International Standard

ISO 11074

Soil quality — Vocabulary

Qualité du sol — Vocabulaire

Third edition
2025-03

Reference number
ISO 11074:2025(en)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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Foreword

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This document was prepared by Technical Committee ISO/TC 190, *Soil quality,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 444, *Environmental characterization of solid matrices,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 11074:2015), which has been technically revised. It also incorporates the Amendment ISO 11074:2015/Amd 1:2020.

The main changes are as follows:

— terminological entries have been reorganised with all the terms and definitions placed in Clause 3 in alphabetical order;

— terms that have different definitions depending on the context have been grouped, and the domain has been added in angle brackets to differentiate them.

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

This document defines soil quality terms. The previous editions (ISO 11074:2015 and ISO 11074/Amd 1:2020) presented terms and definitions in separate clauses to differentiate the terms about e.g. sampling, remediation. This became more and more artificial, since soil quality experts with different expertise need to work closely together and there is a greater need for one term list instead of multiple ones, where experts first need to find out in which clause a specific term is located. In this edition, all the terms are included in Clause 3.

For some terms, there are different definitions, depending on the context. These terms are presented after each other, with the differentiating domains between brackets: <context>. Often these are a general domain and a specific domain, resulting in different definitions.

Though the terms apply to all other ISO/TC 190 soil quality standards, this document does not cover all the terms used in ISO/TC 190 soil quality standards.

New and revised standards are published continuously though time. The revision periods of soil quality standards differ. That means that definitions of the same terms can be different in specific soil quality standard and in this document.

NOTE For general terms relating to quality, see ISO 9000.

Soil quality — Vocabulary

1 Scope

This document defines terms used in the field of soil quality.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

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

3.1
abandoned hazardous site
hazardous site (3.201) left by the owner or other responsible party in unmanaged condition

3.2
abandoned industrial site
industrial *site* (3.443) left by the owner or other responsible party in unmanaged condition

3.3
abandoned potentially hazardous site
site (3.443), left by the owner or other responsible party in unmanaged condition, whose history leads to a suspicion that it can be hazardous

3.4
abandoned waste disposal site
waste disposal *site* (3.443) left by the owner or other responsible party in unmanaged condition

3.5
abiotic decomposition
decomposition (3.113) by physical and/or chemical processes (e.g. photolysis, *hydrolysis* (3.211), *oxidation* (3.305), and *reduction* (3.373))

3.6
abiotic degradation
degradation (3.116) by physical and/or chemical processes

3.7
above-ground sampling
process of taking *samples* (3.398) from material that has been deposited on the ground surface

EXAMPLE Samples are taken from a *stockpile* (3.496) (including *bulk volumes* (3.64) of *excavated soils* (3.154)), deposit of waste or embankment (see ISO 18400-104:2018).

3.8
accumulation
increase of the *concentration* (3.86) of a substance in soil due to the fact that the *substance input* (3.508) is larger than the *substance output* (3.509)

Note 1 to entry: Substance output includes material which is degraded.

3.9
active protective measure
process designed, for example, to control *groundwater* (3.191) migration or *gas migration* (3.178)

EXAMPLE Pumped water extraction or gas extraction system.

3.10
active soil gas sampling
sampling (3.410) by extracting a certain volume of *soil gas* (3.454)

3.11
actual increment size
amount of material that is present in an *increment* (3.218)

3.12
actual sample size
amount of material that is present in the *sample* (3.398)

3.13
aerobic
descriptive of a condition with molecular oxygen available

3.14
aerobic biological treatment
biological treatment (3.46) in the presence of oxygen

3.15
aftercare management
measures applied on completion of remedial works or as an integral part of a *containment* (3.90) strategy to ensure continued *effectiveness* (3.142) over the long term

3.16
aggressive soil conditions
soil conditions potentially damaging to buildings and construction materials

3.17
air-sparging
introduction of air under pressure into the *groundwater* (3.191)

3.18
aliphatic hydrocarbon
acyclic or cyclic, saturated or unsaturated carbon compound, excluding aromatic compounds

3.19
aliquot
known amount of a *homogeneous* (3.204) material, assumed to be taken with negligible *sampling error* (3.413)

Note 1 to entry: The term is usually applied to fluids.

3.20
ammonification
microbial *degradation* (3.116) of organic nitrogen to ammonia

3.21
amplicon
DNA or RNA fragment obtained by *polymerase chain reaction (PCR)* (3.330) from a template

3.22
anaerobic
descriptive of a condition in which molecular oxygen is not available

3.23
anaerobic biological treatment
biological treatment (3.46) in the absence of gaseous or soluble oxygen

3.24
anaerobic transformation
reaction occurring under exclusion of oxygen (*reducing* (3.372) condition)

Note 1 to entry: This generally occurs when the redox potential (Eh) is less than 200 mV.

3.25
analytical and testing strategy
plan comprising the *samples* (3.398) to be analysed or tested, the parameters to be measured, sample preparation methods, and the analytical or testing methods to be employed

Note 1 to entry: There should be associated quality assurance methods.

3.26
analytical sample
portion of material, resulting from the original *sample* (3.398) or *composite sample* (3.83) (3.84) by means of an appropriate method of *sample pretreatment* (3.402) and having the size (volume/mass) necessary for the desired testing or analysis

3.27
anisotropy
property of a soil or other volume of material to have different spatial variation structures depending on direction and distance

Note 1 to entry: Usually illustrated in a *variogram* (3.566).

3.28
anthropogenic change
influence on soil properties caused by human activities

3.29
anthropogenic concentration
concentration (3.86) of a substance in a soil resulting from anthropogenic origin

Note 1 to entry: See ISO 19204:2017.

3.30
anthropogenic ground
deposits which have accumulated through human activity

Note 1 to entry: These can consist of natural materials placed/replaced by man (e.g. clay) or man-made materials (e.g. refuse).

Note 2 to entry: See ISO 18400-104:2018.

3.31
aromatic hydrocarbon
hydrocarbon (3.210) of which the molecular structure incorporates one or more planar sets of six carbon atoms that are connected by delocalized electrons, numbering the same as if they consisted of alternating single and double covalent bonds

3.32
assessment criteria
criteria set up to help decide if a *site* (3.443) requires further investigation or other action (e.g. *remediation* (3.380))

Note 1 to entry: The assessment criteria aid in interpreting the results of a quantitative *risk* (3.393) or other assessment.

Note 2 to entry: For *risk assessments* (3.395), assessment criteria are often *threshold* (3.534) values for *doses* (3.131) or media *concentrations* (3.86), such as tolerable daily intake, tolerable air, water, and soil concentrations set by international, national, or local authorities.

3.33
available water capacity
soil water (3.479) content usable by plants based on the effective root penetration depth

Note 1 to entry: The usable *field capacity* (3.166) in the effective root zone is expressed in millimetres of water column.

Note 2 to entry: The available water capacity (AWC) is generally taken to be the water content between field capacity (FC) and the permanent *wilting point* (3.572) (PWP) or 10 kPa to 1 500 kPa.

3.34
avoidance behaviour
tendency (of an organism) to avoid the test soil while preferring the *control soil* (3.95)

3.35
background concentration
concentration (3.86) of an element or a substance *characteristic* (3.70) of a soil type in an area or region arising from both natural sources and anthropogenic diffuse sources such as atmospheric deposition

3.36
background value
statistical characteristics (3.495) of the total (natural pedo-geochemical and anthropogenic) content of substances in soil

3.37
basal respiration
microbial soil respiration without addition of substrate

3.38
basal respiration rate
R_B
constant mass of CO_2 released or mass of O_2 consumed per unit mass of soil per unit time without substrate addition

3.39
bedrock
in situ naturally consolidated rock either underlying drift deposits such as glacial till or exposed by past or current erosion processes

3.40
bioaccessibility
fraction of a substance in soil or *soil material* (3.459) that is liberated in (human) gastrointestinal juices and thus available for absorption

3.41
bioavailability
<general> degree to which chemicals present in the soil can be absorbed or metabolised by a human or ecological *receptor* (3.370) or are available for interaction with biological systems

3.42
bioavailability
<human health> fraction of a substance present in ingested soil that reaches the systemic circulation (blood stream)

3.43
bioconcentration factor
BCF
ratio of the *concentration* (3.86) of a substance in an organism to that in the soil

3.44
biodegradation
molecular *degradation* (3.116) of an organic substance resulting from the complex actions of living organisms

3.45
biodiversity
variability among living organisms on the earth, including the variability within and between species, and within and between ecosystems

Note 1 to entry: This is also often used to refer to the number and variety of organisms found within a specified geographic region.

[SOURCE: ISO 14050:2020, 3.8.22, modified —Note 1 to entry has been added.]

3.46
biological treatment
methods using the natural activities of plants or *microorganisms* (3.266), such as bacteria and fungi, to transform, destroy, fix or immobilise *contaminants* (3.91)

3.47
biomass
<general> total mass of living organisms or parts of them

Note 1 to entry: Biomass is expressed as fresh or dry mass of test organism or fresh or dry mass per test unit.

3.48
biomass
<fauna> total mass of test organisms or parts of them expressed as dry mass or fresh mass of test organism or dry mass or fresh mass per test unit

3.49
biomass
<plants> total mass of shoots, flowers and seed pods

Note 1 to entry: Biomass is expressed as dry mass per plant or, if needed, as dry mass per pot. During the test period, some of the test plants can reach different *growth* (3.194) stages and their water content can differ when the plants are harvested. Thus, the dry mass better represents the biomass produced during the growth period.

3.50
bioreactor
equipment in which biotreatment is applied to a solid, liquid, or slurry

3.51
bioremediation
use of *biological treatment* (3.46) methods to decontaminate soil or *groundwater* (3.191)

3.52
biosolid
organic product applied to soil

EXAMPLE Sewage sludge, compost, manure, industrial products.

Note 1 to entry: Without giving a specific context, biosolid is often regarded as a component of sewage sludge.

3.53
biotreatment bed
treatment bed
above-ground bed of soil designed to enhance *biodegradation* (3.44) processes, usually incorporating means of collecting leachate and often means of maintaining oxygen (in aerobic processes) and nutrient levels

Note 1 to entry: It can also include means of capturing released volatiles or means of maintaining *anaerobic* (3.22) conditions.

3.54
bioventing
in situ process in which vapour extraction or air infiltration rates, or both, are adjusted to optimize *biodegradation* (3.44) reactions

3.55
boiling point
BP
point at which the vapour pressure of a liquid equals the external pressure acting on the surface of liquid

Note 1 to entry: It is expressed in degrees Celsius.

3.56
boring
borehole
bore
hole of any predetermined diameter and length formed in any soil, geological formation, or man-made material by *drilling* (3.134)

3.57
bottom barrier system
in-ground (largely) horizontal barrier used to isolate or contain a *site* (3.443), or both

3.58
bound residues
non-extractable residues
chemical species in plants and soils, that cannot be extracted without significantly changing the chemical nature of these residues

EXAMPLE Chemical species originating from organic molecules.

Note 1 to entry: These non-extractable residues are considered to exclude fragments recycled through metabolic pathways leading to natural products.

3.59
break layer
stratum of high permeability granular material within a *cover system* (3.102)

Note 1 to entry: Its purpose is to stop upward capillary movement of soluble *contaminants* (3.91).

3.60
brownfield
<general> land affected by former uses

3.61
brownfield
<sustainable remediation> *site* (3.443) which:

— has been affected by former uses of the site or surrounding land;

— is derelict or underused;

— is mainly in fully developed or partly developed urban areas;

— requires intervention to bring it back to beneficial use; and/or

— can have real or perceived *contamination* (3.93) problems

3.62
bulk density
ratio of the mass of a quantity of material (or one phase) and the total volume occupied by this material (including other phases)

Note 1 to entry: This is typically a volumetric mass, but it is commonly named as "density". The numerical values are identical or divided by the volumetric mass of water ($1\ t \cdot m^{-3}$) at 4 °C.

3.63
bulk sample
sample (3.398) resulting from the planned aggregation or the combination of sample units

Note 1 to entry: See also *composite sample* (3.83)(3.84).

[SOURCE: Reference [27]]

3.64
bulk volume
volume, including the solids and pores, of an arbitrary soil mass

3.65
capillary water
water held on soil particles due to unbalanced inter-molecular attraction at the liquid boundary

EXAMPLE The rise or depression of liquids in narrow tubes, the formation of films, drops, bubbles, etc.

3.66
carcinogen
substance that causes the development of malignant cells in animals or humans

3.67
certified reference material
CRM
reference material (3.374), one or more of whose property values are certified by a technically valid procedure accompanied by a certificate or any document allowing the identification of the origin of the certificate

3.68
chain-of-custody procedure
procedure to ensure *sample* (3.398) integrity (e.g. when transferred between the field and laboratory and within a laboratory) and to ensure that the sample will provide legally and technically defensible data

Note 1 to entry: See ISO 5667-3:2024, 3.2 for a definition of integrity.

3.69
channel sample
sample (3.398) obtained by removal of material in a channel-like shape from the soil using suitable equipment

3.70
characteristic
property or attribute of a material that is measured, compared, or observed

3.71
chemical treatment
treatment of contaminated soil, *sediment* (3.433), water, or other material in which the principal mechanism for *degradation* (3.116) or conversion to a less environmentally harmful form is a chemical reaction or combination of reactions

3.72
chemico-physical treatment
process-based treatment relying on combination of physical and chemical processes

3.73
classification system
ranking system
formalized system to perform a *preliminary assessment* (3.341)

Note 1 to entry: Formalized procedures can also aid in interpreting results of the *preliminary investigation* (3.342).

