Electric Power Generation and TRI

This diagram illustrates the operation of a "typical" large coal-based electric power plant, and notes those chemicals that may be reported for such a facility under the Environmental Protection Agency's Toxics Release Inventory (TRI) program. Under TRI, designated facilities must report annually on the amounts of listed chemicals released to the air, water, and land. A facility is required to report if it "manufactures" or "processes" 25,000 pounds or more, or "otherwise uses" 10,000 pounds or more of most of the listed chemicals. The reporting thresholds for mercury and dioxin are much lower at 10 pounds and 0.1 grams, respectively. Electric utilities that burn coal or oil began reporting their TRI releases in July 1999. This diagram indicates the primary TRI chemicals that a "typical" plant is likely to report.

Incoming Coal

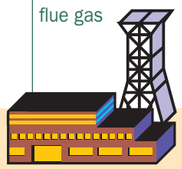
Coal is typically shipped to a power plant by rail car or barge. The incoming coal may contain trace amounts of the following chemicals:

- Arsenic
- Barium
- Beryllium
- Chlorides
- Chromium
- Cobalt
- Copper
- Fluorides
- Lead
- Manganese
- Mercury
- Nickel
- Selenium
- Sulfides
- Vanadium
- Zinc

Coal Preparation

The coal is usually pulverized into a fine powder before being sent to a furnace.

coal



Power Generation

The coal powder is then burned, yielding hot gases that boil water to create steam. The steam spins a turbine, which, in turn, drives a generator to produce electricity.

flue gas

Flue Gas Treatment System

Particulate matter (ash) is removed from the combustion gases and, in some cases, a sulfur removal process is used.

steam

water

Cooling Water System

Steam from power generation is condensed by cooling water and then reused in the boiler. Various chemicals are used to treat the cooling water to minimize corrosion, fouling, and scaling. This treatment process can result in certain wastewaters and waste solids.

treated gases

fly ash and other solids

bottom ash

solids

waste-waters

wastewaters

Releases to Air

Treated gases are discharged to the air through a stack. As a result of the combustion of coal, the following TRI chemicals are produced:

- Dioxin
- Hydrochloric acid
- Hydrogen fluoride
- Mercury
- Possibly some metals
- Sulfuric acid

Releases to Land

Ash from the burning process is typically sent to an ash pond, landfill, or is used commercially. Other waste solids may also be sent to the land. The ash and waste can include various metals that are released during coal combustion, including:

- Arsenic
- Barium
- Beryllium
- Chromium
- Cobalt
- Copper
- Lead
- Manganese
- Nickel
- Selenium
- Vanadium
- Zinc

Releases to Water

Releases to water may involve chemicals from water treatment as well as the coal itself, including such TRI chemicals as:

- Ammonia
- Possibly some metals

This diagram was produced by **Dr. J. Winston Porter**, president of the Waste Policy Center in Leesburg, VA, and a former assistant administrator of the U.S. EPA. He can be reached at:

Phone: 703-777-9800
Fax: 703-777-3733
info@winporter.com

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