Glossary

A

analog indicator, n—A device that translates a measured variable to a pointer deflection of other visual quantity which is continually proportional to and generally calibrated in terms of the measured function. [3]

annular space, n—Ring-shaped space between casing and the wall of the hole or between drill pipe and casing. [2]

API gamma-ray unit, n—This unit is an arbitrary one and is defined as 1/200 of the difference between the deflections produced on a log by the radiation from two standard formations of different gamma-ray intensity in a calibration pit in Houston, Texas. The two standard formations are artificial. One is of very low radioactivity, while the other has a radioactivity approximately twice as great as an average mid-continent shale, which is about 100 API units. [14]

apparent density, n—The mass per unit volume of a material including voids inherent in the material as tested. [16]

apparent rank, n—An indication of the correct relative position of the rank of coal samples analyzed but does not imply any standards of coal sampling. Whenever apparent rank is stated for a coal sample, additional information as to the nature of the sample is required. [18]

as-received basis, n—Analytical data calculated to the moisture condition of the sample as it arrived at the laboratory and before any processing or conditioning. If the sample has been maintained in a sealed state so that there has been no gain or loss, the as-received basis is equivalent to the moisture basis as sampled. [16]

ash, n—Inorganic residue remaining after ignition of combustible substances, determined by definite prescribed methods. [16]

attritus, n—A composite term for dull gray to nearly black coal components of varying maceral content, unsorted and with fine granular texture, that forms the bulk of some coals or is interlayered with bright bands of anthraxylon in others. It is formed of a tightly compacted mixture of altered vegetal materials, especially those that were relatively resistant to complete degradation. [2]

bit crown, n—As used by the drilling and bit-setting industry in the United States, the portion of the bit inset or impregnated with diamonds formed by casting or pressure-molding and sintering processes; hence the steel bit blank to which the crown is attached is not considered part of the crown. [10]

bit footage, n—The number of feet of borehole that a bit was able to drill. [17]

book fashion, n—The organization of core in boxes so that the top of the core is placed beginning in the upper left-hand corner and the bottom of the core is in the lower right-hand corner. [17]

booting, n—The collection of drill cuttings around the drill string and which are ejected from the collar in long tubelike masses. [10]

borehole, n—The circular hole through soil and rock strata made by boring. [19]

borehole erosion. See caving.

Brazilian Test; indirect test, n—A method for the determination of the tensile strength of rock, concrete, ceramic, or other material by applying a load vertically at the highest point of a test cylinder or disk (the axis of which is horizontal), which is itself supported on a horizontal plane. The method was first used in Brazil for testing of concrete rollers on which an old church was being moved to a new site. [10]

bulk density, n—The weight per unit volume of any material including water. Synonymous with apparent density. [15]

bulk density log. See density log.

burrow, n—Tubular openings made by worms and other animals. Usually preserved as fillings; may be vertical, horizontal, or inclined, and straight or sinuous. [2]

button bit, n—A type of rollercone bit with tungsten carbide buttons or inserts on the cone faces. The button bit is commonly used in drilling hard rocks. The button bit crushes the rock by compression and produces relatively fine cuttings compared with those produced by a steel tooth or milled teeth roller-cone bit. [7]

C

caliper log, n—A continuous mechanical measurement of the diameter and thus rugosity of the borehole. The tool identifies zones where swelling or cavings (washouts) have occurred during drilling. The tool’s value is in allowing qualitative or quantitative corrections to be made to other geophysical logs that are affected by borehole size (especially density). [17]

calorific value, n—The heat of combustion of a unit quantity of a substance.
Discussion—It is expressed in ASTM test methods in British thermal units per pound (Btu/lb). Calorific value can also be expressed in calories per gram (cal/g) or in the International System of Units, joules per gram (J/g), when required. [16]

caves or washouts, n—Zones of increased hole diameter caused by rock fragments or unconsolidated material that falls from the walls of a borehole and can block the hole or contaminate the cuttings. These zones can affect the accuracy of certain geophysical logs (especially density). Corrections to other geophysical logs can be made if a caliper log is available. The most common causes of caves or washouts include soft or fractured lithologies, the presence of water-producing zones, and the downhole pressure of the drilling medium (fluid or air) which often causes differential erosion of various strata within the borehole. [19]

caving, n—Rock fragments that fall from the wall of a borehole and may contaminate the well cuttings or block the hole. [17]

cleat, n—A joint or system of joints along which the coal fractures. There are usually two cleat systems developed perpendicular to each other. [17]

coal ball, n—A hard, compact aggregate of mineralized plant debris occurring in a coal seam or in adjacent rocks. [17]

