

Wood Preserving Industry

Industry Description and Practices

Wood preserving involves imparting protective properties to wood from weathering and attack by pests. The three main types of preservatives used are: water-based (such as sodium phenylphenoxide, benzalconium chloride, guazatin, and copper chrome arsenate); organic solvent-based (such as pentachlorophenol whose substitutes include Propiconazol and Tebuconazol, lindane, permethrin, triazoles, tributyltin compounds, and copper and zinc naphthenates); borates; and tar oils (such as creosote). *Note: Some of the preservatives mentioned here (for example, lindane, tributyltin and pentachlorophenol) are banned in some countries and are not to be used.* The preservatives are applied to the surface of wood by pressure impregnation (with a pressure range of 800 kilopascals (kPa) to 1,400 kPa); deluging (mechanical application by flooding or spraying), dipping or immersion; and thermal processing (immersion in a hot bath of preservative). Application of vacuum helps in improving the effectiveness of the process and to recover some of the chemicals used. Application of pesticides is done using appropriate protective clothing including gloves, apron, overalls, and inhalation protection.

Waste Characteristics

Any or all of the substances used in wood preserving (such as preservatives and solvents) can be found in the drips and surface runoff

streams. Air emissions of solvents and other volatile organics result from the surface treatment steps, drying of the treated wood, and chemical storage/transfer areas. Soil contamination may result from the drippage and surface runoff and this may happen near the process areas and the treated wood storage areas. Some of the major pollutants present in drips, surface runoff, and contaminated soil include polynuclear aromatic hydrocarbons, pentachlorophenol, pesticides, dioxins, chrome, copper, and arsenic.

Pollution Prevention and Control

Wood preserving involves different combinations of a wide variety of processes and there are many opportunities to improve upon the traditional practices in the industry. The following improvements should be implemented where feasible:

Process Selection

- Do not use pentachlorophenol, lindane, tributyltin, and copper chrome (or its derivatives) arsenate.
- Give preference to pressurized treatment processes to minimize wastage of raw materials used and thereby minimizing the release of toxics which may be present.

Reduction in Drivpage

- Minimize drippage by effective removal (by mechanical shaking till no drippage is

noticeable) of extra preservative from the wood surface. Provide sufficient holding time after preservative application to minimize free liquid.

- Recycle collected drips after treatment, if necessary.
- Heat treated wood when water based preservatives are used.

Minimizing Soil Contamination

- Use concrete pads for the wood treatment area and intermediate storage areas to ensure proper collection of drippage. Treated wood should only be sent for storage after drippage has completely stopped.

Control of Surface Runon and Surface Runoff

- Minimize the surface runon by diversion of storm water away from the process areas.
- Cover process areas and collect surface runoff for recycle and treatment. Where water based preservatives are used, avoid the contact of fresh treated wood with rain water.

Site Selection

- Sites should be selected which are not prone to flooding, adjacent to water intake points, or valuable groundwater resources.

Storage of Chemicals

Preservatives and other hazardous substances should be stored in a safe way, preferably under a roof with a spill collection system. Proper labels should be applied and used packaging returned to the supplier for re-use or sent for other acceptable uses or destruction.

Target Pollution Loads

Minimize the contamination of surface runoff and soil. Have a closed system for managing liquids to avoid the discharge of liquid effluents.

Treatment Technologies

Air Emissions

Exhaust streams should be treated to reduce volatile organic compounds (VOCs) (using carbon filters which enable the reuse of solvents) to acceptable levels before venting to the atmosphere. Where VOCs recovery is not feasible, destruction is carried out in combustion devices or bio-oxidation systems.

Liquid Effluents

The main treatment processes is recycling of collected drips and surface runoff after evaporation. Other processes include detoxification (using ultraviolet oxidation) and precipitation/stabilization of heavy metals.

Solid and Hazardous Wastes

Contaminated soil may contain heavy metals and toxic organics. It should normally be managed as hazardous waste. Treatment methods include incineration of toxic organics and stabilization of heavy metals.

