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Mining — Vocabulary —

Part 2: Geology

Exploitation minière — Vocabulaire —

Partie 2: Géologie

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Foreword

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This document was prepared by Technical Committee ISO/TC 82, *Mining*.

A list of all parts in the ISO 22932 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 22932 series has been prepared in order to standardize and to co-ordinate the global use of technical terms in mining, for the benefice of the experts working on different types of mining activities.

The need for the ISO 22932 series arose from the widely varying interpretation of terms used within the industry and the prevalent use of more than one synonym.

Mining — Vocabulary —

Part 2: Geology

1 Scope

This document specifies the geologic terms commonly used in mining. Only those terms that have a specific meaning in this field are included.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 General terms

3.1.1
bedrock
solid rock underlying *superficial deposits* (3.4.3.16)

Note 1 to entry: See also *saddle reef* (3.13.11).

[SOURCE: BS 3618-5:1971]

3.1.2
economic geology
study and analysis of *formations* (3.7.22) and materials that can be useful or profitable to man

Note 1 to entry: These materials can be fuels, metallic *minerals* (3.13.4), nonmetallic *minerals* (3.13.4), water and geothermal resources.

Note 2 to entry: For additional terms related to economic geology, see 3.13.

3.1.3
geochemistry
study of the relative and absolute abundances of the elements and their nuclides (isotopes) in the Earth, including the distribution and migration of the individual elements or suites of elements in the various envelopes of the Earth

Note 1 to entry: The envelopes of the Earth are the atmosphere, the hydrosphere, the lithosphere, etc.

Note 2 to entry: For additional terms related to geochemistry, see 3.9.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996, modified - Note 2 to entry added.]

3.1.4
geohydrology
study of hydraulics pertinent to the flow of water and similar liquids through *soils* (3.1.19) and rocks

Note 1 to entry: For additional terms related to geohydrology, see 3.11.

[SOURCE: BS 3618-5:1971, modified - Note 1 to entry added.]

3.1.5
geology
study of the planet Earth, the materials of which it is made, the processes that act on these materials, the products formed, and the history of the planet and its life forms since its origin

Note 1 to entry: Geology considers the physical forces that act on the Earth, the chemistry of its constituent materials, and the biology of its past inhabitants as revealed by fossils. Clues on the origin of the planet are sought in a study of the Moon and other extraterrestrial bodies. The knowledge thus obtained is placed in the service of humans to aid in discovery of *minerals* (3.13.4) and fuels of value in the Earth's crust, to identify geologically stable sites for major *structures* (3.4.1.4), and to provide foreknowledge of some of the dangers associated with the mobile forces of a dynamic Earth.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.1.6
geomorphology
science that treats the general configuration of the Earth's *surface* (3.1.23), specifically the study of the classification, description, nature, origin, and development of present landforms and their relationships to underlying *structures* (3.4.1.4), and of the history of geologic changes as recorded by these surface features

Note 1 to entry: For additional terms related to geomorphology, see 3.8.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996, modified - Note 1 to entry added.]

3.1.7
geophysics
branch of physics dealing with the Earth using specific physical phenomena in order to elucidate processes of dynamic *geology* (3.1.5) and physical geography

Note 1 to entry: The term "Earth" includes atmosphere and hydrosphere.

Note 2 to entry: The physical phenomena dealt with include seismic, gravitational, electric, thermal, radiometric and magnetic.

Note 3 to entry: Earth sciences such as *geodesy* (3.8.4), geology, *seismology* (3.7.10), meteorology, oceanography, and magnetism make use of physics in collecting and interpreting Earth data.

Note 4 to entry: Methods applying geophysics have been applied successfully to the identification of underground *structures* (3.4.1.4) in the Earth and to the search of structures of a particular type, for example those associated with oil bearing sands.

Note 5 to entry: For additional terms related to geophysics, see 3.10.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996, modified - Note 5 to entry added.]

3.1.8
historical geology
major branch of *geology* (3.1.5) concerned with the evolution of the Earth and its life forms from its origins to the present day, involving investigations into stratigraphy, paleontology, and geochronology, as well as the consideration of paleoenvironments, glacial periods, and plate-tectonic motions

Note 1 to entry: It is complementary to *physical geology* (3.1.15). Not to be confused with the history of geology.

Note 2 to entry: For additional terms related to historical geology, see 3.5.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996, modified - Note 2 to entry added.]

3.1.9
hydrology
study of the movement of water on and within the Earth's crust

Note 1 to entry: See also *hydrogeology* (3.11.4).

Note 2 to entry: For additional terms related to hydrology, see 3.12.

[SOURCE: BS 3618-5:1971, modified - Note 2 to entry added.]

3.1.10
ironstone
rock containing a substantial proportion of an iron compound, or any iron ore from which the metal can be smelted commercially; specifically, an iron-rich *sedimentary rock* (3.4.3), either deposited directly as a ferruginous sediment or resulting from chemical replacement

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.1.11
mineralogy
study of *minerals* (3.13.4), including their formation, occurrence, use, properties, composition, and classification

Note 1 to entry: For additional terms related to mineralogy, see 3.3.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996, modified - Note 1 to entry added.]

3.1.12
mining geology
geological aspects of *mineral* (3.13.4) deposits related to mining activities

Note 1 to entry: Its objectives, besides studying the geologic *structures* (3.4.1.4) in place and their continuity in space, are the modes of formation and the occurrence of mineral deposits and their discovery, in particular.

3.1.13
nongraded sediment
bed (3.4.1.1) detrital sediment, loose or cemented, containing notable amounts of more than one grade, e.g. loam or boulder *clay* (3.14.2)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.1.14
petrology
study of the origin, chemical and *mineral* (3.13.4) composition, *structure* (3.4.1.4), and *alteration* (3.4.4.1) of rocks

Note 1 to entry: For additional terms related to petrology, see 3.4.

[SOURCE: BS 3618-5:1971, modified - Note 1 to entry added.]

3.1.15
physical geology
broad division of *geology* (3.1.5) concerned with the processes and forces involved in the inorganic evolution of the Earth and its morphology, and with its constituent *minerals* (3.13.4), rocks, magmas, and core materials

Note 1 to entry: For additional terms related to physical geology, see 3.2.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996, modified - Note 1 to entry added.]

3.1.16
rank
position of a *coal* (3.4.3.1) relative to other coals in the coalification series from brown coal (low rank) to *anthracite* (3.4.4.2) (high rank), indicating its maturity in terms of its general chemical and physical properties

[SOURCE: BS 3618-5:1971]

3.1.17
seam
layer or *bed* (3.4.1.1) of *mineral* (3.13.4)

Note 1 to entry: This term can also be used for minerals.

3.1.18
segregate
to separate from the general mass, and collect together or become concentrated at a particular place or in a certain region

Note 1 to entry: Particles can segregate such as in the process of crystallization or solidification.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.1.19
soil
all unconsolidated materials above *bedrock* (3.1.1)

Note 1 to entry: For additional terms related to soils, see 3.14.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996, modified - Note 1 to entry added.]

3.1.20
subsurface geology
underground geology
geology (3.1.5) and *correlation* (3.5.2) of rock *formations* (3.7.22), *structures* (3.4.1.4), and other features beneath the land or sea-floor *surface* (3.1.23) as revealed or inferred by exploratory drilling, underground workings, and geophysical methods

Note 1 to entry: Usually implies direct evidence derived from shafts, wells, and borings, or obtained by geophysical methods.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.1.21
smut
thin band of soft, inferior *coal* (3.4.3.1)

[SOURCE: BS 3618-5:1971]

3.1.22
structural geology
branch of *geology* (3.1.5) that deals with the form, arrangement, and internal *structure* (3.4.1.4) of the rocks, and especially with the description, representation, and analysis of structures, chiefly on a moderate to small scale

Note 1 to entry: The subject is similar to *tectonics* (3.1.26), but the latter is generally used for the broader regional or historical phases.

Note 2 to entry: For additional terms related to structural geology, see 3.7.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996, modified - Note 2 to entry added.]

3.1.23
surface
boundary surface between one *bed* (3.4.1.1) or mass of rock and another immediately adjacent

EXAMPLE Bedding surface, *fault* (3.7.17) surface, surface of *unconformity* (3.5.8), surface of igneous compact.

Note 1 to entry: This term can also designate an imaginary surface, such as the axial surface of a *fold* (3.7.21).

