EMISSION FACTOR DOCUMENTATION FOR AP-42 SECTION 12.5.1, IRON AND STEEL PRODUCTION

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Emission Factor Documentation for AP-42 Section 12.5
Iron and Steel Production

1.0 Introduction

The EPA publishes emission factors in its Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources, EPA Publication No. AP-42 (AP-42). The document has been published since 1968 as the primary compilation of EPA's emission factor information. Federal, state, and local agencies, consultants, and industry use the document to identify major contributors of atmospheric pollutants, develop emission control strategies, determine applicability of permitting programs, and compile emission inventories for ambient air impact analyses and State Implementation Plans (SIPs). Volume I is published by the Emission Factor Inventory Group (EFIG) in EPA's Office of Air Quality Planning and Standards (OAQPS). The OAQPS is located in Research Triangle Park, NC.

The purpose of this background report is to provide technical documentation supporting the revisions to AP-42 Section 12.5, Iron and Steel Production. The AP-42 section described in this report updates the section published in October 1986. This document focuses on the data gathered for non-integrated facilities, commonly known as "minimills."

2.0 Data Gathering Effort

An initial scoping study was conducted to assess new information and data that could be used to update the existing section. Several potential sources of information were analyzed, including the Background Information Document (BID) for the proposed NESHAP for Integrated Iron and Steel Plants, the *Air Pollution Engineering Manual - Second Edition*, and PM data for iron production and sinter plants developed by the International Institute for Applied Systems Analysis in their RAINS PM module. None of these sources were found to provide data that could be used to update the existing section. A copy of the scoping study is given as an attachment to this background document.

In addition to the sources investigated during the initial scoping study, several state and local air pollution control agencies were contacted regarding the availability of source test data for iron and steel production facilities. The agencies contacted were primarily chosen based on a survey of the locations of existing minimills from the EPA's RACT/BACT/LAER Clearinghouse. The following agencies were contacted:

- Alabama Department of Environmental Management
- Arkansas Department of Environmental Quality
- Canton (OH) City Health Department
- Hamilton County (OH) Department of Environmental Services
- Indiana Department of Environmental Management
- Iowa Department of Natural Resources
- Kentucky Department for Environmental Protection

- North Carolina Department of Environment and Natural Resources
- Ohio Environmental Protection Agency
- Oregon Department of Environmental Quality
- Pennsylvania Department of Environmental Protection
- South Carolina Department of Health and Environmental Control
- Virginia Department of Environmental Quality
- Wisconsin Department of Natural Resources.

Stack test data were received from facilities in Alabama, Indiana, Iowa, Kentucky, Oregon, South Carolina, and Virginia. The names and locations of these facilities are listed in Table 2-1, along with the database Facility ID, which will be discussed in Section 4 below.

3.0 Review of Data

All of the source test data references that were gathered for minimills are listed at the end of this section. Each reference was screened to determine whether it could be used in updating the section. In the review of available references, emissions data were accepted if:

sufficient information about the facility and any pollution control devices was known,
emissions levels were measured by a current test method,
emission test results were reported in appropriate units, and
sufficient data existed to characterize operating conditions during testing.

A brief description of each reference that was gathered for the revision of Section 12.5, including the process and pollutants tested, is given in Table 3-1. Following Table 3-1 is a complete list of all of the references.

Table 2-1. Summary of Facilities

Facility ID	Facility Name	City	State
1	Cascade Steel Rolling Mills	McMinnville	OR
2	IPSCO Montpelier Works	Muscatine	IA
3	Oregon Steel Mills	Portland	OR
4	IPSCO Steel	Mobile	AL
5	Tuscaloosa Steel	Tuscaloosa	AL
6	Trico Steel	Decatur	AL
7	Roanoke Electric Steel	Roanoke	VA
9	Gallatin Steel	Ghent	KY
10	Newport Steel	Newport	KY
11	Kentucky Electric Steel	Ashland	KY
12	Green River Steel	Owensboro	KY
13	Slater Steels - Fort Wayne Specialty Alloys Division	Fort Wayne	IN
14	Nucor Steel	Crawfordsville	IN
15	Steel Dynamics	Butler	IN
16	Qualitech Steel Corporation	Pittsboro	IN
17	Harrison Steel Castings	Attica	IN
18	Beta Steel	Portage	IN
19	SMI Steel	Cayce	SC
20	Nucor Steel	Darlington	SC
21	Nucor Steel	Huger	SC
22	Georgetown Steel	Georgetown	SC
23	Charter Steel	Saukville	WI
24	Timken Company – Faircrest Plant	Canton	OH
25	IPSCO Steel Alabama	Axis	AL
26	North Star Steel	Wilton	IA
27	Nucor Steel Utah Division	Plymouth	UT
28	Allegheny Ludlum	Brackenridge	PA
29	North Star Steel – St Paul	St Paul	MN
30	Timken Company – Harrison Plant	Canton	OH

