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BOILER ASH

Boiler ash is a generic term applied to many types of ash produced by the burning of various materials. They are 4 general types of boiler ash commonly available, each with its own chemical and environmental characteristics:

Wood Ash – from boilers where wood (or bark) is used as a heating source

Coal Ash – from coal powered electrical generating power plants, actually two forms, bottom ash and fly ash

Tire Ash – produced from burning shredded tires for fuel in generating plants

Incinerator Ash – produced from burning MSW (Municipal Solid Waste, i.e. Garbage) as a waste disposal method

Incinerator Ash – This type of ash is produced from burning MSW (Municipal Solid Waste, i.e. Garbage) as a waste disposal method by primarily converting many of the solids to gases which are discharged into the air resulting in a large volume reduction of the material. The garbage is burned at a temperature of 1600-1800 ^{0}F which combusts most of the material destroying many toxic organics. The resulting ash is a Type II material and is a mixture of many chemicals from the plastic, batteries, etc. that were in the garbage. It also contains non-combustibles such as metals, glass, concrete, brick, etc. Often dioxins are formed in the ash. Currently the ash has no beneficial re-use and is disposed of at special landfills at a cost of $30-40 per ton. Chambers County has the only incinerator in this area and all the ash is disposed of at their county landfill.

Tire Ash – Used tires can no longer be disposed of in a landfill hence they must be handled by alternate disposal methods. One of these methods is to grind them up and burn them for fuel. Tires are made up of many chemicals some of which are toxic as well as the metals from the steel belts to high levels of zinc. All the chemicals become concentrated in the ash. As a result of chemical leaching, phytotoxic effects are to be expected from the ash and

permanent damage to your soil would be expected**.** Typically, an ash residue is left behind,

composed mainly of zinc oxide, titanium dioxide, iron, carbon and other materials

The Seattle Times in July 1997 exposed the growing national practice of recycling industrial wastes - many containing toxicants, dioxin and even radioactive material - into agricultural fertilizers. Before The Times' series, few farmers were aware of the practice. Tire ash and fertilizers both fail tests for cadmium, which can be readily absorbed by plants and concentrates in leaves, grain and fleshy fruits. The ash is a good source of zinc, which helps plants grow - but it also contains the poisonous elements lead and cadmium. Millions of discarded tires from the East Coast ended up in fertilizer sold in the West and three foreign nations, in violation of federal hazardous-waste laws. The ash is mixed with sulfuric acid and water to produce fertilizer granules sold to distributors who mixed it in blended products for farmers, nurseries and home gardeners. The buyers are not told the fertilizer was made from recycled waste. The granules are 20 percent zinc, which is commonly used in plant food. But lead and cadmium, heavy metals of no benefit to plants or animals, are also included. They weren't listed on the label or tested by regulators in any of the 10 states in which the product was sold.

Coal Ash – This type of ash is produced from burning coal for electrical power generation and is the waste product that results. There are two primary forms, bottom ash and fly ash. Bottom ash accumulates at the bottom of the burner while fly ash is collected in the smoke stack scrubber. They have very different chemical and physical properties and are the inorganic constituents of the burned fuel that are not completely combusted. Beneficial uses include making portland cement, mixing with concrete, and stabilizing soils for road base.

Fly Ash – The scrubbers in the flue use a lime slurry to reduce the amount of sulfur dioxide (SO_2) escaping to the atmosphere and other toxic materials. Arsenic, cadmium, copper, gallium, lead, antimony, selenium, zinc and other chemicals are commonly found to concentrate in fly ash. Due to the lime slurry used fly ash tends to be very alkaline (toxic).

Also studies have found that as little as 8% fly ash by weight mixed with soil can increase the

salinity 5-6 times in a short period of time. It has also been found depending on application rates that fly ash suppresses beneficial microbes in the soil and as little as 10% can cause a 50% reduction in microbial activity. In a few limited cases the boron present can prove

beneficial in deficient soils when applied in small amounts. The exact properties vary with the

type coal burned and the type equipment used.

Bottom Ash – This is the most common type of ash as it is produced in very large quantities. About 12% of the coal burned ends up as bottom ash.

Coal ash is toxic (mutagenic and carcinogenic) and contains many radioactive elements like uranium and thorium along with arsenic and mercury. When used as a soil amendment many species of plants suffer growth problems. Some plants have been found to accumulate toxic amounts of selenium, manganese, aluminum and boron in their tissues. Small amounts of ash when leached have been found toxic to many animal species (fish and others) leading to deformities and death. Toxic material from coal ash has also been found in drinking water from wells.

Wood Ash – Clean pure wood ash can be beneficial as a soil amendment replacing lime and providing many trace elements. The chemical and physical properties vary greatly depending on the species of wood burned and the temperature at which it is burned. Most of the wood ash produced (over 80%) is land applied in the Northeast United States and very little elsewhere. The first problem occurs since the nutrients in ash can easily leach and pollute waterways. The ash dust is also toxic if breathed which is common. Even though it is illegal, it is very common for CCA, Creosote and Penta (pentachlorophenol) treated wood to be burned or ground up and used in mulch (or compost). The copper, chromium and arsenic levels concentrate in the ash and are toxic.

Discussion:

To keep costs down and profits up some producers of mulch, compost, and other bagged soil amendments use various types of "fillers." These include sawdust, ground pallets, plywood and glueboard dust (may contain dangerous chemicals), spent mushroom substrate that is called compost for marketing (high salts), paper mill sludges, bottom and fly ash from boilers (turns material black), etc.
Boiler Ash (bottom ash) from coal is the most commonly used toxic industrial waste in the Houston area. It is so alkaline it will chemically burn mulch black in a few days. It is applied to organic waste from pine bark to ground up wood to make it look black or composted.

Boiler ash tends to be high in salts and extremely alkaline. The products produced tend to be alkaline with high salt, with very high carbon to nitrogen ratios. Some ashes may contain large

amounts of heavy metals that contaminate the mulch exceeding federal regulatory levels for safety. These mulch products will often turn a bleached grayish color in a few weeks after exposure to sunlight as the toxic chemicals leach into the soil.

Also many dealers and producers will use incorrect or misleading terminology. Some producers sell products that use words like "Black" and "Humus" in their names. These products are often made from fresh pine bark fines, do not contain any humus, and are chemically burned to turn it black by adding the very alkaline chemicals (i.e. it is mixed with boiler ash which is very alkaline and contains high levels of salts). Other dealers will grind up old pallets, scrap wood, trees, etc. and mix it with fly ash or bottom ash then sell it as black hardwood mulch. These type products are very poor mulch choices and are often toxic to many plants as well as people and pets. People use them, but when the plants get sick and die, they think "I just do not have a green thumb." People buy them because they are often sold at bargain prices...but they are not very cost effective.

Note: Black only occurs in nature when anaerobic conditions occur (i.e. fermentation). When anaerobic decay occurs the good microbes die and pathogens grow in their place. Alcohols are produced which are highly toxic to plant roots. Only 1 ppm (1 part per million) alcohol will kill plant roots! Good compost which is often called Black Gold is actually a deep chocolate brown when dry, the color of humus.

As in all things, one gets what you pay for. As one crop and soil scientist (Texas A&M) says, "When dealing with bargains, let the buyer beware."

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