

Form CA-01 CALCULATIONS

Duplicate this form for
Each Emission Unit

1) Company/Facility name MidAmerican Energy Co., Council Bluffs		2) EIQ No. 92-3600
3) Emissions Point No.	4) Emissions Unit No.	5) Emission Unit Description or (SCC) No.

6) Calculations are provided in support of information reported on Form 4.0 page

7) Emissions Calculations

	CEMS Values			
	SO ₂ Tons	NO _x lb/mmBtu	NO _x Tons	mmBtu
EP001	1227.8	0.456	874.85	3,837,041
EP002	1885.9	0.373	1075.61	5,767,371
EP003	17142.7	0.425	11254.45	52,962,127

Note: NO_x Tons = (NOX lb/mmBtu x mmBtu)/2000

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7) Emissions Calculations

Calculation of Emission Factors for coal fired boiler particulate emissions

EP1, EU1 - Dry bottom, wall fired boiler Form 4.0 Page 1

Emission Point	Emission Unit	TSP Test Results lbs/MMBtu	TSP Emission Factor	PM10 Particle Distribution	PM10 Emission Factor
EP001	EU001	0.0700	0.0700	0.67	0.0469

Formula: TSP Emission Factor = TSP Test Results
PM10 Emission Factor = TSP Test Results x PM10 Particle Distribution

TSP Test Results from most recent particulate test.
PM10 Particle Distribution from AP-42.

EP2, EU2 - Dry bottom, tangentially fired boiler Form 4.0 Page 15

Emission Point	Emission Unit	TSP Test Results lbs/MMBtu	TSP Emission Factor	PM10 Particle Distribution	PM10 Emission Factor
EP002	EU002	0.0440	0.0440	0.67	0.0295

Formula: TSP Emission Factor = TSP Test Results
PM10 Emission Factor = TSP Test Results x PM10 Particle Distribution

PM10 Test Results from most recent particulate test.
PM10 Particle Distribution from AP-42.

EP3, EU3 - Dry bottom, wall fired boiler Form 4.0 Page 29

Emission Point	Emission Unit	TSP Test Results lbs/MMBtu	TSP Emission Factor	PM10 Particle Distribution	PM10 Emission Factor
EP003	EU003	0.0257	0.0257	0.67	0.0172

Formula: TSP Emission Factor = TSP Test Results
PM10 Emission Factor = TSP Test Results x PM10 Particle Distribution

TSP Test Results from most recent particulate test.
PM10 Particle Distribution from AP-42.

Emissions Tons = (((Actual Throughput x 2000 x Btu/lb)/1,000,000) x Emission Factor) / 2000

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3) Emissions Point No. EP001	4) Emissions Unit No. EU001	5) Emission Unit Description or (SCC) No. 10100222

6) Calculations are provided in support of information reported on Form 4.0 page

7) Emissions Calculations

HCl Coal Emission Factor Conversion

lb/dry ton to lb/ton - Assume 90% chlorine present in coal is converted to HCl

Emission Factor lb/lb dry coal 0.000058411 (from laboratory analysis)
 Coal Average Percent Moisture 30.5 (from laboratory analysis)
 Correction for molecular weights 1.0282 (H 1.00 + Cl 35.45)/ Cl 34.45
 Emission Factor lb/ton = ((EF x (1.0 - (Ave Moisture)/100)) x 2000 x 0.9) x CF molecular weight
 Emission Factor lb/ton = 7.5133E-02

HF Coal Emission Factor Conversion

lb/dry ton to lb/ton - Assume 90% fluorine present in coal is converted to HF

Emission Factor lb/lb dry coal 0.00006 (from laboratory analysis)
 Coal Average Percent Moisture 30.5 (from laboratory analysis)
 Correction for molecular weights 1.0527 (H 1.00 + F 18.99)/ F 18.99
 Emission Factor lb/ton = ((EF x (1.0 - (Ave Moisture)/100)) x 2000 x 0.9) x CF molecular weight
 Emission Factor lb/ton = 7.9016E-02

Hg

lb/dry ton to lb/ton - Assume 90% mercury present in coal is emitted as Hg compounds