Table 3-1. Summary of References Collected for the Revision of Section 12.5

Ref #	Database ID	Process tested	Pollutants Tested	Notes
1	13.1	EAF/AOD[a] vessel baghouse	PM (filterable, organic condensable, inorganic condensable)	PM inorganic data not included because Run 3 was negative
2	13.2	EAF baghouse, AOD baghouse, General exhaust baghouse, Passivation process	CO, NO_x, VOC, PM, HF	Throughput not given for passivation process
3	15.1	EAF/LMF[b] baghouse	PM, SO_2, NO_x, CO, VOC, CPM[c]	
4	15.2	EAF/LMF baghouse	SO_2, NO_x, VOC	
5	15.3	EAF baghouse, LMF baghouse	PM, CPM, SO_2, NO_x, CO, VOC	CO data thrown out due to spiking out of range during the testing; LMF PM data not used due to baghouse problems; SO_2 & NO_x emissions were not normal due to operational problems
6	15.4	EAF baghouse, LMF baghouse	PM, CPM, SO_2, NO_x, CO	
7	15.5	EAF baghouse, LMF baghouse	SO_2, NO_x	
8	17.1	EAF baghouse	PM, CO	
9	16.1	EAF baghouse	PM	Avg. throughput during testing given in IDEM[d] memo
10	16.2	EAF baghouse, Vacuum tank degasser boiler, reheat furnace	SO_2, NO_x, Lead, VOC, CO	Heat input throughput not given for vacuum tank degasser boiler
11	14.1	Melt shop baghouse, Roller hearth furnace, Acid regeneration, HCl pickle line, Cold reversing mill	PM, NO_x, CO, SO_2, VOC, HCl	Throughput given for melt shop baghouse only
12	14.2	Melt shop baghouse, Pickle line, Acid regeneration	PM, CO	Throughput given for melt shop baghouse only

Ref #	Database ID	Process tested	Pollutants Tested	Notes
13	14.3	Annealing furnace	NO_x	Avg. throughput during testing given in IDEM memo
14	14.4	Melt shop baghouse, Pickle line, Acid regeneration	PM, CO	Throughput given for melt shop baghouse CO test only
15	14.5	Melt shop baghouse, Acid regeneration	PM, HCl	Avg. throughput during melt shop PM testing given in IDEM memo
16	14.6	Melt shop baghouse, Pickle line	PM, CO	
17	14.7	Melt shop baghouse, Pickle line, Acid regeneration	PM, CO	Throughput given for melt shop baghouse only
18	14.8	Melt shop baghouse, Pickle line, Acid regeneration	PM, CO	
19		Melt shop baghouse	PM	This report was not used because it is unclear if the emissions include condensable particulate; test report and IDEM memo do not match
20	14.9	Melt shop baghouse, Pickle line, Acid regeneration	PM, HCl, CO	Throughput given for melt shop baghouse only
21		Cold reversing mill	PM	This report was not used because it is unclear if the emissions include condensable particulate
22	14.11	Annealing furnace	NO_x, CO	
23	14.11	Annealing furnace	NO_x, CO	
24	14.11	Annealing furnace	NO_x, CO	
25	14.10	Annealing furnace	NO_x, CO	
26	14.12	Melt shop baghouse	PM	Avg. throughput during testing given in IDEM memo
27	18.1	Reheat furnace	NO_x	
28	18.2	Reheat furnace, Melt shop baghouse	CO, NO_x, SO_2, VOC, PM	

Ref #	Database ID	Process tested	Pollutants Tested	Notes
29	18.3	Melt shop baghouse	CO, NO_x, SO_2, VOC, PM	
30	18.4	Melt shop baghouse	SO_2	
31	9.1	Melt shop baghouse	NO_x, SO_2	
32	9.2	Melt shop baghouse	NO_x, SO_2	
33	11.1	Melt shop baghouse	PM	
34	12.1	EAF baghouse	PM	Throughput not given
35	10.1	EAF baghouse	PM, SO_2, NO_x, CO, Lead	NO_x and CO numbers were not representative because manual oxygen lancing was being performed - the source was retested (reference #2); SO_2 numbers were reported as zero
36	10.2	EAF baghouse	SO_2, NO_x, CO	
37	3.1	EAF baghouse	PM, CO, NO_x, SO_2, VOC, Lead	SO_2 results may be slightly high due to excessive drift during the testing; the results are drift corrected
38	3.2	EAF baghouse	PM, CO, NO_x, SO_2, VOC, Lead	VOC emissions are estimated
39	2.1	Melt shop baghouse	PM, CPM, SO_2, NO_x, CO, VOC, Lead, Beryllium, Fluoride	
40	1.1 - 1.33	Melt shop baghouse, Melt shop roof monitor, Reheat furnaces, Billet cutting vent	CO, NO_x, PM, Lead, SO_2, VOC	Some data were not indicative of current operations
41	7.1 - 7.2	EAF baghouse	PM, SO_2, CO	
42	6.1 - 6.3	EAF baghouse	PM, SO_2, NO_x	Throughput given for SO_2 and NO_x tests only
43	4.1	EAF baghouse	PM, SO_2	
44	5.1	EAF baghouse	PM	Throughput not given
45	19.1 - 19.6	Melt shop baghouse	PM, NO_x, SO_2, CO	1/1/93 test - throughput not given

Ref #	Database ID	Process tested	Pollutants Tested	Notes
46	20	Melt shop baghouse, Reheat furnace	PM	1991 and 1992 tests - not enough information given either on process or throughput; 11/01 test - emissions given in gr/dscf only
47	21	Melt shop baghouse, Tunnel furnace	SO_2, NO_x, CO, VOC, Lead, PM	5/15/97 and 8/8/97 tunnel furnace tests have no information about control device; 12/1/98 test does not have enough information about the process; 1/8/01 Tunnel furnace test - unit not operated as designed due to excess air entering the furnace
48	22	Metallized briquetter, Reheat furnace, Lime handling baghouse, Melt shop baghouse, LMF baghouse, DRI[e] reformer		Lime handling baghouse has been eliminated; steel throughput not given for LMF baghouse tests
49	23	EAF baghouse	PM, CO	
50	25	EAF/LMF baghouse	PM, SO_2	
51	26	EAF baghouse	PM	
52	24	EAF Baghouse, Melt shop baghouse	PM, PM_{10}, PM Condensables, NO_X, CO, SO_2, Lead, VOC	
53	30	Melt shop baghouse	NO_X, CO	
54	27	EAF baghouse	PM, NO_X, CO, SO_2	
55	29	EAF baghouse	PM, NO_X, CO, SO_2	

[a] EAF: electric arc furnace. AOD: argon oxygen decarburization.
[b] LMF: ladle metallurgical furnace.
[c] CPM: condensable particulate matter.
[d] IDEM: Indiana Department of Environmental Management.
[e] DRI: direct reduced iron.