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.1.24
surface geology
geology (3.1.5) and *correlation* (3.5.2) of rock *formations* (3.7.22), *structures* (3.4.1.4), and other features as seen at the Earth's *surface* (3.1.23)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.1.25
surficial geology
geology (3.1.5) of surficial deposits, including *soils* (3.1.19)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.1.26
tectonics
branch of *geology* (3.1.5) dealing with the broad architecture of the outer part of the Earth, i.e., the regional assembling of structural or deformational features, the study of their mutual relations, origin, and historical evolution

Note 1 to entry: It is closely related to *structural geology* (3.1.22), with which it overlaps, although tectonics generally deals with larger features.

Note 2 to entry: For additional terms related to tectonics, see 3.7.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996, modified - Note 2 to entry added.]

3.1.27
topography
general configuration of a land *surface* (3.1.23) or any part of the Earth's surface, including its relief and the position of its natural and manmade features

Note 1 to entry: The natural or physical surface features of a region, considered collectively as to form the features revealed by the *contour* (3.6.3) lines of a map. In nongeologic usage, the term includes manmade features (such as are shown on a topographic map).

Note 2 to entry: For additional terms related to topography, see 3.6.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996, modified - Note2 to entry added.]

3.1.28
transportation
shifting of material from one place to another on the Earth's *surface* (3.1.23) by moving water, ice, or air

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.2 Physical geology

3.2.1
catastrophe
sudden, violent change in the physical conditions of the Earth's *surface* (3.1.23)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.2.2
contact bed
bed (3.4.1.1) lying next to or in contact with a *formation* (3.7.22) of different character

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.2.3
field geology
field work
geology (3.1.5) as practiced by direct observation in the field; original, primary reconnaissance

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.2.4
geologic drilling
drilling done primarily to obtain information from which the *geology* (3.1.5) of the *formations* (3.7.22) penetrated can be determined

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.2.5
geological province
area throughout which geological history has been essentially the same or one that is characterized by particular structural or physiographic features

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.2.6
measures
series of beds or strata, nowadays generally limited to rock within the *coal* (3.4.3.1) measures

[SOURCE: BS 3618-5:1971]

3.2.7
rake vein
steeply inclined metalliferous *lode* (3.13.3) or *vein* (3.13.13)

[SOURCE: BS 3618-5:1971]

3.2.8
rider
<physical geology> mass of *country rock* (3.3.5) enclosed in a *lode* (3.13.3)

Note 1 to entry: Compare with 3.4.1.3 and 3.13.9.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.2.9
shell bed
bed (3.4.1.1) containing abundant fossil shells

[SOURCE: BS 3618-5:1971]

3.2.10
slump bedding
disturbed bedding, specifically deformed bedding produced by subaqueous slumping or lateral movement of newly deposited sediment

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.2.11
stringer
mineral (3.13.4) veinlet or filament, usually one of a number, occurring in a discontinuous subparallel pattern in host rock

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.3 Mineralogy

3.3.1
barren ground
unmineralised strata

3.3.2
blackband ironstone
bed (3.4.1.1) of *ironstone* (3.1.10) containing sufficient *carbonaceous* (3.4.3.14) matter to make it self-calcining

[SOURCE: BS 3618-5:1971]

3.3.3
clay band ironstone
impure *argillaceous* (3.14.1) carbonate of iron occurring in sand stones and *shales* (3.4.3.34), either as definite layers or as nodules

[SOURCE: BS 3618-5:1971]

3.3.4
cleavage
in a crystalline *mineral* (3.13.4), one or more series of parallel planes along which the mineral tends to split

[SOURCE: BS 3618-5:1971]

3.3.5
country rock
rock adjacent to a *mineral* (3.13.4) deposit or igneous *intrusion* (3.4.2.7) or other geologic features

[SOURCE: BS 3618-5:1971]

3.3.6
exsolution
process whereby an initially homogeneous solid solution separates into two (or possibly more) distinct crystalline phases without addition or removal of material, i.e., without change in the bulk composition

Note 1 to entry: It generally, though not necessarily, occurs on cooling.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.3.7
fluid inclusion
cavity, with or without negative crystal faces, containing one or two fluid phases, and possibly one or more minute crystals, in a host crystal

Note 1 to entry: If two fluid phases are present, the vapor phase (bubble) can show Brownian motion.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.3.8
matrix
finer grained material between the larger particles of a rock or the material surrounding a fossil or *mineral* (3.13.4)

[SOURCE: BS 3618-5:1971]

3.3.9
polymorph
minerals (3.13.4) that have the same chemical composition, but different crystal *structures* (3.4.1.4)

EXAMPLE 1 Kyanite, andalusite, and sillimanite.

EXAMPLE 2 Quartz, tridymite, cristobalite, coesite, and stishovite.

3.3.10
polymorphism
characteristic of a chemical compound to crystallize in more than one crystal class

Note 1 to entry: See *polymorph* (3.3.9).

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4 Petrology

3.4.1 General terms

3.4.1.1
bed
layer of rock or *mineral* (3.13.4)

[SOURCE: BS 3618-5:1971]

3.4.1.2
lithology
character of a rock expressed in terms of its *mineral* (3.13.4) composition, *structure* (3.4.1.4), grain size, color and arrangement of its component parts

[SOURCE: BS 3618 -5:1971, modified - definition reworded.]

3.4.1.3
rider
<petrology> *bed* (3.4.1.1) in a *coal* (3.4.3.1) *seam* (3.1.17)

Note 1 to entry: Compare with 3.2.8 and 3.13.9.

EXAMPLE *Shale* (3.4.3.34) or *mudstone* (3.4.3.30).

3.4.1.4
structure
larger feature of a rock mass and total sum of such features

EXAMPLE Bedding, flow banding, jointing, *cleavage* (3.7.8), shear, *fault* (3.7.17) and brecciation.

3.4.1.5
texture
general physical appearance or character of a rock, including the geometric aspects of, and the mutual relations among, its component particles or crystals

EXAMPLE 1 Size, shape, and arrangement of the constituent elements of a *sedimentary rock* (3.4.3).

EXAMPLE 2 Crystallinity, granularity, and fabric of the constituent elements of an *igneous rock* (3.4.2).

Note 1 to entry: The term is applied to the smaller (megascopic or microscopic) features as seen on a smooth *surface* (3.1.23) of a homogeneous rock or *mineral* (3.13.4) aggregate. The term *structure* (3.4.1.4) is generally used for the larger features of a rock. The two terms should not be used synonymously, although certain textural features can parallel major structural features.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2
igneous rock
rock formed by the solidification of molten material that originated within the Earth

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.1
agglomerate
naturally cemented unstratified mass of coarse volcanic fragments

[SOURCE: BS 3618-5:1971]

3.4.2.2
volcanic ash
fine loose debris ejected in volcanic eruptions

Note 1 to entry: It gives rise to *tuff* (3.4.2.17) when compacted.

[SOURCE: BS 3618-5:1971]

3.4.2.3
batholith
bathylith
large, generally *discordant* (3.5.3) plutonic mass that has more than 104 km^2 of *surface* (3.1.23) exposure and no known floor

Note 1 to entry: Its *formation* (3.7.22) is believed by most investigators to involve magmatic processes.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.4
dolerite
whin
dark crystalline *igneous rock* (3.4.2) forming *intrusions* (3.4.2.7) such as *dykes* (3.4.2.5) and *sills* (3.4.2.16)

[SOURCE: BS 3618-5:1971]

3.4.2.5
dyke
more or less perpendicular wall-like igneous mass intruded into other rocks

[SOURCE: BS 3618-5:1971]

3.4.2.6
hard-rock geology
colloquial term for *geology* (3.1.5) of *igneous rocks* (3.4.2) and *metamorphic rocks* (3.4.4), as opposed to *soft-rock geology* (3.4.3.37)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.7
intrusion
mass of *igneous rock* (3.4.2) which, while molten, was forced into or between other rocks

[SOURCE: BS 3618-5:1971]

3.4.2.8
laccolith
concordant (3.4.4.12) igneous *intrusion* (3.4.2.7) with a known or assumed flat floor and a postulated, dike-like feeder commonly thought to be beneath its thickest point

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.9
lopolith
large, *concordant* (3.4.4.12), typically layered igneous *intrusion* (3.4.2.7), of planoconvex or lenticular shape, that is sunken in its central part owing to sagging of the underlying *country rock* (3.3.5)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.10
phacolith
concordant (3.4.4.12) *intrusion* (3.4.2.7) in the crest of an *anticline* (3.7.1) and trough of a *syncline* (3.7.51) that, in a cross section, has the shape of a doubly convex lens

