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BUREAU OF AIR REGULATION

October 29, 2008

Mr. Syed Arif, P.E.
Florida Department of Environmental Protection
111 South Magnolia Drive, Suite 4
Tallahassee, FL 32301

Via FedEx
Airbill No. 7927 7908 5859

Re: **Request for Additional Information Regarding the Railcar Unloading Project**
Big Bend Power Station
File No.: 0570039-041-AC

Dear Mr. Arif:

This letter serves as a response to the Department's request for additional information (RAI) received October 21, 2008, related to Tampa Electric Company's (TEC) air construction permit application to construct a Railcar Unloading facility at Big Bend Power Station (Railcar Project).

Please find below TEC's clarification of the areas identified by the Department as well as additional process information in order to provide reasonable assurance of the emission analysis and prediction.

Department Request #1

Condition B.5.i.b.ii of Title V permit 0570039~028·AV limits Big Bend Station to a facility wide particulate matter emission limit of 2,767 tons per year, which if relaxed by at least 1 ton per year, will result in a reevaluation of PSD applicability for the facility. Please show that emissions from the new railcar unloading project will not result in exceeding this limit.

TEC Response #1

As stated in the Department request Big Bend Station is subject to a facility wide particulate matter (PM) emission limit of 2767 tons per year as stated below in the Title V Condition B.5.i.b.ii:

> *Facility-wide Particulate Matter Emission Limit: In order to provide reasonable assurance that a significant net emission rate increase will not occur as a result of combusting raw and beneficiated coal residual at Big Bend, the combined emissions from Steam Generator Units 1-4 shall not exceed an annual emissions cap of 2,767 tons per year of PM/PM10. This cap corresponds to the average emissions of the years 1999 and 2000. Any relaxation in this limit that increases the facility's potential to emit by at least 1 ton of pollutant per year will result in a reevaluation of PSD applicability for the facility as though construction had not yet commenced at the facility.*

Although the referenced facility-wide limit is applicable only to the boilers' (Units 1 through 4) emissions, TEC evaluated the last three years (2005-2007) of PM emissions including boiler, fugitive, and other regulated units emissions. As a conservative approach, TEC used the highest total PM emissions value from 2006 of 1422 tons. The net PM emissions increase from the Railcar Project is estimated to be 2.5 tons. As a result, the maximum potential PM emissions are estimated to be 1424 tons, well below the 2767 ton per year boiler limit. Please see Table 1 for a summary of the results and Attachment 1 for detailed calculations.

Table 1: Summary of Facility Wide TSP/PM10/PM2.5

Year	2005	2006	2007	
Total Facility Wide PM Emissions (tons)*	1,219	1,422	1,249	
Net total PM increase from the Railcar Project (tons/yr)				2.51
Current Facility Wide PM Emissions(tons/yr) plus PM increase from Railcar Project**				1,424
Facility Wide PM Permit Limit (tons/yr)				2,767
Potential of Permit Limit Exceedance				NO

Notes:

*2005-2007 Total PM emissions are from the annual fee forms
** Calculation used the 2006 PM emission data to represent most restrictive data (1422 tons + 2.51 tons = 1424)

Department Request #2

Please show how much coal has been received annually in the past five years and provide the PM/PM IO emissions from coal unloading for these years. Choose the values from two consecutive years during the five year period and compare them with a maximum coal unloading annual throughput (which could become a permit condition), in order to show there will be no increase in projected emissions which would exceed the PSD significant rates for PM/PM10 .

TEC Response #2

Table 2 summarizes the past five years coal received/transferred and the resultant TSP/PM_{10}/$PM_{2.5}$ emissions for the transfer and conveyor points prior to the coal yard. Since the coal transferred from the railcar will offset the reduction of coal processed through the barge system, the fugitive emissions will not increase from the solid fuel yard and other coal handling emission points.

Table 2: Summary of Baseline/Future Actual Emissions

Years	Coal Transferred (tpy)	TSP (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
2003	3,973,985	1.280	0.605	0.190
2004	4,244,071	1.367	0.647	0.203
2005	4,433,134	1.428	0.675	0.212
2006	5,052,973	0.655	0.310	0.097
2007	4,688,964	0.608	0.288	0.090

Big Bend Power Station is not subject to an annual coal throughput limit. The intention of the railcar project is not to increase the throughput of coal at Big Bend Power Station. The Future Actual Emissions were calculated assuming that all annual coal throughputs for the station were routed through the railcar system and not through the existing barge unloading system. In reality, coal will be received through both the Railcar Unloading Process and the existing Barge. Comparing the past actual emissions using the data from 2006 and 2007 and the Future Actual emissions in PM emissions, given an annual transfer rate of 8,000,000 tons per year, the net increases of TSP/PM_{10}/$PM_{2.5}$ are 1.439 tons, 0.681 tons, and 0.214 tons (respectively). The increases are below the PSD Significant levels. Table 3 summarizes the PSD Applicability

Analysis from the railcar project. Attachment 1 provides detailed calculations and supporting data.

