A DICTIONARY OF ENVIRONMENTAL FORENSICS

STANDARD TERMINOLOGY
USED IN ENVIRONMENTAL FORENSICS
WITH SPECIAL EMPHASIS ON U. S. REGULATIONS AND STANDARDS
Second Edition

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Contents

Preface

This dictionary was originally derived as a glossary for standards in environmental-forensic investigations to be prepared by the American Society of Testing and Materials (ASTM). The preparation of these standards is underway and should be completed soon. As you will see, the format included herein is very similar to the format used by ASTM.

Environmental forensics is a cross roads between many different fields, including environmental science, geology, geography, hydrology, chemistry, physics, biology, mathematics, statistics and many more. A forensic scientist will need to be familiar with many of these fields and, accordingly, we have tried to include terms from each of these different facets. You will also notice many words dealing with the legal system. Any forensic scientist, who may be called upon to testify in a court of law, should be familiar with many of the terms used by attorneys and judges.

We have also tried to include terms from several new and upcoming forensic methods, such as dendroecology and isotope chemistry. As usual with any forensic tools, there is quite a dependence on petroleum hydrocarbons and we have tried to include many of the terms associated with refining and petroleum characteristics.

This dictionary was prepared with the standards and regulations of the United States in mind. Accordingly, the terms dealing with the legal system and regulatory agencies would be applicable to the USA only (although similarities may exist between the USA and many other countries). However, the technical terms, such as the chemical or geological terms, should be applicable worldwide.

Both English (imperial) units and the corresponding metric units are used throughout the dictionary. Considering that the English system is now only used in three countries (the USA, Liberia and Myanmar), we are hoping for the day when only metric units will be needed.

GO
2010

English and Metric Conversion Factors

To convert from English to Metric	Multiply by	Divide by	To convert from Metric to English
Length			
Inches	25.4	0.0393701	millimeters
Feet	0.3048	3.28084	meters
Yards	0.9144	1.09361	meters
Furlongs	0.201168	4.97097	kilometers
Miles	1.609344	0.621371	kilometers
Area			
Square inches	6.4516	0.155	square centimeters
Square feet	0.092903	10.7639	square meters
Square yards	0.836127	1.19599	square meters
Square miles	2.589988	0.386102	square kilometers
Acres	4046.856422	0.000247	square meters
Acres	0.404866	2.469955	hectares
Volume/Capacity			
Cubic inches	16.387064	0.061024	cubic centimeters
Cubic feet	0.028317	35.3147	cubic meters
Cubic yards	0.764555	1.30795	cubic meters
Cubic miles	4.1682	0.239912	cubic kilometers
Fluid ounces (US)	29.5735	0.033814	milliliters
Fluid ounces (imperial)	28.413063	0.035195	milliliters
Pints (US)	0.473176	2.113377	liters
Pints (imperial)	0.568261	1.759754	liters
Quarts (US)	0.946353	1.056688	liters
Quarts (imperial)	1.136523	0.879877	liters
Gallons (US)	3.785412	0.364172	liters
Gallons (imperial)	4.54609	0.219969	liters
Mass/Weight			
Ounces	28.349523	0.035274	grams
Pounds	0.453592	2.20462	kilograms
Tons (US)	907.18474	0.001102	kilograms
Tons (imperial)	1,016.046909	0.000984	kilograms
Tons (US)	0.907185	1.10231	metric tons
Tons (imperial)	1.016047	0.984207	metric tons
Speed			
Miles per hour	1.609344	0.621371	kilometers per hour
Feet per second	0.3048	3.28084	meters per second
Force			
Pound force	4.4822	0.224809	newton
Kilogram force	9.80655	0.101972	newton
Pressure			
Pound-force per square inch	6.89476	0.145038	kilopascals
Ton-force per square inch (imperial)	15.4443	0.064779	megapascals
Atmospheres	10.1325	0.098692	newtons per sq. cm

Units in the English (Imperial) System

Length

1 foot	= 12 inches
1 yard	= 3 feet
1 rod	= 5.5 yards = 16.5 feet
1 chain	= 4 rods = 22 yards
1 furlong	= 10 chains = 220 yards
1 mile	= 5,280 feet
1 mile	= 1,760 yards
1 mile	= 8 furlongs

Nautical

1 fathom	= 6 feet
1 cable length	= 120 fathoms
1 nautical mile	=6,076.11549 feet

Area

1 square foot	= 144 square inches
1 square yard	= 9 square feet
1 square rod	= 30.25 square yards
1 acre	= 4 roods
1 acre	= 4,840 square yards
1 square mile	= 640 acres

Volume

1 cubic foot	=1,728 square inches
1 cubic yard	= 27 cubic feet
1 bulk barrel	= 5.8 cubic feet

Shipping

1 register ton	= 100 cubic feet

Capacity

1 fluid ounce	= 8 fluid drams
1 gill	= 5 fluid ounces
1 pint	= 4 gills
1 quart	= 2 pints
1 gallon	= 4 quarts
1 peck	= 2 gallons
1 bushel	= 4 pecks
1 quarter	= 8 bushels
1 bulk barrel	= 36 gallons

Weight (avoirdupois)

1 ounce	= 437.5 grains
1 ounce	= 16 drams
1 pound	= 16 ounces
1 stone	= 14 pounds
1 quarter	= 28 pounds
1 hundredweight	= 4 quarters
1 ton	= 20 hundredweight

SI Prefixes

Multiple	Prefix	Symbol	Example
1,000,000,000,000,000,000 (10^{18})	exa-	E	Eg (exagram)
1,000,000,000,000,000 (10^{15})	peta-	P	PJ (petajoule)
1,000,000,000,000 (10^{12})	tera-	T	TV (teravolt)
1,000,000,000 (10^{9})	giga	G	GW(gigawatt)
1,000,000 (10^{6})	mega-	M	MHz (megahertz)
1,000 (10^{3})	kilo-	k	kg (kilogram)
100 (10^{2})	hecto-	h	hm (hectometer)
10 (10^{1})	deka	da	daN (dekanewton)
1/10 (10^{-1})	deci-	d	dC (decicoulomb)
1/100 (10^{-2})	centi-	c	cm (centimeter)
1/1,000 (10^{-3})	milli-	m	mm (millimeter)
1/1,000,000 (10^{-6})	micro	µ	µm (micrometer)
1/1,000,000,000 (10^{-9})	nano-	n	nm (nanometer)
1/1,000,000,000,000 (10^{-12})	pico-	p	ps (picosecond)
1/1,000,000,000,000 (10^{-15})	femto-	f	frad (femtoradian)
1/1,000,000,000,000,000 (10^{-18})	atto-	a	aT (attotesla)

Source: Rennie J., 1999, Scientific American Science Desk Reference: John Wiley & Sons, New York, NY.

Units in the Metric System

Length

1 centimeter	= 10 millimeters	
1 decimeter	= 10 centimeters	= 100 millimeters
1 meter	= 10 decimeters	= 1,000 millimeters
1 dekameter	= 10 meters	
1 hectometer	= 10 dekameters	= 100 meters
1 kilometer	= 10 hectometers	= 1,000 meters

Area

1 square centimeter	= 100 square millimeters	
1 square meter	= 10,000 square centimeters	= 1,000,000 square millimeters
1 are	= 100 square meters	

Mass

1 hectare	= 100 ares	= 10,000 square meters
1 square kilometer	= 100 hectares	= 1,000,000 square meters
1 centigram	= 10 milligrams	
1 decigram	= 10 centigrams	= 100 milligrams
1 gram	= 10 decigrams	= 1,000 milligrams
1 dekagram	= 10 grams	
1 hectogram	= 10 dekagrams	= 100 grams
1 kilogram	= 10 hectograms	= 1,000 grams
1 metric ton	= 1,000 kilograms	

Volume

1 cubic centimeter	= 1,000 cubic milliliters	
1 cubic decimeter	= 1,000 cubic centimeters	= 1,000,000 cubic milliliters
1 cubic meter	= 1,000 cubic decimeters	= 1,000,000,000 cubic milliliters

Capacity

1 centiliter	= 10 milliliters	
1 deciliter	= 10 centiliters	= 100 milliliters
1 liter	= 10 deciliters	= 1,000 millilters
1 decaliter	= 10 liters	
1 hectoliter	= 10 decaliters	= 100 liters
1 kiloliter	= 10 hectoliters	= 1,000 liters

THE ELEMENTS

Element	Symbol	Atomic Number	Element	Symbol	Atomic Number
Actinium	Ac	89	Manganese	Mn	25
Aluminium	Al	13	Meitnerium*	Mt	109
Americium	Am	95	Mendelevium	Md	101
Antimony	Sb	51	Mercury	Hg	80
Argon	Ar	18	Molybdenum	Mo	42
Aresnic	As	33	Neodymium	Nd	60
Astatine	At	85	Neon	Ne	10
Barium	Ba	56	Neptunium	Np	93
Berkelium	Bk	97	Nickel	Ni	28
Beryllium	Be	4	Niobium	Nb	41
Bismuth	Bi	83	Nitrogen	N	7
Bohrium*	Ns	107	Nobelium	No	102
Boron	B	5	Osmium	Os	76
Bromine	Br	35	Oxygen	O	8
Cadmium	Cd	48	Palladium	Pd	46
Calcium	Ca	20	Phosphorous	P	15
Californium	Cf	98	Platinum	Pt	78
Carbon	C	6	Plutonium	Pu	94
Cerium	Ce	58	Polonium	Po	84
Cesium	Cs	55	Potassium	K	19
Chlorine	Cl	17	Praesodymium	Pr	59
Chromium	Cr	24	Promethium	Pm	61
Cobalt	Co	27	Protactinium	Pa	91
Copper	Cu	29	Radium	Ra	88
Curium	Cm	96	Radon	Rn	86
Dubnium*	Db	105	Rhenium	Re	75
Dysprosium	Dy	66	Rhodium	Rh	45
Einsteinium	Es	99	Rubidium	Rb	37
Erbium	Er	68	Ruthenium	Ru	44
Europium	Eu	63	Rutherfordium*	Rf	104
Fermium	Fm	100	Samarium	Sm	62
Fluorine	F	9	Scandium	Sc	21
Francium	Fr	87	Seaborgium*	Sg	106
Gadolinium	Gd	64	Selenium	Se	34
Gallium	Ga	31	Silicon	Si	14
Germanium	Ge	32	Silver	Ag	47
Gold	Au	79	Sodium	Na	11
Hafnium	Hf	72	Strontium	Sr	38
Hassium*	Hs	108	Sulfur	S	16
Helium	He	2	Tantalum	Ta	73
Holmium	Ho	67	Technetium	Tc	43
Hydrogen	H	1	Tellurium	Te	52
Indium	In	49	Terbium	Tb	65
Iodine	I	53	Thallium	Tl	81
Iridium	Ir	77	Thorium	Th	90
Iron	Fe	26	Thulium	Tm	69
Krypton	Kr	36	Tin	Sn	50
Lanthanum	La	57	Titanium	Ti	22
Lawrencium	Lr	103	Tungsten	W	74
Lead	Pb	82	Uranium	U	92
Lithium	Li	3	Vanadium	V	23
Lutetium	Lu	71	Xenon	Xe	54
Magnesium	Mg	12	Ytterbium	Y	70
Yttrium	Y	39	Zinc	Zn	30
Zirconium	Zr	40			

* Names formed systemically based on atomic numbers are preferred by the International Union of Pure and Applied Chemistry for numbers from 104 onward. These names are formed on the numerical roots nil (=0), un (=1), bi (=2), etc. (such as unnilquadium = 104, unnilpentium = 105, etc.)

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aa, *n* – [GEOLOGY] a Hawaiian term for LAVA flows typified by a rough, jagged, spinose surface[4]. *Also see lava, pahoehoe and volcano.*

aapamoor, *n* – [GEOGRAPHY] a MOOR with elevated areas or mounds supporting dwarf shrubs and sphagnum, interspersed with low areas containing SEDGES and sphagnum, thus forming a mosaic[7]. *Also see moor and moorland.*

abandoned channel – *See oxbow.*

abandoned water right, *n* — [LAW] a water right which has not been put to beneficial use for generally five or more years, in which the owner of the water right states that the water right will not be used, or takes such actions that would prevent the water from being beneficially used. *Also see forfeited water right*.

abandoned well, *n* – [HYDROGEOLOGY] a WELL which is no longer used or a well removed from service; a well whose use has been permanently discontinued or which is in a state of such disrepair that it cannot be used for its intended purpose. Generally, abandoned wells will be filled with CONCRETE or CEMENT GROUT to protect underground water from WASTE and CONTAMINATION. Wells, especially former oil wells, can be sources of CROSS-CONTAMINATION between aquifers and zones of oil or brine accumulation. *Also see cross-contamination.*

abandonment – *See decommissioning.*

abatement, *n* — [REMEDIATION TECHNOLOGY] *1*. making or lessening of something strong or severe[5]. *2*. reducing the degree or intensity of, or eliminating, POLLUTION, as a water pollution abatement program.

abîme, *n* – *from French,* [GEOLOGY] *1*. a vertical shaft in KARST TERRAIN. A deep shaft through the LIMESTONE is of such magnitude that it is often referred to as 'bottomless', but in reality it opens into a network of subterranean passages at depth[6]. *Also see gouffre, pot-hole and swallowhole.*

abiocen, *n* – [ECOLOGY] a non-biotic habitat[7]. *Also see abiotic.*

abiogenic—*See abiotic.*

abiotic, *adj* – [BIOLOGY] non-BIOLOGICAL.

abiotic transformation, *n* [BIOLOGY] process in which a substance in the environment is modified by non-biological mechanisms[62].

ablation, *n* – [GEOMORPHOLOGY] the wasting and removal from a rock mass of material by physical processes such as wind erosion or by chemical processes, including dissolution of cementing agents followed by failure of rock material at the chemically altered surface[68].

ablation, *n* – [GLACIOLOGY] the removal of snow and ice from any mass of frozen water through processes of melting, sublimation and evaporation, wind erosion, and calving (such as failure at the snout of a glacier)[68].

ablation till, *n* – [GEOLOGY] TILL deposited from drift in transport upon or within the terminal area of a shrinking GLACIER. As the ice melts inward from terminus, top and base, this drift slides, flows or is dumped, or subsides onto the ground. It is therefore loose, noncompact and nonfissile and its clasts are less strongly abraded than those in LODGMENT TILL[8]. *Also see ground moraine, lateral moraine, recessional moraine and terminal moraine.*

about, *adj* – [LANGUAGE] approximately, somewhere near, not far[15]. *Also see approximately.*

aboveground tank, *n* – [INDUSTRIAL TECHNOLOGY] a TANK situated so that the entire surface area, including the bottom surface, is completely above the plane of the adjacent surface and the entire surface area of the tank can be visually inspected[9]. Many old tanks were built without a bottom surface with the product resting directly on the ground surface or on wooden planks. *Also see tank and underground tank.*

abrade, *v* – [PHYSICS] to wear away by ABRASION or FRICTION[54].

abrasion, *n* – [GEOLOGY] EROSION of ROCK and other materials, such as an UNDERGROUND STORAGE TANK, by friction of solid particles, such as SAND and GRAVEL, moved by GRAVITY, WATER, ICE or WIND[10]. *Also see erosion*.

abscissa, *n* – [MATHEMATICS] the COORDINATE representing the position of a point along a line PERPENDICULAR to the y-AXIS (ORDINATE) in a plane

CARTESIAN COORDINATE SYSTEM[11]. *Also see ordinate.*

abrupt growth change, *n* – [DENDROLOGY] a visually conspicuous reduction of growth within an individual tree-ring sequence[12].

absolute age, *n* – [AGE DATING] the approximate AGE of a geologic event, feature, fossil, or rock in years. 'Absolute' ages are determined by using natural radioactive 'clocks'[4]. The preferred term is radiometric age. *Also see dating.*

absolute chronology, *n* – [AGE DATING] a CHRONOLOGY dated to a calendar date[12].

absolute drought, *n* – [HYDROLOGY] a period of at least fifteen consecutive days on each of which less than 0.25 millimeters (0.01 inch) of rainfall is recorded (British definition). Also known as a dryspell in the USA referring to fourteen consecutive days without measurable rainfall[6].

absolute error, *n* **–** [STATISTICS] difference between the true VALUE of a PARAMETER and the computed or MEASURED VALUE. *Also see accuracy, error, mistake and precision.*

absolute humidity, *n* – [METEOROLOGY] the content of water vapor in air, expressed as the mass of water per unit volume of the humid air[16].

absolute permeability, *n* – [HYDROGEOLOGY] the ability of a ROCK to conduct a fluid, such as gas, at 100% saturation with that fluid[16]. *Also see effective permeability, intrinsic permeability and relative permeability.*

absolute value , *n* – [MATHEMATICS] the positive VALUE for a REAL NUMBER, disregarding the sign. Written |x|. For example, |3|=3, |-4|=4, and |0|=0. *Also see real number.*

absolute viscosity–-*See viscosity coefficient*.

absolute zero, *n* – [PHYSICS] the theoretical temperature at which ENTROPY would reach its minimum value. The LAWS OF THERMODYNAMICS state that absolute zero cannot be reached because this would require a thermodynamic system to be fully removed from the rest of the universe. Absolute zero is defined as 0°K on the Kelvin scale and as −273.15°C on the Celsius scale. This equates to −459.67°F on the Fahrenheit scale.

absorbed water, *n* — [HYDROGEOLOGY] WATER held mechanically in a SOIL or ROCK mass and having PHYSICAL PROPERTIES not substantially different from ordinary water at the same TEMPERATURE and PRESSURE[13]. *Also see absorption, adsorbed water, adsorption, field capacity, residual saturation, specific capacity and specific retention.*

absorption, *n* **–** [HYDROGEOLOGY] assimilation of FLUIDS into INTERSTICES. The PROCESS by which IONS or MOLECULES present in one PHASE tend to penetrate into and concentrate in the interior of a SOLID or a LIQUID[13]. *Also see adsorption.*

absorption loss, *n* — [HYDROGEOLOGY] the loss of water by INFILTRATION or SEEPAGE into the soil during the process of priming, such as during the initial irrigation of a field; generally expressed as flow volume per unit of time[13].

abstract, *adj* – [LOGIC] having only INTRINSIC form with little or no attempt at pictorial representation or narrative content[5].

abstraction, *n* – [HYDROGEOLOGY] *1*. the draining of water from a STREAM by another having more rapid corroding action. *2*. the part of precipitation that does not become direct runoff[54]. *3*. the removal of water from a well.

abundance, *n* – [GEOCHEMISTRY] the relative amount of a given ELEMENT among other elements[54].

abutment, *n* – [CONSTRUCTION TECHNOLOGY] the part of a structure (as an arch or a bridge) that directly receives pressure or thrust[17].

abyssal, *adj* – [OCEANOGRAPHY] OCEANIC depths in the range of 3,500 to 6,000 meters. *Also see abyssal deposit*.

abyssal deposit, *n* – [OCEANOGRAPHY] *1*. a deposit of the deep sea, accumulating in depths of more than 4,000 meters or 1,500 fathoms (9,000 ft or 2.7 km) of water; these deposits comprise the organic oozes, various muds, and red clay of the deepest regions[4]. *2*. pertaining to an igneous intrusion that occurs at considerable depth in the crust or to the resulting rock[4]. *Also see plutonic.*

abyssal hill, *n* – [OCEANOGRAPHY] a relatively small topographic feature of the deep ocean floor, ranging to several meters in height and several kilometers in diameter[4].

abyssal plain, *n* – [OCEANOGRAPHY] an area of the ocean floor with a slope of less than 1 in 1,000 or flat, nearly level areas that occupy the deepest portions of many ocean basins[4].

abyssinian well, *n* – [HYDROGEOLOGY] WELL that is constructed by driving a CASING into the GROUND. *Also see dug well.*

acaricide, *n* – [CHEMISTRY] a class of PESTICIDE used to kill mites and ticks[14]. *Also known as miticide*.

accelerated depreciation, *n* -- [ENVIRONMENTAL POLLUTION] in pollution abatement, an arrangement whereby, as an incentive to industry to install pollution abatement equipment, a company is allowed to deduct from its taxable income, the entire cost of such equipment over a shorter period of time (perhaps only one to three years) than in cases of other types of capital investment[63].

accelerated erosion, *n* – [AGRONOMY] soil erosion that occurs more rapidly than soil horizons can form from the parent regolith[7]. *Also see erosion.*

accelerated erosion, *n* – [GEOMORPHOLOGY] erosion that occurs at a more rapid rate than is typical for a specified site or area. The term generally refers to human-induced land-surface disturbance, especially disruption of soil structure and destruction of natural soil cover by rock fragments and vegetation, that reduces the ability of soil to resist the erosive effects of raindrop impact, OVERLAND FLOW, concentrated flow in rills and gullies, and wind velocities great enough to detach and entrain soil particles. Most accelerated erosion is the result of human activity (agricultural, grazing, logging, surface mining, urban construction), but it also occurs naturally when a geomorphic threshold is exceeded by processes such as slope failure, avulsion, the effects of high-magnitude floods, fire, avalanche, or plant disease[68].

accelerated site characterization (ACS), *n* – [ENVIRONMENTAL INVESTIGATION] a process for collecting and evaluating information pertaining to site geology/hydrogeology, nature and distribution of the chemical(s) of concern, source areas, potential exposure pathways and points of exposure in one mobilization. The ASC employs rapid sampling techniques, on-site chemical analysis and hydrogeological evaluation, and field decision making to provide a comprehensive "snap-shot" of subsurface conditions.

access agreement, *n* – [LAW] a signed AGREEMENT between a property OWNER and a contractor or other entity that allows them access to the property to conduct environmental investigations or cleanups.

acceleration, *n* – [PHYSICS] the process or act of moving faster or gain speed[17].

acceleration due to gravity, *n* – [PHYSICS] the acceleration of a body falling freely in a vacuum due to gravitational attraction of the earth. The International Committee on Weights and Measures has adopted as a standard or accepted value of 980.665 centimeters per square second, but its true value varies with latitude, altitude and the nature of the underlying rocks[4]. *Also see gravitational constant, gravity and physics.*

accessory mineral, *n* – [MINERALOGY] MINERAL constituents of a ROCK occurring in very small amounts[4]. *Also see mineral.*

accident, *n* – [LAW] the happening of an EVENT without the concurrence of the will of the person by whose agency it was caused or the happening of an event without any human agency; the burning of a house in consequence of a fire being made for the ordinary purpose of warming the house which is an accident of the first kind; the burning of the same house by lightning would have been an accident of the second kind[15]. *Also see mistake.*

accident, *n* – [HYDROLOGY] an interruption in a RIVER that interferes with, or sometimes stops, the normal development of the river system[54].

accidented relief, *n* – [GEOLOGY] a descriptive term for an irregular or highly dissected TERRAIN. It may have been derived from a French phrase, *relief accidenté*, meaning broken ground[6].

acclimatization, *n* — [BIOLOGY] the physiological adjustment or adaptation by an ORGANISM to new PHYSICAL and/or ENVIRONMENTAL conditions. With respect to WATER, it is frequently used in reference to the ability of a species to tolerate changes in water TEMPERATURE, DEGRADATION of water quality, or increased levels of SALINITY[7].

accreditation, *n* – [LAW] the recognition of a certification program as conforming to certain standards that qualify individuals receiving the certification for practice in a specific area. Accreditation applies to institutions and programs, not individuals[15].

