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Standard Terminology for Coal Combustion Products[1]

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1. Scope*

1.1 This standard defines terms used in the production, management and use of coal combustion products (CCPs). It is intended to promote understanding by providing precise technical definitions of terms used.

1.2 Terms used only within an individual coal combustion product (CCP) standard, and having a meaning unique to that standard, may be defined or explained in the terminology section of that individual standard.

2. Terminology

acid mine drainage (AMD), *n*—water exhibiting a pH of less than 6.0 and in which total acidity exceeds total alkalinity, discharged from an active, inactive or abandoned coal mine and reclamation operation or from an area affected by surface coal mining and reclamation operations.

acid mine water, *n*—see **AMD**.

aggregate, *n*—granular material used as a component in concrete or mortar with a hydraulic cementing medium to produce either concrete or mortar.

DISCUSSION—Examples include sand, gravel, crushed stone, crushed hydraulic-cement concrete, iron blast furnace slag, or coal bottom ash and boiler slag.

alkalinity, *n*—the capacity of water to neutralize acids, a property imparted by the water's content of carbonates, bicarbonates, and hydroxides and occasionally borates, silicates, and phosphates. It is often expressed in milligrams per liter of calcium carbonate.

aquifer , *n*—a geologic formation, group of formations, or part of a formation that is saturated with water and capable of providing a significant quantity of water.

baghouse, *n*—a facility that removes solid particles from the flue gas by the use of fabric filter bags.

beneficial use of a CCP, *n*—the use of or substitution of the coal combustion product (CCP) for another product based on performance criteria. For purposes of this definition, beneficial use includes but is not restricted to raw feed for cement clinker, concrete, grout, flowable fill, controlled low strength material; structural fill; road base/sub-base; soil- modification; mineral filler; snow and ice traction control; blasting grit and abrasives; roofing granules; mining applications; wallboard; waste stabilization/solidification; soil amendment and agriculture.

boiler slag, *n*—a molten ash collected at the base of slag tap and cyclone boilers that is quenched with water and shatters into black, angular particles having a smooth, glassy appearance.

borrow, *n*—an area designated as a source for soil in construction or mine reclamation projects; a source or sources of material other than the required excavation.

bottom ash, *n*—agglomerated ash particles formed in pulverized coal boilers that are too large to be carried in the flue gases and impinge on the boiler walls or fall through open grates to an ash hopper at the bottom of the boiler. Bottom ash is typically grey to black in color, is quite angular, and has a porous surface structure.

bulk density, *n*—the mass of a material per unit volume including voids. Bulk density is usually reported on a dry basis.

calcium sulfate dihydrate ($CaSO_4 \cdot 2H_2O$), *n*—gypsum; the primary product of a forced-oxidation wet flue gas desulfurization system in which additional air is introduced and lime or limestone is used as the reagent.

cementitious ash, *n*—fly ash, which hardens irreversibly when mixed with water. Also referred to as self-cementing ash.

coal ash, *n*—a collective term referring to any solid materials produced primarily from the combustion of coal.

DISCUSSION—Examples include fly ash, bottom ash, or boiler slag.

coal combustion products (CCPs), *n*—fly ash, bottom ash, boiler slag, fluidized-bed combustion (FBC) ash, or flue gas desulfurization (FGD) material produced primarily from the combustion of coal or the cleaning of the stack gases.

[1] This terminology is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee E50.03 on Pollution Prevention/Beneficial Use.

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***A Summary of Changes section appears at the end of this standard**

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compaction, *n*—the densification of a soil or coal combustion product by means of mechanical manipulation; reduction in bulk volume of solid waste by rolling and tamping.

consolidation, *n*—the reduction in volume of a fill caused by movement of water out of the fill mass. Consolidation generally occurs due to an increase in the vertical stress on a fill. It is the movement of water rather than the compression of air-filled voids that distinguishes consolidation from compaction.

cyclone, *n*—a cone-shaped air-cleaning apparatus that operates by centrifugal separation and is used in particle collecting and fine grinding operations.

density, *n*—the mass per unit volume; weight per unit volume, expressed as grams per cubic centimeter or pounds per cubic foot for solids and liquids and usually as grams per liter for gases.

dike, *n*—an embankment or ridge of either natural or synthetic materials used to contain or hold a liquid, slurry, sludge, or other material in ponds.

discharge, *n*—the release of any solid, liquid or gas waste stream or any constituent thereof to the environment.

drainage blanket, *n*—a uniform layer of permeable material such as sand, crushed stone, or bottom ash/boiler slag installed with properly designed filter media at the base of a structural fill to maintain the fill in a drained condition.

dry fly ash, *n*—fly ash that has been collected by particulate removal equipment such as electrostatic precipitators, Baghouses, mechanical collectors, or fabric filters.

electrostatic precipitator (ESP), *n*—a facility that removes fly ash from the flue gas by producing an electric charge on the fly ash and collecting it electrostatically.

encapsulation, *n*—the complete enclosure of a waste in another material in such a way as to isolate it from external effects.

ettringite, *n*—a high-calcium sulfoaluminate mineral ($Ca_6 \cdot Al_2(SO4)_3\ (OH)_{12} \cdot 26H_2O$).

final cover, *n*—cover material that is applied as part of closure of a landfill or surface impoundment.

fixation, *n*—solidification or stabilization.

flowable fill, *n*—a material that flows like a liquid, is self-leveling, requires no compaction or vibration to achieve maximum density, hardens to a predetermined strength and is sometimes a controlled low strength material (CLSM).

