ENVIRONMENTAL STANDARDS CONCERNING INDUSTRIAL POLLUTION DISCHARGE

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Contents

Summary

Industry contributes various pollutants to the environment. Standards concerning industrial discharge are a very important part of the environmental standards. The principles and functions to set environmental emission standards are described. Taking the standards of the United States of America as an example, the basic contents of the discharge standards for air, water, solid pollutants, odor and noise are introduced. The environmental management standards set by the International Standards Organization (ISO) are discussed. The development trends of the emission standards are summarized. It is predicted that environmental standards will soon be an integral part of the world's general-purpose, distributed, electronically-linked information system that provides access to essentially all human knowledge.

1. Introduction

Industry is a major contributor to pollution. Therefore, the establishment and enforcement of environmental standards for industrial discharge is very important to protect the environment.

Environmental standards are norms of governmental or non-governmental agencies and institutions. They include many "discussion values" or "orientation values" that are suggested by scientists, committees, commissions, associations, or agencies. "Guidelines" are made available to the public by agencies, commissions, and associations. "Limits" are mandatory and set by regulatory agencies following legislative action.

The pollutant discharge standards are the main body of the environmental standards Industrial pollution discharge standards are mainly emission-based standards, which are norms to limit the emissions of contaminants into environmental media (water, air, and soil) as well as for the disposal of benign wastes.

The environmental standards are composed of a very complex system. Different countries, different regions set their environmental standards based upon different principles. The common principles cover the following

- Protection human health and maintenance of ecological balance. The World Health Organization (WHO) sets a series of pollutant criteria upon summarizing the data from all around the world. These criteria provide the very basic base for countries worldwide to develop their environmental standards.
- Economic acceptability. The current economic capability should afford the expense to meet the standards.
- Integrated consideration of regional conditions, short term and long term planning, policy requirements.
- Sound scientific support Advanced analysis, monitoring, sampling methods should be used. The best available technology (BAT) and advanced scientific tools should be evaluated to establish environmental standards.

Generally speaking, industrial discharge standards are made based upon comprehensive considerations of the technology, economics, and environmental characteristics. It is a measurement to realize the environmental quality standards. For industrial pollution, the discharge standards have various categories depending on various industries, the pollutant exiting type, characteristics, time, scale, etc.

In this chapter, we take the standard system of the USA as an example to introduce some basic parts of the emission standards.

2. Emission Standards for Air

The Clean Air Act (CAA) is a comprehensive federal statute designed to regulate air emissions from stationary and mobile sources. The goal of the CAA is to protect the public health and welfare from the harmful effects of air pollutants. To this end, national ambient air quality standards were required to manage and regulate the provisions of the act, including permits. For implementing the CAA, the U. S. Environmental Protection Agency (EPA) established a series of regulations, including National primary and secondary ambient quality standards; Standards of performance for new stationary sources; National emission standards for hazardous air pollutants; National emission standards for hazardous air pollutants for source categories; etc.

2.1. Ambient Air Quality Standards

Ambient air quality standards are national in scope and set air quality goals to be achieved by the states. The standards are stated in terms of annual concentration levels or annual mean measurement for the air. These numerical standards were to be based on background studies that included control technology, costs, energy requirements,

emission reduction benefits, and environmental impacts.

Based on the criteria established for each pollutant under the CAA and "allowing an adequate margin of safety", EPA is directed to promulgate national primary and secondary ambient air quality standards for each pollutant. Primary air quality standards are designed to protect the public health. Secondary standards are intended to protect the public welfare from any known or anticipated adverse effects associated with the presence of such pollutants in the air. The major criteria pollutants are: carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter (PM_{10}, particulate matter that is 10 microns or less in diameter and $PM_{2.5}$, particulate matter that is 2.5 microns or less in diameter), ozone, lead.

Regions within a state are designated as either attainment or non-attainment areas. When the air quality exceeds national ambient air quality standards, the region is an "attainment area". Non-attainment areas are quality control regions that have not met the ambient air quality standards. The designations are pollutant-specific, which means an area may fall into both categories for different pollutants. EPA allows new major source in non-attainment areas only if stringent conditions are met, including a greater than one-for–one offset of emissions from existing sources in the area. National air quality regulations are applied to individual sources through State Implementation Plans (SIPs). A SIP is an extensive, detailed document that contains elements such as emission inventories, monitoring programs, attainment plans and enforcement programs.