accretion, *n* – [GEOLOGY] the accumulation of MINERAL material in a particular locality or environment[6].

accuracy, *n* — [STATISTICS] a MEASURE of the degree of conformity of a value generated by a specific PROCEDURE to the assumed or accepted true VALUE, and includes both PRECISION and BIAS[5]. *Also see bias, error and precision.*

acequia, *n* – [HYDROLOGY] *1*. an irrigation CANAL; an irrigation DITCH or CHANNEL, a term commonly used in northern New Mexico. *2*. a Spanish word used in the Southwestern United States in referring to a community IRRIGATION ditch or canal. *3*. community-run irrigation ditches and/or the community-run organizations that manage them. These systems of water management are rooted in ancient Spanish custom and many still operate in northern New Mexico[16].

acetate, *n* – [CHEMISTRY] an ESTER or SALT of ACETIC ACID in which a terminal HYDROGEN atom of the acid is replaced by either a HYDROCARBON or other RADICAL or METAL[17].

acetic acid, *n* – [CHEMISTRY] a carbonyl compound that is emitted into the troposphere by both natural and ANTHROPOGENIC processes. In the troposphere, acetic acid is present in the gas phase and is highly water soluble. Since acetic acid is highly water soluble, it is found in high concentration as acidic precipitation, such as in fog water and cloud droplets

in urban areas[17].

acetone, *n* – [CHEMISTRY] ORGANIC CHEMICAL with the FORMULA, CH_3COCH_3, often used in LABORATORIES for cleaning equipment and often found as an ARTIFACT in the laboratory results of environmental samples[17]. *Also known as methyl methyl ketone or propanone. Also see methylene chloride and ketone.*

acetylene—*See alkyne.*

acid, *n* – [CHEMISTRY] a corrosive SOLUTION with a pH of less than 7[17]. *Also see base, caustic and pH.*

acid aerosol, *n* — [CHEMISTRY] airborne particles composed of sulfates (SO_x), sulfuric acid (H_2SO_4), nitrates (NO_x), and/or nitric acid (HNO_3). Dry particle diameters are typically less than 1 to 2 microns. *Also see acid deposition and acid fog.*

acid clay, *n* – [AGRONOMY] a type of CLAY that gives off HYDROGEN IONS when it dissolves in water[7].

acid deposition, *n* — [CHEMISTRY] the introduction of acidic material to the ground or to surface waters. Involves a complex chemical and atmospheric phenomenon that occurs when emissions of sulfur and nitrogen compounds and other substances are transformed by chemical processes in the atmosphere, often far from the original sources, and then become deposited on the land or surface waters in either wet or dry forms. Wet deposition (commonly referred to as ACID PRECIPITATION, ACID RAIN or ACID FOG) results from precipitation as rain, snow, or fog. Dry deposition results from particle fallout or acidic gases[7]. *Also see acid fog, acid precipitation and acid rain.*

acid extractable compounds (AE), *n* – [CHEMISTRY] semi-volatile COMPOUNDS amenable to ANALYSIS by extraction of the SAMPLE with an acidic organic solvent[18]. *Also see base/neutral extractable compound.*

acid fog, *n* — [CHEMISTRY] airborne water droplets containing sulfuric acid and/or nitric acid. Typical diameters are 3–30 microns. *Also see acid deposition and acid aerosol.*

acid-forming materials, *n* – [GEOCHEMISTRY] earth materials that contain sulfide MINERALS or other materials, which, if exposed to air, water, or WEATHERING PROCESSES, will produce ACIDS that may result in acid drainage. *Also see acid-mine drainage.*

acid gas, *n* – [PETROLEUM TECHNOLOGY] NATURAL GAS or any other gas mixture which contains significant amounts of hydrogen sulfide (H_2S), carbon dioxide (CO_2), or similar contaminants. *Also see sour gas.*

acidic cations, *n* – [CHEMISTRY] CATIONS, that on being added to water, undergo HYDROLYSIS resulting in an acidic solution. Hydrated acidic cations donate protons to water to form hydronium ions (H_3O^+)[20].

acid igneous rock, *n* – [GEOLOGY] a melt-derived ROCK with a COMPOSITION of greater than 65% SILICA.

acidity, *n* — [CHEMISTRY] the QUANTITATIVE capacity of AQUEOUS MEDIA to react with HYDROXYL IONS[17]. *Also see alkalinity, base and pH.*

acidity coefficient, *n* – [CHEMISTRY] the ratio of the oxygen content of the bases in a rock to the oxygen content in the silica. Also known as the oxygen ratio[7].

acidity, residual, *n* – [AGRONOMY] soil acidity that is neutralized by lime or a buffered salt solution to raise the pH to a specified value (usually 7.0 or 8.0) but which cannot be replaced by an unbuffered solution[20].

acidity, total, *n* – [CHEMISTRY] the total acidity including residual and exchangeable acidity[20].

acid lava, *n* – [GEOLOGY] LAVA rich in SILICA which has a high MELTING POINT (~850°C). Thus, it cools very quickly on exposure to the air and flows slowly in a stiff or viscous stream only short distances from the volcanic vent[6].

acid mine drainage, *n* – [HYDROGEOLOGY] DRAINAGE of water from areas that have been mined for COAL or other mineral ores. The water has a low *pH* because of its contact with sulfur-bearing material and is harmful to aquatic ORGANISMS[4]. *Also see mine, pH, pyrite and yellow-boy.*

acid mine water, *n* – [HYDROGEOLOGY] mine water that contains free sulfuric acid, mainly due to the weathering of iron pyrites. A pit water, which corrodes iron pipes and pumps, usually contains a high proportion of solids per gallon, principally the sulfates of iron, chiefly ferrous and alumina[4]. *Also see acidity and acid mine drainage.*

acidophile, *n* – [BIOLOGY] an ORGANISM that grows best under acid conditions (as low as pH=1)[34]. *Also see microbe and organism.*

acid pickle, *n* – [CHEMISTRY] industrial WASTE WATER that is the spent LIQUOR from a chemical process to clean metal surfaces[7]. *Also see liquor.*

acid rain—*See acid deposition.*

acid-sulfate soils, *n* – [AGRONOMY] SOILS which originally contained elevated CONCENTRATIONS of PYRITE (Fe_2S), at least some of which has since been oxidized to form strongly ACIDIC SULFATE SALTS of IRON[61].

acre, *n* – [GEOGRAPHY] a measure of land in the English System equaling 4,840 square yards, 0.405 hectare and 43,560 square feet[15]. *Also see hectare.*

acre-foot, *n* – [HYDROLOGY] unit of measurement for large quantities of water, such as a reservoir, equal to its area in acres multiplied by the depth in feet. One acre-foot equals 1,233.5 cubic meters or 43,560 cubic

feet or the amount of water covering one acre to a depth of one foot[16]. *Also see acre, acre-inch and acre-yield.*

acre-inch, *n* – [HYDROLOGY] the volume of water required to cover one acre to a depth of one inch[16]. *Also see acre, acre-foot and acre-yield.*

acre-yield, *n* – [PETROLEUM TECHNOLOGY] the average amount of oil, gas, or water recovered from one acre of reservoir[16].

acrisol, *n* – [AGRONOMY] clay-rich SOIL associated with humid, tropical climates.

actinide, *n* – [CHEMISTRY] a group of CHEMICAL ELEMENTS with an atomic number greater than 88, all of which are RADIOACTIVE and have similar chemical properties (multiple valence states range from +1 to +7)[2].

action levels, *n* – [ENVIRONMENTAL REGULATION] *1*. in the United States, REGULATORY levels recommended by the Environmental Protection Agency (EPA) for enforcement by the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) when pesticide RESIDUES occur in food or feed commodities for reasons other than the direct application of the PESTICIDE. As opposed to "tolerances" which are established for residues occurring as a direct result of proper usage, action levels are set for inadvertent residues resulting from previous legal use or accidental contamination[9]. *2*. in the SUPERFUND program or other ENVIRONMENTAL ENFORCEMENT programs, the existence of a CONTAMINANT CONCENTRATION in the environment high enough to warrant action or trigger a RESPONSE under the Superfund Amendments and Reauthorization Act of 1986 (SARA), the National Oil and Hazardous Substances Contingency Plan or other state environmental enforcement programs. *Also see drinking-water standard and maximum contaminant level.*

activated carbon, *n* – [TREATMENT TECHNOLOGY] porous form of CARBON made by destructively distilling carbon-rich materials to eliminate VOLATILE components followed by high-temperature TREATMENT with steam or carbon dioxide[11].

activated sludge, *n* – [TREATMENT TECHNOLOGY] the FLOC produced in raw or settled WASTEWATER due to the growth of BACTERIA and other ORGANISMS in the presence of DISSOLVED OXYGEN. It is the product that results when primary EFFLUENT is mixed with bacteria-laden SLUDGE and then agitated and aerated to promote BIOLOGICAL TREATMENT, speeding the breakdown of ORGANIC MATTER in raw SEWAGE undergoing secondary waste TREATMENT[11]. *Also see flocculation, sludge and treatment.*

activation energy, *n* – [CHEMISTRY] a term used in KINETICS to describe the ENERGY necessary for chemical transformations to take place, usually expressed in kilocalories per mole (kcal/mol)[17].

active fault, *n* – [GEOLOGY] a FAULT that has had a surface rupture within Holocene time or within the last 11,000 years[4].

active judge, *n* – [LAW] a judge in the full-time service of the court[19]. *Also see senior judge.*

active layer, *n* – [GEOLOGY] the top layer of ground above the PERMAFROST table that thaws each summer and refreezes each winter[6]. *Also see permafrost.*

active remediation, *n* – [ENVIRONMENTAL REMEDIATION] actions taken to reduce the concentrations of chemical(s) of concern. Active remediation could be implemented when the no-further-action and passive remediation courses of action are not appropriate.

active sampling, *n* – [ENVIRONMENTAL INVESTIGATION] a SAMPLING PROCEDURE where some type of stress, such as PUMPING, is placed on the MEDIUM. *Also see pumping test, slug test and step-drawdown test.*

active source rock, *n* – [GEOLOGY] a source rock that is currently generating PETROLEUM due to thermal maturation or microbial activity (such as METHANOGENESIS)[34]. *Also see crude oil.*

active volcano, *n* – [GEOLOGY] a VOLCANO that is erupting or is expected to erupt. There is no precise distinction between an active and a dormant volcano[4]. *See dormant volcano and volcano.*

activity, *n* – [CHEMISTRY] *1*. the rate of RADIOACTIVE DECAY. It is commonly expressed in a unit of MEASURE known as a CURIE. One curie equals 3.7 x 10^{10} atomic DISINTEGRATIONS per second. Activity in WATER is expressed in PICOCURIES per liter (pCi/l), where 1 pCi/l is equal to 2.2 radioactive disintegrations per minute per liter of WATER. *2*. an effective CONCENTRATION used in THERMODYNAMIC calculations in place of the actual concentration to allow EQUATIONS developed for ideal solutions to be used to treat real solutions[17]. *Also see concentration, fugacity molality and molarity.*

activity ratio, *n* – [CHEMISTRY] an EMPIRICAL relationship to measure the ability of a soil to take up moisture. It is defined by the plasticity index divided by the percentage weight less than 2 micrometers (μm) in size[6].

act of god, *n* – [LAW] occasioned exclusively by forces of NATURE without interference of any HUMAN agency. A misadventure or casualty is said be caused by the "act of god" when it happens by the direct and exclusive operation of the forces of nature, uncontrolled and uninfluenced by the power of man,

and without human intervention, and is such a character that it could not have been prevented or escaped from by any amount of foresight or prudence, or by any degree of care or diligence, or by aid of any appliances which the situation of the party mightly reasonably require them to do. Any accident produced by any physical cause which is irresistible, such as lightning, tempests, perils of the sea, tornadoes or earthquakes, among many others[19]. *Also see god.*

actual cash value, *n* – [INSURANCE] the fair or reasonable cash price for which the property could be sold in the market in the ordinary course of business, and not at forced sale[19]. *Also known as fair market value*. *See also market value*.

actual cost, *n* – [INSURANCE] the actual price paid for goods by a party, in the case of a real bona fide purchase, which may not necessarily be the market value of the goods. It is a general or descriptive term which may have varying meanings according to the circumstances in which it is used[19].

actual damages, *n* -- [LAW] compensation for actual injuries. Term used to denote the type of damage award as well as the nature of injury for which recovery is allowed; Real DAMAGES to compensate for loss or injuries that have actually occurred. This is in contrast to "nominal" damages (a small amount paid where there is no real loss) or "punitive" damages (intended to punish the party who must pay damages)[19].

actual evapotranspiration, *n* – [HYDROLOGY] that portion of the POTENTIAL EVAPOTRANSPIRATION which actually occurs over a specified period of time, given the limited rate of supply of moisture to the soil surface and/or to transpiring plants. Under most circumstances, actual evapotranspiration is only a small fraction of the potential evapotranspiration[61]. *Also see evaporation, evapotranspiration and potential evapotranspiration.*

actuary, *n* – [INSURANCE] an INSURANCE professional skilled in the ANALYSIS, EVALUATION, and management of STATISTICAL INFORMATION. Evaluates insurance firms' RESERVES, determines rates and rating METHODS, and determines other business and financial RISKS. *Also see insurance and insurance carrier*[15].

acute, *adj* – [TOXICOLOGY] of short duration and/or rapid onset; develops during or shortly after a brief EXPOSURE to a TOXIC substance. A disease which rapidly develops into a crisis[11]. *Also see chronic and exposure.*

acute effect, *n* – [TOXICOLOGY] an adverse EFFECT on any living ORGANISM which results in severe symptoms that develop rapidly; symptoms often subside after the EXPOSURE stops.

acute exposure, *n* – [TOXICOLOGY] a single exposure to a TOXIC SUBSTANCE which may result in severe biological harm or death. Acute exposures are usually characterized as lasting no longer than a day, as compared to longer, continuing exposure over a period of TIME.

acute toxicity, *n* – [TOXICITY] the ability of a SUBSTANCE to cause severe BIOLOGICAL harm or death soon after a single EXPOSURE or DOSE. Also, any POISONOUS effect resulting from a single short-term exposure to a TOXIC substance.

acyclic, *adj* – [CHEMISTRY] straight or chained carbon-carbon linkage in a compound without cyclic structures[34].

adamantane-–*See diamonoid.*

additive, *n* – [CHEMISTRY] a SUBSTANCE added to another substance or material to improve its QUALITIES in some way[15]. Additives are often present in small amounts and are used for a variety of purposes, as in preventing *corrosion*, increasing the *octane rating* of gasoline or preventing knocking in engines. *See anti-icing additive, anti-knock additive and oxygenate.*

adenosine triphosphate (ATP), *n* – [CHEMISTRY] an organic, phosphate-rich compound important in the transfer of energy in organisms. Its central role in living cells makes ATP an excellent indicator of the presence of living material in water. A measurement of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter[47].

adhesion, *n* — [AGRONOMY] shearing resistance between SOIL PARTICLES or contiguous surfaces and a second material under zero, externally applied PRESSURE[4]. *Also see cohesion.*

adhesive forces, *n* – [HYDOLOGY] intermolecular forces between MOLECULES in a separate-fluid phase which are manifested as the tendency for the fluids to cling together. *Also see cohesive forces.*

adhesive water—*See pellicular water.*

adiabatic, *adj* – [CHEMISTRY] applies to a THERMODYNAMIC PROCESS during which no HEAT is added to or withdrawn from the body or SYSTEM concerned. In the ATMOSPHERE, adiabatic changes of TEMPERATURE occur only in consequence of COMPRESSION or EXPANSION accompanying an increase or decrease of atmospheric PRESSURE. Thus, a descending body of AIR undergoes compression and adiabatic cooling[4]. *Also see compression.*

adit, *n* – [GEOLOGY] a horizontal or nearly horizontal passage driven from the surface for the working or dewatering of a MINE. If driven through the hill or

mountain to the surface on the opposite side, it would be a tunnel[4]. *Also known as a drift or adit level.*

adjudication, *n* – [LAW] the legal process of resolving a dispute; the giving or pronouncing a judgment in a cause; a JUDGMENT[19]. *Also see decision and judgment.*

adjusted discharge, *n* -- [HYDROLOGY] discharge data that have been mathematically adjusted (for example, to remove the effects of a daily tide cycle or reservoir storage)[47].

adjusted stream, *n* – [HYDROLOGY] STREAM flowing essentially parallel to the STRIKE of underlying BEDS[4].

adjuster, *n* – [INSURANCE] an individual employed by a property/casualty INSURER to evaluate LOSSES and settle POLICYHOLDER CLAIMS. These adjusters differ from public adjusters, who negotiate with insurers on behalf of policyholders, and receive a portion of a claims settlement. Independent adjusters are independent contractors who adjust claims for different insurance companies[19]. *Also see insurance and insurance carrier.*

administrative law, *n* – [LAW] body of LAW governing administrative AGENCIES, that is, those agencies created by Congress or state legislatures, such as the Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA). The authority these agencies possess is delegated to them by the bodies which created them.

Administrative Order (AO), *n* – [ENVIRONMENTAL REGULATION] a LEGAL document signed by the Environmental Protection Agency (EPA), state, county, or other local regulatory agency directing an individual, BUSINESS, or other ENTITY to take CORRECTIVE ACTION or refrain from an activity. It describes the VIOLATIONS and actions to be taken, and can be enforced in COURT. Such ORDERS may be issued, for example, as a result of an administrative complaint whereby the respondent is ordered to pay a penalty for violations of a STATUTE.

Administrative Order On Consent, *n* – [ENVIRONMENTAL REGULATION] a LEGAL AGREEMENT signed by the Environmental Protection Agency (EPA), state, county or other local regulatory agency and an individual, BUSINESS, or other ENTITY through which the violator agrees to pay for correction of violations, take the required corrective or cleanup actions, or refrain from an activity. It describes the actions to be taken, may be subject to a comment period, applies to CIVIL ACTIONS, and can be enforced in COURT. In some states, such as New Jersey, it is called an Administrative Consent Order (ACO).

Administrative Procedures Act, *n* – [LAW] a LAW that spells out PROCEDURES and REQUIREMENTS related to the PROMULGATION of REGULATIONS.

admissible, *adj* – **[**LAW**]** a term used to describe EVIDENCE that may be considered by a JURY or JUDGE in CIVIL and CRIMINAL cases[19].

adobe, *n* – [GEOLOGY] a mixture of CLAY and SILT found in the DESERT of the southwest USA and Mexico. The material is used extensively for making sun-dried bricks[4].

adret, *n* – [GEOLOGY] the side of a HILL or VALLEY that receives the most sunlight (insolation). In the Northern Hemisphere they face south, whereas in the Southern hemisphere, they face north[6].

adsorbed water, *n*— [HYDROLOGY] water in a *soil* or *rock* mass attracted to the *particle surfaces* by physiochemical *forces*, having *properties* that may differ from those of pore water at the same *temperature* and *pressure* due to altered *molecular* arrangement; adsorbed water does not include *water* that is chemically combined within the *clay* minerals[6]. *Also see absorption, absorbed water, adsorption, attached water, field capacity, residual saturation and specific retention.*

adsorption, *n* **–** [HYDROLOGY] *1*. assimilation of GAS, VAPOR or dissolved matter by the SURFACE of a SOLID. *2*. an advanced method of treating waste in which activated carbon removes organic matter from waste water[16]. *Also see absorption, absorbed water, field capacity, partitioning coefficient, residual saturation and specific retention.*

adsorption chromatography, *n* – [CHEMISTRY] a type of LIQUID CHROMATOGRAPHY that relies on adsorption to separate compounds. Silica gel and alumina are the most commonly used supports. Molecules are retained by the interaction of their polar functional groups with the surface functional groups (such as silanols of silica)[34].

adulterant, *n* – [CHEMISTRY] CHEMICAL impurities or substances that by law do not belong in a food, such as a PESTICIDE[16].

adult wood, *n* – [DENDROLOGY] all of the XYLEM outside the core of JUVENILE WOOD, with the cells in general having reached their maximum dimensions and structural development[12].

advance-cut meander, *n* – [GEOLOGY] a MEANDER in which the outer bank of the channel is eroded so rapidly that deposition on the inner bank fails to keep pace, thereby widening the channel[16].

advanced regeneration, *n* – [DENDROLOGY] smaller older trees in the FOREST UNDERSTORY that grow rapidly when a neighbor dies and opens a gap in the CANOPY.

advanced wastewater treatment, *n* – [TREATMENT TECHNOLOGY] the final stage of wastewater treatment

to remove the remaining traces of such things as BIOCHEMICAL OXYGEN DEMAND, phosphate, odor and taste[16].

advection, *n* **–** [HYDROGEOLOGY] the process by which SOLUTES or heat are transported by the motion of a flowing FLUID such as GROUND WATER or GAS*;* the bulk mass of flowing ground water[16]. *Also see dispersion and diffusion.*

advection-dispersion equation, *n* – [HYDROGEOLOGY] the partial differential equation which describes solute transport as the sum of ADVECTION and DISPERSION processes[61].

adventitious stream, *n* – [HYDROLOGY] a STREAM resulting from accidential variations of conditions, generally in an area that is approaching topographic maturity[16].

aeolian deposits, *n* – [GEOLOGY] DEPOSITS relating to WIND action - EROSION or transportation by wind; also known as EOLIAN[4]. Named after the Greek god of the winds: *Aeolus*. *Also spelled eolian deposits.*

aeonian, *adj* – [GEOLOGY] lasting for an immeasurably or indefinitely long perod of time. *Also known as aeonic.*

aerated lagoon, *n* – [TREATMENT TECHNOLOGY] WASTEWATER ponds or basins in which mechanical or diffused air is used to supplement natural OXYGEN supply, thereby aiding in the TREATMENT process[16].

aerated pond—*See aerated lagoon.*

aeration, *n* – [TREATMENT TECHNOLOGY] *1*. a process that promotes biological degradation of organic matter in water. The process may be passive (as when waste is exposed to air), or active (as when a mixing or bubbling device introduces the air). *2*. the process by which air in the soil is replaced by air from the atmosphere. In well-aerated soil, the soil air is very similar to the composition of the above atmosphere. In poorly-aerated soils, the soil air contains a much higher content of CO_2 and a lower content of O_2 than the atmosphere above the soil[16].

aeration porosity, *n* – [HYDROLOGY] the volume of interstices that do not hold water at a specified low moisture tension[16].

aeration zone—*See unsaturated zone.*

aerial photograph, *n* – [GEOGRAPHY] a photograph of a portion of the earth's surface, often from an airplane or other aircraft. *Also see infra-red aerial photograph, ground truth and remote sensing.*

aerobe, *n* – [BIOLOGY] an ORGANISM that require molecular OXYGEN (terminal electron acceptor) to carry out respiratory processes[34]. *Also see aerobic bacteria.*

aerobic, *adj* **–** [BIOLOGY] using or consuming OXYGEN; the presence of oxygen; opposite of ANAEROBIC[16]. *Also see oxic.*

aerobic bacteria, *n* – [MICROBIOLOGY] BACTERIA that require free elemental OXYGEN for their growth[16].

aerobic biodegradation, *n* **–** [MICROBIOLOGY] BIOLOGICAL TREATMENT or naturally-induced process where MICROORGANISMS metabolize biodegradable organics in aqueous waste in an oxygen environment.

aerobic respiration, *n* – [BIOLOGY] process whereby MICROORGANISMS use OXYGEN as an ELECTRON ACCEPTOR to generate ENERGY.

aerology, *n* – [METEOROLOGY] the study of the AIR.

aerosol, *n* – [METEOROLOGY] *1*. a suspension of fine solid or liquid particles in gas, such as smoke, fog and mist. *2*. a substance, such as a pesticide or medicine, dispensed from a pressurized container.

affect, *v* – [SCIENTIFIC METHOD] produce an EFFECT on. Both affect and effect are verbs and nouns, but effect is common as a noun, usually meaning 'a result, consequence, impression, etc.' Affect means to 'to produce an effect upon', while effect means 'to bring about'[15]. *Also see effect*.

affidavit, *n* -- [LAW] a written or printed declaration or statement of FACTS, made voluntarily, and confirmed by the OATH or affirmation of the party making it, taken before a person having authority to administer such oath or affirmation[19]. *Also see interrogatory.*

affirmation, *n* – [LAW] the act or process of asserting strongly or stating as a FACT[19].

affirmed, *adj* – **[**LAW**]** in the practice of the court of appeals, it means that the court of appeals has concluded that the lower court decision is correct and will stand as rendered by the lower court[19].

affluent, *adj* – [HYDROLOGY] a STREAM flowing into a larger stream or lake, a TRIBUTARY. *Also see stream and tributary.*

afflux, *n* – [HYDROLOGY] the upstream rise of water level above the normal surface of the water in a channel, caused by contraction or obstruction of the normal waterway. 2. the difference between high flood levels upstream and downstream of a WEIR[16].

afforestation, *n* -- [GEOGRAPHY] the process of transforming an area into FOREST, usually when trees have not previously grown there[21]. *Also see reforestation*.

