

AP-42
FIFTH EDITION
JANUARY 1995

COMPILED OF AIR POLLUTANT EMISSION FACTORS

VOLUME I: STATIONARY POINT AND AREA SOURCES

Office Of Air Quality Planning And Standards
Office Of Air And Radiation
U. S. Environmental Protection Agency
Research Triangle Park, NC 27711

January 1995

AP-42
MORTICHTHIN
2021 TRAUMA

This report has been reviewed by the Office Of Air Quality Planning And Standards, U. S. Environmental Protection Agency, and has been approved for publication. Any mention of trade names or commercial products is not intended to constitute endorsement or recommendation for use.

COMPREHENSIVE
Emissions Inventory
Methodology
AP-42
Fifth Edition
Volume I

VOLUME I
STATIONARY POINT
AND AREA SOURCES

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

NOTICE

The Emission Factor And Inventory Group (EFIG) has been working for several months on this Fifth Edition of AP-42. It is the result of a major technical undertaking by EFIG's AP-42 Team and the several contractors who assisted. This document represents a substantial step toward complying with Section 130 of the *Clean Air Act Amendments Of 1990*, which direct the U. S. Environmental Protection Agency to review and revise its air pollutant emission factors every three years. Although such updating is required only for ozone-related pollutants (total organic compounds, oxides of nitrogen, and carbon monoxide), the AP-42 Team has also addressed the other criteria pollutants, hazardous pollutants, global warming gases and speciation information, where data are available. Sections of AP-42 are continuously being developed, reviewed and/or updated.

Even though there are significant additions and improvements in this book, many data gaps and uncertainties still exist. All readers and users of AP-42 are asked to provide comments, test data, and any other information for our evaluation and possible use to improve future updates.

Users familiar with this document may notice changes in factor quality ratings, specifically that some factors, although unchanged or supported by even newer and more extensive data, are rated lower in quality than previously in the AP-42 series. This is attributable to the adoption of more consistent and stringently applied rating criteria. There are some factors in this edition with lower ratings than previously, but they are believed to represent appropriate estimates. AP-42 emission factors are truly for estimation purposes and are no substitute for exact measurements taken at a source.

Users should especially note this edition's expanded "Introduction", for its information on pollutant definition, factor limitations, the factor rating system, and cautionary notes on the use of factors for anything other than emission estimation and inventory and approximation purposes.

In addition to print, the AP-42 series is available in several other media. The *Air CHIEF* compact disc (CD-ROM), with AP-42 and other hazardous air pollutant emission estimation reports and data bases, can be purchased from the Government Printing Office. Also, *The CHIEF* electronic bulletin board (by modem, 919-541-5742) posts the latest AP-42 and other reports and tools before they are available on paper. Final sections of AP-42 can be obtained quickly from our automatic *Fax CHIEF* service (919-541-5626 or -0548). These last two media operate 24 hours per day, 7 days per week. If you have questions or need further information on these tools or other aspects of emission estimation, call our help line, *Info CHIEF*, at 919-541-5285, during regular office hours, eastern time.

If you have factor needs, new data, questions, or suggestions, please send them to the address below. You may also ask for a free subscription to *The CHIEF*, our quarterly newsletter (also on the electronic bulletin board and *Fax CHIEF*). Our abilities to respond to individual questions often get impinged by time and resource constraints and the sheer volume of requests, so please use the above capabilities and tools whenever possible. Though we are a client-oriented organization, we have neither staff nor structure to provide engineering support.

AP-42 Team (MD 14)
Emission Factor And Inventory Group
Emissions, Monitoring, And Analysis Division
Office Of Air Quality Planning And Standards
U. S. Environmental Protection Agency
Research Triangle Park, NC 27711

AP-42 TABLE OF CONTENTS

Page	
INTRODUCTION	1
1. EXTERNAL COMBUSTION SOURCES	1.0-1
1.1 Bituminous And Subbituminous Coal Combustion	1.1-1
1.2 Anthracite Coal Combustion	1.2-1
1.3 Fuel Oil Combustion	1.3-1
1.4 Natural Gas Combustion	1.4-1
1.5 Liquefied Petroleum Gas Combustion	1.5-1
1.6 Wood Waste Combustion In Boilers	1.6-1
1.7 Lignite Combustion	1.7-1
1.8 Bagasse Combustion In Sugar Mills	1.8-1
1.9 Residential Fireplaces	1.9-1
1.10 Residential Wood Stoves	1.10-1
1.11 Waste Oil Combustion	1.11-1
2. SOLID WASTE DISPOSAL	2.0-1
2.1 Refuse Combustion	2.1-1
2.2 Sewage Sludge Incineration	2.2-1
2.3 Medical Waste Incineration	2.3-1
2.4 Landfills	2.4-1
2.5 Open Burning	2.5-1
2.6 Automobile Body Incineration	2.6-1
2.7 Conical Burners	2.7-1
3. STATIONARY INTERNAL COMBUSTION SOURCES	3.0-1
3.1 Stationary Gas Turbines For Electricity Generation	3.1-1
3.2 Heavy-duty Natural Gas-fired Pipeline Compressor Engines	3.2-1
3.3 Gasoline And Diesel Industrial Engines	3.3-1
3.4 Large Stationary Diesel And All Stationary Dual-fuel Engines	3.4-1
4. EVAPORATION LOSS SOURCES	4.0-1
4.1 Dry Cleaning	4.1-1
4.2 Surface Coating	4.2-1
4.2.1 Nonindustrial Surface Coating	4.2.1-1
4.2.2 Industrial Surface Coating	4.2.2-1
4.2.2.1 General Industrial Surface Coating	4.2.2.1-1
4.2.2.2 Can Coating	4.2.2.2-1
4.2.2.3 Magnet Wire Coating	4.2.2.3-1
4.2.2.4 Other Metal Coating	4.2.2.4-1
4.2.2.5 Flat Wood Interior Panel Coating	4.2.2.5-1
4.2.2.6 Paper Coating	4.2.2.6-1
4.2.2.7 Polymeric Coating Of Supporting Substrates	4.2.2.7-1
4.2.2.8 Automobile And Light Duty Truck Surface Coating Operations	4.2.2.8-1
4.2.2.9 Pressure Sensitive Tapes And Labels	4.2.2.9-1
4.2.2.10 Metal Coil Surface Coating	4.2.2.10-1
4.2.2.11 Large Appliance Surface Coating	4.2.2.11-1

