

General Environmental Guidelines

The World Bank Group may finance commercial and industrial projects for which no specific environmental guidelines have been written. In such cases, the general environmental guidelines outlined in this chapter can be used, but, depending on the project, the requirements contained here may need to be supplemented by additional requirements.

Projects must comply with World Bank Group policies and guidelines, which emphasize pollution prevention, including the use of cleaner production technologies. The intent of the guidelines is to minimize resource consumption, including energy use, and to eliminate or reduce pollutants at the source. For ease of monitoring, maximum permitted emissions limits are often expressed in concentration terms—for example, milligrams per liter (mg/l) for liquid effluents and, for air emissions, milligrams per normal cubic meter (mg/Nm³), where "normal" is measured at one atmosphere and 0° Celsius. The focus, however, should continue to be on reducing the mass of pollutants emitted to the environment. *Dilution of effluents and air emissions to achieve maximum permitted values is unacceptable.* Occasionally, emissions limits are specified in mass of pollutants per unit of production or some other process parameter. In such cases, the limits include leaks and fugitive emissions.

Pollution control systems may be required in order to meet specified emissions limits. These systems must be well maintained and operated and must not be fitted with overflow or bypass devices unless such devices are required for emergencies or for safety purposes.

The following sections contain requirements for air emissions, liquid effluents, hazardous chemicals and wastes, and solid wastes. Sections on ambient noise and monitoring requirements are included. The final section summarizes the

key steps that will contribute to minimizing the impact of the project on the environment.

Emissions Guidelines

Emissions levels for the design and operation of each project must be established through the environmental assessment (EA) process on the basis of country legislation and the *Pollution Prevention and Abatement Handbook*, as applied to local conditions. The emissions levels selected must be justified in the EA and acceptable to the World Bank Group.

The guidelines given below present emissions levels normally acceptable to the World Bank Group in making decisions regarding provision of World Bank Group assistance. Any deviations from these levels must be described in the World Bank Group project documentation.

All of the maximum levels should be achieved for at least 95% of the time that the plant or unit is operating, calculated as a proportion of annual operating hours.

Air Emissions

Most of the air emissions from commercial and general industrial facilities originate with the fuel used for heating purposes or for generating steam for process purposes. Particular emissions that may originate in the process are addressed case by case. Concentrations of contaminants emitted from the stacks of significant sources with an equivalent heat input of more than 10 million British thermal units per hour (Btu/hr), including boilers, furnaces, incinerators, and electrical generating equipment, should not exceed the limits presented in Table 1.

Table 1. Air Emissions Limits for General Application

(milligrams per normal cubic meter)

Pollutant or parameter	Limit
PM	50 for units with ≥ 50 MWe input 100 for units with < 50 MWe input
Nitrogen oxides, as NO ₂	
Coal fired	750 (260 ng/J)
Oil fired	460 (130 ng/J)
Gas fired	320 (86 ng/J)
Sulfur dioxide	Not to exceed 2,000

Note: MWe, megawatts electricity; ng/J, nanograms/joule.

The project sponsor is required to demonstrate compliance with the emissions limits specified in Table 1. The following methods may be used to demonstrate compliance:

- For sources less than 100 million Btu/hr, compliance with the guidelines for particulate matter may be demonstrated by maintaining the stack emissions opacity below 20%. Opacity can be determined visually by a qualified observer, with a continuous opacity meter, or with a mobile light detection and ranging (LIDAR) system.
- The sulfur content of fuels may be used to demonstrate compliance with the sulfur dioxide (SO₂) emissions guidelines. The guidelines are met by the use of liquid fuels with a sulfur content of 0.5% or less or of solid fuels with a sulfur content of 0.8% or less and a heat content of 7,000 kilocalories per kilogram (kcal/kg). The use of solid fuels burned in underfired-feed stoker units meets the SO₂ emissions guideline if the sulfur content of the solid fuel is 1.0% or less. The sponsor must maintain records of fuel analyses to demonstrate that the sulfur content of the fuel is at or below the specified levels.
- Manufacturers' performance guarantees can be used to demonstrate that the emissions guidelines for nitrogen oxides (NO_x) are met. The performance guarantees must be verified by conducting an initial performance test after the equipment has been commissioned. The sponsor must maintain records to demonstrate that the equipment is operated within manufacturers' specifications.