References for Update to Section 12.5

1. Performance Test Report PM10 Emissions Evaluation, Slater Specialty Steels, Ft. Wayne, Indiana. Prepared for Slater Specialty Steels, Ft. Wayne, IN. Prepared by FBT Testing and Environmental Services, West Chester, OH. December 1997.

2. Final Test Report Stainless Steel Processes, Slater Steels - Ft. Wayne Specialty Alloys Division, Ft. Wayne, Indiana. Prepared for Slater Steels, Ft. Wayne, IN. Prepared by FBT Testing and Environmental Services, West Chester, OH. July 1995.

3. Source Emissions Test Report for Triad Engineering, Inc. Performed at Steel Dynamics, Inc. Steel Processing Mill, Butler, IN, on the Twin Shell Electric Arc Furnace Baghouse Outlet-Exhaust Stack. Prepared for: Mr. Barry Smith, Triad Engineering, Inc., Fort Wayne, IN. G/SA Project No. 96-T-004. September 19 and 20, 1996.

4. Emission Test Report for Melt Shop Baghouse Stack. Prepared for: Steel Dynamics, Inc., Butler, IN. Dames & Moore Job No. 27892-006-140. September 18, 1997.

5. Source Emissions Test Report, Performed for Steel Dynamics, Inc., Butler, IN. Twin Shell Electric Arc Furnace Ladle Metallurgical Station. Prepared for: Mr. Barry Smith, Steel Dynamics, Inc., Butler, IN. G/SA Project No. 98-T-065. November 17-20, 1998.

6. Source Emissions Test Report, Performed for Steel Dynamics, Inc., Butler, IN. Twin Shell Electric Arc Furnace Ladle Metallurgical Station. Prepared for: Mr. Barry Smith, Steel Dynamics, Inc., Butler, IN. G/SA Project No. 99-T-069. February 2-3, 1999.

7. Source Emissions Test Report, Performed for Steel Dynamics, Inc., Butler, IN. Twin Shell Electric Arc Furnace Ladle Metallurgical Station Baghouse Outlets. Prepared for: Mr. Barry Smith, Steel Dynamics, Inc., Butler, IN. G/SA Project No. 01-T-136. July 26, 2001.

8. Emissions Test Report, Particulate and Carbon Monoxide, for Harrison Steel Castings Company ARC Furnace Baghouse Stack, Attica, IN. September 24, 1992. ATEC Project No. 52-10-92-00022.

9. Report on Particulate Compliance Testing. Performed for: Qualitech Steel Corporation, Pittsboro, IN, Baghouse Stack. By SESCO on January 15, 1999. SESCO Project No. 011599.

10. Report on SO_2/NO_x/CO/PB/VOC Compliance Testing. Performed for: Qualitech Steel Corporation, Pittsboro, IN, EAF, VTD Boiler and Reheat Furnace Stacks. By SESCO on September 7-10 and 15, 1999. SESCO Project No. 090799.

11. Compliance Emission Testing for Particulate, Nitrogen Oxide, Carbon Monoxide, Sulfur Dioxide, Volatile Organic Carbon, and Hydrogen Chloride on the Melt Shop Baghouse, Roller Hearth Furnace, Acid Regeneration, HCL Pickle Line, and Cold Reversing Mill at Nucor Steel, Crawfordsville, IN. Test Date: July 17-20, 1990. ATI Job Number: 90T02010.

12. Source Sampling - Acid Regeneration Unit, Pickle Line, and EAF Baghouse. Nucor Steel, Crawfordsville, IN. February 21 through 24, 1995.

13. Source Sampling for NO_x Emissions, Annealing Furnace Outlet Stack. Nucor Steel, Crawfordsville, IN. May 23 and 24, 1995.

14. Source Sampling for CO Emissions, EAF Baghouse. Nucor Steel, Crawfordsville, IN. September 22, 1995.

15. Source Sampling for Particulate Emissions, EAF Baghouse. Nucor Steel, Crawfordsville, IN. November 28, 1995.

16. Source Sampling for Particulate, HCl, CO and Visible Emissions, Pickle Line and EAF Baghouse Inlet. Nucor Steel, Crawfordsville, IN. May 14-16, 1996.

17. Source Sampling for Particulate, HCl, CO and Visual Emissions, Baghouse, Acid Regeneration Unit, and Pickle Line. Nucor Steel, Crawfordsville, IN. October 8-9 and 11, 1996.

18. Source Sampling for Particulate, HCl, CO and Visible Emissions, Acid Regenerator, EAF Baghouse and Pickle Line. Permit No. CP-107-5235. Nucor Steel, Crawfordsville, IN. March 3-4, 1997.

19. Source Sampling for Particulate and Visible Emissions, EAF Baghouse. Permit No. CP-107-5235. Nucor Steel, Crawfordsville, IN. June 6, 1997.

20. Source Sampling for Particulate, HCl, CO and Visible Emissions, Acid Regenerator, EAF Baghouse and Pickle Line. Permit No. CP-107-5235. Nucor Steel, Crawfordsville, IN. September 30 - October 1-2, 1997.

21. Report on Particulate/PM10 Compliance Testing. Performed for: Nucor Steel, Crawfordsville, IN, RT Mill Baghouse Stack. By: RCP Environmental on March 31, 1998. RCP Project No.: 033198.

22. Report on NO_x and CO Emissions. Annealing Furnace #9. Performed for: Nucor Steel, Crawfordsville, IN. August 24, 2001.

