



EASTERN RESEARCH GROUP, INC.

MEMORANDUM

TO: Roy Huntley, U.S. EPA/EFIG (D205-01)
FROM: Eric Goehl and Clint Burklin, ERG, Inc.
DATE: September 23, 2002
SUBJECT: Recommended Source Categories for AP-42 chapter update and emission test program

1.0 INTRODUCTION AND SCOPE

The major purposes of this memorandum is to recommend which AP-42 source categories could be revised based on the availability of new $PM_{2.5}$ and condensible PM emission test data. The second purpose is to recommend which source categories would be good candidates for future emission testing programs. Information on the availability of test data was collected through telephone calls to public and private institutions that were believed to have test data on the most significant sources of emissions in the U.S.

2.0 BACKGROUND

Attachment A contains a memorandum that was developed early in this assignment, identifying the source categories that are prime candidates for an AP-42 update focused on $PM_{2.5}$ and condensible PM. The memorandum identified source categories that were high temperature combustion sources, top emitting sources of PM and pollutants likely to contribute to condensible PM (NO_x , SO_x , and VOC), and were inadequately covered in the current edition of AP-42.

3.0 TEST DATA SEARCH

The list of prime candidate sources for an AP-42 update became the focus of a test data search among public and private institutions likely to have collected PM_{2.5} and condensible PM test data. Each of the contacts were asked a series of questions about available emission test data for this list of candidate sources. The information obtained from each phone call was documented in telephone conference call memorandums which are included in Attachment B. Note that the contacts were asked to summarize their available data as best they could remember. Therefore, there are not always specific details available for the data they have collected.

The information documented in the telephone conference call memorandums were assembled into Table C (presented in Attachment C). For each source category, Table C contains the organization's name that has test data, the approximate number tests conducted, the pollutants tested and the test methods used.

4.0 RECOMMENDATIONS

Table 1 summarizes the available PM_{2.5} and condensible PM test data, and recommends source categories for updating AP-42. The top four source categories in this table contain sufficient amounts of data to revise the applicable AP-42 section. Each row of the table contains a separate source category and identifies how the source category ranks nationally for PM, NO_x, SO_x, and VOC emissions combined. The table also contains the total number of tests identified for PM_{2.5}, condensibles and PM_{2.5} total. The comment column indicates any additional information to consider when a decision is made about updating the AP-42 section.

Coal-fired boilers rank in the top 5 highest emitting sources in the nation for PM, NO_x, SO_x, and VOC. This is a good indicator that this source is a significant national source of PM_{2.5} and condensible PM. There are 620 separate tests for coal-fired boilers that were identified for PM_{2.5} and condensible PM data. Additional information documented in the "Comments" column state that the coal-fired boilers data contains 150 tests that would require a significant amount of work on EPA's part to obtain usable data. The Pennsylvania contact stated that someone would need to visit their office and go through all the reports and in some cases calculate PM data to obtain size fractions information.

Table 1 - Recommendations Table for AP-42 Update

Source Category	AP-42 Section	Contribution to Nat'l emissions	Approximately how many separate tests?	Test Report Available?			Comment
				PM2.5	Condensibles	PM2.5-total	
Boiler - coal-fired	Sections 1.1, 1.7	Top 5	620	200	420	0	Information gathered did not distinguish coal type; significant effort needed to pull data together 150 tests from PA.
Boiler - gas-fired	Section 1.4	Top 15	100	0	90	10	
Fiberglass manufacturing	Section 11.13	Top 10	50	0	50	0	Significant effort needed to pull data together 50 tests from Oregon and PA.
Process heaters - gas-fired	No designed section	Top 25	50	0	40	10	Significant effort needed to pull data together 20 tests from Oregon and NJ.
Catalytic cracking units	Section 5.1	Top 20	30	0	20	10	Significant effort needed to pull data together 10 tests from Oregon and PA.
Glass manufacturing	Section 11.15	Top 20	30	0	30	0	
Boiler - oil-fired	Section 1.3	Top 10	25	3	21	1	
Cement kilns	Section 11.6	Top 15	20	3	17	0	Wet and dry processes not identified separately.
Ammonia production	Section 8.1	Top 25	10	0	10	0	Significant effort needed to pull data together 10 tests from PA.
Carbon black production	Section 6.1	Top 15	10	0	10	0	Significant effort needed to pull data together 10 tests from PA.
Commercial charbroiling	No designed section	Top ?	10	4	0	6	
Nitric acid production	Section 8.8	Top 25	10	0	10	0	Significant effort needed to pull data together 10 tests from PA.
Commercial frying	No designed section	Top ?	5	2	1	2	
Primary copper smelting	Section 12.3	Top 20	5	3	2	0	Significant effort needed to pull data together 2 tests from PA.
Grey iron foundries	Section 12.10	Top 20	3	0	3	0	Significant effort needed to pull data together 3 tests from PA.
Boiler - process gas-fired	Section 1.4	Top 15	2	0	1	1	
IC engines - natural gas	Section 3.2	Top 10	1	0	0	1	

The second recommended source category is gas-fired boilers, which has approximately 100 tests available and 90% of them were condensible PM data. Gas-fired boilers are ranked in the top 15 of highest national emitters.