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.11
phenocryst
large crystal or *mineral* (3.13.4) grains floating in the *matrix* (3.3.8) or groundmass of a *porphyry* (3.4.2.14)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.12
pluton
body of medium- to coarse-grained *igneous rock* (3.4.2) that formed beneath the *surface* (3.1.23) by crystallization of a magma

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.13
porphyritic
texture (3.4.1.5) of an *igneous rock* (3.4.2) in which larger crystals [*phenocrysts* (3.4.2.11)] are set in a finer-grained groundmass, which can be crystalline or glassy or both

Note 1 to entry: Also, said of a rock with such texture, or of the *mineral* (3.13.4) forming the phenocrysts.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.14
porphyry
porphyritic igneous rock
igneous rock (3.4.2) of any composition that contains conspicuous *phenocrysts* (3.4.2.11) in a fine-grained groundmass

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.15
pyroclastic
produced by explosive or aerial ejection of *ash* (3.4.3.4), fragments, and glassy material from a volcanic vent

Note 1 to entry: It applies to the rocks and rock layers as well as to the *texture* (3.4.1.5) so formed.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.2.16
sill
intrusive sheet of *igneous rock* (3.4.2) parallel or nearly parallel to the general stratification

[SOURCE: BS 3618-5:1971]

3.4.2.17
tuff
compacted fine *volcanic ash* (3.4.2.2) and dust

[SOURCE: BS 3618-5:1971]

3.4.2.18
vitrophyric
porphyritic (3.4.2.13) *igneous rock* (3.4.2) having a glassy groundmass

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.3
sedimentary rock
rock formed from materials derived from the weathering of previously existing rock masses

[SOURCE: BS 3618-5:1971]

3.4.3.1
coal
combustible *sedimentary rock* (3.4.3), formed from variously altered plant remains

[SOURCE: BS 3618-5:1971]

3.4.3.1.1
anthracology
branch of *geology* (3.1.5) dealing with the physical constitution of *coal* (3.4.3.1) in much the same way that petrography deals with the *mineral* (3.13.4) composition of rocks

Note 1 to entry: It is concerned with the physical variations in coal that make it possible to classify coal material by types.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.3.2
alluvium
deposits, normally unconsolidated, made by streams in channels and over their flood plains and deltas

[SOURCE: BS 3618-5:1971]

3.4.3.3
arenaceous
said of a sediment or *sedimentary rock* (3.4.3) consisting wholly or in part of sand-sized fragments, or having a sandy *texture* (3.4.1.5) or the appearance of sand

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.3.4
ash
inorganic residue after the incineration of *coal* (3.4.3.1) to constant weight under standard conditions

Note 1 to entry: In general, it differs in weight and composition from the original *mineral* (3.13.4) matter.

[SOURCE: BS 3618-5:1971]

3.4.3.5
basement complex
series of rocks generally with complex *structure* (3.4.1.4) beneath the dominantly *sedimentary rocks* (3.4.3)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.3.6
bedding plane
interface between two adjacent beds of *sedimentary rock* (3.4.3)

[SOURCE: BS 3618-5:1971]

3.4.3.7
bituminous coal
coal (3.4.3.1) other than *anthracite* (3.4.4.2) and low-volatile coal on the one hand and *lignite* (3.4.3.28) on the other

[SOURCE: BS 3618-5:1971]

3.4.3.8
boghead coal
coal (3.4.3.1) resembling *cannel coal* (3.4.3.12) in physical appearance and properties, but distinguished microscopically by the presence of the remains of algae

[SOURCE: BS 3618-5:1971]

3.4.3.9
breccia
rock consisting of broken angular, unworn fragments held together by a natural cement

[SOURCE: BS 3618-5:1971]

3.4.3.10
buried channel
old channel filled and concealed by glacial or other *superficial deposits* (3.4.3.16)

[SOURCE: BS 3618-5:1971]

3.4.3.11
burnt coal
coal (3.4.3.1) altered by heat from an igneous *intrusion* (3.4.2.7) within or near the *seam* (3.1.17)

[SOURCE: BS 3618-5:1971]

3.4.3.12
cannel coal
strong, non-banded *coal* (3.4.3.1) with a satin sheen or wax lustre, showing a conchoidal fracture; distinguished microscopically from *boghead coal* (3.4.3.8) by the presence of the remains of spores

Note 1 to entry: Generally having high volatile matter content and readily ignitable.

[SOURCE: BS 3618-5:1971]

3.4.3.13
cank
hard, dark-grey massive rock consisting largely of ankerite

Note 1 to entry: Cank is found in some *coal* (3.4.3.1) *measures* (3.2.6) marine beds.

[SOURCE: BS 3618-5:1971]

3.4.3.14
carbonaceous
consisting of or containing *coal* (3.4.3.1) or coal-like material

Note 1 to entry: The term is used especially of *shale* (3.4.3.34) with particles of such material distributed throughout the mass.

[SOURCE: BS 3618-5:1971]

3.4.3.15
cauldron bottom
concretionary mass surrounded by glossy *surfaces* (3.1.23) and usually occurring in the roof of a *coal* (3.4.3.1) *seam* (3.1.17)

[SOURCE: BS 3618-5:1971]

3.4.3.16
superficial deposit
most recent deposit, generally unconsolidated (e.g. most, peat, sand, gravel, *silt* (3.4.3.35), mud, etc.) lying above the *rockhead* (3.13.10)

[SOURCE: BS 3618-5:1971]

3.4.3.17
coal balls
calcareous concretions of mineralized plant debris occurring in certain *coal* (3.4.3.1) *seams* (3.1.17)

[SOURCE: BS 3618-5:1971]

3.4.3.18
conglomerate
coarse-grained *sedimentary rock* (3.4.3) composed of rounded fragments embedded in a *matrix* (3.3.8) of cementing material such as silica

3.4.3.19
crop coal
oxidized *coal* (3.4.3.1) found near the *surface* (3.1.23)

[SOURCE: BS 3618-5:1971]

3.4.3.20
cross bedding
laminations, in a *bed* (3.4.1.1) of *sedimentary rock* (3.4.3), which are inclined to the general stratification

Note 1 to entry: See Figure 1.

[SOURCE: BS 3618-5:1971]

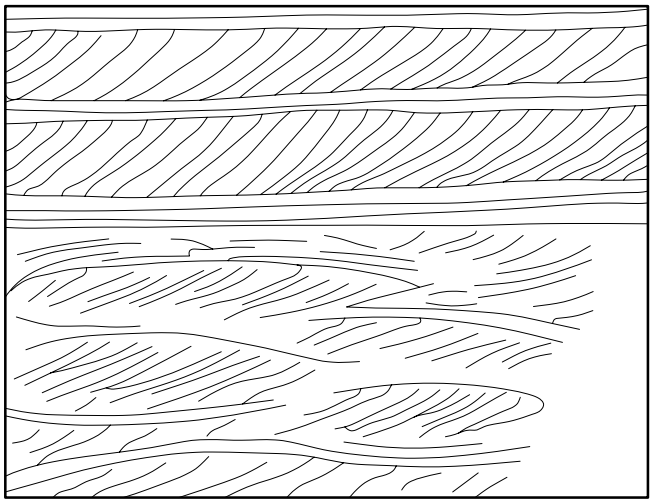


Figure 1 — Cross bedding

3.4.3.21
dirt band
thin stratum of *shale* (3.4.3.34) or other inorganic rock material in a *coal* (3.4.3.1) *seam* (3.1.17)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.3.22
splint coal
hard *coal* (3.4.3.1) with a dull lustre and uneven fracture

[SOURCE: BS 3618-5:1971]

3.4.3.23
drift
superficial deposit

EXAMPLE Boulder *clay* (3.14.2), glacial gravel, *alluvium* (3.4.3.2), peat.

[SOURCE: BS 3618-5:1971]

3.4.3.24
evaporite
rock, formed by the evaporation of lakes or seas

EXAMPLE Anhydrite, rock salt, potash salts.

[SOURCE: BS 3618-5:1971]

3.4.3.25
freestone
uniform, fine-grained *sandstone* (3.4.3.33) or *limestone* (3.4.3.29) that can be readily sawn and shaped

[SOURCE: BS 3618-5:1971]

3.4.3.26
ganister
compact, highly siliceous, *sedimentary rock* (3.4.3), often containing plant remains

[SOURCE: BS 3618-5:1971]

3.4.3.27
intrusion
mass of *sedimentary rock* (3.4.3) occurring in a *coal* (3.4.3.1) *seam* (3.1.17)

[SOURCE: BS 3618-5:1971]

3.4.3.28
lignite
coal (3.4.3.1) of low *rank* (3.1.16) with a high inherent moisture and volatile matter

Note 1 to entry: In this general sense, lignite can be sub-divided into black lignite, brown lignite and brown coal.