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cor, n, in drilling—A cylindrical section of rock (coal) taken as part of the interval penetrated by a core bit and brought to the surface for geologic examination, representative sampling, and laboratory analyses. [19]

core, n, in drilling—A cylindrical section of rock (coal) taken as part of the interval penetrated by a core bit and brought to the surface for geologic examination, representative sampling, and laboratory analyses. [19]

core barrels, n—Two nested tubes above the bit of a core drill, the outer rotating with the bit, the inner receiving and preserving a continuous section or core of the material penetrated. [19]

core catcher, n—In counter-flow or reverse-flow continuous core drilling, the sievelike tray or device on or in which the core is ejected continuously from the upper end of a drill string and is caught and held when core is recovered. [10]

core recovery, n—The amount of the drilled rock withdrawn as core in core drilling, generally expressed as a percentage of the total length of the interval cored. [17]

core run, n—Technically, the distance cored per round trip, which is expressed in number of feet or in relative terms, as short, long. Core blocks may occur before core barrel is filled; the barrel then is short of being full, resulting in a short core run. Loosely, amount of core recovered per round trip of coring. [10]

core sample, n—That part of a core of rock or coal obtained so as to accurately represent a thickness of a unit penetrated by drilling. [19]

core tray, n—An open or lidless core box. [10]

Coulomb Criterion, n—A criterion of brittle shear failure based on the concept that shear failure will occur along a surface when the shear stress acting in that plane is large enough to overcome the cohesive strength of the material plus the frictional resistance to movement. Cohesive strength is equal to inherent shear strength when the stress normal to 'he shear surface is equal to stress normal to the shear surface multiplied by the coefficient of internal friction of the material. [17]

density log (Gamma-gamma log), n—Measures electron density within lithologic units, which is related to their bulk density. The density tool records the intensity of gamma radiation (in counts per second) from a nuclear source within the tool after it has been attenuated and backscattered by lithologies within the borehole. Because of the distinctly low density of coals, the density log is especially useful in coal exploration for differentiating coal seams, coal seam partings, and other lithologies. The bias/resolution of density logs can be affected by source-detector spacing (closer spacing increases resolution), borehole size and irregularities (see caves or washouts), the presence of casing, and the logging speed. [19]

desorbed gas, n—The gas collected from a unit of coal core that is contained in a pressurized canister. [17]

desorption, n—The reverse process of adsorption whereby matter is removed from the adsorbent. [12]

development log, n—A geophysical logging technique for measuring the deviation of a borehole from its intended course. [4]