The third recommended category is fiberglass manufacturing, which has 50 tests available and is in the top 10 of highest emitting source categories in the U.S. There was just condensible data identified for fiberglass manufacturing and no PM_{2.5} data. This data limitation may drop this source category from future updating and the available data may require significant effort to obtain. The fourth recommended source category for an AP-42 update is the process heaters. There are no factors in AP-42 for this source category, but AP-42 recommends using boiler factors as a default. However, for NSPS purposes, OAQPS determined that process heaters were sufficiently different from boilers that they were excluded from the boiler standards. Approximately 50 tests were identified for process heaters. Although consideration should be given whether to update this section since 20 of the 50 tests may require significant effort to obtain the data.

Table 2 lists the recommended sources for future emission testing programs. Table 2 contains 11 source categories where limited test data is available and for which AP-42 factors were of poor data quality. Each source category's national emissions rank based on total PM was added (when available) to the table to indicate how each source category contributes to national PM emissions. Diesel engines, process gas-fired boiler and refinery-gas-fired boilers were the top three sources in this table. This is due to these sources having the highest national PM emissions ranking; and because the process gas-fired boilers have virtually no emission factor data and the diesel engines have very poor quality emission factors.

5.0 ADDITIONAL FINDINGS

During the information gathering stage, ERG investigated the data collected for the Industrial Combustion Coordinated Rulemaking (ICCR) NESHAP. According to the ICCR project leader, the file of test reports for boilers, process heaters and incinerators contains approximately 1,800 reports. The project leader explained that these test reports were originally reviewed for toxic pollutant data, but not for PM or condensible PM. Therefore, it is not known whether the reports contain PM or condensible PM data. The EPA may decide to include the investigation of these reports in the next phase of the project.

Table 2 - Recommended Sources for Emission Testing

SCC Number	Nat'l PM Rank	SCC Description 1	SCC Description 3	SCC Description 6	Date of last AP-42 update?	Are emission factors available for these pollutants and what is the emission factor quality rating?					Date of Test data?
						PM	Total PM	Filter PM	Total Cond.	Size Fraction Curve	
20100101	9	Internal Combustion Engines	Electric Generation	Distillate Oil (Diesel)	Apr-00		C,-	C,-	C,-		2000
10200701	19	External Combustion Boilers	Refinery	Process Gas	This section references natural gas boilers						
10200704	19	External Combustion Boilers	Industrial	Process Gas	This section references natural gas boilers						
30300504	21	Industrial Processes	Primary Metal Production	Primary Copper Smelting							
30400301	24	Industrial Processes	Secondary Metal Production	Grey Iron Foundries	Jan-95		E,C/E			C,E	1975-81
30100504	ND	Industrial Processes	Chemical Manufacturing	Carbon Black Production	May-83*	C,C					1974-76
30102704	27	Industrial Processes	Chemical Manufacturing	Ammonia Nitrate Production	Jul-93*	A,B					1981
30100306	ND	Industrial Processes	Chemical Manufacturing	Ammonia Production							
30101301	ND	Industrial Processes	Chemical Manufacturing	Nitric Acid							
	ND			Residential charbroiling and frying							
	ND			Commercial charbroiling and frying							

NOTES:

<Jan 95 - indicates the factors where revised prior to the reformatting revisions in January 95.

ND = no PM data available to rank these source categories.

*AP-42 section was reformatted in 1/95

Factor ratings - the final rating is uncontrolled followed by controlled emission factors, for example (A,B) means the uncontrolled factor is rated A and the controlled factor rated B.

Factor ratings - a dash or blank cell indicates no data.

Factor ratings - (A, B/C) indicates an A rated uncontrolled factor with two controlled factors rated B and C.

Addition note of interest about the process heater data: since there is not a dedicated section in AP-42 for process heaters, EPA may have an interest in the process heater toxic data in the ICCR database. There is likely enough toxic data on process heaters to create a section in AP-42.