[SOURCE: BS 3618-5:1971]

3.4.3.29
limestone
sedimentary rock (3.4.3) consisting predominantly of calcium carbonate

3.4.3.30
mudstone
indurated *sedimentary rock* (3.4.3) consisting largely of *clay* (3.14.2) *minerals* (3.13.4), with little or no fissility

[SOURCE: BS 3618-5:1971]

3.4.3.31
rashings
<composition> *carbonaceous* (3.4.3.14) *shale* (3.4.3.34) with *coal* (3.4.3.1) streaks

[SOURCE: BS 3618-5:1971]

3.4.3.32
rashings
<structure> soft *shale* (3.4.3.34), normally *carbonaceous* (3.4.3.14)

Note 1 to entry: Rashings often are associated with *coal* (3.4.3.1) *seams* (3.1.17) containing sheared coal fragments.

[SOURCE: BS 3618-5:1971]

3.4.3.33
sandstone
medium-grained clastic *sedimentary rock* (3.4.3) composed of fragments of sand size set in a fine-grained *matrix* (3.3.8) [*silt* (3.4.3.35) or *clay* (3.14.2)] and more or less firmly united by a cementing material (commonly silica, iron oxide, or calcium carbonate)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.3.34
shale
fine-grained detrital *sedimentary rock* (3.4.3), formed by the consolidation (especially by compression) of *clay* (3.14.2), *silt* (3.4.3.35), or mud

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.3.35
silt
fine grained sediment having a particle size intermediate between that of fine sand and *clay* (3.14.2)

[SOURCE: BS 3618-5:1971]

3.4.3.36
siltstone
consolidated *silt* (3.4.3.35).

[SOURCE: BS 3618-5:1971]

3.4.3.37
soft-rock geology
colloquial term for *geology* (3.1.5) of *sedimentary rocks* (3.4.3), as opposed to *hard-rock geology* (3.4.2.6)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.4
metamorphic rock
rock altered by the action of heat, pressure, or migrating fluids, acting separately or together

[SOURCE: BS 3618-5:1971]

3.4.4.1
alteration
change in the mineralogic composition of a rock brought about by physical or chemical means, especially by the action of hydrothermal solutions

Note 1 to entry: It can be a secondary, i.e., supergene, change in a rock or *mineral* (3.13.4).

Note 2 to entry: Alteration is sometimes considered as a phase of *metamorphism* (3.4.4.9), but is usually distinguished from it because of being milder and more localized than metamorphism is generally thought to be.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.4.2
anthracite
coal (3.4.3.1) of the highest *rank* (3.1.16) having volatile matter in the region of 100 g/Kg or less

3.4.4.3
contact metamorphism
metamorphism (3.4.4.9) taking place in rocks at or near their contact with a body of *igneous rock* (3.4.2)

Note 1 to entry: Metamorphic changes are effected by the heat and materials emanating from the magma and by some deformation connected with the emplacement of the igneous mass.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.4.4
dynamometamorphism
dynamic metamorphism
metamorphism (3.4.4.9) resulting from the processes and effects of orogenic movements and differential stresses in producing new rocks from old, with marked structural and mineralogical changes due to crushing and shearing at low temperatures and extensive recrystallization at higher temperatures

Note 1 to entry: It can involve large areas of the Earth's crust, i.e., be regional in character.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.4.5
gneiss
foliated rock formed by *regional metamorphism* (3.4.4.10), in which bands or lenticles of granular *minerals* (3.13.4) alternate with bands or lenticles in which minerals having flaky or elongate prismatic habits predominate

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.4.6
hydrolysis
decomposition of organic compounds by interaction with water; either cold, or on heating alone, or in the presence of acids or alkalies

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.4.7
hydrothermal alteration
alteration (3.4.4.1) of rocks or *minerals* (3.13.4) by the reaction of hydrothermal fluid with preexisting solid phases

3.4.4.8
marble
metamorphic rock (3.4.4) composed essentially of calcite, dolomite, or a combination of the two, with a fine- to coarse-grained crystalline *texture* (3.4.1.5)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.4.9
metamorphism
mineralogical, chemical, and structural adjustment of solid rocks to physical and chemical conditions that have generally been imposed at depth below the *surface* (3.1.23) zones of weathering and cementation, and that differ from the conditions under which the rocks in question originated

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.4.10
regional metamorphism
metamorphism (3.4.4.9) affecting an extensive region, as opposed to local or *contact metamorphism* (3.4.4.3)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.4.11
slate
compact, fine-grained *metamorphic rock* (3.4.4) that possesses slaty *cleavage* (3.7.8) and hence can be split into slabs and thin plates

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.4.4.12
concordant
<metamorphism> metamorphic processes at the extreme upper range of temperatures and pressures, at which partial to complete fusion of the affected rocks takes place and magma is produced

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.5 Historical geology

3.5.1
concordant
<historical geology> radiometric ages, either determined by more than one method, that are in agreement within the analytical precision for the determining methods, or given by coexisting *minerals* (3.13.4), determined by the same method, that are in agreement

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.5.2
correlation
determination of the equivalence in the stratigraphical position of beds in separated areas

[SOURCE: BS 3618-5:1971]

3.5.3
discordant
contact between an igneous *intrusion* (3.4.2.7) and the *country rock* (3.3.5) that is not parallel to the foliation or *bedding planes* (3.4.3.6) of the latter

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.5.4
inlier
area of older rocks surrounded by younger rocks

[SOURCE: BS 3618-5:1971]

3.5.5
outlier
area of younger rocks surrounded by older rocks

[SOURCE: BS 3618-5:1971]

3.5.6
stratabound
mineral (3.13.4) deposit confined to a single stratigraphic unit

Note 1 to entry: The term can refer to a *stratiform* (3.5.7) deposit, to variously oriented orebodies contained within the unit, or to a deposit containing veinlets and *alteration* (3.4.4.1) zones that may or may not be strictly conformable with bedding.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.5.7
stratiform
special type of strata-bound deposit in which the desired rock or ore constitutes, or is strictly coextensive with, one or more sedimentary, metamorphic, or igneous layers

EXAMPLE Beds of salt or iron oxide, or layers rich in chromite or platinum, in a layered igneous complex.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.5.8
unconformity
substantial break in the continuity of deposition, where one rock *formation* (3.7.22) is overlain by another that is not the next in geological succession

[SOURCE: BS 3618-5:1971]

3.5.8.1
angular unconformity
unconformity (3.5.8) in which the older underlying strata *dip* (3.7.13) at a different angle (generally steeper) than the younger overlying strata

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.5.8.2
disconformity
unconformity (3.5.8) in which the *bedding planes* (3.4.3.6) above and below are essentially parallel, indicating a considerable interval of erosion (or sometimes of nondeposition), and usually marked by a visible and irregular or uneven erosion *surface* (3.1.23) of appreciable relief

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6 Topography

3.6.1
isopach
line drawn on a map through points of equal true thickness of a designated stratigraphic unit or group of stratigraphic units

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6.2
horizon
given definite position or interval in the stratigraphic column or the scheme of stratigraphic classification

Note 1 to entry: The term is generally used in a relative sense.