Aftonian Interglacial Stage, *n* – [GEOLOGY] time period of retreat of the North American ICE SHEET between 1.4 million years BP and about 1.75 million years BP, occurring after the NEBRASKA GLACIAL STAGE[8].

age, *n* – [AGE DATING] *1*. the length of TIME a person or thing has existed or is likely to exist[15]. *2*. any one of the named epochs in the history of the earth

marked by specific phases of physical conditions or organic evolution, such as the Age of Mammals. 3. one of the smaller subdivisions of the epoch as geologic time, corresponding to the stage or formation[7]. *Also see time.*

aged, *adj* – [GEOLOGY] of a ground configuration, having been reduced to base level[7].

age-dating investigation, *n* -- [AGE DATING] estimating the TIME frame of a CONTAMINANT RELEASE to the ENVIRONMENT.

age determination, *n* – [GEOLOGY] identification of the geologic age of a biological or geologic SPECIMEN by using the methods of DENDROCHRONOLOGY or RADIOMETRIC DATING[7].

age discrete, *adj* – [AGE DATING] relating to a GROUND-WATER SAMPLE that is known to represent a distinct age and not a mixture of AGES. MONITORING WELLS with very short SCREENS are normally required to obtain age-discrete, ground-water samples. *Also see discrete and tritium method*.

aged shore, *n* – [GEOLOGY] a SHORE long established at a constant level and adjusted to the waves and currents of the sea[7].

agency, *n* – [LAW] a specialized department, as of *government*[15].

agent, *n* – [TOXICOLOGY] any PHYSICAL, CHEMICAL, or BIOLOGICAL entity that can be harmful to an ORGANISM or the environment[22].

agent, *n* – [LAW] *1*. a person who performs services for another person under an express or implied AGREEMENT and who is subject to the other's control or right to control the manner and means of performing the services. The other person is called a PRINCIPAL. One may be an agent without receiving compensation for services. The agency agreement may be oral or written. *2*. the person to whom a POWER OF ATTORNEY is given. An agent has AUTHORITY to act on behalf of the grantor, as specified by the grantor in a power of attorney document[19]. *Also see attorney, counselor at law, lawyer and principal.*

age ratio, *n* – [CHEMISTRY] the ratio of the amount of daughter to parent ISOTOPE in a mineral or other substance being dated radiometrically[7].

agglomerate, *n* – [GEOLOGY] a cemented mixture of angular, fragmented material of volcanic origin[6].

agglutination, *n* – [GEOLOGY] a synonym for SEDIMENTARY CEMENTATION, especially in regard to fine-grained pelletal muds and more rarely coarse-grained rocks, such as BRECCIA or CONGLOMERATE[16].

aggradation, *n* – [GEOLOGY] *1*. the raising of STREAM beds or FLOOD PLAINS by DEPOSITION of SEDIMENT eroded and transported from UPSTREAM[6]. *2*. the build-up of sediments at the HEADWATERS of a LAKE or RESERVOIR or at a point where streamflow slows to the point that it will drop part or all of its sediment load. *3*. the building of a floodplain by sediment deposition; the filling of a depression or drainage way with sediment; the building of a fan by deposition of an alluvial mantle. *4*. modification of the earth's surface in the direction of uniformity of grade or slope, by deposition, as in a river bed[7].

aggrading river, *n* – [HYDROLOGY] a RIVER that is building up its VALLEY bottom by the deposition of material[16]. *Also known as aggrading stream. Also see aggradation.*

aggregate, *n* – [GEOLOGY] *1*. GRAIN mixture loosely held together. *2*. a mass or body of rock particles, mineral grains or both[4].

aggregation, *n* – [AGRONOMY] the process whereby primary soil particles (sand, silt and clay) are bound together, usually by natural forces and substances derived from root exudates and microbial activity[20].

aggressive water, *n* – [HYDROLOGY] water having the power of dissolving or disintegrating solids in contact with it[68].

aging, *n* – [HYDROLOGY] the process by which a young lake becomes an old lake as a result of filling and nutrient loading, eutrophication, vegetation encroachment and other actions[4].

agonic line, *n* – [GEOLOGY] a shifting, irregular imaginary line running through the Earth's north and south magnetic poles along which the compass needle points to true North[4].

agouni, *n* – [HYDROLOGY] a broad, generally dry GULLY carved by a torrent[16].

agreement, *n* – [LAW] an understanding or consent between two or more parties regarding their respective rights and obligations with respect to a specific subject or thing[19]. *Also see contract.*

agric horizon, *n* – [AGRONOMY] SOIL HORIZON immediately below the plow layer which contains SILT, CLAY and HUMUS. The wormholes and illuvial clay, silt and humus occupy at least 5% of the horizon by volume[20].

agrichemicals, *n* – [CHEMISTRY] chemical materials used in agriculture, such as fertilizers.

agriculture, *n* – [AGRONOMY] the SCIENCE, art, or practice of cultivating the SOIL, producing crops, and raising livestock and in varying degrees the preparation and marketing of the resulting products[15]. *Also see farm.*

agricultural pollution, *n* – [AGRONOMY] farming WASTES, including RUNOFF and LEACHING of PESTICIDES and FERTILIZERS; EROSION and dust from plowing; improper DISPOSAL of animal MANURE and carcasses;

crop RESIDUES, and DEBRIS[16]. *Also see agricultural waste and feedlot.*

agricultural waste, *n* – [AGRONOMY] poultry and livestock MANURE, and RESIDUAL materials in LIQUID or SOLID form generated from the production and marketing of poultry, livestock or fur-bearing animals; also includes grain, vegetable, and FRUIT harvest residue.

agronomy, *n* – [SCIENCE] field of SCIENCE that studies PHENOMENA related to AGRICULTURE, in particular, SOIL management and crop production[20].

A horizon, *n* – [AGRONOMY] the uppermost zone in the SOIL profile, from which soluble salts and COLLOIDS have been leached, and in which organic matter has accumulated[4].

aiguille, *n* – [GEOLOGY] *from French,* sharply pointed ROCK OUTCROP on a MOUNTAIN PEAK[6].

air, *n* – [CHEMISTRY] the mixture of invisible odorless tasteless GASES (as NITROGEN and OXYGEN) that surrounds the EARTH. The COMPOSITION of the Earth's ATMOSPHERE is about 78.08% nitrogen, 20.95% oxygen, 0.93% argon, 0.03% CO_2, 0.0018% NEON, 0.0005% HELIUM, 0.0001% krypton and 0.00001% xenon[23].

air entrainment, *n* – [HYDROLOGY] the incorporation of air into moving water as a result of turbulence or the breaking of small waves[16].

air-entry pressure, *n* – [HYDROGEOLOGY] the capillary pressure at which air or gas begins to enter the pores in a porous medium and begins to displace water. Liquid saturation is 100% above the air-entry pressure and less than 100% otherwise. The air-entry pressure surface defines the top of the capillary fringe[16].

air-rotary drilling rig, *n* – [DRILLING TECHNOLOGY] a DRILLING METHOD in which a BOREHOLE is advanced by a rotating BIT to which a downward force is applied. The bit is fastened to and rotated by the drill stem, which also provides a passageway through which compressed air is circulated. Additional joints of drill pipe are added as drilling progresses[4]. *Also see direct-push drilling rig, hollow-stem auger drilling rig, percussion drilling and mud-rotary drilling rig.*

air sparging, *n* – [TREATMENT TECHNOLOGY] a REMEDIAL TECHNOLOGY for GROUND WATER where AIR under PRESSURE is introduced below the WATER TABLE to liberate and VOLATILIZE ORGANIC CHEMICALS into the UNSATURATED ZONE where the fugitive VAPORS are captured and evacuated via a SOIL-VAPOR EXTRACTION SYSTEM[16]. *Also known as biosparging. Also see soil-vapor extraction.*

air stripping, *n* – [TREATMENT TECHNOLOGY] a TREATMENT SYSTEM that removes VOLATILE ORGANIC COMPOUNDS (VOCs) from contaminated GROUND WATER or SURFACE WATER by forcing an air stream through the water and causing the compounds to EVAPORATE[16]. *Also see treatment.*

air-void ratio, *n* – [AGRONOMY] the ratio of the volume of air-filled voids to the total volume of voids in the SOIL[16].

air volcano, *n* – [GEOLOGY] a mud volcano characterized more by the gas it emits than by the mud and rocks thrown out[16].

air-water partitioning coefficient—*See Henry's Law Constant.*

air well, *n* – [HYDROGEOLOGY] a tower of loose rock, used in some desert countries, to collect water by condensation of moisture from the warm atmosphere on the relatively cooler rock surfaces within the tower[16].

alabaster, *n* – [GEOLOGY] a compact, fine-grained GYPSUM, white or delicately shaded and often translucent[4].

alachlor, *n* — [CHEMISTRY] a HERBICIDE, marketed under the trade name Lasso, listed by the U.S. Environmental Protection Agency (EPA) as a "probable human carcinogen" and found frequently in streams and rivers, particularly following floods and periods of heavy rain. Alachlor is used extensively for weed control in corn, cotton, and soybean fields[14].

alas , *n* – [GEOLOGY] occurs in thermo-KARST areas, where the local melting of PERMAFROST has created a steep-sided, flat-floored depression, perhaps containing a lake[6].

alb—*See alp.*

albedo, *n* – [METEOROLOGY] RATIO of reflected to incoming RADIATION, usually given in percent[6].

albic horizon, *n* – [AGRONOMY] a mineral soil horizon from which clay and free iron oxides have been removed or in which the oxides have been segregated to the extent that the color of the horizon is determined primarily by the color of the primary sand and silt particles rather than by their coating[20]. *Also see horizon*.

alcohol, *n* -- [CHEMISTRY] class of ORGANIC COMPOUNDS that contain one or more HYDROXYL groups attached to a HYDROCARBON group that can be straight- or branched-chained or possess a ring-like structure[17]. *Also see ethanol, methanol and tert-butyl alcohol.*

alcove, *n* – [GEOLOGY] a steep sided cavity on the side of a ROCK OUTCROP which has been produced by EROSION by WATER[6].

aldehyde, *n* – [CHEMISTRY] prepared by OXIDATION of primary ALCOHOLS, so that the OH (HYDROXYL) group

loses its HYDROGEN to give an OXYGEN joined by a *DOUBLE* BOND to a CARBON atom (CHO)[17].

aldrin, *n* – [CHEMISTRY] an AGRICULTURAL PESTICIDE[14].

alfisol, *n* – [AGRONOMY] a soil order which occurs under DECIDUOUS woodlands or grasslands in the world's humid areas where there is some leaching and ELUVIATION with some color change[6].

algae, *n* – [BIOLOGY] photosynthetic, MICROSCOPIC, AQUATIC plants. May be single CELLS or colonial forms, either free floating or attached to SUBSTRATES[16].

algal bloom, *n* – [BIOLOGY] an unusual or excessive abundance of ALGAE[16].

algal growth potential (AGP), *n* – [BIOLOGY] the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample[47].

algal limestone, *n* – [GEOLOGY] type of LIMESTONE formed by CALCIUM secreting ALGAE[4].

algebra, *n* – [MATHEMATICS] a branch of MATHEMATICS which studies structure and QUANTITY. It may be roughly characterized as a generalization and abstraction of ARITHMETIC, in which operations are performed on SYMBOLS rather than NUMBERS. It includes elementary algebra, taught to high school students, as well as abstract algebra which covers such structures as groups, rings and fields. Along with GEOMETRY and ANALYSIS, it is one of the three main branches of mathematics[24]. *Also see arithmetic, calculus, geometry, mathematics, statistics and trigonometry.*

algicide, *n* — [CHEMISTRY] one of a group of plant POISONS used to kill filamentous algae and phytoplankton[14].

algorithm, *n* – [MATHEMATICS] PROCEDURE or series of steps that can be used to solve a problem[24].

alidade, *n* – [GEOGRAPHY] a telescopic surveying device used to construct surface topographic and geologic MAPS in the field. The alidade is mounted on a plane table, which has a sheet of paper on which to draw the map, and an object or location is sighted through the alidade. The edge of the alidade is aligned in the azimuthal direction of the object or location. The vertical angle from which elevation of the location can be calculated is measured using the calibrated arc of the alidade[25].

aligned sequence, *n* – [GEOLOGY] a series of glacial meltwater CHANNELS which have a marked alignment when traced across neighboring SPURS or INTERFLUVES[6].

aliphatic, *adj* **--** [CHEMISTRY] pertaining to an open-chain saturated HYDROCARBON compound known as ALKANES, ALKENES or ALKYNES. Aliphatic compounds are usually associated with PETROLEUM products derived from a PARAFFIN base[17]. *Also see alkane, alkene, alkyne and paraffin.*

aliquot, *n* – [CHEMISTRY] a measured portion of a SAMPLE taken for ANALYSIS. One or more aliquots make up a sample[11]. *Also see sample and specimen.*

alkali, *n* – [CHEMISTRY] the soluble HYDROXIDE of a METAL which will react with an acid to form a salt solution such as calcium, sodium and potassium[6].

alkali flat, *n* – [GEOLOGY] a salt covered or heavily saline depression or lake floorin an arid environment such as the Jordan Valley in Israel[6].

alkali metals, *n* – [CHEMISTRY] ELEMENTS of group 1 of the PERIODIC TABLE*:* lithium, sodium, potassium, rubidium, cesium and francium[24].

alkali earth metals, *n* – [CHEMISTRY] the group 2 ELEMENTS, beryllium (Be), MAGNESIUM (Mg), CALCIUM (Ca), strontium (Sr), barium (Ba), and radium (Ra) which form ALKALINE oxides and HYDROXIDES[24].

alkaline, *n* – [CHEMISTRY] the condition of *water* or SOIL which contains a sufficient amount of alkali SUBSTANCE to raise the pH above 7.0[24]. *Also see basic.*

alkalinity, *n* — [CHEMISTRY] the quantitative capacity of AQUEOUS MEDIA to REACT with HYDROGEN IONS[16]. *Also see acidity.*

alkalization, *n* – [AGRONOMY] accumulation of sodium ion on the exchange sites of a soil[6].

alkane, *n* – [PETROLEUM CHEMISTRY] a PARAFFIN. HYDROCARBON COMPOUNDS which do not contain double or triple bonds with the formula C_nH_{2n+2}. Alkanes can form straight chains or cyclic structures. They form a homologous series of methane (CH_4), ethane (C_2H_6), propane (C_3H_8), butane (C_4H_{10}), pentane (C_5H_{12}), etc.[17] *Also see double bond, homologous series, n-alkane and paraffin.*

alkene, *n* **--** [PETROLEUM CHEMISTRY] an OLEFIN. HYDROCARBONS containing one or more double or triple bonds between the carbons with the formula C_nH_{2n} and part of a HOMOLOGOUS SERIES containing ethane (CH_2:CH_2), butene (C_4H_8) and propene (CH_3:CH:CH_2)[17].

alkylbenzene sulfonates (ABS), *n* **–** [CHEMISTRY] a major class of alkylaryl sulfonate SURFACTANTS used in detergents; usually a sodium salt. ABS is anionic and highly sudsing. Prior to the mid-1960s, the form of ABS most widely used in detergent formulations resisted BIODEGRADATION. In 1965, DETERGENT manufacturers replaced ABS nationally in household laundry products by a more rapidly biodegradable variety of ABS called linear alkylate sulfonate, or LAS[7]. *Also see detergent and surfactant.*

alkyl group, *n* – [CHEMISTRY] a group obtained by removing a HYDROGEN ATOM from an ALKANE, such as a METHYL GROUP derived from METHANE having the general formula C_nH_{2n+1}, which forms part of the molecule. Examples are the methyl group (CH_3) or the ethyl group (C_2H_5)[17].

alkylate, *n* – [PETROLEUM CHEMISTRY] the product of an ALKYLATION reaction. It usually refers to the high OCTANE product from alkylation units. This alkylate is used in blending high octane gasoline[26].

alkylation, *n* – [PETROLEUM TECHNOLOGY] a REFINING PROCESS that converts components in crude oil to light OLEFINS and ISO-ALKANES, which are high-octane GASOLINE-range components. One of the major products of this process is ISO-OCTANE[26].

alkylcyclohexanes, *n* – [PETROLEUM CHEMISTRY] a COMPONENT of CRUDE OIL and found in many refined petroleum products such as DIESEL FUEL. Because of their relative RESISTANCE to alteration, they can be used for FINGERPRINTING purposes. They are found on the m/z 83 MASS CHROMATOGRAM[27].

alkyne, *n* – [PETROLEUM CHEMISTRY] HYDROCARBONS with the general formula C_nH_{2n-2}. Also known as ACETYLENES. They are unsaturated compounds, characterized by one or more triple bounds between adjacent carbon atoms[17].

allegation, *n* – [LAW] the ASSERTION, declaration or statement of a party of what he or she can prove[15].

allocation, *n* – [LAW] an assignment or allotment[15]; the percentage allocated or assigned to a specific RESPONSIBLE PARTY. Allocation studies are often a part of, and the basis for many, forensic investigations.

allochthonous, *adj* – [GEOLOGY] term applied to the material-forming rocks which have been transported to the site of deposition[6]. *Also see autochthonous.*

allogenic, *adj* – [GEOLOGY] a geological and geomorphological term to describe a phenomenon whose genesis lies elsewhere. It is particularly used to describe those parts of sedimentary rocks which were eroded from elsewhere prior to being transported, redeposited and compacted into new rocks[6].

allophane, *n* – [MINERALOGY] an amorphous CLAY MINERAL, a hydrous alumino-silicate gel of highly variable composition[4].

allotropic, *adj* – [MINERALOGY] of substances that may exist in two or more forms, such as diamond and graphite[4].

alloy, *n* – [METALLURGY] a manmade MIXTURE of METALS, either SOLID or LIQUID[17].

alluvial, *n* – [GEOLOGY] relating to and/or SAND DEPOSITED by flowing WATER[4].

alluvial fan, *n* – [GEOLOGY] a triangular DEPOSIT of SEDIMENT left by a STREAM that has lost velocity upon entering a broad, relatively flat VALLEY[4].

alluvial flat, *n* — [GEOLOGY] a nearly level, graded, alluvial surface between the PIEDMONT slope and PLAYA of a BOLSON or the axialstream floodplain of a semi-bolson. This major LANDFORM may include both recent and relict components[4].

alluvial plain, *n* – [GEOLOGY] a level tract bordering a RIVER on which ALLUVIUM is deposited; it may be situated on a FLOOD PLAIN, on a DELTA or on an ALLUVIAL FAN[4]. *Also see alluvial fan, delta and flood plain.*

alluviation, *n* – [GEOLOGY] the process of accumulating deposits of GRAVEL, SAND, SILT or CLAY at places in RIVERS, LAKES or ESTUARIES where the FLOW velocity has reduced[4].

alluvium, *n* — [GEOLOGY] the CONSTITUENTS of which have been transported in SUSPENSION by flowing WATER and subsequently DEPOSITED by SEDIMENTATION. *Also see colluvium*[4].

alp, *n* – [GEOGRAPHY] *1*. the land above a glacial trough. *2*. a high pasture or meadowland on a mountain side, between timberline and snowline[4]. *Also known as alb*.

alpha olefin, *n* – [PETROLEUM CHEMISTRY] a family of organic compounds which are OLEFINS or ALKENES with a chemical formula C_xH_{2x}, distinguished by having a DOUBLE BOND at the primary or alpha (α) position.

alpha particle (α), *n* – [CHEMISTRY] a HELIUM NUCLEUS emitted during the DISINTEGRATION of some RADIOACTIVE ELEMENTS[17]. *Also see beta particle, gamma ray and radioactivity.*

alpha radiation, *n* – [CHEMISTRY] composed of a particle, consisting of two PROTONS and two NEUTRONS, spontaneously emitted from the NUCLEUS of a subset of radioactive elements (mostly the heaviest elements) during radioactive decay. Alpha radiation is ionizing radiation, meaning that it strips ELECTRONS from adjacent atoms as it passes. Alpha radiation cannot penetrate skin; thus, an alpha-particle emitting radionuclide must be ingested in order to contact internal tissue. Because of the large size, alpha particles are likely to collide with cell tissue, causing tissue damage. An accumulation of tissue damage in the cell nucleus may lead to cell mutation and potential cancer formation[2].

alpha radioactivity, gross, *n* – [CHEMISTRY] a laboratory measurement of total alpha radioactivity emitted by a sample. This measurement includes alpha particle radioactivity emitted by isotopes of naturally occurring uranium, thorium, radium, and

progeny such as polonium, as well as alpha particles emitted from isotopes of plutonium or americium, which are not naturally occurring. Long-term measurement, usually conducted of plutonium and americium. The plutonium from 20 to 30 days after sample collection, measures only the amount of alpha radiation present from long-lived radionuclides, such as naturally occurring uranium-238 or radium-226 (half-life, 1,602 years), or the isotopes and americium isotopes considered in this study are alpha-particle emitting nuclides.[2]

alpha radioactivity count, *n* – [CHEMISTRY] an analytical technique that specifies alpha radioactivity emitted by a chemically purified sample that contains only one radionuclide of interest. The alpha-particle activity is counted in a low-background gas proportional counter.[2]

alpha spectrometry, *n* – [CHEMISTRY] an analytical technique that specifies the amount of alpha radiation emitted at specified energy levels, thus, allowing determination of individual RADIONUCLIDE concentrations (from known energy levels of alpha particles unique to each radionuclide). The gridded-pulse-ionization chamber is the most sensitive and most commonly used instrument.[2]

alpine, *n* – [GEOGRAPHY] that portion of a MOUNTAIN or MOUNTAIN RANGE above TREE growth; or ORGANISMS living there[6].