Table 3: PSD Applicability Analysis

Railcar Unloading Project Big Bend Station

	TSP (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Baseline Actual Emissions	1.069	0.506	0.159
Future Actual Emissions	2.508	1.186	0.373
Net Emissions Increase	1.439	0.681	0.214
PSD Significant Increase Rate	25	15	15
PSD Review Required?	No	No	No

The third request for additional information made by the Department was to address the comments made by the Environmental Protection Commission of Hillsborough County (EPCHC). Tampa Electric's responses for each request are outlined below.

EPCHC Request #1

In Section III Emission Unit Information, under Subsection B Emission Capacity Information, the maximum process or throughput rate is listed as 4000 tons/hour. Rule 62-210.200(244) "Potential to Emit" FAC. is defined as the maximum capacity of an emission unit or facility to emit under its physical and operational design. Therefore, in order to determine the "Potential to Emit" of the emission unit, please provide the following design information: conveyor belt width, maximum conveyor belt speed, and number of belt plies. In addition, please provide manufacturer's specifications verifying the design information submitted.

TEC Response to EPCHC #1

The design information requested by the EPCHC is given in the Table 4 as follows:

Table 4: Conveyor System Design Specifications

CONVEYORS AND BELT FEEDERS	Width (in)	Speed (fpm)	Manufacturer	Number of plies
BF-1	96	135	CONTINENTAL	4
C-10	72	650	CONTINENTAL	4
C-11	72	650	CONTINENTAL	4
C-12	72	650	CONTINENTAL	4
C-13	72	650	CONTINENTAL	4
C-14	72	650	CONTINENTAL	4
C-15	72	650	CONTINENTAL	4
C-16	72	650	CONTINENTAL	4

Note that the above information is based on design specifications and TEC has not yet received the final manufacturer's specifications.

EPCHC Request #2

On Drawing No SK-10 of Attachment B of the Application, TECO submitted a process flow diagram, which labels the Track Hopper for the railcar unloading as a "GRIZZLY". Is this a vibrating screen? If so, please provide the following design information in order to determine the emission unit's "Potential *to Emit" as referenced in Equation 19-7 of Perry's Chemical Engineers' Handbook, 7th Edition: screen area, through flow rate, unit capacity, open-area factor, slotted-area factor. In addition, please provide manufacturer's specifications verifying the design information submitted.*

<u>TEC Response to EPCHC #2</u>

The equipment labeled "Grizzly" on the process flow diagram submitted by TEC as Attachment B of the application is not a vibrating screen. The grizzly is an 8 inch by 8 inch safety grating designed to allow coal to fall through to the hopper below.

<u>EPCHC Request #3</u>

On Page 2 of Attachment G, TECO submitted PM calculations for the railcar unloading process using factors that were from AP-42, Section 13.2.4, Aggregate Handling and Storage Piles, that resulted in a PM emission factor of 0.00092 (lb PM/ton). The estimated total emissions for this project, based on this emission factor, are 2.8 tons/year of PM. However, Rule 62-210.370(2)(d)1., F.A.C., states that an owner or operator may use an emission factor to compute emissions of a pollutant for purposes of this rule provided the emission factor is based on site-specific data such as stack test data, where available, unless the owner or operator demonstrates to the department that alternative emission factor is more accurate. Furthermore, in accordance with Chapter 62-210.370(2)(d)2., F.A.C., if site-specific data are not available to derive an emission factor, the owner or operator may use a published emission factor directly-applicable to the process for which emissions are computed. If no directly-applicable emission factor is available, the owner or operator may use a factor based on a similar, but different, process. The calculations submitted in this application used a generic emission factor, which is not site-specific to coal handling, but applicable to a number of different types of materials. However, AP-42, Section 11.9, Western Surface Coal Mining, Table 11.9-1, specifies a publish PM emission factor directly-applicable to the process for Truck loading is 1.16/(M)^1.2 =lb/ton, where M is the % moisture content. This results in an uncontrolled PM emission factor of 0.12 lb PM/ton assuming a moisture content of 6.5 % given by TECO in their calculations. Using a 90% control efficiency for the use of enclosures and dust suppressants and 6,000,000 tons/yr for the ten transfer points, yields total project emissions of 368 tons/year of PM. In addition, Table 1. Fugitive Dust Emission Factors for Coal-Processing Plants, in A&WMA Air Pollution Engineering Manual, 2nd Edition, Chapter 15, Coal Processing, Table 1 specifies published PM emission factors directly applicable to the process of 0.40 lb/ton for coal railcar unloading, and 0.20 lb/ton for coal transfer and conveying. Using a 90% control efficiency for the use of enclosures and dust suppressants and 6,000,000 tons/yr for the ten transfer points, yields total project emissions of

660 tons/year of PM. Therefore, in light of the fact that there are no emission factors based upon site-specific data such as stack tests and there are no restrictions in TECO's current Title V Permit on the type of coal used, TECO must revise the emissions calculations using one of the published emission factor from AP-42, Section 11.9, Table 11.9-1 or A&WMA Air Pollution Engineering Manual, 2nd Edition, Chapter 15, Coal Processing, Table 1, which are directly-applicable to the process.