Attachment C

Telephone Summary

Attachment C - Telephone Summary (Continued)**Attachment C - Telephone Summary**

Source Category	Number of Test Reports	Pollutants Tested	Test Method	Availability of New Data	Contact Name/Organization	Comments/Observations
Ammonia production	<10 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data
Boiler - coal-fired	many units	Condensibles	EPA method 5 and 202	available	EPA EMAD - Ron Myers	Contact Robin Seagell (EPA) for the data
Boiler - coal-fired	1 unit	Condensibles	dilution	available Spring 2003	EPA ORD - Dean Smith	Test will be conducted end of year
Boiler - coal-fired	<100 units	Condensibles	EPA method 202	available with large effort	Minnesota - Stuart Arkley	Most data less than 5 years old
Boiler - coal-fired	5 units	Condensibles	EPA method 202	available	Missouri - Peter Yronwood	test data less than 10 years old, one boiler-coal-fired uses SCR
Boiler - coal-fired	12 units	Condensibles	EPA method 202	available	New Jersey - Mike Klein	Send someone to NJ to copy the reports
Boiler - coal-fired	190 units	Condensibles	EPA method 5 and 202	available in hardcopy	North Carolina - Mike Aldridge	All data only few years old, one process heater used SCR
Boiler - coal-fired	2 units	Condensibles	EPA method 5&5a	available	Oregon - Jack Herbert/Stephen Crane	Data can be e-mailed, mostly hardcopy goto Oregon, few SCR boiler-gas-fired
Boiler - coal-fired	150 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data
Boiler - coal-fired	3 units	Condensibles	dilution	available for process fee	SRI - Joe McCain/Bill Farthing	
Boiler - coal-fired (many coal types)	200 units	PM2.5 filterable	cascade impactors	available for process fee	SRI - Joe McCain/Bill Farthing	
Boiler - gas-fired	<100 units	Condensibles	EPA method 202	available with large effort	Minnesota - Stuart Arkley	Most data less than 5 years old
Boiler - natural gas	10 units	PM2.5 total	alternative dilution method	available Jan 04	DOE - Dan Gurney	
Boiler - natural gas	10 units	Condensibles	alternative dilution method	available Jan 04	DOE - Dan Gurney	
Boiler - natural gas-fired	5 units	Condensibles	EPA method 202	available	Missouri - Peter Yronwood	Test data less than 10 years old, one boiler-coal-fired uses SCR
Boiler - natural gas-fired	20 units	Condensibles	EPA method 5&5a	available	Oregon - Jack Herbert/Stephen Crane	Data can be e-mailed, mostly hardcopy goto Oregon, few SCR boiler-gas-fired
Boiler - oil-fired	1 unit	PM2.5 filterable	cascade impactors	test report received	EPA APPCD - Andy Miller	
Boiler - oil-fired	2 unit	PM2.5	EPA method 5	test report received	EPA APPCD - Andy Miller	Particle size distribution used
Boiler - oil-fired	1 unit	PM2.5 total	dilution	available June 03	EPA EMAD - Ron Myers	
Boiler - oil-fired	8 units	Condensibles	EPA method 5 and 202	available in hardcopy	North Carolina - Mike Aldridge	All data only few years old, one process heater used SCR
Boiler - oil-fired	12 units	Condensibles	EPA method 5&5a	available	Oregon - Jack Herbert/Stephen Crane	Data can be e-mailed, mostly hardcopy goto Oregon, few SCR boiler-gas-fired
Boiler - oil-fired	1 unit	Condensibles	dilution	available Spring 2003	EPA ORD - Dean Smith	Test will be conducted end of year

Attachment C - Telephone Summary (Continued)

