance materials and supplies are estimated at four percent of total plant cost. Both feed and refuse disposal costs are considered as marginal to the existing preparation plant operation and therefore equal to zero (no benefit assumed to be derived from avoided disposal to an impoundment pond). Consumption of grinding media is estimated to be 0.68 lb media per ton coal (d.b.) at $0.50/lb. An allowance is made for flotation reagents at $0.16/ton flocculant and 2 lb fuel oil per ton of coal at $0.20/lb. Electrical power consumption for the state of Indiana is taken at 4 cents/KWh. Capital charges are calculated at a 15% cost of capital with a payback period of 7 years. At this level of the analysis, the use of government funds to build the MCWM plant (and a 4% discount rate) is not assumed in order to provide an additional margin, and to allow for sizing the plant for multiples of Crane (as discussed below).

The additive package costs primarily consists of a dispersant to avoid the formation of agglomerates that pose problems for storage and atomization of the slurry by the burner. The dispersant is estimated as 0.6 wt.% to coal at a cost of $0.55/lb (active ingredient). A base is also used in conjunction with the dispersant in order to correct slurry pH. The costs for using the base are estimated as 0.4 wt.% to coal at a cost of $0.14/lb. It is recognized that several additive packages exist which may provide acceptable results. Physical slurry preparation techniques may also substantially reduce the amount of dispersant required.

A sensitivity analysis of MCWM costs, f.o.b. slurry preparation plant, was conducted using a methodology similar to that accomplished for the Crane base case. It was shown that the $/MM Btu cost of coal decreases substantially with an increasing number of oil-designed boilers converted over to fire MCWM. At a coal requirement equivalent to 10 boilers the size of Crane, the MCWM cost is $1.03/MM Btu and drops to $0.67/MM Btu at 50 Crane boiler equivalents. The analysis presented here does not imply that this many boiler conversions are undertaken. Indeed, only a few industrial or commercial-sized boilers would need to be converted to create an equivalent level of demand.

It should be noted that throughout the analysis of MCWM costs the capital charges are not amortized over a significant fraction of maximum rated slurry plant capacity. Since the demand is assumed to be only for a six month heating season, the slurry plant with all its capital equipment, sits idle for half of the year, regardless of the type of fuel supply. An interesting analysis might be to size the preparation plant for the anticipated annual demand and compare the benefit of a reduced plant capital cost to the added storage costs of slurry.

Another consideration of using MCWM as a boiler fuel is the relatively high costs of transport that range from 0.87 to 1.45 $/MM Btu. A significant factor in the slurry transportation costs is the weight and bulk penalty of transporting up to 40 wt.% of water with coal. Any slurry fuel system that reduces weight being transported from the source to the point of use would reduce slurry transportation charges. Consideration might be given to transporting MCWM with the highest solids loading possible and then adding the necessary quantity of water at the boiler site. This fuel form also tends to higher charges due the necessity of using tanker versus dry bulk trucks. Extending the previous concept, the MCWM might be transported in covered trucks as filter cake and then slurried at the boiler site.

Appendix 4C

MCWM Retrofit Technology Cost Model

Table 4C-1 MCWM Cost Estimate to Retrofit a 25.2 MM Btu/h Boiler

Ref. No	Item Description	Material Cost	Installation Hours
General Equipment			
116	FD FAN w/vfd	$14,000	60
117	Air Preheater 'steam'	$4,715	40
118	Air Heater (Q-Tube)	$85,000	80
119	Air Heater Sootblower	$2,700	24
120	Bag House	$49,734	160
121	ID Fan w/vfd	$18,750	80
122	Boiler Mods	$0	0
123	Stack	$45,000	100
124	Floor Air Blast System	$4,200	160
125	Air Dryer	$8,000	24
126	Oil/Water Separator Equip	$4,000	24
127	Air Receiver Tanks	$1,500	24
128	Pitot Grid-Comb. Air	$3,000	16
129	Underground Building	$20,000	1000
130	Compressor Building	$4,000	160
131	Retaining Wall	$4,500	430
132	Excavation	$1,000	120
133	Concrete Slab	$11,500	600
134	Air and FG Ductwork	$28,500	560
135	A.H. Support Steel	$4,500	40
136	Valves and Instrumentation	$80,000	800
137	Controls	$100,000	
138	Electrical Work	$70,000	1200
139	Run-Off Drain	$400	24
140	Concrete Pipeway	$650	100
141	A.H. Sootblower Piping	$2,200	220
	Subtotal		
Ash Handling Equipment			
142	Pneumatic Conveying System	$7,390	120
143	Ash Silo	$18,034	
144	Ash Silo Bin Vent Filter	$3,508	40
145	Rotary Valve	$4,382	24
146	Ash Unloading Screw Conveyor	$16,614	120

