United States
Environmental Protection
Agency

Air and Energy Engineering
Research Laboratory
Research Triangle Park, NC 27711

Research and Development

EPA/600/S2-90/044 Jan. 1991

EPA

Project Summary

Emission Factors for Iron Foundries: Criteria and Toxic Pollutants

Gerhard Gschwandtner and Susan Fairchild

This report lists criteria and toxic pollutant emission factors for sources commonly found in iron foundries. Emission factors are identified for process source and process fugitive emissions. The emission factors, representing uncontrolled emissions, may be used to estimate emissions when site-specific information and data are not available.

This Project Summary was developed by EPA's Air and Energy Engineering Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

Iron foundries have been identified in certain areas of the U.S. to be potentially significant sources of air pollution. The Control Technology Center of the U.S. Environmental Protection Agency, in response to a request for air toxic emission factors by the Hamilton County Air Pollution Control Bureau of Chattanooga, Tennessee, commissioned this report. The report is a compilation of current emission factor information that may be used by state and local agencies in estimating emissions from iron foundries. This report is a follow-on to a previous report (EPA/600/2-90/024; NTIS PB-90 242 314) on emission factors for iron and steel manufacturing facilities.

The objective of this study was to provide a comprehensive set of emission factors for sources of both criteria and toxic air pollutants in gray and ductile iron foundries. Emission factors are identified for process sources, process fugitive and open source fugitive emissions. The emission factors are not specific to any one facility.

For several years, attention has focused mostly on emissions of criteria pollutants. These pollutants include particulate matter, sulfur dioxide (SO_2), carbon dioxide (CO_2), nitrogen oxide (NO_x), volatile organic compounds (VOCs), and lead (Pb) . More recently, attention has focused on toxic air pollutants. These pollutants include many different organic and inorganic compounds. This report summarizes the information available for both criteria and toxic pollutants. It is a guide for estimating the emissions when emission measurements are not available.

This study involved a literature search of the libraries of the U.S. EPA and the American Foundrymen's Society. Articles were reviewed for information that could be used to develop emission factors for processes associated with iron foundries. The emission factors are presented in terms of an average value or range of values together with a rating of quality or reliability.

The emission factors developed for the National Acid Precipitation Assessment Program (NAPAP) emission inventory normally represent uncontrolled emissions. For PM_{10} emission factors, consult Compilation of Air Pollutant Emission Factors, AP-42, Supplement B, Volume I, Fourth Edition (NTIS PB-89 128 631), since the particulate emission factors developed as part of the NAPAP

effort were for total suspended particulates (TSP), not PM_{10}.

Table 1, showing criteria air pollutant emission factors, is an example of the data presented in the project report. Those emission factors derived from AP-42 represent a range of emissions, samples, and foundries under which testing was conducted. Those emission factors derived from NAPAP were developed from states files, published reports from both industrial and government sources, AP-42, engineering estimates, and communication with industry representatives. Where NAPAP used AP-42 data, the AP-42 data range was averaged to present a single value.

Figure 1 shows all the major air pollutant emission sources one might find in iron foundries. In any given foundry, one would not expect to find more than one type of melting furnace although there may be some exceptions. Only foundries producing ductile iron would have magnesium inoculation facilities. The major emission sources are the melting, pouring, shakeout, and cooling operations.

Table 1. *Criteria Emissions from Iron Foundry Operations, mg/Mg Metal Melted*

	Operation					
Emission	*Cupola*	*Electric Arc Furnace*	*Inoculation*	*Pouring*	*Greensand Shakeout*	*Source*
PM_{10}	6.2×10^6	5.8×10^6		1.03×10^6	1.12×10^6	AP-42
	6.2×10^6	5.7×10^6	1.6×10^6	2.5×10^6	1.12×10^6	NAPAP
VOC		3×10^4				AP-42
		1.5×10^5				
	9×10^4	9×10^4	2.5×10^3	7×10^4	6×10^5	NAPAP
NO_x		2×10^4				AP-42
		3×10^5				
	5×10^4	9.0×10^4		5×10^3		NAPAP
CO	7.25×10^7	5×10^4				AP-42
		1.9×10^5				
	7.25×10^7	9.5×10^6				NAPAP
SO_2	1.8×10^3					AP-42
		1.25×10^5		1.0×10^4		NAPAP