alpine glacier, *n* – [GEOLOGY] any GLACIER in a MOUNTAIN RANGE which is dominantly confined by the surrounding TOPOGRAPHY. It usually originates in a *cirque* and may flow down into a VALLEY previously carved by a STREAM[4]. *Also known as a mountain glacier.*

alpine permafrost, *n* – [GEOLOGY] PERMAFROST developed in temperate-climate, mountainous area.

alternate concentration limits (ACLs), *n* — [ENVIRONMENTAL REGULATION] one of the three types of standards that may be applied when a leak is detected at a treatment, storage, or disposal facility and groundwater compliance monitoring is required. ACLs are set by the *U.S. Environmental Protection Agency (EPA)* for specific hazardous waste constituents at levels that are designed to prevent a substantial hazard to human health or the environment. Ground-water compliance monitoring can use the following standards: (1) background concentrations, or the levels found in the area naturally; (2) specific values set by federal regulations in Title 40, Part 264.94, of the *Code of Federal Regulations* for eight metals and six pesticides and herbicides; or (3) alternative concentration limits.

alternate juror, *n* – [LAW] a JUROR selected in the same manner as a regular juror who hears all the EVIDENCE but does not help decide the case unless called on to replace a regular juror[19].

alternate method, *n* – [ENVIRONMENTAL INVESTIGATIONS] any METHOD of SAMPLING and ANALYZING for an AIR or WATER POLLUTANT that is not a REFERENCE or equivalent method but that has been demonstrated in specific cases to EPA's, or whatever authority that has jurisdiction, satisfaction to produce results adequate for COMPLIANCE MONITORING.

alternate terrace, *n* – [GEOLOGY] one of several MEANDER-SCAR terraces[16].

alternative compliance, *n* – [ENVIRONMENTAL REGULATION] a POLICY that allows facilities to choose among METHODS for achieving emission-reduction or risk-reduction instead of command-and control REGULATIONS that specify standards and how to meet them.

alternative dispute resolution (ADR), *n* – [LAW] a procedure for settling a dispute outside the courtroom. Most forms of ADR are not binding on the parties, and involve referral of the case to a neutral party such as an arbitrator or mediator.

alternative fuels, *n* – [PETROLEUM CHEMISTRY] substitutes for traditional LIQUID, OIL-derived motor vehicle FUELS like GASOLINE and DIESEL. Includes mixtures of ALCOHOL-based fuels with gasoline, METHANOL, ETHANOL, compressed natural gas, and others[26]. *Also see biodiesel, ethanol and methanol.*

alternative hypothesis, *n* – [STATISTICS] statistical HYPOTHESIS that specifies that the underlying distribution differs from the NULL HYPOTHESIS. *Also see hypothesis and null hypothesis.*

altitude, *n* – [GEOGRAPHY] the distance above or below SEA LEVEL[25]. *Also see elevation and relief.*

alum, *n* – [CHEMISTRY] a chemical substance (usually potassium aluminum sulfate), gelatinous when wet, used in water-treatment plants for settling out small particles of foreign matter[63].

alumina, *n* – [CHEMISTRY] a common adsorbent in LIQUID CHROMATOGRAPHY. Aluminum oxide (Al_2O_3) is a porous adsorbent that is available with a slightly basic surface[34].

aluminum (Al), *n* – [CHEMISTRY] a light, silvery-white, ductile METAL with high electrical conductivity and good resistance to corrosion. Obtained from bauxite. It is the lightest of the metals in general use commercially and is the basis for light alloys used in the construction of modern aircraft and rockets; aluminum coatings are used for telescope mirrors, decorative paper, packages, and toys. The oxide,

alumina, occurs naturally as ruby, sapphire, corundum, and emery[17].

alvar, *n* – [GEOGRAPHY] a biological environment based on a limestone plain with thin or no soil and, as a result, sparse vegetation.

alveolate relief, *n* – [GEOGRAPHY] a TERRAIN of DOME-shaped HILLS, particularly common in GRANITE areas of the humid tropics[6].

ambient, *n* – [ECOLOGY] the ENVIRONMENT surrounding a body but undisturbed or unaffected by it[15]. *Also see background and natural.*

ambiguity, *n* – [LANGUAGE] the presence of two or more distinct meanings for a single word or expression. In itself, ambiguity is a common, harmless, and often amusing feature of ordinary language. When unnoticed in the context of otherwise careful reasoning, however, it can lead to one of several informal fallacies[15].

American Rule, *n* – [LAW] a GROUND-WATER doctrine that holds that an overlying property owner has the right to use only a reasonable amount of water[16].

americium, *n* – [CHEMISTRY] a RADIOACTIVE ACTINIDE ELEMENT derived from the radioactive decay of man-made PLUTONIUM.[2]

amictic lake, *n* – [GEOLOGY] a LAKE that does not experience mixing or turnover on a seasonal basis[16].

amicus curiae, *n* – [LAW] *from Latin*, for "friend of the court." It is advice formally offered to the court in a BRIEF filed by an entity interested in, but not a party to, the case.

amide, *n* – [CHEMISTRY] ORGANIC CHEMICALS derived from a CARBOXYLIC ACID (fatty acid) by the replacement of the HYDROXYL (OH) group with an AMINO GROUP (NH_2)[17].

amine, *n* – [CHEMISTRY] a class of ORGANIC CHEMICALS in which one or more of the HYDROGEN ATOMS of AMMONIA (NH_3) have been replaced by other groups of atoms[17].

amino acids, *n* – [CHEMISTRY] the basic building blocks of life, being a vital constituent of proteins. They have a CARBOXYL GROUP (COOH) and an amino group (NH_2) joined to the same carbon atom, and have the general formula $RCHNH_2(COOH)$[17].

amino group, *n* – [CHEMISTRY] an $-NH_2$ group attached to a carbon skeleton, as in the AMINES and AMINO ACIDS[34]. *Also see amines and amino acids*.

ammonia, *n* – [CHEMISTRY] a compound of NITROGEN and HYDROGEN (NH_3) which when present in WATER suggests that human or animal wastes have been recently introduced. It can cause nutrient enrichment and EUTROPHICATION, and in sufficient quantities can be TOXIC to aquatic animals[17]. *Also ammonification, nitrate and nitrogen.*

ammonification, *n* – [CHEMISTRY] the biochemical process whereby ammoniacal nitrogen is released from nitrogen-containing organic compounds[20]. *Also see ammonia and nitrogen.*

ammonium ion, *n* – [CHEMISTRY] the CATION NH_4^+ which caries a +1 charge[17]. *Also see ammonia, ammonification, denitrification and nitrification.*

amorphous, *adj* – [MINERALOGY] non-CRYSTALLINE, lacking a CRYSTAL structure; a SOLID such as glass, opal, WOOD or COAL, that lacks an ordered internal arrangement of ATOMS or IONS[4].

amphibole, *n* – [MINERALOGY] a group of generally dark-colored, rock-forming silicate minerals, composed of double-chain SiO_4 tetrahedra, linked at the vertices and often containing iron and/or magnesium in their structures. Amphiboles are of either igneous or metamorphic origin; they occur as nornblende in igneous rocks such as granite, diorite, andesite and others. Amphiboles of metamorphic origin include those developed in limestones by contact metamorphism (tremolite) and or formed by the alteration of other ferro-magnesian minerals (hornblende).

amphibolite, *n* – [PETROLOGY] a METAMORPHIC ROCK composed chiefly of AMPHIBOLE with minor PLAGIOCLASE and little QUARTZ.

amplitude, *n* – [PHYSICS] maximum extent of a vibration or OSCILLATION from the position of EQUILIBRIUM[23].

amphipilic, *adj* – [CHEMISTRY] a property of MOLECULES that have both HYDROPHILIC and HYDROPHOBIC properties. An example is a SURFACTANT that has an end with an affinity for water and an end that has an affinity for substances that lack an affinity for water[16].

anabranch, *n* — [HYDROLOGY] a diverging branch of a RIVER which re-enters the main STREAM[16]. *Also see river and stream.*

anaerobe, *n* – [BIOLOGY] an ORGANISM that does not require air or free OXYGEN to maintain its life process[16].

anaerobic, *adj* -- [BIOLOGY] in the absence of OXYGEN[16]. *Also see aerobic.*

anaerobic bacteria, *n* – [BIOLOGY] BACTERIA that grow only in the absence of free ELEMENTAL OXYGEN.

anaerobic biodegradation, *n* – [TREATMENT TECHNOLOGY] BIOLOGICAL TREATMENT where MICROORGANISMS METABOLIZE BIODEGRADABLE ORGANICS in AQUEOUS WASTE in an OXYGEN-deficient ENVIRONMENT. *Also see aerobic biodegradation*.

anaerobic contact process, *n* – [TREATMENT TECHNOLOGY] a waste-treatment process similar to the

activated sludge process; it is largely one of contact in the absence of free oxygen between living organisms and sludge, in which the organisms digest the organic matter in the sludge[63].

anaerobic lagoon, *n* -- [TREATMENT TECHNOLOGY] a liquid-based MANURE management system, characterized by waste residing in water to a depth of at least six feet for a period ranging between 30 and 200 days. BACTERIA produce METHANE in the absence of oxygen while breaking down waste[16].

anaerobic respiration, *n* – [BIOLOGY] a metabolic process in which ELECTRONS are transferred from organic or, in some cases, inorganic compounds to an inorganic receptor molecule other tan oxygen. The most common receptors are nitrate, sulfate and carbonate[34]. *Also see aerobic respiration.*

anaglyph, *n* – [GEOGRAPHY] a method of obtaining a three-dimensional image of TOPOGRAPHY by viewing two adjoining AERIAL PHOTOGRAPHS that have been printed in red and green[6].

analog, *n* — [PHYSICS] a continuously variable electrical signal representing a measured quantity. For example, electrical signals such as current, voltage, frequency, or phase used to represent physical quantities such as water level, flow, and gate position[15].

analysis, *n* – [SCIENTIFIC METHOD] process of breaking up a complex concept or expression in order to reveal its simpler CONSTITUENTS, thereby elucidating its implicit meaning[15].

analyte, *n*— [CHEMISTRY] a possible SAMPLE COMPONENT whose presence and CONCENTRATION is of interest[14].

analytical chemistry, *n* – [CHEMISTRY] the branch of CHEMISTRY which deals with QUALITATIVE ANALYSIS and quantitative analysis. The three major branches of analytical chemistry are ELECTROCHEMISTRY, CHROMATOGRAPHY and SPECTROSCOPY.

analytical modeling, *n* – [HYDROGEOLOGY] MODEL that provides approximate or exact solutions to simplified forms of the DIFFERENTIAL EQUATIONS for WATER movement and SOLUTE TRANSPORT. Such models generally require the use of complex calculations and the use of computers[16]. *Also see numerical modeling.*

anastatic water, *n* – [HYDROLOGY] that part of the subterranean water in the CAPILLARY FRINGE between the zone of aeration and the zone of saturation in the soil[54].

anastomosing, *adj* — [HYDROLOGY] the branching and rejoining of CHANNELS to form a netlike pattern[16].

anastamosis, *n* – [HYDROLOGY] a product of braiding, especially an interlacing network of branching and reuniting channels[16].

anchialine pool, *n* [HYDROLOGY] a landlocked body with a subterranean connection to the OCEAN. Anchialine pools are a feature of coastal AQUIFERS which are density stratified, with the water near the surface being fresh or BRACKISH, and SALINE water intruding from the coast below at some depth.

andesite, *n* – [GEOLOGY] fine-grained, generally dark colored, IGNEOUS VOLCANIC ROCK with more SILICA than BASALT. Commonly with visible crystals of plagioclase feldspar. Generally occurs in lava flows, but also as dikes. The most common rock in volcanic arcs[4].

andosol, *n* – [AGRONOMY] a SOIL developed on newly weathered base-rich volcanic material[6].

angiosperm, *n* – [DENDROLOGY] group of vascular plants who encase their seeds in a mature ovary or FRUIT[12]. *Also see gymnosperm*.

angle , *n* – [MATHEMATICS] the figure formed by two line segments or rays that extend from a given point[15].

angle of repose, *n* – [GEOLOGY] MEASUREMENT commonly used in civil engineering. It is the maximum ANGLE at which a material can be inclined without failing. GEOMORPOLOGISTS use this measurement for determining the STABILITY of slope to mass movements[4].

angular, *n* – [GEOLOGY] the property of unconsolidated grains with sharp edges[4].

angular cross-bedding, *n* – [GEOLOGY] cross-bedding in which the inclined BEDS appear in section as nearly straight lines meeting the underlying surface at high, sharp or discordant ANGLES; it often implies deposition by water[4].

angular unconformity, *n* – [GEOLOGY] an UNCONFORMITY in which the older underlying STRATA DIP at a different ANGLE (generally steeper) than the younger overlying strata[4]. *Also see disconformity.*

anhydrite, *n* – [MINERALOGY] a MINERAL, anhydrous calcium sulfate ($CaSO_4$). It alters readily to GYPSUM.

anhydrous, *adj* – [GEOLOGY] completely or essentially without water.

aniline point, *n* – [CHEMISTRY] the AROMATICS content of a mixture.

anion, *n* – [CHEMISTRY] a negatively CHARGED ION[4]. *Also see cation and ion.*

anion exclusion, *n* – [AGRONOMY] the exclusion or repulsion of ANIONS from the vicinity of negatively charged soil particles[20].

anisotropic, *adj* – [PHYSICS] denoting a MEDIUM in which certain PHYSICAL PARAMETERS are different in different directions[4]. *Also see isotropic, homogeneous and heterogeneous.*

annual flood, *n* – [HYDROLOGY] the highest peak discharge of a STREAM in a WATER YEAR[1]. *Also see water year*.

annual layer, *n* – [GEOLOGY] a SEDIMENTARY layer deposited, or presumed to have been deposited, during the course of a year; for example, a glacial VARVE[54].

annual runoff, *n* – [HYDROLOGY] the total quantity of water that is discharged ("runs off") from a drainage basin in a year. Data reports may present annual runoff data as volumes in acre-feet, as discharges per unit of drainage area in cubic feet per second per square mile, or as depths of water on the drainage basin in inches[47].

annual space; annulus, *n* — [HYDROGEOLOGY] the space between two concentric tubes or casings, or between the CASING and the BOREHOLE wall[4]. *Also known as annular space*.

> DISCUSSION — This would include the space(s) between multiple strings of tubing/casings in a borehole installed either concentrically or multi-cased adjacent to each other.

annular drainage, *n* – [HYDROLOGY] a ringlike drainage pattern in origin and associated with maturely dissected DOME or BASIN structures[54].

annular space, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] the space created between the primary and secondary container of a secondarily contained underground storage tank system[48].

anode, *n* – [CHEMISTRY] a positively charged ELECTRODE[24]. *Also see cathode and electrode.*

anomaly, *n* – [SCIENTIFIC METHOD] *1*. a departure from the expected or normal. *2*. the difference between an observed *value* and the corresponding computed value[24].

anoxic, *adj* – [CHEMISTRY] *1*. total deprivation of OXYGEN. *2*. condition in which the CONCENTRATION of DISSOLVED OXYGEN is so low that certain groups of MICROORGANISMS prefer OXIDIZED forms of NITROGEN, SULFUR or CARBON as an ELECTRON ACCEPTOR[7]. *Also see anaerobic and oxic.*

answer, *n* – [LAW] in a CIVIL case, the DEFENDANT'S written response to the PLAINTIFF'S COMPLAINT. It must be filed within a specified period of time, and it either admits to or (more typically) denies the factual or legal basis for liability[19].

antagonism pollution, *n* – [ENVIRONMENTAL POLLUTION] the combined effect of two or more toxic substances acting together that is less adverse than their sum would be if each were acting separately or independently[63].

Antarctic Circle, *n* – [GEOGRAPHY] LATITUDE of 66.5° south. The northern limit of the area of the Earth that experiences 24 hours of darkness or 24 hours of day at least one day during the year[4]. *Also see Arctic Circle, Equator, latitude, Tropic of Cancer and Tropic of Capricorn.*

antecedent stream, *n* – [HYDROLOGY] a STREAM having established its course before occurrence of orogenic events that would later alter the general drainage pattern[16].

antecedent valley, *n* – [GEOLOGY] a STREAM VALLEY that existed before uplift, faulting or folding occurred and which has maintained itself during and after these events[54].

anteconsequent stream, *n* – [HYDROLOGY] a STREAM consequent to the form assumed by the earth's surface as the result of early movement of the earth but antecedent to later movement[54].

anteisoalkanes, *n* – [CHEMISTRY] straight-chain ALKANES that have a METHYL group attached to the third CARBON (such as 3-methyl alkanes)[34].

anthracene oil, *n* – [PETROLEUM CHEMISTRY] a heavy green oil that distills from COAL TAR above 270 degrees C and is the principal source of anthracene, phenanthrene, and carbozole.

anthracite coal, *n* – [GEOLOGY] a hard, jet-black COAL that develops from LIGNITE and BITUMINOUS COAL through METAMORPHISM, has a carbon content of 92% to 98%, and contains little or no GAS. Anthracite burns with an extremely hot, blue flame and very little smoke, but it is difficult to ignite and both difficult and dangerous to MINE[4]. *Also see bituminous coal, lignite and peat.*

anthropogenic, *adj* – [ENVIRONMENTAL INVESTIGATION] of, relating to, or resulting from the influence of human beings on NATURE[7]. *Also see ambient, man-made and natural.*

Anthropogenic Lead ArchaeoStratigraphy model (ALAS), *n* - [AGE DATING] a method of AGE DATING GASOLINE or gasoline RELEASES based on the concentrations of ^{204}Pb and ^{206}Pb. The MODEL assumes that the ^{204}Pb and ^{206}Pb concentrations in the original ore used to produce the lead ADDITIVES are known going back in TIME.

anticline, *n* – [GEOLOGY] a convex FOLD in rock, the central part of which contains the oldest section of ROCK[4]. *See also fold and syncline.*

antidegradation, *n* -- [ENVIRONMENTAL REGULATION] a POLICY to ensure that existing GROUND-WATER QUALITY (that currently is of higher quality than the water quality criteria) is not degraded to the criteria by discharges, but rather remains at a better quality ranging from natural quality at the most stringent, to a limited allowance for DEGRADATION at the least stringent. Nondegradation is the most stringent case of the antidegradation policy. It prohibits any

degradation of ground-water quality below existing BACKGROUND water quality by a DISCHARGE.

antiform, *n* – [GEOLOGY] a general term denoting an upfold of strata of the Earth's crust, but one in which the precise stratigraphic relationships of the rocks are not known[6].

antifreeze, *n* – [CHEMISTRY] a SUBSTANCE added to a LIQUID, usually WATER, in the cooling systems of internal combustion engines to lowers its FREEZING POINT so that it does not solidify at sub-zero temperatures[15]. The most common antifreeze is ethylene glycol (ethane-1,2-diol).

anti-icing additives, *n* – [PETROLEUM CHEMISTRY] SURFACTANTS, ALCOHOLS, and glycols that are added to GASOLINE. They prevent ice formation in the carburetor and fuel system. The need for this ADDITIVE is disappearing as older-model vehicles with carburetors are replaced by vehicles with fuel injection systems[32].

DISCUSSION – Anti-icing additives can sometimes be used to differentiate or fingerprint different gasolines.

anti-knock additive, *n* – [PETROLEUM CHEMISTRY] LEAD ALKYLS – TETRAETHYL LEAD (TEL) and tetramethyl lead (TML), manganese compounds – METHYLCYCLOPENTADIENYL MANGANESE TRICARBONYL (MMT), and iron compounds – FERROCENE added to gasoline. Antiknock compounds increase the antiknock quality of GASOLINE. Because the amount of additive needed is small, they are a lower cost method of increasing octane number than changing gasoline chemistry. Gasoline containing tetraethyl lead was first marketed in 1923. The average concentration of lead in gasoline gradually was increased until it reached a maximum of about 5 grams per gallon (g/gal.) in the 1960s. After that, a series of events resulted in the use of less lead: new refining processes that produced higher-octane gasoline components, steady growth in the population of vehicles requiring unleaded gasoline, and federal regulations requiring the reduction of the lead content of gasoline in phased steps beginning in 1979. The EPA completely banned the addition of lead additives to on-road gasoline in 1996 (1992 in California) and the amount of incidental lead may not exceed 0.05 g/gal[27, 32]. *Also see alkyl lead, ferrocene and methylcyclopentadienyl manganese tricarbonyl (MMT).*

DISCUSSION – Organolead antiknock additives were phased out throughout much of the world in the 1980s and 1990s. The first country to complete the phaseout was Japan in 1980, followed by Brazil in 1988. The European Union did not ban organolead additives until 2000 and some EU countries, such as Spain and Portugal, were permitted to use these additives until 2001.

antiknock index, *n* – [PETROLEUM CHEMISTRY] the average of the RESEARCH OCTANE NUMBER (RON) and the MOTOR OCTANE NUMBER (MON) for a fuel. Used as a measure of the octane quality of a GASOLINE, particularly in North America[28]. *Also see Motor Octane Number (MON) and Research Octane Number (RON).*

DISCUSSION – The antiknock index was first developed by the Ethyl Gasoline Corporation in the late 1920s.

antipodes, *n* – [GEOGRAPHY] two places situated on opposite sides of the earth, so that a straight line is drawn through the earth from one to the other and passes through the center[6].

apex, *n* –[GEOGRAPHY] *1*. the uppermost point, such as the APEX of a mountain[15]. *2*. the narrowed or pointed end. *3*. the highest or culminating point. *4*. the highest point on an ALLUVIAL FAN or similar LANDFORM below which the flow path of the major STREAM that formed the fan becomes unpredictable and alluvial fan flooding can occur. *5*. the point of highest ELEVATION on an alluvial fan, which on undisturbed fans is generally the point where the major stream that formed the fan emerges from the mountain front. *Also see crest and peak.*

aphanitic, *adj* – [GEOLOGY] an IGNEOUS ROCK TEXTURE in which individual MINERAL GRAINS are too small to be distinguished with the naked eye[4].

aphotic, *adj* — [BIOLOGY] without light. Of or relating to the region of a body of water that is not reached by sunlight and in which PHOTOSYNTHESIS is unable to occur. The Aphotic Zone of the ocean is the water deeper than about 800 meters (2,625 feet), beyond which no light penetrates[6].

apparent cohesion, *n* – [AGRONOMY] cohesion of granular soils due to capillary forces associated with water[20].

appeal, *n* – [LAW] a request to a supervisory COURT, usually composed of a panel of judges, to review a lower court's DECISION[19].

appeal, notice of, *n* – [LAW] the document a person must file with the trial court in order to pursue an appeal[19].

appearance, *n* – [LAW] the literal, or by filing of papers or pleadings, coming into court by a party or the attorney for a party[19].

appellant, *n* – [LAW] the party bringing the action to court (usually an appellate/appeal court).

appellate, *n* – [LAW] about appeals; an appellate court has the power to review the JUDGMENT of another lower COURT or TRIBUNAL[19].

