

Email: info@aquilogic.com Telephone: +1.714.770.8040

The Coal Ash Experts

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Regulatory Strategy



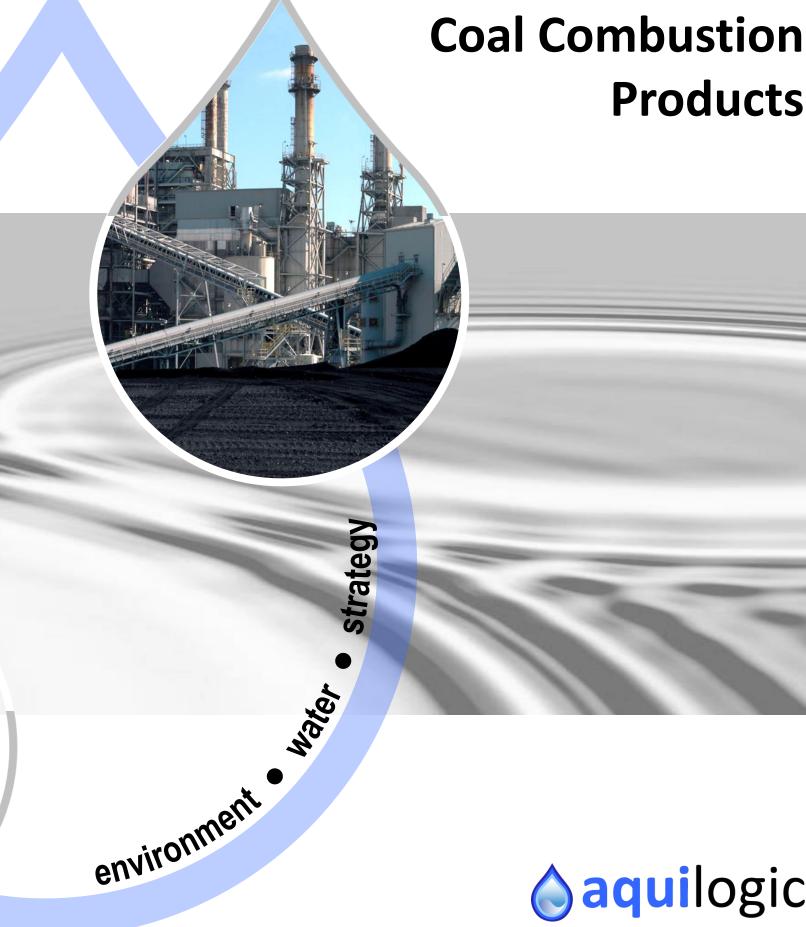
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Products





Coal Combustion Products

Coal combustion products (CCPs), also typically referred to as "fly ash", are the fine particulate material left over from burning ground or powdered coal. Coal-burning power plants are generally the largest producers of CCPs. With increasing emphasis on environmental issues, information on ash yield, sulfur content, and caloric value, as well as major-, minor-, and trace-element content, has become important information on the quality of the coal. Therefore, it is becoming increasingly important to determine how these elements are distributed in the feed coal, the resulting changes in composition as coal is processed, and the chemical composition of the CCPs.

Under a microscope, CCPs are composed mostly of very small glassy silica particles that are spherical in shape. The main components of CCPs are oxides of silicon, aluminum, iron, and calcium, with lesser amounts magnesium, sulfur, sodium, and potassium. Of significant environmental concerns, trace quantities of the following metals may also be present in CCPs.

Arsenic Beryllium

Boron

- Cobalt
- Lead

Selenium

Strontium

Vanadium

Thallium, and

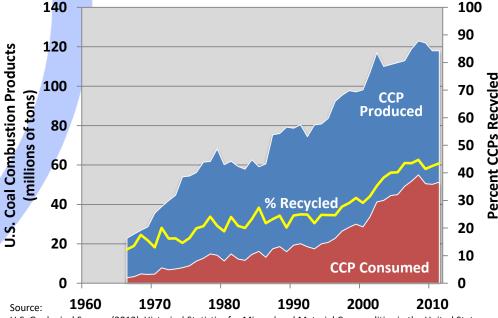
Benzo(a)pyrene, and

Benzo(a)Fluoroanthene

- Manganese
- Cadmium
- 6 Chromium
- Mercury Molybdenum

In addition, polycyclic aromatic hydrocarbons (PAHs) are a group of chemicals formed during the incomplete burning of coal, or other organic materials. The following PAHs have also been reported in CCPs:

- Naphthalene
- Anthracene
- Phenanthrene
- Benzo(k)anthracene
- Fluoroanthene
- 6 Chrysene
- Dibenzofuran
- Fluorene



U.S. Geological Survey. (2013). Historical Statistics for Mineral and Material Commodities in the United States. U.S. Geological Survey Data Series 140.