3.74
clay content
proportion of soil particles with a particle size < 2 µm

3.75
cloning vector
a small piece of DNA that can be stably maintained in an organism, and into which a foreign DNA fragment can be inserted for cloning purposes

3.76
cluster sample
composite sample (3.83) (3.84) for which the *increments* (3.218) are taken over a small area around a predefined *sampling point* (3.418)

Note 1 to entry: Sampled area is typically about 0,5 m^2 to 1,0 m^2.

Note 2 to entry: Material sampled is taken from within the same stratum or from material with the same *characteristics* (3.70).

3.77
community relations
processes involved in informing and consulting the local community affected by a *hazardous site* (3.201) and activities to investigate or remediate it

3.78
community relations plan
formal statement of measures to be taken to inform and consult the local community

3.79
competent authority
<contaminated sites> authority that assesses investigation results and takes decisions about the severity and urgency of the soil *contamination* (3.93) found, and that also assesses proposals for *remediation* (3.380) or *protective measures* (3.354)

Note 1 to entry: Depending on the *site* (3.443) and the country, the competent authority can be very different.

3.80
compliance control
performance control
investigation or programme of ongoing inspection, testing, or *monitoring* (3.276) to confirm that a *remediation strategy* (3.383) has been properly implemented (e.g. all contaminated materials have been removed) and/or when a *containment* (3.90) approach has been adopted, that this continues to perform to the specified level

3.81
compliance point
location (e.g. soil or *groundwater* (3.191)) where the *assessment criteria* (3.32) is measured to check if the criteria are met

3.82
composite extract
extract obtained by *mixing* (3.272) two or more extracts from different *test samples* (3.528) in an equivalent manner

Note 1 to entry: Composite extracts are used instead of *composite samples* (3.83) (3.84) if mixing influences the composition of a composite sample, as is to be expected for e.g. volatile components.

3.83
composite sample
average sample
aggregated sample
<general> two or more *increments* (3.218) or *subsamples* (3.503) mixed together in appropriate proportions, either discretely or continuously, from which the average result of a desired *characteristic* (3.70) can be obtained

3.84
composite sample
<field> *sample* (3.398) made of a number of *increments* (3.218)

Note 1 to entry: See *cluster sample* (3.76).

3.85
composting
biological treatment (3.46) of contaminated soil usually (but not always) in *treatment bed* (3.53) where organic substances are submitted to *aerobic* (3.13) transformation

3.86
concentration
mass of *test substance* (3.530) per unit mass of material

Note 1 to entry: Concentration is expressed as a mass fraction, in milligrams per kilogram (mg/kg) of dry soil.

3.87
concentration method
adsorption method
method in which substances to be determined are concentrated adsorptively on an adsorbent, subsequently desorbed and analysed

EXAMPLE Adsorbent can be activated charcoal or XAD 4 resin.

3.88
conceptual site model
synthesis of all information about a potentially *contaminated site* (3.92) relevant to the task in hand with interpretation as necessary and recognition of *uncertainties* (3.555)

3.89
construction works
applications where *soil materials* (3.459) are not required to have a direct productive use although they can support other layers intended to have a productive use

EXAMPLE *Earthworks* (3.138) (e.g. embankments), landscape engineering, road construction, construction of waste disposal *sites* (3.443), and back filling of excavated sites or mines.

3.90
containment
isolation
control of migration of gaseous, liquid, or solid contaminated media from a *site* (3.443) by use of measures such as covering systems, vertical in-ground barriers, and in-ground horizontal barriers

Note 1 to entry: Depending on site-specific factors, measures can be used alone or in combination.

3.91
contaminant
substance or agent present in an *environmental medium* (3.147) as a result of human activity

Note 1 to entry: There is no assumption in this definition that *harm* (3.198) results from the presence of the contaminant. See also *pollutant* (3.328).

3.92
contaminated site
site (3.443) where *contamination* (3.93) is present

Note 1 to entry: There is no assumption in this definition that *harm* (3.198) results from the presence of contamination.

3.93
contamination
substance(s) or agent(s) present in the soil as a result of human activity

3.94
contaminant release assessment
assessment of the possibility and rate of *contaminant* (3.91) release based on the contaminant *characteristic* (3.70) and the *site* (3.443) characteristics

3.95
control soil
uncontaminated substrate or natural soil, used as a control and as *medium* (3.262) for preparing dilution series with test soils or chemicals, that allows the *growth* (3.194) of healthy plants

Note 1 to entry: Either artificial or natural standard or *reference soils* (3.376) can be used, if unhindered growth of the test plants in these soils can be expected. In any case, differences in nutrient levels between a test soil and a control soil can affect the *dose* (3.131) (response pattern). For example, a control soil much richer in nutrients than a test soil can result in a false-positive result (i.e. the test soil appears to have a "toxic" effect on the growth of the test plants). If a control soil is poorer in nutrients than a test soil, *hormesis* (3.206) can be expected at low soil-mixture ratios, or even an inverse *dose-response relationship* (3.132), if nutrient supply becomes the main effect.

3.96
control substrate
inert substrate which does not affect spore germination, used as a control or diluent

3.97
convenience sample
sample (3.398) chosen on the basis of accessibility, expediency, cost, efficiency, or other reason not directly concerned with sampling parameters

Note 1 to entry: The term "ad hoc sample" is sometimes applied to this type of sample.

3.98
convenience sampling
process of taking *samples* (3.398) based on accessibility, expediency, cost, efficiency, or other reason not directly concerned with sampling parameters

Note 1 to entry: The samples can be taken to a predetermined plan (locations, depths etc.) or taken from locations and/or depths decided on *site* (3.443) (the term "ad hoc sampling" is sometimes applied to this type of sampling).

3.99
core
more or less cylindrical section of soil or rock, usually 40 mm to 150 mm in diameter and sometimes up to several metres in length, obtained from a *borehole* (3.56) or drillhole

Note 1 to entry: The complete core can also be the *sample* (3.398).

3.100
core sample
sample (3.398) obtained from a *core* (3.99)

3.101
correlatory sample
sample (3.398) collected to describe correspondence in character and/or stratigraphic position of two or more separated areas

3.102
cover system
one or more layers of materials, such as soils, suitable mineral wastes, and *geosynthetics* (3.188) (e.g. membranes, *geotextiles* (3.189)) superimposed on the surface of a *site* (3.443) (sometimes following partial *excavation* (3.155)) designed to control migration of *contaminants* (3.91) upwards and infiltration of rainfall, etc. downwards, and often to perform other functions such as to sustain vegetation or to provide a platform on which construction can take place

3.103
critical concentration
quantitative estimate of a *concentration* (3.86) of one or more *pollutants* (3.328) below which significant harmful effects on specified sensitive elements of the (soil) environment do not occur, according to existing knowledge

3.104
critical load
quantitative estimate of the input of one or more *pollutants* (3.328) below which significant harmful effects on specified sensitive elements of the (soil) environment do not occur, according to existing knowledge

3.105
cross contamination
undesired result due to:

— collection of a *sample* (3.398) with uncontrolled *mixing* (3.272) of *soil material* (3.459) from different soil horizons/layers;

— addition of chemical substances to a soil sample from *sampling devices* (3.412), containers, reagents of preservation, by transport conditions, means of preparation, and during analytical processing

3.106
cumulative CO_2 evolution
cumulative O_2 consumption
C_R
total area bounded by the line of the *soil respiration rate* (3.470) curve to the time axis from time of the addition of substrate to the time of peak maximum ($t_{peakmax}$)

3.107
cutting cylinder
cylindrical device with removable top and base forced into the surface of the ground/exposed soil to obtain an *undisturbed sample* (3.557)

3.108
cycle threshold
number of *qPCR* (3.360) cycles required for the fluorescent signal to cross the *threshold* (3.534) (i.e. to exceed background level)

3.109
degraded land
land which, due to natural processes or human activity, is no longer able to properly sustain an economic function and/or the natural or near natural ecological function

3.110
data quality objectives
statement of the required detection limits, accuracy, reproducibility, and repeatability of the required analytical data and other data

Note 1 to entry: Generic data quality objectives can sometimes be set at national level. Data quality objectives can also embrace amount of data required for an area of land (or part of a *site* (3.443)) to enable a sound comparison with generic guidelines or standards or for a site-specific or material-specific estimation of *risk* (3.393).

3.111
dead volume
volume which is present between the suction opening of the *soil gas probe* (3.456) and the sampling vial, including the volume of the sampling vial or the absorption tube

3.112
dechlorination
chemical process designed to remove chlorine from organic chemicals, such as polychlorinated biphenyls (PCB)

3.113
decomposition
breakdown of complex organic substances into simpler molecules or ions by physical, chemical, and/or biological processes

3.114
decontamination
removal or partial removal of *hazardous substances* (3.202) from the soil, with the aim of restoring *soil functions* (3.453) and reclaiming the soil for intended usage

Note 1 to entry: "Decontamination" is different from "removal of contamination", since *contamination* (3.93) is not necessarily harmful.

3.115
deep soil
<biological/human exposure> soil in which plants can achieve a rooting depth of 50 cm or more

3.116
degradation
physical and chemical breakdown of the substances

3.117
degraded soil
soil whose natural properties and *soil functions* (3.453) have been damaged by physical, chemical and/or biological processes

Note 1 to entry: A soil can be degraded as a result of *contamination* (3.93).

3.118
dehydrogenase activity
activity of hydrogen-abstracting *enzymes* (3.149) which are involved in many energy and biosynthesis metabolic processes (e.g. the respiratory chain) and which require cell integrity to be produced

3.119
dense non-aqueous phase liquid
DNAPL
non-aqueous phase liquid (NAPL) (3.291) denser than water

EXAMPLE Trichloroethene.

Note 1 to entry: For light non-aqueous phase liquid (LNAPL), see 3.245.

3.120
depth related sample
metric sample
sample (3.398) collected at a predefined depth independent of the present soil conditions and *characteristics* (3.70)

3.121
derelict site
site (3.443) so damaged by human activity as to be incapable of beneficial use without treatment

Note 1 to entry: Damage can be to the aesthetic, physical, engineering, environmental, or *contamination* (3.93) aspects of the site.

3.122
dermal exposure
rate or *concentration* (3.86) of substances capable of penetrating through the skin

3.123
diapause
interruption of metabolism during egg, larva, pupa, or imago development

EXAMPLE Resting phase or period of quiescence of some earthworm species to resist drought.

3.124
diffuse source input
input of a substance emitted from moving sources, from sources with a large area or from many sources

Note 1 to entry: In practice, two situations are commonly recognized: rural areas with diffuse *source* (3.484) inputs typically from land spreading and aerial deposition; and urban areas where the diffuse source inputs come typically from traffic and industrial activities.

Note 2 to entry: Diffuse source input usually leads to *sites* (3.443) that are relatively uniformly contaminated. At some sites, the input conditions can nevertheless cause a higher local input, such as near the source or where atmospheric deposition/rain is increased.

3.125
direct method
direct measuring method
method of analysis where the *soil gas* (3.454) *sample* (3.398) (*aliquot* (3.19)) is directly introduced into a suitable equipment without first being concentrated and subjected to analysis

3.126
direct-reading detecting tube
tube filled with reagents which, after drawing through certain gaseous compounds, show concentration-dependent chromophoric reactions, and which is thus used for qualitative and semi-quantitative analyses as well

Note 1 to entry: Attention should be paid to cross-sensitivities.

Note 2 to entry: The tube can be made of glass.

3.127
displacement barrier
in-ground barrier installed without *excavation* (3.155)

EXAMPLE Sheet steel piling.

3.128
dissolved organic carbon
DOC
concentration (3.86) of *organic carbon* (3.300) remaining in solution after filtration and/or centrifugation under defined conditions

Note 1 to entry: It is expressed in mg/l, g/m^3.

3.129
disturbed sample
sample (3.398) obtained from the ground without preservation of the *soil structure* (3.475)

EXAMPLE Sample obtained by using an auger.

3.130
donor site
site (3.443) from which *soil material* (3.459) is removed for use on a *target site* (3.522)

3.131
dose
amount of a substance reaching a *receptor* (3.370)

Note 1 to entry: For a human or other animal receptor, this is commonly expressed in terms of the amount of substance per unit of body weight per unit of time (e.g. mg/kg/day). Analogous concepts can be applied to other potential receptors.

3.132
dose-response relationship
effect a given *dose* (3.131) (or equivalent quantity for non-animal *receptors* (3.370)) has on the receptor

3.133
dredged material
solid material excavated or otherwise removed from waters, e.g. during maintenance, construction, reconstruction and harbour or channel extension operation

Note 1 to entry: Dredged material may consist of *sediments* (3.433) and soil taken from below the water surface.

3.134
drilling
process by which a *borehole* (3.56) is produced in any soil, geological formation, or man-made deposit by rotary, rotary percussive, percussive, or thrust methods and in any predetermined direction in relation to the drill rig

Note 1 to entry: Two types of *sample* (3.398) can be obtained by drilling: sludge/*mud sample* (3.279) and *core sample* (3.100).

3.135
drying
process of removing the *soil water* (3.479) from a *sample* (3.398)

Note 1 to entry: In soil analysis, the following four kinds of drying may be applied:

— air drying;

— oven drying;

— chemical drying;

— freeze drying.

3.136
DT-50
time taken for the *concentration* (3.86) of a given compound to be reduced by 50 % of its original value

3.137
DT-90
time taken for the *concentration* (3.86) of a given compound to be reduced by 90 % of its original value

3.138
earthwork
reuse of soil material (3.391) for civil engineering and construction purposes

Note 1 to entry: The same word can also refer to the material accumulated during an operation of earthwork.

3.139
ecological effect
change to an aspect of the ecosystem caused by anthropogenic stress factors

Note 1 to entry: Changes (see also *assessment criteria* (3.32)) to an ecosystem as a result of the presence of *contaminants* (3.91) are regarded as negative changes regardless of the direction. In addition, the variation in space, time and parameters is important (see ISO 18504:2017).

