

AP42 Section: 11.10 Coal Cleaning

Title: Comments

1994

Note: This material is related to a section in *AP42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources*. AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the file number, the AP42 chapter and then the section. The file name "rel01_c01s02.pdf" would mean the file relates to AP42 chapter 1 section 2. The document may be out of date and related to a previous version of the section. The document has been saved for archival and historical purposes. The primary source should always be checked. If current related information is available, it will be posted on the AP42 webpage with the current version of the section.



MIDWEST RESEARCH INSTITUTE

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October 17, 1994

John Wootten
Vice President, Engineering and Environmental Affairs
Peabody Holding Company, Inc.
701 Market Street
Suite 700
St. Louis, Missouri 63101-1826

Dear Mr. Wootten:

As discussed with Jim Lunan of Peabody Holding Company, Inc. (Peabody) this morning by telephone, Midwest Research Institute currently is assisting the U. S. Environmental Protection Agency (EPA) in revising Section 8.9, Coal Cleaning, of the publication *Compilation of Air Pollutant Emission Factors*, otherwise known as AP-42. A draft revision to this AP-42 section was sent to the National Coal Association (NCA) on January 12, 1993 for review. Based on NCA's response, EPA is now trying to gather additional test data that is more representative of current operations in the coal cleaning industry to incorporate into the revised AP-42 section. Enclosed is a copy of the draft AP-42 section on coal cleaning and a copy of the February 16, 1993, letter from David Branand of the NCA to Ron Myers of EPA with NCA's comments on the draft AP-42 section.

During a recent conversation with NCA, Mr. Branand suggested that we contact you for additional information. Therefore, we are requesting your help in obtaining emission test reports on coal cleaning sources. Please note that the emission factors presented in AP-42 generally are based upon the results from validated tests or other emission evaluations that are similar to EPA test methods. We also would appreciate any comments that you could provide on the process description and identification of emission points presented in the enclosed draft AP-42 section. Please note that we need to receive any additional information no later than December 31, 1994 in order to incorporate it into the revised AP-42 section on coal cleaning.

Thanks for you help.

Sincerely,

A handwritten signature in black ink, appearing to read "R. J. Marinshaw", is written over a horizontal line.

Richard J. Marinshaw
Senior Environmental Engineer

2 Enclosures

cc: James S. Lunan, Peabody
Ron Myers, EPA (MD-14)



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September 28, 1994

Richard Kerch
Director, Air and Water Quality Assistance
CONSOL, Inc.
1800 Washington Road
Pittsburgh, Pennsylvania 15241

Dear Mr. Kerch:

As we discussed this morning by telephone, I am forwarding to you a copy of the draft revised AP-42 section on coal cleaning and a copy of the February 16, 1993, letter from David Branand of the National Coal Association, to Ron Myers, U. S. Environmental Protection Agency, commenting on the draft AP-42 section. We would appreciate your help in obtaining emission test reports on coal cleaning sources. In addition, any comments that you could provide on the process description and identification of emission points as presented in the draft AP-42 section would be helpful.

Please note that we will need to receive any additional information no later than December 31, 1994 in order to incorporate it into the final AP-42 section.

Thanks for you help.

Sincerely,

A handwritten signature in dark ink, appearing to read "R. Marinshaw", is written over the typed name.

Richard J. Marinshaw
Senior Environmental Engineer

2 Enclosures

cc: Ron Myers, EPA (MD-14)

February 16, 1993

Mr. Ronald E. Myers
United States Environmental Protection Agency
Emissions and Methodologies Section
Emission Inventory Branch
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

Dear Mr. Myers:

By letter of January 12, you provided the National Coal Association (NCA) with an opportunity to comment on draft AP-42 Section 8.9, Coal Cleaning revisions. NCA, whose membership produces almost two-thirds of the nation's annual one billion tons of coal production, is pleased to submit these comments. Although you requested comments by February 15 (Washington-Lincoln Day and a federal holiday), NCA was unable to comply with this deadline and trusts that the attached comments submitted on February 16 will be accepted. The NCA comments are based on responses from the NCA Environmental Committee which reviewed copies of your January 12 letter with enclosures.

It is apparent from the comments that NCA could work with its members to provide EPA with additional data. The short comment period has prevented inclusion of this information with these comments. However, NCA would welcome the opportunity to work with EPA.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "David C. Branand".

David C. Branand
Counsel and Director, Environmental
Affairs

**NATIONAL COAL ASSOCIATION COMMENTS ON CHAPTER 8 OF
A4-42 SECTION 8.9
COAL CLEANING REVISIONS 11/92**

February 16, 1993

INTRODUCTION

The U.S. EPA is in the process of updating the document **Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources** (commonly referred to as AP-42). Chapter 8 of this manual addresses the mineral industry with a sub-section dealing with coal cleaning plants. Within this section, thermal dryers are identified as the primary source of emissions. EPA has asked for comments regarding a proposed draft of the revised section on coal cleaning plants specific to thermal dryers. The National Coal Association (NCA) comments regarding this draft are documented in this correspondence.