Ref. No	Item Description	Material Cost	Installation Hours
	Slurry Feed Equipment		
147	MCWSF Transfer Pump (2)	$4,000	24
148	MCWSF Storage Tank	$52,000	120
149	MCWSF Mixer	$34,000	
150	Strainer (3 Sets) @ 1500 each	$4,500	32
151	MCWSF Injection Pump (2)	$13,400	32
152	MCWSF Heater	$16,000	60
153	Flush Water Booster Pump	$1,200	24
154	Waste Processing Tank	$5,200	24
155	MCWSF Burner	$66,000	80
156	Air Compressor	$33,000	80
157	Slurry Building	$7,500	400
158	Slurry & Flush Water Piping	$26,000	600
159	Waste Processing Equipment	$27,500	80
160	Power Station	$21,500	64
		$929,577	7970
	Direct Construction Costs		
	Total Materials	$929,577	
	Total Installation Hours Cost (@ $40/hr)	$318,800	
	Construction Indirect Costs		
	Field Supervision (15% of Labor hours)	$47,820	
	Construction Overhead and Fee (20%)	$249,675	
	Other Project Costs		
	Frieght (6%)	$55,775	
	Taxes, Permits (7%)	$65,070	
	Subtotal Subcontractor and Equipment	$1,666,717	
	Estimating Accuracy Allowance (10%)	$166,672	
	Total Subcontractor and Equipment	$1,833,389	
	Engineering (15% of project)	$376,724	
	Project Management (4% of project)	$100,460	
	Construction Management (6% of project)	$150,690	
	Start up (2% of project)	$50,230	
	Subtotal Project	$2,511,492	
	Contingencies (about 15%)	$374,212	
	Total Project Cost w/contingency	$2,885,704	

Appendix 4D

ELECTRIC POWER IN YOUR COMMUNITY

In this survey we are interested in how you feel an electric power plant could affect you and your community. Because we are asking how you feel, there are no right or wrong answers. You do not need to know anything about electricity or how it is produced to answer the questions in this survey. Just answer the questions according to what you know, your own personal experiences, and attitudes. Please answer every question.

Throughout this survey, think of a risk as something that may or may not happen and an impact as the result that actually happens. An impact can be either good or bad.

Q1. Below is a list of technologies and types of facilities common in today's society. With a 1 meaning "not at all risky" and a 5 meaning "very risky," indicate how risky you feel each item is to you and your family.
(Circle appropriate number for each item.)

	NOT AT ALL RISKY		SOMEWHAT RISKY		VERY RISKY
PESTICIDES	1	2	3	4	5
X-RAYS	1	2	3	4	5
NUCLEAR POWER PLANT	1	2	3	4	5
ASBESTOS	1	2	3	4	5
TRAFFIC	1	2	3	4	5
QUARRY OR MINE	1	2	3	4	5
SEWAGE TREATMENT PLANT	1	2	3	4	5
NATURAL GAS-FIRED POWER PLANT	1	2	3	4	5
MANUFACTURING PLANT	1	2	3	4	5
LANDFILL	1	2	3	4	5
COAL-FIRED POWER PLANT	1	2	3	4	5
GROUNDWATER CONTAMINATION	1	2	3	4	5

Many human activities, including the production of electricity, have both good and bad effects on your life and on the community in which you live. We want to learn how individuals like you feel about power plants that burn either coal or natural gas to produce electricity and how you feel electricity production could affect the quality of your life.

Q2. Are you aware of any facilities near your home or in your community that produce electricity? (Circle appropriate number.)

1. NO
2. YES **(GO TO Q2A)**
3. NOT SURE

Q2A. Approximately how far away from your home is the nearest power plant?

____________ MILE(S)

Q3. Do you know what fuel is burned to produce the electricity that supplies your community with its electricity needs? (Circle appropriate number.)

1. NO
2. YES - PLEASE SPECIFY: ________________________
3. NOT SURE

Q4. Do you feel that the amount of electricity that your household consumes is less than, about equal to, or greater than the amount of electricity consumed by other households in your community? (Circle appropriate number.)

1. LESS THAN AVERAGE
2. ABOUT EQUAL TO THE AVERAGE
3. GREATER THAN AVERAGE

Q5. What is the average amount that you pay for your electricity each month?
If you are not the person in your household who pays the electricity bill, please indicate about how much you think your electricity bill is each month.
(Write in dollar amount.)

$ ____________

A Coal-Fired Power Plant in Your Community

As the population in the United States grows, more electricity will be needed for the extra homes, businesses, and industries. We are interested in how you feel you will be affected if a coal-burning power plant were to be built and operate near your home. We would like you to consider a hypothetical situation in which a coal-burning power plant has been proposed for your community.