3.140
ecosystem service
service that is (directly or indirectly) provided by an ecosystem to benefit people

3.141
effect concentration for *x* % effect
EC*x*
concentration (3.86) (mass fraction) of a *test material* (3.524) or *test substance* (3.530) that causes *x* % of an effect on a given end point within a given *exposure* (3.159) (3.160) period, when compared with a control

Note 1 to entry: The EC*x* is expressed as a percentage of soil or test material per dry mass of soil mixture. When chemicals are tested, the EC*x* is expressed as mass of the test substance per dry mass of soil, in milligrams per kilogram.

3.142
effectiveness
<remediation method> measure of the ability of a *remediation* (3.380) method to achieve required performance

Note 1 to entry: In the case of a process-based method, effectiveness can be expressed in terms of the achievable *residual contamination* (3.388) *concentrations* (3.86).

3.143
electrokinetic remediation
application of electrokinetic processes, such as electro-osmosis, to remove *contaminants* (3.91) from soil or other solids

3.144
engineering-based method
civil engineering technique (e.g. *excavation* (3.155), *containment* (3.90), hydraulic control) used to remove the *contaminant* (3.91) *source* (3.484) or *soil material* (3.459) or to modify pathways without necessarily removing, destroying, or modifying the source

EXAMPLE By removing targets (*receptors* (3.370)) from the *site* (3.443) or vicinity of the site or changing the intended use of site.

3.145
environmental fate analysis
analysis of the fate of the *contaminant* (3.91) once it is released into the environment

Note 1 to entry: This includes a pathway analysis and other environmental fate considerations, e.g. transport processes due to physical and chemical properties, *degradation* (3.116), dilution or *accumulation* (3.8) in biota.

3.146
environmental justice
combination of environmental rights and environmental responsibilities that asserts that everyone has:

— a right to healthy places to live, work, play, learn and enjoy oneself;

— a right to a fair share of nature's benefits and *ecosystem services* (3.140), such as food and water;

— a responsibility to look after the planet for others and for future generations

3.147
environmental medium
<contaminated sites> soil, underlying material, *sediments* (3.433), surface water, *groundwater* (3.191), *soil gas* (3.454), and air that can contain *contaminants* (3.91)

3.148
environmental protection plan
plan providing an assessment of the environmental *risks* (3.393) associated with *remediation* (3.380), the measures to be taken to minimize risks, the point when corrective action will be taken, the type of action to be taken, and identifying those responsible for *monitoring* (3.276) and for taking action

3.149
enzyme
biologically produced protein catalyst that accelerates the conversion of one compound (or compounds) to another (or others)

3.150
equivalent carbon number
empirically determined parameter related to the *boiling point* (3.55) of a chemical normalized to the boiling point of the *n*-alkanes or its retention time in a boiling-point gas chromatographic (GC) column

3.151
essential trace element
element essential in low *concentrations* (3.86) for plant or animal (including human) metabolism

Note 1 to entry: An element can be essential at low concentrations but become harmful at higher concentrations.

3.152
ex situ treatment method
treatment method applied to *medium* (3.262) to be treated (e.g. soil, *groundwater* (3.191)) after extraction from the ground

3.153
excavated barrier
barrier formed in an *excavation* (3.155)

EXAMPLE Slurry wall.

3.154
excavated soil
soil material (3.459) extracted from the ground

EXAMPLE *Topsoil* (3.536), *subsoil* (3.506) (3.507), altered parent rock, typically arising during *construction works* (3.89).

3.155
excavation
removal of soil, *anthropogenic ground* (3.30) (e.g. *fill* (3.169), *made ground* (3.254)), *sediment* (3.433), etc., from the ground for treatment or disposal

3.156
exploratory investigation
phase 2
collection of *samples* (3.398) for analysis to confirm the hypothesis concerning *soil quality* (3.466) from *phase 1* (3.342) investigation and to provide information to enable the design of the *main investigation* (*phase 3)* (3.255)

3.157
exposed population investigation
characterization of the *population* (3.331) possibly exposed to *contaminants* (3.91) from the *contamination* (3.93) *source* (3.484) in terms of numbers

Note 1 to entry: For a human population also e.g. in terms of socio-economic status and susceptibility.

Note 2 to entry: The *exposure* (3.158) (3.159) (3.160) can be investigated on one or several media.

3.158
exposure
<geology> location where a soil/rock or other geological feature (e.g. fault, incongruity) can be seen

Note 1 to entry: The exposure can be natural or artificially formed (e.g. by *excavation* (3.155)).

3.159
exposure
<risk assessment, general> rate or *concentration* (3.86) of a substance or agent reaching a *receptor* (3.370) or defined part of a receptor via specified *exposure pathways* (3.162) or subsequent on certain events

3.160
exposure
<risk assessment, human health> rate or *concentration* (3.86) of a substance or agent reaching a body or a defined organ via specified *exposure pathways* (3.162)

3.161
exposure assessment
process of establishing whether, and how much, *exposure* (3.158) (3.159) (3.160) occurs between a *receptor* (3.370) and a contaminated *source* (3.484)

3.162
exposure pathway
exposure route
path, route or other means, a *contaminant* (3.91) or *hazardous substance* (3.202) from a particular *source* (3.484) takes to a *receptor* (3.370)

Note 1 to entry: Each exposure pathway links a source to a receptor.

3.163
exposure pathway identification
determination of the relevant *exposure pathways* (3.162) for the *risk assessment* (3.395) for a specific *source* (3.484)

Note 1 to entry: In the specific context of risk assessment, ISO 21365 provides a full definition on what is expected for exposure pathway identification.

3.164
extractable fraction
amount of an element extracted under defined conditions, e.g. with a complexing agent, salt solutions, or water used to mimic different kinds of *bioavailability* (3.41) (3.42) including plant uptake or *exposure routes* (3.162) related to the *pore water* (3.333) *concentration* (3.86) of a substance

3.165
field blank
container prepared in the laboratory using reagent water or other blank matrix and sent with the *sampling personnel* (3.403) for *exposure* (3.158) (3.159) (3.160) to the sampling environment to verify possible *contamination* (3.93) during *sampling* (3.410)

3.166
field capacity
FC
maximum water content that an unsaturated soil can retain against gravity under undisturbed soil conditions

Note 1 to entry: It is expressed as a mass or volume fraction in per cent.

Note 2 to entry: Conventionally stated as water content 48 h after saturation under conditions of free drainage.

3.167
field sample
sample (3.398) obtained and/or formed on-site during an investigation intended for laboratory analysis or testing following any necessary pretreatment in the laboratory

Note 1 to entry: A sample as originally obtained from the ground can sometimes undergo pretreatment in the field to obtain a sample of suitable size and character to be sent to a laboratory (see ISO 18400-201).

Note 2 to entry: Sometimes not all field samples are sent to the laboratory to become *laboratory samples* (3.236). The unused samples are discarded or appropriately stored in case they are required at a later date.

Note 3 to entry: Field samples are sometimes employed directly on-site, for example, when measurements are made using a portable X-ray fluorescence instrument (see ISO 13196).

3.168
field spike
sample (3.398) collected in the field and spiked with compounds of interest or related compounds to check on the potential for loss of analyte on transportation, storage and preparation, and for recovery of analytes

3.169
fill
anthropogenic ground (3.30) in which the material has been selected, placed and compacted in accordance with an engineering specification

Note 1 to entry: The material can be natural in origin or comprise wastes or other artificial materials.

3.170
filter characteristic
ability of a soil to retain or bind solid, dissolved, or gaseous substances

3.171
final sample
sample (3.398) obtained at the final step of multistage *sampling* (3.410)

Note 1 to entry: For example, for analytical operations the term "final sample" applies to the *"test sample"* (3.528).

[SOURCE: ISO 3534-2:2006, 1.2.23, modified — Note 1 to entry has been added.]

3.172
fraction
group of aromatic or *aliphatic hydrocarbons* (3.18), or both, with similar physic-chemical properties

Note 1 to entry: For example, group of aromatic or aliphatic compounds with *leaching* (3.240) (3.241) and volatilization factors differ by approximately one order of magnitude.

3.173
freeze-dried bacteria
bacterial culture preserved through the removal of water from a frozen cell suspension by sublimation under reduced vacuum pressure

3.174
fresh sample
sample (3.398) used for analysis and testing without preliminary *drying* (3.135)

3.175
fungal treatment
biological treatment (3.46) based on use of fungi (e.g. dry rot fungi)

3.176
gas chromatography
analytical method that is used to separate and determine the components of complex mixtures based on *partitioning* (3.312) between a gas phase and a stationary phase

3.177
gas control system
system designed to control the migration and release of *landfill* (3.238) and other gases from *sites* (3.443)

3.178
gas migration
movement of gas from the *source* (3.484) through the ground to the adjoining strata or to emit to atmosphere

Note 1 to entry: Examples of sources include wastes within a *landfill* (3.238) or spill of *hydrocarbons* (3.210).

3.179
gas monitoring well
standpipe suitably installed inside a *borehole* (3.56) from which gas *samples* (3.398) can be taken to measure soil gas *concentrations* (3.86) and to monitor changes in composition of *soil gas* (3.454) or soil gas migration

3.180
gas protection measure
measure to protect buildings from *landfill* (3.238) and other gases, usually combining measures to prevent entry of gas and to provide warnings of unsafe conditions

3.181
gas sampling
collection of a volume of *soil gas* (3.454) contained in the *pore space* (3.332) of the soil

3.182
general exposure pattern
level of *exposure* (3.158) (3.159) (3.160) to different potential *hazards* (3.200) in the relevant area and not directly related to the *site* (3.443) considered, e.g. content of a specific *contaminant* (3.91) generally found in the average diet of the population in the area in question

3.183
geocomposite
product made from a combination of two or more *geoproducts* (3.186)

3.184
geogrid
geomesh
synthetic material in the form of a net or mesh used in civil engineering and related activities

3.185
geomembrane
plastic sheeting used in civil engineering and related activities to contain solids, liquids, or gases

EXAMPLE For lining ponds and other impoundments and waste disposal sites, formation of *vertical barriers* (3.567) and formation of covers to prevent ingress of water or egress of gases.

3.186
geoproduct
geosynthetic (3.188) and similar product made from natural materials

3.187
geostatistics
statistical methodology based on the use of spatial coordinates and able to define a model of estimation and *prediction* (3.340)

3.188
geosynthetic
geotextile (3.189), *geomembrane* (3.185), etc. made from synthetic materials

3.189
geotextile
woven, non-woven, or knitted permeable textile used in civil engineering and related activities, usually made from synthetic materials (such as polypropylene) but that can also be made from natural materials

3.190
gravimetric water content
W_w
mass of water evaporating from the *soil* (3.448) when dried to a constant mass at 105 °C

Note 1 to entry: It is expressed as the mass of water divided by the original dry mass of the soil *sample* (3.398).

3.191
groundwater
water which is being held in, and can usually be recovered from, an underground formation, except capillary or *percolating water* (3.318)

Note 1 to entry: Groundwater is usually taken to include any water beneath the surface of the land or beneath the bed of any stream, lake, reservoir, or other body of surface water, whatever the geological formation or structure in which such water occurs; but water within the beds of streams, etc. is often excluded.

[SOURCE: ISO 6107:2021, 3.260, modified — In the definition, “except capillary or percolating water” has been added; Note 1 to entry has been added.]

3.192
groundwater extraction
removal of *groundwater* (3.191) from the ground using pumps

3.193
groundwater surface
water table
upper boundary surface of the *groundwater* (3.191)

3.194
growth
increase in *biomass* (3.47) (3.48) (3.49) (i.e. the fresh mass of organisms)

Note 1 to entry: It is expressed as a percentage of the fresh mass of organisms at the start of the test.

3.195
growth medium
material, other than soils in situ, in which plants, fungi and bacteria are grown

3.196
guideline value
value recommended without legal obligation

3.197
habitat function
ability of soil/*soil materials* (3.459) to serve as a habitat for micro-organisms, plants, soil living animals, and their interactions (biocenosis)

3.198
harm
measurable adverse effect on a *receptor* (3.370)

3.199
harmlessness
<application of soil materials> condition in which the application of a *soil material* (3.459) does not result in damage, as defined by specific criteria, to the functions of the soil already at the *target site* (3.522)

3.200
hazard
property of a substance or material, or any action that can have an adverse effect on *soil functions* (3.453)

Note 1 to entry: A hazard has the potential to cause *harm* (3.198).

3.201
hazardous site
site (3.443) which, by reason of the substances or agents present, is judged to be hazardous to human health and *safety* (3.397) or to the environment

3.202
hazardous substance
substance which, because of its properties, quantity or *concentration* (3.86), has an adverse effect on *soil functions* (3.453) and soil utilization

3.203
heterogeneous
having properties which vary from point to point when viewed at a scale suitable to the job at hand

Note 1 to entry: This is the opposite of *homogeneous* (3.204).

3.204
homogeneous
having the same properties at all points when viewed at a scale suitable to the job at hand

Note 1 to entry: This is the opposite of *heterogeneous* (3.203).

3.205
horizon related sample
sample (3.398) collected from and representing a defined soil horizon

Note 1 to entry: The sample can be one-off or not.

3.206
hormesis
biphasic dose-response phenomenon with low-dose stimulation and zero-dose or high-dose inhibition

EXAMPLE Improvement of *seedling emergence* (3.434), *growth* (3.194) or survival (or other response of the test plants) at low *concentrations* (3.86) of chemicals or mixtures of soil that are toxic when applied at higher levels in comparison to the control.

3.207
humification
decomposition (3.113) of organic material followed by a synthesis of humic substances

3.208
humus
total of all dead plant and animal substances and their organic transformation products, as well as organic material inserted through anthropogenic activities, appearing in and on mineral soil

Note 1 to entry: Living plants and soil organisms, as well as charcoal, are not counted among humus but are often methodically not separable.