COMMENTS & DISCUSSION

Low Quality Data: All of the emission factors presented in this document have either a "below average (D)" or "Poor (E)" quality rating. Using the EPA definition, these factors may not be representative of the industry and have limitations on their use. Considering the quality of the emission factors, this current draft is of little value in estimating emission levels.

Old Data: Most of the emission factors are based on sampling data collected in the early 1970s. These data were obtained by first-generation stack samplers using first-generation equipment. Much of this work was complicated by the unusual problems associated with coal dryers such as saturated gas streams and cyclonic flows. Since then, improvements have been made in all facets of stack sampling.

The current draft document states that the past sampling efforts have shown no CO emissions as measured by ORSAT analysis (EPA Method 3). This method has a detection limit of ~0.1% or ~1000 ppm. The use of more sophisticated analytical instrumentation such as electrochemical sensors and gas chromatography has shown measurable amounts of CO in thermal dryers. It is a misconception based upon the earlier data that thermal dryers do not emit CO. This misconception could prove to be a future permitting obstacle.

Other advancements in QA/QC procedures have led to improved data. Improvements have also been made on the thermal dryers themselves including the use of "high energy" venturi scrubbers. These collectors operate at pressure drops greater than 36 WG and afford greater particulate collection compared to their "low energy" counterparts. High energy scrubbers have also shown to be effective in removing SO₂ and to a lesser degree NO_x. Emission factors should be based on this type of collection device.

Units for Emission Factors: The expression of emission factors in "mass of emission per mass of coal throughput" is only valid for the particulate emissions and possibly the VOCs. The particulate emissions are primarily a product of entrained coal fines and may correlate to coal throughput. The primary VOC emissions are dependent on the coal type and combustion process. However, secondary VOC emissions can be generated during the drying process. In some cases, the secondary VOC emissions are greater than the primary VOC emissions. All other emissions are the products of combustion and should be expressed in either "mass of emissions per mass of fuel fired" or better as "mass of emissions per MM Btu of fuel fired."

Type of Combustion and Conditions: Consideration should be given to the type of combustion and also the furnace conditions. The coal industry operates both stoker-fired and pulverized coal-fired systems. The differences in these combustion processes can affect the NO_x, CO, and VOC emissions.

Coal Characteristics: The type and quality of the fired coal has a direct effect on the emissions of SO₂, NO_x, VOCs, and CO. The SO₂ emissions are a function of the amount of coal fired, its sulfur content, and the SO₂ removal across the venturi scrubber. The removal across the scrubber can vary considerably depending on the local scrubber water quality.

Other coal quality parameters such as volatile matter, fixed carbon, and grind size can affect the NO_x, VOC, and CO emissions. A recent study conducted by an NCA member showed that the majority of the particulate emitted from thermal dryers consists of fine coal particles. Emission of inorganic species would be predominantly dependent on the concentration of these species in the original coal matrix. Also, the coal size and friability could affect the amount of fine coal entrained in the flue gas during the drying step. These parameters vary depending on the coal.

COMPARISON WITH COLLECTED DATA

The data in the following table compares the current AP-42 estimates with measured emissions for two post-1966 construction thermal dryers.

| Species | AP-42 Estimate (lb/hr) | Dryer # 1 PC Unit (lb/hr) | Dryer # 2 Stoker Unit (lb/hr) |
|-------------------------------|------------------------|---------------------------|-------------------------------|
| Filterable Particulate Matter | 8.5 | 10.8 | 26.5 |
| CO | Not Detected | 32 | --- |
| CO ₂ | Not Measured | 14100 | 22000 |
| SO ₂ | 110 | 157 | 27.3 |
| NO _x | 11 | 36 | 52 |
| VOCs | 3.5 | ~50 | 3.5 |

The variability in the data shown in this table illustrates the gross miscalculations that can result when using the current AP-42 emission factors. The AP-42 estimates carry an order of magnitude uncertainty for all the above species. The data clearly show the limited value of the current emission factors.

RECOMMENDATIONS

Thermal dryer emissions are dependent on a wide variety of variables. The differences in dryer designs also affect the emission rates. The source specific nature of thermal dryer designs and operation results in a wide degree of variability in their emission rates. Because of this, the current AP-42 factors are of limited value in the estimation of thermal dryer emissions from a specific facility. A more accurate estimate would be to use the measured emission rates from a facility that most closely resembles the dryer in question and to use an appropriate scaling factor to project the emissions. Two potential scaling factors are the tons of water evaporated and the gas flowrate. This technique eliminates the potential biases previously discussed such as firing type, fuel type and quality, control equipment, etc. The emission factors should be expressed on "mass of emissions per MM Btu of fuel fired" basis for all emissions except particulate matter and VOCs. These emissions are greatly influenced by the type and quantity of coal throughput and are better expressed on the basis of "mass of emissions per ton of coal throughput."