In the following pages, you will be asked how you feel the proposed coal-fired power plant will create risks to your health, the environment, and the aesthetic quality of your community. In addition, we will ask how you feel the proposed power plant could affect your community's economy.

4.1 *CONSIDER THE FOLLOWING PROPOSAL:*

YOU AND YOUR COMMUNITY	• You have lived in your community for 5 years and plan to live there permanently. • You rely on electricity for all of the heating, lighting, and cooking in your home. In other words, your household does not have a woodstove, an oil furnace, or a hook-up to a natural gas pipeline.
NEED FOR ELECTRICITY	• Because of the growth in the area in which you live, the public utility that supplies your community with its electricity has announced that the proposed power plant is greatly needed. • The price you pay for your electricity will remain the same after the new coal power plant is in operation.
GENERAL FEATURES OF THE POWER PLANT	• The coal power plant will produce 180 megawatts of electricity per year. This will be enough power to supply the growth in your area for the next 30 years. • The power plant will be built on a 40-acre plot of land near a local river. • The site for the proposed coal-fired power plant is 3 miles away from your home. • The life span of the power plant is projected to be at least 30 years.
REGULATORY COMPLIANCE	• All local, state, and federal regulations will be obeyed during the construction and operation of the plant.

ANSWER THE FOLLOWING QUESTIONS
AS IF YOU WERE TRULY FACING THIS SITUATION.

The Coal-Fired Power Plant and Your Health

Human health impacts are due to changes in the air you breath and the water you drink. To answer the following questions, consider how you feel the proposed coal-fired power plant could affect your health and the health of others that live in your community. Please think <u>only</u> of the potential health impacts as you answer the questions on this page.

Q6. Do you feel that there might be health impacts as a result of the coal-fired power plant described on **page 4D-3**? (Circle appropriate number.)

1. NO
2. YES

Q7. Indicate below how positive or negative you feel that the impact(s) to your health could be from the proposed coal-fired power plant.
(Circle appropriate number.)

VERY NEGATIVE IMPACT				NO IMPACT				VERY POSITIVE IMPACT
-4	-3	-2	-1	0	1	2	3	4

Q8. How serious do you feel the risks to your health could be from the proposed coal-fired power plant? (Circle appropriate number.)

NOT AT ALL SERIOUS			SOMEWHAT SERIOUS			VERY SERIOUS
1	2	3	4	5	6	7

Q9. What do you feel is the chance or likelihood that the coal plant will affect your health some time in the future? (Circle percentage.)

NO CHANCE HEALTH WILL BE AFFECTED					MAY OR MAY NOT AFFECT HEALTH					DEFINITELY WILL AFFECT HEALTH
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Q10. How would you describe your feelings when you think about the health risks from the proposed power plant? (Circle appropriate number.)

I FEEL AFRAID AND DREADFUL				MY FEELINGS ARE NEUTRAL				I FEEL HAPPINESS AND COMFORT
-4	-3	-2	-1	0	1	2	3	4

The Coal-Fired Power Plant and Your Local Economy

Economic impacts may be caused by changes in the local employment level, tax revenues and tax payments, property values, prices, and overall changes in the business activity in your community. To answer the following questions, consider how you feel the proposed coal-fired power plant could affect your local economy. Please think only of the potential impacts on your community's economy as you answer the questions on this page.

Q11. Do you feel that there might be economic impacts as a result of the coal-fired power plant described on **page 4D-3**? (Circle appropriate number.)

1. NO
2. YES

Q12. Indicate below how positive or negative you feel the impact(s) on your local economy could be from the proposed coal-fired power plant.
(Circle appropriate number.)

VERY NEGATIVE IMPACT				NO IMPACT				VERY POSITIVE IMPACT
-4	-3	-2	-1	0	1	2	3	4

Q13. How significant do you feel the impacts on your local economy could be from the proposed coal-fired power plant? (Circle appropriate number.)

NOT AT ALL SIGNIFICANT			SOMEWHAT SIGNIFICANT			VERY SIGNIFICANT
1	2	3	4	5	6	7

Q14. What do you feel is the chance or likelihood that the coal plant will affect your local economy some time in the future? (Circle percentage.)

NO CHANCE ECONOMY WILL BE AFFECTED					MAY OR MAY NOT AFFECT ECONOMY					DEFINITELY WILL AFFECT ECONOMY
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Q15. How would you describe your feelings when you think about the economic impacts associated with the proposed coal plant?
(Circle appropriate number.)

I FEEL AFRAID AND DREADFUL				MY FEELINGS ARE NEUTRAL				I FEEL HAPPINESS AND COMFORT
-4	-3	-2	-1	0	1	2	3	4

The Coal-Fired Power Plant and Your Environment

Environmental impacts could be caused by changes in the air quality, water quality, plants and wildlife, and how the land in your community is used. To answer the following questions, consider how you feel the proposed power plant may be a risk to the environment, and how serious you feel the actual environmental impact(s) could be from the coal-fired power plant. Please think only of the potential impacts on environmental quality as you answer the questions on this page.

