APPENDIX F

AEP – Great Bend IGCC Facility

Material Handling Emission Calculations

AEP - Great Bend IGCC Facility

		Uncontrolled TSP		Controlled TSP		Uncontrolled PM10 (filterable)		Controlled PM10 (filterable)		Control 1		Control 2		Emission Point Summary: Controlled TSP		Emission Point Summary: Controlled PM10 (filterable)	
Fugitive Emission Source:	**Capacity (tons/hr)**	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	Ctrl	Ctrl %	Ctrl	Ctrl %	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Coal Barge Unloader 1:																	
Transfer from Barge to Barge Unloader 1	2100	1.87	8.2	0.28	1.2	0.88	3.9	0.13	0.6	WS	80	PC	25	**0.56**	**2.5**	**0.26**	**1.2**
Transfer from Barge Unloader 1 to Conveyor A1	2100	1.87	8.2	0.28	1.2	0.88	3.9	0.13	0.6	WS	80	PC	25				
Transfer House 1A:																	
Transfer from Conveyor A1 to Conveyor A2	2100	1.87	8.2	0.02	0.1	0.88	3.9	0.01	0.0	CE	90	BE	90	**0.02**	**0.08**	**0.01**	**0.04**
Transfer House 3:																	
Transfer from Conveyor A2 to Conveyor C	4200	3.74	16.4	0.04	0.2	1.76	7.7	0.02	0.1	CE	90	BE	90	**0.04**	**0.2**	**0.02**	**0.08**
Transfer House 4:																	
(Option 1) Transfer from Conv C to Coal Pile #1	4200	3.74	16.4	0.75	3.3	1.76	7.7	0.35	1.5	ST	80			**0.75**	**3.3**	**0.35**	**1.5**
(Option 2) Transfer from Conv C to Conv D1	4200	3.74	16.4	0.04	0.2	1.76	7.7	0.02	0.1	CE	90	BE	90				
Transfer House 5:																	
(Option 1) Transfer from Conv D1 to Coal Pile #2	4200	3.74	16.4	0.75	3.3	1.76	7.7	0.35	1.5	ST	80			**0.75**	**3.3**	**0.35**	**1.5**
(Option 2) Transfer from Conv D1 to Conv D2	4200	3.74	16.4	0.04	0.2	1.76	7.7	0.02	0.1	CE	90	BE	90				
Transfer House 6:																	
Transfer from Conveyor D2 to Coal Pile #3	4200	3.74	16.4	0.75	3.3	1.76	7.7	0.35	1.5	ST	80			**0.75**	**3.3**	**0.35**	**1.5**
Coal Pile Reclaim System:																	
Transfer to Reclaim Conveyor A	800	0.71	3.1	0.0007	0.003	0.34	1.5	0.0003	0.0015	UP	90	BH	99	**0.003**	**0.01**	**0.001**	**0.006**
Transfer to Reclaim Conveyor B	800	0.71	3.1	0.0007	0.003	0.34	1.5	0.0003	0.0015	UP	90	BH	99				
Transfer from Reclaim Conv A to Conv E	800	0.71	3.1	0.0007	0.003	0.34	1.5	0.0003	0.0015	UP	90	BH	99				
Transfer from Reclaim Conv B to Conv F	800	0.71	3.1	0.0007	0.003	0.34	1.5	0.0003	0.0015	UP	90	BH	99				
Crusher Station:																	
Transfer from Conv E to Crusher Surge Bin	800	0.71	3.1	0.0007	0.003	0.34	1.5	0.0003	0.0015	CE	90	BH	99	**0.04**	**0.2**	**0.01**	**0.05**
Transfer from Conv F to Crusher Surge Bin	800	0.71	3.1	0.0007	0.003	0.34	1.5	0.0003	0.0015	CE	90	BH	99				
Surge Bin to Crusher A	800	0.71	3.1	0.0007	0.003	0.34	1.5	0.0003	0.0015	CE	90	BH	99				
Surge Bin to Crusher B	800	0.71	3.1	0.0007	0.003	0.34	1.5	0.0003	0.0015	CE	90	BH	99				
Crusher A	800	16.0	70.1	0.016	0.07	4.80	21.0	0.005	0.02	CE	90	BH	99				
Crusher B	800	16.0	70.1	0.016	0.07	4.80	21.0	0.005	0.02	CE	90	BH	99				
Transfer from Crusher A to Conveyor G	800	0.71	3.1	0.0007	0.003	0.34	1.5	0.0003	0.0015	CE	90	BH	99				
Transfer from Crusher B to Conveyor H	800	0.71	3.1	0.0007	0.003	0.34	1.5	0.0003	0.0015	CE	90	BH	99				
Transfer House 7:																	
Transfer from Conveyor G to Conveyor K	800	0.71	3.1	0.007	0.03	0.34	1.5	0.003	0.015	CE	90	BE	90	**0.01**	**0.06**	**0.007**	**0.03**
Transfer from Conveyor H to Conveyor L	800	0.71	3.1	0.007	0.03	0.34	1.5	0.003	0.015	CE	90	BE	90				
Transfer House 8:																	
Transfer from Conveyor K to Conveyor M	800	0.71	3.1	0.007	0.03	0.34	1.5	0.003	0.015	CE	90	BE	90	**0.01**	**0.06**	**0.007**	**0.03**
Transfer from Conveyor L to Conveyor N	800	0.71	3.1	0.007	0.03	0.34	1.5	0.003	0.015	CE	90	BE	90				