[SOURCE: Glossary of Mining Terms. Kentucky Mining Institute]

3.6.3
contour
imaginary line, or a line on a map or chart, that connects points of equal value, e.g., elevation of the land *surface* (3.1.23) above or below some reference value or datum plane, generally sea level

Note 1 to entry: Contours are commonly used to depict topographic or structural surfaces; they can also readily show the laterally variable properties of sediments or any other phenomenon that can be quantified.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6.4
gravity anomaly
difference between the observed value of gravity at a point and the theoretically calculated value

Note 1 to entry: It is based on a simple gravity model, usually modified in accordance with some generalized hypothesis of variation in subsurface density as related to *surface* (3.1.23) topography.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6.5
inverted relief
topographic configuration that is the inverse of the geologic structure

Note 1 to entry: Inverted relief is given where mountains occupy the site of *synclines* (3.7.51) and valleys occupy the sites of *anticlines* (3.7.1)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6.6
isostatic correction
adjustment made to values of gravity, or to deflections of the vertical, observed at a point, to take account of the assumed mass deficiency under topographic features for which a *topographic correction* (3.6.10) is also made

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6.7
photogeology
identification, recording, and study of geologic features and *structures* (3.4.1.4) by means of photography; specifically the geologic interpretation of aerial and space photographs and images and the presentation of the information so obtained

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6.8
massif
massive topographic and structural feature, especially in an orogenic belt, commonly formed of rocks more rigid than those of its surroundings

Note 1 to entry: These rocks can be protruding bodies of *basement* (3.7.5) rocks or younger plutonic bodies.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6.9
outcrop
part of a rock *formation* (3.7.22) that appears at the *surface* (3.1.23) of the ground

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6.10
topographic correction
terrain correction
correction applied to observed values obtained in geophysical surveys in order to remove the effect of variations in the observations due to the *topography* (3.1.27) near observation sites

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6.11
topographic contour
imaginary line on the ground, all points of which are at the same elevation above (or below) a specified datum *surface* (3.1.23)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.6.12
topographic unconformity
relationship between two parts of a landscape or two kinds of *topography* (3.1.27) that are out of adjustment with one another, due to an interruption in the ordinary course of the erosion cycle of a region; e.g., a lack of harmony between the topographic forms of the upper and lower parts of a valley, due to rejuvenation

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7 Structural geology and tectonics

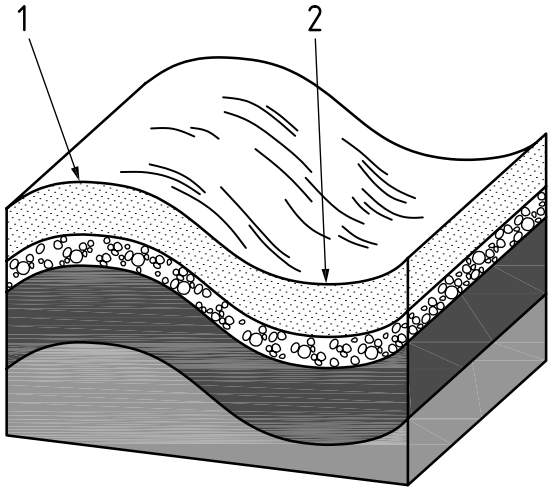
3.7.1
anticline
fold (3.7.21), generally convex upward, whose core contains the stratigraphically older rocks

Note 1 to entry: See Figure 2.

Note 2 to entry: Applied to strata that *dip* (3.7.13) in opposite directions from a common ridge or axis, like the roof of a house, the *structure* (3.4.1.4) is termed an anticline or saddleback.

Note 3 to entry: In this type of fold (anticline) the sides or limbs of the fold typically slope away from the plane of the axis of either side. Every anticlinal axis *pitches* (3.7.41) in two directions; i.e., toward the two ends of the fold.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]



Key

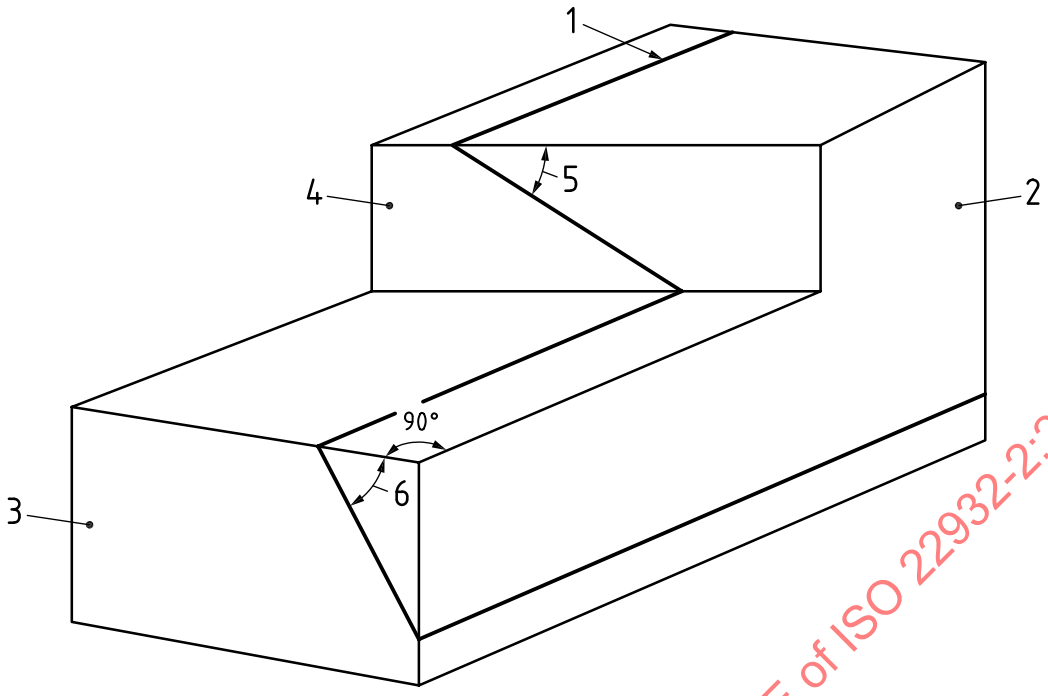
1 anticline
2 syncline

Figure 2 — Anticline and syncline

3.7.2
apparent dip
dip (3.7.13) in any random vertical section, having a value between zero in the section containing the line of *strike* (3.7.48) and *full dip* (3.7.24) in the section at right angles to this line

Note 1 to entry: See Figure 3.

[SOURCE: BS 3618-5:1971]



Key

1	strike	4	random section
2	section in the direction of strike	5	apparent dip
3	section in the direction of strike	6	full dip

NOTE SOURCE: BS 3618-5:1971.

Figure 3 — Dip and associated terms

3.7.3
backs
system of *joints* (3.7.34) in *coal* (3.4.3.1) or stratified *mineral* (3.13.4) oblique to the bedding at an angle at 35° to 75°

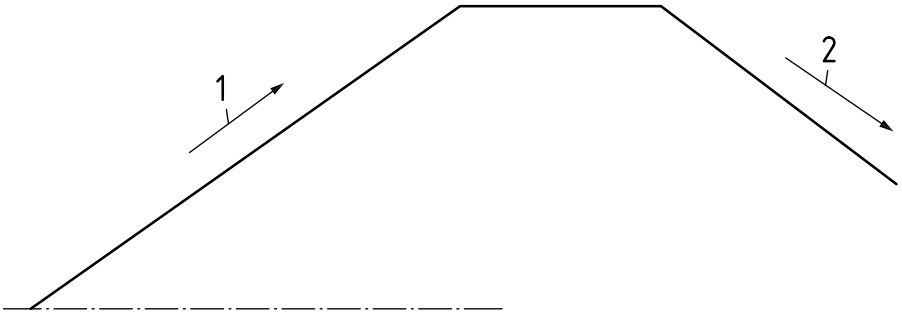
[SOURCE: BS 3618-5:1971]

3.7.4
back slope
structural plain
less sloping side of a ridge

Note 1 to entry: See Figure 4.

Note 2 to entry: It contrasts with escarpment, or steeper slope; especially the slope more nearly parallel with the strata.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]



Key

1 fore slope

2 back slope

Figure 4 — Back slope

3.7.5
basement
underlying complex that behaves as a unit mass and does not deform by folding

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.6
basin
structure (3.4.1.4) in which the strata *dip* (3.7.13) inwards on all sides

[SOURCE: BS 3618-5:1971]

3.7.7
carinate fold
isoclinal *fold* (3.7.21)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.8
cleavage
in a rock, definite parallel closely spaced planes along which the rock can split, and which can be highly inclined to the *bedding planes* (3.4.3.6)

[SOURCE: BS 3618-5:1971]

3.7.9
competent beds
beds with such physical characteristics that they respond to tectonic forces by folding and faulting, rather than by crushing and flowing

Note 1 to entry: Competent beds are relatively strong and *incompetent beds* (3.7.31) relatively weak.

[SOURCE: BS 3618-5:1971]

3.7.10
cover
vertical distance between any position in the strata and the *surface* (3.1.23) or any other position used as reference

[SOURCE: BS 3618-5:1971]

3.7.11
cross course
cross vein
cross lode
vein (3.13.13) or *lode* (3.13.3) which intersects the main productive veins or lodes

[SOURCE: BS 3618-5:1971]

3.7.12
current bedding
particular form of cross bedding formed by water or wind

[SOURCE: BS 3618-5:1971]

3.7.13
dip
inclination of strata to the horizontal

Note 1 to entry: See Figures 13 and 5.