dip, n—The angle that a bedding or fault plane makes with the horizontal measured perpendicular to the strike of the structure and in the vertical plane.—v, To be tilted or inclined at an angle. [17]
dipmeter, *n*—A three-pad or four-pad wall-contact log whose finely detailed microresistivity log curves are correlated to measure depth offsets relative to each other. In conjunction with simultaneous measurements of the caliper and inclination and direction of the borehole, such measurements can be solved for dip and strike of the strata. Both the borehole curves as measured and the subsequent graphic plot of computed dip-strike symbols are called dipmeters, the former a “continuous dipmeter” or dipmeter log, the latter a “computed dipmeter” or “tadpole plot.” [1] double-tube core barrel, rigid-type, *n*—A core barrel having both the inner and outer tubes rigidly coupled to a common headpiece. [17] double-tube core barrel, swivel-type, *n*—A core barrel having the upper end of the inner tube coupled to the core-barrel head by means of an antifriction device, such as a roller or ball bearing. Hence, the inner tube tends to remain stationary when the outer tube, which is rigidly coupled to the core-barrel head, is rotated. [10] drag bit, *n*—A type of rotary drill bit with no moving parts and steel cutting blades on the bottom. The fixed blades drag and cut the sediments on the bottom of the well. A drag bit is used for soft formations. [7] drift, in drilling, *n*—1. The deviation of a borehole from its intended direction or target. 2. The horizontal distance measured from the bottom of the well to a vertical line extending down from the surface location of the well. [7] drill bit, *n*—The cutting tool used in drilling. [7] drill core. Synonym for core. drill pipe, *n*—The heavy steel pipe that turns the drill bit in rotary drilling by transmitting the motion from the rotary table of the drilling rig to the bit at the bottom of the hole, and that conducts the drilling mud from the surface to the bottom. It is normally formed of sections connected end to end. [19] drill string, *n*—1. The term used in rotary drilling for the assemblage of drill pipe, drill collars, drill bit, and core barrel connected to and rotated by the drilling rig at the surface. Synonym: drill stem. 2. A term used in cable-tool drilling for the assemblage of drill bit, drill stem, cable, and other tools connected to the walking beam at the surface. [1] drill stem joint, *n*—A part of the drill string formed by connection of two threaded parts of the drill stem (a short pin-threaded coupling and a box-threaded length of heavy-wall steel tubing) that connect lengths of drill string. [17] drilling fluid, *n*—Air, mist, water, or drilling mud used to cool the bit and carry cuttings up from the bottom. It is pumped continuously down the drill pipe, out through openings in the drill bit, and back up in the annulus between the pipe and the walls of the hole to a surface pit where it is screened and reintroduced through the mud pump. The drilling fluid is used to lubricate and cool the bit used to carry the cuttings up from the bottom. [1] drilling mud, *n*—A carefully formulated heavy suspension, usually in water but sometimes in oil, used in drilling. It commonly consists of bentonitic clays, chemical additives, and weighting materials such as barite. Drilling muds are used to prevent blowouts and cave-ins by plastering friable or porous formations with mud cake and maintaining a hydrostatic pressure in the borehole offsetting pressures of fluids that may exist in the formation. Synonyms: drilling fluid; circulating fluid. [1] drilling rig, *n*—A general term for the derrick, power supply, draw works, and other surface equipment necessary in drilling. [7] dry basis, *n*—Data calculated to a theoretical base of no moisture associated with the sample. The numerical value as established by ASTM Test Method D 3173 is used for converting the as-determined data to a dry basis. [16] dry, mineral-matter-free basis, *n*—Data calculated to a theoretical base of no moisture and no mineral matter associated with the sample. The numerical values as established by ASTM Classification D 388 and ASTM Test Method D 2799 are used for converting the as-determined data to a dry, mineral-matter-free basis. [16] electric log, *n*—The generic term for a well log that displays electrical measurements of induced current flow or natural potentials in the rocks of an uncased borehole. equilibrium moisture, *n*—of coal. The moisture-holding capacity of a coal sample as determined in accordance with ASTM D 1412 at 96–97% relative humidity and 30°C. [17] exploration, *n*—1. The search for deposits of useful minerals or fossil fuels; prospecting. It may involve geologic reconnaissance (e.g., remote sensing, photogeology, geophysical and geochemical methods) and surface and underground investigations. 2. Establishing the nature of a known mineral deposit, preparatory to development. In the sense that exploration goes beyond discovery, it is a broader term than prospecting. [1] face channel sample, *n*—A sample obtained from the plane or surface of a coal seam at the advancing surface on which mining operations are in progress and taken in accordance with ASTM D 4976 to represent a vertical section through the coal seam. [17] failure under load, *n*—Fracture of rupture of a rock or other material that has been stressed beyond its ultimate strength. [17] fault gouge, *n*—Soft, un cemented pulverized clayey or claylike material, commonly a mixture of minerals in finely divided form, found along some faults or between the walls of a fault, and filling or partly filling a fault zone; a slippery mud that coats the fault surface or cements the fault breccia. [1] faulted, *adj*—Characterized by a fracture or a zone of fractures along which there has been displacement of the sides relative to one another parallel to the fracture. [17] filter cake. Synonym for mud cake. fishing, *n*—Searching for and attempting to recover, by the use of specially prepared tools, a piece or pieces of drilling equipment (such as sections of pipe, cables, or casing) that
have become detached, broken, or lost from the drill string or have been accidentally dropped into the hole. [7]

**floor**, n—Strata immediately underlying a coal bed. [19]

**floor conditions**, n—Characteristics of the strata that lie immediately below a coal seam and would form the mine floor were the coal seam mined. [17]

**foaming agent**, n—A substance used to form stable bubbles due to aeration or agitation of a liquid. A foaming agent is used with water in most drilling and when excessive water is encountered while drilling with air or gas. [7]

**focused-current log**, n—The resistivity log curves from a multi-electrode sonde designed to focus the surveying current radially through the rocks in a horizontal, disk-shaped pattern. This permits sharp definition of bed boundaries and improved measurement of resistivity. [1]