API gravity, *n* – [PETROLEUM CHEMISTRY] the U.S. PETROLEUM industry often uses API gravity instead of relative density. The following equation relates API gravity, in degrees API (°API), to relative density.

$$^{o}API = 141.5/RD(60^{o}F) - 131.5$$

While API gravity measurements may be made on LIQUIDS at TEMPERATURES other than 60°F, the results are always converted to the values at 60°F, the standard temperature. API gravity is an arbitrary scale developed by the American Petroleum Institute in the early years of the petroleum industry. Density had been used as a primary indicator of quality for liquid products. However, the higher value products have lower densities. The API gravity scale was constructed so that API gravity increases inversely to density; therefore, products with higher value have higher API gravities. The numbers are also scaled so that most API gravities are between 10 and about 70, rather than less than one[34]. *Also see relative density, density, mass, specific gravity and weight.*

API oil-water separator, *n* – [PETROLEUM TECHNOLOGY] a device designed to separate gross amounts of oil and suspended solids from the waste-water effluents of petroleum refineries, petrochemical plants, chemical plants, natural-gas-processing plants and other industrial sources. The name is derived from the fact that such separators are designed according to standards published by the American Petroleum Institute (API).

apparent dip, *n* – [GEOLOGY] the ANGLE between the horizontal and the tilt of the STRATUM or bedding plane measured vertically in any direction except that which is at right ANGLES (90°) to the strike[6].

Applicable or Relevant and Appropriate Requirements (ARARs), *n* – [ENVIRONMENTAL REGULATION] those requirements, cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that show either a direct correspondence or address problems or situations sufficiently similar at a site to show that they are well suited for application[28].

apposed glacier, *n* – [GEOLOGY] a GLACIER formed when two separate glaciers coalesce[6].

appraisal, *n* – [INSURANCE] a survey to determine a property's insurable value, or the amount of a loss. *Also see loss and value*.

appropriate inquiry, *n* – [LAW] that inquiry constituting "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice" as defined in CERCLA, 42 USC § 9601(35)(B), that will give a party to a commercial real estate transaction the innocent landowner defense to CERCLA liability (42 USC§ 9601(A) and (B) and § 9607(b)(3)), assuming compliance with other elements of the defense.

appropriation doctrine, *n* – [LAW] the system for allocating water to private individuals used in most Western states. The doctrine of Prior Appropriation was in common use throughout the arid west as early settlers and miners began to develop the land. The prior appropriation doctrine is based on the concept of "First in Time, First in Right." The first person to take a quantity of water and put it to Beneficial Use has a higher priority of right than a subsequent user. Under drought conditions, higher priority users are satisfied before junior users receive water. Appropriative rights can be lost through nonuse; they can also be sold or transferred apart from the land. Contrasts with Riparian Water Rights.

approximately, *n* – [LANGUAGE] near to the actual. *Also see about.*

apron, *n* – [GEOLOGY] a very low-ANGLE OUTWASH spread in front of an ALLUVIAL FAN[6].

aquatic, *n* – [ECOLOGY] growing in, living in, or frequenting WATER.

aquatic plants, *n* – [BIOLOGY] plants that grow and live in water; they may be floating, submerged, or emergent[63].

aqueduct, *n* – [HYDROLOGY] an artificial CHANNEL for conveying WATER, especially in the form of a bridge supported by tall columns[15]. *Also see canal and channel.*

aqueous, *adj* -- [CHEMISTRY] having to do with water.

aqueous geochemistry, *n* – [CHEMISTRY] the study of the CHEMICAL CHARACTERISTICS or conditions of WATER, including SURFACE WATER, GROUND WATER, SEA WATER or other natural waters. *Also see geochemistry and hydrology.*

aqueous phase, *n* – [CHEMISTRY] of, or pertaining to, a WATER phase. *Also see gaseous phase, vapor phase and solid phase.*

aqueous solubility, *n* – [CHEMISTRY] extent to which a COMPOUND will dissolve in WATER. Commonly expressed in milligrams per liter (mg/l). *Also see immiscibility and miscibility.*

aquiclude, *n* — [HYDROGEOLOGY] a relatively IMPERVIOUS FORMATION capable of absorbing WATER slowly but will not transmit it fast enough to furnish an appreciable supply for a WELL or SPRING[33]. *Also see aquifuge and aquitard.*

aquifer, *n* — [HYDROGEOLOGY] a GEOLOGIC FORMATION, group of formations, of part of a formation that is

SATURATED and is capable of providing an economically significant quantity of water[33].

aquifer compaction, *n* – [HYDROGEOLOGY] term used to describe the effects of emptying or overdrawing an AQUIFER; overdrafts tend to collapse the structure of the aquifer such that the original volume cannot be restored. May also be associated with a general land subsidence in the surrounding ground level as the result of such COMPACTION.

aquifer, confined, *n* — [HYDROGEOLOGY] an AQUIFER bounded above and below by CONFINING BEDS and in which the static HEAD is above the top of the aquifer[33].

aquifer mining, *n* – [HYDROGEOLOGY] the EXTRACTION of WATER from an AQUIFER at a RATE greater than its natural RECHARGE[16]. *Also known as ground-water mining.*

aquifer, perched, *n* – [HYDROGEOLOGY] a region in the unsaturated zone where the soil may be locally saturated because it overlies a low-permeability unit[33].

aquifer, semi-confined, *n* – [HYDROGEOLOGY] an AQUIFER CONFINED by a low-permeability unit that permits WATER to slowly flow through it[33]. *Also known as a leaky confined aquifer* or a *leaky artesian aquifer*.

aquifer, unconfined, *n* — [HYDROGEOLOGY] an AQUIFER that has a WATER TABLE[33]. *Also see water-table aquifer.*

aquifuge, *n* – [HYDROGEOLOGY] an absolutely IMPERMEABLE unit that will neither transmit nor store WATER[33]. *Also see aquiclude and aquitard.*

aquitard , *n* — [HYDROGEOLOGY] a CONFINING BED that retards but does not prevent the flow of WATER to or from an adjacent AQUIFER; a leaky confining bed[33]. *Also see aquiclude and aquifuge.*

aquifer test—*See pumping test.*

aragonite, *n* – [MINERALOGY] MINERAL with a formula of $CaCO_3$ and a orthorhombic crystal structure[4]. *Also see calcite, carbonate, karst and limestone.*

arbitrary, *n* – [STATISTICS] based on or derived from uninformed OPINION or RANDOM choice[15].

arbitration, *n* – [LAW] a process of dispute resolution in which a third party (arbitrator) renders a DECISION after a hearing in which both parties have an opportunity to be heard. Where arbitration is voluntary, the disputing parties select the arbitrator who has the power to render a binding decision[19].

arbitrary and capricious, *adj* – [LAW] absence of a rational connection between the facts found and the choice made. When a judge makes a decision without reasonable grounds or adequate consideration of the circumstances, it is said to be arbitrary and capricious and can be invalidated by an appellate court on that ground. There is, however, no set standard for what constitutes an arbitrary and capricious decision; what appears arbitrary to one judge may seem perfectly reasonable to another[19].

arboreal, *adj* – [DENDROLOGY] pertaining to TREES[6].

arc, *n* – [MATHEMATICS] a portion of a circle[15].

Archean Eon, *n* – [GEOLOGY] the time interval between 3,800 to 2,500 million years ago. The Archean is one of the Precambrian time intervals[4].

archeological dating, *n* – [AGE DATING] the dating of articles or events in history or ancient history by reference to the works of man[6].

archeology, *n* – [SCIENCE] the SCIENCE that focuses on the study of past human cultures[15].

Archimedes' Principle, *n* – [PHYSICS] PRINCIPLE stating that the WEIGHT of the LIQUID displaced by a floating body is equal to the weight of the body[24]. *Also see buoyancy.*

archipelago, *n* – [GEOGRAPHY] a chain or set of ISLANDS grouped together[6].

archive, *n* – [ENVIRONMENTAL INVESTIGATION] a collection of private, public or corporate DOCUMENTS and RECORDS[15].

archive, *v* – [CHEMISTRY] to hold a sample at the laboratory until a decision can be made on the appropriate analytical parameters. The archive time frame must be within the specified holding time for the sample and the analytical parameter.

Arctic Circle, *n* – [GEOGRAPHY] LATITUDE of 66.5° North. The southern limit of the area of the Earth that experiences 24 hours of darkness or 24 hours of day at least one day during the year[6]. *Also see Antarctic Circle, Equator, latitude, Tropic of Cancer and Tropic of Capricorn.*

arcuate delta, *n* – [GEOLOGY] a DELTA in which the outermost margin exhibits an arc-like form, convex towards the sea, such as the Nile delta[6].

area, *n* – [MATHEMATICS] the extent or measure of a surface with units of length squared. *Also see length and volume.*

areal precipitation, *n* – [METEOROLOGY] precipitation in a specific area expressed as the average depth of liquid water over this area[68]. *Also see precipitation.*

area of concern (AOC), *n* – [ENVIRONMENTAL INVESTIGATION] any existing or former location where HAZARDOUS SUBSTANCES, HAZARDOUS WASTES, or POLLUTANTS are or were known or suspected to have been *discharged*, generated, manufactured, refined, transported, stored, handled, *treated*, *disposed*, or where hazardous substances, hazardous wastes, or pollutants have or may have migrated[18].

area of influence of a well, *n* — [HYDROGEOLOGY] (L^2) AREA surrounding a well within which the

PIEZOMETRIC SURFACE has been lowered when PUMPING has produced the maximum steady rate of FLOW. *Also see capture zone*.

arena, *n* – [GEOGRAPHY] a shallow, circular basin surrounded or almost enclosed by a rim of higher land[6].

arenaceous, *adj* – [GEOLOGY] a term applied to SEDIMENTARY ROCKS, either CONSOLIDATED or UNCONSOLIDATED, which contain SAND, such as SANDSTONE[4].

arenite, *n* – [GEOLOGY] a general name for SEDIMENTARY ROCKS composed of sand-sized fragments irrespective of composition such as SANDSTONE, GRAYWACKE, ARKOSE, and calcarenite[4]. Sand grain size range from between 0.0625 millimetre (mm) (0.00246 inch (in)) and 2 mm (0.08 in) and contain less than 15% matrix.

arenization, *n* – [GEOLOGY] a weathering process in solid rocks which produces a deep sandy REGOLITH. It is most active in tropical areas where high temperatures and plentiful ground water lead to rotting by CORROSION[6].

arête, *n* – [GEOLOGY] *from French,* a sharp ridge of EROSION-resistant ROCK formed between adjacent CIRQUE GLACIERS[4].

aretic drainage, *n* – [HYDROLOGY] a drainage pattern which is confined to an inland basin, with no outlet to the sea[6].

argillaceous, *adj* – [GEOLOGY] term applied to sedimentary rocks containing a substantial proportion of CLAY MINERALS, such as SHALE[4].

argillite, *n* – [GEOLOGY] a compact ROCK, derived either from MUDSTONE (CLAYSTONE or SILTSTONE), or SHALE, that has undergone a somewhat higher degree of INDURATION than mudstone or shale but is less clearly laminated and without its FISSILITY, and that lacks the cleavage distinctive of SLATE[4]. *Also see claystone, shale and slate.*

argument, *n* – [LOGIC] a collection of two or more propositions, all but one of which are the premises supposed to provide inferential support—either DEDUCTIVE or INDUCTIVE—for the truth of the remaining one, the conclusion[15]. The structure of arguments is the principal subject of LOGIC.

arheic, *adj* – [HYDROLOGY] relates to areas which almost completely lack superficial DRAINAGE[16].

arid, *n* – [METEOROLOGY] a term applied to a CLIMATE or region where PRECIPITATION is so deficient in quantity, or occurs so infrequently, that crop production is impractical or impossible without IRRIGATION[16].

aridisol, *n* – [AGRONOMY] a soil order that includes infertile alkaline and saline soils of desert areas and characterized by a thick accumulation of basic mineral salts at or near the surface owing to capillarity. This capillary action may cause ground water to concentrate sodium to such a degree that the soil becomes toxic[6].

arithmetic, *n* – [MATHEMATICS] *1*. the science of numbers. *2*. the use of numbers and computation[15]. *Also see algebra, calculus, geometry, mathematics and trigonometry.*

arithmetic mean, *n* – [MATHEMATICS] the arithmetic mean of *n* numbers is the sum of the numbers divided by *n*. *Also known as average. Also see average, mean and mode.*

arkose, *n* – [GEOLOGY] a type of SANDSTONE that contains a large quantity of WEATHERED FELDSPAR grains. This type of SEDIMENTARY ROCK forms in arid conditions[4]. *Also see greywacke, sandstone and sedimentary rock.*

arm, *n* – [GEOGRAPHY] an INLET of WATER (as from the SEA)[16]. *Also see inlet.*

aromatic, *n* – [PETROLEUM CHEMISTRY] pertaining to HYDROCARBONS (C_nH_{2n-6}) containing one or more BENZENE rings (a six-carbon ring structure with alternating DOUBLE BONDS)[17]. *Also see aromatic ring, benzene, double bond, hydrocarbon isoparaffins, naphthenes, olefins, paraffins, PIANO and petroleum.*

aromaticity ratio (B), *n* – [PETROLEUM CHEMISTRY] the ratio of TOLUENE to *n*-heptane[34].

aromatic ring, *n* – [PETROLEUM CHEMISTRY] an exceptionally stable planar ring of ATOMS with resonance structures that consist of alternating double and single BONDS, such as BENZENE[17]. *Also see aromatic and benzene.*

Arrhenius Equation, *n* – [CHEMISTRY] In 1889, Svante Arrhenius explained the variation of rate constants with TEMPERATURE for several elementary reactions using the relationship,

$$k = A \exp(-E_a/RT)$$

where, the rate constant k is the total frequency of collisions between reaction MOLECULES A times the fraction of collisions $\exp(-E_a/RT)$ that have an ENERGY that exceeds a threshold activation energy E_a at a temperature of T (in kelvins). R is the universal gas constant[17].

arroyo, *n* – [GEOLOGY] *from Spanish,* a small, deep, usually dry CHANNEL eroded by a short-lived or intermittent DESERT stream[16]. *Also known as a wadi.*

arroyo-running, *n* – [GEOLOGY] a phase of local flooding characterized by a temporary mountain torrent debouching from a CANYON and spreading out over a great fan[16].

artesian, *n* – [HYDROGEOLOGY] *from French,* of, being, or concerning an AQUIFER in which the water rises to above the top of the geologic formation due to PRESSURE from overlying water[16]. Word based on the French region *Artois*. *Also see aquifer, confined and flowing artesian.*

artesian basin, *n* – [HYDROGEOLOGY] a TERRANE, often but not necessarily basin-shaped, including a CONFINED AQUIFER whose POTENTIOMETRIC SURFACE typically is above the land surface in the topographically lower portion of the terrane[16].

artesian discharge, *n* – [HYDROGEOLOGY] DISCHARGE of water from a WELL, SPRING or AQUIFER under ARTESIAN PRESSURE[16]. *Also see artesian and artesian pressure.*

artesian flow, *n* – [HYDROGEOLOGY] movement of water from a WELL or SPRING under conditions in which the ARTESIAN HEAD is sufficient for the water to flow above the land surface[16]. *Also see artesian head.*

artesian head, *n* – [HYDROGEOLOGY] ELEVATION of the PIEZOMETRIC SURFACE in an artesian AQUIFER above a given DATUM[16].

artesian leakage, *n* – [HYDROGEOLOGY] GROUND-WATER FLOW from a CONFINED AQUIFER into confining beds[16].

artesian pressure, *n* – [HYDROGEOLOGY] HYDROSTATIC PRESSURE of artesian water, often expressed in terms of pounds per square inch at the land surface[16].

artesian spring, *n* – [HYDROGEOLOGY] SPRING yielding water from an ARTESIAN AQUIFER, generally through some FISSURE or other opening in the CONFINING BED that overlies the aquifer[16]. *Also see spring.*

articulation, *n* – [HYDROLOGY] the ratio of area of inlets and bays to the total area of the water body[63].

artifact, *n* – [CHEMISTRY] something created by humans and remaining behind[15].

> DISCUSSION – Commonly there are laboratory and sampling artifacts detected in environmental samples, such as acetone, methylene chloride or phthalates.

artificial, *n* – [ECOLOGY] not real, imitation, fake[15]. *Also see ambient, anthropogenic and natural.*

artificial recharge, *n* – [HYDROGEOLOGY] *1*. the addition of SURFACE WATER to a ground-water reservoir by human activity, such as putting surface water into a spreading basin. *2*. the designed (as per man's activities as opposed to the NATURAL or incidental) replenishment of ground-water storage from surface water supplies such as irrigation or induced infiltration from STREAMS or wells. There exist five common techniques to effect artificial recharge of a ground-water basin[33].

asbestos, *n* — [MINERALOGY] six naturally occurring fibrous MINERALS found in certain types of ROCK formations. Of the six, the minerals chrysotile, amosite, and crocidolite have been most commonly used in building products. When mined and processed, asbestos is typically separated into very thin fibers. Because asbestos is strong, incombustible, and corrosion resistant, asbestos was used in many commercial products beginning early in this century and peaking in the period from WorldWar II into the 1970s. When inhaled in sufficient quantities, asbestos fibers can cause serious health problems[17]. *Also see mountain wood.*

asbestos-containing material, *n* – [CONSTRUCTION TECHNOLOGY] a building material containing more than one percent (1 %) asbestos based on analysis using polarized light microscopy (PLM)[28].

aseptic, *adj* – [TOXICOLOGY] free from pathogenic or contaminating organisms[20].

ash, *n* — [GEOLOGY] the RESIDUE remaining after IGNITION of a SUBSTANCE as determined by definite prescribed METHODS[28].

> DISCUSSION—Ash may not be identical in composition or quantity with the inorganic substances present in the analysis sample before ignition.

ash cone, *n* – [GEOLOGY] a VOLCANIC CONE made entirely, or almost entirely, of ASH. In general, ash cones are small in stature, although there are a few of major proportions[6]. *Also see ash and volcano.*

ash flow—*See nuée ardente.*

aspect, *n* – [GEOLOGY] the direction in which a slope faces, especially in the context of exposure or different degrees of insolation[6].

asphalt, *n* – [PETROLEUM CHEMISTRY] thick, viscous mixture of HYDROCARBONS found in the RESIDUE of PETROLEUM DISTILLATION[4]. *Also known as pitch. Also see asphaltenes, hydrocarbons and petroleum.*

asphaltenes, *n* – [PETROLEUM CHEMISTRY] a complex mixture of heavy ORGANIC COMPOUNDS precipitated from oils and extracts by natural processes (associated with crude oils) or in the laboratory by addition of excess *n*-pentane, *n*-hexane or *n*-heptane. After precipitation of asphaltenes, the remaining oil or bitumen consists of SATURATES, AROMATICS and nitrogen-, sulfur-, or oxygen-containing (NSO) compounds[34]. *Also see asphalt.*

assay, *n* – [CHEMISTRY] a TEST for a specific CHEMICAL, MICROBE, or effect.

assertion, *n* – [LAW] a declaration or forthright statement[15]. *Also see assumption and conclusion*.

assessment, *n* – [ENVIRONMENTAL INVESTIGATION] the action or an instance of determining the importance,

size, or VALUE of a certain object or location, etc. *Also see evaluation and investigation.*

assessment monitoring, *n* — [ENVIRONMENTAL INVESTIGATION] an INVESTIGATIVE MONITORING program that is initiated after the presence of a CONTAMINANT in GROUND WATER has been detected. The objective of this program is to determine the concentration of CONSTITUENTS that have contaminated the ground water and to quantify the RATE and extent of migration of these constituents. *Also see compliance monitoring.*

assessment of damages, *n* – [LAW] after an interlocutory JUDGMENT has been obtained, the damages must be, ascertained; the act of thus fixing the amount of damages is called the ASSESSMENT of damages[19]. *Also see actual damages and damages.*

assimilation, *n* – [HYDROGEOLOGY] the ability of a body of water to purify itself of (particularly organic) pollution[16]. *Also known as assimilative capacity*.

assimilative capacity, *n* – [SOIL SCIENCE] process by which a solute or contaminant within a soil is transformed to non-toxix metabolites[68].

associated gas, *n* – [PETROLEUM CHEMISTRY] NATURAL GAS that occurs with OIL, either dissolved in the oil or as a gas cap above the oil[34]. *Also see natural gas.*

assumption, *n* – [LOGIC] the act of conceding or taking for granted[15]. *Also see assertion and conclusion*.

asymmetrical fold, *n* – [GEOLOGY] a FOLD, either ANTICLINE or SYNCLINE, in which the axial plane is not vertical and which results in one of the limbs dipping more steeply than the other[6]. *Also see anticline, fold and syncline.*

asymmetrical valley, *n* – [GEOGRAPHY] a VALLEY in which the slope on one of the sides is greater than that of the other[6].

asymptote, *n* – [MATHEMATICS] a line that is considered to be the limit to a curve. As the curve approaches the asymptote, the distance separating the curve and the asymptote continues to decrease, but the curve never actually intersects the asymptote[24].

at-a-station, *n* – [HYDROLOGY] the term applied by hydrologists to all observations made at one point on a river by gauging its discharge. Such observations will provide information on changes of flow over a time period, and should be distinguished from observations made at one time but at many places along the river[6].

atlas, *n* – [GEOGRAPHY] a collection of MAPS bound into a volume[15].

atmosphere, *n* – [METEOROLOGY] *1*. the body of AIR and GAS which surrounds the EARTH[23]. *Also see bathysphere, hydrosphere and lithosphere*.

atmosphere, *n* – [CHEMISTRY] a unit of PRESSURE, equal to a barometer reading of 760 millimeters of mercury (Hg). One atmosphere is 101,325 pascals and 1.01325 bar[17]. *Also known as atmospheric pressure.*

atmospheric distillation, *n* – [PETROLEUM TECHNOLOGY] a unit within a PETROLEUM REFINERY that distills CRUDE OIL into fractions. *Also see vacuum distillation.*

atmospheric pressure, *n* – [METEOROLOGY] the pressure of the atmosphere. *See atmosphere.*

atoll, *n* – [GEOGRAPHY] a ring-shaped coral REEF surrounding a LAGOON[6]. *Also see barrier island, bay, island, islet, motu and lagoon.*

atom, *n* – [CHEMISTRY] the smallest unit of an ELEMENT that retains the physico-chemical properties of that element[24]. *Also see element and molecule.*

atomic absorption spectroscopy (AAS), *n* – [CHEMISTRY] an analytical technique in which a sample is vaporized and the non-excited ATOMS absorb ELECTROMAGNETIC RADIATION at characteristic WAVELENGTHS. Used predominantly for the measurement and identification of INORGANICS such as METALS[24]. *Also see spectroscopy*.

atomic mass unit, *n* – [CHEMISTRY] a unit of MASS equal to 1/12 the mass of a carbon-12 NUCLEUS, which is $1.66053873 \times 10^{-27}$ kg $\pm$ $0.00000013 \times 10^{-27}$ kg[24]. Abbreviated as amu or u. Sometimes called the dalton, after John Dalton, architect of the first modern atomic *theory*.

atomic number, *n* – [CHEMISTRY] the number of PROTONS in the NUCLEUS of a given ATOM. ELEMENTS are distinguished from each other by their atomic numbers[24]. *Also see atomic weight.*

atomic theory, *n* – [PHYSICS] a theory of the nature of matter, which states that matter is composed of discrete units called ATOMS, as opposed to the obsolete notion that matter could be divided into any arbitrarily small quantity. The word "atom" is derived from the Greek word "atomos", meaning indivisible.