Note 2 to entry: See also *apparent dip* (3.7.2) and *full dip* (3.7.24).

[SOURCE: BS 3618-5:1971]

3.7.14
dome
structure (3.4.1.4) in which the strata *dip* (3.7.13) outwards on all sides

[SOURCE: BS 3618-5:1971]

3.7.15
downthrow
amount, measured vertically, of downward displacement of beds caused by a *fault* (3.7.17)

[SOURCE: BS 3618-5:1971]

3.7.16
downthrow side
lower side of a *fault* (3.7.17)

[SOURCE: BS 3618-5:1971]

3.7.17
fault
plane of fracture in a rock body along which there has been displacement

[SOURCE: BS 3618-5:1971]

3.7.18
fault breccia
shattered rock material along a *fault plane* (3.7.20)

[SOURCE: BS 3618-5:1971]

3.7.19
fault drag
distortion of the bedding which can occur in the vicinity of a *fault plane* (3.7.17)

[SOURCE: BS 3618-5:1971]

3.7.20
fault plane
surface (3.1.23) along which strata movement has taken place

Note 1 to entry: See Figures 5 and 11.

[SOURCE: BS 3618-5:1971]

3.7.21
fold
curve or bend of a planar *structure* (3.4.1.4) such as rock strata, *bedding planes* (3.4.3.6), foliation, or *cleavage* (3.7.8)

Note 1 to entry: A fold is usually a product of deformation, although its definition is descriptive and not genetic and can include primary structures.

Note 2 to entry: See also *anticline* (3.7.1), *syncline* (3.7.51) and *monocline* (3.7.36).

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.22
formation
set of lithologically distinctive beds selected as a convenient unit for mapping and description

[SOURCE: BS 3618-5:1971]

3.7.23.1
footwall
<general> underlying side of a *fault* (3.7.17), orebody, or mine working

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.23.2
footwall
<vein or fault-specific> wall rock beneath an inclined *vein* (3.13.13) or *fault* (3.7.17)

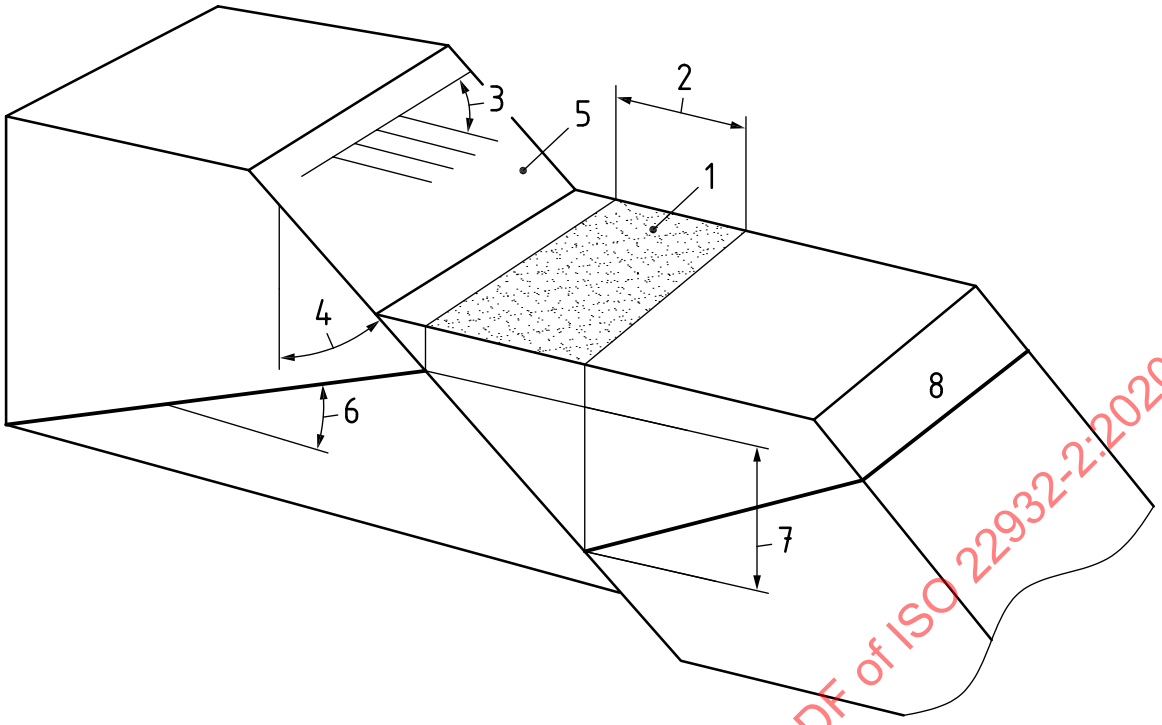
[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.24
full dip
maximum angle, measured in a vertical plane, between the plane of a stratum and the horizontal

Note 1 to entry: See Figures 3 and 8.

Note 2 to entry: The vertical section containing the full dip is at right angles to the line of *strike* (3.7.48).

[SOURCE: BS 3618-5:1971]



Key

1	want	4	hade	7	throw
2	heave	5	fault plane	8	strike
3	pitch	6	full dip		

NOTE SOURCE: BS 3618-5:1971.

Figure 5 — Normal fault and associated terms

3.7.25
geotechnics
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

Note 1 to entry: It is the applied science of making the Earth more habitable.

Note 2 to entry: It embraces the fields of *soil* (3.1.19) mechanics and rock mechanics, and many of the engineering aspects of *geology* (3.1.5), *geophysics* (3.1.7), *hydrology* (3.1.9), and related sciences.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.26
graben
elongate, relatively depressed crustal unit or block that is bounded by *faults* (3.7.17) on its long sides

Note 1 to entry: It is a structural form that can be geomorphologically expressed as a rift valley.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.27
hade
angle of inclination of the plane of a *fault* (3.7.17) to the vertical

Note 1 to entry: See Figure 2.

[SOURCE: BS 3618-5:1971]

3.7.28.1
hanging wall
<general> overlying side of an orebody, *fault* (3.7.17), or mine working

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

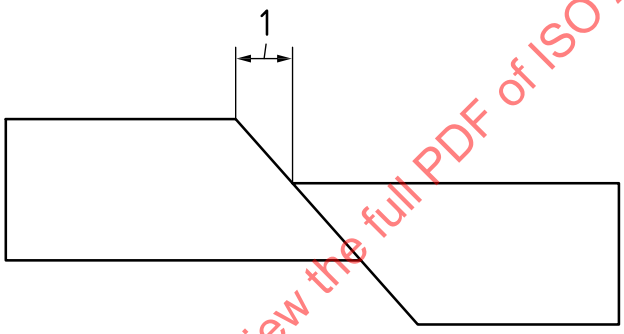
3.7.28.2
hanging wall
<vein- or fault-specific> wall rock above an inclined *vein* (3.13.13) or *fault* (3.7.17)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.29
heave
horizontal displacement of strata measured at right angles to the *strike* (3.7.48) of a *fault* (3.7.17)

Note 1 to entry: See Figures 5 and 6.

[SOURCE: BS 3618-5:1971]



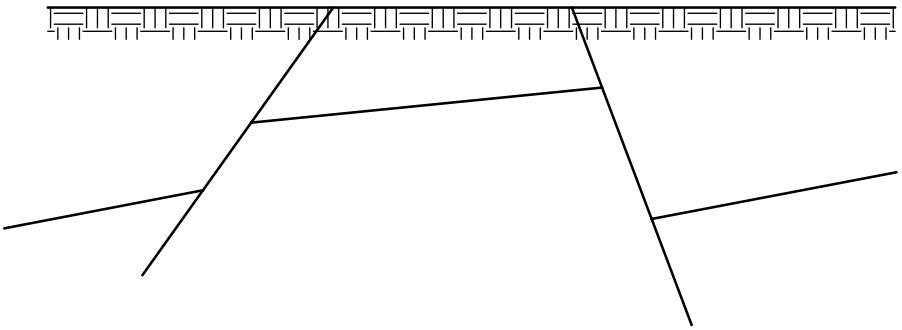
Key
1 heave

Figure 6 — Heave

3.7.30
horst
block of strata that has been displaced upwards between two *fault planes* (3.7.20)

Note 1 to entry: See Figure 7.

[SOURCE: BS 3618-5:1971]



NOTE SOURCE: BS 3618-5:1971.