AEP - Great Bend IGCC Facility

		Uncontrolled TSP		Controlled TSP		Uncontrolled PM10 (filterable)		Controlled PM10 (filterable)		Control 1		Control 2		Emission Point Summary: Controlled TSP		Emission Point Summary: Controlled PM10 (filterable)	
Fugitive Emission Source:	**Capacity (tons/hr)**	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	Ctrl	Ctrl %	Ctrl	Ctrl %	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Coal Slurry Prep Building (Ongoing Design):																	
Transfer from Conveyor M to Coal Prep Bldg	800	0.71	3.1	0.007	0.03	0.34	1.5	0.003	0.015	CE	90	BE	90	**0.07**	**0.31**	**0.03**	**0.15**
Transfer from Conveyor N to Coal Prep Bldg	800	0.71	3.1	0.007	0.03	0.34	1.5	0.003	0.015	CE	90	BE	90				
TBD Coal Prep System Transfer 1 (assumed)	1600	1.42	6.2	0.014	0.06	0.67	2.9	0.007	0.03	CE	90	BE	90				
TBD Coal Prep System Transfer 2 (assumed)	1600	1.42	6.2	0.014	0.06	0.67	2.9	0.007	0.03	CE	90	BE	90				
TBD Coal Prep System Transfer 3 (assumed)	1600	1.42	6.2	0.014	0.06	0.67	2.9	0.007	0.03	CE	90	BE	90				
TBD Coal Prep System Transfer 4 (assumed)	1600	1.42	6.2	0.014	0.06	0.67	2.9	0.007	0.03	CE	90	BE	90				
Coal Pile Wind Erosion:																	
Coal Storage Pile		See Wind Erosion Calculations															
Traffic Related Emissions:	**VMT**																
Traffic - Road Segment A - paved	3.0	4.6	20.0	0.2	1.0	0.9	3.9	0.0	0.2	WT	75	SR	80	**0.2**	**1.0**	**0.05**	**0.2**
Traffic - Road Segment B - paved	5.8	8.8	38.6	0.4	1.9	1.7	7.6	0.1	0.4	WT	75	SR	80	**0.4**	**1.9**	**0.09**	**0.4**
Traffic - Road Segment C - paved	0.5	0.8	3.3	0.0	0.2	0.2	0.7	0.0	0.0	WT	75	SR	80	**0.04**	**0.2**	**0.008**	**0.03**
Traffic - Road Segment D - paved	3.4	5.2	22.6	0.3	1.1	1.0	4.5	0.1	0.2	WT	75	SR	80	**0.3**	**1.1**	**0.05**	**0.2**
Traffic - Road Segment E - unpaved	5.1	21.7	95.2	1.1	4.8	5.6	24.3	0.3	1.2	WT	75	SR	80	**1.1**	**4.8**	**0.3**	**1.2**
Traffic - Coal Pile - unpaved	3.0	6.5	28.6	1.2	5.4	1.4	6.2	0.3	1.2	WT	75	PC	25	**1.2**	**5.4**	**0.3**	**1.2**
Traffic - Parking Lots/Misc Unit 1 Traffic	5.0	0.15	0.64	0.007	0.03	0.025	0.1	0.001	0.005	WT	75	SR	80	**0.007**	**0.03**	**0.001**	**0.005**

*Emission Factors per AP-42.