TEC Response to EPCHC #3

TEC's calculation procedure complies with Chapter 62-210.370(2)(d)2, F.A.C. since, as cited by this rule, the calculation is based on "a published emission factor directly applicable to the process for which emissions are computed." Chapter 13 identifies coal as one of the aggregates for which the chapter is intended. In contrast, the factors that EPC proposes are for western surface coal mines. TECO's fuel yard is not a western surface coal mine, therefore EPC's recommended factor is on the lowest tier of applicability and would not comply with 62-210.370(2)(d)2, F.A.C., since Chapter 13 has a factor that is directly applicable to the subject process. Below is a more detailed description of why EPC's proposed factors are not appropriate to use on the subject process.

The table referenced by the EPCHC in the request, *Table 1 Fugitive Dust Emission Factors for Coal-Processing Plants, in A&WMA Air Pollution Engineering Manual, 2nd Edition, Chapter 15, Coal Processing*[1] has an endnote referencing the use of a 1976 EPA document titled *Evaluation of Fugitive Dust Emissions from Mining*[2] (relevant excerpts in Attachment 2). This document provides discussion regarding the basis of the 0.20 lb/ton emission factor that conflicts with the EPC contention that it is applicable to the Big Bend solid fuel handling system. The points contradicting EPC's position include:

- The document clearly refers to mining operations that transfer and convey coal that has not had the benefit of significant processing as has the coal at Big Bend Station. The additional processing results in significant differences between mined coal and the coal used at Big Bend Station.
- The emission factor was derived from work by a company called ERT by subtracting out the emission factor of the crushing and storage operations at coal mines from the total fugitive emissions of the entire mine operation. The difference is a gross

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[1] Wayne T. Davis, ed., *AWMA Air Pollution Engineering Manual*, 2nd Edition, (New York: John Wiley & Sons, 2000), 693-695

[2] G. Jutze, K Axetell, and R. Amick, *Evaluation of Fugitive Dust Emissions from Mining*, PEDCo Environmental, Inc., prepared for EPA IERL, ORD, Cincinnati, OH, Contract 6802-1321, Task No. 36, EPA-600/9-76-001, June 1976, 49-51

estimation of the emission rate from all of the conveyor transfer points at a mining facility. As described by the following excerpt from page 51 of the EPA document, "*ERT proposed a single emission factor for the combined processing sources at coal mines in northwestern Colorado...*" EPC proposes to use this factor for each transfer point in the Big Bend fuel yard. This proposal is not consistent with the source or intent of the factor.

- The authors of this factor acknowledge that the factor is "excessive" in the following quote from page 51 of the EPA document that is its source: "*This seems to be excessive in comparison with estimates for conveying other material, and may be an indication that other unidentified particulate sources are also included in the ERT emission factor for the processing area. The value of 0.20 lb/ton does not account for the relatively high control efficiencies, usually at least 90 percent associated with enclosed transfer and conveying systems.*"
- Authors of the referenced 1976 EPA document have had several updates that have been appropriately incorporated in AP-42 Chapter 11 addressing emissions from western surface coal mines. Therefore, the subject reference in the *Air Pollution Engineering Manual* is outdated. TEC will notify the *Air Pollution Engineering Manual* publisher that Table 1 is misleading as written and needs clarification.

Similarly, EPC cites a railcar unloading emission factor of 0.4 lb/ton from the same source as above, *Table 1* of the previously referenced *A&WMA Air Pollution Engineering Manual, 2nd Edition, Chapter 15, Coal Processing.* The endnote associated with this emission factor references the document titled, *Reasonably Available Control Measures for Fugitive Dust*[3] (relevant excerpts in Attachment 2). This document identifies the railcar unloading emission factor as 'E' rated, stating on p2-174 that, "*The emission factor for railcar, truck, and conveyor unloading are of unspecified origin; therefore, the reliability should be considered very poor.*" Although this factor is published, the publication does not provide any guidance as to how the factor should be applied, nor does it have any credible basis for use in calculating emissions for this project. In contrast, the emission calculations performed by TEC in the application use empirical equations based on sound engineering principles that are the industry standard. As

[3] *Reasonably Available Control Measures for Fugitive Dust*, Ohio EPA, 274-275

noted before, TEC will notify the *Air Pollution Engineering Manual* publisher that Table 1 is misleading as written and needs clarification and correction.

Based on the findings outlined above, the EPC-endorsed emission factors are based on the wrong type of operation and if applied as intended by the authors, would actually result in lower estimated fugitive emissions than TEC currently reports. AP-42 Chapter 13 continues to be the most appropriate estimate of fugitive emissions from Big Bend Station. The 1976 EPA document that is the basis of EPC's preferred factor also addresses fugitive emissions from other industries in the same manner that Chapter 13 does and the EPC source is actually less "coal-specific" than AP-42 Chapter 13. Based on the aforementioned, we assert that TEC is using the best available emission factor based on sound engineering judgment as certified in the application.