4.2.2.12	Metal Furniture Surface Coating	4.2.2.12-1
4.2.2.13	Magnetic Tape Manufacturing	4.2.2.13-1
4.2.2.14	Surface Coating Of Plastic Parts For Business Machines	4.2.2.14-1
4.3	Waste Water Collection, Treatment And Storage	4.3-1
4.4	Polyester Resin Plastic Products Fabrication	4.4-1
4.5	Asphalt Paving Operations	4.5-1
4.6	Solvent Degreasing	4.6-1
4.7	Waste Solvent Reclamation	4.7-1
4.8	Tank And Drum Cleaning	4.8-1
4.9	Graphic Arts	4.9-1
4.9.1	General Graphic Printing	4.9.1-1
4.9.2	Publication Gravure Printing	4.9.2-1
4.10	Commercial/Consumer Solvent Use	4.10-1
4.11	Textile Fabric Printing	4.11-1
5.	PETROLEUM INDUSTRY	5.0-1
5.1	Petroleum Refining	5.1-1
5.2	Transportation And Marketing Of Petroleum Liquids	5.2-1
5.3	Natural Gas Processing	5.3-1
6.	ORGANIC CHEMICAL PROCESS INDUSTRY	6.0-1
6.1	Carbon Black	6.1-1
6.2	Adipic Acid	6.2-1
6.3	Explosives	6.3-1
6.4	Paint And Varnish	6.4-1
6.5	Phthalic Anhydride	6.5-1
6.6	Plastics	6.6-1
6.6.1	Polyvinyl Chloride	6.6.1-1
6.6.2	Poly(ethylene terephthalate)	6.6.2-1
6.6.3	Polystyrene	6.6.3-1
6.6.4	Polypropylene	6.6.4-1
6.7	Printing Ink	6.7-1
6.8	Soap And Detergents	6.8-1
6.9	Synthetic Fibers	6.9-1
6.10	Synthetic Rubber	6.10-1
6.11	Terephthalic Acid	6.11-1
6.12	Lead Alkyl	6.12-1
6.13	Pharmaceuticals Production	6.13-1
6.14	Maleic Anhydride	6.14-1
6.15	Methanol	6.15-1
6.16	Acetone And Phenol	6.16-1
6.17	Propylene	6.17-1
6.18	Benzene, Toluene And Xylenes	6.18-1
6.19	Butadiene	6.19-1
6.20	Cumene	6.20-1
6.21	Ethanol	6.21-1
6.22	Ethyl Benzene	6.22-1
6.23	Ethylene	6.23-1

6.24	Ethylene Dichloride And Vinyl Chloride	6.24-1
6.25	Ethylene Glycol	6.25-1
6.26	Ethylene Oxide	6.26-1
6.27	Formaldehyde	6.27-1
6.28	Glycerine	6.28-1
6.29	Isopropyl Alcohol	6.29-1
7.	LIQUID STORAGE TANKS	7.0-1
7.1	Organic Liquid Storage Tanks	7.1-1
8.	INORGANIC CHEMICAL INDUSTRY	8.0-1
8.1	Synthetic Ammonia	8.1-1
8.2	Urea	8.2-1
8.3	Ammonium Nitrate	8.3-1
8.4	Ammonium Sulfate	8.4-1
8.5	Phosphate Fertilizers	8.5-1
8.5.1	Normal Superphosphates	8.5.1-1
8.5.2	Triple Superphosphates	8.5.2-1
8.5.3	Ammonium Phosphate	8.5.3-1
8.6	Hydrochloric Acid	8.6-1
8.7	Hydrofluoric Acid	8.7-1
8.8	Nitric Acid	8.8-1
8.9	Phosphoric Acid	8.9-1
8.10	Sulfuric Acid	8.10-1
8.11	Chlor-Alkali	8.11-1
8.12	Sodium Carbonate	8.12-1
8.13	Sulfur Recovery	8.13-1
8.14	Hydrogen Cyanide	8.14-1
9.	FOOD AND AGRICULTURAL INDUSTRIES	9.0-1
9.1	Tilling Operations	9.1-1
9.2	Growing Operations	9.2-1
9.2.1	Fertilizer Application	9.2.1-1
9.2.2	Pesticide Application	9.2.2-1
9.2.3	Orchard Heaters	9.2.3-1
9.3	Harvesting Operations	9.3-1
9.3.1	Cotton Harvesting	9.3.1-1
9.3.2	Grain Harvesting	9.3.2-1
9.3.3	Rice Harvesting	9.3.3-1
9.3.4	Cane Sugar Harvesting	9.3.4-1
9.4	Livestock And Poultry Feed Operations	9.4-1
9.4.1	Cattle Feedlots	9.4.1-1
9.4.2	Swine Feedlots	9.4.2-1
9.4.3	Poultry Houses	9.4.3-1
9.4.4	Dairy Farms	9.4.4-1
9.5	Animal And Meat Products Preparation	9.5-1
9.5.1	Meat Packing Plants	9.5.1-1
9.5.2	Meat Smokehouses	9.5.2-1