*The OEPA RACM document (as presented in Fugitive Dust Control Technology by Orlemann et al, 1983), USEPA Document EPA-450/3-88-008 (Control of Open Fugitive Dust Sources), & previously approved AEP PTI applications were used to estimate control efficiencies for reducing potential fugitive emissions.

Control Efficiencies

BE = Buliding Enclosure (90%)
CE = Chute Enclosure (90%)
UP = Underpile Loadout Encl. (90%)
PE = Partial Building Encl. (70%)
WT = Water Truck (75%)
SR = Speed Reduction (80%)
ST = Concrete Stacking Tube (80%)
PC = Precautionary Measures (25%)
BH = Forced Air Dust Collector (99%) (baghouse or equivalent)
WS = Dust Supressant System (80%) (water spray or equivalent)

Coal Transfer:
TSP: 0.0009 lb/ton
PM10: 0.0004 lb/ton

Coal Crushing:
TSP: 0.02 lb/ton
PM10: 0.006 lb/ton

Paved Road - Parking Lots/Misc Unit 1 Traffic
TSP: 0.029 lb/VMT
PM10: 0.005 lb/VMT

Unpaved Road - Segment E:
TSP: 4.26 lb/VMT
PM10: 1.09 lb/VMT

Unpaved Road - Coal Pile Traffic:
TSP: 2.18 lb/VMT
PM10: 0.47 lb/VMT

Paved Road Slag/Sulfur TruckTraffic:
TSP: 1.52 lb/VMT
PM10: 0.3 lb/VMT

Table F1: Road Segment Summary					
Road Segment	**Segment Description**	**Road Type**	**Distance (feet)**	**Distance (miles)**	**Round Trip (miles)**
A	SRU to Plant Gate	Paved	3900	0.74	1.48
B	Rt 33 to Intersection 1	Paved	2550	0.48	0.97
C	Slag Pile to Intersection 1	Paved	350	0.07	0.13
D	Intersection 1 to Segment E	Paved	1500	0.28	0.57
E	Segment D to Landfill	Unpaved	2250	0.43	0.85

Table F2: Truck Capacity Summary					
Material	**Material Production (tons/hr)**	**Material Production (tons/day)**	**Truck Capacity (tons)**	**Trucking Hours (hrs/day)**	**Trucks per Hour**
Slag	32	768	25	8	3.84
Sulfur	13	312	25	8	1.56

*Assume Truck Weight = 15 tons (empty); 40 tons (loaded); 27.5 tons (average)

Table F3: Road Segment - Potential Hourly Miles					
Traffic Activity	**Segment A**	**Segment B**	**Segment C**	**Segment D**	**Segment E**
Slag to Landfill	0	0	4	4	4
Slag to Offsite Location	0	4	4	0	0
Sulfur to Landfill	2	2	0	2	2
Sulfur to Offsite Location	2	0	0	0	0
Estimated Trucks per Hour	2	6	4	6	6
Segment - Round Trip Distance (miles)	1.48	0.97	0.13	0.57	0.85
Estimated Vehicle Miles Traveled (VMT)/hour	3.0	5.8	0.5	3.4	5.1

Table F4: Storage Pile Traffic Summary				
Storage Pile Traffic	**Road Type**	***Round Trip (miles)**	**Trucks per Hour**	**VMT per Hour**
Coal Pile Traffic	Unpaved	1.5	2	3

*Assumes 1.5 miles traveled per hour per coal pile vehicle.

Table F5: Parking Lots/Misc Unit 1 Traffic Summary		
Storage Pile Traffic	**Road Type**	**VMT per Hour**
Parking lots/Misc Unit 1 traffic	Paved	5

*Assumed 5 miles traveled per hour on parking lots and miscellaneous plant roads.

Coal Transfer:

From AP-42 Section 13.2.4 (January 1995)

$= K(0.0032)\{(U/5)^{1.3}/(M/2)^{1.4}\}$

Data Source:

Where K=0.74 for PM, 0.35 for PM10
U = 6.3 mph — NCDC
M = 5% moisture content for coal — AEP Estimate

	lb/ton	Emission
EF=	0.00089	TSP
EF=	0.00042	PM10 - filterable

Coal Crushing:

From EPA FIRE 6.35 Database (October 2005):

	lb/ton	Emission
EF=	0.02	TSP
EF=	0.006	PM10 - filterable

Paved Road Traffic (Slag/Sulfur Truck Traffic):

From AP-42 Section 13.2.1 (December, 2003); Uncontrolled EF rated "A" for PM and PM10