The database regarding CO emissions is invalid. It is a misconception to assume that thermal dryers which use coal as a heat source have no CO emissions. Consideration should be given to what these levels are for the different firing configurations.

Since 1979, the coal industry has conducted many thermal dryer source tests. Most of these tests involved the measurement of particulate matter, NO_x, and SO₂. In some of these tests, VOC and CO measurements were also taken. These data could be useful to the EPA in their determination of the variability in thermal dryer emissions. This would also give EPA some additional insight into the utility of emission factors.

There are some limitations to the current industry data. The objective of most of these tests was to measure emission rates during "routine and normal" dryer operation. For the majority of these tests, no data regarding the fuel firing rate of the dryer throughput were required or taken. For these reasons it would be prudent for EPA to undertake a program to compile and review the most current data and to re-assess their emission factors based on their findings.

FAX TRANSMISSION

TO: Ron Myers, EFIG
FROM: Rick Marinshaw, MRI
DATE: February 14, 1995

RECEIVING FAX NUMBER: 541-0684

SENDING FAX NUMBER: 919-677-0065

THIS FAX CONSISTS OF ⁷/~~2~~ PAGES (INCLUDING THIS PAGE)

As I mentioned during our phone conversation yesterday, I am sending you a fax copy of the results of an emission test conducted on a coal preparation plant thermal dryer provided by Dick Kerch of CONSOL. The table includes run by run emission rates and emission factors for several pollutants. Mr. Kerch said that CONSOL has conducted emission tests on eight thermal dryers over the past year and that they can provide at least the summaries of those tests. He can send similar summaries for all the tests right away, but it may take time for them to provide us with complete copies of the test reports.

The emission factors in the accompanying summary table are in units of mass (lb) emitted per heat input (millions of BTUs). In the current AP-42 section, the emission factors for coal cleaning are presented in units of mass emitted per mass of coal dried. According to in-house studies performed by CONSOL, emissions are more a function of heat input than tonnage dried because of large variations in the initial moisture content of the coal. Furthermore, Mr. Kerch stated that CONSOL may not have data on tonnage dried for the recent tests. He also suggested that the emission factor for VOC should take into account the volatile material content of the coal. In their February 16, 1993 response to the draft AP-42 section, the National Coal Association (NCA) also recommended that emission factors be expressed in units of mass emitted per heat input for all pollutants except PM and VOC, for which they recommended units of mass emitted per mass of coal dried. I am also faxing a copy of NCA's comments

I checked the emission test reports in the background file and none of them include data on heat input for the tests, so they would not be usable if we were to express factors in units of mass emitted per heat input.

