

Management of Wood Ash Generated from Biomass Combustion Facilities



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Environmental
Quality

Environmental Solutions Division Materials Management Program

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Background

This fact sheet explains the importance of proper management of wood ash generated by biomass combustion facilities in Oregon. It also describes DEQ-approved management options for wood ash and describes the associated regulatory mechanisms for each option.

Biomass combustion facilities

Biomass is a popular term with many definitions. For purposes of this fact sheet, biomass is considered to be a woody material that is burned as fuel to generate electricity or produce heat. Direct combustion is the conventional and most common way in which biomass is used to generate energy.

Recent federal and state government initiatives including grants, low-interest loans and tax credit programs are available to support the development of energy-generating biomass combustion facilities. These initiatives are intended to advance forest health, renewable energy production and economic development. In response to these initiatives, at least six new biomass/electrical power combustion facilities are either been proposed or under construction in Oregon, with at least 12 new facilities in the planning stage.

Wood combustion ash

Wood ash is generated from burning various fuel sources. Forest management residues (slash) and lumber mill waste (bark, sawdust and wood chips) provide "clean" sources of woody biomass for combustion.

Hogged fuel is a common term for urban-generated woody biomass and can consist of chemically treated and painted wood, chips and sawdust. Hogged fuel can also include construction and demolition wood wastes, lumber mill wood wastes, stumps, brush and yard debris.

The chemical characteristics of wood ash depend on the types and quality of the fuels burned and the operating conditions and technology of the biomass facility. Although burning clean wood produces ash that is "cleaner" than coal-derived ash or municipal solid waste incinerator ash, the

characteristics of wood ash can be a concern for human health or the environment. These concerns are increased if treated wood is burned. Metals such as copper, chromium and arsenic are used as preservatives in treated wood and, when burned, those metals are concentrated above levels found in logging slash, bark, sawdust and other "clean" wood wastes.



Whether a facility separates fly ash and bottom ash can make a difference in ash composition. Fly ash is the lightest-weight component. It rises with the flue gases and is captured by a boiler or incinerator's air contaminant control equipment. Fly ash has higher concentrations of heavy metals and dioxins. Bottom ash is the material that falls to the bottom of the burner unit. Depending on the technology, bottom ash can be of ash consistency or often is a semi-solid slag material.

Compared to the original wood fuel, both fly and bottom ash contain concentrated chemical elements resulting from the removal of volatile components and the reduction of carbon mass.

Burning urban fuels, including painted lumber or wood treated with copper, chromium, or arsenic, can noticeably increase heavy metal concentrations.

Environmental and public health issues

Combustion of biomass fuels for power generation produces solid wastes (ash and slag) that concentrate metals, salts and other elements from the original fuel materials. If improperly managed, ash poses a threat to human health and the environment. Metals can leach into surface or groundwater, killing aquatic life and

contaminating drinking water. Plants can take up and concentrate metals that may be poisonous to domestic livestock or wildlife. Salts in ash can contaminate agricultural soils, inhibiting the soil's ability to grow crops.

If heavy metal and dioxin concentrations in ash are high enough, ash can affect public health if swallowed (ash can stick to hands or to food crops), and can affect ecological health (metals and dioxins can accumulate in worms that birds eat).

Wood ash management

Wood ash is considered solid waste and is subject to solid waste management requirements. It has practical applications if used appropriately and with DEQ approval. The following describes approved management options for wood ash generated by biomass combustion facilities in Oregon and each option's regulatory mechanisms:

Soil Amendment

Wood ash can be used on some agricultural soils to enhance crop production by raising soil pH (liming). Oregon soils that are acidic and normally receive liming applications for the growing of agricultural commodities (such as those in Western Oregon) may be good candidates for ash use as a liming agent, depending upon ash waste constituents.

DEQ evaluates each soil amendment proposal based on site-specific and ash-specific characteristics. Other conditions that are evaluated include: 1) the projected change in soil pH resulting from liming properties of the ash; 2) ability of waste chemical constituents to leach to groundwater; 3) surface water interactions from runoff; 4) ash storage management practices; and, 5) biotoxic effects on certain habitats.

Generators of wood ash who wish to land apply their ash should contact DEQ to discuss whether to apply to DEQ for a solid waste agricultural use exclusion for land application, or a beneficial use of solid waste determination. DEQ will review either application in the same manner.

Ingredient for Concrete

Fly ash contains several properties that are beneficial as a concrete ingredient. Chemically, fly ash can help bind concrete together. Physically, fly ash can help wet concrete flow better. However, fly ash quality is extremely important. Generators should contact DEQ to discuss applying for a beneficial use of solid waste determination if they intend to market their fly ash for use in concrete.

Other Beneficial Uses

Other appropriate beneficial uses, such as slag use in road construction, may be possible. Generators should contact DEQ to discuss applying for a beneficial use of solid waste determination in these cases.

Landfill Alternative Daily Cover

Wood ash may be a good alternative daily cover for landfills. DEQ approval is required for ash to be used as daily cover. A landfill must demonstrate the suitability of ash as alternative daily cover according to DEQ's *Guidelines for Alternative Daily Cover Material Application*.

Landfill Disposal

Ash can be disposed at landfills permitted to receive ash waste or at municipal, non-municipal and industrial solid waste landfills that are permitted to receive ash waste or that have an approved Solid Waste Management Plan for ash disposal.

For more information please contact a Regional Solid Waste Permit Coordinator:

Eastern Region: 541-298-7255 x221

Eastern Region counties include: Baker, Crook, Deschutes, Gilliam, Grant, Harney, Hood River, Jefferson, Klamath, Lake, Malheur, Morrow, Sherman, Umatilla (including Milton-Freewater), Union, Wallowa, Wasco, and Wheeler.

Northwest Region: 503-229-5263

Northwest Region counties include: Clackamas, Clatsop, Columbia, Multnomah, Tillamook, and Washington.

Western Region: 541-687-7465

Western Region counties include: Benton, Coos, Curry, Douglas, Jackson, Josephine, Lane, Lincoln, Linn, Marion, Polk, and Yamhill.

Alternative formats

Alternative formats of this document can be made available. For more information call 503-229-5696, Portland, or call toll-free in Oregon at 1-800-452-4011, ext. 5696. Hearing-impaired persons may call 711.