EPCHC Request #4

In the application TECO did not submit an estimate of baseline actual to projected actual emissions as required under Rule 62-212.400(2) F.A.C., in order to determine whether a major modification has occurred. In addition, in accordance with Rule 62-210.200(36)(a), F.A.C states that for an existing electric utility steam generating unit, baseline actual emission means the average rate, in tons per year, at which the emissions unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 5-year period immediately preceding the date a complete permit application is received by the Department. Based on the average 2005 and 2006 coal throughputs submitted by TECO, EPC estimated baseline actual emissions of 291 tons/year for the Solid Fuel Yard (Emission Unit No. 010) using the emission factors from A&WMA Air Pollution Engineering Manual, 2nd Edition, Chapter 15, Coal Processing, Table 1. Since there are no federally enforceable limits on the coal throughput, this modification results in a increase in actual emissions of at least 77 tons/year, which is above the PSD significant net emissions increase of 25 tons/year of PM. Therefore, pursuant to Rule 62-212.300(1)(a), F.A.C. and Rule 62-212.400, F.A.C., TECO shall submit a baseline actual to projected actual applicability test for the modification to the Solid Fuel Yard emission unit, and submit a PSD construction permit application with a BACT analysis for each the emission unit.

TEC Response to EPCHC #4

TEC continues to assert that the best available emission factor is being used based on sound engineering evaluation and judgment as certified in the application. Based on this assertion, the installation of the Railcar would not warrant an estimate of the baseline actual to projected actual emissions. The Big Bend

Power Station Railcar Project is not subject to the requirements of Rule 62-212.400(2) F.A.C. due to the fact that the project is not a major modification and is not subject to PSD review.

Since the coal processed from the railcar system will offset the coal processed through the barge system, the fugitive emissions from the solid fuel yard and other coal handling emission points will not increase significantly as a result of the railcar project. Table 4 below summarizes the requested information.

Table 5: Baseline Actual to Projected Actual PM Emissions

	Coal Transferred Tons/year	Total Tons/year
Avg. Year 2006 & 2007	4,870,968	1.07
Projected Actual	4,870,968	1.53
Net Increase		0.46

The net increase is below the PSD Significant Level of 25 tons and thus is not subjected to PSD Review.

This response and associated calculations have been certified by a Florida professional engineer in the attached certification statement. TEC continues to look forward to resolving any questions the Department has and appreciates the Departments' efforts in expediently processing this permit application.

If you have any questions, please contact me at (813) 228-1282.

Sincerely,

Byron T,Burrows, P.E.
Manager - Air Programs
Environmental, Health & Safety

C/enc: Mara. Nasca (FDEP – SW)
Jerry Campbell (EPCHC)

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TAMPA ELECTRIC COMPANY
BIG BEND STATION

RAILCAR UNLOADING AND CONVEYANCE SYSTEM
RESPONSE TO FDEP REQUEST FOR ADDITIONAL INFORMATION

Professional Engineer Certification

1.	Professional Engineer Name: Byron T. Burrows, PE Registration Number: 53817
2.	Professional Engineer Mailing Address... Organization/Firm: Tampa Electric Company Street Address: PO Box 111 City: Tampa State: FL Zip Code: 33601
3.	Professional Engineer Telephone Numbers... Telephone: (813) 228 - 1282 Fax: (813) 228 - 1308
4.	Professional Engineer E-mail Address: btburrows@tecoenergy.com
5.	Professional Engineer Statement: *I, the undersigned, hereby certify that:* *(1) To the best of my knowledge, the information presented in the Tampa Electric Company (TEC) response to the Departments' October 21, 2008 request for additional information regarding the Big Bend Station railcar unloading project are true, accurate, and complete based on my review of material provided by TEC engineering and environmental staff; and* *(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this certification.* Signature Date 10/28/08 (seal)

ACTUAL COAL USAGE AND METEOROGICAL DATA SUMMARY
BIG BEND STATION

Year	2003	2004	2005	2006*	2007*
Coal Throughput (tons)	3,973,985	4,244,071	4,433,134	5,052,973	4,688,964
Moisture Content, %	6.5	6.5	6.5	10.2	9.9
Mean Wind Speed, mph, annual	8.6	8.6	8.6	6.9	6.9

*Years used for Potential Emissions Calculations

Notes:

Moisture content and wind speed are actual annual average as reported in the Annual Operating Reports

Baseline Actual Emissions

$$E = k \times 0.0032 \times [(U / 5)^{1.3} / (M / 2)^{1.4}] \times TR \times [(1 - (CE / 100)] \times (1 \text{ ton} / 2{,}000 \text{ lb})$$

E* = TSP/PM_{10}/$PM_{2.5}$ emission rate; tons per year (tpy)
k = particle size multiplier; dimensionless
U = mean wind speed, miles per hour (mph)
M = fuel moisture content; weight percent (%)
TR = transfer rate; tons per year (tpy)
CE** = control efficiency; 90 percent (%)

*Source: Section 13.2.4.3, Eqn. (1), AP-42, November 2006.
**Source: Section 13.2.4.4, AP-42, November 2006.