IMAL DRYER EMISSION MEASUREMENTS

Post-it™ brand fax transmittal memo 7671 # of pages 1

To *RICK MARINSHAW* From *FLK/reh*

Co. *MRI* Co. *CONSOL*

Dept. *RTP, NC* Phone *(412) 831-4527*

Fax # *(919) 677-0065* Fax #

| | 8/94 | 10/18/94 | 10/19/94 | 10/19/94 | 10/20/94 | 10/20/94 | 10/20/94 | AVG | SDEV | PRSD |
|-------------------------------------|-------|----------|----------|----------|----------|----------|----------|-------|-------|-------|
| STACK GAS PARAMETERS: | | | | | | | | | | |
| Gas Flow, DSCFM | 66796 | 66796 | 69400 | 67400 | 66800 | 66800 | 66800 | 67599 | 1234 | 1.8% |
| Firing Rate, lb/hr | 4527 | 4527 | 4611 | 4341 | 4187 | 4187 | 4187 | 4417 | 190 | 4.3% |
| Firing Rate, lb/MM Btu | 64.0 | 64.0 | 65.1 | 61.3 | 59.1 | 59.1 | 59.1 | 62.4 | 2.7 | 4.3% |
| CO ₂ % | 2.8 | 2.8 | 2.7 | 2.6 | 2.5 | 2.5 | 2.5 | 2.7 | 0.1 | 4.9% |
| O ₂ % | 17.6 | 17.6 | 17.7 | 17.8 | 17.9 | 17.9 | 17.9 | 17.8 | 0.1 | 0.7% |
| PARTICULATE EMISSIONS: | | | | | | | | | | |
| Grains/dscf | 0.021 | | 0.024 | 0.027 | 0.022 | 0.022 | 0.022 | 0.024 | 0.009 | 11.3% |
| lb/hr | 11.8 | | 14.6 | 15.7 | 12.6 | 12.6 | 12.6 | 13.7 | 1.8 | 13.1% |
| lb/MM Btu | 0.18 | | 0.22 | 0.26 | 0.21 | 0.21 | 0.21 | 0.22 | 0.03 | 13.5% |
| CO EMISSIONS: | | | | | | | | | | |
| ppmv | 449 | | 404 | 406 | 400 | 400 | 407 | 413 | 20 | 4.9% |
| lb/hr | 130 | | 123 | 120 | 118 | 118 | 120 | 122 | 5 | 3.9% |
| lb/MM Btu | 2.03 | | 1.89 | 1.96 | 1.99 | 1.99 | 1.96 | 1.97 | 0.05 | 2.6% |
| NOx EMISSIONS: | | | | | | | | | | |
| ppmv | 75 | 46 | 60 | | 59 | 59 | | 60 | 11 | 19.1% |
| lb/hr | 35 | 22 | 29 | | 28 | 28 | | 28 | 5 | 19.0% |
| lb/MM Btu (O ₂ based) | 0.55 | 0.35 | 0.47 | | 0.47 | 0.47 | | 0.46 | 0.09 | 18.7% |
| SO₂ EMISSIONS: | | | | | | | | | | |
| ppmv | 179 | | 171 | 172 | 157 | 157 | | 170 | 9 | 5.4% |
| lb/hr | 118 | | 118 | 115 | 105 | 105 | | 114 | 6 | 5.4% |
| lb/MM Btu (O ₂ based) | 1.84 | | 1.82 | 1.88 | 1.78 | 1.78 | | 1.83 | 0.04 | 2.3% |
| Estimated Removal, % | 11.3 | | 12.8 | 9.6 | 13.6 | 13.6 | | 11.8 | 1.8 | 14.9% |
| TOTAL VOC EMISSIONS: | | | | | | | | | | |
| ppmv | 9.6 | | 9.8 | 11.7 | 9.7 | 9.7 | | 10.1 | 0.9 | 8.7% |
| lb/hr | 4.4 | | 4.7 | 5.4 | 4.5 | 4.5 | | 4.7 | 0.4 | 8.4% |
| lb/MM Btu (O ₂ based) | 0.06 | | 0.07 | 0.08 | 0.08 | 0.08 | | 0.07 | 0.01 | 12.1% |
| NON - METHANE VOC EMISSIONS: | | | | | | | | | | |
| ppmv | 9.6 | | 9.8 | 11.7 | 9.7 | 9.7 | | 10.1 | 0.9 | 8.7% |
| lb/hr | 4.4 | | 4.7 | 5.4 | 4.5 | 4.5 | | 4.7 | 0.4 | 8.4% |
| lb/MM Btu (O ₂ based) | 0.06 | | 0.07 | 0.08 | 0.08 | 0.08 | | 0.07 | 0.01 | 12.1% |

01/30/95

O:VAPRES/STACK USE-SUMM



March 8, 1993

Mr. Neville Holt
Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, California 94304

Dear Mr. Holt:

Thank you for the information you provided in a telephone conversation with me on February 26, 1993. Enclosed are two copies of a contact report summarizing the information discussed.

The information that you provided will be used in preparing a revised section on coal conversion for the publication Compilation of Air Pollutant Emission Factors, otherwise known as AP-42. To ensure the accuracy of the information, please review the enclosed report and mark any changes you believe are necessary to make the information accurate, complete, and nonconfidential. Return to me one copy that you have signed and dated, and retain one copy for your records. A final version of the report, incorporating any changes you request, will be placed in the background file for the AP-42 section. If we have not received a response from you by March 24, 1993, the report will be considered final and nonconfidential and will be placed in the project files that will be made available to the public.

Thank you for your review of this report. If you have any questions, please call me at (919) 677-0249, extension 5359.

Sincerely,

A handwritten signature in black ink, appearing to read "Richard Marinshaw", written in a cursive style.

Richard Marinshaw
Environmental Engineer

Enclosures

CONTACT REPORT--MRI Project No. 3612

From: Richard Marinshaw, Environmental Engineering
Department

Date of Contact: February 26, 1993

Contacted by: Telephone

Company/Agency: Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, California 94304

Telephone Number: (415) 855-2503

Person(s) Contacted/Title(s)

Neville Holt

CONTACT SUMMARY:

Mr. Holt was contacted for information on coal gasification. Mr. Holt stated that only three coal gasification plants currently are in operation in the United States. These plants are located in Louisiana, Tennessee, and North Dakota. However, many new coal gasification plants are under design through the Department of Energy's Clean Coal Demonstration Project.

The Electric Power Research Institute (EPRI) has conducted research on emissions from coal gasification processes. The results of this research are included in two reports (GS-6806 and AP-5931), which can be obtained through EPRI's distribution center (Telephone: [510] 934-4212).