23. Report on NO_x and CO Emissions. Annealing Furnace #13. Performed for: Nucor Steel, Crawfordsville, IN. August 24, 2001.

24. Report on NO_x and CO Emissions. Annealing Furnace #15. Performed for: Nucor Steel, Crawfordsville, IN. August 23, 2001.

25. Report on NO_x and CO Emissions. Annealing Furnace. Performed for: Nucor Steel, Crawfordsville, IN. June 6, 2001.

26. Report on Particulate Compliance Testing. Positive Pressure Baghouse. Performed for: Nucor Steel, Crawfordsville, IN. By: SESCO. October 31, 2001. SESCO Project No. 4214.

27. Gaseous Emission Compliance Study. Performed for Beta Steel Corporation at the Steel Reheat Furnace Stack. Portage, IN. January 21, 1993. Project No. 30317.

28. Report of Emissions Test. Beta Steel Corp - Portage, Indiana Plant. Plant ID No. 127-00036. Hot Strip Mill Slab Reheat Furnace Stack Selective Catalytic Reduction (SCR) Unit. November 4, 1999. Prepared for: Beta Steel Corp, Portage, IN. Prepared by: Industrial Environmental Management Consultants, Inc. Chesterton, IN and Ambient Air Services, Inc., Starke, FL. December 1999.

29. Source Emissions Test. Performed for Beta Steel Corporation, Portage, IN. Meltshop Baghouse Outlet, Portage, IN. November 13-14, 2000. G/SA Project No. 00-T-118. Prepared for: Mr. Joe Gazarkiewicz, Beta Steel Corporation, Portage, IN.

30. Source Emissions Test. Performed for Beta Steel Corporation, Portage, IN. Melt Shop Facility Baghouse Inlet, Slag Pit and Baghouse Outlet, Portage, IN. September 24-25, 2001. G/SA Project No. 01-T-141. Prepared for: Mr. Joe Gazarkiewicz, Beta Steel Corporation, Portage, IN.

31. Emissions Test Report for Sulfur Dioxide and Oxides of Nitrogen, Gallatin Steel Company, Ghent, KY (Permit Number F-96-009 Revision 1). May 4, 2000. Ambient Air Services, Inc., Starke, FL.

32. Emissions Test Report for Sulfur Dioxide and Oxides of Nitrogen, Gallatin Steel Company, Ghent, KY (Permit Number V-99-003). May 3, 2001. Ambient Air Services, Inc., Starke, FL.

33. Air Emissions Test Report, Total Particulate Matter Emissions, Harsell Positive Pressure Baghouse, Kentucky Electric Steel, Inc., Ashland, KY. Prepared for Kentucky Electric Steel, Inc., Ashland, KY. July 2000. Submitted by Environmental Quality Management, Inc., Cincinnati, OH. PN: 050163.0009.

34. Particulate Matter Emissions Evaluation, Melt Line Furnace Baghouse, Green River Steel, Owensboro, KY. Prepared for Green River Steel, Owensboro, KY. Prepared by FBT Testing & Environmental Services, West Chester, OH. August, 1999.

35. Air Emissions Test Report - Brandt Baghouse - Newport Steel Corporation, Newport, KY. Prepared for: Newport Steel Corporation, Newport, KY. PN 050101.0011. Prepared by: Environmental Quality Management, Inc. September 2000.

36. Air Emissions Test Report - Brandt Positive Pressure Baghouse - Newport Steel, Newport, KY. Prepared for: Newport Steel Corporation, Newport, KY. PN 050101.0013. Prepared by: Environmental Quality Management, Inc. November 2000.

37. Source Evaluation Report, Oregon Steel Mills, Portland, OR, Electric Arc Furnace Baghouse. December 27, 2000. Prepared for Oregon Steel Mills, Portland, OR by Michele R. Kinney & David R. Rossman, P.E. Project No. 1536.

38. Source Evaluation Report, Oregon Steel Mills, Portland, OR, Electric Arc Furnace Baghouse. November 7, 2001. Prepared for Oregon Steel Mills, Portland, OR by Michele R. Kinney & David R. Rossman, P.E. Project No. 1685.

39. Stack test reports for IPSCO Steel, Montpelier, IA. Testing conducted on November 17-19, 1998; April 30, 1999; January 9, 2002; March 6, 2003; April 30, 2003; July 9, 2003; October 9, 2003; March 3, 2004; April 28, 2004; July 13-15, 2004; October 21, 2004; April 28, 2005; and August 10, 2005. Received from Marnie Stein, Iowa Department of Natural Resources, Air Quality Bureau on September 11, 2006.

40. Stack test summary information and Title V permit for Cascade Steel Rolling Mills, Inc., McMinnville, OR. Testing conducted on August 9, 1991; May 20, 1994; March 3, April 6, August 1, September 13, and October 3, 1995; May 24 and October 22-23, 1996; May 15 and October 29-30, 1997; June 29, August 8, and October 8-9, 1998; April 15-16, October 21-22, and November 16, 1999; June 14, June 19, October 26-17, 2000; May 15-16 and October 30-31, 2001; February 26-27 and March 13, 2002. Received from Gary Andes, Oregon Department of Environmental Quality on April 30, 2002.

41. Stack test results memorandum and excerpts from test report for stack testing at Roanoke Electric Steel, Roanoke, VA. Testing conducted on April 9-10, 1992 and July 20-21, 1992. Received from Robina Jordan, Virginia Department of Environmental Quality.

42. Stack test report summary sheets for Trico Steel, Decatur, AL. Testing conducted on September 2, 1997; October 9, 1999; and October 24, 2000. Received from Doug Carr, Alabama Department of Environmental Management on April 10, 2002.