- Alternatively, stack emissions can be monitored for specified contaminants. The monitoring must be sufficiently frequent to demonstrate continued compliance with the guidelines.

Table 2 may be used to determine equivalent source sizes.

The World Bank's "Pollution Prevention and Abatement Guidelines for Thermal Power Plants" apply to sources larger than 50 MWe or with an equivalent heat input greater than 170 million Btu/hr. Sources with an equivalent heat input of 10 million Btu/hr are generally not subject to the above limits. However, the World Bank Group may in particular cases specify emissions limits for such sources to protect the local environment.

To ensure that ambient air conditions are not compromised, concentrations of contaminants, measured immediately outside the project property boundary, should not exceed the limits shown in Table 3.

Pollutants such as dioxins and furans, toxic organics, and toxic metals should not exceed risk-specific doses or reference air concentrations at the receptor end. The dioxin emissions level for 2,3,7,8-TCDD equivalent should be less than 1 nanogram per normal cubic meter.

Table 2. Equivalent Source Sizes

In millions of Btu/hr	In tons of steam/hr	In MWe
10	4.2	2.9
50	21.0	14.5
100	42.0	29.0
200	84.0	58.0

Table 3. Ambient Air Conditions at Property Boundary, for General Application

(micrograms per cubic meter)

Pollutant	Concentration
<i>Particulate matter</i>	
Annual arithmetic mean	50
Maximum 24-hour average	70
<i>Nitrogen oxides</i>	
Maximum 24-hour average	150
<i>Sulfur dioxide</i>	
Annual arithmetic mean	50
Maximum 24-hour average	125

Liquid Effluents

Process wastewater, domestic sewage, and contaminated stormwater and runoff must meet the maximum limits shown in Table 4 before being

Table 4. Limits for Process Wastewater, Domestic Sewage, and Contaminated Stormwater Discharged to Surface Waters, for General Application

(milligrams per liter, except for pH, bacteria, and temperature)

Pollutant or parameter	Limit
pH	6–9
BOD	50
COD	250
Oil and grease	10
TSS	50
<i>Metals</i>	
Heavy metals, total	10
Arsenic	0.1
Cadmium	0.1
Chromium	
Hexavalent	0.1
Total	0.5
Copper	0.5
Iron	3.5
Lead	0.1
Mercury	0.01
Nickel	0.5
Selenium	0.1
Silver	0.5
Zinc	2.0
<i>Cyanide</i>	
Free	0.1
Total	1.0
Ammonia	10
Fluoride	20
Chlorine, total residual	0.2
Phenols	0.5
Phosphorus	2.0
Sulfide	1.0
Coliform bacteria	< 400 MPN/100 ml
Temperature increase	< 3°C ^a

Note: MPN, most probable number.

a. The effluent should result in a temperature increase of no more than 3° C at the edge of the zone where initial mixing and dilution take place. Where the zone is not defined, use 100 meters from the point of discharge.

discharged to surface waters. Where there is a leachate from a solid waste disposal site, the toxic metals contained in the leachate should not exceed the levels shown in the table for pollutants in liquid effluents. Pollutants of concern for a project that are not included in Table 4 will be specified by the World Bank Group. Levels of pesticides, dioxins, furans, and other toxics, such as polynuclear aromatic hydrocarbons (PAHs), in effluent discharges should not exceed either 100 times the WHO guidelines for drinking water or 0.05 mg/l.

Liquid effluent may be discharged to a public or private central wastewater treatment system. Where this is the case, information from the local authority or private central wastewater treatment company is to be provided to confirm that the treatment system has the capacity and is managed to adequately treat the project's liquid effluents. The World Bank Group may require pretreatment prior to such discharge.

Hazardous Materials and Wastes

Sponsors shall, whenever possible, use nonhazardous instead of hazardous materials. All hazardous wastes, process residues, solvents, oils, and sludges must be properly disposed of. Leachates that contain hazardous pollutants must not exceed the liquid effluent levels given in Table 4.