9.5.3	Meat Rendering Plants	9.5.3-1
9.5.4	Manure Processing	9.5.4-1
9.5.5	Poultry Slaughtering	9.5.5-1
9.6	Dairy Products	9.6-1
9.6.1	Natural And Processed Cheese	9.6.1-1
9.7	Cotton Ginning	9.7-1
9.8	Preserved Fruits And Vegetables	9.8-1
9.8.1	Canned Fruits And Vegetables	9.8.1-1
9.8.2	Dehydrated Fruits And Vegetables	9.8.2-1
9.8.3	Pickles, Sauces And Salad Dressings	9.8.3-1
9.9	Grain Processing	9.9-1
9.9.1	Grain Elevators And Processes	9.9.1-1
9.9.2	Cereal Breakfast Food	9.9.2-1
9.9.3	Pet Food	9.9.3-1
9.9.4	Alfalfa Dehydration	9.9.4-1
9.9.5	Pasta Manufacturing	9.9.5-1
9.9.6	Bread Baking	9.9.6-1
9.9.7	Corn Wet Milling	9.9.7-1
9.10	Confectionery Products	9.10-1
9.10.1	Sugar Processing	9.10.1-1
9.10.1.1	Cane Sugar Processing	9.10.1.1-1
9.10.1.2	Beet Sugar Processing	9.10.1.2-1
9.10.2	Salted And Roasted Nuts And Seeds	9.10.2-1
9.10.2.1	Almond Processing	9.10.2.1-1
9.10.2.2	Peanut Processing	9.10.2.2-1
9.11	Fats And Oils	9.11-1
9.11.1	Vegetable Oil Processing	9.11.1-1
9.12	Beverages	9.12-1
9.12.1	Malt Beverages	9.12.1-1
9.12.2	Wines And Brandy	9.12.2-1
9.12.3	Distilled Spirits	9.12.3-1
9.13	Miscellaneous Food And Kindred Products	9.13-1
9.13.1	Fish Processing	9.13.1-1
9.13.2	Coffee Roasting	9.13.2-1
9.13.3	Snack Chip Deep Fat Frying	9.13.3-1
9.13.4	Yeast Production	9.13.4-1
9.14	Tobacco Products	9.14-1
9.15	Leather Tanning	9.15-1
9.16	Agricultural Wind Erosion	9.16-1
10.	WOOD PRODUCTS INDUSTRY	10.0-1
10.1	Lumber	10.1-1
10.2	Chemical Wood Pulping	10.2-1
10.3	Pulp Bleaching	10.3-1
10.4	Papermaking	10.4-1
10.5	Plywood	10.5-1
10.6	Reconstituted Wood Products	10.6-1
10.6.1	Waferboard And Oriented Strand Board	10.6.1-1

10.6.2	Particleboard	10.6.2-1
10.6.3	Medium Density Fiberboard	10.6.3-1
10.7	Charcoal	10.7-1
10.8	Wood Preserving	10.8-1
11.	MINERAL PRODUCTS INDUSTRY	11.0-1
11.1	Hot Mix Asphalt Plants	11.1-1
11.2	Asphalt Roofing	11.2-1
11.3	Bricks And Related Clay Products	11.3-1
11.4	Calcium Carbide Manufacturing	11.4-1
11.5	Refractory Manufacturing	11.5-1
11.6	Portland Cement Manufacturing	11.6-1
11.7	Ceramic Products Manufacturing	11.7-1
11.8	Clay And Fly Ash Sintering	11.8-1
11.9	Western Surface Coal Mining	11.9-1
11.10	Coal Cleaning	11.10-1
11.11	Coal Conversion	11.11-1
11.12	Concrete Batching	11.12-1
11.13	Glass Fiber Manufacturing	11.13-1
11.14	Frit Manufacturing	11.14-1
11.15	Glass Manufacturing	11.15-1
11.16	Gypsum Manufacturing	11.16-1
11.17	Lime Manufacturing	11.17-1
11.18	Mineral Wool Manufacturing	11.18-1
11.19	Construction Aggregate Processing	11.19-1
11.19.1	Sand And Gravel Processing	11.19.1-1
11.19.2	Crushed Stone Processing	11.19.2-1
11.20	Lightweight Aggregate Manufacturing	11.20-1
11.21	Phosphate Rock Processing	11.21-1
11.22	Diatomite Processing	11.22-1
11.23	Taconite Ore Processing	11.23-1
11.24	Metallic Minerals Processing	11.24-1
11.25	Clay Processing	11.25-1
11.26	Talc Processing	11.26-1
11.27	Feldspar Processing	11.27-1
11.28	Vermiculite Processing	11.28-1
11.29	Alumina Manufacturing	11.29-1
11.30	Perlite Manufacturing	11.30-1
11.31	Abrasives Manufacturing	11.31-1
12.	METALLURGICAL INDUSTRY	12.0-1
12.1	Primary Aluminum Production	12.1-1
12.2	Coke Production	12.2-1
12.3	Primary Copper Smelting	12.3-1
12.4	Ferroalloy Production	12.4-1
12.5	Iron And Steel Production	12.5-1
12.6	Primary Lead Smelting	12.6-1
12.7	Zinc Smelting	12.7-1

12.8	Secondary Aluminum Operations	12.8-1
12.9	Secondary Copper Smelting And Alloying	12.9-1
12.10	Gray Iron Foundries	12.10-1
12.11	Secondary Lead Processing	12.11-1
12.12	Secondary Magnesium Smelting	12.12-1
12.13	Steel Foundries	12.13-1
12.14	Secondary Zinc Processing	12.14-1
12.15	Storage Battery Production	12.15-1
12.16	Lead Oxide And Pigment Production	12.16-1
12.17	Miscellaneous Lead Products	12.17-1
12.18	Leadbearing Ore Crushing And Grinding	12.18-1
12.19	Electric Arc Welding	12.19-1
12.20	Electroplating	12.20-1
13.	MISCELLANEOUS SOURCES	13.0-1
13.1	Wildfires And Prescribed Burning	13.1-1
13.2	Fugitive Dust Sources	13.2-1
13.2.1	Paved Roads	13.2.1-1
13.2.2	Unpaved Roads	13.2.2-1
13.2.3	Heavy Construction Operations	13.2.3-1
13.2.4	Aggregate Handling And Storage Piles	13.2.4-1
13.2.5	Industrial Wind Erosion	13.2.5-1
13.3	Explosives Detonation	13.3-1
13.4	Wet Cooling Towers	13.4-1
13.5	Industrial Flares	13.5-1
14.	GREENHOUSE GAS BIOGENIC SOURCES	14.0-1
14.1	Emissions From Soils — Greenhouse Gases	14.1-1
14.2	Termites — Greenhouse Gases	14.2-1
14.3	Lightning Emissions — Greenhouse Gases	14.2-1
APPENDIX A	Miscellaneous Data And Conversion Factors	A-1
APPENDIX B.1	Particle Size Distribution Data And Sized Emission Factors For Selected Sources	B.1-1
APPENDIX B.2	Generalized Particle Size Distributions	B.2-1
APPENDIX C.1	Procedures For Sampling Surface/Bulk Dust Loading	C.1-1
APPENDIX C.2	Procedures For Laboratory Analysis Of Surface/Bulk Dust Loading Samples	C.2-1