Figure 7 — Horst (in section)

3.7.31
incompetent bed
bed (3.4.1.1) that is relatively weak in comparison with adjacent beds and which can crush or flow plastically under structural distortion

[SOURCE: BS 3618-5:1971]

3.7.32
isoclinal fold
fold (3.7.21) whose limbs are parallel

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.33
incorp
former *outcrop* (3.6.9) concealed by younger unconformable deposits

[SOURCE: BS 3618-5:1971]

3.7.34
joint
crack or fissure intersecting a mass of rock, often occurring in two sets of parallel planes

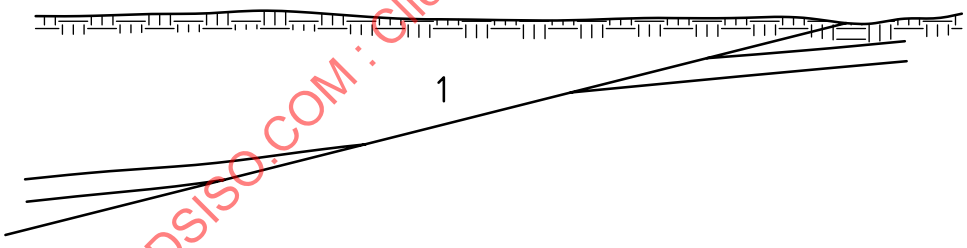
Note 1 to entry: Joints are usually more or less at right angles to the *bedding planes* (3.4.3.6).

[SOURCE: BS 3618-5:1971]

3.7.35
lag fault
normal fault (3.7.38) having a high angle of *hade* (3.7.27)

Note 1 to entry: See Figure 8.

[SOURCE: BS 3618-5:1971]



Key
1 fault plane

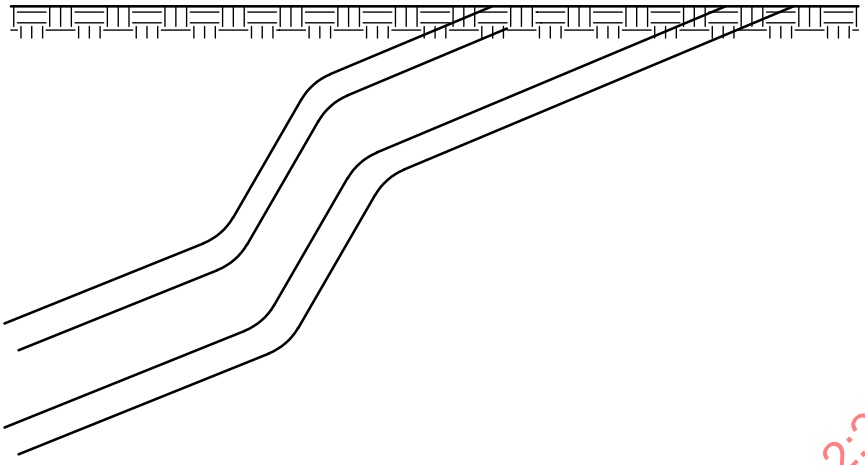
NOTE SOURCE: BS 3618-5:1971.

Figure 8 — Lag fault (in section)

3.7.36
monocline
fold (3.7.21) *formation* (3.7.22) in which the strata, after local steepening, resume their original inclination

Note 1 to entry: See Figure 9.

[SOURCE: BS 3618-5:1971]



NOTE SOURCE: BS 3618-5:1971.

Figure 9 — Monocline (in section)

3.7.37
nip out
local thinning or disappearance of a *coal* (3.4.3.1) *seam* (3.1.17) due to tectonic movement

[SOURCE: BS 3618-5:1971]

3.7.38
normal fault
fault (3.7.17) which *hades* (3.7.27) towards the *downthrow side* (3.7.16)

Note 1 to entry: See Figure 5.

[SOURCE: BS 3618-5:1971]

3.7.39
overlap
extension of a *bed* (3.4.1.1) beyond underlying conformable beds

[SOURCE: BS 3618-5:1971]

3.7.40
parting
lamina or very thin sedimentary layer separating thicker strata of a different type

EXAMPLE A thin layer of *shale* (3.4.3.34) or *slate* (3.4.4.11) in a *coal* (3.4.3.1) *bed* (3.4.1.1), or a shale break in *sandstone* (3.4.3.33).

Note 1 to entry: Strata tend to separate readily at partings.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.41
pitch
angular inclination, measured in relation to the direction of the *strike* (3.7.48), of the axis of any feature in a known plane

Note 1 to entry: See Figures 1 and 2.

[SOURCE: BS 3618-5:1971]

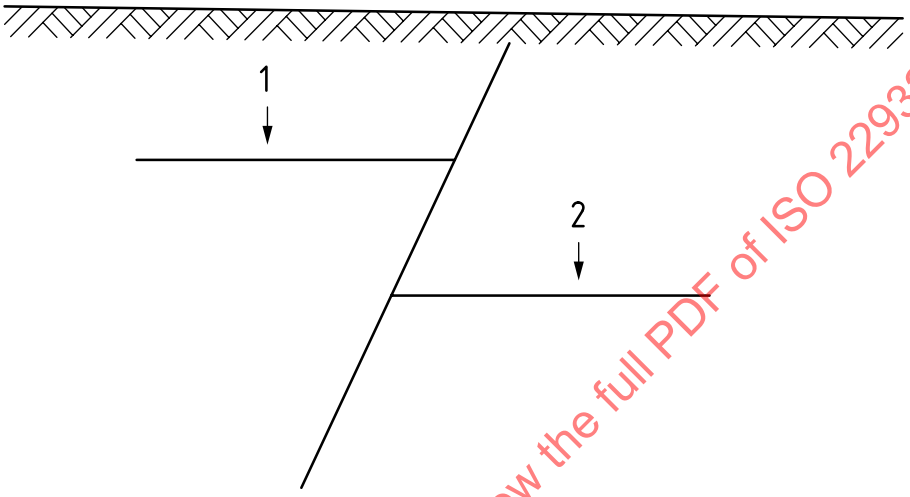
3.7.42
plunge
inclination of the crest of an *anticline* (3.7.1) or the trough of a *syncline* (3.7.51)

[SOURCE: BS 3618-5:1971]

3.7.43
reverse fault
fault (3.7.17) which *hades* (3.7.27) towards the *upthrow* (3.7.59) side

Note 1 to entry: See Figure 10.

[SOURCE: BS 3618-5:1971]



Key
1 upthrow side
2 downthrow side

NOTE SOURCE: BS 3618-5:1971.

Figure 10 — Reverse fault (in section)

3.7.44
slickenside
polished and striated *surface* (3.1.23) on a *fault plane* (3.7.20)

[SOURCE: BS 3618-5:1971]

3.7.45
slide
fault (3.7.17) intersecting beds at an acute angle, with the same direction of *dip* (3.7.13) and *hade* (3.7.27)

[SOURCE: BS 3618-5:1971]

3.7.46
washout
local thinning or disappearance of a *coal* (3.4.3.1) *seam* (3.1.17) due to erosion during or shortly after its *formation* (3.7.22)

[SOURCE: BS 3618-5:1971]

3.7.47
step faulting
progressive displacement of the strata between *faults* (3.7.17) which *hade* (3.7.27) and *throw* (3.7.55) in the same direction

[SOURCE: BS 3618-5:1971]

3.7.48
strike
direction of a line formed by the intersection of a stratum with a horizontal plane

Note 1 to entry: See Figures 5 and 3.

[SOURCE: Glossary of BLM surveying and mapping terms, 1980]

3.7.49
structure contour
contour (3.6.3) of a selected *bed* (3.4.1.1), which indicates the physical form of that bed

[SOURCE: BS 3618-5:1971]

3.7.50
superimpose
establish (a structural system) over, independently of, and eventually upon, underlying *structures* (3.4.1.4)

Note 1 to entry: The term is applicable to terranes, rivers, *drainage* (3.12.3) systems, valleys, etc., such as a superimposed valley.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.51
syncline
fold (3.7.21) in which the core contains the stratigraphically younger rocks, generally concave upward

Note 1 to entry: See Figure 2.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.51.1
synclinal axis
central line of a *syncline* (3.7.51), toward which the beds *dip* (3.7.13) from both sides

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.51.2
synclinal mountain
mountain whose geologic *structure* (3.4.1.4) is that of a *syncline* (3.7.51)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.51.3
synclinal valley
valley whose geologic *structure* (3.4.1.4) is a *syncline* (3.7.51)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.52
want
zone in which the *coal* (3.4.3.1) of a coal *seam* (3.1.17) is missing, owing to a low-angle *normal fault* (3.7.38) or a washout, *squeeze* (3.7.54), or *roll* (3.7.53)

[SOURCE: Reference (8)]

3.7.53
roll
elongate protrusion of *shale* (3.4.3.34), *siltstone* (3.4.3.36), or *sandstone* (3.4.3.33) [locally *limestone* (3.4.3.29)] from the roof into a *coal* (3.4.3.1) *seam* (3.1.17), causing a thinning of the seam and sometimes replacing it almost entirely

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.54
squeeze
crushing of *coal* (3.4.3.1) or other materials with the roof moving nearer to the floor, due to the weight of the overlying strata

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.7.55
throw
amount of vertical displacement caused by a *fault* (3.7.17)

Note 1 to entry: See Figure 2.