The following management measures for handling hazardous wastes and materials should be implemented:

- All hazardous (ignitable, reactive, flammable, radioactive, corrosive, and toxic) materials must be stored in clearly labeled containers or vessels.
- Storage and handling of hazardous materials must be in accordance with local regulations or international standards and appropriate to their hazard characteristics. Storage and liquid impoundment areas for fuels, raw and in-process materials, solvents, wastes, and finished products should be designed with secondary containment (e.g., dikes and berms) to prevent spills and the contamination of soil, groundwater, and surface waters.
- Fire prevention systems and secondary containment should be provided for storage fa-

cilities, where necessary or required by regulations, to prevent fires or the release of hazardous materials to the environment.

New installations or manufactured products should not contain unbonded asbestos fibers. The need to remove asbestos and asbestos-containing materials (ACMs) from existing applications shall be evaluated case by case. Disposal of removed asbestos and ACMs should be carried out in accordance with host country requirements or following internationally recognized best practices.

Formulations containing chromates should not be used in water treatment processes.

Transformers or equipment containing polychlorinated biphenyls (PCBs) or PCB-contaminated oil should not be installed. Existing equipment containing PCBs or PCB-contaminated oil should be phased out and disposed of in a manner consistent with the requirements of the host country or internationally recognized best practices.

Several chemicals classified as ozone-depleting substances (ODSs) are scheduled for phase-out under the Montreal Protocol on Substances That Deplete the Ozone Layer. They include chloro-fluorocarbons (CFCs); halons; 1,1,1-trichloroethane (methyl chloroform); carbon tetrachloride; hydrochlorofluorocarbons (HCFCs); hydrobromofluorocarbons (HBFCs); and methyl bromide. These chemicals are currently used in a variety of applications, including domestic, commercial, and process refrigeration (CFCs and HCFCs); domestic, commercial, and motor vehicle air conditioning (CFCs and HCFCs); manufacturing of foam products (CFCs); solvent cleaning applications (CFCs, HCFCs, methyl chloroform, and carbon tetrachloride); aerosol propellants (CFCs); fire protection systems (halons and HBFCs); and crop fumigants (methyl bromide). No systems or processes are to be installed using CFCs, halons, 1,1,1-trichloroethane, carbon tetrachloride, methyl bromide, or HBFCs unless it can be shown that no alternative exists. (There are few applications worldwide that require any of these chemicals.) HCFCs should be considered only as interim or bridging alternatives, since they too are to be phased out.

Solid Wastes

Project sponsors are to implement the following practices for managing solid wastes generated in the course of operating the facility:

- Recycle or reclaim materials where possible.
- If recycling or reclamation is not practical, wastes must be disposed of in an environmentally acceptable manner and in compliance with local laws and regulations.

Other Environmental Requirements: Ambient Noise

Noise abatement measures should achieve either the levels given below or a maximum increase in background levels of 3 decibels (measured on the A scale) [dB(A)]. Measurements are to be taken at noise receptors located outside the project property boundary.

Receptor	Maximum allowable log equivalent (hourly measurements), in dB(A)	
	Day (07:00–22:00)	Night (22:00–07:00)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Monitoring

Liquid effluents should be sampled and measured weekly, or as agreed between the borrower and the World Bank Group, for common parameters such as BOD, suspended solids, pH, oils and grease, and flow. The World Bank Group will specify sampling frequencies for project-specific pollutants that are present in the effluent. Leachates from solid waste disposal sites should be sampled and tested monthly, using strategically located sampling points. The parameters to be tested will depend on the nature of the potential leachate and will be specified by the World Bank Group.

The World Bank Group will specify the frequency and method for monitoring pollutants in the stack discharge.

Recordkeeping and Reporting

The project sponsor is required to maintain records of air emissions, effluents, and hazardous wastes sent off site, as well as significant environmental events such as spills, fires, and other emergencies that may have an impact on the environment. The information should be reviewed and evaluated to improve the effectiveness of the environmental protection plan.

Key Issues for Environmental Control

The key production and control practices that will assist in meeting emissions requirements can be summarized as follows:

- Where feasible, choose energy-efficient and environmentally sound processes.
- Ensure that control, treatment, and monitoring facilities are properly maintained and that they are operated according to their instruction manuals.