PUBLICATIONS IN SERIES

<i>Issue</i>		<i>Date</i>
COMPILATION OF AIR POLLUTANT EMISSION FACTORS, FIFTH EDITION		1/95
SUPPLEMENT A		11/96
Introduction		
Section 1.1	Bituminous And Subbituminous Coal Combustion	
1.2	Anthracite Coal Combustion	
1.3	Fuel Oil Combustion	
1.4	Natural Gas Combustion	
1.6	Wood Waste Combustion In Boilers	
1.7	Lignite Combustion	
1.11	Waste Oil Combustion	
3.1	Stationary Gas Turbines For Electricity Generation	
3.2	Heavy-duty Natural Gas-fired Pipeline Compressor Engines	
3.4	Large Stationary Diesel And All Stationary Dual-fuel Engines	
5.3	Natural Gas Processing	
7.0	Liquid Storage Tanks Introduction	
7.1	Organic Liquid Storage Tanks	
9.5.2	Meat Smokehouses	
9.5.3	Meat Rendering Plants	
9.8.1	Canned Fruits And Vegetables	
9.8.2	Dehydrated Fruits And Vegetables	
9.8.3	Pickles, Sauces And Salad Dressings	
9.9.1	Grain Elevators And Processes	
9.9.2	Cereal Breakfast Food	
9.9.5	Pasta Manufacturing	
9.11.1	Vegetable Oil Processing	
9.12.2	Wines And Brandy	
9.13.2	Coffee Roasting	
10.7	Charcoal	
11.10	Coal Cleaning	
11.14	Frit Manufacturing	
11.19	Construction Aggregate Processing	
11.22	Diatomite Processing	
11.26	Talc Processing	
11.28	Vermiculite Processing	
13.2.1	Paved Roads	
12.2.2	Unpaved Roads	
Appendix	B.2	
Generalized Particle Size Distributions		

SUPPLEMENT B

11/96

Section

- 1.1 Bituminous And Subbituminous Coal Combustion
- 1.2 Anthracite Coal Combustion
- 1.3 Fuel Oil Combustion
- 1.4 Natural Gas Combustion
- 1.5 Liquefied Petroleum Gas Combustion
- 1.6 Wood Waste Combustion In Boilers
- 1.7 Lignite Combustion
- 1.8 Bagasse Combustion In Sugar Mills
- 1.9 Residential Fireplaces
- 1.10 Residential Wood Stoves
- 1.11 Waste Oil Combustion
- 2.1 Refuse Combustion
- 3.1 Stationary Gas Turbines For Electricity Generation
- 3.2 Heavy-duty Natural Gas-fired Pipeline Compressor Engines
- 3.3 Gasoline And Diesel Industrial Engines
- 3.4 Large Stationary Diesel And All Stationary Dual-fuel Engines
- 6.2 Adipic Acid
- 9.7 Cotton Ginning
- 9.9.4 Alfalfa Dehydrating
- 9.12.1 Malt Beverages
- 11.7 Ceramic Products Manufacturing
- 12.20 Electroplating
- 13.1 Wildfires And Prescribed Burning
- 14.0 Greenhouse Gas Biogenic Sources
- 14.1 Emissions From Soils—Greenhouse Gases
- 14.2 Termites—Greenhouse Gases
- 14.3 Lightning Emissions—Greenhouse

SUPPLEMENT C

11/97

Section

- 9.5.1 Meat Packing Plants
- 9.6.1 Natural and Processed Cheese
- 9.9.6 Bread Baking
- 9.10.1.1 Cane Sugar Processing
- 9.10.1.2 Sugarbeet Processing
- 9.12.3 Distilled Spirits
- 9.15 Leather Tanning
- 11.3 Brick And Structural Clay Product Manufacturing
- 11.14 Frit Manufacturing
- 11.23 Taconite Ore Processing

**Instructions For Inserting
Supplement A Of Volume I
Into AP-42**

Pp. 1.1-3 through -24 replace same. Editorial Change.
Pp. 1.2-3 through -6 replace same. Editorial Change.
Pp. 1. 3-1 through - 12 and - 15 through - 18 replace same. Editorial Change.
Pp. 1.4-3 and -4 replace same. Editorial Change.
Pp. 1.6-3 through -6 replace same. Editorial Change.
Pp. 1.7-3 through -8 replace same. Editorial Change.
Pp. 1.11-5and-6 replace same. EditorialChange.
Pp. 3.1-3 through -6 replace same. Editorial Change.
Pp. 3.2-3 and -4 and -7 and -8 replace same. Editorial Change.
Pp. 3.4-3 and -4 replace same. Editorial Change.
Pp. 5.3-1 through -8 (blank) replace same. Editorial Change.
Pp. 7.0-1 and -2 (blank) replace same. Revised Chapter Introduction.
Pp. 7.1-1 through -102 (blank) replace 7.1-1 through-108 (blank). Major Revision.
Pp. 9.5.2-1 through -6 replace 9.5.2-1 and -2 (blank). New Section.
Pp. 9.5.3-1 through -8 replace 9.5.3-1 and -2 (blank). New Section.
Pp. 9.8. 1-1 through -8 replace 9.8. 1-1 and -2 (blank). New Section.
Pp. 9.8.2-1 through -4 replace 9.8.2-1 and -2 (blank). New Section.
Pp. 9.8.3-1 through -4 replace 9.8.3-1 and -2 (blank). New Section.
Pp. 9.9. 1-1 and -2 (blank) replace same. New Information.
Pp. 9.9.2-1 through -12 replace 9.9.2-1 and -2 (blank). New Section.
Pp. 9.9.5-1 through -4 (blank) replace 9.9.5-1 and -2 (blank). New Section.
Pp. 9.11.1-1through-12 (blank)replace9.11.1-1and-2 (blank). NewSection.
Pp. 9.12.2-1 through -10 (blank) replace 9.12.2-1 and -2 (blank). New Section.
Pp. 9.13.2-1 through -8 (blank) replace 9.13.2-1 and -2 (blank). New Section.
Pp. 10.7-1 through -8 (blank) replace 10.7-1 and -2 (blank). New Section.
Pp. 11.10-1through-8(blank)replacell.10-1through-4. MajorRevision.
Pp. 11. 14-1 through -6 (blank) replace 11. 14-1 and -2 (blank). New Section.
Pp. 11. 19. 1 -1 through -8 replace I 1. 19. 1 -1 and -2 (blank). New Section.
Pp. 11.22-1 through -6 (blank) replace 11.22-1 and -2 (blank). New Section.
Pp. 11.26-1 through -8 (blank) replace 11.26-1 through -4 (blank). Major Revision.
Pp. 11.28-1 through -4 replace 11.28-1 and -2 (blank). New Section.
Pp. 13.2. 1-1 through -28 replace same. Editorial Change.
Pp. 13.2.2-1 through -8 replace same. Editorial Change.
Pp. B.2-3 and -4 replace same. Editorial Change.
Insert new Technical Report Data Sheet.