2.2. Structure of the Emission Standards

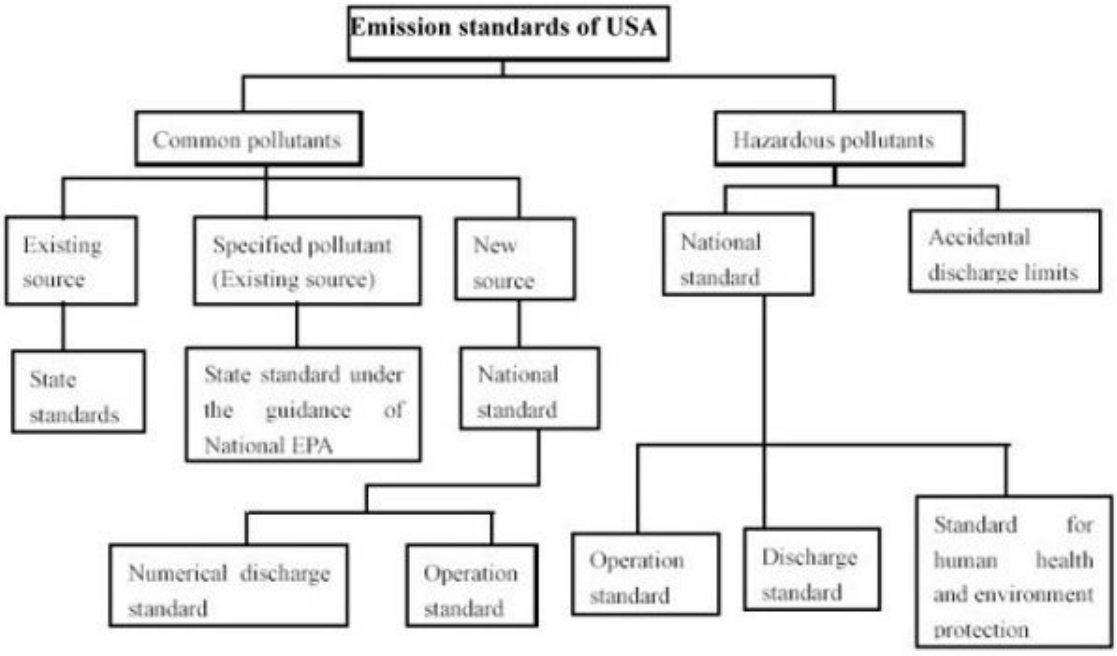

Figure 1: Structure of the emission standards for air pollutants in the USA

There are standards for common pollutant and hazardous pollutants. The permitting

limits for pollutants for new source and existing source are different. Figure 1 describes the structure of the emission standards for air pollutants in the USA.

2.3. New Source Performance Standards

Performance standards for new sources are designed to allow industrial growth without undermining the national program for achieving air quality goals. New Source Performance Standards (NSPS) are established at the national level in order to prevent states from becoming "pollution havens" and attracting industry with their lenient emission standards. NSPA are oriented to particular sources of pollutants rather than to air quality in general. NSPS are typically numeric standards that relate to the level of pollution control achieved by installing the best demonstrated technology (BDT).

The new source performance standards are set for specific processes and apply to all new processes of that type and to existing sources that are substantially modified or rebuilt. The regulations also specify test standards that apply nationwide. On the state level, existing facilities must meet a state-promulgated standard pursuant to requirements of the CAA.

	Source
	General provisions
	Adoption and submittal of state plans for designated facilities
	Emissions guidelines and compliance times
	Emissions guidelines and compliance schedules for municipal waste combustors
	Emissions guidelines and compliance schedules for municipal waste landfills
	Emissions guidelines and compliance schedules for sulfuric acid production units
	Fossil-fuel fired steam generators (construction commenced after 8-17-71)
	Electric utility steam generating units (construction commenced after 9-18-78)
	Industrial –commercial-institutional steam generating units
	Small industrial-commercial-institutional steam generating units
	Incinerators
	Municipal waste combustors (construction between 12-20-89 and 1-20-94)
	Portland cement plant
	Nitric acid plants
	Sulfuric acid plants
	Asphalt concrete plants
	Petroleum refineries
	Storage vessels for petroleum liquids (construction commenced after 6-11-73 and prior to 5-19-78)
	Storage vessels for petroleum liquids (construction commenced after 5-19-78 and prior to 7-23-84)
	Volatile organic liquid storage vessels (construction commenced after 7-23-84)

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Bibliography

Erickson S. L., Brian J. K. (1999) *Fundamentals of environmental Management.* John Wiley & Sons, Inc. [A comprehensive review of the fundamental concepts of environmental management as a guidance document]

Förstner U. (1995) *Integrated pollution control.* Translated and edited by Weissbach A. and Boeddicker H., Springer-Verlag Berlin Heidelberg. [Development and optimization of method that limit the spread of pollutants in human and natural environment]

Robert A. C. (1998) *Standard handbook of environmental engineering.* McGraw Hill. 2nd edition. [Introduction of environmental legislation]

Vincent O'malley. (1999) The integrated pollution prevention and control (IPPC) directive and its implications for the environment and industrial activities in Europe. *Sensors and Actuators* B. 59:78-82 [Holistic control of environmental pollution]

Wright R. N. (1999) Standards media and methods. *Automation in Construction*. 8: 473-479 [New trends in environmental standards development]

Biographical Sketch

Xianghua WEN is a Professor in Department of Environmental Science and Engineering at Tsinghua University, Beijing, Peoples' Republic of China. She received her Ph.D degree in Environmental Engineering from Tsinghua University in 1991. She teaches Modern Environmental Biotechnology for graduate students. She carries out the research works in the State Key Joint Laboratory of Environmental Simulation and Pollution Control. Her major research fields are in Water pollution control theory and technology and Environmental Chemistry. The on-going project that she is in responsible for or involved in include: "Membrane Bioreactor for Industry Wastewater Treatment"; "Effect and reinforced mechanism of modern biotechnology in detoxification of pollutants"; "Sustainable Development of Water Resource in Chinese Cities"; "Screening and testing on White-rot Fungi to degrade refractory organics" and etc. She is the author or co-author of about 100 technical papers and research reports.