atomic volume, *n* – [CHEMISTRY] the relative ATOMIC MASS of an ELEMENT divided by its DENSITY[24]. *Also see atomic mass.*

atomic weight, *n* – [CHEMISTRY] the average MASS of an ATOM of an ELEMENT, usually expressed in atomic mass units. The terms mass and WEIGHT are used interchangeably in this case. The atomic weight given on the PERIODIC TABLE is a weighted average of ISOTOPIC masses found in a typical terrestrial sample of the element[24]. *Also known as relative atomic mass. Also see atomic number.*

atrazine, *n* — [CHEMISTRY] an HERBICIDE listed by the U.S. Environmental Protection Agency (EPA) as a "possible human carcinogen" and found frequently in streams and rivers, particularly following floods and periods of heavy rain and runoff from agricultural lands. Atrazine is used extensively for weed control for corn, sorghum, and sugarcane. Along with another common farm herbicide, CYANAZINE, atrazine concentrations can soar to levels much higher than federal standards during the peak growing season. *Also see herbicide and pesticide*.

attached-dune, *n* – [GEOLOGY] a sand-dune which occurs in deserts as a result of accumulation around a rock or other obstacle[6].

attached ground water, *n* – [HYDROGEOLOGY] portion of GROUND WATER adhering to the pore walls. It is assumed to be equal in amount to the residual water after DRAINAGE[35]. *Also known as field capacity and specific retention.*

attapulgite clay, *n* — [MINERALOGY] a chain-lattice CLAY MINERAL. The term also applies to a group of clay materials that are lightweight, tough, matted, and fibrous[13].

attenuation, *n* – [REMEDIATION TECHNOLOGY] general term that relates to the reduction in MAGNITUDE, intensity, or CONCENTRATION of a SUBSTANCE once it has been released to the environment[29]. *Also enhanced natural attenuation, natural attenuation and monitored natural attenuation.*

Atterberg Limits, *n* – [AGRONOMY] the transition points between various states of SOIL CONSISTENCY[4]. The Atterberg Limits consist of:

> ***liquid limit*** - water content at which the soil passes from the liquid to the plastic state.
>
> ***plastic limit*** - water content at which the soil passes from the plastic to the semi-solid state.
>
> ***shrinkage limit*** - water content at which the soil passes from the semi-solid to the solid state.

attest, *v* – [LAW] to affirm to be true or genuine. Some states allow an attestation prior to giving TESTIMONY for those not religiously inclined[19]. *Also see oath.*

attorney, *n* – [LAW] in the most general sense, this term denotes an AGENT or substitute, or one who is appointed and authorized to act in the place or stead of another[19]. In its most common usage, however, unless a contrary meaning is clearly intended, this term means *attorney at law. Also see counselor at law and lawyer*.

attorney-client privilege, *n* – [LAW] a client, whether or not a party, may have the privilege to refuse to disclose, and to prevent another from disclosing, a confidential communication between client and LAWYER. Most US states have a similar doctrine, whether by statute or otherwise[19].

attribute, *n* — [STATISTICS] a quality of SAMPLES or a POPULATION[15]. *Also see quality.*

attrition, *n* – [GEOLOGY] the mutual wearing down of rock particles during transport by WIND, WATER, or ICE, so that they become reduced in size, smoothed and rounded[4]. *Not to be confused with abrasion. Also see abrasion and erosion*.

aufeis, *n* – [HYDROLOGY] *from German,* ICE formed when BROOK WATER or underground water emerges and freezes on previously formed ice[6]. *Also see ice.*

auger, *n* – [DRILLING TECHNOLOGY] a tool for drilling into UNCONSOLIDATED earth materials consisting of a spiral blade wound around a central stem or shaft that can be hollow[6].

austral, *adj* – [GEOGRAPHY] relating to the Southern Hemisphere.

autecology, *n* – [ECOLOGY] the study of single ORGANISMS and how they relate to their ENVIRONMENTS. *Also see synecology.*

authigenic, *adj* – [GEOLOGY] a term used to describe a PHENOMENON which developed *in situ*. It is particularly used to describe SEDIMENTARY MATERIAL which is produced after the formation of the ROCK in which it occurs, such as growth of CALCITE on shell fragments and the secondary overgrowth of QUARTZ on sand grains[6].

authority, *n* – [LAW] *1*. persons in command; specifically, GOVERNMENT. A governmental agency or corporation to administer a revenue-producing public enterprise. 2. a citation (as from a book or file) used in defense or support[15].

autochthonous, *adj* – [GEOLOGY] denoting any feature which is non-transported. An autochthonous sediment is one in which the main constituents have been formed *in situ*. *Also see allochthonous*.

autocorrelation, *n* – [MATHEMATICS] internal correlation between members of a series of observations ordered in time and space[68].

autocorrelation coefficient, *n* – [STATISTICS] measure of the autocorrelation between pairs of a series given by their covariance divided by the variance of the series[68].

autogas—*See liquefied petroleum gas.*

automatic sampler, *n* -- [ENVIRONMENTAL INVESTIGATION] a device designed to collect samples at preset times or when triggered by some other parameter such as water level.

autopiracy, *n* – [HYDROLOGY] capture of an upper part of a STREAM by its lower part, as by the cutting-

off of a MEANDER, generally resulting in a shortening of its own course[16].

autotrophic, *adj* – [BIOLOGY] characteristic of BACTERIA that can oxidize inorganic material[34]. *Also see heterotrophic.*

auwai, *n* – [HYDROLOGY] *from Hawaiian,* a water course or CHANNEL, especially one used for irrigation[16].

auxiliary variable, *n* — [STATISTICS] the secondary characteristic or MEASUREMENT of interest[28].

> DISCUSSION—In ranked set sampling, information contained in an auxiliary variable is useful for ranking the samples. This ranking may mimic the rankings of the samples with respect to the values of the primary variable when there is correlation between the auxiliary variable and the primary variable. Auxiliary information may include visual inspection, inexpensive quick measurement, and KNOWLEDGE of operational history, previous site data, or any other similar information.

available water, *n* – [AGRONOMY] that portion of soil water that can be readily absorbed by plant roots[6]. *Also see field capacity*.

avalanche, *n* – [GEOLOGY] a fall or slide of a large mass, as of SNOW or ROCK, down a mountainside[6].

aven, *n* – [GEOLOGY] *from French*, a deep shaft-like hole in limestone terrain, leading down into extensive cave systems[6]. *Also see gouffre, ponor, pot-hole and swallow hole.*

average, *n* – [STATISTICS] in ordinary usage, often understood to refer to the ARITHMETIC MEAN. Generally, it purports to represent or to summarize the relevant features of a set of VALUES, such as the median and the MODE. In a more limited sense, an average compounds all the values of the set, such as the arithmetic or geometric means[24]. *Also see mean and mode.*

average linear velocity, *n* – [HYDROGEOLOGY] the mean rate that ground-water molecules flow; the specific discharge of ground water divided by the effective porosity[16].

aviation gasoline, *n* – [PETROLEUM CHEMISTRY] FUEL, known as avgas, used mainly by small airplanes and light helicopters, but there is also a significant number of military and civilian transports powered by large piston engines that use avgas. Avgas continues to contain lead ADDITIVES, ETHYLENE DIBROMIDE (EDB) and has a carbon range between C_4 and C_{10}. It is a complex mixture of relatively VOLATILE HYDROCARBONS with or without small quantities of additives, blended to form a fuel suitable for use in aviation reciprocating engines. Fuel specifications are provided in ASTM Specification D 910 and Military Specification MIL-G-5572. Naphthas which will be used for blending or compounding into finished aviation gasoline (such as straight-run gasoline, alkylate, reformate, benzene, toluene, and xylene). Excludes oxygenates (alcohols, ethers), butane, and pentanes plus. Oxygenates are reported as other hydrocarbons, hydrogen, and oxygenates[36]. *Also see gasoline and jet fuel.*

Avogadro's Number, *n* – [CHEMISTRY] the number of PARTICLES in one MOLE, equal to $6.02214199 \times 10^{23}$ mol^{-1} (" 0.00000047 mol^{-1})[24]. *Also see molarity and mole.*

avon, *n* – [GEOGRAPHY] *from Celtic,* a RIVER[16].

avulsion, *n* – [HYDROLOGY] *1*. the abandonment of a RIVER CHANNEL and the establishment of a new channel at a lower elevation on its FLOODPLAIN as a result of a flood[6]. *2*. marked changes in the shore of a water body or the course of a stream (such as may result from wave erosion) involving extensive removal and redeposition of soil or sediment; such changes affect riparian property rights and raise legal questions concerning property lines and ownership of the transported and redeposited material[63].

award, *n* – [LAW] the amount and/or form of a JUDGMENT a JUDGE or JURY gives the successful party in a LAWSUIT. It is often, but not always, an amount of money[19].

axial stream, *n* – [HYDROLOGY] *1*. the mean STREAM of an INTERMONTANE VALLEY, flowing in the deepest part of the valley and parallel to its longest dimension. *2*. a stream that follows the AXIS of a SYNCLINE or ANTICLINE[16].

axiom, *n* – [LOGIC] an established or widely held PRINCIPLE[15]. *Also see principle.*

axis, *n* – [GEOGRAPHY] an imaginary line about which a body rotates or about which a PLANE figure is conceived as generating a solid.

axis, *n* – [MATHEMATICS] a fixed reference line for the MEASUREMENT of coordinates[15]. The y-axis normally represent the vertical, whereas the x-axis represents the horizontal. *Also see coordinate.*

ayre, *n* – [GEOGRAPHY] a body of water divided from the sea by a narrow bar of land.

azeotrope, *n* – [CHEMISTRY] a mixture of LIQUIDS whose DISTILLATION characteristics do not conform to RAOULT'S LAW. Azeotropic distillation is a method of separating materials having very similar boiling points[17].

azimuth, *n* – [GEOGRAPHY] the horizontal angular distance between the vertical PLANE passing through the observer and the Poles of the earth and the vertical plane passing through the observer and the given object; it may be measured in degrees (0^o – 180^o) eastward or westward from the Pole, as in

nautical astronomy or in degrees (0^o – 360^o) clockwise from true north, as in meteorology[6].

azimuthal projection, *n* – [GEOGRAPHY] a type of MAP PROJECTION constructed as if a plane was to be placed tangential to the surface of the Earth and the portions of the surface covered were to be projected onto the plane. Thus, all points have their true compass bearings[6].

azoic, *adj* – [BIOLOGY] a term meaning without LIFE. *1*. the period of earth history before organic life. *2*. those parts of the ocean where ORGANISMS cannot exist[6].

azonal soil, *n* – [AGRONOMY] SOILS without distinct layering in HORIZONS[6].

Bb

back, *n* – [GEOLOGY] the ceiling or roof of an underground MINE[4].

backarc basin, *n* – [GEOLOGY] a depression landward of a volcanic arc in a subduction zone, which is lined with trapped SEDIMENT from the volcanic arc and the plate interior[4]. *Also see forearc basin*.

backhoe, *n* – [ENVIRONMENTAL INVESTIGATION] the most versatile rig used for trenching. The basic action involves extending its bucket forward with its teeth-armed lip pointing downward and then pulling it back toward the source of power.

background, *n* – [CHEMISTRY] the CONCENTRATION of a SUBSTANCE in an ENVIRONMENTAL MEDIA (AIR, WATER, SOIL, etc.) that occurs NATURALLY or is not the result of human activities[22].

background, *n* – [TOXICOLOGY] in exposure ASSESSMENT, the concentration of a substance in a defined control area, during a fixed period of TIME before, during, or after a data-gathering operation. *Also see ambient and natural.*

background ground-water contamination, *n* – [HYDROGEOLOGY] CONCENTRATIONS of HAZARDOUS SUBSTANCES, HAZARDOUS WASTE and POLLUTANTS in GROUND WATER that originated from either natural sources (that is, non-man-made) or upgradient, offsite discharges (that is, man-made, non-site-related discharges). Background ground-water contamination may include, but is not limited to, the same contaminants present both on the site and off the site at upgradient locations, or parent contaminants detected off the site at upgradient locations and daughter products of these parent contaminants detected on the site[18]. *Also see ambient and natural.*

backfill, *n* – [AGRONOMY] SOIL used to fill an EXCAVATION[4]. *Also see fill.*

backlimb, *n* – [GEOLOGY] the more gently dipping side of an asymmetrical ANTICLINE[4].

backset bed, *n* – [GEOLOGY] a CROSS-BED that dips against the direction of flow, such as an inclined layer of sand deposited on the gentle windward slope of a transverse DUNE[4].

backshore, *n* – [GEOLOGY] the portion of a BEACH that extends from the high-tide line inland to the sea cliff or vegetation line. SWASH reaches the backshore only during major storms[4].

backslope, *n* – [GEOLOGY] the gentler slope of a CUESTA or FAULT BLOCK. It may be unrelated to the dip of the underlying rocks[4].

backswamp, *n* – [HYDROLOGY] the section of a FLOODPLAIN where deposits of fine silts and clays settle after a flood. Backswamps usually lie behind a stream's natural LEVEES[4].

back wall, *n* – [GEOLOGY] the steep slope at the back of a GLACIAL CIRQUE[6].

backwash, *n* – [HYDROLOGY] the seaward return of water running down the foreshore of a BEACH following an uprush of waves[4].

backwater, *n* – [HYDROLOGY] that part of a RIVER in which current velocity is low and the water virtually unmoving or stagnant[6].

backwoods, *n* – [GEOGRAPHY] a sparsely settled, partially cleared LAND; generally an area of pioneer settlement[45].

bacteria (pl.), bacterium (s.), *n* -- [BIOLOGY] a diverse group of ubiquitous MICROORGANISMS all of which consist of a single CELL that lacks a distinct nuclear membrane and has a cell wall of a unique COMPOSITION[24]. *Also see microorganism, microbe and virus.*

bacterial lawn, *n* – [BIOLOGY] a continuous layer or cover of BACTERIA on the surface of a growth medium, used to culture coliphage for analysis.[3]

bad faith, *n* – [LAW] *1*. dishonesty or fraud in a transaction, such as entering into an AGREEMENT with no intention of ever living up to its terms, or knowingly misrepresenting the quality of something that is being bought or sold. *2*. intent to deceive. A person who intentionally tries to deceive or mislead another in order to gain some advantage[19].

badlands, *n* – [GEOLOGY] term used to describe a semi-ARID LANDSCAPE that has been influenced by heavy FLUVIAL EROSION. Characterized by deep RAVINES and GULLIES, shape RIDGES, and a generally barren surface[6]. Such as the Badlands of South Dakota.

Baer's Law, *n* – [GEOLOGY] named after Karl Ernst von Baer, a German geologist, the law states that, because of the rotation of the earth, in the Northern Hemisphere, erosion occurs mostly on the right banks of rivers and in the Southern Hemisphere on the left banks.

baffle, *n* — [HYDROLOGY] a pier, WEIR, sill, fence, wall, or MOUND built on the bed of a STREAM to parry, deflect, check, or regulate the flow or to float on the surface to dampen the wave action. *2*. a structure within an OIL-WATER SEPARATOR which allows the two PHASES to separate. *Also see oil-water separator.*

bafflestone, *n* – [GEOLOGY] a sedimentary rock which formed because organisms acted as baffles during deposition, reducing the local depositional energy.

The rock will contain traces of baffling organisms and smaller grains that would be expected from the paleocurrent strength.

bahía–*See bay.*

bail-down test, *n* – [HYDROGEOLOGY] a type of SLUG TEST performed by using a BAILER to remove a volume of water from a small-diameter well[33]. *Also known as a bail test.*

bailer, *n* — [HYDROGEOLOGY] a hollow tubular receptacle used to facilitate withdrawal of *fluid* from a WELL or BOREHOLE[4].

bailiff, *n* – [LAW] a minor officer of some U.S. COURTS usually serving as a messenger or usher[19].

bajada, *n* – [GEOLOGY] *from Spanish,* consecutive series of ALLUVIAL FANS forming along the edge of a linear MOUNTAIN RANGE. Surface of this feature undulates in a rolling fashion as one moves from the center of one alluvial fan to another. Normally occurs in ARID CLIMATES[6]. *Also spelled bahada*.

bald-headed anticline, *n* – [GEOLOGY] an ANTICLINE whose CREST has been eroded prior to deposition of an unconformably overlying SEDIMENTARY unit[4].

balk, *n* – [GEOGRAPHY] a section of unploughed land between ploughed areas. In open-field systems, holdings were divided by such areas of grass[45].

ballast, *n* – [CONSTRUCTION TECHNOLOGY] broken STONE, GRAVEL, SLAG or similar material used in the roadbed of a railroad to provide a firm base for the ties[4].

ball clay, *n* – [AGRONOMY] a highly PLASTIC CLAY, sometimes refractory clay, commonly characterized by the presence of organic matter, having unfired colors ranging from light bluff to various shades of gray and used as a bonding constituent of ceramic wares[4].

ballena, *n* – [GEOLOGY] a major LANDFORM comprising distinctively round topped ridgeline remnants of fan ALLUVIUM. The RIDGE'S broadly rounded shoulders meet from either side to form a narrow CREST and merge smoothly with the CONCAVE backslopes. In ideal examples, the slightly concave footslopes of adjacent ballenas merge to form a smoothly rounded drainageway.

ball valve, *n* – [PUMPING TECHNOLOGY] valve that contains a sphere with a hole through it, the "ball" can be rotated thus turning the valve on or off, similar to a plug valve in function.

banco, *n* – [HYDROLOGY] an OXBOW LAKE or MEANDER cutt off from a RIVER by an alteration in its course[4].

band, *n* – [GEOLOGY] a STRATUM or LAMINA conspicuous because it differs in color or lithology from adjacent layers[4].

banded coal, *n* – [GEOLOGY] COAL containing bands of varying LUSTER, usually BITUMINOUS, although it occurs in all ranks[4].

banded iron formation, *n* – [GEOLOGY] a ROCK that is made up of alternating light SILICA-rich layers and dark-colored layers of IRON-rich minerals, which were deposited in MARINE basins on every continent about 2 billion years ago[4].

bank, *n* – [HYDROLOGY] *1*. the sloping edge of LAND, often raised, alongside a WATER body such as a RIVER[4]. *2*. a long, narrow ISLAND along the Atlantic coast of the USA, composed of SAND, forming a barrier between a LAGOON and the ocean. *3*. a SHOAL. *Also see bank storage, levee and shoal.*

bank filtration, *n* – [HYDROLOGY] an improvement in water quality observed during the process of INDUCED RECHARGE[61].

bankfull stage, *n* – [HYDROLOGY] the maximum amount of water that a CHANNEL can carry is when the RIVER reaches the very top of the BANKS. Over bankfull and the river will flood[16].

bank storage, *n* -- [HYDROLOGY] WATER absorbed and stored in the permeable bed and BANKS of a STREAM, LAKE or RESERVOIR and returned in whole or in part as the level of the surface of the water body falls[16]. *Also see bank.*

bar, *n* – [PHYSICS] unit of pressure equal to 10^5 pascals or 10^6 dynes per square centimeters, approximately 750 millimeters of mercury or 0.987 atmospheres[24]. *Also see atmosphere and pressure.*

bar, *n* – [LAW] the collective ATTORNEYS or LAWYERS permitted to practice in a particular JURISDICTION[19]. *Also see attorney, counselor and lawyer***.**

barachois, *n* – [GEOGRAPHY] a term often used in Atlantic Canada and Saint Pierre & Miquelon to describe a coastal LAGOON separated from the OCEAN by a SAND BAR. Salt water may enter the barachois during high tide. The sand bar often is formed as a result of SEDIMENT deposited in the DELTA region of a RIVER or - as is the case in Miquelon - by a TOMBOLO.

barbed drainage pattern, *n* – [HYDROLOGY] a DRAINAGE PATTERN produced by TRIBUTARIES that join the main STREAM in sharp bends that point upstream; it is usually the result of stream piracy that has reversed the direction of flow of the main stream[4].

barchan, *n* – [GEOLOGY] a DUNE having a crescentic ground plan, with the CONVEX side facing the wind; the gentler slope is on the convex side[4].

barge, *n* – [PETROLEUM TECHNOLOGY] a vessel carrying OIL usually on RIVERS, containing between 8,000 to 50,000 bbl or weighing 1,000 to 10,000mt. In the US,

barges can be up to 100,000 bbl, and some barges can even exceed this.

bark, *n* – [DENDROLOGY] the skin or covering of branches and ROOTS of a TREE. A relatively waterproof layer that protects the tree from insects, fungus, etc., and stops it from drying out. As the trunk grows, for many trees, the bark cracks as it expanded around the trees[12]. *Also see cambium, phloem and xylem.*

barminutor–*See communitor.*

barrage, *n* – [HYDROLOGY] a large structure, usually of concrete, sometimes of earth, built across a RIVER usually to hold back a large body of water for irrigation and for supply to domestic and industrial users[45].

barranca, *n* – [GEOLOGY] *from Spanish,* a deep RAVINE cut by STREAM action on the slope of a VOLCANO[6].

barrel, *n* – [PETROLEUM TECHNOLOGY] unit of volume equal to 42 U.S. gallons[34].

barrel sampler, *n* – [DRILLING TECHNOLOGY] open-ended steel tube used to collect soil samples. The sampler has a sharpened end, or "shoe," that is pushed or driven into the ground. A soil core is collected inside of sampler.

barrier, *n* – [GEOLOGY] a GEOLOGICAL FORMATION or part of a formation having become impervious to GROUND-WATER FLOW caused by a facies change[4].

barrier beach, *n* – [GEOLOGY] a long and narrow BEACH of SAND and/or GRAVEL that runs parallel to the coastline and is not submerged by the TIDE[4].

barrier boundary, *n* – [HYDROGEOLOGY] an AQUIFER-system BOUNDARY represented by a rock mass that is not a source of water[33].

barrier flat, *n* – [HYDROLOGY] the relatively flat area, often occupied by pools of water, separating the exposed or seaward edge of a BARRIER BEACH or ISLAND and the LAGOON behind it[4]. *Also see barrier beach, barrier island and lagoon.*

barrier island, *n* – [GEOLOGY] a RIDGE of SAND that runs parallel to the main COAST but is separated from it by a BAY or LAGOON. Barrier islands range from 10 to 100 kilometers in length and from 2 to 5 KILOMETERS in width[4]. A barrier island may be as high as 6 *meters* above *sea level*. *Also see atoll, bay, barrier beach, barrier flat and lagoon.*

barrier reef, *n* – [GEOLOGY] a long, narrow REEF that runs parallel to the main COAST but is separated from it by a wide LAGOON[4]. *Also see atoll, bay, lagoon and reef.*

barrier zone, *n* – [DENDROLOGY] woody tissue formed by the CAMBIUM after wounding; it differs from the normal XYLEM as regards to structure and chemical composition[12].

bar screen, *n* – [TREATMENT TECHNOLOGY] in a waste-treatment plant, a screen that removes large suspended solids[63].

baryon, *n* – [PHYSICS] a composite particle made of three QUARKS. Baryons are opposed to MESONS which are made of one quark and one antiquark. Both baryons and mesons belong to the HADRON family, which are the particles made of quarks.

basal conglomerate, *n* – [GEOLOGY] a CONGLOMERATE occurring at the lowest part of a stratigraphic section, usually resting above older rocks in an unconformable relationship[6].