Emission Factor lb/lb dry coal 0.000000072 (from laboratory analysis)
 Coal Average Percent Moisture 30.5 (from laboratory analysis)
 Emission Factor lb/ton = (EF x (1.0 - (Ave Moisture)/100)) x 2000 x 0.9
 Emission Factor lb/ton = 9.0072E-05

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Duplicate this form for
Each Emission Unit

1) Company/Facility name MidAmerican Energy Co., Council Bluffs		2) EIQ No. 92-3600
3) Emissions Point No. EP002	4) Emissions Unit No. EU002	5) Emission Unit Description or (SCC) No. 10100226

6) Calculations are provided in support of information reported on Form 4.0 page

7) Emissions Calculations

HCl Coal Emission Factor Conversion

lb/dry ton to lb/ton - Assume 90% chlorine present in coal is converted to HCl

Emission Factor lb/lb dry coal 0.000058411 (from laboratory analysis)
 Coal Average Percent Moisture 30.43 (from laboratory analysis)
 Correction for molecular weights 1.0282 (H 1.00 + Cl 35.45)/ Cl 34.45
 Emission Factor lb/ton = ((EF x (1.0 - (Ave Moisture)/100)) x 2000 x 0.9) x CF molecular weight
 Emission Factor lb/ton = 7.5208E-02

HF Coal Emission Factor Conversion

lb/dry ton to lb/ton - Assume 90% fluorine present in coal is converted to HF

Emission Factor lb/lb dry coal 0.00006 (from laboratory analysis)
 Coal Average Percent Moisture 30.43 (from laboratory analysis)
 Correction for molecular weights 1.0527 (H 1.00 + F 18.99)/ F 18.99
 Emission Factor lb/ton = ((EF x (1.0 - (Ave Moisture)/100)) x 2000 x 0.9) x CF molecular weight
 Emission Factor lb/ton = 7.9095E-02

Hg

lb/dry ton to lb/ton - Assume 90% mercury present in coal is emitted as Hg compounds

Emission Factor lb/lb dry coal 0.000000072 (from laboratory analysis)
 Coal Average Percent Moisture 30.43 (from laboratory analysis)
 Emission Factor lb/ton = (EF x (1.0 - (Ave Moisture)/100)) x 2000 x 0.9
 Emission Factor lb/ton = 9.0163E-05

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1) Company/Facility name MidAmerican Energy Co., Council Bluffs		2) EIQ No. 92-3600
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3) Emissions Point No. EP003	4) Emissions Unit No. EU003	5) Emission Unit Description or (SCC) No. 10100222
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6) Calculations are provided in support of information reported on Form 4.0 page

7) Emissions Calculations

HCl Coal Emission Factor Conversion
lb/dry ton to lb/ton - Assume 90% chlorine present in coal is converted to HCl

Emission Factor lb/lb dry coal 0.000058411 (from laboratory analysis)
Coal Average Percent Moisture 30.35 (from laboratory analysis)
Correction for molecular weights 1.0282 (H 1.00 + Cl 35.45)/ Cl 34.45
Emission Factor lb/ton = ((EF x (1.0 - (Ave Moisture)/100)) x 2000 x 0.9) x CF molecular weight
Emission Factor lb/ton = 7.5295E-02

HF Coal Emission Factor Conversion
lb/dry ton to lb/ton - Assume 90% fluorine present in coal is converted to HF

Emission Factor lb/lb dry coal 0.00006 (from laboratory analysis)
Coal Average Percent Moisture 30.35 (from laboratory analysis)
Correction for molecular weights 1.0527 (H 1.00 + F 18.99)/ F 18.99
Emission Factor lb/ton = ((EF x (1.0 - (Ave Moisture)/100)) x 2000 x 0.9) x CF molecular weight
Emission Factor lb/ton = 7.9186E-02

Hg
lb/dry ton to lb/ton - Assume 90% mercury present in coal is emitted as Hg compounds

Emission Factor lb/lb dry coal 0.000000072 (from laboratory analysis)
Coal Average Percent Moisture 30.35 (from laboratory analysis)
Emission Factor lb/ton = (EF x (1.0 - (Ave Moisture)/100)) x 2000 x 0.9
Emission Factor lb/ton = 9.0266E-05