**friable, adj**—Said of a rock or mineral that crumbles naturally or is easily broken, pulverized, or reduced to powder, such as a soft or poorly cemented sandstone. [1]

**foam flotation**, n—A process for cleaning fine coal in which hydrophobic particles, generally coal, attach to air bubbles in a water medium and rise to the surface to form a froth. The hydrophilic particles, generally the ash-forming matter, remain in the water phase. [16]

**gamma-gamma density**. Synonym for density log.

**geophysical log**, n—A graphic record (acquired as analog or digital data) of the measured or computed physical characteristics of the rock section encountered in a borehole, plotted as a continuous function of depth. Measurements are made by a sonde, which contains the detectors, usually as it is withdrawn from the borehole by a wire line. Several measurements are usually made simultaneously, and the resulting curves are displayed side by side on the common depth scale. A common suite of logs used in coal exploration includes caliper, density (gamma-gamma), natural gamma, and resistivity (resistance). [19]

**geostatistics**, n—Statistical techniques developed for mine evaluation by the French school of G. Matheron. [1]

**geotechnical, adj**—Of or pertaining to the application of scientific methods and engineering principles to the acquisition, interpretation, and use of knowledge of materials of the Earth's crust for the solution of engineering problems; the applied science of making the Earth more habitable. It embraces the fields of solid mechanics and rock mechanics, and many of the engineering aspects of geology, geophysics, hydrology, and related sciences. [1]

**Gieseler fluidity**, n—The degree of plasticity exhibited by a sample of coal heated in the absence of air under controlled conditions as described in ASTM Test Method D 2639. [17]

**Griffith’s Theory**, n—A theory of failure based on the assumption that the low order of tensile strength in common materials is due to the pressure of small cracks or flaws. [9]

**grindability**, n—The ability of a coal sample to be reduced in particle size to powder or small fragments by friction as in the action of a mill. [17]

**grout plug**, n—A filling of an abandoned borehole or well by cement to prevent the flow of water or oil from one strata to another or to and/or from the surface. [8]

**hammer mill crusher**, n—An impact mill consisting of a rotor, fitted with movable hammers, that is revolved rapidly in a vertical plane within a closely fitting steel casing. [5]

**Hardgrove Grindability Index**, n—An index that is relative to the ease of grinding coal to a resultant size consist as determined in accordance with ASTM Test Method D 409. [17]

**impregnated diamond bit**, n—A sintered, powder-metal matrix bit with fragmented bore or whole diamonds of selected screen size uniformly distributed throughout the entire crown section. As the matrix wears down, new, sharp diamond parts are exposed; hence the bit is used until the crown is consumed entirely. [7]

**impure coal**, n—Coal having 25 weight % or more, but less than 50 weight %, of ash on the dry basis.

Discussion—Bone coal with more than 50 weight % ash is properly called coaly or carbonaceous shale or siltstone. Types of impure coal other than bone coal and mineralized coal sometimes occur, for example, sandy coal. [16]

**in-pit blending**, n—The practice during mining of combining coal seams or different layers of a coal seam which have different quality or physical characteristics such that the resultant product will have quality or characteristics intermediate of the coals that are mixed. [17]

**in-seam quality**, n—The inherent quality of a coal seam prior to mining. [17]

**incompetent, adj**—Applied to stratum, a formation, rock, or rock structure not combining sufficient firmness and flexibility to transmit a thrust and to lift a load by bending, consequently, admitting only the deformation of flowage. [6]

**indurated, adj**—Hardened. Applied to rocks hardened by heat, pressure, or the addition of some ingredient not commonly contained in the rock itself, such as marls indurated by calcium carbonate or shales indurated by silica. [1]

**inherent moisture**, n—In coal, moisture that exists as an integral part of the coal seam in its natural state, including water in pores but not that present in macroscopically visible fractures. On removal of coal from a seam, the water originally present in fractures appears as surface moisture whereas coal containing only pore moisture appears dry.