basalt, *n* – [GEOLOGY] a dark, dense, APHANITIC, EXTRUSIVE ROCK that has a SILICA content of 40% to 50% and makes up most of the ocean floor. Basalt is the most abundant VOLCANIC rock in the Earth's *crust*[4]. *Also see diabase.*

basal sapping, *n* – [GEOLOGY] erosion concentrated along the base of a slope, causing undermining and recession of that slope[45].

base, *n* – [CHEMISTRY] ***1.*** a COMPOUND that REACTS with an ACID to form a SALT. ***2.*** a compound that produces hydroxide ions in AQUEOUS SOLUTION ***3.*** a MOLECULE or ION that captures HYDROGEN ions. ***4.*** a molecule or ion that donates an ELECTRON pair to form a CHEMICAL BOND[17]. *Also see acid.*

base, *n* – [MATHEMATICS] the number of different single-digit SYMBOLS used in a particular number system[24].

base exchange, *n* — [CHEMISTRY] the PHYSICOCHEMICAL PROCESS whereby one species of IONS ADSORBED on SOIL PARTICLES is replaced by another species[20].

baseflow, *n* – [HYDROGEOLOGY] the WATER in a STREAM derived originally from EFFLUENT GROUND WATER[16]. *Also see interflow and underflow.*

baseflow index, *n* – [HYDROLOGY] the ratio of of BASEFLOW to total flow for a given WATERCOURSE over a given period of time[61].

baseflow recession, *n* – [HYDROLOGY] the declining rate of DISCHARGE of a STREAM fed only by BASEFLOW for an extended period. Typically, a baseflow recession will be exponential[33].

baseflow recession curves, *n* – [HYDROLOGY] graphs of stream flow rate versus time displaying BASEFLOW RECESSIONS[61].

base level, *n* – [HYDROLOGY] the lowest point at which EROSION can occur. For rivers, this is usually sea level, though there are exceptions when rivers flow into areas that are lower than sea level[16].

baseline monitoring, *n* – [ENVIRONMENTAL INVESTIGATION] the establishment and operation of a designed surveillance system for continuous or periodic measurements and recording of existing and changing conditions that will be compared with future observations.

baseline risk assessment, *n* -- [TOXICOLOGY] an ASSESSMENT conducted before cleanup activities begin at a site to identify and evaluate the threat to human health and the environment. After remediation has been completed, the information obtained during a baseline risk assessment can be used to determine whether the cleanup levels were reached.

base level, *n* – [GEOMORPHOLOGY] the lowest elevation to which a STREAM can flow, often referred to as the 'mouth'. For large RIVERS, sea level is commonly the base level, but a large river or lake is likewise the base level for TRIBUTARY streams. All rivers and streams erode toward sea level, which is the ultimate base level.

base map, *n* – [GEOGRAPHY] a set of TOPOGRAPHIC DATA displayed in MAP form providing a frame of reference or contextual information to the user[6].

basement rock, *n* – [GEOLOGY] very old IGNEOUS and METAMORPHIC ROCKS found in continental CRUST. These rocks make up the continental shield[4]. *Also see bedrock, country rock and craton.*

base/neutral extractable compound (B/N), *n* – [CHEMISTRY] SEMIVOLATILE COMPOUNDS amenable to analysis by EXTRACTION of the SAMPLE with a pH neutral and a pH BASIC ORGANIC SOLVENT[18]. *Also see acid extractable compound.*

basicity factor, *n* – [CHEMISTRY] a measure of ALKALINITY, which can be used for comparing relative neutralization power of materials. It is determined as grams of calcium oxide equivalents per kilogram of material.

basin, *n* – [GEOLOGY] TOPOGRAPHIC ROCK STRUCTURE whose shape is concave downwards[4]. *Also see depression.*

basin and range, *n* – [GEOLOGY] a TOPOGRAPHY, LANDSCAPE, or physiographic province characterized by a series of tilted fault blocks forming longitudinal, asymmetric RIDGES or mountains and broad, intervening BASINS[4].

basisol, *n* – [AGRONOMY] a tropical soil, characterized by its blackness, its low organic content and its accumulation of calcium carbonate. It forms from the weathering of basalt under humid conditions[6].

batch, *n* – [ENVIRONMENTAL INVESTIGATION] a group of SAMPLES prepared at the same time in the same location using the same method.

batholith, *n* – [GEOLOGY] a massive, discordant PLUTON with a surface area greater than 100 square kilometers, typically having a depth of about 30 kilometers. Batholiths are generally found in elongated MOUNTAIN RANGES after the COUNTRY ROCK above them has eroded[4]. *Also see laccolith, lopolith and pluton.*

bathtub effect, *n* – [HYDROLOGY] *1*. the accumulation of LEACHATE in a LANDFILL containing a good LINER, but not equipped with a leachate collection and removal system. *2*. the accumulation of water in an excavation, especially an excavation for an underground tank, because of differences in the permeability of the soil and backfill.

bathyal, *adj* – [HYDROLOGY] pertaining to the benthonic environment on the continental slope, ranging in depth from 200 to 2,000 meters[4].

bathymetry, *n* – [HYDROLOGY] *1*. the measurement of the depth of large bodies of water. *2*. the measurement of water depth at various places in a body of water. Also the information derived from such measurements[16]. *Also see hydrography.*

bathysphere, *n* – [GEOLOGY] the inner portion of the earth below the LITHOSPHERE or outer CRUST[4]. *Also see atmosphere, hydrosphere and lithosphere.*

battery, *n* – [CHEMISTRY] a device consisting of one or more electrically connected electrochemical cells which is designed to receive, store, and deliver electric energy[15]. An electrochemical cell is a system consisting of an ANODE, CATHODE, and an ELECTROLYTE, plus such connections (electrical and mechanical) as may be needed to allow the cell to deliver or receive electrical energy. The term battery also includes an intact, unbroken battery from which the electrolyte has been removed.

Baumé gravity, *n* – [PETROLEUM CHEMISTRY] the specific WEIGHT of a LIQUID, measured on a scale based on the weight of water; it is used in the petroleum industry for denoting the specific weight of oils. For liquids lighter than water, degrees Baumé=140/(specific gravity of the liquid at 60°F)-130. *Also see API gravity*.

bauxite, *n* – [GEOLOGY] a CLAY-rich SOIL containing varying proportions of alumina; the chief source of ALUMINUM[4]. *Also see caliche and laterite.*

bay, *n* – [GEOGRAPHY] a body of sheltered WATER found in a crescent shaped COASTAL configuration of LAND[6]. *Also see bight, gulf and sound.*

baydzherakh—*See pingo.*

Bayesian Inference, *n* – [LOGIC] recognizes that a decision maker usually has some expectation (an a priori model) of what will occur even before

acquiring information, and provides a procedure for using new evidence to produce a revised a posteriori estimate of probability[11]. *Also see inference.*

bayhead beach, *n* – [GEOLOGY] an extensive DEPOSIT of SAND and/or GRAVEL in the form of a BEACH at the back of a BAY[6].

baymouth bar, *n* – [GEOLOGY] a BAR of SAND or GRAVEL extending partially or entirely across the MOUTH of a BAY. It usually connects two HEADLANDS, thus straightening the COAST[4].

bayou, *n* – [HYDROLOGY] a CREEK, secondary WATERCOURSE, or minor RIVER, TRIBUTARY to another river or other body of water. A term regularly used in the lower Mississippi River basin and in the Gulf-coast region of the United States to denote a large STREAM or creek, or small river, characterized by a slow or imperceptible CURRENT through alluvial lowlands or SWAMPS. May also refer to an ESTUARIAL creek or INLET on the Gulf coast; a small BAY, open COVE, or HARBOR; also, a LAGOON, LAKE or bay, as in a SEA MARSH or among salt-marsh ISLANDS[6].

bay-mouth bar, *n* -- [HYDROLOGY] a narrow DEPOSIT of SAND and/or GRAVEL found across the MOUTH of a BAY[4].

beach, *n* – [GEOLOGY] the part of a COAST that is washed by waves or TIDES, which cover it with SEDIMENTS of various sizes and COMPOSITION, such as SAND or PEBBLES[4].

beachrock, *n* – [GEOLOGY] *1*. ROCK composed of SAND GRAINS and/or sand-sized shell fragments cemented by calcium carbonate, commonly formed very rapidly on some beaches in tropical and sub-tropical areas. Beachrock generally occurs as thin beds between BEDDING PLANES that dip seawards at ANGLES similar to those of the beach slope[6]. *2*. a friable to indurated rock consisting of sand grains of various minerals cemented by calcium carbonate; occurs in thin beds dipping seaward at less than 15°. *Also known as beach sandstone.*

beaded stream, *n* – [GEOMORPHOLOGY] a stream characterized by narrow reaches linking pools or small lakes.

bearing capacity (of a pile), *n* – [PHYSICS] the load per pile required to produce a condition of failure[13].

becquerel, *n* – [PHYSICS] the SI unit of RADIOACTIVITY equal to one nuclear disintegration per second. The becquerel supersedes the curie, which equals 3.7 x 10^{10} nuclear disintegrations per second. One becquerel (Bq) equals 27.03 picocuries (pCi)[24]. *Also see curie.*

bed, *n* — [GEOLOGY] *1*. applies to ROCKS resulting from CONSOLIDATION of SEDIMENTS and exhibiting SURFACES of separation (BEDDING PLANES) between layers of the same or different materials, that is, SHALE, SILTSTONE, SANDSTONE, LIMESTONE, etc. *2*. collective term signifying the existence of layers of beds. Planes or other surfaces dividing SEDIMENTARY ROCKS of the same or different LITHOLOGY[4]. *Also known as bedding. Also see layer, seem and strata.*

bedding-plane fracture, *n* – [GEOLOGY] a FRACTURE or PARTING which occurs along the SURFACE separating layers of SEDIMENTARY ROCKS. Each bedding plane marks termination of one DEPOSIT and beginning of another of different character. *Also see bed, layer and strata.*

bed load, *n* – [HYDROLOGY] *1*. SEDIMENT PARTICLES up to ROCK, which slide and roll along the bottom of the streambed. *2*. material in movement along a STREAM bottom, or, if wind is the moving agent, along the surface[16].

bedrock, *n* – [GEOLOGY] general term for the ROCK, usually solid, that underlies SOIL or other UNCONSOLIDATED material[4].

bedrock (ledge), *n* — [GEOLOGY] ROCK of relatively great thickness and extent in its native location. A term often used by drillers.

beheaded stream, *n* — [HYDROLOGY] the lower section of a STREAM that has lost its upper portion through diversion or STREAM PIRACY[16].

belief, *n* – [SCIENTIFIC METHOD] conviction of the TRUTH of some statement or the reality of some being or PHENOMENON especially when based on examination of EVIDENCE[15]. *Also see opinion.*

belted coastal plain, *n* – [GEOLOGY] a broad, maturely dissected coastal plain on which a series of roughly parallel cuestas alternates with subsequent lowlands or VALES[4].

bench, *n* – [MINING] a level layer of earth or rock adjacent to a surface mine site[66].

bench mark, *n* – [GEOGRAPHY] a relatively permanent mark, natural or artificial, furnishing a survey point at a known ELEVATION in relation to an adopted datum. Bench marks, or marked points, connected by precise leveling, constitute the control of landsurface settlement in subsidence studies[4].

bench scale, *n* – [CHEMISTRY] bench scale testing is usually conducted in the laboratory, but is a simulated test in which conditions are approximate to those with which the item will be used.

bench trial, *n* – [LAW] also called a COURT TRIAL. A bench trial is another term for a trial before a JUDGE only without a JURY. In general, the parties begin with the presentation of EVIDENCE, although in some cases they make opening statements. After the PLAINTIFF

finishes presenting his or her evidence, the DEFENDANT presents his or her case. After the defendant concludes the presentation, the plaintiff may rebut the defendant's case. Rarely are closing arguments made. The judge may rule immediately, but more often takes anywhere from a few hours to a few weeks to consider the evidence and reach a DECISION[19]. *Also see jury trial.*

bend, *n* – [HYDROLOGY] a curve in a RIVER CHANNEL whose lateral changes involve a decrease in radius. Bends generally grow into MEANDER[4].

beneficiation, *n* – [CHEMISTRY] improvement of the chemical or physical properties of a raw material or intermediate product by the removal or modification of undesirable components or impurities[4].

benthic, *adj* – [BIOLOGY] an ORGANISM that feeds on the SEDIMENT at the bottom of a WATER body such as an OCEAN, LAKE, or RIVER[4].

benthic macroorganism, *n* – [BIOLOGY] an organism associated with the bottom material of a lake or stream, or with sludge and deposits in a trickling filter, large enough to be retained by a coarse-mesh screen (no. 30 sieve, having openings of 0.589 mm)[63].

benthic microorganism, *n* – [BIOLOGY] a bottom-dwelling organism small enough so that it will be retained only be a relatively fine-mesh screen (no. 100, having openings of 0.149 mm)[63].

bentonitic clay, *n* — [MINERALOGY] a CLAY with a high content of the MINERAL MONTMORILLONITE, usually characterized by high swelling on wetting[4]. *Also see drilling mud.*

benzene, *n* – [CHEMISTRY] a colorless, liquid, AROMATIC HYDROCARBON, C_6H_6 obtained through the refining of CRUDE OIL (formerly COAL TAR)[34]. *Also see coal tar and gasoline.*

benzine—*Also see motor gasoline and petrol.*

berg till, *n* – [GEOLOGY] GLACIAL TILL deposited intact by grounded icebergs in fresh or saline water bordering an ice sheet[4].

berm, *n* — [HYDROLOGY] 1. a narrow ledge or path as at the top or bottom of a slope, STREAM BANK, or along a BEACH[4]. 2. (Dam) a horizontal step or bench in the upstream or downstream face of an Embankment Dam.

Bernoulli's Equation, *n* **--** [PHYSICS] describes the behavior of a FLUID moving along a streamline. The original form, for incompressible flow, is:

$$\frac{v^2}{2} + gh + \frac{p}{\rho} = constant$$

where v is the fluid velocity along the streamline, g is acceleration due to GRAVITY on Earth, h is height from an arbitrary point in the direction of gravity, p is PRESSURE along the streamline and ρ is fluid density. These assumptions must be met for the equation to apply: 1. Non-viscous flow: VISCOSITY (internal friction) is zero. 2. Steady flow. 3. Incompressible flow: ρ is constant. 4. Generally, the equation applies along a streamline. For irrotational flow, it applies throughout the entire flow field. The decrease in pressure simultaneous with an increase in velocity, as predicted by the equation, is often called Bernoulli's principle. *Also see gravity, kinetic energy and potential energy.*

best available technology economically achievable (BAT), *n* — [ENVIRONMENTAL REGULATION] a national goal under the *Water Pollution Control Act* of 1972 (*Public Law 92–500*, commonly referred to as the *Clean Water Act*) which provides that industry shall use the best treatment technically and economically achievable for a category or class of point sources. Under this concept, pollution control will consider such factors as the age of the facilities and equipment involved, processes employed, engineering aspects of the control techniques, process changes, cost of the reductions, and environmental impacts other than water quality, including energy requirements.

best demonstrated achievable technology (BDAT), *n* – [ENVIRONMENTAL REGULATION] a technology that has demonstrated the ability to reduce a particular contaminant to a lower concentration than other currently available technologies. BDATs can change over time as technologies evolve.

best evidence, *n* – [LAW] a requirement that the most reliable proof of a fact be used[19].

best management practices (BMPs), *n* – [ENVIRONMENTAL REGULATION] schedules of activities, prohibitions of practices, maintenance procedures, and other management practices that prevent or reduce the pollution of water. They include treatment goals, operating procedures, and practices to control plant site runoff, spillage, or leaks, of sludge, waste disposal, or drainage from raw material storage.

beta oxidation, *n* – [BIODEGRADATION] the progressive cleavage of terminal ethyl groups from straight-chain hydrocarbons (*N*-ALKANES). Branched-chain ALIPHATICS (*ISO*-ALKANES) may also be degraded by beta oxidation after they are transformed into straight-chain fatty acids.

beta particle (β), *n* – [CHEMISTRY] an ELECTRON emitted during the DISINTEGRATION of some

RADIOACTIVE ELEMENTS[17]. *Also see alpha particle, gamma ray and radioactivity.*

beta radioactivity, *n* – [CHEMISTRY] radiation composed of a particle, consisting of an ELECTRON, spontaneously emitted from the NUCLEUS of a subset of radioactive ELEMENTS during radioactive decay. Beta radiation, like alpha radiation, is ionizing radiation—it strips electrons from adjacent atoms as it passes. Beta radiation can penetrate only the surface layer of skin; thus, a beta-particle emitting radionuclide must be ingested in order to contact internal organs or tissues. An accumulation of tissue damage in the cell nucleus may lead to cell mutation and potential cancer formation.[2] *Also see alpha radioactivity.*

beta radioactivity, gross, *n* – [CHEMISTRY] a laboratory measurement of total beta radioactivity emitted by a sample. This measurement includes radioactivity emitted by naturally occurring progeny of uranium and thorium, such as radium-228 and lead-210, and numerous other naturally occurring beta-particle-emitting radioactive isotopes such as potassium, as well as a host of manmade radionuclides.[2]

beta radioactivity count, *n* – [CHEMISTRY] an analytical technique that specifies total beta radioactivity emitted by a chemically purified sample that contains only one RADIONUCLIDE of interest. The beta-particle activity is counted in a low-background gas proportional counter.

beveled cliff, *n* – [GEOGRAPHY] a sea CLIFF in which the lower part comprises a steep or vertical free face and the upper part a gentler slope, often rectilinear in profile and covered by rock fragments and soil[45].

B horizon, *n* – [AGRONOMY] the zone in the soil profile that is enriched in CLAY MINERALS and in sesquioxides leached from the overlying A HORIZON. It is known as the "zone of accumulation"[4].

bias, *n* — [SCIENTIFIC METHOD] *1*. an OPINION of feeling or influence that strongly favors one side in an argument or one item in a group or series[15]. The persistent positive or negative deviation of the METHOD AVERAGE VALUE from the assumed or accepted true value[35]. *2*. the difference between the SAMPLE value of the test results and an accepted reference value.

> DISCUSSION—BIAS represents a constant error as opposed to a RANDOM ERROR. A method bias can be estimated by the difference (or relative difference) between a measured average and an accepted standard or reference value. The data from which the estimate is obtained should be statistically analyzed to establish bias in the presence of random error. A thorough bias investigation of a measurement procedure requires a statistically designed experiment to repeatedly measure, under essentially the same conditions, a set of standards or reference materials of known value that cover the range of application. Bias often varies with the range of application and should be reported accordingly.

biased sampling, *n* — [ENVIRONMENTAL INVESTIGATION] the taking of a SAMPLE(S) with prior KNOWLEDGE that the sampling result will be biased relative to the true VALUE of the POPULATION[28].

> DISCUSSION—This is the taking of a sample(s) based on available information or knowledge, especially in terms of visible signs or knowledge of contamination. This kind of sampling is used to detect the presence of localized contamination or to identify the source of a contamination. The sampling results are not intended for generalization to the entire population. This is one form of authoritative sampling. *See judgment sampling*.

bicarbonate, *n* – [CHEMISTRY] any acid salt of carbonic acid[4], such as HCO_3^- and CO_3^{2-}. *Also see calcite, carbonate, dolomite, hardness and limestone.*

bicyclic sesquiterpanes, *n* – [PETROLEUM CHEMISTRY] BIOMARKERS within the distillate range include bicyclic hydrocarbons known as sesquiterpanes. These hydrocarbons are 'low boiling' biomarkers that can provide diagnostic information about the source of distillate fuels. These compounds are "inherited" from the parent crude oil feedstock used in the production of this diesel fuel. These bicyclic compounds are relatively resistant to weathering (as compared to the *n*-alkanes and isoprenoids) and can be useful in recognizing distinct distillate fuel types in the environment34.

bifurcation, *n* — [HYDROLOGY] dividing structure which splits the flow of water[16].

bight, *n* – [GEOGRAPHY] a curve or recess in the coast line or river[6]. *Also see bay and gulf.*

bill , *n* – [LAW] a proposed LAW, to be debated and voted on[19].

billabong, *n* — [HYDROLOGY] *Australian, 1*. a dead-end CHANNEL extending from the main STREAM of a RIVER. *2*. a streambed filled with water only in the rainy season. *3*. a stagnant pool or backwater[16].

billion, *n* – [MATHEMATICS] a thousand million or 1 x 10^9. Note that, in the United Kingdom, a billion is equal to a million million or 1 x 10^{12}. *Also known as a milliard. Also see million.*

bill of lading, *n* – [LAW] documentation associated with a specific cargo and is signed by the captain of

the vessel (whether a ship, airplane or truck) and the contract supplier.

binary operation, *n* – [MATHEMATICS] an operation that involves two operands. For example, addition and subtraction are binary operations.

bindstone, *n* – [GEOLOGY] a sedimentary rock produce when organisms (such as algae) encrust the elements during deposition and bind them together.

binomial, *n* – [MATHEMATICS] an expression that is the sum of two terms[24].

binomial coefficient, *n* –[MATHEMATICS] the coefficients of x in the expansion of $(x+1)^n$.

bioassay, *n* – [TOXICOLOGY] a method of testing a material's effects on living organisms[22].

bioaugmentation, *n* -- [TREATMENT TECHNOLOGY] the introduction of MICROBES into the subsurface to increase BIODEGRADATION of CONTAMINANTS.

bioavailability, *n* – [ECOLOGY] the degree to which a material in environmental media can be assimilated by an organism.

biochemical oxygen demand—*See biological oxygen demand.*

biochemistry, *n* – [CHEMISTRY] the CHEMISTRY of living things, including the structure and function of biological MOLECULES and the mechanism and products of their REACTIONS[24].

bioclastic, *n* – [GEOLOGY] ROCK made up of broken ORGANIC remains[4].

biodegradable, *adj* – [BIOLOGY] capable of being broken down by living ORGANISMS, principally BACTERIA and FUNGI.

biodegradation, *n* – [BIOLOGY] MICROBIAL alteration of ORGANIC MATTER[34]. *Also see bacteria, biodegradable, bioremediation, decomposition, microbe, microorganism and remedial action.*

biodenitrification, *n* — [BIOLOGY] the controlled use of MICROBES, usually BACTERIA, to reduce level of NITRATES (NO_3^-) and thereby reclaim contaminated water or wastewater. The process consists of several stages to decompose the nitrates first into nitrites and then into nitrogen gas, N_2. Upon entering the treatment process, sodium sulfite (Na_2SO_3) is added as a reducing agent to the wastewater to remove the oxygen from the water. To break down the nitrates, the bacteria must have a carbon food source and typically ethanol is added for the bacteria to feed on. In order to survive, however, the bacteria need oxygen which they obtain by breaking down the nitrate ions, first to nitrite and then to harmless nitrogen gas.

biodiesel, *n* – [PETROLEUM TECHNOLOGY] a FUEL made at least in part from vegetable or vegetative materials and intended as a substitute for PETROLEUM-derived MOTOR DIESEL FUEL. *Also see alternative fuel.*

biodiversity, *n* – [ECOLOGY] the range of species in a given ECOSYSTEM.

bioenergetics, *n* – [BIOLOGY] the energy and mass transfer kinetics that are defined by microbial cell metabolism[66].

bioeroion, *n* – [GEOLOGY] the erosion of hard ocean substrates, and less often terrestrial substrates, by living organisms.