**Instructions For Inserting
Supplement B Of Volume I
Into AP-42**

Preliminary Matter	Publications In Series, Contents, Key Word Index	Replace all	Minor Revision
Chap. 1, Sect 1-11	External Combustion Sources	Replace all	New Information
Chap. 2, Sect. 1	Refuse Combustion	Replace entire	Minor Revision
Chap. 3, Sect. 1-4	Stationary Internal Combustion Sources	Replace all	New Information
Chap. 6, Sect. 2	Adipic Acid	Replace entire	Major Revision
Chap. 9, Sect. 7	Cotton Ginning	Replace [Work In Progress] sheet	New Section
Chap. 9, Sect. 9.4	Alfalfa Dehydrating	Replace [Work In Progress] sheet	New Section
Chap. 9, Sect. 12.1	Malt Beverages	Replace [Work In Progress] sheet	New Section
Chap. 11, Sect. 7	Ceramic Products Manufacturing	Replace entire	Major Revision
Chap. 12, Sect. 20	Electroplating	Add	New Section
Chap. 13, Sect. 1	Wildfires And Prescribed Burning	Replace entire	Minor Revision
Chap. 14, Sect. 1-3	Greenhouse Gas Biogenic Sources	Add	New Chapter
Insert new Technical Report Data Sheet.			

**Instructions For Inserting
Supplement C Of Volume I
Into AP-42**

Chap. 9, Sect. 5.1	Meat Packing Plants	Replace [Work In Progress] sheet	New Section
Chap. 9, Sect. 6.1	Natural and Processed Cheese	Replace [Work In Progress] sheet	New Section
Chap. 9, Sect. 9.6	Bread Baking	Replace [Work In Progress] sheet	New Section
Chap. 9, Sect. 10.1.1	Cane Sugar Processing	Replace [Work In Progress] sheet	New Section
Chap. 9, Sect. 10.1.2	Sugarbeet Processing	Replace [Work In Progress] sheet	New Section
Chap. 9, Sect. 12.3	Distilled Spirits	Replace [Work In Progress] sheet	New Section
Chap. 9, Sect. 15	Leather Tanning	Replace [Work In Progress] sheet	New Section
Chap. 11, Sect. 3	Brick And Structural Clay Product Manufacturing	Replace entire	Major Revision
Chap. 11, Sect. 14	Frit Manufacturing	Replace entire	Minor Revision
Chap. 11, Sect. 23	Taconite Ore Processing	Replace entire	Major Revision
Insert new Technical Report Data Sheet.			

KEY WORD INDEX

	Chapter/Section
Abrasives Manufacturing	11.31
Acetone And Phenol	6.16
Acid	
Adipic	6.2
Hydrochloric	8.6
Hydrofluoric	8.7
Nitric	8.8
Phosphoric	8.9
Sulfuric	8.10
Terephthalic	6.11
Adipic Acid	6.2
Aggregate Handling	13.2.4
Aggregate Manufacturing, Lightweight	11.20
Aggregate Processing, Construction	11.19
Aggregate Storage Piles	13.2.4
Agricultural Industries	9.0
Agricultural Wind Erosion	9.16
Alcohol, Isopropyl	6.29
Alfalfa Dehydration	9.9.4
Alkali, Chlor-	8.11
Almond Processing	9.10.2.1
Alumina Manufacturing	11.29
Aluminum	
Operations, Secondary	12.8
Production, Primary	12.1
Ammonia, Synthetic	8.1
Ammonium Nitrate	8.3
Ammonium Phosphate	8.5.3
Ammonium Sulfate	8.4
Analysis, Surface/Bulk Dust Loading	App. C.2
Anhydride, Phthalic	6.5
Animal And Meat Products Preparation	9.5
Anthracite Coal Combustion	1.2
Appliance Surface Coating	4.2.2.11
Ash	
Fly Ash Sintering	11.8
Asphalt	
Hot Mix Plants	11.1
Paving	4.5
Roofing	11.2
Automobile Body Incineration	2.6
Automobile Surface Coating	4.2.2.8
Bagasse Combustion In Sugar Mills	1.8
Baking, Bread	9.9.6