Q16. Do you feel that there might be environmental impacts as a result of the coal-fired power plant described on **page 4D-3**? (Circle appropriate number.)

1. NO
2. YES

Q17. Indicate below how positive or negative you feel that the impact(s) to the environment could be from the proposed coal-fired power plant.
(Circle appropriate number.)

VERY NEGATIVE IMPACT				NO IMPACT				VERY POSITIVE IMPACT
-4	-3	-2	-1	0	1	2	3	4

Q18. How serious do you feel the risks to the environment could be from the proposed coal-fired power plant? (Circle appropriate number.)

NOT AT ALL SERIOUS			SOMEWHAT SERIOUS			VERY SERIOUS
1	2	3	4	5	6	7

Q19. What do you feel is the chance or likelihood that the coal plant will affect the environment some time in the future? (Circle percentage.)

NO CHANCE THE ENVIRONMENT WILL BE AFFECTED					MAY OR MAY NOT AFFECT THE ENVIRONMENT					DEFINITELY WILL WILL AFFECT THE ENVIRONMENT
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Q20. How would you describe your feelings when you think about the environmental risks from the proposed power plant? (Circle appropriate number.)

I FEEL AFRAID AND DREADFUL				MY FEELINGS ARE NEUTRAL				I FEEL HAPPINESS AND COMFORT
-4	-3	-2	-1	0	1	2	3	4

The Coal-Fired Power Plant and Aesthetic Quality

The aesthetic quality of your community is how pleasant your community is to live in. Many people think of the noise, sights, and smells around their community when they think of its aesthetic quality. To answer the following questions, consider how you feel the proposed coal-fired power plant could be a risk to the aesthetic quality of your community. Please think <u>only</u> of the potential impacts on the aesthetic quality as you answer the questions on this page.

Q21. Do you feel that there might be aesthetic impacts as a result of the coal-fired power plant described on **page 4D-3**? (Circle appropriate number.)

1. NO
2. YES

Q22. Indicate below how positive or negative you feel that the impact(s) on the aesthetic quality of your community could be from the proposed coal-fired power plant. (Circle appropriate number.)

VERY NEGATIVE IMPACT				NO IMPACT				VERY POSITIVE IMPACT
-4	-3	-2	-1	0	1	2	3	4

Q23. How serious do you feel the aesthetic risks could be from the proposed coal-fired power plant? (Circle appropriate number.)

NOT AT ALL SERIOUS			SOMEWHAT SERIOUS			VERY SERIOUS
1	2	3	4	5	6	7

Q24. What do you feel is the chance or likelihood that the coal plant will affect your community's aesthetic quality some time in the future? (Circle percentage.)

NO CHANCE AESTHETIC QUALITY WLL BE AFFECTED					MAY OR MAY NOT AFFECT AESTHETIC QUALITY					DEFINITELY WILL AFFECT AESTHETIC QUALITY
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Q25. How would you describe your feelings when you think about the aesthetic risks from the proposed power plant? (Circle appropriate number.)

I FEEL AFRAID AND DREADFUL				MY FEELINGS ARE NEUTRAL				I FEEL HAPPINESS AND COMFORT
-4	-3	-2	-1	0	1	2	3	4

Consider the "overall concern" you have about the proposed coal-burning power plant. We are interested in how much of your concern is due to each of the four types of impacts covered in the last four pages.

Q26. In the spaces below, write in the percentage of the overall concern that you have for each type of potential impact from the proposed coal power plant. Please make sure your answers add up to 100%.

POTENTIAL HEALTH IMPACTS	______%
POTENTIAL ENVIRONMENTAL IMPACTS	______%
POTENTIAL ECONOMIC IMPACTS	______%
POTENTIAL AESTHETIC IMPACTS	______%
OTHER POTENTIAL IMPACTS (PLEASE DESCRIBE: ______________ ______________)	______%
	TOTAL = 100%

Consider how you feel the proposed coal-burning power plant will affect your health, your local economy, the environment and the aesthetic quality of your community.

Q27. Would you vote in favor of or against the coal-burning power plant proposed for your community?

1. I WOULD VOTE IN FAVOR OF THE COAL POWER PLANT
2. I WOULD VOTE AGAINST THE COAL POWER PLANT
3. DON'T KNOW
4. I WOULDN'T VOTE - PLEASE EXPLAIN: ______________ ______________

Suppose that your electricity supplier proposed to build the coal-fired power plant described on **page 4D-3**. We would like you to imagine that you live in the community in which the coal power plant is being proposed. If the supplier is not able to build this power plant, it will have to increase the price you pay for electricity because the much needed electricity must be purchased at a higher cost from other power producers elsewhere in the state.