Data	
k (TSP)	0.74
k (PM_{10})	0.35
k ($PM_{2.5}$)	0.11
U	7.92 mph
M	7.92 %
TR	4870968.18 tpy

Transfer Point	Emission Point ID	Control Efficiency (%)	Maximum Throughput (tph)	Throughput (tpy)	Emissions TSP (tpy)	Emissions PM_{10} (tpy)	Emissions $PM_{2.5}$ (tpy)
Barge Clamshell to Conveyor D1	FH-001	90	4,000	4,870,968	0.153	0.072	0.023
Barge Bucket Elevator to Conveyor A1	FH-002	90	4,000	4,870,968	0.153	0.072	0.023
Conveyor A1 to Conveyor B1	FH-003	90	4,000	4,870,968	0.153	0.072	0.023
Conveyor B1 to Conveyor D1	FH-004	90	4,000	4,870,968	0.153	0.072	0.023
Self-Unloading Barge to Conveyor D1	FH-005	90	4,000	4,870,968	0.153	0.072	0.023
Conveyor D1 to Conveyor E1	FH-006	90	4,000	4,870,968	0.153	0.072	0.023
Conveyor E1 to Conveyor Y or F1	FH-007	90	4,000	4,870,968	0.153	0.072	0.023
				Totals	**1.069**	**0.506**	**0.159**

Notes:
Values for U & M for the equation are the averages data from plant weather station referenced in TABLE 2-1
New emission points are referenced in Flow Diagram (Drawing SK-10) submitted in AC Application

Future Projected Emissions

$$E = k \times 0.0032 \times [(U / 5)^{1.3} / (M / 2)^{1.4}] \times TR \times [(1 - (CE / 100)] \times (1 \text{ ton} / 2{,}000 \text{ lb})$$

E* = $TSP/PM_{10}/PM_{2.5}$ emission rate; tons per year (tpy)
k = particle size multiplier; dimensionless
U = mean wind speed, miles per hour (mph)
M = fuel moisture content; weight percent (%)
TR = transfer rate; tons per year (tpy)
CE** = control efficiency; 90 percent (%)

*Source: Section 13.2.4.3, Eqn. (1), AP-42, November 2006.
**Source: Section 13.2.4.4, AP-42, November 2006.

2007 Data		
k (PM)	0.74	
k (PM_{10})	0.35	
k ($PM_{2.5}$)	0.11	
U	7.92	mph
M	7.92	%
TR	8,000,000	tpy

Transfer Point	Emission Point ID	Control Efficiency (%)	Maximum Throughput (tph)	Throughput (tpy)	Emissions TSP (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Train Car Drop Unloading to Track Hopper	New	90	4,000	8,000,000	0.251	0.119	0.037
Drop to Belt Feeder BF-1	New	90	4,000	8,000,000	0.251	0.119	0.037
Transfer from BF-1 to C-1	New	90	4,000	8,000,000	0.251	0.119	0.037
Conveyor Transfer Point T-10	New	90	4,000	8,000,000	0.251	0.119	0.037
Conveyor Transfer Point T-11	New	90	4,000	8,000,000	0.251	0.119	0.037
Conveyor Transfer Point T-12	New	90	4,000	8,000,000	0.251	0.119	0.037
Conveyor Transfer Point T-13	New	90	4,000	8,000,000	0.251	0.119	0.037
Conveyor Transfer Point T-14	New	90	4,000	8,000,000	0.251	0.119	0.037
Conveyor Transfer Point T-15	New	90	4,000	8,000,000	0.251	0.119	0.037
Conveyor Transfer Point T-16	New	90	4,000	8,000,000	0.251	0.119	0.037
				Totals	**2.508**	**1.186**	**0.373**

Notes:
Values for U & M for the equation are the averages data from plant weather station referenced in TABLE 2-1
New emission points are referenced in Flow Diagram (Drawing SK-10) submitted in AC Application

Resource 1

AWMA Air Pollution Engineering Manual, 2nd Edition
Wayne T. Davis, ed.
(New York: John Wiley & Sons, 2000)
Pages 693-695

Wayne T. Davis, ed.,AWMA Air Pollution Engineering Manual, 2nd Edition, (New York: John Wiley & Sons, 2000), 693-695

ded by a rising column of the gases. ıe dryer at an overflow weir. A flash econd most popular type of dryer. In ɜnerated in the combustion furnace wet coal up a riser. The turbulence ɜs an excellent drying environment. :or extremely fine coal, with the top

ıg, mines using unit-train shipment ı coal to fill a train. Silos an often thermore, silo storage prevents the and exposure to wind. Some mines ıg conveyors for loading. At other ges are loaded directly as the coal is