Bark	
Wood Waste Combustion In Boilers	..... 1.6
Batching, Concrete	..... 11.12
Battery Production, Storage	..... 12.15
Beet Sugar Processing	..... 9.10.1.2
Benzene, Toluene And Xylenes	..... 6.18
Beverages	..... 9.12
Brandy	..... 9.12.2
Liquors, Distilled Spirits	..... 9.12.3
Malt	..... 9.12.1
Wines	..... 9.12.2
Bituminous Coal Combustion	..... 1.1
Bleaching, Wood Pulp	..... 10.3
Brandy	..... 9.12.2
Bread Baking	..... 9.9.6
Bricks And Related Clay Products	..... 11.3
Bulk Material Analysis Procedures	..... App. C.2
Bulk Material Sampling Procedures	..... App. C.1
Burners, Conical (Teepee)	..... 2.7
Burning, Open	..... 2.5
Burning, Prescribed, And Wildfires	..... 13.1
Business Machines, Plastic Parts Coating	..... 4.2.2.14
Butadiene	..... 6.19
Calcium Carbide Manufacturing	..... 11.4
Can Coating	..... 4.2.2.2
Cane Sugar Processing	..... 9.10.1.1
Canned Fruits And Vegetables	..... 9.8.1
Carbon Black	..... 6.1
Carbonate	
Sodium Carbonate Manufacturing	..... 8.12
Cattle Feedlots	..... 9.4.1
Cement	
Portland Cement Manufacturing	..... 11.6
Ceramic Products Manufacturing	..... 11.7
Cereal Breakfast Food	..... 9.9.2
Charcoal	..... 10.7
Cheese, Natural And Processed	..... 9.6.1
Chemical Wood Pulping	..... 10.2
Chemicals, Inorganic	..... 8.0
Chemicals, Organic	..... 6.0
Chlor-Alkali	..... 8.11
Clay	
Bricks And Related Clay Products	..... 11.3
Ceramic Products Manufacturing	..... 11.7
Clay And Fly Ash Sintering	..... 11.8
Clay Processing	..... 11.25

Cleaning	
Coal	.....
Drum	.....
Dry Cleaning	.....
Tank	.....
Coal	
Anthracite Combustion	.....
Bituminous Combustion	.....
Cleaning	.....
Conversion	.....
Subbituminous Combustion	.....
Surface Mining, Western	.....
Coating, Surface	.....
Appliance, Large	.....
Automobile And Light Duty Truck	.....
Can	.....
Fabric	.....
Flat Wood Interior Panel	.....
Labels, Pressure Sensitive	.....
Magnet Wire	.....
Magnetic Tape	.....
Metal Coil	.....
Metal Furniture	.....
Metal, General	.....
Paper	.....
Plastic Parts For Business Machines	.....
Polymeric Coating Of Supporting Substrates	.....
Tapes, Pressure Sensitive	.....
Coffee Roasting	.....
Coke Manufacturing	.....
Collection, Waste Water	.....
Combustion	
Anthracite Coal	.....
Bagasse, In Sugar Mills	.....
Bituminous Coal	.....
Fuel Oil	.....
Internal, Mobile	.....
Internal, Stationary	.....
Lignite	.....
Liquefied Petroleum Gas	.....
Natural Gas	.....
Orchard Heaters	.....
Refuse	.....
Residential Fireplaces	.....
Residential Wood Stoves	.....
Subbituminous Coal	.....
Waste Oil	.....
Wood Waste In Boilers	.....
Compressors, Pipeline, Natural Gas Fired	.....
Concrete Batching	.....
Confectionery Products	.....
Conical Burners	.....
Construction Aggregate Processing	.....

Construction Operations, Heavy	13.2.3
Conversion factors, units, etc. – Miscellaneous	App. A
Cooling Towers, Wet	13.4
Copper	
Alloying	12.9
Smelting, Primary	12.3
Smelting, Secondary	12.9
Corn Wet Milling	9.9.7
Cotton	
Ginning	9.7
Harvesting	9.3.1
Crushed Stone Processing	11.19.2
Cumene	6.20
Cyanide, Hydrogen	8.14
Dairy Farms	9.4.4
Dairy Products	9.6
Deep Fat Frying, Snack Chip	9.13.3
Degreasing, Solvent	4.6
Dehydrated Fruits And Vegetables	9.8.2
Dehydration, Alfalfa	9.9.4
Detergents	
Soap And Detergents	6.8
Detonation, Explosives	13.3
Diatomite Processing	11.22
Diesel Engines, Industrial	3.3
Diesel Engines, Stationary	3.4
Distilled Spirits	9.12.3
Drum Cleaning	4.8
Dry Cleaning	4.1
Dual Fuel Engines, Stationary	3.4
Dust Loading Analysis, Surface/Bulk	App. C.2
Dust Loading Sampling Procedures, Surface/Bulk	App. C.1
Dust Sources, Fugitive	13.2
Electric Arc Welding	12.19
Electric Utility Power Plants, Gas	3.1
Electricity Generators, Stationary Gas Turbine	3.1
Electroplating	12.20
Erosion, Wind, Industrial	13.2.5
Ethanol	6.21
Ethyl Benzene	6.22
Ethylene	6.23
Ethylene Dichloride And Vinyl Chloride	6.24
Ethylene Glycol	6.25
Ethylene Oxide	6.26
Evaporation Loss Sources	4.0
Explosives	6.3
Explosives Detonation	13.3
External Combustion Sources	1.0
Fabric Coating	4.2.2.7
Fabric Printing, Textile	4.11

Fats, Cooking	9.11
Feedlots	
Cattle	9.4.1
Dairy Farms	9.4.4
Poultry Houses	9.4.3
Swine	9.4.2
Feldspar Processing	11.27
Ferroalloy Production	12.4
Fertilizer Application	9.2.1
Fertilizers	
Ammonium Phosphate	8.5.3
Phosphate	8.5
Fiberboard, Medium Density	10.6.3
Fiber Manufacturing, Glass	11.13
Fibers, Synthetic	6.9
Fireplaces, Residential	1.9
Fires	
Forest Wildfires And Prescribed Burning	13.1
Fish Processing	9.13.1
Flares, Industrial	13.5
Flat Wood Interior Panel Coating	4.2.2.5
Fly Ash	
Clay And Fly Ash Sintering	11.8
Food And Agricultural Industries	9.0
Food And Kindred Products, Miscellaneous	9.13
Coffee Roasting	9.13.2
Fish Processing	9.13.1
Snack Chip Deep Fat Frying	9.13.3
Yeast Production	9.13.4
Formaldehyde	6.27
Foundries	
Gray Iron	12.10
Steel	12.13
Frit Manufacturing	11.14
Fruits, Preserved	9.8
Canned	9.8.1
Dehydrated	9.8.2
Fuel Oil Combustion	1.3
Fugitive Dust Sources	13.2
Furniture Surface Coating, Metal	4.2.2.12
Gas Combustion, Liquefied Petroleum	1.5
Gas, Natural	
Combustion	1.4
Pipeline Compressors	3.2
Processing	5.3
Turbines, Electricity-generating	3.1
Gasoline/Diesel Industrial Engines	3.3
Ginning, Cotton	9.7
Glass Fiber Manufacturing	11.13
Glass Manufacturing	11.15
Graphic Arts	4.9
General Graphic Printing	4.9.1