Think of how much more money you would be willing to pay on your monthly electricity bill in order to prevent the coal-burning power plant from being built in your community. When answering the following question, please consider your household income, your average monthly electricity bill, and how much extra you can actually afford to pay to prevent the coal-fired power plant.

Q28. Circle the dollar value closest to the largest amount you would be willing to pay extra each month on your electricity bill to prevent the coal-fired power plant from being built in your community.

$0.00	$0.10	$0.25	$0.50	$0.75	$1.00
$1.25	$1.50	$2.00	$3.00	$4.00	$5.00
$6.00	$8.00	$11.00	$14.00	$19.00	$22.00
$26.00	$30.00	$35.00	$40.00	$45.00	$50.00
$55.00	$60.00	$70.00	$80.00	$90.00	$100.00
$110.00	$120.00	$140.00	$160.00	$220.00	$300.00

OTHER: $__________

If You Answered $0.00 in Question 28, Go To Page 4D-11. ⟶

If You Answered $0.00 in Question 28, Go To Page 4D-11.

Q29. Think of the amount you would pay to prevent the coal-burning power plant from being built in your community **(Q28.)** About what percent of that amount would be to ensure ....
(Write in percentage.)

THAT MY HOUSEHOLD WILL NOT BE AFFECTED AT ALL BY THE POTENTIAL IMPACTS FROM THE COAL -FIRED POWER PLANT.	_______ %
THAT OTHER HOUSEHOLDS WILL NOT BE AFFECTED AT ALL BY THE POTENTIAL IMPACTS FROM THE COAL-FIRED POWER PLANT.	_______ %
THAT FUTURE GENERATIONS WILL NOT BE AFFECTED AT ALL BY THE POTENTIAL IMPACTS FROM THE COAL-FIRED POWER PLANT.	_______ %
THAT COAL-FIRED POWER PLANTS SHOULD BE PREVENTED EVEN IF NO ONE WILL HAVE TO LIVE NEAR THEM.	_______ %
REASONS OTHER THAN THESE (PLEASE DESCRIBE: ______________________ _______)	_______ %
	TOTAL = 100%

PLEASE MAKE SURE YOUR ANSWERS ADD UP TO 100%.

A Natural Gas-Fired Power Plant in Your Community

As the population in the United States grows, more electricity will be needed for the extra homes, businesses, and industries. We are interested in how you feel you will be affected if a natural gas-burning power plant were to be built and operate near your home. We would like you to consider a hypothetical situation in which a natural gas-burning power plant has been proposed for your community.

In the following pages, you will be asked how you feel the proposed natural gas-fired power plant will create risks to your health, the environment, and the aesthetic quality of your community. In addition, we will ask how you feel the proposed power plant could affect your community's economy.

CONSIDER THE FOLLOWING PROPOSAL:

YOU AND YOUR COMMUNITY	• You have lived in your community for 5 years and plan to live there permanently. • You rely on electricity for all of the heating, lighting, and cooking in your home. In other words, your household does not have a woodstove, an oil furnace, or a hook-up to a natural gas pipeline.
NEED FOR ELECTRICITY	• Because of the growth in the area in which you live, the public utility that supplies your community with its electricity has announced that the proposed power plant is greatly needed. • The price you pay for your electricity will remain the same after the new natural gas power plant is in operation.
GENERAL FEATURES OF THE POWER PLANT	• The natural gas power plant will produce 180 megawatts of electricity per year. This will be enough power to supply the growth in your area for the next 30 years. • The power plant will be built on a 40-acre plot of land near a local river. • The site for the proposed natural gas-fired power plant is 3 miles away from your home. • The life span of the plant is projected to be at least 30 years.
REGULATORY COMPLIANCE	• All local, state, and federal regulations will be obeyed during the construction and operation of the plant.

ANSWER THE FOLLOWING QUESTIONS
AS IF YOU WERE TRULY FACING THIS SITUATION.

The Natural Gas-Fired Power Plant and Your Health

Human health impacts are due to changes in the air you breath and the water you drink. To answer the following questions, consider how you feel the proposed natural gas-fired power plant could have an affect on your health and the health of others that live in your community. Please think only of the potential health impacts as you answer the questions on this page.

Q30. Do you feel that there might be health impacts as a result of the natural gas -fired power plant described on **page 4D-11**? (Circle appropriate number.)

1. NO
2. YES

Q31. Indicate below how positive or negative you feel that the impact(s) to your health could be from the proposed natural gas-fired power plant.
(Circle appropriate number.)

VERY NEGATIVE IMPACT				NO IMPACT				VERY POSITIVE IMPACT
-4	-3	-2	-1	0	1	2	3	4

Q32. How serious do you feel the risks to your health could be from the proposed natural gas-fired power plant? (Circle appropriate number.)