[SOURCE: BS 3618-5:1971]

3.7.56
thrust fault
fault (3.7.17) with a *dip* (3.7.13) of 45°or less over much of its extent on which the *hanging wall* (3.7.28.2) appears to have moved upward relative to the *footwall* (3.7.23.2)

Note 1 to entry: See Figure 11.

Note 2 to entry: Horizontal compression rather than vertical displacement is its characteristic feature.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

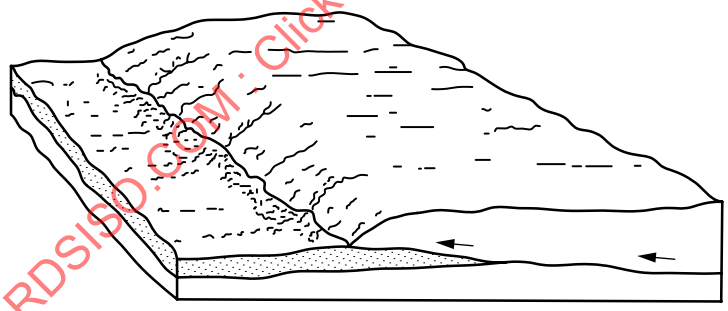


Figure 11 — Thrust fault

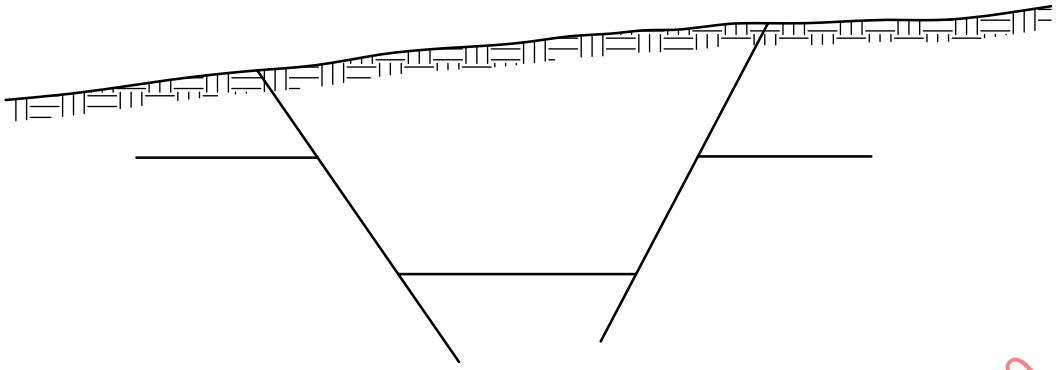
3.7.57
transcurrent fault
fault (3.7.17) resulting from of the movement that is essentially horizontal along the face of the fault, the plane of fracture being vertical or approximately vertical

[SOURCE: BS 3618-5:1971]

3.7.58
trough fault
block of strata that has been displaced downwards between two *fault planes* (3.7.20)

Note 1 to entry: See Figure 12.

[SOURCE: BS 3618-5:1971]



NOTE SOURCE: BS 3618-5:1971.

Figure 12 — Trough fault (in section)

3.7.59
upthrow
amount, measured vertically, of upward displacement of beds caused by a *fault* (3.7.17)

[SOURCE: BS 3618-5:1971]

3.7.60
upthrow side
higher side of a *fault* (3.7.17)

[SOURCE: BS 3618-5:1971]

3.8 Geomorphology

3.8.1
equilibrium
balance between form and process

EXAMPLE Balance between the resistance of rocks along a coast and the erosional force of the waves.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.8.2
areal geology
branch of *geology* (3.1.5) that pertains to the distribution, position, and form of the areas of the Earth's *surface* (3.1.23) occupied by different types of rock or by different geologic units, and to the making of geologic maps

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.8.3
cleat
joints (3.7.34) in *coal* (3.4.3.1) more or less normal to the *bedding planes* (3.4.3.6)

[SOURCE: BS 3618-5:1971]

3.8.4
geodesy
science concerned with the determination of the size and shape of the Earth and the precise location of points on its *surface* (3.1.23)

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.8.5
geomorphogeny
part of *geomorphology* (3.1.6) that deals with the origin, development, and changes of the Earth's *surface* (3.1.23) features or landforms

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.8.6
photogeomorphology
study of earth forms as revealed by aerial photographs

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.8.7
seat earth, en GB
bed (3.4.1.1) of rock underlying a *coal* (3.4.3.1) *seam* (3.1.17), representing an old *soil* (3.1.19) that supported the vegetation from which the coal was formed

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.8.8
tonstein
thin *bed* (3.4.1.1) similar in composition to *China clay* (3.14.5), characteristically developed in certain *coal* (3.4.3.1) *seams* (3.1.17) and *seat earths* (3.8.7) and which can be used for *correlation* (3.5.2)

[SOURCE: BS 3618-5:1971]

3.9 Geochemistry

3.9.1
geochemical anomaly
concentration of one or more elements in rock, *soil* (3.1.19), sediment, vegetation, or water that is markedly higher or lower than background

Note 1 to entry: The term can also be applied to hydrocarbon concentrations in soils.

[SOURCE: Dictionary of Geological Terms. Third Edition, American Geological Institute, 1984]

3.9.2
geochemical coherence
phenomenon of the intimate occurring together of certain chemical elements in nature because of their similar chemical properties, as, for example, the group of the lanthanides, zirconium-hafnium, niobium-tantalum, etc.

[SOURCE: Dictionary of Mining, Mineral and Related Terms, U.S. Bureau of Mines, 1996]

3.9.3
geochemical exploration
geochemical prospecting
search for economic *mineral* (3.13.4) deposits or petroleum by detection of abnormal concentrations of elements or hydrocarbons in surficial materials or organisms, usually accomplished by instrumental, spot-test, or quickie techniques that can be applied in the field

[SOURCE: Dictionary of Geological Terms. Third Edition, American Geological Institute, 1984]

3.9.4
gossan
weathered upper part of an ore body in which intensive leaching, oxidation and hydration have occurred

[SOURCE: BS 3618-5:1971]

3.10 Geophysics

3.10.1
anomaly
geological feature, especially in the subsurface, distinguished by geological, geophysical, or geochemical means, which is different from the general surroundings and is often of potential economic value

EXAMPLE A magnetic anomaly.

[SOURCE: Dictionary of Geological Terms. Third Edition, American Geological Institute, 1984]

3.10.2
geophysical mapping
locating geophysical anomalies in space

[SOURCE: Reference (6)]

3.10.3
geophysical exploration
use of geophysical techniques — electric, gravity, magnetic, seismic, or thermal — in the search for economically valuable *mineral* (3.13.4) deposits

[SOURCE: Dictionary of Geological Terms. Third Edition, American Geological Institute, 1984]

3.10.4
processing
<geophysics> changing data so as to emphasize certain aspects or to correct for known influences, thereby facilitating interpretation

[SOURCE: Reference (6)]

3.10.5
seismograph
instrument that detects, magnifies, and records motions of the Earth, especially those caused by earthquakes or explosions

[SOURCE: Dictionary of Geological Terms. Third Edition, American Geological Institute, 1984]

3.10.6
seismogram
record of Earth motion made by a *seismograph* (3.10.5)

[SOURCE: Dictionary of Geological Terms. Third Edition, American Geological Institute, 1984]

3.10.7
seismology
geophysical science concerned with the study of earthquakes and measurement of the elastic properties of the Earth

[SOURCE: Dictionary of Geological Terms. Third Edition, American Geological Institute, 1984]

3.10.8
tomography
method for determining the distribution of physical properties within the Earth by inverting the results of a large number of measurements made in three dimensions (e.g. seismic, radar, resistivity, EM) between different source and receiver locations

[SOURCE: Reference (6)]