Discussion—To establish the amount of inherent moisture, it is essential to conform to the conditions for its determination as specified in ASTM D 1412 or D 388. Inherent moisture is considered equivalent to bed moisture, but is not equated to the moisture remaining in a coal sample after air drying, as is the practice in some other countries. [16]

**interval benching**, n—The practice of sampling coal by thickness intervals on the basis of lithologic characteristics or predetermined thickness. [17]
A lens may be double-convex or plano-convex.

penetration and the first return of the cuttings from that lag-time, the time delay during drilling between strata nonagglomerating.

meta-anthracite, n—The rank of coal, within the anthracite class of ASTM Classification D 388, such that—the coal is equal to or less than 2% (or the fixed carbon is equal to or greater than 98%) and the coal is nonagglomerating. [16]

metallurgical coal, n—Coal used in the production of coke to aid in the separation of iron from its ore. [17]

metamorphism, n—The mineralogical, chemical, and structural adjustment of solid rocks to physical and chemical conditions which have generally been imposed at depth below
the surface zones of weathering and cementation, and which differ from the conditions under which the rocks in question originated. [1]

**mineralization, n**—The process or processes by which a mineral or minerals are introduced into a rock. It is a general term, incorporating various types (e.g., fissure filling, impregnation, replacement). [1]

**moisture, in coal, n**—That moisture determined as the loss in weight under rigidly controlled conditions of temperature, time, and air flow as established in ASTM Test Method D 3302. [17]

**mud cake, n**—A clay lining or layer of concentrated solids adhering to the walls of a well or borehole, formed where the drilling mud lost water by filtration into a porous strata during rotary drilling.

**mud density, n**—Relative density of the drilling fluid or mud. [17]

**mud pump, n**—A large, reciprocating pump that circulates drilling mud. Examples are the duplex (two-cylinder) or triple (three-cylinder) pumps which draw mud from the suction mud pit and pump the slurry downhole through the drillpipe and bit and back up the borehole to the mud settling pits. After the rock cuttings drop out in the settling pit, the clean mud gravitates into the suction pit where it is picked up by the pump’s suction line. [8]

**natural gamma (gamma ray) log, n**—A record of the natural radioactivity of the lithologies encountered in the borehole environment. During recording of natural-gamma logs, the amount of natural radiation is recorded and presented in either CPS (counts per second) or API (American Petroleum Institute) units. Unlike many other log types, a representative natural gamma log can be obtained where borehole and/or fluid conditions are not optimal or where casing is present. The natural gamma log is most often used in the coal environment for identifying clastic lithologies and differentiating coal seams and coal seam partings. [17]

**natural radiation, n**—Energy radiated in the form of radioactive waves or particles from rock. [17]

**neutron log, n**—A radioactivity log curve that indicates the intensity of radiation (neutrons or gamma rays) produced when the rocks in a borehole are bombarded by neutrons from a sonde. Because this tool responds to the presence of hydrogen, it indicates the presence of fluids (but does not distinguish between oil and water) in the rocks, and is used with the gamma-ray log to differentiate porous from non-porous formations. [17]

**nodule, n**—A small, irregularly rounded knot, mass, or lump of a mineral or mineral aggregate, normally having a warty or knobby surface and no internal structure, and usually exhibiting a contrasting composition from the enclosing sediment or rock matrix in which it is embedded (e.g., a nodule of pyrite in a coal seam). [1]

**nonbanded coal, n**—Consistently fine-granular coal essentially devoid of megascopic layers.

**Discussion**—Nonbanded coal may be interbedded with common banded coal, or form a discrete layer at the top or at the bottom of the seam, or may compose the entire seam. It is formed from natural accumulations of finely comminuted plant detritus and commonly includes a significant amount and variety of remains of pollen grains, spores, planktonic algae, wax and resin granules, as well as other fragments of plants. These materials, containing markedly higher amounts of volatile matter than vitrain and some other attrital components, are more abundant in this variety of coal than they are in common types of banded coal. Also, nonbanded coal may contain more disseminated detrital mineral matter, chiefly clay, than associated banded coals, and in the field it may be difficult to distinguish from bone coal. Nonbanded coal is much less common than banded coal in North America. [16]

**noncoal layers, n**—Inorganic layers within a coal seam. [17]

**O**

**offscape traces, n**—Curves on a geophysical chart that exceed the maximum or minimum calibrations of the pen deflection causing the pen to create another separate trace generally on the opposite side of the chart. [17]

**out-of-seam dilution, n**—The effect on quality parameters by the inclusion of non-coal seam material such as roof or floor material.