NOT AT ALL SERIOUS			SOMEWHAT SERIOUS			VERY SERIOUS
1	2	3	4	5	6	7

Q33. What do you feel is the chance or likelihood that the natural gas plant will affect your health some time in the future? (Circle percentage.)

NO CHANCE HEALTH WILL BE AFFECTED					MAY OR MAY NOT AFFECT HEALTH					DEFINITELY WILL AFFECT HEALTH
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Q34. How would you describe your feelings when you think about the health risks from the proposed power plant? (Circle appropriate number.)

I FEEL AFRAID AND DREADFUL				MY FEELINGS ARE NEUTRAL				I FEEL HAPPINESS AND COMFORT
-4	-3	-2	-1	0	1	2	3	4

The Natural Gas-Fired Power Plant and Your Local Economy

Economic impacts may be caused by changes in the local employment level, tax revenues and tax payments, property values, prices, and overall changes in the business activity in your community. To answer the following questions, consider how you feel the proposed natural gas-fired power plant could affect your local economy. Please think only of the potential impacts on your community's economy as you answer the questions on this page.

Q35. Do you feel that there might be economic impacts as a result of the natural gas -fired power plant described on **page 4D-11**? (Circle appropriate number.)

1. NO
2. YES

Q36. Indicate below how positive or negative you feel the impact(s) on your local economy could be from the proposed natural gas-fired power plant.
(Circle appropriate number.)

VERY NEGATIVE IMPACT				NO IMPACT				VERY POSITIVE IMPACT
-4	-3	-2	-1	0	1	2	3	4

Q37. How significant do you feel the impacts on your local economy could be from the proposed natural gas-fired power plant? (Circle appropriate number.)

NOT AT ALL SIGNIFICANT			SOMEWHAT SIGNIFICANT			VERY SIGNIFICANT
1	2	3	4	5	6	7

Q38. What do you feel is the chance or likelihood that the natural gas plant will affect your local economy some time in the future? (Circle percentage.)

NO CHANCE ECONOMY WILL BE AFFECTED					MAY OR MAY NOT AFFECT ECONOMY					DEFINITELY WILL AFFECT ECONOMY
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Q39. How would you describe your feelings when you think about the economic impacts associated with the proposed natural gas plant?
(Circle appropriate number.)

I FEEL AFRAID AND DREADFUL				MY FEELINGS ARE NEUTRAL				I FEEL HAPPINESS AND COMFORT
-4	-3	-2	-1	0	1	2	3	4

The Natural Gas-Fired Power Plant and Your Environment

Environmental impacts could be caused by changes in the air quality, water quality, plants and wildlife, and how the land in your community is used. To answer the following questions, consider how you feel the proposed power plant may be a risk to the environment, and how serious you feel the actual environmental impact(s) could be from the natural gas-fired power plant. Please think only of the potential impacts on environmental quality as you answer the questions on this page.

Q40. Do you feel that there might be environmental impacts as a result of the natural gas -fired power plant described on **page 4D-11**? (Circle appropriate number.)

1. NO
2. YES

Q41. Indicate below how positive or negative you feel that the impact(s) to the environment could be from the proposed natural gas-fired power plant.
(Circle appropriate number.)

VERY NEGATIVE IMPACT			NO IMPACT				VERY POSITIVE IMPACT	
-4	-3	-2	-1	0	1	2	3	4

Q42. How serious do you feel the risks to the environment could be from the proposed natural gas-fired power plant? (Circle appropriate number.)

NOT AT ALL SERIOUS			SOMEWHAT SERIOUS			VERY SERIOUS
1	2	3	4	5	6	7

Q43. What do you feel is the chance or likelihood that the natural gas plant will affect the environment some time in the future? (Circle percentage.)

NO CHANCE THE ENVIRONMENT WILL BE AFFECTED					MAY OR MAY NOT AFFECT THE ENVIRONMENT					DEFINITELY WILL WILL AFFECT THE ENVIRONMENT
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Q44. How would you describe your feelings when you think about the environmental risks from the proposed power plant? (Circle appropriate number.)

I FEEL AFRAID AND DREADFUL				MY FEELINGS ARE NEUTRAL				I FEEL HAPPINESS AND COMFORT
-4	-3	-2	-1	0	1	2	3	4

The Natural Gas-Fired Power Plant and Aesthetic Quality

The aesthetic quality of your community is how pleasant your community is to live in. Many people think of the noise, sights, and smells around their community when they think of its aesthetic quality. To answer the following questions, consider how you feel the proposed natural gas-fired power plant could be a risk to the aesthetic quality of your community. Please think only of the potential impacts on the aesthetic quality as you answer the questions on this page.