3.209
hydraulic measure
application of ground-water infiltration and extraction methods (e.g. extraction wells and horizontal adits) to control *groundwater* (3.191) levels and directions of flow

3.210
hydrocarbon
compound of hydrogen and carbon which are the principal constituents of crude oil, refined petroleum products, and products derived from the carbonization of coal

Note 1 to entry: Hydrocarbons can derive from the carbonization of coal at high or low temperatures.

3.211
hydrolysis
reaction with water involving incorporation of oxygen, hydrogen, and/or a hydroxyl group

3.212
hyphae
filaments which compose fungus *mycelium* (3.281)

3.213
hypothesis of soil contamination
assumption whether or not a *site* (3.443) is contaminated or assumption on the nature or spatial distribution of the soil *contamination* (3.93)

3.214
immediate measure
measure required to counteract immediate threats to human health or the environment

EXAMPLE Fencing, removal of surface deposits, bunding to protect surface waters.

3.215
immobilization
conversion of substances or soil particles into a (temporarily) immobile form

Note 1 to entry: See *accumulation* (3.8).

3.216
in situ treatment method
treatment method applied directly in the ground

Note 1 to entry: The treatment can be applied to different *media* (3.262) (e.g. soil, *groundwater* (3.191)) without extraction from the ground.

3.217
incineration
treatment in the presence of oxygen, in which contaminated *medium* (3.262) (e.g. soil) is raised to a temperature at which thermal destruction of *contaminants* (3.91) occurs

Note 1 to entry: Organic contaminants can burn in the *treatment bed* (3.53) or be vaporized. They can then burn above the bed or in an after-burner. Some inorganic contaminants, such as cyanides, can also be destroyed. Volatile inorganics (e.g. mercury) can be partly or totally vaporized and should be collected in an off-gas *treatment system* (3.548). Non-volatilized contaminants are retained in the residual mineral matter which typically sinters.

3.218
increment
material forming part of a *sample* (3.398) obtained by a single operation of a *sampling device* (3.412)

EXAMPLE The filling of a scoop or auger.

3.219
indicator
single *characteristic* (3.70) that represents a sustainability effect, whether benefit or negative impact, which may be compared across alternative *remediation strategies* (3.383), comprising one or more *remediation* (3.380) techniques and/or institutional controls, to evaluate their relative performance

EXAMPLE Greenhouse gas emissions.

3.220
indicator compound
compound chosen to describe properties, primarily toxicity, of a petroleum mixture or *fraction* (3.172)

3.221
indicator substance
substance representing a group or a mixture of substances

3.222
indigenous
organism which has developed naturally in a given area and not as a consequence of artificial introduction

3.223
ingestion exposure
quantity of substances reaching the body by ingestion, e.g. from contaminated food or direct soil ingestion, in particular by children

Note 1 to entry: Ingestion can also be caused by bronchial mucus, as a result of an *inhalation exposure* (3.225).

Note 2 to entry: Often expressed as rate, e.g. mg/kg body mass.

3.224
in-ground sampling
process of taking *samples* (3.398) from the ground surface and/or within the ground beneath the surface

3.225
inhalation exposure
quantity or *concentration* (3.86) of airborne particles and gases reaching the body by inhalation

Note 1 to entry: The inhalation exposure covers alveolar exposure as well as bronchial exposure; and this bronchial mucus can subsequently be ingested.

3.226
inhibitory dose
ID
amount of a *test substance* (3.530) added to soil that effectively inhibits biological activity by a stated percentage after a given time, in comparison to an untreated control

EXAMPLE ID25 and ID50 indicate 25 % and 50 % inhibition of biological activity respectively.

Note 1 to entry: It is expressed as a percentage.

3.227
injected barrier
barrier formed by injecting material under pressure into ground to seal natural *migration pathways* (3.267)

EXAMPLE Barrier formed by injection of chemical or cementitious grouts (grouting).

3.228
inoculum
suspension of cells, tissue, fungi or *microorganisms* (3.266) used to inoculate a nutrient solution

3.229
intrinsic bioremediation
reduction in *contaminant* (3.91) *concentrations* (3.86) in soil, *groundwater* (3.191) or other media, caused by natural biological processes, in the absence of human intervention

Note 1 to entry: See also *natural attenuation* (3.283).

3.230
investigation objective
purpose of the soil and *site* (3.443) investigation separated into phases, each having a specific objective, namely *preliminary investigation* (3.342), *exploratory investigation* (3.156), main site investigation, and *remedial investigation* (3.379)

3.231
investigation for compliance or performance
<remediation strategy> investigation, or programme of ongoing inspection, testing or *monitoring* (3.276), to confirm that a *remediation strategy* (3.383) has been properly implemented and/or, when a *containment* (3.90) approach has been adopted, that this continues to perform to the specified level

EXAMPLE Testing to confirm that all contaminated material has been removed.

3.232
involved party
individual, group, and/or institution involved in the (iterative) process of defining and executing the *sampling programme* (3.420)

3.233
judgemental sampling
process of taking *samples* (3.398) from particular zones or features of a *site* (3.443) taking into account existing knowledge

Note 1 to entry: Judgemental sampling can be required, for example, around underground storage tanks or pipelines where there might have been leaks, above ground storage tanks where there might have been spills, and for areas where raw materials or wastes have been stored or deposited.

Note 2 to entry: Sampling locations are usually predetermined based on what is known about the target area, but some locations can be selected in the field in response to on-site observations.

3.234
kriging
special interpolation method applied in *geostatistics* (3.187) for the estimation of unknown values of a variable at unsampled locations

Note 1 to entry: Usually illustrated in a *variogram* (3.566).

3.235
kubiëna tin
metal box with removable top and base which can be forced into the surface of the ground to obtain an *undisturbed sample* (3.557)

Note 1 to entry: Usually made to desired size from aluminium, galvanized steel, or stainless-steel sheet. Size varies, but a typical example can have an area of about 55 mm × 75 mm with a depth of 40 mm. The *sample* (3.398), once obtained, can be used to determine *bulk density* (3.62) or can be impregnated with resin prior to the production of thin sections for microscopic examination.

3.236
laboratory sample
sample (3.398) intended for laboratory inspection or testing

Note 1 to entry: When the laboratory sample is further prepared (reduced) by subdividing, *mixing* (3.272), *grinding* (3.268), or by combinations of these operations, the result is the *test sample* (3.528). When no preparation of the laboratory sample is required, the laboratory sample is the test sample. A *test portion* (3.527) is removed from the test sample for the performance of the test or for analysis. See Figure A.1.

Note 2 to entry: The laboratory sample is the *final sample* (3.171) from the point of view of sample collection, but it is the initial sample from the point of view of the laboratory.

Note 3 to entry: Several laboratory samples can be prepared and sent to different laboratories or to the same laboratory for different purposes.

3.237
landfarming
biological treatment (3.46) applied directly to *in situ* contaminated surface soils using largely agricultural technique

Note 1 to entry: Also applied to oily materials, etc., and deliberately applied to soil as means of treatment/disposal.

3.238
landfill
deposition of waste into or onto the land

Note 1 to entry: It can eventually provide land which can be used for another purpose.

3.239
landfill gas
mixture of *permanent gases* (3.319) (main components), dominated by methane and carbon dioxide, formed by the *decomposition* (3.113) of degradable wastes within *landfill* (3.238) *sites* (3.443)

Note 1 to entry: It can also include a large number of *volatile organic compounds (VOCs)* (3.569) (trace components).

3.240
leaching
<general> dissolution and movement of soluble substances by water

3.241
leaching
<natural soil> process of *percolating water* (3.318) which dilutes and removes soluble substances (organic, mineral) and transports them away under influence of gravity (from one horizon or soil volume to another)

3.242
leaching potential
potential for substances present in the soil/*soil material* (3.459) to be moved due to the movement of water

3.243
lessivage
translocation (3.544) of solid particles within the soil profile

Note 1 to entry: Lessivage is the combination of eluviation (process of material being leached from the upper part of the soil profile) and illuviation (*accumulation* (3.8) of that material lower in the soil profile).

3.244
lethal concentration *x*
LC_x
<fauna> *concentration* (3.86) of a *test substance* (3.530) or percent dilution of contaminated soil, which kills *x* % of the test organisms within the test period

Note 1 to entry: *x* is the percentage (10, 20, 25, 50) of this effect.

3.245
light non-aqueous phase liquid
LNAPL
NAPL (3.291) less dense than water

EXAMPLE *Hydrocarbons* (3.210) such as fuel.

Note 1 to entry: For dense non-aqueous phase liquid (DNAPL), see 3.119.

3.246
limit test
single *concentration* (3.86) test, e.g. the test soil without any dilution or one concentration of a *test substance* (3.530) mixed into the *control soil* (3.95) and compared with the control

3.247
limiting factor
condition that limits *soil functions* (3.453) and/or the utilization of a soil

3.248
locally contaminated site
site (3.443) with discrete areas of high *concentrations* (3.86) of substances hazardous to soil

Note 1 to entry: The extent of the *contamination* (3.93) is usually small and the gradient of concentration within the site is steep.

3.249
log
continuous record as a function of depth (usually graphical and plotted to scale) of observations made on the materials and fluids of the section exposed in a drillhole

Note 1 to entry: For a description concerning only the soil, see 3.448.

Note 2 to entry: A log can be one of the *sampling records* (3.421) and should be part of the *sampling report* (3.422) if the *samples* (3.398) are obtained from drillholes.

3.250
logging
act or process of making or recording a *log* (3.249)

3.251
lower explosive limit
LEL
lowest volume fraction of a mixture of flammable gas with air which will propagate an explosion in a confined space at 25 °C and atmospheric pressure

Note 1 to entry: LEL can be expressed as a percentage or in mg/l or similar units.

Note 2 to entry: For upper explosive limit (UEL), see 3.561.

3.252
lowest ineffective dilution
LID
lowest value of the dilution factor above which the test gives an ecotoxicological relevant *reduction* (3.373) (e.g. 20 % inhibition of luminescence)

3.253
lowest observed effect concentration
LOEC
lowest *test substance* (3.530) *concentration* (3.86) that has a statistically significant effect ($p > 0{,}05$)

Note 1 to entry: All test concentrations above the LOEC should usually show an effect that is statistically different from the control.

3.254
made ground
anthropogenic ground (3.30) comprising material placed without engineering control and/or manufactured by man in some way, such as through *crushing* (3.268) or washing, or arising from an industrial process

Note 1 to entry: It can comprise mixed *natural soil materials* (3.286) and/or wastes such as building rubble, timber, refuse and industrial wastes.

3.255
main investigation
phase 3
accurate evaluation of the *soil quality* (3.466) for *contaminants* (3.91) and all other information necessary for identification and assessment of *risks* (3.393) and to enable decisions to be made about the need for remedial actions and for preliminary decisions about the nature of the works required

3.256
manufactured soil
manufactured product intended to perform specified *soil functions* (3.453) produced by blending combinations of natural, waste, or other *soil materials* (3.459) with the addition of nutrients or other additives, when necessary

3.257
mass balance
relationship between input and output of a specified substance in a defined system

Note 1 to entry: For example, in a soil layer or in a soil horizon, taking into account the formation or *decomposition* (3.113) of that substance in the system.

3.258
mathematically combined sample
sample (3.398) obtained by removing specific fractions by separation or selection techniques (e.g. heavy liquid, magnetic, sieving), analysing the fractions separately, and combining the results mathematically

Note 1 to entry: When not combined, the sample is a *modified sample* (3.278) or *selective sample* (3.436).

Note 2 to entry: This term should not be confused with *composite sample* (3.83) (3.84).

3.259
maximum particle size
D_{95}
particle size such that 5 % of the mass of the material corresponds to particles having larger size

3.260
measurement uncertainty
estimate attached to a test result which characterizes the range of values within which the true value is asserted to lie

3.261
median lethal concentration
LC_{50}
<fauna> *concentration* (3.86) of a *test substance* (3.530) or percent dilution of contaminated soil which kills 50 % of the test organisms within the test period

3.262
medium
aqueous nutritive solution required for bacterial *growth* (3.194)

3.263
metabolic quotient
q_{CO_2}
specific metabolic activity of soil *microorganisms* (3.266), which can be calculated as the quotient *basal respiration* (3.37): microbial *biomass* (3.47) (3.48) (3.49)

Note 1 to entry: Metabolic quotient is usually expressed as milligrams of CO_2 carbon released per hour per gram of microbial biomass carbon.

3.264
metric
<sustainable remediation> result of a measurement of an *indicator* (3.219)

EXAMPLE 10 t of CO_2.

3.265
microbial activity
metabolic performance of *microorganisms* (3.266)

Note 1 to entry: It can be measured, for example, as O_2 uptake or CO_2 release.

3.266
microorganism
organism smaller than 50 µm that can occur as single cells as well as multicellular organism

Note 1 to entry: All three domains of life contain microorganisms. Thus, microorganisms include a large variety of procaryotes (bacteria and archaea) as well as eucaryotes (fungi, protists, algae).

3.267
migration pathway
means by which *contaminants* (3.91) or *hazardous substances* (3.202) from a particular *source* (3.484) of *contamination* (3.93) can spread or distribute

Note 1 to entry: A migration pathway does not necessarily link to a *receptor* (3.370).

3.268
milling
grinding
crushing
mechanical reduction of the particle size of a *sample* (3.398) by attrition (friction), impact, or cutting

Note 1 to entry: Depending on the nature of the material and of the treatment, one of these techniques is used.

3.269
mineralization
final stage of the *biodegradation* (3.44) of *organic matter* (3.301) or organic substances into carbon dioxide, water and the hydrides, oxides or other mineral salts

3.270
minimum increment size
minimum mass or volume of material in an *increment* (3.218) obtained during composite sampling to ensure that it is representative of the material sampled

Note 1 to entry: The fact that every particle in the material to be sampled shall have the same probability of being part of a *sample* (3.398) results in requirements for the size of the sampling equipment. These requirements determine the amount of material that is obtained with a single sampling operation.