**Discussion**—Ash yield can be greater in coal as mined than as obtained from a face channel sample because, in the former, roof and floor rocks can be included in the sample. This reduction of quality (highest quality coal would yield the least ash) is referred to as out-of-seam dilution or simply dilution. [16]

**overshot tool, n**—A fishing tool; a specially designed barrel with gripping lugs on the inside that can be slipped over the end of a tubing, drillpipe, or geophysical tool that is trapped in the hole. An overshot tool is screwed to a string of drillpipe and lowered into the hole, and over the upper end of the lost pipe or the interbarrel in the wireline system. The lugs take a friction grip on the pipe, which can then be retrieved. [7]

**oxidation, n**—The process of modifying the fundamental properties of coal as a result of chemisorption of oxygen in the air or oxygen dissolved in groundwater. Oxidation can reduce the affinity of coal surfaces for oil and seriously impair coking, caking, and agglutinating properties. [11]

**P**

**parting, mineral, n**—Discrete layer of mineral or mineral-rich sediment interbedded with coal along which separation commonly occurs during mining. Layers of bone coal having indefinite boundaries usually are not considered to be partings because they do not form planes of physical weakness. They may merge vertically or horizontally with layers that are bony or coaly shale and that do form planes of physical weakness. [16]

**permitting, n**—The act of granting a written license or warrant by governmental authorities for activities relating to the exploration of coal such as drilling, road construction, surface water retention, etc. [17]

**petrographic composition, of coal, n**—The general makeup of coal in terms of microscopic constituents, specifically macerals and minerals. [17]

**pilot hole, n**—Commonly a drillhole of small diameter that is drilled ahead of a full-sized or larger borehole. Also com-
monly used to describe the first of two or more holes drilled on a site. Typically the first hole is an open hole used to identify the depths of strata of interest; the subsequent holes are drilled to a certain depth that has been identified in the pilot hole and the strata of interest is cored with greater certainty. [10]

Poisson's ratio, \( n \) — The ratio between linear strain changes perpendicular to and in the direction of a given uniaxial stress change. [15]

predevelopment, \( n \) — Period prior to the establishment of mining. [17]

proximate analysis, \( n \) — in the case of coal and coke — The determination, by prescribed methods of moisture, volatile matter, fixed carbon (by difference), and ash.

Discussion — Unless otherwise specified, the term proximate analysis does not include determinations of sulfur or phosphorus or any determinations other than those named. [16]

pull-down, \( n \) — A system of pulleys or sheaves rigged with cable or chains attached to the drive rod or kelly and used to increase the cutting pressure on the bit when the weight of the rod is insufficient. [10]

pyrite, \( n \) — A common mineral that consists of iron sulfide \((\text{FeS}_2)\) and has a grass-yellow color and metallic luster (and is burned in making sulfur dioxide and sulfuric acid). [20]

radioactive source, \( n \) — A compound or material that spontaneously emits particular radiation such as gamma rays. [17]

rank, \( n \) — Of coal, a classification designation that indicates the degree of metamorphism or progressive alteration from lignite to anthracite in accordance with ASTM Classification D 388. [16]

raw head sample, of coal, \( n \) — A representative sample of coal that has been crushed but not subjected to any size or float/sink separation or other tests or analyses. [17]

reamer, \( n \) — A rotary-drilling tool with a special bit used for enlarging, smoothing, or straightening a drill hole, or making the hole circular when the drill has failed to do so. [1]

reclamation, \( n \) — The restoration of land disturbed by mining or drilling operations to a condition that is in concert with surrounding natural conditions or that is suited for human use. [17]

relative density, \( n \) — The ratio of the difference between the void ratio of a cohesionless soil in the loosest state and any given void ratio to the difference between the void ratios in the loosest and in the densest states. [15]

reserve sample, \( n \) — A sample obtained after a test sample has been extracted and which is saved for additional testing or repeat testing, if needed. [17]

resistivity log, \( n \) — A measure of the voltage differential of strata along the walls of a borehole when electrical current is passed through the strata. The resistivity log requires a fluid-filled hole to constantly provide a conductive medium between electrodes on the tool. The spacing between the electrodes determines the precision of bed boundary relationships in much the same manner as with the density log. The resistivity log is useful primarily in conjunction with other log types. The logs are affected by casing, logging speed, electrode spacing, formation porosity, and resistivity changes in the borehole fluid. [19]

reverse circulation drill system, \( n \) — A drill system involving the circulation of drilling fluid down the outside of the drillpipe and return up through the center of the drillpipe.