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Duplicate this form for
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1) Company/Facility name MidAmerican Energy Co., Council Bluffs		2) EIQ No. 92-3600
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3) Emissions Point No. EP005	4) Emissions Unit No. EU005a	5) Emission Unit Description or (SCC) No.
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7) Emissions Calculations

Coal Bulldozing Emission Factor -Fire 6.23/AP-42 11.9-1 Western Surface Coal Mining

Emission Factor PM10

$$E = 0.75 * ((18.6 * (s^{1.5})) / (M^{1.4}))$$

$$E = 0.75 * ((18.6 * (8.6^{1.5})) / (10.4^{1.4}))$$

$$E = 13.25791 \text{ lbs/hr}$$

s = material silt content Table 11.9-3 mean for as received coal 8.6

M = material moisture content Table 11.9-3 mean for as received coal 10.4

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7) Emissions Calculations

Coal Handling Dust Collectors

Emission Point	Emission Unit	TSP Test lb/hr	Coal Tons/Hr	Emission Factor lb/Ton
EP6	EU6	15.95	3500.00	4.5571E-03
EP7	EU7	1.2	3500.00	3.4286E-04
EP8	EU8	0.94	3500.00	2.6857E-04
EP9	EU9	0.65	3500.00	1.8571E-04
EP10	EU10, EU1	1.26	1500.00	8.4000E-04
EP11	EU11	0.61	1500.00	4.0667E-04
EP13	EU13	1.42	950.00	1.4947E-03
EP14	EU14	3.11	450.00	6.9111E-03
EP15	EU15	2.59	450.00	5.7556E-03
EP16	EU16	0.52	500.00	1.0400E-03
EP17	EU17	0.84	500.00	1.6800E-03

Formula: $EF \text{ lb/Ton} = \text{TSP Test lb/hr} / \text{Coal Tons/hr}$

Where: TSP Test lb/hr = emissions test results as reported to the IDNR
 Coal Tons/hr = coal system throughput recorded during the test
 EF lb/Ton = Emission factor from calculation

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3) Emissions Point No.	4) Emissions Unit No.	5) Emission Unit Description or (SCC) No.

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7) Emissions Calculations

EP30, EP31, EP117b EU30, EU31a,b,c,d, EU117b

Coal Handling Emission Factor - AP42 13.2.4 Aggregate Handling And Storage Piles
Applicable to coal continuous drop process such as stocking out and conveyor belt feeds.

Emission Factor PM10

$$E = k(0.0032)((U/5)^{1.3}/(M/2)^{1.4})$$

$$E = (0.35 \cdot 0.0032) \cdot (((10.5/5)^{1.3}) / (4.5/2)^{1.4})$$

$$E = 0.00094 \text{ lbs/ton}$$

Emission Factor PM

$$E = k(0.0032)((U/5)^{1.3}/(M/2)^{1.4})$$

$$E = (0.74 \cdot 0.0032) \cdot (((10.5/5)^{1.3}) / (4.5/2)^{1.4})$$

$$E = 0.00200 \text{ lbs/ton}$$

E = emission factor
k = particle size multiplier PM10 = 0.35 PM = 0.74
U = mean wind speed - mph Council Bluffs average = 10.5 mph
M = material moisture content Table 13.2.4-1 mean for as received coal 4.5

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3) Emissions Point No. EP024	4) Emissions Unit No. EU024	5) Emission Unit Description or (SCC) No. 40400402

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7) Emissions Calculations

Calculation of Gasoline Emission Factors

% Mix	VOC	Emission Factor	Units	Source
		1.4900E+01	lb/1000 gal	Fire
16	Methyl Tert Butyl Ether	2.3840E+00	lb/1000 gal	% of VOC
4.9	Benzene	7.3010E-01	lb/1000 gal	% of VOC
3	Ethylbenzene	4.4700E-01	lb/1000 gal	% of VOC
20	Toluene	2.9800E+00	lb/1000 gal	% of VOC
10	Xylenes (mixed isomers)	1.4900E+00	lb/1000 gal	% of VOC
3	Hexane	4.4700E-01	lb/1000 gal	% of VOC
1	Cumene	1.4900E-01	lb/1000 gal	% of VOC
1	Naphthalene	1.4900E-01	lb/1000 gal	% of VOC

Based on - Exxon Regular Unleaded Gasoline CG - non ethanol