43. Stack test report summary sheets for IPSCO Steel, Mobile, AL. Testing conducted on October 2, 2001. Received from Doug Carr, Alabama Department of Environmental Management on April 10, 2002.

44. Stack test report summary sheets for Tuscaloosa Steel, Tuscaloosa, AL. Testing conducted on April 25, 2001. Received from Doug Carr, Alabama Department of Environmental Management on April 10, 2002.

45. Summary of stack test results for SMI Steel (formerly Owens Electric Steel - Cayce, SC). Testing conducted on February 3-4, April 1, and June 30, 1993; February 23-24, 1995; April 17-18, 1997; April 14, and 21-22, 1999; February 22-23 and July 11, 2001; May 20-21, 2002; and May 13-14, 2003. Received from Anthony Keeler, South Carolina Department of Health and Environmental Control on September 16, 2002.

46. Summary of stack test results for Nucor Steel (Darlington SC). Testing conducted on July 17, 1990; February 5-6, February 28, July 23, 1991; September 18, October 27, and December 10, 1992; November 2-3, 1994; February 15-16, 1995; February 25-26, 1997; February 23-24, 1999; January 16 and November 13-15, 2001. Received from Anthony Keeler, South Carolina Department of Health and Environmental Control on September 16, 2002.

47. Summary of stack test results for Nucor Steel (Huger SC). Testing conducted on May 14-15, August 5-8, and December 4, 1997; December 1, 1998; April 20 and May 15, 1999; January 8, February 27, and August 23-23, 2001. Received from Anthony Keeler, South Carolina Department of Health and Environmental Control on September 16, 2002.

48. Summary of stack test results for Georgetown Steel (Georgetown, SC). Testing conducted on March 27-28, 1990; June 3, June 6, November 13, and December 19 1991; June 2-3, 1992; June 23-24 and December 22, 1993; February 16-17, June 14-15, and December 13, 1995; June 20, 1996; April 17-18, and June 24-25, 1997; June 15 and December 8, 1998; April 12-13 and June 15-16, 1999; March 26 and June 19, 2001. Received from Anthony Keeler, South Carolina Department of Health and Environmental Control on September 16, 2002.

49. Stack test reports for Charter Steel (Saukville, WI). Testing conducted on March 31-April 2, 2003; and April 12-14, 2005. Received from William Hoden, MACTEC on September 7, 2006.

50. Stack reports for IPSCO Steel Alabama Inc. (Axis, AL). Testing conducted on October 2-3, 2001; September 24-25, 2002; and October 21-22, 2003.

51. Stack test report for North Star Steel (Wilton, IA). Testing conducted on August 17, 1999.

52. Stack test reports for The Timken Company – Faircrest Plant (Canton, OH). Testing conducted on March 3-4, 1998; January 22-30, 2002; and April 15-16, 2002.

53. Stack test reports for The Timken Company – Harrison Plant (Canton, OH). Testing conducted on July 18-19, 2001; and March 19-27, 2002.

54. Stack test reports for Nucor Steel Utah Division (Plymouth, UT). Testing conducted on March 5-6, 2001; March 7-8, 2002; and March 25-26, 2003.

55. Stack test reports for North Star Steel (St Paul, MN). Testing conducted on November 7, 2002; April 16, 2003; and September 29, 2003.

4.0 Emissions Database

The data that met acceptance criteria were entered into a database to facilitate the calculation of emission factors. The database consists of four tables, which are described in greater detail below.

Facility Data Table

This table contains information about the facilities, such as location and state agency contact. Each facility is assigned a unique Facility ID number. The fields in the table are as follows:

- *Facility ID* - unique ID number for each facility
- *Facility Name* - name of facility
- *City* - city where facility is located
- *State* - state where facility is located
- *Agency* - state agency that provided data for the facility
- *Agency Contact* - contact person at state agency
- *Agency Contact Phone* - phone number for state agency contact
- *Agency Contact Email* - email address for state agency contact
- *Facility Type* - integrated mill or minimill
- *Description* - brief description of facility
- *Capacity* - overall capacity of facility
- *Capacity Unit* - unit for capacity (ex. tons/year)
- *Data Source* - describes the source of the data
- *Notes* - any notes about the facility.

Source Description Table

Information about the different types of sources at each facility is contained in this table. The table contains the Facility ID, and each source at the facility is assigned a different Source ID number. The fields in the table are as follows:

- *Facility ID* - the facility ID for the source
- *Emission Source ID* - the ID number for the source
- *Unit Number* - if given, the unit number at the plant (for example “reheat furnace #3)
- *Source Cat ID* - the source classification number for the source. This links to the “Source Category Lookup” table.
- *Source Description* - a detailed description of the source
- *Burners* - information on any type of burners used by the source, if applicable
- *Lancing* - information on any type of lancing used by the source, if applicable
- *Control* - the type of control device used by the source
- *Control Notes* - notes on the control device.

Source Category Lookup

This is a lookup table used for assembling the data for various facilities that have similar processes. This table contains all of the distinct emission sources that were identified from the source test data. An example of a distinct type of source is "Annealing furnace, natural gas-fired, with low-NOx burners." The fields in the table are as follows:

- *Source Cat ID* - unique ID number for the source category
- *Source Category* - brief description of the source category
- *Processes* - description of the processes for the source category (for example, charging, tapping, etc.)
- *Notes* - any notes about the source category.