A double-walled reverse circulation system is a special type of reverse circulation system in which nearly uncontaminated cuttings can be acquired because the fluid does not contact the drillhole wall. [17]

rheologic, adj — Of or pertaining to the deformation and flow of matter. Tests which determine the rheologic properties of coal include the Geisler plastometer and Audibert-Arnou dilatometer. [20]

riffle, \( n \) — A hand-fed sample divider device that divides the sample into two parts of approximately the same mass. [16]

rock mechanics, \( n \) — The theoretical and applied science of the physical behavior of rocks, representing a “branch of mechanics concerned with the response of rock to the force fields of its physical environment.” [12]

rock type, \( n \) — A particular kind of rock based on a specific classification such as a sandstone or shale. [17]

rollercone bit, \( n \) — A rock-cutting tool placed at the bottom of the drillstring made with three or four shanks welded together to form a tapered body. Each shank supports a cone-like wheel with case-hardened teeth that rotate on steel bearings. [7]

roof, \( n \) — The strata immediately overlying a coal seam. [19]

rotary bit, \( n \) — A general class term for drill bits that are used in drilling by rotation of the drill bit under constant pressure without impact. [7]

rotary table, \( n \) — In rotary drilling, a power-driven circular platform that rotates the kelly, drill pipe, and drill bit. It is sometimes used as the zero-depth reference for downhole measurements. [1]

rugosity, of a drillhole, \( n \) — The irregularities or roughness of the wall of a drillhole. [17]

seam correlation, \( n \) — The interpretation of the connection of coal seams from one locality to another. [17]

sedimentary structure, \( n \) — A structure in a sedimentary rock formed either contemporaneously with the deposition (a primary sedimentary structure) or by sedimentary processes subsequent to deposition (a secondary sedimentary structure). [7]

selective mining, \( n \) — The differential extraction of parts of a coal bed to enhance its quality or to eliminate or minimize the inclusion of unwanted parts of the bed. [17]

semianthracite, \( n \) — The rank of coal, within the anthracite class of ASTM Classification D 388, such that on the dry and mineral matter free basis, the volatile matter content of the coal is greater than 8% but equal to or less than 14% (or the fixed carbon content is equal to or greater than 86% but less than 92%) and the coal is nonagglomerating. [16]

service company, \( n \) — A company that performs specialized work at the drill site such as logging, sampling, fishing, and fracturing. [17]
sieve analyses, of coal, n—The designation of size of raw or cleaned coal in accordance with ASTM Test Method D 4749. [17]
size consist, of coal, n—The particle size distribution of a coal. [17]
as-mined size consist—The makeup of the mined coal product by size classes as determined by performing standard sieve analysis tests in accordance with ASTM Test Method D 4749. [16]
sonde, n—An elongated cylindrical tool assembly used in a borehole to acquire a geophysical log. [17]
sonic log, n—An acoustic log showing the interval-transit time of compressional seismic waves in rocks near the well bore of a liquid-filled borehole. First used for seismic-velocity information it is now used chiefly for estimating porosity and lithology by the empirical Wyllie time-average equation. [17]
spontaneous potential log (SP), n—The geophysical log that records changes in natural potential along an uncased borehole. Small voltages are developed between mud filtrate and formation water of an invaded bed, and also across the shale-sonde, n. An elongated cylindrical tool assembly used in a borehole to acquire a geophysical log. [17]
strata, n—Tabular or sheetlike bodies or layers of sedimentary rock, visually separable from other layers above and below; a bed. [17]
stratigraphic sequence, n—A chronologic succession of sedimentary rocks from older below to younger above, essentially without interruption. [1]
strip mine, n—Synonym for surface mine.
structural, n—The general disposition, attitude, arrangement, or relative positions of the rock masses of a region or area; the sum total of the structural features of an area, consequent upon such deformatonal processes as faulting, folding, and igneous intrusion. [1]
surface mine, n—A mining method in which coal is exposed and recovered by removal of topsoil and overburden followed by coal extraction. Following extraction of the coal, the excavated area is reclaimed by replacing the overburden and topsoil and revegetating the surface. [17]
surface moisture, n—That moisture being the difference between the total moisture as determined by ASTM Test Method D 3302 and the equilibrium moisture as determined by ASTM Test Method D 1412. [17]
surfactant, n—A surface-active substance (as a detergent). [20]
swelling clay, n—Clay that is capable of absorbing large quantities of water, thus increasing greatly in volume (e.g., bentonite). Swelling clay shrinks and cracks on drying. [1]
synfuel, n—Any synthetic crude oil or gas produced by the pyrolysis or hydrogenation of coal or coal extracts and which can be used as a fuel. [17]
synthetic polycrystalline diamonds, n—Diamonds produced by subjecting a carbonaceous material to extremely high temperature and pressure. [17]
test pit, n—Open excavations, dug by hand or machine, large enough to permit a person to enter, examine, and sample the coal in a natural state. [17]
trace element, n—An element that is not essential in coal but can be detected analytically in small quantities. Commonly, trace elements refers to those elements in concentrations less than 1% in the whole coal, dry basis. [17]
true density, n—The ratio of the mass of a material or substance to its true volume, excluding the volume of pores. [17]
ultimate analysis, n—In the case of coal and coke, the determination of carbon and hydrogen in the material, as found in the gaseous products of its complete combustion, the determinations of sulfur, nitrogen, and ash in the material as a whole, and the calculation of oxygen by difference. Discussion—The determination of phosphorus or chlorine is not by definition a part of the ultimate analysis of coal or coke. See ASTM Test Method D 2361 for the determination of chlorine and ASTM Test Methods D 2795 for the determination of phosphorus.
Moisture is not by definition a part of the ultimate analysis of coal of coke but must be determined in order that analytical data may be converted to bases other than that of the analysis sample. Inasmuch as some coals contain mineral carbonates, and practically all contain clay or shale containing combined water, a part of the carbon, hydrogen, and oxygen found in the products of combustion may arise from these mineral components. [16]
underground mining, n—An extraction method of coal mining from below the surface of the ground in which a shaft or entry is dug to intersect with a coal seam and the coal is extracted by either room and pillar or longwall mining methods. [17]
vertical book, n—A method of arranging core in a multi-column core box placed vertically and away from the individual, whereby the top of the core is placed in the upper left-hand corner of the box and the bottom of the core in the lower right-hand corner. [17]
verticality log, n—A geophysical log which indicates the dip and direction of a borehole such that depths within the borehole can be plotted relative to the position of the borehole at the surface. [17]
vitrain, n—Shiny black bands, thicker than 0.5 mm, of subbituminous and higher rank banded coal. Discussion—Vitrain, attributed to the coalification of relatively large fragments of wood and bark, may range up to about 30 mm (approximately 1 in.) thick in eastern North American coals, but may be much thicker in the younger western deposits. Vitrain is commonly traversed by many fine cracks oriented normal to the banding.
In lignite, the remains of woody material lack the shiny luster of vitrain in the higher rank coals and may instead be called previtrain. It is differentiated from attrital bands of lignite by its smoother texture, often showing the grain of wood. Previ­
train may be several inches thick. [16]