3.271
minimum sample size
minimum mass or volume of material in a *sample* (3.398) for which the variability caused by the individual particles within that material has a negligible effect

Note 1 to entry: The minimum sample size is calculated based on an equation that considers different factors. One of these factors is the variability that is accepted to be caused by the differences between individual particles. When a large amount of variability is chosen for this factor, there will no longer be a “negligible effect”, as mentioned in the definition. However, in normal circumstances, a low value is chosen, accepting only a relatively small amount of variability.

3.272
mixing
combining of components, particles, or layers into a more *homogeneous* (3.204) state

3.273
mobile treatment system
readily-movable process-based treatment method

EXAMPLE Lorry or barge mounted.

Note 1 to entry: A mobile system can consist of one or more mounted unit operations. For example, separate lorries may carry the main processing unit, the emissions control unit(s), and power generation units.

3.274
mobilization
conversion of substances or soil particles into a mobile form

3.275
modified sample
sample (3.398) or a known fraction of the investigated *population* (3.331) in which the analyte has been isolated or (usually) concentrated before submission to the laboratory

3.276
monitoring
process of repetitive observation for defined purposes of one or more elements of the environment, according to pre-arranged schedules in space and time, using comparable methods for environmental sensing and data collection

3.277
monitoring installation
permanent or temporary device used for measuring parameters in the soil

3.278
monitoring site
site (3.443) where there are one or more monitoring areas or installations

Note 1 to entry: A monitoring area or installation can be used in a one-off investigation or be permanent.

Note 2 to entry: In the context of managing contaminated land, the *monitoring* (3.276) carried out at the site can focus on one or more environmental media (e.g. soil, water, *soil gas* (3.454)).

3.279
mud sample
sample (3.398) obtained from sludge loaded cuttings and/or flushings resulting from solid *drillings* (3.134)

3.280
multi-stage sampling
nested sampling
sampling (3.410) in which the *sample* (3.398) is selected by stages, the sampling units at each stage being sampled from the larger sampling units chosen at the previous stage

Note 1 to entry: The first set of portions (units or *increments* (3.218)) taken from the *population* (3.331) available for sampling is the *primary sample* (3.348). The subsequent samples (secondary, tertiary, etc.) are the sets of *subsamples* (3.503), units, items, *individuals* (3.559), or increments taken from the preceding step. The units can be different at different steps of multistage sampling.

3.281
mycelium
branched *hyphae* (3.212) network

3.282
mycorrhizal fungus
ubiquitous *microorganism* (3.266) forming symbiotic association with the roots of vascular plant species

3.283
natural attenuation
natural processes, including chemical, physical, and biological processes, which lead to reduction in *contaminant* (3.91) *concentrations* (3.86) in the soil or *groundwater* (3.191)

Note 1 to entry: In the case of groundwater, natural attenuation can occur at the *source* (3.484) and during migration of contaminants.

3.284
natural background concentration
concentration (3.86) of a substance that is derived solely from natural sources (i.e. of geogenic origin), commonly expressed in terms of average, a range of values, or a *natural background value* (3.285)

3.285
natural background value
statistical characteristics (3.495) of the natural pedo-geochemical content of a substance in soils

3.286
natural soil material
material coming from soil that has been displaced

3.287
negative control
well-characterized material or substance that, when tested by a specific procedure, demonstrates the suitability of the procedure to yield a reproducible, appropriately negative, non-reactive or minimal response in the test system

3.288
nitrification
microbial *oxidation* (3.305) of ammonium to nitrite and thereafter, to nitrate

3.289
nitrogen mineralization
N-mineralization
microbial *degradation* (3.116) of an organic substance containing nitrogen, through the processes of *ammonification* (3.20) and *nitrification* (3.288), to the respective inorganic end-products, specifically ammonium and nitrate

3.290
no observed effect concentration
NOEC
highest *test substance* (3.530) *concentration* (3.86) immediately below the *lowest observed effect concentration (LOEC)* (3.253) at which no statistically significant effect is observed

Note 1 to entry: NOEC has no statistically significant effect ($p < 0,05$) when compared with the control.

3.291
non-aqueous phase liquid
NAPL
liquid organic substance which is relatively insoluble in water

Note 1 to entry: For dense non-aqueous phase liquid (DNAPL), see 3.119.

Note 2 to entry: For light non-aqueous phase liquid (LNAPL), see 3.245.

3.292
non-point source input
input of a substance from a *source* (3.484) other than a point source

Note 1 to entry: See *diffuse source input* (3.124).

3.293
non-systematic pattern
sampling pattern (3.416) indicating sampling locations based on other than statistical procedures

3.294
non-template control
control that is used as *negative control* (3.287) in *qPCR* (3.360) assay to check for the absence of *contaminant* (3.91) in the qPCR mix

3.295
NSO compound
organic compound that contains nitrogen, sulphur, and oxygen

EXAMPLE Asphaltenes.

Note 1 to entry: NSO compounds occur in *organic matter* (3.301) and crude oil. NSO compounds can be separated from crude oil by polar solvents such as methanol.

3.296
off-site treatment
treatment applied away from the *site* (3.443) to be remediated

3.297
one-stage soil gas sampling
sampling (3.410) of *soil gas* (3.454) directly from a *soil gas probe* (3.456) placed in soil, without pre-drilling

Note 1 to entry: Under extremely hot circumstances, some substances can become gases that would not otherwise be. These are not *permanent gases* (3.319).

3.298
on-site treatment
treatment applied on the *site* (3.443) being remediated

3.299
optical density of bacterial inoculum
measurement of the attenuation of a light beam passing through a bacterial suspension at 600 nm (used to determine the cell count indirectly)

Note 1 to entry: In a bacterial test, the absorbance is usually measured as FAU (formazine attenuation units) at 600 nm.

3.300
organic carbon
summarizing parameter including all the carbon forms for dissolved (*dissolved organic carbon* (*DOC)* (3.128)) and total organic compounds (*total organic carbon* (*TOC)* (3.539))

Note 1 to entry: Organic carbon is not synonymous with *organic matter* (3.301).

3.301
organic matter
matter consisting of plant and/or animal organic materials, and the conversion products of those materials

EXAMPLE *Humus* (3.208).

3.302
orientation sample
sample (3.398) obtained by methods of lower cost and leading to results of lower reliability

Note 1 to entry: Taking orientation samples is a common screening practice in the exploratory stage of extending soil *sampling programmes* (3.420).

3.303
oriented sample
sample (3.398) obtained in such a way that the original spatial orientation is marked on the sample before it is taken

Note 1 to entry: This technique is usually applied to hard rock samples or preconditioned, unconsolidated soil intended for structural or textural examination.

3.304
orphan site
site (3.443) for which no owner or other responsible party for pollution can be identified

3.305
oxidation
loss of an electron by an atom or group of atoms

EXAMPLE Change in oxidation stage (e.g. As(V) to As(III)), addition of oxygen to an organic molecule, *hydrolysis* (3.211) of an inorganic or organic species.

3.306
parent material
unweathered organic or inorganic solid or unconsolidated rock from which soil developed or originated

Note 1 to entry: It can include material from alluvial, colluvial, and aeolian origins.

3.307
particle size distribution
distribution of the soil mineral particles according to predefined classes of size

3.308
particle size reduction
crushing (3.268) of the *sample* (3.398) in order to reduce the particle size of the whole (sub)-sample without *reducing* (3.372) the *sample size* (3.406) (mass)

3.309
partition coefficient
ratio between the *concentrations* (3.86) of a substance in two different media and e.g. environmental compartments

Note 1 to entry: Henry's coefficient is a commonly used specification of a partition coefficient between *soil water* (3.479) and soil air.

3.310
partition coefficient between soil and plant
ratio between the *concentrations* (3.86) of a substance in the soil and in plant material

3.311
partition coefficient between soil organic matter and soil water
ratio of the *concentration* (3.86) of a substance in the soil *organic matter* (3.301) fraction to that in the soil-water phase

Note 1 to entry: This *partition coefficient* (3.309) is often expressed in relation to the soil *organic carbon* (3.300) content (hence: Koc).

3.312
partitioning
extent to which a compound of a *hydrocarbon* (3.210) mixture separates into different media (or phases) based on its chemical and physical properties and the size and properties of the media

3.313
passive protective measure
protective measure (3.354) that provides protection solely through its presence

EXAMPLE Soil *cover system* (3.102), a *containment* (3.90) barrier system designed to protect *groundwater* (3.191) from migrating chemicals, a barrier system designed to prevent migration of gas towards housing, a coating system for concrete to protect it against attack by an aggressive chemical.

3.314
passive soil gas sampling
sampling (3.410) based on the adsorption of gases of the ground on an adsorbent placed in the ground, without using artificially reduced pressure

3.315
pedo-geochemical background value
statistical characteristics (3.495) of the pedo-geochemical content

Note 1 to entry: Any estimate of pedo-geochemical background value is prone to a certain amount of error given the *uncertainty* (3.555) associated with determining the pedo-geochemical content.

3.316
pedo-geochemical concentration
concentration (3.86) of a substance in a soil resulting from natural geological and pedological processes, excluding any addition of anthropogenic origin

Note 1 to entry: It is difficult to determine the precise pedo-geochemical concentration of certain substances in soil due to the presence of anthropogenic diffuse *contamination* (3.93).

3.317
perched water table
isolated body of *groundwater* (3.191), which is limited in lateral and vertical extent, located within the *unsaturated zone* (3.560) overlying a much more extensive groundwater body

[SOURCE: ISO 6107:2021, 3.391]

3.318
percolating water
infiltrating water that moves downward in the *pore space* (3.332) due to gravity

3.319
permanent gas
element or compound that is a gas at all ambient temperatures likely to be encountered on the surface of the earth

3.320
permanent monitoring area
representative area chosen according to specific criteria where one or more *environmental mediums* (3.147) are investigated over long periods to obtain reliable information on the effects of environmental influences

Note 1 to entry: One or more permanent monitoring areas can be part of a *monitoring site* (3.278).

Note 2 to entry: In the context of managing contaminated land, the *monitoring* (3.276) carried out in an area can focus on one or more environmental media (e.g. soil, water, *soil gas* (3.454)).

3.321
persistence
<description of soil> resistance of a substance to chemical changes

Note 1 to entry: Persistence is always related to environmental conditions. Thus, a substance can be persistent in one soil, but not in another.

Note 2 to entry: Persistence can be expressed as the half-life of a substance under clearly defined environmental conditions.

3.322
persistence
<biodegradability> residence time of a chemical species in a specifically defined compartment of the environment

3.323
petroleum hydrocarbon
organic compound comprised of carbon and hydrogen atoms arranged in varying structural configurations which make up the principal constituents of crude oil and petroleum products

Note 1 to entry: Mineral oil is a colloquial term for petroleum hydrocarbons or petroleum products.

3.324
physical treatment
process-based treatment method based primarily on physical processes such as dewatering, particle size separation, magnetic separation, flotation, washing, *solvent extraction* (3.482), *thermal treatment* (3.533), vapour extraction

Note 1 to entry: Chemicals can be used to enhance the *effectiveness* (3.142) of some physical processes.

3.325
phytoavailability
availability of a chemical species present in the soil for plants

Note 1 to entry: It is estimated by partial chemical extraction, also called "selective".

3.326
phytoremediation
methods using the natural activities of plants to transform, destroy, fix, or immobilise *contaminants* (3.91)

Note 1 to entry: Some plants (called accumulating plants) can accumulate toxic substances in their tissues.

3.327
point source input
input of a substance from a stationary discrete *source* (3.484) of definite size

Note 1 to entry: The sources can be stack emissions, accidental spills, waste dumps, spills on industrial *site* (3.443), major leaks from sewers and other pipelines.

Note 2 to entry: Point source input can cause both *locally contaminated sites* (3.248) and relatively *uniformly contaminated sites* (3.558).

3.328
pollutant
substance or agent present in an *environmental medium* (3.147), which, due to its properties, amount or *concentration* (3.86), causes adverse impacts on the environmental medium

3.329
polycyclic aromatic hydrocarbon
PAH
compound whose molecules contain two or more simple aromatic rings fused together by sharing two neighbouring carbon atoms

EXAMPLE Naphthalene, anthracene, phenanthrene and benzo(a)pyrene.

3.330
polymerase chain reaction
PCR
method allowing the amplification of a specific DNA sequence using a specific pair of oligonucleotide primers

3.331
population
<soil sampling> entirety of a soil volume or mass about which information is sought via *sampling* (3.410)

EXAMPLE The entirety can be a particular *site* (3.443), in situ volume of soil, *stockpile* (3.496), truck load.

3.332
pore space
all volumes of a soil *sample* (3.398) or horizon not occupied by the solid phase and therefore available either for air or for the storage or circulation of fluids

3.333
pore water
all volumes of a soil *sample* (3.398) or horizon not occupied by the solid phase and filled with fluids

3.334
porosity
volume of pores in a soil *sample* (3.398) (non-solid volume) divided by the *bulk volume* (3.64) of the sample

3.335
positive control
test which contains a known amount of the analyte in the *test material* (3.524) which will produce a known response

[SOURCE: ISO 6107:2021, 3.422]

3.336
post-treatment measure
activity applied to the product of a process-based treatment to prepare it for disposal or reuse

EXAMPLE *Drying* (3.135).

3.337
potentially harmful substance
substance which, by its chemical form, *concentration* (3.86) or presence, can be dangerous for humans or the environment

Note 1 to entry: It can be present naturally or as a result of human activity.