flue gas desulfurization (FGD), *n*—removal of gaseous sulfur dioxide from boiler exhaust gas. Primary types of FGD processes are wet scrubbers, dry scrubbers and sorbent injection. Sorbents include lime, limestone, sodium-based compounds and high-calcium coal fly ash.

dry FGD ash, n—see *dry FGD material*.

dry FGD material, n—the product that is produced from dry FGD systems and consists primarily of calcium sulfite, fly ash, portlandite ($Ca(OH)_2$), and/or calcite.

fixated FGD material, n—a designed mixture of dewatered FGD sludge that is primarily calcium sulfite with either a high-lime fly ash or a low lime fly ash combined with a cementitious material. FGD sludge is also known as scrubber sludge, scrubber material, FGD solids, filter cake or centrifuge cake.

lime spray drier ash, n—see *dry FGD material*.

stabilized FGD material, n—another name for *fixated FGD material*.

wet FGD products, n—the product of wet FGD processes or systems. It is composed primarily of water, calcium sulfite/sulfate solids, and small quantities of fly ash. Wet FGD products can be thixotropic.

FGD gypsum, n—gypsum formed from an oxidizing and calcium-based flue gas desulfurization process.

FGD material, n—a product of an FGD process typically using a high-calcium sorbent such as lime or limestone. Sodium-based sorbent and high-calcium coal fly ashes are also used in some systems. The physical nature of these materials varies from a wet thixotropic sludge to a dry powdered material depending on the process.

FGD material dry scrubbers, n—the dry powdered material from dry scrubbers that is collected in a baghouse along with fly ash and consists of a mixture of sulfites, sulfates, and fly ash.

fluidized-bed combustion (FBC) ash, *n*—the fly ash and bed ash produced by an FBC boiler.

fluidized-bed combustion (FBC) bed ash, *n*—the spent bed material that is produced by an FBC boiler. The bed ash is usually collected separately and can be considered as being equivalent to bottom ash in dry bottom or wet-bottom wall-fired furnace.

fluidized-bed combustion (FBC) products, *n*—the unburned coal, ash, spent bed material, and unreacted sorbent produced by an FBC boiler.

fly ash, *n*—coal ash that exits a combustion chamber in the flue gas and is captured by air pollution control equipment such as electrostatic precipitators, Baghouses, and wet scrubbers.

fly ash-lime content, *n*—the total calcium content of fly ash, including reactive and non-reactive calcium species expressed as calcium oxide (CaO).

free lime, *n*—reactive lime and hydroxide species available to react with a pozzolan to form a cementitious product, usually expressed as a percentage by total weight of the product.

leachate, *n*—the liquid including any suspended components in the liquid that has percolated through or drained from a pile or cell of solid materials.

leaching, *v*—the operation, natural or designed, of producing leachate.

lift, *n*—the depth of soil and other materials placed in an embankment or fill that can be compacted to the specified density with the available equipment.

mine subsidence, *n*—the downward displacement of the natural land surface in response to the removal of underlying supporting material by mining.

pozzolan, *n*—primarily siliceous or siliceous and aluminous materials that will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

pozzolanic activity, *n*—the phenomenon of strength development that occurs when lime and certain aluminosilicates react at ambient temperatures in the presence of water.

product, *n*—any object possessing intrinsic value, capable of delivery either as an assembled whole or as a component part or parts, and produced for introduction into trade or commerce.

reclamation, *n*—actions taken to restore mined land to a post mining land use approved by the regulatory authority.

run-off , *n*—water, which, having fallen on a surface, flows across the surface, picking up materials and will, if not collected, continue into a watercourse. Also any rainwater, leachate or other liquid that drains over land from any part of a facility.

scrubber, *n*—a pollution control device designed to remove gaseous elements from boiler exhaust gasses. See **flue gas desulfurization**.

sedimentation, *n*—gravitational settling of solid particles in a liquid system.

self-cementing coal fly ash, *n*—see **cementitious ash**.

slurry, *n*—a mixture of water and any finely divided insoluble material in suspension.

soil modification, *n*—a change to the physical or chemical characteristics of soils.

soil stabilization, *n*—a soil modification that improves the physical characteristics of soils.

solidification, *n*—the conversion of liquids, slurries or sludges into a material that can be more easily handled or compacted for disposal or use; a process for converting a liquid to a solidified material; fly ash is often used as a reagent or sorbent in a solidification process.

sorbent , *n*—a chemical compound that is added to the gas side of the steam generator to reduce (sorb) emissions; a substance that decreases the concentration or availability of another substance by a sorption mechanism such as absorption and/or adsorption; a material that is used to soak up free liquids by either adsorption or absorption or both.

stabilization, *n*—a process for treating a waste to minimize an undesirable attribute of that waste; the treating of solids from wet scrubbing or other air pollution control processes; fly ash is often used as a reagent or filler.

structural fill, *n*—an engineered fill, typically constructed in layers of uniform thickness and compacted to a desired unit weight in a manner to control compressibility, strength, and hydraulic conductivity.

thixotropic, *n*—the property of a material that enables it to stiffen in a relatively short time on standing but, upon agitation or manipulation, to change to a very soft consistency or to a fluid of high viscosity, the process being completely reversible.

treatment, *n*—any method, technique, or process designed to change the physical, chemical or biological character of a waste to neutralize the waste, render it less hazardous, make it safer to transport or manage, or reduce its volume.

SUMMARY OF CHANGES

Committee E50 has identified the location of selected changes to this standard since the last issue (E2201–02a) that may impact the use of this standard.

(1) Terms not present in the current E50.03 standards were removed.

(2) The term “coal ash” was revised.

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