Q45. Do you feel that there might be aesthetic impacts as a result of the natural gas -fired power plant described on **page 4D-11**? (Circle appropriate number.)

1. NO
2. YES

Q46. Indicate below how positive or negative you feel that the impact(s) on the aesthetic quality of your community could be from the proposed natural gas-fired power plant. (Circle appropriate number.)

VERY NEGATIVE IMPACT				NO IMPACT				VERY POSITIVE IMPACT
-4	-3	-2	-1	0	1	2	3	4

Q47. How serious do you feel the aesthetic risks could be from the proposed natural gas-fired power plant? (Circle appropriate number.)

NOT AT ALL SERIOUS			SOMEWHAT SERIOUS			VERY SERIOUS
1	2	3	4	5	6	7

Q48. What do you feel is the chance or likelihood that the natural gas plant will affect your community's aesthetic quality some time in the future? (Circle percentage.)

NO CHANCE AESTHETIC QUALITY WLL BE AFFECTED					MAY OR MAY NOT AFFECT AESTHETIC QUALITY					DEFINITELY WILL AFFECT AESTHETIC QUALITY
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Q49. How would you describe your feelings when you think about the aesthetic risks from the proposed power plant? (Circle appropriate number.)

I FEEL AFRAID AND DREADFUL				MY FEELINGS ARE NEUTRAL				I FEEL HAPPINESS AND COMFORT
-4	-3	-2	-1	0	1	2	3	4

Consider the "overall concern" you have about the proposed natural gas-burning power plant. We are interested in how much of your concern is due to each of the four types of impacts covered in the last four pages.

Q50. In the spaces below, write in the percentage of the overall concern that you have for each type of potential impact from the proposed natural gas power plant. Please make sure your answers add up to 100%.

POTENTIAL HEALTH IMPACTS	________%
POTENTIAL ENVIRONMENTAL IMPACTS	________%
POTENTIAL ECONOMIC IMPACTS	________%
POTENTIAL AESTHETIC IMPACTS	________%
OTHER POTENTIAL IMPACTS (PLEASE DESCRIBE:________________ ________________)	________%
	TOTAL = 100%

Consider how you feel the proposed natural gas-burning power plant will affect your health, your local economy, the environment and the aesthetic quality of your community.

Q51. Would you vote in favor of or against the natural gas-burning power plant proposed for your community?

1. I WOULD VOTE IN FAVOR OF THE NATURAL GAS POWER PLANT
2. I WOULD VOTE AGAINST THE NATURAL GAS POWER PLANT
3. DON'T KNOW
4. I WOULDN'T VOTE - PLEASE EXPLAIN: ________________
____

Suppose that your electricity supplier proposed to build the natural gas-fired power plant described on **page 4D-11**. We would like you to imagine that you live in the community in which the natural gas power plant is being proposed. If the supplier is not able to build this power plant, it will have to increase the price you pay for electricity because the much needed electricity must be purchased at a higher cost from other power producers elsewhere in the state.

Think of how much more money you would be willing to pay on your monthly electricity bill in order to prevent the natural gas-burning power plant from being built in your community. When answering the following question, please consider your household income, your average monthly electricity bill, and how much extra you can actually afford to pay to prevent the natural gas-fired power plant.

Q52. Circle the dollar value closest to the largest amount you would be willing to pay extra each month on your electricity bill to prevent the natural gas-fired power plant from being built in your community.

$0.00	$0.10	$0.25	$0.50	$0.75	$1.00
$1.25	$1.50	$2.00	$3.00	$4.00	$5.00
$6.00	$8.00	$11.00	$14.00	$19.00	$22.00
$26.00	$30.00	$35.00	$40.00	$45.00	$50.00
$55.00	$60.00	$70.00	$80.00	$90.00	$100.00
$110.00	$120.00	$140.00	$160.00	$220.00	$300.00

OTHER: $__________

If You Answered $0.00 in Question 52, Go To Page 19. →

If You Answered $0.00 in Question 52, Go To Page 19. →

Q53. Think of the amount you would pay to prevent the natural gas-burning power plant from being built in your community **(Q52.)** About what percent of that amount would be to ensure .... Please make sure your answers add up to 100%.
(Write in percentage.)