3.338
potential soil productivity
ability of a soil to produce yields under optimum conditions (e.g. fertilizers, pesticides, irrigation, soil cultivation)

3.339
precipitation
chemical reaction in solution resulting in the formation of a solid product

3.340
prediction
process of forming a statistic from observed values to predict random variables at an unsampled location

3.341
preliminary assessment
desktop *risk assessment* (3.395) based on the possible *contamination* (3.93), its release, and effect taking into account similar situations and *site* (3.443) *characteristics* (3.70) from existing databases such as site history, *contaminant* (3.91) characteristics, geological maps, or weather records

Note 1 to entry: The preliminary assessment does not require site specific data, such as soil sampling. The purpose of the preliminary assessment is to decide about the need for further study.

3.342
preliminary investigation
phase 1
desk study and *site* (3.443) reconnaissance

3.343
pretreatment measure
activity (e.g. *drying* (3.135), *grinding* (3.268), grading) applied to a material before it enters the main treatment process or treatment train

3.344
preventive measure
measure to avoid *hazard* (3.200)

3.345
primary biodegradation
degradation (3.116) of a substance to an extent sufficient to remove some characteristic property of the parent molecule

Note 1 to entry: In practice, this is determined by analysis as a loss of parent compound or some specific function of the parent compound.

3.346
primary degradation
degradation (3.116) or alteration of the molecular structure of a substance to an extent sufficient to remove some characteristic property

[SOURCE: ISO 6107:2021, 3.435, modified — "or alteration" was added.]

3.347
primary objective
short description of what is to be achieved by the *sampling* (3.410) in terms of, for example, questions to answer, *characteristics* (3.70) to determine, or whether spatial information or average information is required

3.348
primary sample
sample (3.398) taken from a *population* (3.331) during the first stage of *multi-stage sampling* (3.280)

Note 1 to entry: Primary samples can be either combined (*composite sample* (3.83) (3.84)) or kept separate (gross sample).

3.349
primary treatment
<contaminated water> stage of treatment involving the removal of suspended solids from raw wastewater or after preliminary treatment

Note 1 to entry: This treatment usually forms the first stage of a treatment train for contaminated water.

3.350
principal sampling situation
one of four sampling situations characterised by a combination of whether information is required on spatial distribution or average properties, with whether *in-ground sampling* (3.224) or *above-ground sampling* (3.7) is required

Note 1 to entry: The concept is illustrated in ISO 18400-104:2018, Table 2.

3.351
probabilistic sampling
sampling (3.410) to ensure that each particle or element in the *population* (3.331) has an equal chance of being part of the *sample* (3.398)

Note 1 to entry: This means it is easy to obtain a quantifiable level of reliability (or *uncertainty* (3.555)) in the estimated mean value and enables estimation of variability of the results for the population being tested.

3.352
profile description
description, according to a specified system or terminology, of the features of a soil exposed in a pit or section and its environment

Note 1 to entry: See ISO 25177.

3.353
project manager
individual responsible for the development of both the *sampling programme* (3.420) and the *sampling plan* (3.417)

3.354
protective measure
measure designed to protect a specified target against an identified *hazard* (3.200) or *risk* (3.393)

Note 1 to entry: Protective systems do not seek to remove *contamination* (3.93) or the *source* (3.484) of contamination, only to control them.

Note 2 to entry: Many protective systems combine active and passive elements.

3.355
pseudo-total concentration
<for inorganics> amount of an element determined using a strong acid or combination of acids as extractant

Note 1 to entry: Typically, a small insoluble proportion of the element under consideration is not removed from the matrix by the chosen extractants.

Note 2 to entry: Depending on the element and the soil matrix, the pseudo-total concentration is typically 70 % to 90 % of the true *total concentration* (3.537) (3.538).

3.356
public health protection plan
plan providing an assessment of the public health *risks* (3.393) associated with *remediation* (3.380), the measures to be taken to minimize risks, the point when corrective action will be taken, and identifying those responsible for *monitoring* (3.276) and for taking action

3.357
pump and treat system
system in which water is extracted for treatment above ground

3.358
pure water
grade of water, produced, for example, by single distillation, by de-ionization, by ultra-filtration or by reverse osmosis

3.359
pyrolysis
chemical change caused by heat in the absence of oxygen

3.360
quantitative polymerase chain reaction
qPCR
method allowing the quantification, in a DNA template, of the number of copies of a specific DNA sequence using a specific pair of oligonucleotide primers

3.361
quantitative polymerase chain reaction standard
qPCR standard
cloned DNA target used as template for *qPCR* (3.360) reaction to establish the standard curve relating the abundance of target sequence as a function of *cycle threshold* (3.108) values (Ct)

3.362
quality control sample
sample (3.398) usually relating to the quality assurance of field sampling

Note 1 to entry: Three types can be distinguished: *field blanks* (3.165), *split samples* (3.489), and *field spikes* (3.168).

3.363
quantitative risk assessment
risk assessment (3.395) performed with the data from the *site* (3.443) investigations using databases and numerical models for *contaminant* (3.91) release assessment, *environmental fate analysis* (3.145), *exposure assessment* (3.161), environmental impact analysis, and an *uncertainty* (3.555) analysis

3.364
quartering
reduction of a *sample* (3.398) in size by formation and combination of quarters of a granular or powdered sample

Note 1 to entry: Two opposite quarters are combined while the other two quarters are discarded. The process is repeated as many times as necessary to obtain the quantity desired for some final use (e.g. as the *laboratory sample* (3.236) or as the *test sample* (3.528)).

3.365
radicle
portion of the plant embryo which develops into the primary root

3.366
rate of CO_2 formation
amount of CO_2 released per time unit from a mass unit of soil

Note 1 to entry: CO_2 formation is half part of the soil respiration, the other part is O_2 consumption.

Note 2 to entry: It is usually expressed as milligrams per gram per hour ($mg \cdot g^{-1} \cdot h^{-1}$).

3.367
rate of O_2 consumption
amount of O_2 consumed per time unit from a mass unit of soil

Note 1 to entry: O_2 consumption is half part of the soil respiration, the other part is CO_2 formation.

Note 2 to entry: It is usually expressed as milligrams per gram per hour ($mg \cdot g^{-1} \cdot h^{-1}$).

3.368
reaction time
time it takes for the *enzyme* (3.149) to react (from the addition of the resazurin solution until the end of the reaction)

3.369
reactive barrier
permeable in-ground wall which absorbs, reacts with, or degrades *contaminants* (3.91) in *groundwater* (3.191) migrating through it

3.370
receptor
entity that is vulnerable to the adverse effect(s) of a *hazardous substance* (3.202) or agent

Note 1 to entry: Receptors can include persons (e.g. trespassers, current and intended users, construction workers), other organisms or complete ecosystems, environmental media or artificial construction.

3.371
reclamation
return of damaged, degraded, or derelict land to a beneficial use

Note 1 to entry: The term *remediation* (3.380) is commonly reserved for the process of dealing with contaminated/polluted sites.

3.372
reducing
decreasing the size of the *sample* (3.398)

3.373
reduction
addition of an electron to an atom or group

EXAMPLE Change in *oxidation* (3.305) stage of an atom (e.g. As(V) to As(III)).

3.374
reference material
RM
material or substance, one or more of whose property values are sufficiently *homogeneous* (3.204) and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials

EXAMPLE Water for the calibration of viscometers, sapphire as a heat-capacity calibrant in calorimetry, and solutions used for calibration in chemical analysis.

Note 1 to entry: A reference material can be in the form of a pure or mixed gas, liquid, or solid.

3.375
reference site
area whose one or more element *concentrations* (3.86) are well characterised in terms of spatial/time variability

3.376
reference soil
uncontaminated site-specific soil (e.g. collected in the vicinity of a *contaminated site* (3.92)) with properties (nutrient *concentrations* (3.86), pH, *organic carbon* (3.300) content and texture, etc.) similar to the test soil

3.377
regular sampling
process of taking *samples* (3.398) in a regular pattern and at evenly-spaced locations, such as the nodes of a square or triangular grid

3.378
relative fluorescence
fluorescence measured for each treatment (control and test) after subtracting the fluorescence of the respective blank A

3.379
remedial investigation
investigation to collect all information necessary to design and execute a *remediation strategy* (3.383)

3.380
remediation
process of dealing with contaminated soil, *groundwater* (3.191), or *site* (3.443) to eliminate or control *risks* (3.393) to human health or the environment

3.381
remediation monitoring plan
programme of inspection and/or testing for the regular assessment, over a period of time, of

— the *remediation* (3.380) process(es) (e.g. stage reached, quality achieved), and

— the performance of completed remediation works

3.382
remediation objective
objective related to technical (e.g. *residual contamination* (3.388) *concentrations* (3.86), engineering performance), administrative, and legal requirements

3.383
remediation strategy
combination of remedial techniques and associated work programmes that will meet specified *contamination* (3.93)-related *remediation* (3.380) objectives and other objectives (e.g. engineering-related ones), and overcome possible restraints

3.384
remediation target value
indication of the performance to be achieved by *remediation* (3.380), usually defined as *contamination* (3.93)-related objective in terms of a residual *concentration* (3.86)

3.385
remediation technology
technology that pre-processes, processes or post-processes the ground or *contaminant* (3.91)

3.386
replicate sample
one of the two or more *samples* (3.398) or sub samples obtained separately at the same time, by the same *sampling procedure* (3.419) or sub-sampling procedure, at the same location

Note 1 to entry: Although the replicate samples are expected to be identical, often the only thing replicated is the act of taking the physical sample.

Note 2 to entry: The replicate sample is usually used to estimate sample variability, while the *umpire sample* (3.553) is usually used to settle a dispute.

3.387
representative sample
sample (3.398) in which the *characteristic(s)* (3.70) of interest is (are) present with a reliability appropriate for the purpose of the testing programme

[SOURCE: CEN/TR 15310-1:2006, 2.24]

3.388
residual contamination
amount or *concentration* (3.86) of *contaminants* (3.91) remaining in a specific *medium* (3.262), following *remediation* (3.380)

3.389
respiratory activation quotient
Q_R
basal respiration rate (R_B) (3.38) divided by *substrate-induced respiration* (3.510) rate (R_S)

$$Q_R = \frac{R_B}{R_S}$$

3.390
retention function
ability of soils/*soil materials* (3.459) to absorb *contaminants* (3.91) in such a way that they cannot be mobilised through the water pathway and translocated into the terrestrial food chain

3.391
reuse of soil material
useful and harmless utilization of *soil materials* (3.459)

Note 1 to entry: Reuse can mean the transfer of soil materials to another location for use in agriculture, horticulture, forestry, gardens, recreational areas, and construction sites.

3.392
riffling
separation of a free-flowing *sample* (3.398) into (usually) equal parts by means of a mechanical device composed of diverter chutes

3.393
risk
combination of the probability or frequency of occurrence of a defined *hazard* (3.200) and the magnitude of the consequences of the occurrence

3.394
risk analysis
use of available information to identify *hazard* (3.200) and to characterize the *risk* (3.393)

3.395
risk assessment
process of *risk analysis* (3.394) and evaluation of the damaging effects on humans and the environment, with respect to the nature, extent, and probability of occurrence of these effects

3.396
root germination
appearance of a root of at least 1 mm of length

3.397
safety
freedom from *unacceptable risk* (3.554) of *harm* (3.198)

Note 1 to entry: In standardization, the safety of products, processes, and services is generally considered with a view to achieving the optimum balance of a number of factors, such as human behaviour, that eliminates avoidable *risks* (3.393) of harm to persons and goods to an acceptable degree.

[SOURCE: ISO/IEC Guide 2:2004, 2.5]

3.398
sample
portion of *soil material* (3.459) selected from a larger quantity of material

Note 1 to entry: The manner of selection of the sample should be described in the *sampling plan* (3.417).

3.399
sample container
receptacle for storage and/or transportation of a soil *sample* (3.398), adapted to the type of sample and the kind of subsequent examination or analysis

3.400
sample division
<bulk material> activity in *sample* (3.398) preparation whereby a sample of bulk material is divided by such means as *riffling* (3.392), mechanical division, or *quartering* (3.364) into separate parts, one or more of which is retained

[SOURCE: ISO 3534-2:2006, 5.3.8]

3.401
sample preservation
procedure used to stabilize a *sample* (3.398) in such a way that the properties under examination are maintained stable from the collection step until preparation for analysis

3.402
sample pretreatment
procedures used for conditioning a soil *sample* (3.398) to a defined state which allows subsequent examination or analysis or long-term storage

Note 1 to entry: Sample pretreatment includes e.g. *mixing* (3.272), splitting, *drying* (3.135), *crushing* (3.268), *stabilization* (3.492).

3.403
sampler
sampling personnel
person or a group of persons carrying out the *sampling procedures* (3.419) at the sampling locality

Note 1 to entry: Tools and other devices to obtain *samples* (3.398) are sometimes also designated as "samplers". In this case, use "*sampling devices*" (3.412) or "sampling equipment".

3.404
sample related to mass
sample (3.398) whose analytical results are expressed for evaluation on the basis of mass per mass

3.405
sample related to unit area
sample (3.398) whose analytical results are expressed for evaluation on the basis of mass per area

3.406
sample size
number of items or the quantity of material constituting a *sample* (3.398)

3.407
sample storage
process and the result of keeping a soil sample available under predefined conditions, usually for a specified time interval between collection and further treatment of a *sample* (3.398)

3.408
sample transportation
act of transferring a *sample* (3.398) from the locality of *sampling* (3.410) to the place of subsequent treatment (e.g. laboratory, *soil specimen bank* (3.474))

3.409
sample volume
volume of *sample* (3.398) which is taken from soil

3.410
sampling
act of drawing or constituting a *sample* (3.398)

Note 1 to entry: For the purpose of soil investigation, "sampling" also relates to the selection of locations for the purpose of in situ testing carried out in the field without removal of material.