ɪIZATION

factors for coal-processing-plant ummarized in Table 1, and fugitive ı the following paragraphs.

ource in the fine or coarse coal ıir exhaust from the air separation r the dry cleaning process, these hen the coal is stratified by pulses of ssions from this source are normally 'ollowed by fabric filters. Potential ıg processes are very low.[43]

ıissions from the final preparation ɛr exhaust. This emission stream ıtrained in the drying gases and .s (VOC) released from the coal, in :oducts of coal combustion resulting 'ate the hot gases [including carbon ioxide (CO_2), VOC, sulfur dioxide ɜs (NO_x)]. Table 2 shows emission ;ter. Emission factors for SO_2, NO_x, ed in Table 3.[43]

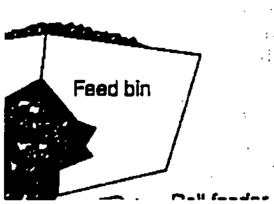

Table 1. Fugitive Dust Emission Factors for Coal-Processing Plants

Unloading	
Truck	0.02 lb/ton unloaded[a]
Railcar	0.40 lb/ton unloaded[b]
Primary crushing	0.02 lb/ton crushed[c]
Secondary crushing/screening	0.16 lb/ton crushed/screened[c]
Transfer and conveying	0.20 lb/ton transferred or conveyed[d]
Cleaning	Negligible[e]
Storage	
Loading onto pile	0.08 lb/ton loaded[f]
Vehicular traffic	0.16 lb/ton stored[f]
Loading out	0.10 lb/ton stored[f]
Wind erosion	0.09 lb/ton stored[f]
Loading	
Truck	0.02 lb/ton loaded[a]
Railcar	0.40 lb/ton loaded[b]
Barge	0.40 lb/ton loaded[b]

[a]Ref. 16.
[b]Ref. 17 and 18.
[c]Ref. 19.
[d]Ref. 20.
[e]Ref. 21 (see Table 2 for dryer emissions).
[f]Ref. 22.

A number of inorganic hazardous air pollutants are found in trace quantities in coal. These include arsenic, beryllium, cadmium, chromium, copper, mercury, manganese, nickel, lead, thorium, and uranium. It is likely that many of these are emitted in trace amounts from crushing, grinding, and drying operations.[43]

The new source performance standards (NSPS) for coal preparation plants were promulgated in January 1976 (40 CFR Subpart Y). These standards specify emission limits for PM from coal cleaning thermal dryers and pneumatic cleaning equipment sources, and opacity limits for fugitive emissions from coal processing and conveying equipment, coal storage systems, and coal transfer and loading systems.

AIR POLLUTION CONTROL MEASURES

This section presents the fugitive dust control methods that may be used on a case-by-case basis by the coal-processing industry followed by a discussion of control technologies used in the processing phase.[17,22] Application of fugitive dust control measures would be to meet the National Ambient Air Quality Standards or to reduce the nuisance potential beyond the property line of the coal-processing facility.

Table 2. PM Emission Factors for Coal Cleaning[a] Emission Factor Rating: D (Except as Noted)

	Filterable PM[b]			Condensible PM[c]	
Process	PM	$PM_{2.5}$	$PM_{1.0}$	Inorganic	Organic
Multilouvered dryer[d] (SCC 3-05-010-03)	3.7	ND	ND	0.057	0.018
Fluidized bed dryer[e] (SCC 3-05-010-01)	26[f]	3.8[g]	1.1[g]	0.034[h]	0.0075[h]
Fluidized bed dryer with venturi scrubber[j] (SCC 3-05-010-01)	0.17	ND	ND	0.043	0.0048
Fluidized bed dryer with venturi scrubber and tray scrubber[k] (SCC 3-05-010-01)	0.025	ND	ND	ND	ND
Air tables with fabric filter[m] (SCC 3-05-010-13)	0.032[n]	ND	ND	0.033[p]	0.0026[q]

[a]Emission factor units are lb/ton of coal feed, unless noted. 1 lb/ton = 2 kg/Mg. SCC, Source Classification Code; ND, no data. Table taken from AP-42, Chapter 11.10, "Coal Processing."
[b]Filterable PM is that PM collected on or prior to the filter of an EPA Method 5 (or equivalent) sampling train.
[c]Condensible PM is that PM collected in the impinger portion of a PM sampling train.
[d]Ref. 35. Alternate SCC is 3-05-310-03, which corresponds to units of lb/thousand tons of coal feed. To determine the emission factor for this alternate SCC, multiply the factor in this table by 1,000.
[e]Alternate SCC is 3-05-310-01, which corresponds to units of lb/thousand tons of coal feed. To determine the emission factor for this alternate SCC, multiply the factor in this table by 1,000.
[f]Refs. 36, 38.
[g]Refs. 36, 38. Emission factor rating: E. Particle size data from Ref. 38 used in conjunction with filterable PM data from Refs. 36 and 38. Actual cut size of $PM_{2.5}$ data was 2.7 μm.
[h]Ref. 36
[j]Refs. 27, 28, 36, 38, 41. See footnote e for alternate SCC.
[k]Ref. 42. Tray scrubber using NaOH as the scrubbing liquid. See footnote e above for alternate SCC.
[m]Alternate SCC is 3-05-310-13, which corresponds to units of lb/thousand tons of coal feed. To determine the emission factor for this alternate SCC, multiply the factor in this table by 1,000.
[n]Refs. 39, 40.
[p]Ref. 40.
[q]Ref. 39.