Source Category	Number of Test Reports	Pollutants Tested	Test Method	Availability of New Data	Contact Name/Organization	Comments/Observations
Boiler - process gas-fired	1 unit	PM2.5 total	EPA method 5 and dilution	available online	GTI - Paul Drayton	Possibly SCR data
Boiler - process gas-fired	1 unit	Condensibles	EPA method 5 and dilution	available online	GTI - Paul Drayton	Possibly SCR data
Carbon black production	<10 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data
Catalytic cracking units	10 units	PM2.5 total	alternative dilution method	available Jan 04	DOE - Dan Gurney	
Catalytic cracking units	10 units	Condensibles	alternative dilution method	available Jan 04	DOE - Dan Gurney	
Catalytic cracking units	2 units	Condensibles	EPA method 202	available with large effort	Minnesota - Stuart Arkley	Most data less than 5 years old
Catalytic cracking units	4 units	Condensibles	NJ method 1	available	New Jersey - Mike Klein	Send someone to NJ to copy the reports
Catalytic cracking units	<10 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data
Cement kilns	5 units	Condensibles	EPA method 202	available	Missouri - Peter Yronwood	Test data less than 10 years old, one boiler-coal-fired uses SCR
Cement kilns	<20 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data
Cement kilns - coal	2 units	PM2.5 filterable	cascade impactors	available for process fee	SRI - Joe McCain/Bill Farthing	
Cement kilns - coke oven offgas	1 unit	PM2.5 filterable	cascade impactors	available for process fee	SRI - Joe McCain/Bill Farthing	
Cement manufacturing	1 unit	Condensibles	EPA method 5&5a	available	Oregon - Jack Herbert/Stephen Crane	Data can be e-mailed, mostly hardcopy goto Oregon, few SCR boiler-gas-fired
Commercial charbroiling	1 unit	PM2.5	cascade impactors	test report received	EPA APPCD - Paul Lemieux	Report completed in June 1999
Commercial charbroiling	2 units	PM2.5 total	dilution	test report received	Univ. of Stanford - Dr. Lynn Hildemann	
Commercial charbroiling	3 units	PM2.5 total	dilution	summary report received	Univ. of WI - Dr. Jamie Schauer	
Commercial charbroiling - electric	1 unit	PM2.5	SCAQMD method 5.1	test report received	CE CERT - Bill Welch	Report completed in July 1997
Commercial charbroiling - gas	2 units	PM2.5	SCAQMD method 5.1	test report received	CE CERT - Bill Welch	Report completed in July 1997
Commercial frying	1 unit	Condensibles	EPA method 5&5a	available	Oregon - Jack Herbert/Stephen Crane	Data can be e-mailed, mostly hardcopy goto Oregon, few SCR boiler-gas-fired
Commercial frying	2 units	PM2.5 total	dilution	test report received	Univ. of Stanford - Dr. Lynn Hildemann	
Commercial frying - electric	1 unit	PM2.5	SCAQMD method 5.1	test report received	CE CERT - Bill Welch	
Commercial frying - gas	1 unit	PM2.5	SCAQMD method 5.1	test report received	CE CERT - Bill Welch	
Fiberglass manufacturer	2 units	Condensibles	EPA method 5 and 202	available in hardcopy	North Carolina - Mike Aldridge	All data only few years old, one process heater used SCR
Fiberglass manufacturer	<50 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data

Attachment C - Telephone Summary (Continued)

Source Category	Number of Test Reports	Pollutants Tested	Test Method	Availability of New Data	Contact Name/Organization	Comments/Observations
Glass manufacturing	1 unit	Condensibles	EPA method 202	available with large effort	Minnesota - Stuart Arkley	Most data less than 5 years old
Glass manufacturing	3 units	Condensibles	EPA method 202	available	Missouri - Peter Yronwood	Test data less than 10 years old, one boiler-coal-fired uses SCR
Glass manufacturing	2 units	Condensibles	EPA method 5 and 202	available in hardcopy	North Carolina - Mike Aldridge	All data only few years old, one process heater used SCR
Glass manufacturing	<25 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data
Grey iron foundries	3 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data
IC Engine - natural gas	1 unit	PM2.5 total	dilution	test report received	CA Energy Commission - Guido Franco	SCR with CO catalyst
Nitric acid production	1 unit	Condensibles	EPA method 202	available	Missouri - Peter Yronwood	Test data less than 10 years old, one boiler-coal-fired uses SCR
Nitric acid production	<10 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data
Primary Cu smelt	2 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data
Primary Cu smelt - natural gas fired converters	3 units	PM2.5 filterable	cascade impactors	available for process fee	SRI - Joe McCain/Bill Farthing	
Process heater - gas-fired	12 units	Condensibles	EPA method 202	available	New Jersey - Mike Klein	Send someone to NJ to copy the reports
Process heaters - gas-fired	1 unit	PM2.5 total	EPA method 5 and dilution	available online	GTI - Paul Drayton	Possibly SCR data
Process heaters - gas-fired	25 units	Condensibles	EPA method 202	available with large effort	Minnesota - Stuart Arkley	Most data less than 5 years old
Process heaters - gas-fired	1 unit	Condensibles	EPA method 5&5a	available	Oregon - Jack Herbert/Stephen Crane	Data can be e-mailed, mostly hardcopy goto Oregon, few SCR boiler-gas-fired
Process heaters - gas-fired	<10 units	Condensibles	EPA method 202	available	Pennsylvania - Greg Parrish	Significant effort to pull together the data, possibly SCR data
Process heaters - refinery gas	10 units	PM2.5 total	alternative dilution method	available Jan 04	DOE - Dan Gurney	
Process heaters - refinery gas	10 units	Condensibles	alternative dilution method	available Jan 04	DOE - Dan Gurney	