Note 2 to entry: See in Annex A the relationships between sampling operations.

[SOURCE: ISO 3534-2:2006, 1.3.1, modified — Notes to entry have been added.]

3.411
sampling design
decisions as to types of *samples* (3.398) to obtain, sampling locations, how to handle samples, etc.

3.412
sampling device
apparatus or tool used to obtain a *sample* (3.398) from soil or *soil material* (3.459)

3.413
sampling error
part of the total error (the estimate from a *sample* (3.398) minus the *population* (3.331) value) associated with using only a fraction of the population and extrapolating to the whole, as distinct from analytical or test error

Note 1 to entry: It arises from a lack of homogeneity in the investigated population.

3.414
sampling network
system of predetermined sampling locations designed to monitor one or more specified *sites* (3.443)

[SOURCE: ISO 6107:2021, 3.495]

3.415
sampling objective
technical description of the purpose of *sampling* (3.410)

3.416
sampling pattern
set of predetermined *sampling points* (3.418)

3.417
sampling plan
predetermined procedure for implementation of the *sampling strategy* (3.424)

3.418
sampling point
precise position within a *sampling site* (3.423) or within each soil-constituting horizon from which *samples* (3.398) are collected

3.419
sampling procedure
operational requirements and/or instructions as to how to carry out *sampling* (3.410)

Note 1 to entry: Adapted from ISO 3534-2:2006, 5.4.4.

3.420
sampling programme
total sampling operation, from the first step in which the purpose of *sampling* (3.410) is defined to the last step in which the analytical results are compared with the relevant test level(s)

3.421
sampling record
set of raw data gathered in the field

3.422
sampling report
description of the whole *sampling* (3.410) process, based on *sampling plan* (3.417) and *sampling record* (3.421) and including how the sampling was planned and performed

3.423
sampling site
general areas within a body of soil from which *samples* (3.398) are collected

3.424
sampling strategy
arrangement by which a *sampling programme* (3.420) is conducted

Note 1 to entry: The purpose of designing a sampling programme is to provide the most efficient and economical methods of reaching valid and relevant conclusions from the investigations of a *site* (3.443). The design is a function of many considerations such as the aim of the investigation, the homogeneity of the soil/site under consideration, and the cost of performing the investigation.

3.425
sampling technique
appropriate procedures and *sampling devices* (3.412) to obtain and describe *samples* (3.398) of soil or *soil material* (3.459), either in the field or during transportation and in laboratory

Note 1 to entry: The manner of selection of the sampling technique should be described in the *sampling plan* (3.417).

3.426
sampling uncertainty
part of the total *measurement uncertainty* (3.260) attributable to *sampling* (3.410)

3.427
saturated soil
part of the soil which is completely saturated by water

3.428
saturated zone
zone of the ground in which the *pore space* (3.332) is filled completely with liquid at the time of consideration

3.429
scenario
<general> description of the data and assumptions for *quantitative risk assessment* (3.363)

3.430
scenario
<exposure pathway> *exposure pathway* (3.162) which is identified when developing a *conceptual site model* (3.88)

3.431
secondary objective
detailed definition of technical activities required to achieve the *primary objective(s)* (3.347) of the investigation

Note 1 to entry: The secondary objectives address items such as the population to be sampled, the components to be determined, the statistical parameter to be determined, the scale of *sampling* (3.410), and the desired precision and confidence.

3.432
secondary treatment
<contaminated water> stage of treatment by biological processes such as activated sludge, biological filtration, or other processes giving equivalent result

Note 1 to entry: This treatment forms the second stage (usually the main stage) of a treatment train for contaminated water.

3.433
sediment
solid material, both mineral and organic, that is in suspension or has been moved from its *site* (3.443) of origin by water or other processes

3.434
seedling emergence
appearance of the seedling (i.e. visible seedling) above the surface of the cover material

Note 1 to entry: This refers to the appearance of the coleoptile or cotyledon above the soil.

3.435
segment
<bulk materials> single, large portion of material either pre-existing in space (e.g. bags, bales, drums) or accumulated during a fixed time (e.g. discharge from a conveyor belt) or formable as *increment* (3.218) by a *sampling device* (3.412)

Note 1 to entry: A segment can be actual or conceptual.

3.436
selective sample
sample (3.398) deliberately chosen or formed, based on some specific *characteristic(s)* (3.70) of the material to be sampled

Note 1 to entry: Characteristics include appearance, odour and particle sizes.

3.437
selective subsampling
separation of part of a *sample* (3.398) on the basis of grading (i.e. above or below a defined particle size), appearance or some other attribute

3.438
sensitive site
site (3.443) whose soil properties or functions are readily or excessively affected by changes in external influences

3.439
sequential sample
units, *increments* (3.218), or *samples* (3.398) taken one at a time or in successive predetermined groups until the cumulative result of their measurements (typically applied to attributes), as assessed against predetermined limits, permits a decision to accept or reject the *population* (3.331) or to continue *sampling* (3.410)

Note 1 to entry: The number of observations required is not determined in advance, but the decision to terminate the operation depends, at each stage, on the results of previous observations. The plan can have a practical, automatic termination after a certain number of units have been examined.

3.440
simple random sample
sample (3.398) of *n items* (3.559) taken from a *population* (3.331) of *N* items in such a way that all possible combinations of *n* items have the same probability of being taken

Note 1 to entry: Haphazard or arbitrary choice of units is generally insufficient to guarantee randomness.

3.441
simple random sampling
<soil sampling> *sampling* (3.410) that involves arbitrary selection of locations within the area to be investigated

Note 1 to entry: The coordinates of the intended sampling locations are derived using pseudo-random or quasi-random numbers which can be found in tables included in manuals on statistics or which can be generated by computer programs.

3.442
single sample
sampling (3.410) unit collected by one or more *increments* (3.218) from a coherent volume of material and kept and treated separately from other *samples* (3.398)

3.443
site
defined area

3.444
site characterization
collection of data connected to a *site* (3.443) providing appropriate information for the assessment in question

Note 1 to entry: In the context of *risk assessment* (3.395), specifically the *source* (3.484) identification and characterization elements of the *exposure assessment* (3.161) are part of site characterization.

3.445
shallow soil
soil in which plants can achieve a rooting depth of less than 50 cm

3.446
slot sample
sample (3.398) taken as a vertical slot from within a stratum or other subpart which is putatively *homogeneous* (3.204)

3.447
slurry bioreactor
equipment in which bio-treatment is applied to a slurry of contaminated soil or *sediment* (3.433) with water, biological agents, nutrients, etc.

3.448
soil
upper layer of the Earth's crust transformed by weathering and physical/chemical and biological processes and composed of mineral particles, *organic matter* (3.301), water, air, and living organisms organized in soil horizons

Note 1 to entry: In a broader horizon civil engineering sense, soil includes *topsoil* (3.536) and sub-soil; deposits such as clays, silts, sands, gravels, cobbles, boulders, and organic matter and deposits such as peat; materials of human origin such as wastes; ground gas and moisture; and living organisms.

3.449
soil characterization
determination of relevant physical, chemical, and biological properties of the soil

3.450
soil damage
alteration of soil properties which can cause negative effects on one or more *soil functions* (3.453), human health, or the environment

3.451
soil fertility
current status of a soil with respect to sustainable plant *growth* (3.194)

3.452
soil flushing
in situ soil washing
in situ process in which *contaminants* (3.91) are physically removed from soil by washing with water

Note 1 to entry: *Effectiveness* (3.142) can be enhanced by use of agents such as surfactants.

3.453
soil function
role performed by soil that support ecosystems, the biosphere, the water environment and human activities

3.454
soil gas
gas and vapour in the *pore spaces* (3.332) of soils

3.455
soil gas monitoring device
soil gas monitoring installation
permanent or temporary device used for *soil gas* (3.454) *sampling* (3.410)

EXAMPLE Sub-slab, *soil gas probe* (3.456).

3.456
soil gas probe
soil gas sampling probe
probe, generally a tube, which is installed directly into soil (*one-stage soil gas sampling* (3.297)) or in a *borehole* (3.56) (*two-stage soil gas sampling* (3.551)) to take soil gas *samples* (3.398)

Note 1 to entry: By applying a negative pressure to the upper end of the soil gas probe (head), the *soil gas* (3.454) at the lower end (tip) is drawn through the suction opening(s) and transferred to a gas collecting equipment and online measurement equipment (*direct measuring method* (3.125)) or to an absorbent (*concentration method* (3.87)), which are installed either in or at the head of the soil gas probe or subsequently used.

3.457
soil gas sample volume
volume of *soil gas* (3.454) taken to form the *sample* (3.398)

3.458
soil gas suction test
continuous *soil gas* (3.454) *sampling* (3.410) from a *borehole* (3.56) well over a controlled period of time (mostly several hours up to days) to observe the variations over time of the gas *concentrations* (3.86) and of the pressure distribution in the soil

3.459
soil material
soil-like material, *anthropogenic ground* (3.30) (e.g. *made ground* (3.254), *fill* (3.169) materials), peat, *dredged materials* (3.133), *manufactured soils* (3.256), *treated soil material* (3.546) and generally any material found in the ground

Note 1 to entry: See also *natural soil material* (3.286).

3.460
soil microbial biomass
mass of intact microbial cells in a given soil

Note 1 to entry: This is usually estimated from the measurement of carbon or nitrogen content of these cells.

3.461
soil mixture ratio
ratio of the dry mass of test soil to the dry mass of reference or *control soil* (3.95)

Note 1 to entry: It is expressed as a percentage.

3.462
soil pores
part of the soil volume, between the solid particles of the soil

3.463
soil protection
measures for long-term maintenance or restoration of soils and *soil functions* (3.453)

3.464
soil processes
physical or reactive geochemical and biological processes, which can attenuate, concentrate, immobilise, liberate, degrade, or otherwise transform substances in soil

3.465
soil productivity
ability of a soil to produce yields under current conditions

3.466
soil quality
positive or negative properties with regards to soil utilization and *soil functions* (3.453)

3.467
soil reaction
characterizing property of the acid base state of soils, which is determined by hydrogen ion *concentration* (3.86) of an aqueous soil extract under defined conditions

Note 1 to entry: The pH value is stated as negative 10-logarithm of the concentration of hydrogen ions as expressed in mol/l in aqueous solution.

3.468
soil redox potential
E_h
electrochemical potential reflecting the oxidation-reduction status of a liquid chemical system (in this case of the soil solution)

3.469
soil rehabilitation
action taken to improve the capability of a damaged or *degraded soil* (3.117) to perform specified functions

EXAMPLE Addition of *organic matter* (3.301) and nutrients to promote plant *growth* (3.194).

3.470
soil respiration rate
volume of carbon dioxide released and/or oxygen consumed per unit mass of soil per unit time

3.471
soil restoration
actions to restore *soil functions* (3.453) for intended uses or to protect man and the environment from dangers

3.472
soil salinization
accumulation (3.8) of water-soluble salts in soil

3.473
soil sampling device
tool to collect *soil material* (3.459) in a quick and standardized way

3.474
soil specimen bank
systematic or permanent collection and long-term storage of representative soil *samples* (3.398) for

— documentation of the state of the material at the time of *sampling* (3.410), and

— control of analytical methods

3.475
soil structure
arrangement of mineral particles and *organic matter* (3.301) to form aggregates which produce microstructures and macrostructures in the soil

3.476
soil texture
relative proportions of the various particle size fractions (i.e. sand, silt, clay) in a soil, according to a soil *classification system* (3.73)

3.477
soil vapour extraction
in-situ process involving extraction of vapours from the ground under suction

Note 1 to entry: This can also involve controlled infiltration of air.

3.478
soil washing
water-based system designed to physically separate *contaminants* (3.91) from soil or *sediment* (3.433)

Note 1 to entry: Contaminants can be concentrated in a particular size fraction (usually a fine fraction) leaving the remaining (coarser) material free of *contamination* (3.93).

3.479
soil water
all water of the unsaturated and *saturated zone* (3.428)

3.480
soil-water partition coefficient
K_d
ratio of the *concentration* (3.86) of a substance in the soil solid phase to that in the soil-water phase

3.481
solidification
addition of reagents to contaminated material to reduce its fluidity/friability and prevent access by external mobilising agents, such as wind or water, to *contaminants* (3.91) contained in the solid product

Note 1 to entry: Solidification does not necessarily require that chemical reaction occurs between contaminants and the solidification agent, although such reactions can take place depending on the nature of the reagent.

3.482
solvent extraction
use of non-aqueous liquids (e.g. organic solvents, super-critical gases) to physically separate *contaminants* (3.91) from *soil* (3.448) or *sediment* (3.433)

3.483
sorption
reversible binding of a substance by *soil* (3.448) constituents

Note 1 to entry: Mechanisms of sorption include, for example, ion exchange, surface absorption, and dissolution of organic chemicals in the *soil* (3.448) *organic matter* (3.301).

3.484
source
<risk assessment> place from which a *contaminant* (3.91) or hazardous agent is released

3.485
spatial composite sample
composite sample (3.83) (3.84) formed from small incremental point *samples* (3.398) taken over an area (such as a field)

Note 1 to entry: The general premise is that the distribution of *soil* (3.448) constituents is relatively *homogeneous* (3.204). The *increments* (3.218) may be located according to a regular grid, random, or other pattern. In agricultural/horticultural land investigations "N", "S", "W" and "X" *sampling patterns* (3.416) are commonly used. Along the outline of such a pattern, a number of samples or increments are taken which are bulked and mixed to provide one (composite) sample for analysis.

3.486
specific growth rate
μ
number of multiplication (by *e*) of respiration rate per unit of time during the exponential phase of *growth* (3.194)

3.487
specific surface area
surface area of the *soil* (3.448) or a size fraction of the soil particles

Note 1 to entry: Surface area can be measured by a variety of means that can give differing results, such as:

a) ratio of surface area to mass of solid particles;

b) ratio of surface area to volume of solid particles.