Publication Gravure Printing	4.9.2
Glycerine	6.28
Grain	
Alfalfa Dehydration	9.9.4
Bread Baking	9.9.6
Cereal Breakfast Food	9.9.2
Corn Wet Milling	9.9.7
Elevators And Processes	9.9.1
Harvesting	9.3.2
Pasta Manufacturing	9.9.5
Pet Food	9.9.3
Processing	9.9
Gravel Processing	11.19.1
Gray Iron Foundries	12.10
Greenhouse Gas biogenic Sources	14.0
Growing Operations	9.2
Gypsum Manufacturing	11.16
 Harvesting Operations	9.3
Cotton Harvesting	9.3.1
Grain Harvesting	9.3.2
Rice Harvesting	9.3.3
Sugar Cane Harvesting	9.3.4
Heaters, Orchard	9.2.3
Highway Vehicles	Vol. II
Hot Mix Asphalt Plants	11.1
Hydrochloric Acid	8.6
Hydrofluoric Acid	8.7
Hydrogen Cyanide	8.14
 Incineration	
Automobile Body	2.6
Medical Waste	2.3
Open Burning	2.5
Sewage Sludge	2.2
Industrial Engines, Gasoline And Diesel	3.3
Industrial Flares	13.5
Industrial Surface Coating	4.2.2
Industrial Surface Coating, General	4.2.2.1
Industrial Wind Erosion	13.2.5
Ink, Printing	6.7
Inorganic Chemical Industry	8.0
Interior Panel Coating, Flat Wood	4.2.2.5
Internal Combustion Engines	
Highway Vehicle	Vol. II
Off-highway Mobile	Vol. II
Off-highway Stationary	3.0
 Iron	
Gray Iron Foundries	12.10
Iron Production	12.5
Isopropyl Alcohol	6.29

Labels, Pressure Sensitive	4.2.2.9
Landfills	2.4
Large Bore Engines	3.4
Lead	
Ore Crushing And Grinding	12.18
Processing, Secondary	12.11
Products, Miscellaneous	12.17
Smelting, Primary	12.6
Lead Alkyl	6.12
Lead Oxide Production	12.16
Lead Pigment Production	12.16
Leadbearing Ore Crushing And Grinding	12.18
Leather Tanning	9.15
Light Duty Truck Surface Coating	4.2.2.8
Lightning	14.1
Lightweight Aggregate Manufacturing	11.20
Lignite Combustion	1.7
Lime Manufacturing	11.17
Liquefied Petroleum Gas Combustion	1.5
Liquid Storage Tanks	7.0
Livestock Feed Operations	9.4
Lumber	10.1
Magnesium, Secondary Smelting	12.12
Magnet Wire Coating	4.2.2.3
Magnetic Tape Manufacturing	4.2.2.13
Maleic Anhydride	6.14
Malt Beverages	9.12.1
Manure Processing	9.5.4
Marketing, Petroleum Liquids	5.2
Meat Packing Plants	9.5.1
Meat Products Preparation	9.5
Meat Rendering Plants	9.5.3
Meat Smokehouses	9.5.2
Medical Waste Incineration	2.3
Metal Coating, General	4.2.2.4
Metal Coil Surface Coating	4.2.2.10
Metal Furniture Surface Coating	4.2.2.12
Metallic Minerals Processing	11.24
Metallurgical Industry	12.0
Methanol	6.15
Mineral Products Industry	11.0
Mineral Wool Manufacturing	11.18
Minerals Processing, Metallic	11.24
Mining, Western Surface Coal	11.9
Miscellaneous Sources	13.0
Mobile Sources	
Highway	Vol. II
Off-highway	Vol. II
Natural And Processed Cheese	9.6.1
Natural Gas Combustion	1.4
Natural Gas Fired Pipeline Compressors	3.2

Natural Gas Processing	5.3
Nitric Acid Manufacturing	8.8
Nonindustrial Surface Coating	4.2.1
Normal Superphosphates	8.5.1
Nuts And Seeds, Salted And Roasted	9.10.2
Almond Processing	9.10.2.1
Peanut Processing	9.10.2.2
Off-highway Mobile Sources	Vol. II
Off-highway Stationary Sources	3.0
Oil	
Fuel Oil Combustion	1.3
Waste Oil Combustion	1.11
Oils, Cooking	9.11
Vegetable Oil Processing	9.11.1
Open Burning	2.5
Orchard Heaters	9.2.3
Ore Processing	
Leadbearing Ore Crushing And Grinding	12.18
Taconite	11.23
Organic Chemical Process Industry	
Organic Liquid Storage Tanks	7.1
Oriented Strand Board	10.6.1
Paint And Varnish	6.4
Panel Coating, Flat Wood Interior	4.2.2.5
Paper Coating	4.2.2.6
Papermaking	10.4
Particleboard	10.6.2
Particle size distribution data, factors, generalized	App. B.2
Particle size distribution data, factors, selected	App. B.1
Pasta Manufacturing	9.9.5
Paved Roads	13.2.1
Paving, Asphalt	4.5
Peanut Processing	9.10.2.2
Perlite Manufacturing	11.30
Pesticide Application	9.2.2
Pet Food	9.9.3
Petroleum	
Liquefied Petroleum Gas Combustion	1.5
Liquids, Transportation And Marketing	5.2
Refining	5.1
Storage Of Organic Liquids	7.1
Petroleum Industry	5.0
Pharmaceuticals Production	6.13
Phenol	6.16
Phosphate, Ammonium	8.5.3
Phosphate Fertilizers	8.5
Phosphate Rock Processing	11.21
Phosphoric Acid	8.9
Phthalic Anhydride	6.5
Pickles	9.8.3
Pigment	