THAT MY HOUSEHOLD WILL NOT BE AFFECTED AT ALL BY THE POTENTIAL IMPACTS FROM THE NATURAL GAS-FIRED POWER PLANT.	_______ %
THAT OTHER HOUSEHOLDS WILL NOT BE AFFECTED AT ALL BY THE POTENTIAL IMPACTS FROM THE NATURAL GAS-FIRED POWER PLANT.	_______ %
THAT FUTURE GENERATIONS WILL NOT BE AFFECTED AT ALL BY THE POTENTIAL IMPACTS FROM THE NATURAL GAS-FIRED POWER PLANT.	_______ %
THAT NATURAL GAS-FIRED POWER PLANTS SHOULD BE PREVENTED EVEN IF NO ONE WILL HAVE TO LIVE NEAR THEM.	_______ %
REASONS OTHER THAN THESE (PLEASE DESCRIBE:_______________________ ________)	_______ %
TOTAL =	**100%**

Your Preferences for the Use of Either Coal or Natural Gas in the Proposed Power Plant

Suppose that your electricity supplier has already received local, state, and federal approval to build a power plant for your community. Assume that a power plant will be built in your community, but the type of fuel that it will burn has not yet been determined.

Q54. Based upon your current knowledge, feelings, and opinions, what type of fuel would you prefer that the plant burn to produce electricity - coal or natural gas?

1. COAL
2. NATURAL GAS

Think of how much more money you would be willing to pay on your monthly electricity bill to make sure that the power plant uses the fuel type that you circled above in **Q54**. When answering the following question, please consider your household income, your average monthly electricity bill, and how much extra you can actually afford to pay so the plant burns the fuel that you prefer.

Q55. How much would you be willing to pay each month, in addition to your current electricity bill, to ensure that the plant burns the fuel that you prefer (**Q54.**)?
Circle the dollar amount closest to the amount you would be willing to pay extra each month.

$0.00	$0.10	$0.25	$0.50	$0.75	$1.00
$1.25	$1.50	$2.00	$3.00	$4.00	$5.00
$6.00	$8.00	$11.00	$14.00	$19.00	$22.00
$26.00	$30.00	$35.00	$40.00	$45.00	$50.00
$55.00	$60.00	$70.00	$80.00	$90.00	$100.00
$110.00	$120.00	$140.00	$160.00	$220.00	$300.00

OTHER: $__________

ABOUT YOU AND YOUR HOUSEHOLD

PLEASE REMEMBER THAT ALL INFORMATION IS ENTIRELY CONFIDENTIAL

H1. Your gender:

1. FEMALE
2. MALE

H2. Your age:

____________YEARS

H3. Including yourself, how many members in your household are in each age group? (If none, write "0".)

______ UNDER 18 YEARS OF AGE
______ 18-35
______ 35-60
______ 60 AND OVER

H5. How would you describe your racial or ethnic background? (Circle one.)

1. WHITE OR CAUCASIAN
2. BLACK OR AFRICAN AMERICAN
3. HISPANIC OR MEXICAN AMERICAN
4. ASIAN OR PACIFIC ISLANDER
5. NATIVE AMERICAN INDIAN
6. OTHER - PLEASE SPECIFY: ______________________

H4. How many years of education have you completed?
A high school education = 12 years.
(Circle number of years.)

6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	25+

H6. What is your present employment status?
(Circle the best answer.)

1. LABORER
2. TEACHER
3. FULL TIME HOMEMAKER
4. PROFESSIONAL
5. GOVERNMENT EMPLOYEE
6. SECRETARY/CLERICAL
7. SERVICE EMPLOYEE
8. SELF-EMPLOYEED
9. STUDENT
10. RETIRED
11. UNEMPLOYED
12. OTHER - PLEASE SPECIFY: ____________________

H7. What is your total annual household income before taxes and other deductions?
(Circle best answer.)

1. UNDER $9,999
2. $10,000 - 19,999
3. $20,000 - 29,999
4. $30,000 - 39,999
5. $40,000 - 49,999
6. $50,000 - 59,999
7. $60,000 - 69,999
8. $70,000 - 79,999
9. $80,000 - 89,999
10. $90,000 - 99,999
11. $100,000 - 119,999
12. $120,000 - 139,999
13. $140,000 - 159,999
14. $160,000 - 179,000
15. $180,000 - 199,999
16. $200,000 AND OVER

H8. How active have you been active in community related issues during the past two years?
(Circle appropriate number.)

NOT AT ALL ACTIVE		SOMEWHAT ACTIVE		VERY ACTIVE
1	2	3	4	5

Appendix 4E

Sector Definition

Sector	Name	BEA Code
1	Agriculture	1-4
2	Iron Mining	5
3	Non-Iron Mining	6
4	Other Mining	9,10
5	Coal Mining	7
6	Petroleum Mining	8
7	Construction	11,12
8	Manufacturing	13-30,33,34,39-64
9	Petroleum Refining	41
10	Plastics	32
11	Glass	35
12	Stone	36
13	Steel	37
14	Metal Manufacturing	38
15	Transportation	65
16	Communication	66,67
17	Electric Utilities	68.01
18	Gas Utilities	68.02
19	Trade & Finance	69,70
20	Services (including Water & Sanitary Services)	71-79,68.03

Notes: Sectors 5, 6, 9, 17, and 18 from the energy aggregate.