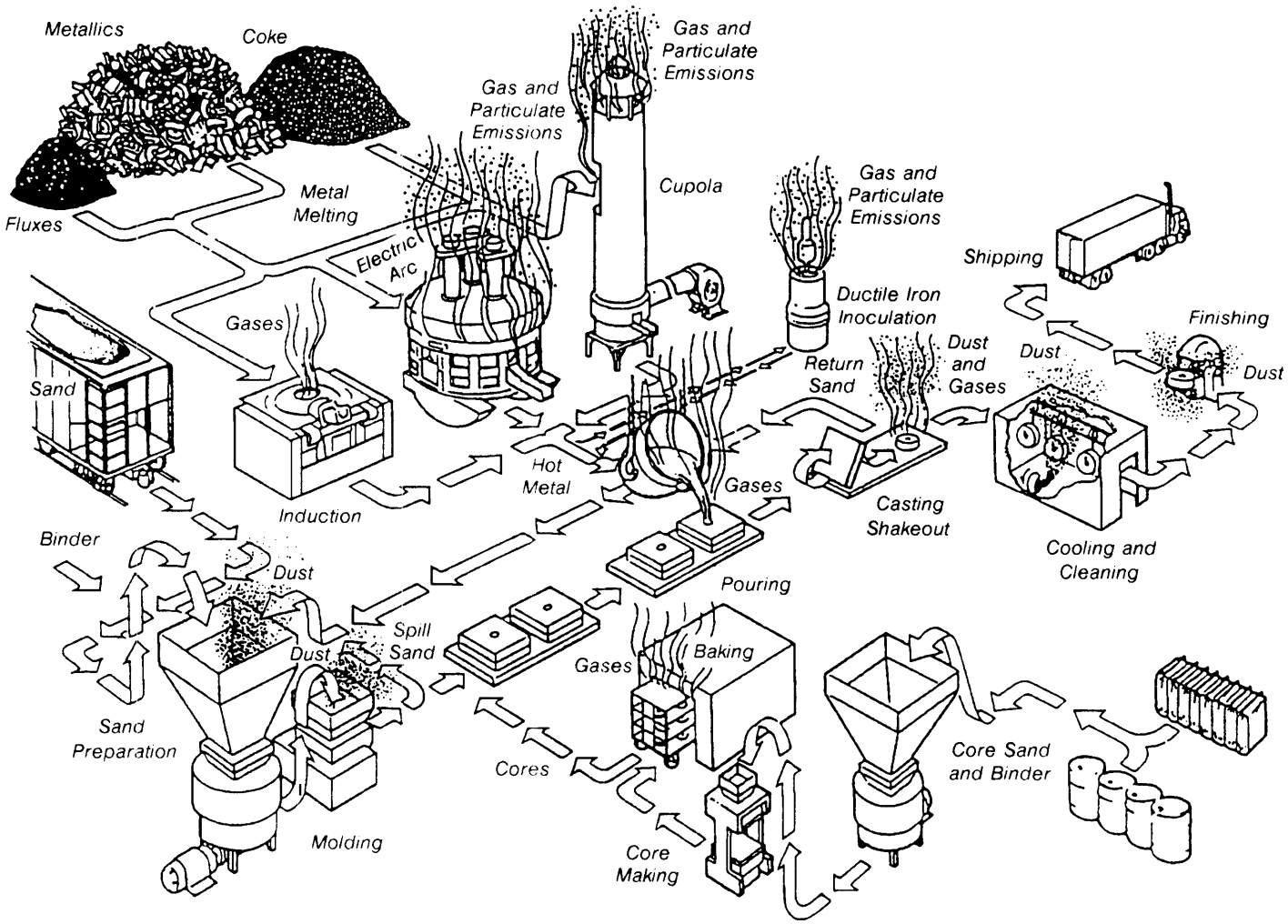

Figure 1. *Emission points in a typical iron foundry.*

Gerhard Gschwandtner and Susan Fairchild are with E. H. Pechan and Associates, Inc., Durham, NC 27707.
***Robert C. McCrillis** is the EPA Project Officer (see below).*
The complete report, entitled "Emission Factors for Iron Foundries: Criteria and Toxic Pollutants" (Order No. PB 90-266 743/AS; Cost: $17.00, subject to change) will be available only from:
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650
The EPA Project Officer can be contacted at:
Air and Energy Engineering Research Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

United States
Environmental Protection
Agency

Center for Environmental Research
Information
Cincinnati OH 45268

BULK RATE
POSTAGE & FEES PAID
EPA
PERMIT No. G-35

Official Business
Penalty for Private Use $300

EPA/600/S2-90/044