**vitrinite reflectance**, *n*—The percent of incident radiation that is reflected from the polished surface of vitrinite as measured using a reflected light microscope in accordance with ASTM Test Method D 2798. [17]

**volatile matter**, *n*—Those products, exclusive of moisture, given off by a material, such as gas or vapor, determined by definite prescribed methods which may vary according to the nature of the material.

**DISCUSSION**—In the case of coal and coke, the methods employed shall be those prescribed in ASTM Test Methods D 3175. [16]

**W**

**washability testing**, *n*—the analysis of the specific gravity distribution of chemical and physical characteristics of coal.

**DISCUSSION**—The specific gravity fractions are obtained by subjecting the material being studied to a series of solution, each with a discrete specific gravity, that covers the range of specific gravities in question. In the case of the washability analysis of coal, these solutions are obtained by the mixing of various organic liquids that are relatively inert toward the majority of coal types. The distribution, as determined by the analysis, is affected by the physical condition of the sample subjected to the washability analysis (e.g., the moisture content and the size content of the material). [16]

**weathered coal**, *n*—Coal that has been subjected to the actions of air and water in surface stockpiles, mining faces, and outcrops causing size reduction, oxidation, mineralization, and decrease of any caking or coking properties. [17]

**wireline drill-core system**, *n*—A system in which removing of a core is accomplished with the drill string in place, without withdrawing and dismantling the drill pipes, such as retrieving the core in a retractable inner core barrel and lowering the same or an alternative inner barrel into place inside the drill pipe. [17]

**Y**

**Young's modulus**, *n*—The ratio of the increase in stress on a test specimen to the resulting increase in strain under constant transverse stress, limited to materials having a linear stress-strain relationship over the range of loading. Also called *elastic modulus*. [15]

**REFERENCES**


[16] ASTM Terminology on Coal and Coke (D 121).

[17] Terms defined within the context of this manual.

[18] ASTM Classification of Coals by Rank (D 388).

[19] ASTM Practice for Collection of Coal Samples from Core (D 5192).