={k (sL/2)^0.65(W/3)^1.5) - C}*(1-(P/4N))

Where K=0.082 for PM, 0.016 for PM10
C = 0.00047 for PM and PM10
W = 27.5 tons (15 ton tare weight and 40 ton loaded weight - Avg for roundtrip is 27.5 tons) — AEP Estimate
P = 146 days with at 0.01" rain/year — NCDC
N = 365 days/year
sL = 1.26 g/m2 — AEP Estimate

	lb/VMT	Emission
EF=	1.52	TSP
EF=	0.30	PM10 - filterable

Paved Road Traffic (Parking Lots/Misc Unit 1 Traffic):

From AP-42 Section 13.2.1 (December, 2003); Uncontrolled EF rated "A" for PM and PM10

={k (sL/2)^0.65(W/3)^1.5) - C}*(1-(P/4N))

Where K=0.082 for PM, 0.016 for PM10
C = 0.00047 for PM and PM10
W = 2 tons — AEP Estimate
P = 146 days with at 0.01" rain/year — NCDC
N = 365 days/year
sL = 1.26 g/m2 — AEP Estimate

	lb/VMT	Emission
EF=	0.029	TSP
EF=	0.005	PM10 - filterable

Unpaved Road - Segment E:

From AP-42 Section 13.2.2 (December 2003); Uncontrolled EF rated "B" for PM and PM10

=[(k (s/12)^0.7(W/3)^0.45)]*[(365-p)/365]

Where k=4.9 for PM, 1.5 for PM10
s = 4.9 % (Surface Material Silt Content %) — AEP Estimate
W = 27.5 tons (15 ton tare weight and 40 ton loaded weight - Avg for roundtrip is 27.5 tons) — AEP Estimate
p = 146 Days w/ at least 0.01" rain/year — NCDC

	lbs/VMT	Emission
EF =	4.26	TSP
EF =	1.09	PM10 - filterable

Unpaved Road - Coal Pile Traffic:

From AP-42 Section 13.2.2 (December 2003); Uncontrolled EF rated "B" for PM and PM10

=[(k (s/12)^0.7(W/3)^0.45)]*[(365-p)/365]

Where k=4.9 for PM, 1.5 for PM10
s = 2.0% (Surface Material Silt Content %) — AEP Estimate
W = 25 tons — AEP Estimate
p = 146 Days w/ at least 0.01" rain/year — NCDC

	lbs/VMT	Emission
EF =	2.18	TSP
EF =	0.47	PM10 - filterable

Wind Erosion Estimates:

*AP-42 Section 13.2.4 (Aggregate Handling & Storage Piles) is used to estimate potential wind erosion emissions.

Potential PM10 Emissions - Wind Erosion	
Year	**Coal Storage Area (lb/year)**
1991	181.9
1992	327.5
1993	953.8
1994	1039.1
1995	51

Site	Area	Pile	No.	Height (ft)	Length (ft)	Width (ft)	Diameter (ft)	Area (m^2)	H/B
Great Bend	Coal Storage Area	Active Conical Piles	3	40			111	3325	0.36
Great Bend	Coal Storage Area	Long-Term Linear Storage Piles	3	50	910	250		62751	0.10

Meteorological data obtained from NOAA Integrated Surface Hourly Observations, and processed with Earthtech's DATSAV3 program. The roughness height at Huntington Tri-State Airport is assumed to be 15 cm. This is used in equation (5) from AP-42 Section 13.2.5 to calculate the wind speed at a 10 meter anemometer height. The threshold velocity of 1.12 m/s is taken from AP-42 Table 13.2.5-2 for uncrusted coal pile (western surface coal mine). Data for eastern coal and slag are not provided in AP-42. For the active coal pile, the H/B > 0.2. The method described on pages 6 through 8 of AP-42 Section 13.2.5 is used to calculate wind erosion.

For the long-term coal piles, the H/B < 0.2. AP-42 Table 13.2.5-2 shows surface roughness = 0.003 m; friction velocity = 1.12 m/s. Applying AP-42 13.2.5 eq (1) shows that the threshold wind speed at 10 meters = 22.7 m/s. The highest adjusted 10 wind speed Huntington Tri-State Airport for 2001 to 2003 is less than this threshold. As such, no fugitive emissions would be calculated if thse were treated as flat pile. To provide conservative estimates, the piles are treated as if H/B > 0.2, and the method described on pages 6 through 8 of AP-42 Section 13.2.5 is used.