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Range of Concentrations for Selected Trace Metals in CCPs and Soils

Location	Matrix	Arsenic	Barium	Chromium	Lead	Mercury	Selenium
		milligrams per kilogram (mg/kg)					
Indiana	Fly Ash	20.2 – 56.3	336 – 422	78.2 – 984	22.1 – 293	0.01 - 0.10	4.06 – 22.5
New Mexico	Fly Ash	16.8 – 22.2	1,230 – 1,950	33.7 – 45.9	53.8 – 67.5	0.06 - 0.26	1.03 – 12.2
Ohio	Fly Ash	33.7 – 93.8	464 – 608	118 – 181	21.4 – 50.4	0.02 - 0.06	3.49 – 5.47
Wyoming	Fly Ash	14.6 – 22	2,980 – 3,370	54.1 – 102	25 – 33.1	0.02 - 0.97	11.2 – 13.5
Alaska	Fly Ash	7.3 – 32.9	4,290 – 5,730	247 – 925	14.4 – 77	0.12 – 1.15	1.25 – 7.14
Western U.S.	Soil	<0.10 – 97	70 – 4,000	3 – 2,000	<10 – 700	<0.01 – 4.6	<0.1 – 4.3
Eastern U.S.	Soil	<0.10 – 73	10 – 1,500	1 – 1,000	<10 – 300	0.01 – 3.4	<0.1 – 3.9

U.S. Geological Survey. (2011). Geochemical database of feed coal and coal combustion products (CCPs) from five power plants in the United States: U.S. Geological Survey Data Series 635 and pamphlet.

U.S. Geological Survey. (1984). Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States. Professional Paper 1270.

Coal-fired power plants produce approximately 118 million tons of waste CCPs per year, making these wastes one of the largest industrial waste streams in the U.S. Of the CCPs produced, slightly more than 40% are consumed, or recycled, into other products, such as:

Cement and Concrete

Flowable Fill

Porous Pavement

Structural Fill/Embankments

Aggregate

Mine Reclamation

Soil Stabilization

Road Base

Snow and Ice Control

Blasting Grit

6 Roofing Granules

Gypsum Panel Products

Waste Stabilization/Solidification

Agricultural/Soil Amendments

Of the millions of tons of waste stream CCPs that are currently not utilized in other processes or products, excess CCPs are typically stored in surface waste ponds, impoundments, abandoned mines, and quarries. The U.S. Environmental Protection Agency (EPA) has identified approximately 600 CCP waste impoundments split roughly equal between landfills and surface impoundments. As of 2007, of the 85 CCPs waste storage sites evaluated by the U.S. EPA, damages to the environment by CCPs have been confirmed at 24 sites. At an additional 43 waste CCPs storage sites, environmental damage by CCPs was also considered likely, but had not been confirmed. That is, at 67 of 85 CCP waste sites evaluated by the U.S. EPA (nearly 80%) environmental damages were either proven or likely.

As CCPs come into contact with water, whether due to infiltration from rainfall, runoff, or in direct contact with groundwater, components of the CCPs, including trace metals, can leach out of the stored waste and contaminate groundwater and surface water. Groundwater has been impacted at 16 of the 24 sites where the U.S. EPA has identified environmental damages from the stored waste CCPs.

There is no federal regulation for the storage and/or disposal of waste CCPs. The majority of states do not require adequate monitoring or liners to stop the migration of CCPs either in groundwater or surface waters. Of the 16 sites where impact to groundwater was identified by the U.S. EPA, the underlying causes were suspected to be from CCP wastes being stored in unlined landfills, unlined surface impoundments, and unlined sand and gravel pits.

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