Test Data

All of the stack test data is contained in this table. The data is identified by a Facility ID, Source ID, and Test ID. The Test ID is unique to each source test but may be repeated in the table if multiple pollutants were tested during the same source test. The fields in the table are as follows:

- *Facility ID* - the facility ID for the test
- *Source ID* - the source ID for the test
- *Test ID* - the ID for the source test - note that this is in the format "3.1", with "3" being the facility ID
- *Pollutant* - the pollutant tested
- *Test Date* - the date of the test
- *Method* - the test method used
- *Throughput Run1* - the throughput during run 1 of the test
- *Throughput Run2* - the throughput during run 2 of the test
- *Throughput Run3* - the throughput during run 3 of the test
- *Throughput Avg* - the average throughput during the test
- *Throughput Unit* - the unit of the throughput (ex. lb/ton, lb/MMBtu)
- *Throughput Desc* - a description of the throughput (for example "of steel produced" or "heat input")
- *Airflow* - the average airflow during the test
- *Airflow Unit* - the unit of the average airflow
- *LbHr Run1* - emissions in units of lb/hr during run 1 of the test
- *LbHr Run2* - emissions in units of lb/hr during run 2 of the test
- *LbHr Run3* - emissions in units of lb/hr during run 3 of the test
- *LbHr Avg* - average emissions in units of lb/hr during the test
- *LbTon Run1* - emissions in units of lb/ton during run 1 of the test
- *LbTon Run2* - emissions in units of lb/ton during run 2 of the test
- *LbTon Run3* - emissions in units of lb/ton during run 3 of the test
- *LbTon Avg* - average emissions in units of lb/ton during the test
- *LbMMBtu Run1* - emissions in units of lb/MMBtu during run 1 of the test
- *LbMMBtu Run2* - emissions in units of lb/MMBtu during run 2 of the test
- *LbMMBtu Run3* - emissions in units of lb/MMBtu during run 3 of the test
- *LbMMBtu Avg* - average emissions in units of lb/MMBtu during the test

- *GrDscf Run1* - emissions in units of gr/dscf during run 1 of the test
- *GrDscf Run2* - emissions in units of gr/dscf during run 2 of the test
- *GrDscf Run3* - emissions in units of gr/dscf during run 3 of the test
- *GrDscf Avg* - average emissions in units of gr/dscf during the test
- *PPM Run1* - emissions in units of ppm during run 1 of the test
- *PPM Run2* - emissions in units of ppm during run 2 of the test
- *PPM Run3* - emissions in units of ppm during run 3 of the test
- *PPM Avg* - average emissions in units of ppm during the test
- *PPM Unit* - more specific unit for emissions in units of ppm (ppmv or ppmw for example)
- *O2 Run1* - the percent oxygen during run 1 of the test
- *O2 Run2* - the percent oxygen during run 2 of the test
- *O2 Run3* - the percent oxygen during run 3 of the test
- *Other Run1* - emissions in any miscellaneous units during run 1 of the test
- *Other Run2* - emissions in any miscellaneous units during run 2 of the test
- *Other Run3* - emissions in any miscellaneous units during run 3 of the test
- *Other Avg* - average emissions in "other" units during the test
- *Other Unit* - unit for "other" runs
- *Notes* - any notes about the testing, particularly any reasons for excluding the test data.

5.0 AP-42 Emission Factor Development

The emission factors developed for the revision of Section 12.5 are presented in Tables 5-1 through 5-9. These tables show the source, emission factor rating, emission factor, emission factor unit, the number of facilities and tests that were used in calculating the emission factor, and the database Test IDs for each of the tests. Emission factors that were based on tests done at greater than two facilities were given a "D" rating, while those based on tests done at two or fewer facilities were given an "E" rating. No emission factors were given a rating higher than "D" due to the small number of facilities represented. If multiple tests on the same process were conducted at a facility, these values were averaged to determine an average value for that facility/process. This value was then averaged with the average value(s) of similar processes at other facilities to determine the final emission factor.

Table 5-1. FILTERABLE PM EMISSION FACTORS FOR MINIMILLS

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	B	0.083	Lb/ton	9	17	7.1, 7.2, 10.1, 15.3, 17.1, 21.2, 21.4, 21.8, 23.1, 23.2, 24.2, 24.3, 26.1, 27.1, 27.2 (2 tests), 27.3
Ladle metallurgy Controlled by baghouse	E	0.0009	Lb/ton	1	1	15.4
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	B	0.053	Lb/ton	11	27	1.3 - 1.7, 2.1, 2.2, 2.14, 3.1, 3.2, 4.1, 11.1, 15.1, 16.1, 18.3, 19.1 - 19.4, 19.6, 19.7, 19.8, 19.9, 25.1, 29.1, 29.3
Electric arc furnace and continuous caster Charging, melting, slagging, tapping, continuous casting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	E	0.018	Lb/ton	1	6	22.6 - 22.8, 22.10, 22.13, 22.14

Table 5-1 (Continued).

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace, ladle metallurgy, and continuous caster Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	E	0.067	Lb/ton	2	9	14.1, 14.2, 14.5, 14.12, 20.1 - 20.5
Ladle heating and transfer and continuous casting Uncontrolled leaving roof monitor	E	0.12	Lb/ton	1	5	1.29 - 1.33
Metallized briquetter Controlled by scrubber	E	0.15	Lb/ton	1	5	22.1 - 22.5
Reheat furnace, natural gas-fired Uncontrolled	E	0.036	Lb/ton	1	5	22.1 - 22.5
Reheat furnace, natural gas-fired Controlled by SCR	E	0.0035	Lb/MMBtu	1	1	18.2
Cold reversing mill Controlled by high efficiency mist eliminator	E	0.021	Lb/ton	1	1	21.9
Billet cutting torches, natural gas-fired Uncontrolled	E	0.032	Lb/ton	1	1	1.26

[a] Unit of lb/ton is lb/ton of steel produced. Unit of lb/MMBtu is lb/MMBtu heat input.

Table 5-2. CONDENSABLE PM EMISSION FACTORS FOR MINIMILLS

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	D	0.073	Lb/ton	4	6	2.1, 2.2, 18.3, 24.3, 29.1, 29.3
Ladle metallurgy Controlled by baghouse	E	0.0039	Lb/ton	1	1	15.4

[a] Unit of lb/ton is lb/ton of steel produced.

