

WOOD PROCESSING WASTE AND THE ENVIRONMENT

Manufacturing operations that process raw wood, such as sawmills, paper mills and furniture manufacturers, generate wood residue, such as bark, sawdust, shavings, wood chips and off-cuts. There is clear scientific evidence that, if improperly managed, wood residue can negatively impact the environment, contaminate water and destroy fish habitat.

Although, wood residue comes from a natural resource, it is not found in the natural environment in this state. In the presence of water, fragmented wood such as sawdust or wood chips can result in the discharge of contaminants.

Wood residue, also known as woodwaste, is a waste stream that is regulated under the *Environmental Protection Act*. The Ministry of the Environment applies the *Environmental Protection Act* and the *Ontario Water Resources Act* to ensure that companies generating woodwaste manage it in a way that will protect the environment and conserve resources. In order to promote re-use, woodwaste is exempted from specific regulatory requirements when the material is managed through re-use and recycling. However, the material remains defined as a waste material.

The ministry's concerns are strengthened by its review of scientific studies and documents that highlight such findings in other jurisdictions. This information is available from several agencies, including the B.C. Ministry of Water, Land and Air Protection, Fisheries and Oceans Canada and the Oregon Department of Environmental Quality (see List of References).

Leachate from Wood Residue

Wood Residue leachate is produced when water percolates, or flows, through wood residue. Precipitation is one source of water that can create wood residue leachate. Storing woodwaste in pits where it has contact with groundwater creates another source of leachate. The process is like brewing coffee or tea. Moreover, water infiltrating woodwaste deposited into watercourses (rivers, creeks, lakes) or wetlands will also result in leachate production. Typically, pure wood residue leachate is a black liquid with a petroleum-like odour that can cause foaming and slicks in water.

Wood residue decomposition is a slow process that can result in decades of leachate production. During periods of prolonged water saturation, substances found naturally in wood, such as resin acids, lignins, lignans, terpenes, fatty acids and tannins, dissolve from this waste in high concentrations. Woodwaste deposits retain leachate until becoming over-saturated with water. When over-saturation occurs, leachate is released into the environment and can have an adverse impact on the ground water, nearby surface waters and aquatic life.

Several of the chemicals in wood residue leachate are found at levels equal to or higher than that of raw municipal sewage. As such, wood residue leachate has the potential to harm the environment and as such cannot be discharged without proper treatment.

The following table compares the levels of some chemical components measured in a wood residue leachate sample to levels typically found in medium strength raw municipal sewage:

Component	Leachate Concentration * (mg/L=milligrams/litre)	Typical Raw Municipal Sewage
Biochemical Oxygen Demand	2,970 mg/L	150-250 mg/L
Ammonia	0.3 mg/L	15-50 mg/L
Organic Nitrogen	22 mg/L	25-85 mg/L
Phosphorus	8.75 mg/L	6-12 mg/L

* Based on a leachate sample taken May 30, 2001

The following table compares the levels of some chemical components measured in a wood residue leachate sample to drinking water limits:

Component	Leachate Concentration * (mg/L=milligrams/litre)	Drinking Water Limit	Relative Impact
Iron (taste, staining)	47 mg/L	0.30 mg/L	157X
Manganese (taste, staining)	13 mg/L	0.05 mg/L	260X
Organic Nitrogen (taste, odour)	22 mg/L	0.15 mg/L	147X
pH (plumbing corrosion)	4.7**	6.5-8.5	-

* Based on a leachate sample taken May 30, 2001

** Plumbing corrosion is associated with a pH value less than 6.5. Mineral incrustation and bitter taste are associated with a pH value greater than 8.5.

Groundwater Impacts

Wood residue leachate can contaminate groundwater. Wood residue leachate contains high concentrations of natural organic compounds and can mobilize metals such as iron from soils. Leachate-impacted groundwater is generally brownish in colour, has an unpleasant odour, an offensive taste and can cause staining of plumbing fixtures and laundry. The colour, odour and taste of leachate-impacted groundwater can be effective warning signs. Leachate-impacted well water will likely produce an offensive odour or taste before unhealthy concentrations are reached. Wood residue leachate impacts on well water supplies can be successfully remedied using commercial water treatment systems.

Impacts to Surface Water

Woodwaste deposited into or near watercourses can alter, disrupt or destroy fish habitat. In fact, it can smother spawning grounds and feeding areas, decreasing fish variety and abundance. Wood residue leachate can mobilize high concentrations of metals such as iron from native soils. These can smother the bottoms of streams and lakes forming pavement-like areas.

To give an example of the impacts, leachate collected from a sawmill in Northern Ontario caused 100 per cent mortality in Rainbow Trout within 90 seconds and 100 per cent mortality in invertebrates (fish food) within 48 hours.

Concentrations of metals found in wood residue leachate can exceed lethal levels for certain fish species and benthic invertebrates. For example, the concentration of zinc found in a sample of wood residue leachate was 1.5 mg/litre. The lethal level for zinc for certain fish is 0.135 mg/L at hardness of 26 mg/litre.

Oxygen is required by almost all aquatic life. Biological Oxygen Demand (BOD) measures the dissolved oxygen required to break down wastes. High BOD levels in wood residue leachate indicate conditions that would cause fish to suffocate. Low levels of dissolved oxygen in the presence of toxicants, such as resin acids, may exacerbate the impact of those compounds on fish and other aquatic organisms. In oxygen-poor waters, fish may be stressed to the point they are affected by levels of certain toxicants that would not ordinarily be lethal.

Wood residue may also produce hydrogen sulphide and ammonia under oxygen-poor conditions. The ammonia in water can reduce the oxygen-carrying capacity of fish blood, which can cause death by suffocation.

Woodwaste Management

The ministry has been working with owners of sawmill operations in Renfrew and Lanark Counties to ensure that they have the necessary ministry approvals and they adopt proper environmental controls and practices to protect the local environment. The ministry's inspections in this area build on work already undertaken with sawmill operators in Northern Ontario, helping them come into compliance with environmental regulations.

Sawmill owners should develop and implement woodwaste management plans to minimize environmental impact, while taking into consideration the unique environmental conditions at each site where woodwaste is found. The ministry has offered sawmill operators \$25,000 in funding to assist with the development of a set of best environmental management practices for sawmill operators.

A number of steps can be taken to prevent or minimize environmental impacts from woodwaste. The most effective way to prevent a potential environmental impact is to reduce the volume of woodwaste requiring on-site storage or disposal.

Finding alternative uses for woodwaste is an encouraged best practice. For example, bark chips can be used for landscaping purposes, provided that they are properly handled to minimize environmental impact. Also, ministry regulations require larger manufacturers, including those who generate woodwaste, to conduct waste audits and implement waste reduction plans. They are also required to separate woodwaste at the source and ensure that it is recycled. There are many products made from recycled woodwaste. Woodwaste can be a valuable secondary material and it is used in a wide variety of processes such as in the manufacturing of medium-density fiberboard, composting or landscaping.

If temporary on-site storage is required, the woodwaste piles must be located away from any watercourses and stored in a manner that minimizes contact with water.

Woodwaste disposal sites require ministry approval. The approval process for waste disposal sites involves evaluating the potential for environmental impact at a site, and is intended to ensure that proper controls are in place prior to disposal to avoid or sufficiently minimize such impact.

For more information of on woodwaste and woodwaste disposal, please call the ministry's Public Information Centre at 1-800-565-4923.

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