Note 2 to entry: Because both expressions (mass and volume) are in use, this term shall be defined explicitly wherever it is used.

3.488
specimen
specifically selected unit/portion of a material taken from a dynamic system and assumed to be representative of the initial material at the time it is taken

Note 1 to entry: A specimen can be considered as a special type of *sample* (3.398), taken primarily in time rather than in space.

Note 2 to entry: The term "specimen" has been used both as a representative unit and as a non-representative unit of a population, usually in clinical, biological, and mineralogical collections.

3.489
split sample
sample (3.398) used to challenge the analytical laboratory performance or to verify analytical results of two (or more) parties analysing samples from the same *site* (3.443)

3.490
spot sample
sample (3.398) from a discrete location

Note 1 to entry: Sample can be formed from one or more contiguous portions (*increments* (3.218)) of material.

Note 2 to entry: It can be a *disturbed sample* (3.129) or *undisturbed sample* (3.557).

3.491
stabilization/solidification
treatment combining stabilization and solidification in a single or two stage process

Note 1 to entry: See also *stabilization* (3.492) and *solidification* (3.481).

Note 2 to entry: Stabilization/solidification methods can change the physical state of a contaminated material (e.g. solidifying a contaminated sludge) and/or reduce the "availability" of *contaminants* (3.91) to potential targets through chemical stabilization and (usually) by containment within a solid, low permeability product.

3.492
stabilization
addition of chemicals to the contaminated material to produce more chemically stable constituents, for example by precipitating soluble metal ions out of solution

Note 1 to entry: Stabilization might not result in an improvement in the physical *characteristics* (3.70) of the material. For example, it can still remain a relatively mobile sludge, but the toxicity or mobility of the hazardous constituents will have been reduced by the stabilization process.

3.493
standard compound
target compound with the highest possible purity, which can be used as a reference during the analysis

3.494
standard soil
field-collected *soil* (3.448) or *manufactured soil* (3.256) whose main properties (e.g. pH, texture, *organic matter* (3.301) content) are within a known range

EXAMPLE Euro-soils, artificial soil, LUFA standard soil.

Note 1 to entry: The properties of standard soils can differ from the test soil.

3.495
statistical characteristic
numerical value calculated from a variate of a selected parameter of the population

EXAMPLE Mean, median, standard deviation, standard error, percentiles of the ordered frequency distribution.

3.496
stockpile
anthropogenic deposit of *soil* (3.448) or *soil material* (3.459)

3.497
stratified random sampling
process in which the area to be sampled is divided into a number of identical grid cells (strata) and *samples* (3.398) are taken randomly in each cell

3.498
stratified sample
sample (3.398) taken from a single stratum of the defined population (e.g. area or volume of *soil* (3.448) to be sampled)

Note 1 to entry: Sample can be taken randomly within the stratum (stratified random sample) or at predefined regularly arranged *sampling points* (3.418) (stratified regular sample).

Note 2 to entry: The purpose of taking stratified samples is to obtain a more *representative sample* (3.387) than that which can otherwise be obtained by random *sampling* (3.410).

Note 3 to entry: The term stratum is used here in a statistical sense and should not be misunderstood as pedological or geological strata.

3.499
stratified sampling
sampling, in a *population* (3.331) which can be divided into mutually exclusive and exhaustive *sub-populations* (3.502) (called strata), carried out in such a way that specified proportions of the *sample* (3.398) are drawn from the different strata and each stratum is sampled with at least one *sampling* (3.410) unit

3.500
study area
three-dimensional definition of the area where *samples* (3.398) are obtained from and thus for which the *background value(s)* (3.36) are determined

3.501
subhydric soil
soil (3.448) formed below water, or which is formed on *parent material* (3.306) that was deposited in water or through alluvial processes

3.502
sub-population
defined part of a *population* (3.331)

[SOURCE: ISO 3534-2:2006, modified — “defined” has been added.]

3.503
subsample
selected part of a *sample* (3.398)

Note 1 to entry: The subsample can be selected by the same method that was used in selecting the original sample, but need not be so.

[SOURCE: ISO 3534-2:2006, 1.2.19]

3.504
subsampling
process of selecting one or more *subsamples* (3.503) from a *sample* (3.398) of a *population* (3.331)

3.505
sub-slab sampling location
soil gas (3.454) *sampling* (3.410) location just below the foundation slab, within the *unsaturated zone* (3.560)

Note 1 to entry: The slab can be located under a building.

3.506
subsoil
<general> *natural soil material* (3.286) below the *topsoil* (3.536) and overlying the *parent material* (3.306)

Note 1 to entry: Much of the original rock structure has usually been obliterated by pedogenic processes.

3.507
subsoil
undersoil
<soil gas> layer of *soil* (3.448) beneath the surface soil and overlying the *bedrock* (3.39)

3.508
substance input
movement of a substance from another environmental compartment into a *soil* (3.448)

3.509
substance output
movement of a substance from the *soil* (3.448) into another environmental compartment

3.510
substrate-induced respiration
SIR
microbial *soil* (3.448) respiration after addition of nutrients

Note 1 to entry: Glucose is an example of an added nutrient.

3.511
supplementary investigation
phase 4
collection of such other information as required for the selection and design of remedial works, if necessary

3.512
surface liner system
cover to *hazardous site* (3.201) composed primarily of a *geomembrane* (3.185)

Note 1 to entry: Other *geosynthetics* (3.188) and natural materials, such as sand or *soil* (3.448), can be used to complete the *cover system* (3.102).

3.513
surrogate compound
representative compound with toxicological and/or physical properties indicative of a *hydrocarbon* (3.210) *fraction* (3.172), which can therefore be used to represent the fraction in an *exposure assessment* (3.161)

3.514
suspect site
site (3.443) whose history or any other information leads to a suspicion that it can be hazardous for human health or environment

3.515
sustainable development
development that meets the needs of the present without compromising the ability of future generations to meet their own needs

Note 1 to entry: Sustainable development is about integrating the broader expectations of society as a whole of a high quality of life, health and prosperity with *environmental justice* (3.146) and maintaining Earth's capacity to support life in all its diversity. These social, economic and environmental goals are interdependent and should be mutually reinforcing.

[SOURCE: ISO 26000:2010, 2.23, modified — The last sentence in Note 1 to entry has been removed.]

3.516
sustainable redevelopment
component of *sustainable development* (3.515) that results in the return to use of abandoned, derelict, underused and potentially *contaminated sites* (3.92) in a way that increases their environmental, economic, and social benefits

3.517
sustainable regeneration
component of *sustainable development* (3.515) that reverses the economic, social and environmental decline of places

3.518
sustainable remediation
elimination and/or control of *unacceptable risks* (3.554) in a safe and timely manner whilst optimising the environmental, social and economic value of the work

3.519
systematic pattern
sampling pattern (3.416) indicating *sampling* (3.410) locations based on the results of statistical procedures

3.520
systematic sampling
process of taking *samples* (3.398) from locations that have been pre-designated according to a geometric or other statistically-derived pattern

Note 1 to entry: Systematic sampling can include a random positioning component.

Note 2 to entry: Some systematic *sampling patterns* (3.416) are regarded as "probabilistic" (see 3.351).

Note 3 to entry: This definition is wider than the usual definition found in the literature, where systematic sampling commonly means *regular sampling* (3.377).

3.521
systematic unaligned sampling
process of taking *samples* (3.398) using a *sampling pattern* (3.416) intermediate between a regular grid and *stratified random sampling* (3.497), where each row (respectively column) of the grid shows a similar pattern of unaligned points

Note 1 to entry: See ISO 18400-104:2018, Figure B.8.

3.522
target site
site (3.443) at which *soil* (3.448) is to be reused

3.523
tertiary treatment
<contaminated water> additional treatment processes which result in further purification than that obtained by applying primary and *secondary treatment* (3.432)

Note 1 to entry: The expression for the precise treatment (e.g. nitrogen removal, phosphorus removal, polishing lagoons, disinfection, and filtration) should be used since, in some cases, the tertiary treatment can also be integrated in the secondary treatment.

Note 2 to entry: This treatment forms the third (and usually the final) stage of a treatment train for contaminated water.

3.524
test material
material to be tested

EXAMPLE Soils, *soil materials* (3.459), compost, sludge, etc.

3.525
test mixture
mixture of contaminated *soil* (3.448) or the *test substance* (3.530) (e.g. chemical, *biosolid* (3.52), waste) with *control soil* (3.95)

3.526
test mixture ratio
ratio between the test *soil* (3.448) and the *control soil* (3.95) in a *test mixture* (3.525)

Note 1 to entry: Different ratios may be applied in a dilution series to establish a *dose-response relationship* (3.132).

3.527
test portion
analytical portion
quantity of material, of proper size, for measurement of the *concentration* (3.86) or other property of interest, removed from the *test sample* (3.528)

Note 1 to entry: The test portion can be taken from the *primary sample* (3.348) or from the *laboratory sample* (3.236) directly if no preparation of sample is required (e.g. with liquids), but it is usually taken from the prepared test sample.

Note 2 to entry: A unit or *increment* (3.218) of proper homogeneity, size, and fineness, needing no further preparation, can be a test portion.

3.528
test sample
portion of material, resulting from the *laboratory sample* (3.236) by means of an appropriate method of *sample pretreatment* (3.402), and having the size (volume/mass) necessary for the desired testing or analysis

3.529
test solution
analytical solution
solution prepared by dissolving (with or without reaction) the *test portion* (3.527) in a liquid

Note 1 to entry: The solution can also be obtained by extraction with appropriate liquid of one or several constituent(s) of test portion.

3.530
test substance
chemical substance under investigation added to the test system

3.531
test substrate
manufactured soil (3.256) or natural *soil* (3.448) used as control and dilution substrate or to be spiked with a *test substance* (3.530)

3.532
thermal desorption
removal of substances by application of heat to the *medium* (3.262) to be treated

Note 1 to entry: Heat can be applied directly or indirectly.

EXAMPLE 1 For direct thermal desorption: by open flame, infrared radiant heaters, stream of hot-gas.

EXAMPLE 2 For indirect thermal desorption: by applying heat to the outside of a rotating kiln or through hollow screw feeder.

3.533
thermal treatment
treatment in which heat is applied to destroy, remove, or immobilise *contaminants* (3.91)

3.534
threshold
limit of acceptability for an *indicator* (3.219) that is not allowed to be crossed or carries an unacceptable consequence if it is crossed, such as regulatory non-compliance

3.535
time to the peak maximum
$t_{peakmax}$
time from addition of *growth* (3.194) substrate to the maximum respiration rate

Note 1 to entry: It also reflects the viability of the growing organisms.

3.536
topsoil
upper layer(s) of a natural *soil* (3.448) that is generally dark coloured and has a higher content of *organic matter* (3.301) and nutrients when compared to the (mineral) horizons below, excluding the *humus* (3.208) layer

Note 1 to entry: For arable land, topsoil refers to the ploughed soil depth, while for grassland; it is the soil layer with high root content.

3.537
total concentration
<for inorganics> total of an element present in all chemical forms and irrespective of its location in the *soil material* (3.459), including that incorporated in silicate minerals

Note 1 to entry: Determination of the total concentration requires use of an instrumental technique such as X-ray fluorescence analysis or a powerful solvent combination, such as a mixture of hydrofluoric and perchloric acid or alkaline melt. The use of this solvent mixture presents many practical and safety-related problems in the laboratory and is therefore often avoided.

3.538
total concentration
<for organics> *concentration* (3.86) derived by applying an analytical technique that cannot distinguish between similar compounds

EXAMPLE For the phenols, the technique cannot distinguish between monohydric, dihydric, and trihydric compounds.

Note 1 to entry: The term 'total' can be misleading, e.g. not all phenols can be detected by the method and different methods can give different results.

3.539
total organic carbon
TOC
all carbon present in *organic matter* (3.301)

3.540
total petroleum hydrocarbons
method-defined expression of the total amount of *petroleum hydrocarbons* (3.323) in the *soil* (3.448)

Note 1 to entry: Expressed as "total petroleum hydrocarbons determined by (method)".

Note 2 to entry: The value depends on the analytical method used to measure it.

Note 3 to entry: Total petroleum hydrocarbons (TPH) is a term used to describe a large family of several hundred chemical compounds that originally come from crude oil. For analytical quantification, TPH is divided into groups of petroleum hydrocarbons that act alike in soil or water (petroleum hydrocarbon *fractions* (3.172)), and each fraction contains many individual chemicals.

3.541
trace element
element present in low *concentration* (3.86) in *soil material* (3.459)

3.542
traceability
property of the result of a measurement whereby it can be related to appropriate measurement standards, generally international or national standards, through an unbroken chain of comparisons

Note 1 to entry: The unbroken chain of comparisons is called a "traceability chain". See ISO 10012.

3.543
transect
sampling (3.410) area, usually elongated or linear, chosen as the basis for studying a particular *characteristic* (3.70) of the *soil* (3.448)

3.544
translocation
movement of substances within or on the surface of the *soil* (3.448) caused by water, air, and human activities or soil organisms

3.545
treated soil
soil (3.448) subject to a process-based treatment method

3.546
treated soil material
material coming from *treated soil* (3.545) and displaced and/or modified by human activity

3.547
treatment line
sequence of treatment processes applied to a *soil* (3.448), soil-like material, or water to separate out size or other fractions, remove, destroy, or immobilise *contaminants* (3.91)

3.548
treatment system
combination of treatment processes applied in sequence or parallel applied to a *soil* (3.448), soil-like material or water to separate out size or other fractions, remove, destroy or immobilise *contaminants* (3.91)

3.549
trend
drift
systematic spatial variation of the local mean of a variable, expressed as a polynomial function of location coordinates