Table 5-3. TOTAL PM (FILTERABLE + CONDENSABLE) EMISSION FACTORS FOR MINIMILLS

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	D	0.064	Lb/ton	4	6	2.2, 2.14, 15.3, 29.1, 29.3
Ladle metallurgy Controlled by baghouse	E	0.0054	Lb/ton	1	1	15.4
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	D	1.1	Lb/ton	2	2	15.1, 18.3

[a] Unit of lb/ton is lb/ton of steel produced.

Table 5-4. NO_X EMISSION FACTORS FOR MINIMILLS

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse without oxygen lancing and oxy-fuel burners	D	0.22	Lb/ton	4	7	13.2, 21.1, 21.2, 21.4, 21.8, 27.1, 29.2
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxygen lancing and oxy-fuel burners	E	0.31	Lb/ton	2	3	10.2, 15.4, 15.5
Ladle metallurgy Controlled by baghouse	E	0.011	Lb/ton	1	1	15.4
Argon oxygen decarburization vessel Controlled by baghouse	E	0.1	Lb/ton	1	1	13.2
Electric arc furnace and argon oxygen decarburization vessel Fugitive emissions, controlled by roof monitor exhausted to baghouse	E	0.002	Lb/ton	1	1	13.2

Table 5-4. (Continued)

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting Controlled by direct shell evacuation and roof canopy hood without oxygen lancing and oxy-fuel burners	D	0.27	Lb/ton	3	16	2.1, 2.2, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 3.1, 3.2, 3.3, 18.2, 18.3
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting Controlled by direct shell evacuation and roof canopy hood with oxygen lancing	E	0.48	Lb/ton	1	1	6.2
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting Controlled by direct shell evacuation and roof canopy hood with oxy-fuel burners	E	0.32	Lb/ton	1	3	19.5, 19.7, 19.8
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting Controlled by direct shell evacuation and roof canopy hood with oxygen lancing and oxy-fuel burners	C	0.30	Lb/ton	5	14	1.5 – 1.7, 1.11 – 1.16, 15.1, 15.2, 16.2, 24.3, 30.2

Table 5-4. (Continued)

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace, ladle metallurgy, and continuous caster Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with argon oxygen decarburization vessel	E	0.38	Lb/ton	1	1	14.1
Electric arc furnace, ladle metallurgy, and continuous caster Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxy-fuel burners and oxygen lancing	E	0.13	Lb/ton	1	2	9.1, 9.2
Direct reduced iron reformer Controlled by cyclone and scrubber	E	0.96	Lb/ton	1	1	22.12
Reheat furnace, natural gas-fired Controlled by SCR	E	0.085	Lb/MMBtu	1	2	18.1, 18.2
Reheat furnace, natural gas-fired Controlled by low NO_x burners	E E	0.068 0.19	Lb/ton Lb/MMBtu	1 3	1 5	21.5 1.18 - 1.20, 16.2, 21.5
Reheat furnace, natural gas-fired Controlled by ultra-low NO_x burners and flue gas recirculation	E	0.17	Lb/MMBtu	2	8	1.21 - 1.25, 2.1, 2.3, 2.4

Table 5-4. (Continued)

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Annealing furnace, natural gas-fired Uncontrolled	E	0.26	lb/MMBtu	1	1	14.3
Annealing furnace, natural gas-fired Controlled by low NO_x burners	E	0.085	lb/MMBtu	1	4	14.10, 14.11 (3 tests)
Tunnel furnace, natural gas-fired Controlled by low NO_x burners	E	0.072	lb/MMBtu	1	1	21.7

[a] Unit of lb/ton is lb/ton of steel produced. Unit of lb/MMBtu is lb/MMBtu heat input.

Table 5-5. CO EMISSION FACTORS FOR MINIMILLS

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse without oxygen lancing and oxy-fuel burners	C	1.6	Lb/ton	8	13	13.2, 15.1, 16.2, 17.1, 21.1, 21.2, 21.4, 21.8, 23.1, 23.2, 27.1, 27.3, 29.2
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxygen lancing and oxy-fuel burners	D	1.8	Lb/ton	3	3	7.1, 10.2, 15.4
Ladle metallurgy Controlled by baghouse	E	0.016	Lb/ton	1	1	15.4
Argon oxygen decarburization vessel Controlled by baghouse	E	0.6	Lb/ton	1	1	13.2
Electric arc furnace and argon oxygen decarburization vessel Fugitive emissions, controlled by roof monitor exhausted to baghouse	E	0.11	Lb/ton	1	1	13.2

Table 5-5. (Continued).

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse without oxygen lancing and oxy-fuel burners	D	2.1	Lb/ton	3	7	2.1, 2.2, 3.1, 3.2, 3.3, 18.2, 18.3
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxy-fuel burners	E	1.5	Lb/ton	1	1	19.5
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxy-fuel burners and oxygen lancing	E	3.8	Lb/ton	3	6	13.2, 17.1, 21.1, 21.2, 21.4, 21.8

Table 5-5. (Continued).

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace, argon oxygen decarburization, ladle metallurgy, and continuous caster Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	E	1.0	Lb/ton	1	7	14.1, 14.2, 14.4, 14.6 - 14.9
Reheat furnace, natural gas-fired Controlled by SCR	E	0.0006	Lb/MMBtu	1	1	18.2
Reheat furnace, natural gas-fired Controlled by low NO_x burners	E	0.021	Lb/MMBtu	1	2	1.18, 1.19
Reheat furnace, natural gas-fired Controlled by ultra-low NO_x burners and flue gas recirculation	E	0.00021	Lb/MMBtu	2	5	1.22, 1.25, 2.1, 2.3, 2.4
Annealing furnace, natural gas-fired Controlled by low NO_x burners	E	0.0018	Lb/MMBtu	1	4	14.10, 14.11 (3 tests)

[a] Unit of lb/ton is lb/ton of steel produced. Unit of lb/MMBtu is lb/MMBtu heat input.