For fugitive dust emissions from conveying operations, the control methods generally used are partial (top) enclosure, total enclosure, or wet suppression. Also, fugitive dust emissions created by the droppings from the return belt conveyors may

:ol Alternatives and Their Control

Control Alternatives	CE[a] (%)
ıclosure, vent to fabric filter	99
ıclosure	70
ɜt suppression with :hemicals	80
ɑtering	50
ıclosure vent to fabric filter	99
ıclosure	70
ɜt suppression with :hemicals	80
ɑtering	50
ıclosure, vent to fabric filter	99
ɜt suppression with :hemicals	90
ıclosure, vent to fabric filter	99
ɜt suppression with :hemicals	90
ıclosure of conveyors and :ransfer points, vent to fabric filter	99
ıclosure of conveyors and ınsfer points	70
ɜt suppression with :hemicals	90
ıclosure	100
ıclosure	80
lescopic chutes	75
ɜt supression with :hemicals	75
nd guards	50
ıclosure	100
ɜt suppression with :hemicals	99
ıder-pile conveyor	80
ɜt suppression with :hemicals	95
.cket wheel reclaimer	80
ɜt suppression with :hemicals	80
lescopic chutes	75
ɜt suppression with :hemicals	80
lescopic chutes	75

and 22.

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Resource 2

Evaluation of Fugitive Dust Emissions from Mining
G. Jutze, K Axetell, and R. Amick
PEDCo Environmental, Inc., prepared for EPA IERL, ORD
Cincinnati, OH
Contract 6802-1321, Task No. 36, EPA-600/9-76-001
June 1976
Pages 49-51

G. Jutze, K Axetell, and R. Amick, *Evaluation of FugitiveDust Emissions from Mining,* PEDCo Environmental, Inc., prepared for EPA IERL, ORD, Cinncinnati, OH, Contract 6802-1321, Task No. 36, EPA-600/9-76-001, June 1976, PP. 49-51

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
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Evaluation of Fugitive Dust Emissions from Mining

PEDCo-Environmental, Inc, Cincinnati, OH

Prepared for

Industrial Environmental Resarch Lab -Cincinnati, OH Resource Extraction and Handling Div

Apr 76

or to deliver the processed material to the consumer, conveying is most often found within the processing area--moving the crushed material to storage, a cleaning process, or the train loading station. This operation also includes the loading of train cars and other transfer of the material, except for conveyors within the crushing or storage operations which are considered to be integral to these operations. Because of the large tonnages that must be moved in mining, most of the transport systems are belt conveyors rather than screw, vibrating, or continuous-flow conveyors.

Generally, conveyor runs between processes are less than 1,000 ft. The average length of the few haulage conveyors between pits and crushers is about 2,100 ft,[22] and off-site delivery conveyors of up to 12 mi have been built for coal.

Loss of material from the conveyors is primarily at the feeding, transfer, and discharge points and occurs due to spillage or windage. A conveyor belt is shown in Figure 3.7. The total weight loss in transit is certainly greater than the fugitive dust emissions from this operation since much of the spillage is deposited along the conveyor and some of the windblown material is in the settleable size range.

Excessive moisture in the material or air currents can create discharge problems on belt conveyors. Therefore, most are enclosed, and in some cases the transfer points may be hooded and vented to a dust collector. Both the enclosure and the hooding greatly reduce fugitive dust emissions from this operation.

Emission Estimate

Conveying is one of the most variable mining operations with respect to fugitive dust emission rates. In many