Emission Guidelines

Emission levels for the design and operation of each project must be established through the Environmental Assessment (EA) process, based on country legislation and the *Pollution Prevention and Abatement Handbook* as applied to local conditions. The emission levels selected must be justified in the EA and acceptable to MIGA.

The following guidelines present emission levels normally acceptable to the World Bank Group in making decisions regarding provision of World Bank Group assistance, including MIGA guarantees; any deviations from these levels must be described in the project documentation.

The guidelines are expressed as concentrations to facilitate monitoring. Dilution of air emissions or effluents to achieve these guidelines is unacceptable.

All of the maximum levels should be achieved for at least 95% of the time that the

plant or unit is operating, to be calculated as a proportion of annual operating hours.

Air Emissions

The maximum air emission level from wood impregnation areas for VOC is 20 mg/Nm³.

Liquid Effluents

Wood preserving plants should use closed systems where feasible or attain the following effluent levels:

Effluents (including surface runoff) from the Wood Preserving Industry

<i>Parameter</i>	<i>Maximum value milligrams per liter (mg/L)</i>
pH	6-9
Total suspended solids	50
COD	150
Oil and grease	10
Phenol	0.5
Arsenic	0.1
Chromium (hexavalent)	0.1
Chromium (total)	0.5
Copper	0.5
Fluorides	20
PAHs (each) such as benzo (a) pyrene	0.05
Dioxins/Furans (sum of all)	0.0005
Pesticides (each)	0.05

Note: Effluent requirements are for direct discharge to surface waters.

Sludges

Wherever possible, generation of sludges and contaminated soil should be minimized. Contaminated soil and sludges must be treated, stabilized, and disposed of in an approved secure landfill. The levels of toxics in the leachate should be those for liquid effluents.

Ambient Noise

Noise abatement measures should achieve either the following levels or a maximum increase in background levels of 3 dB(A). Measurements are to be taken at noise receptors located outside the project property boundary.

Ambient Noise

Receptor	Maximum Allowable L_{eq} (hourly), in dB(A)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

The emission requirements given here can be consistently achieved by well-designed, well-operated and well-maintained pollution control systems. The emission guidelines given here can be consistently achieved by well-designed, well-operated and well-maintained pollution control systems.

Monitoring and Reporting

Daily monitoring of the above listed parameters except metals should be installed to provide an indication of overall treatment reliability. Metals should be sampled at least on a monthly basis. Frequent sampling may be required for certain batches and during wet weather conditions.

Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken. Records of monitoring results should be kept in an acceptable format. These should be reported to the responsible authorities and relevant parties, as required, and submitted to MIGA if requested.

Key Issues

The following box summarizes the key production and control practices that will lead to compliance with emission guidelines:

- Do not use pentachlorophenol, lindane, tributyltin, copper chrome arsenate, and other preservatives which are considered toxic and for which less toxic alternatives are available for wood treatment systems.
- Use pressurized treatment processes.
- Heat treated wood when water-based preservatives are used.
- Minimize drippage carryover by ensuring that it has completely stopped before removing the treated wood from the process area. Collect and recycle drip solutions and have total recycle systems for liquid/effluents.
- Use concrete pads for the wood treatment and intermediate storage areas.
- Divert storm water away from the process areas. Collect and treat surface runoffs.
- Recycle solvent vapors where feasible, otherwise they should be destroyed in a combustion device or in a bio-oxidation system.
- Manage contaminated soil and sludges as hazardous wastes.

Further Information

The following are suggested as sources of additional information (these sources are provided for guidance and are not intended to be comprehensive):

U.S. Government Printing Office. 1990. Federal Register, Volume 55, Number 235, Thursday, December 6. Wood Preserving; Identification and Listing of Hazardous Waste: Final Rule.

World Bank, Environment Department. 1995. "Industrial Pollution Prevention and Abatement: Wood Preserving Industry." Draft document.