Lead Oxide And Pigment Production	12.16
Pipeline Compressors, Natural Gas Fired	3.2
Plastic Part Surface Coating, Business Machine	4.2.2.14
Plastics	6.6
Plywood	10.5
Polyester Resin Plastic Products Fabrication	4.4
Poly(ethylene terephthalate)	6.6.2
Polymeric Coating Of Supporting Substrates	4.2.2.7
Polypropylene	6.6.4
Polystyrene	6.6.3
Polyvinyl Chloride	6.6.1
Portland Cement Manufacturing	11.6
Poultry Feed Operations	9.4
Poultry Houses	9.4.3
Poultry Slaughtering	9.5.5
Prescribed Burning, Wildfires And	13.1
Preserved Fruits And Vegetables	9.8
Preserving, Wood	10.8
Printing, General Graphic	4.9.1
Printing, Publication Gravure	4.9.2
Printing, Textile Fabric	4.11
Printing Ink	6.7
Processed Cheese	9.6.1
Propylene	6.17
Pulp Bleaching, Wood	10.3
Pulping, Chemical Wood	10.2
Reclamation, Waste Solvent	4.7
Reconstituted Wood Products	10.6
Recovery, Sulfur	8.13
Refining, Petroleum	5.1
Refractory Manufacturing	11.5
Refuse Combustion	2.1
Rendering Plants, Meat	9.5.3
Residential Fireplaces	1.9
Resin, Polyester, Plastic Product Fabrication	4.4
Rice Harvesting	9.3.3
Roads	
Paved	13.2.1
Unpaved	13.2.2
Roasted Nuts And Seeds	9.10.2
Roasting, Coffee	9.13.2
Rock Processing, Phosphate	11.21
Roofing, Asphalt	11.2
Rubber, Synthetic	6.10
Salad Dressings	9.8.3
Salted And Roasted Nuts And Seeds	9.10.2
Almond Processing	9.10.2.1
Peanut Processing	9.10.2.2
Sampling, Surface/Bulk Loading	App. C.1
Sand And Gravel Processing	11.19.1
Sauces	9.8.3

Seeds, Salted And Roasted	9.10.2
Sewage Sludge Incineration	2.2
Sized emission factors, generalized	App. B.2
Sized emission factors, selected	App. B.1
Smelting	
Primary Copper	12.3
Primary Lead	12.6
Secondary Copper Smelting And Alloying	12.9
Secondary Magnesium	12.12
Zinc	12.7
Smokehouses, Meat	9.5.2
Snack Chip Deep Fat Frying	9.13.3
Soap And Detergent Manufacturing	6.8
Sodium Carbonate Manufacturing	8.12
Soils	14.1
Solid Waste Disposal	2.0
Solvent	
Commercial/Consumer Use	4.10
Degreasing	4.6
Waste, Reclamation	4.7
Stationary Gas Turbines	3.1
Stationary Internal Combustion Sources, Off-highway	3.0
Steel	
Foundries	12.13
Production	12.5
Stone Processing, Crushed	11.19.2
Storage, Waste Water	4.3
Storage Battery Production	12.15
Storage Piles, Aggregate	13.2.4
Storage Tanks, Liquid	7.0
Organic Liquid Storage Tanks	7.1
Subbituminous Coal Combustion	1.1
Substrates, Supporting, Polymeric Coating Of	4.2.2.7
Sugar Harvesting, Cane	9.3.4
Sugar Mills, Bagasse Combustion In	1.8
Sugar Processing	9.10.1
Sugar Processing, Beet	9.10.1.2
Sugar Processing, Cane	9.10.1.1
Sulfur Recovery	8.13
Sulfuric Acid	8.10
Surface/Bulk Dust Loading Analysis	App. C.2
Surface/Bulk Dust Loading Sampling Procedures	App. C.1
Surface Coal Mining, Western	11.9
Surface Coating	4.2
Surface Coating, Industrial	4.2.2
Surface Coating, Nonindustrial	4.2.1
Surface Material Analysis Procedures	App. C.2
Surface Material Sampling Procedures	App. C.1
Swine Feedlots	9.4.2
Synthetic Ammonia	8.1
Synthetic Fibers	6.9
Synthetic Rubber	6.10

Taconite Ore Processing	11.23
Talc Processing	11.26
Tank And Drum Cleaning	4.8
Tape, Magnetic, Manufacturing	4.2.2.13
Tapes And Labels, Pressure Sensitive	4.2.2.9
Teepee (Conical) Burners	2.7
Terephthalic Acid	6.11
Termites	14.2
Textile Fabric Printing	4.11
Tilling Operations	9.1
Tobacco Products	9.14
Toluene	6.18
Transportation And Marketing Of Petroleum Liquids	5.2
Treatment, Waste Water	4.3
Triple Superphosphates	8.5.2
Truck, Light Duty, Surface Coating,	4.2.2.8
Turbines, Natural Gas Fired	3.1
Unpaved Roads	13.2.2
Urea	8.2
Varnish	
Paint And Varnish Manufacturing	6.4
Vegetable Oil Processing	9.11.1
Vegetables, Canned	9.8.1
Vegetables, Dehydrated	9.8.2
Vegetables, Preserved	9.8
Vehicles, Highway And Off-highway	Vol. II
Vermiculite Processing	11.28
Vinyl Chloride	6.24
Waferboard	10.6.1
Waste Disposal, Solid	2.0
Waste Oil Combustion	1.11
Waste Solvent Reclamation	4.7
Waste Water Collection, Treatment and Storage	4.3
Welding, Electric Arc	12.19
Wet Cooling Towers	13.4
Wet Milling, Corn	9.9.7
Wildfires	13.1
Wind Erosion	
Agricultural	9.16
Industrial	13.2.5
Wine	9.12.2
Wire Coating, Magnet	4.2.2.3
Wood	
Charcoal	10.7
Flat Interior Panel Coating	4.2.2.5
Lumber	10.1
Medium Density Fiberboard	10.6.3
Oriented Strand Board	10.6.1
Papermaking	10.4
Particleboard	10.6.2

Plywood	10.5
Pulp Bleaching	10.3
Pulping, Chemical	10.2
Reconstituted Wood Products	10.6
Stoves	1.10
Waferboard	10.6.1
Waste Combustion In Boilers	1.6
Wood Preserving	10.8
Wood Products Industry	10.0
Xylenes	6.18
Yeast Production	9.13.4
Zinc	
Processing, Secondary	12.14
Smelting	12.7