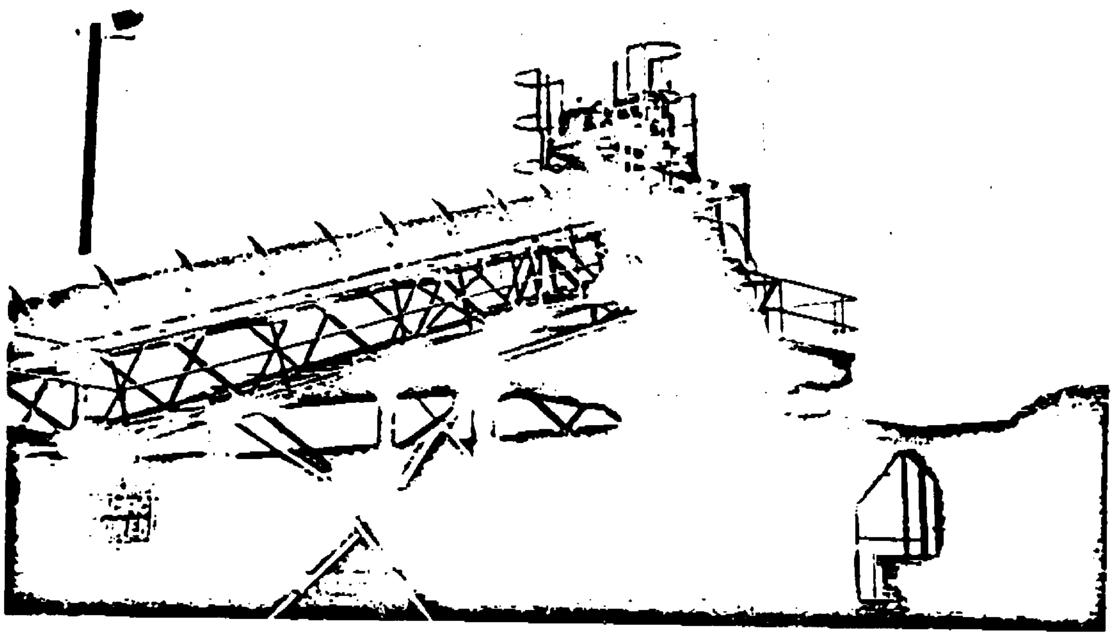

Figure 3.7. Transfer and conveying.

mines, there are no belt conveyors or similar transfer processes; the material is moved by truck to the tipple and loaded directly onto trains. At other mines, extensive networks of unenclosed conveyors are used, such as with bucket wheel excavators. Also, the emissions from conveying different materials vary greatly, depending in part on size distribution and moisture content.

ERT proposed a single emission factor for the combined processing sources at coal mines in northwestern Colorado--0.44 lb/ton (0.044 percent of material processed with half of these emissions fugitive dust). The processing sources at these mines were identified as transfer and conveying, crushing, and storage. Since other emission estimates are available specifically for the crushing and storage operations at coal mines, a value for conveying can be determined by subtraction from the overall ERT emission factor. Using the higher of alternative emission estimates for crushing and storage of 0.18 lb/ton and 0.054 lb/ton, respectively, the indicated emission rate for conveying would be 0.20 lb/ton. This seems to be excessive in comparison with estimates for conveying other material, and may be an indication that other unidentified particulate sources are also included in the ERT emission factor for the processing area. The value of 0.20 lb/ton does not account for the relatively high control efficiencies, usually at least 90 percent, associated with enclosed transfer and conveying systems.

The Hittman report stated that coal conveyor systems "are either covered or operated at such a speed that dusting does not occur to any great extent." Also, it was pointed out that only a small proportion of coal transport is done by this method. However, the same report used a value of 0.04 percent, or 0.8 lb/ton, loss through spillage at conveyor transfer points. Even if only a few percent of the

Resource 3

Reasonably Available Control Measures for Fugitive Dust
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A typical power plant has a generating capacity of about 500 MW, equivalent to consumption of roughly 230 tons of bituminous coal per hour.

Fugitive dust may be emitted from several sources in the coal-fired power plant cycle. At the mine, potential sources include overburden removal, coal extraction, stockpiles, conveying, loading and hauling. At the power plant site, possible sources include coal unloading, stockpiling, coal handling and transfer, and dry ash handling and disposal. Coal preparation plants at either the mine or power plant site can be sources of fugitive emission generation at crushing, sizing and handling operations.

2.4.2 Fugitive Dust Emission Factors

The estimated emission factors for fugitive emissions from coal-fired power plants are summarized in Table 2.4-1.

The emission factors for coal mining and processing sources were excluded since these are addressed in Sections 2.1.4 and 2.19.

The emission factors for rail car, truck and conveyor unloading are of unspecified origin; therefore, the reliability should be considered as very poor. The emission factor for barge unloading is based upon limited testing and field observations. Its reliability should be considered as fair. The coal storage and the transfer and conveying emission factors are discussed in Section 2.2.1.

The emission factor for fly ash handling and disposal is described by the source as an engineering estimate without

TABLE 2.4-1. FUGITIVE DUST EMISSION FACTORS FOR COAL-FIRED POWER PLANTS

Source	Emission factor	Reliability rating	Reference
(1) Coal delivery			
Railcar unloading	0.4 lb/ton unloaded	E	1
Barge delivery	0.046 lb/ton unloaded	C	2
Truck unloading	0.4 lb/ton unloaded	E	1
Conveyors	0.04 to 1.0 lb/ton unloaded	E	1,2
(2) Coal storage			
Loading onto pile	0.08 lb/ton coal loaded	D	3
Vehicular traffic	0.16 lb/ton coal stored	D	3
Loading out	0.10 lb/ton coal loaded out	D	3
Wind erosion	0.09 lb/ton coal stored	D	3
(3) Transfer and conveying	0.04 to 1.0 lb/ton coal handled	E	1,2,4
(4) Fly ash handling and disposal	20 to 100 lb/ton ash handled	E	5