Table 5-6. SO_2 EMISSION FACTORS FOR MINIMILLS

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse without oxygen lancing and oxy-fuel burners	D	0.09	Lb/ton	3	7	21.1 - 21.4, 21.8, 27.3, 29.2
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxygen lancing and oxy-fuel burners	D	0.10	Lb/ton	3	4	7.1, 10.2, 15.4, 15.5
Ladle metallurgy Controlled by baghouse	E	0.035	Lb/ton	1	2	15.4, 15.5
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse without oxygen lancing and oxy-fuel burners	D	0.36	Lb/ton	4	10	2.1, 2.2, 2.8, 2.9, 3.2, 3.3, 18.2 - 18.4, 25.1

Table 5-6. (Continued).

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxygen lancing	E	0.22	Lb/ton	2	2	4.1, 6.2
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxy-fuel burners	E	0.096	Lb/ton	1	1	19.5
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxygen lancing and oxy-fuel burners	D	0.38	Lb/ton	5	11	1.16, 1.17, 15.1, 15.2, 16.2 (3 tests), 24.1, 24.2, 24.3, 30.2

Table 5-6. (Continued).

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace, ladle metallurgy, and continuous caster Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with argon oxygen decarburization vessel	E	0.046	Lb/ton	1	1	14.1
Electric arc furnace, ladle metallurgy, and continuous caster Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxy-fuel burners	E	0.18	Lb/ton	2	4	9.1, 9.2, 19.7, 19.8
Direct reduced iron reformer Controlled by cyclone and scrubber	E	0.048	Lb/ton	1	1	22.12

[a] Unit of lb/ton is lb/ton of steel produced.

Table 5-7. LEAD EMISSION FACTORS FOR MINIMILLS

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse without oxygen lancing and oxy-fuel burners	E	0.00066	Lb/ton	2	5	21.1, 21.2, 21.4, 21.8, 24.3
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxygen lancing and oxy-fuel burners	E	0.0003	Lb/ton	1	1	10.1
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse without oxygen lancing and oxy-fuel burners	E	0.00039	Lb/ton	2	5	2.1, 2.2, 3.1, 3.2, 3.3
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxygen lancing and oxy-fuel burners	E	0.032	Lb/ton	1	1	16.2

[a] Unit of lb/ton is lb/ton of steel produced.

Table 5-8. VOC EMISSION FACTORS FOR MINIMILLS

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse without oxygen lancing and oxy-fuel burners	E	0.17	Lb/ton	2	5	13.2, 21.1, 21.2, 21.4, 21.8
Electric arc furnace Charging, melting, slagging, tapping Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxygen lancing and oxy-fuel burners	E	0.057	Lb/ton	1	1	15.3
Ladle metallurgy Controlled by baghouse	E	0.0033	Lb/ton	1	1	15.3
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse without oxygen lancing and oxy-fuel burners	D	0.16	Lb/ton	3	6	2.1, 2.2, 3.1, 3.3, 18.2, 18.3
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse with oxygen lancing and oxy-fuel burners	D	1.4	Lb/ton	6	8	1.16, 15.1, 15.2, 16.2, 19.7, 19.8, 24.3, 30.2

Table 5-8. (Continued).

Source	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace, argon oxygen decarburization, ladle metallurgy, and continuous caster						
Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, continuous casting						
Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	E	24	Lb/ton	1	1	14.1

[a] Unit of lb/ton is lb/ton of steel produced.

Table 5-9. OTHER EMISSION FACTORS FOR MINIMILLS

Source	Pollutant	EMISSION FACTOR RATING	Emission Factor	Unit[a]	Number of Facilities	Number of Tests	Test IDs
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	Beryllium	E	7.4 E-08	Lb/ton	1	1	2.1
Electric arc furnace and ladle metallurgy Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting Controlled by direct shell evacuation and roof canopy hood exhausted to baghouse	Fluoride	E	0.075	Lb/ton	2	3	2.1, 24.1, 24.3

[a] Unit of lb/ton is lb/ton of steel produced.

6.0 Speciated PM Data

One objective of the revision to Section 12.5 was to obtain speciated PM data. However, the data gathering effort found that only a limited amount of speciated PM data was available. A total of five tests with speciated PM data were found; of those tests, four are for PM-10. Because of the limited data, these numbers were not incorporated into the revised section; for informational purposes only, they are shown in Table 6-1.

Table 6-1. Speciated PM Data

Test ID	Facility	Source	Pollutant	Average Lb/ton
7.1	Roanoke Electric Steel	EAF with oxy-fuel burners and oxygen lancing, controlled by baghouse	PM-3.5	0.12
13.1	Slater Steels - Fort Wayne Specialty Alloys Division	EAF and AOD vessel, controlled by baghouse	PM-10 filterable + condensable	1.0
			PM-10 filterable	0.088
			PM-10 organic condensable	0.67
15.3	Steel Dynamics	EAF with oxy-fuel burners and oxygen lancing, controlled by baghouse	PM-10 condensable	0.035
2.2	IPSCO Montpelier Works	EAF Baghouse	PM-10 filterable	0.017
2.14	IPSCO Montpelier Works	EAF Baghouse	PM-10 filterable	0.043
2.2	IPSCO Montpelier Works	EAF Baghouse	PM-10 filterable + condensables	0.15
2.14	IPSCO Montpelier Works	EAF Baghouse	PM-10 filterable + condensables	0.16