biofuel, *n* – [PETROLEUM TECHNOLOGY] the joint name of fuels which originate from plants (biomass). This can include everything from wood and straw to refined biofuels such as pellets and ethanol. Biofuels are converted solar energy; plants transform solar energy into chemical energy in the form of different types of sugar. Biofuels are renewable because they can be re-created in a relatively short period of time once they have been used, as long as we do not consume more than we grow. Cutting down too many trees can have a negative effect on biodiversity. Peat is no longer regarded as a biofuel.

biofouling, *n* — [HYDROLOGY] the gradual accumulation of waterborne ORGANISMS (as bacteria and protozoa) on the surfaces of engineering structures in water that contributes to CORROSION of the structures and to a decrease in the efficiency of moving parts.

biogas, *n* — [BIOLOGY] METHANE GAS produced during the ANAEROBIC DECOMPOSITION of the remains of plants or animal wastes by BACTERIA[22].

biogenic, *adj* – [BIOLOGY] related to, or originating from, ORGANISMS[22].

biogeomorphology, *n* – [GEOMORPHOLOGY] the study of the interaction between ORGANISMS and the production of LANDFORMS. Therefore, this study lands between the fields of GEOMORPHOLOGY and ICHNOLOGY.

biological oxygen demand (BOD), *n* – [BIOLOGY] an indirect MEASURE of the CONCENTRATION of BIOLOGICALLY degradable material present in ORGANIC WASTES. It usually reflects the amount of OXYGEN consumed in five days by biological PROCESSES breaking down organic waste[7]. *Also known as biochemical oxygen demand. Also see chemical oxygen demand (COD).*

biology, *n* – [SCIENCE] a branch of KNOWLEDGE that deals with living ORGANISMS and vital PROCESSES[24].

biomarker, *n* – [PETROLEUM CHEMISTRY] complex ORGANIC COMPOUNDS composed of CARBON, HYDROGEN, and other ELEMENTS that are found in PETROLEUM, ROCKS and SEDIMENTS and show little or no change in

structure from their parent organic MOLECULES in living ORGANISMS[34]. Because of their resistance to alteration, biomarkers are often used to FINGERPRINT crude oils and refined products. Examples of biomarkers include alkylcyclohexanes, bicyclic sesqueterpanes, diamonoids and adamantanes, among many others.

biomass, *n* – [BIOLOGY] the amount of living matter in a given area or volume[7].

biome, *n* – [ECOLOGY] a naturally occurring organic community of plants and animals[7].

biomonitor, *n* – [ECOLOGY] a biological measurement which can be used to infer previous patterns of CONTAMINATION or environmental disruption in a certain ECOSYSTEM.

bioreactor, *n* – [BIODEGRADATION] a device or system supporting a biologically-active environment. a bioreactor may be a treatment vessel in which a chemical process occurs involving organisms or biochemically-active substances derived from these organisms.

bioremediation, *n* – [BIOLOGY] the PROCESS by which ORGANISMS remove or detoxify HAZARDOUS ORGANIC CONTAMINANTS in SOIL, WATER and the subsurface[7]. *Also see biodegradation.*

biosparging—*See air sparging.*

biostratigraphy, *n* – [GEOLOGY] STRATIGRAPHY based on the PALEONTOLOGIC aspects of ROCKS; the differentiation of rock units through the study of FOSSILS they contain[4].

biostimulation, *n* – [BIODEGRADATION] the modification of the biochemical or geochemical environment to stimulate existing microbes capable of bioremediation. This process is accomplished by the addition of various nutrients and electron acceptors, such as phosphorus, nitrogen, oxygen, or carbon.

biota, *n* – [BIOLOGY] the animal and plant life of a given region[7]. *Also see fauna and flora.*

biotic, *adj* – [BIOLOGY] caused or induced by living ORGANISMS[7]. *Also see abiotic.*

biotope, *n* –[ECOLOGY] a special type of nature in which a plant or animal species lives and is dependent on. A biotope can be a highland deciduous forest, the edge of a ditch, forests near the mountains or another type of nature with special characteristics. When the biotope changes, the living conditions for the individuals living there also change. Many biotopes are changed as a result of human intervention, such as cutting down forests, drainage or eutrophication.

bioturbation, *n* – [BIOLOGY] the mixing of LAKE or RIVER SEDIMENTS and /or soil through organic activity (such as burrowing by animals)[4].

bioventing, *n* – [REMEDIATION TECHNOLOGY] a remedial technology for SOIL where OXYGEN is delivered to contaminated, unsaturated soils by forced AIR movement (either extraction or injection of air) to increase oxygen concentrations and stimulate biodegradation. *Also see air sparging and soil-vapor extraction.*

birdfoot delta, *n* – [GEOLOGY] a DELTA formed by many LEVEE-bordered DISTRIBUTARIES extending seaward and resembling in plan to an outstretched claw of a bird[4].

bit, *n* — [DRILLING TECHNOLOGY] any device that may be attached to or is an integral part of a drill string and is used as a cutting tool to bore into or penetrate rock or other materials[4]. *Also see drill.*

biscuit-board topography, *n* – [GEOLOGY] a GLACIAL LANDSCAPE characterized by a rolling upland on the sides of which are CIRQUES that resembles the bites made by a biscuit-cutter in the edge of a slab of dough[4].

bitter lake, *n* – [HYDROLOGY] a SALT LAKE whose waters contain in solution a high content of sodium sulfate and lesser amounts of the CARBONATES and CHLORIDES ordinarily found in salt lakes[4].

bittern, *n* – [HYDROLOGY] the bitter liquid that remains in saltworks after sea water has evaporated until the salt has crystallized out[4].

bitumen, *n* – [PETROLEUM CHEMISTRY] organic matter extracted from fine-grained rocks using common organic solvents. Unlike oil, bitumen is indigenous to the rock in which it is found[4]. *Also see oil sand and oil shale.*

bituminous coal, *n* – [GEOLOGY] soft coal, containing about 80 percent carbon and 10 percent oxygen[4]. *Also see anthracite coal.*

black-box model, *n* – [MATHEMATICS] a type of mathematical MODEL in which output values are calculated from input values using a mathematical formula which need not have any physical meaning, such as a statistical correlation[61].

black water, *n* – [HYDROLOGY] WASTE WATER from toilet, latrine, and flushing and sinks used for food preparation or disposal of chemical or chemical-biological ingredients.

bladder pumps, *n* – [PUMPING TECHNOLOGY] also known as squeeze pumps, bladder pumps operate by the compression of a flexible bladder housed inside the pump. Water enters the bladder through a check valve. Once the bladder is filled, it is squeezed by

compressed air that has been injected into the housing surrounding the bladder. Water cycles through the bladder in evenly spaced pulses[16].

blank, *n* — [CHEMISTRY] MATRIX carried through all or part of the analytical process, where the ANALYTE is not present, or where the analyte response is suppressed[35]. *Also see equipment blank, field blank, method blank and trip blank.*

NOTE 1—A blank must be appropriate to the analytical process it is being used with.

NOTE 2—A blank is typically used to monitor contamination or to establish a baseline for quantitation.

blanket deposit, *n* – [GEOLOGY] a SEDIMENTARY DEPOSIT of great lateral extent and relatively uniform thickness[4].

blending, *n* – [PETROLEUM TECHNOLOGY] despite the diversity and ingenuity of the processes within a modern PETROLEUM REFINERY, no single stream meets all the requirements of GASOLINE. Thus, the final step in gasoline manufacturing is blending the various streams into a finished product. It is not uncommon for the finished gasoline to be made up of six or more streams[37]. *Also see blending plant.*

blending plant, *n* – [PETROLEUM TECHNOLOGY] a facility which has no refining capability but is either capable of producing finished motor GASOLINE through mechanical blending or blends OXYGENATES with motor gasoline[37]. *Also see blending and refinery.*

blendstock, *n* – [PETROLEUM TECHNOLOGY] a component blended with other materials to produce a finished refined product[37].

blight, *n* – [DENDROLOGY] diseases that hurt and sometimes destroy plants. Blights will cause a plant to wither, stop growing, or cause all or parts of it to die[12].

blind sample, *n* – [ENVIRONMENTAL INVESTIGATION] a QUALITY ASSURANCE SAMPLE in which the LABORATORY performing the ANALYSIS is unaware of the sample's true location. This sample is collected as a duplicate.

blind valley, *n* – [GEOLOGY] a VALLEY in KARST that ends abruptly downstream at the point at which its stream disappears underground[4].

block-centered, *adj* – [MATHEMATICS] applications of FINITE-DIFFERENCE methods in which computational NODES are located in the centers of the finite-difference cells[61].

blockfield—*See felsenmeer.*

block mountain, *n* – [GEOLOGY] a mass of high land surrounded by FAULTS. The surrounding blocks may have sunk or the high land may have been forced upwards[4].

bloom, *n* – [BIOLOGY] the excessive growth of ALGAE in a body of water due to an oversupply of dissolved NUTRIENTS; it may impart a disagreeable order to the water, cause fish to die, and impair the use of the water for drinking or recreation[63]. *Also see eutrophication.*

blown-out land, *n* – [GEOGRAPHY] areas from which all or most of the SOIL has been removed by WIND[6].

blue gas—*See water gas.*

blue-green algae, *n* – [BIOLOGY] algal form that may cause water to turn green, gray or brown during late summer periods. Some forms may be TOXIC in large CONCENTRATIONS[7]. *Also known as cyanobacteria.*

blueschist, *n* – [GEOLOGY] a high-PRESSURE, low-TEMPERATURE METAMORPHIC ROCK characteristic of subduction zones[34].

bluff, *n* – [GEOLOGY] a steep-sided, almost vertical, RIVER CLIFF[6].

bocage, *n* – [GEOGRAPHY] a small FOREST, a decorative element of leaves, a TERRAIN of mixed woodland and pasture, or a type of rubble-work, comparable with the English use of 'rustic' in relation to garden ornamentation.

bodden, *n* – [GEOLOGY] an irregularly shaped coastal INLET formed by the influx of the sea into an undulating TERRAIN[6].

bog, *n* – [HYDROLOGY] a type of WETLAND that accumulates appreciable PEAT DEPOSITS. Bogs depend primarily on PRECIPITATION for their water source, and are usually ACIDIC and rich in plant RESIDUE with a conspicuous mat of living green MOSS[6]. *Also see fen, marsh, swamp and wetland.*

bogaz, *n* – [GEOLOGY] narrow, deep RAVINES in KARST areas[6].

boiler slag, *n* – [PETROLEUM CHEMISTRY] a molten ASH collected at the base of slag tap and cyclone boilers that is quenched in a water-filled hopper and shatters into black, angular particles having a smooth, glassy appearance.

boiling point, *n* – [PHYSICS] the TEMPERATURE at which the VAPOR PRESSURE of a LIQUID is equal to the external PRESSURE on the liquid. The standard boiling point is the temperature at which the vapor pressure of a liquid equals standard pressure. The boiling point for water is 100°C or 212°F[17]. *Also see freezing point and melting point.*

boiling range, *n* – [PETROLEUM CHEMISTRY] the RANGE of TEMPERATURE (usually at ATMOSPHERIC PRESSURE) at which the boiling (or DISTILLATION) of a HYDROCARBON LIQUID commences, proceeds, and finishes[28]. *Also see boiling point.*

bolson, *n* – [GEOLOGY] a closed DESERT BASIN without a DRAINAGE outlet, surrounded by MOUNTAINS[6]. *Also see arheic and closed basin.*

bond, *n* – [CHEMISTRY] to combine, by means of CHEMICAL REACTION, with another atom to form a COMPOUND. When an ATOM bonds with another, it either loses, gains, or shares ELECTRONS with the other atom. *Also see double bond*[17]**.**

bony, *n* – [MINING] rock that has a high carbon content; usually refers to dark-colored coal mining waste material[66].

boot-strap technique, *n* -- [STATISTICS] a statistical technique that estimates the ERROR of a DATA set by repeated random sampling of the data so as to increase the sample size artificially.

bore, *n* – [HYDROLOGY] the current of the incoming TIDE up a RIVER ESTUARY. This produces a wall of water moving upstream[6]. *Not to be confused with borehole.*

boreal, *adj* – [ECOLOGY] usually applied to ecosystems localized to subarctic (Northern hemisphere) and subantarctic (Southern hemisphere) zones, although AUSTRAL is also used for the latter.

boreal forest, *n* – [DENDROLOGY] a northern FOREST characterized by evergreen CONIFERS and long winters[6]. The boreal forest, also referred to as a TAIGA, is found in the northern parts of North America, Europe, and Asia. *Also see taiga.*

borehole, *n* — [HYDROGEOLOGY] a hole of circular cross-section made in SOIL or ROCK[16].

> DISCUSSION— Normally, a borehole is advanced using an auger, a drill, or casing with or without drilling fluid. It can be done mechanically, as with a drilling rig, or manually.

Also see boring.

borehole catchment—*See capture zone.*

borehole geophysics, *n* – [GEOPHYSICS] the general field of GEOPHYSICS developed around the lowering of various probes into a WELL or BOREHOLE and measuring their responses versus depth[33].

borehole log, *n* — [GEOLOGY] the record of GEOLOGIC units penetrated, drilling progress, depth, water level, sample recovery, volumes and types of materials used, and other significant facts regarding the drilling of an exploratory borehole or WELL.

boring, *adj* – [GRAMMAR] not interesting. Not to be confused with BOREHOLE.

bornhardt, *n* – [GEOLOGY] an isolated residual HILL which rises abruptly from a PLAIN[6].

boron, *n* – [CHEMISTRY] ELEMENT of group 13 of the PERIODIC TABLE[17].

> DISCUSSION -- Boron-containing compounds were used as DETERGENTS in GASOLINE in the 1960s and 1970s[32].

borrow, *n* – [GEOLOGY] SOIL or ROCK material obtained from an off-site source for use as fill on construction and projects.

boson, *n* – [PHYSICS] a family of elementary particles, alongside QUARKS and LEPTONS, that act as carriers of the fundamental forces of nature.

boss, *n* – [GEOLOGY] a dome shaped IGNEOUS INTRUSION (such as a BATHOLITH) which has been exposed at the top by the EROSION of the softer surrounding rocks[6].

botany, *n* – [BIOLOGY] branch of BIOLOGY that studies plants, including their structure, function, growth, origin, evolution, and distribution[7].

bottom ash, *n* – [PETROLEUM CHEMISTRY] agglomerated ASH PARTICLES formed in pulverized COAL boilers that are too large to be carried in the flue gases and impinge on the boiler walls or fall through open grates to an ash hopper at the bottom of the boiler. Bottom ash is typically grey-to-black in color, is quite angular, and has a porous surface texture.

bottoms, *n* – [PETROLEUM CHEMISTRY] a heavy fraction of CRUDE OIL that does not vaporize during DISTILLATION[34].

boulders, *n* — [GEOLOGY] a ROCK fragment, usually ROUNDED by WEATHERING or ABRASION, with an average DIMENSION of 12 inches (305 millimeters) or more[4]. *Also see cobble, gravel and pebble.*

boundary, *n* – [GEOGRAPHY] something that indicates or fixes a limit of extent[15].

boundary conditions, *n* – [HYDROGEOLOGY] set of conditions to be satisfied by the solution of a DIFFERENTIAL EQUATION at the BOUNDARY (including fluid boundary) of the region in which the solution is sought.

boundstone, *n* – [GEOLOGY] SEDIMENT where the original components have been bound together after deposition.

bourne, *n* – [HYDROLOGY] *1*. a STREAM that appears in a normally dry VALLEY. *2*. intermittent STREAM in a normally dry valley in CHALK country[16]. *Also spelled burn or burnie.*

Boussinesq equation, *n* – [HYDROGEOLOGY] the general equation for two-dimensional, unconfined transient flow[33].

Boyle's Law, *n* – [PHYSICS] LAW that states the VOLUME of any confined GAS at constant TEMPERATURE varies inversely to the PRESSURE applied to it[24].

brackish water, *n* — [HYDROLOGY] WATER that contains dissolved matter at an approximate CONCENTRATION range from 1,000 milligrams per liter (mg/L) to 30,000 mg/L. Brackish water is normally

found in areas such as estuaries or wherever sea water comes into contact with fresh water[16]. *Also see fresh water and sea water.*

bradyseism, *n* – [GEOLOGY] the gradual uplift (positive bradyseism) or descent (negative bradyseism) of part of the ground surface caused by filling and/or emptying of a MAGMA chamber and/or hydrothermal activity, particularly near CALDERAS.

brae, *n* – [GEOGRAPHY] *a Scottish term,* a hill-slope or brow of a HILL[6].

braid bar, *n* – [GEOMORPHOLOGY] a LANDFORM in a river that forms when discharge is low and the river is forced to take the route of less resistance by flowing through the lowest elevation. With time, the river erodes the outer edges of the bar, elevating it higher than surrounding areas.

braided stream, *n* – [HYDROLOGY] a STREAM that becomes a maze of interconnected channels with excess SEDIMENT[16]. *Also see drainage pattern and meandering stream.*

branch, *n* – [HYDROLOGY] *1*. a TRIBUTARY of a RIVER or other body of WATER[16]. *2*. a divergent section of a river, especially near the MOUTH.

branched hydrocarbon, *n* – [PETROLEUM CHEMISTRY] branched ALKANE containing CARBON ATOMS that are linked to more than two other carbon atoms[34].

breached anticline, *n* – [GEOLOGY] an ANTICLINE where EROSION has been concentrated along the FOLD AXIS, to give an elongated VALLEY bounded by facing escarpments[45].

breakdown product, *n* – [CHEMISTRY] a compound derived by chemical, biological, or physical action on a chemical compound[62].

breakthrough curve, *n* — [HYDROGEOLOGY] a plot of relative CONCENTRATION versus TIME, where relative concentration is defined as C/C_0; the concentration at a point in the ground-water flow domain divided by the source concentration.

Breakwater, *n* – [Hydrology] a natural or artificial barrier that serves to break the force of waves and thereby shelters craft in a harbor or protects a beach from erosion63.

breccia, *n* – [GEOLOGY] a CLASTIC ROCK composed of particles more than 2 millimeters in DIAMETER and marked by the angularity of its COMPONENT GRAINS and ROCK FRAGMENTS[4]. *Also see fault breccia.*

brick, *n* – [CONSTRUCTION TECHNOLOGY] a handy-sized unit of building or paving material typically being rectangular and in the USA about 2 ¼ x 3 ¾ x 8 inches (57 x 95 x 203 millimetres) and of moist clay hardened by heat[15].

brickearth, *n* – [GEOLOGY] a general term for any loamy CLAY that can be used for brickmaking[6].

bridge scour, *n* – [HYDROLOGY] the removal or erosion of SEDIMENT such as sand and rocks from around bridge abutments or piers. Scour, caused by swiftly moving water, can produce scour holes, compromising the integrity of the bridge.

brief, *n* – [LAW] a written argument furnished to the COURT which sets forth the pertinent FACTS of the case or MOTION being tried or heard and the LAWS applicable to it[19].

brightstock, *n* – [PETROLEUM CHEMISTRY] heavy lube oil obtained by REFINING RESIDUUM[28].

brine, *n* — [HYDROLOGY] WATER that contains dissolved matter at an approximate CONCENTRATION of more than 30,000 mg/L. Brines are normally found beneath oil and gas reservoir. During the pumping of oil wells, brines are a removed and become a waste product. The improper disposal of brines in the vicinity of oil wells often causes ground-water contamination[16]. *Also known as hypersaline water*.

bromine flame retardants, *n* – [CHEMISTRY] substances added to PLASTIC, plastic insulation material, the plastic casing of electronic systems and printed circuit boards to help reduce its flammability. Samples from the bed of the Baltic Sea reveal that the levels of bromine aromatic substances are rapidly increasing and this could cause a new problem like that posed by POLYCHLORINATED BIPHENYLS (PCBs).

brook, *n* – [HYDROLOGY] small, shallow STREAM usually in continuous flow in a somewhat TURBULENT manner[16]. *Also see creek, river, run and stream*

Brownfields, *n* – [ENVIRONMENTAL INVESTIGATION] abandoned, idled, or under used industrial and commercial facilities/sites where expansion or redevelopment is complicated by real or perceived ENVIRONMENTAL CONTAMINATION. They can be in urban, suburban, or rural areas.

Brownian movement, *n* – [PHYSICS] random movement of MOLECULES or COLLOIDS suspended in a FLUID[24].

Brunton compass, *n* – [GEOLOGY] a compact pocket instrument that consists of an ordinary COMPASS, folding open sights, a mirror, and a rectangular spirit-level clinometer, which can be used in the hand or on a staff or light rod for reading horizontal and vertical ANGLES, for leveling, and for reading the magnetic bearing of a line. It is used in sketching MINE workings, and in preliminary TOPOGRAPHIC and geologic surveys on the surface, such as in determining elevations, STRATIGRAPHIC thickness, and strike and dip[4]. *Also see compass and sextant.*

BTEX – [CHEMISTRY] acronym for AROMATIC COMPOUNDS: BENZENE, TOLUENE, ETHYLBENZENE AND O,M,P-XYLENES.

DISCUSSION – BTEX is a major component of gasoline and each BTEX component may be anywhere from 1% to 10% of the gasoline, depending on the time of year and geographic location. BTEX is also a component of diesel fuels but at much lower concentrations.

bubble point, *n* – [PHYSICS] the PRESSURE at which GAS starts to come out of solution[4].

Buckingham-Darcy equation, *n* – [HYDROGEOLOGY] the equation of motion for flow under unsaturated conditions. Similar to DARCY'S LAW, except that hydraulic conductivity is a function of pressure head of water[6].

buffer, *n* – [CHEMISTRY] a SUBSTANCE or MIXTURE of compounds which, when added to a solution, is capable of neutralizing both ACIDS and BASES without appreciably changing the original ACIDITY or ALKALINITY of the SOLUTION[17].

buffering capacity or index (β), *n* – [CHEMISTRY] the slope of the titration curve of PH versus MOLES of strong BASES added (C_b) or moles of strong ACID added (C_a) where,

$$\beta = dC_b/dpH = -dC_a/dpH$$

The buffer index indicates the number of moles of acid or base required to produced a prescribed pH change[6].

bulgunniakh—*See pingo.*

bulk density, *n* — [PHYSICS] the MASS of a quantity of a bulk solid divided by its total VOLUME[4].

bulkhead, *n* – [HYDROLOGY] a stone, steel, wood, or concrete wall-like structure primarily designed to resist earth or water pressure, such as a retaining wall holding back the ground from sliding into a channel, or a partition preventing water from entering a working area in a mine.

bulk isotope analyses, *n* – [ISOTOPES] the weighted average of a particular ISOTOPE ratio, such as $^{13}C/^{12}C$, in a mixture of HYDROCARBONS, such as GASOLINE or FUEL OIL[39]. *Also see compound-specific isotope analyses.*

bulk modulus, *n* – [PHYSICS] a MODULUS of ELASTICITY which relates a change in volume to the HYDROSTATIC state of stress. It is the reciprocal of COMPRESSIBILITY[4]. *Also see modulus*.

bulk terminal, *n* – [PETROLEUM TECHNOLOGY] a facility used primarily for the storage and/or marketing of PETROLEUM products which has a total bulk storage capacity of 50,000 barrels or more and/or receives petroleum products by tanker, barge, or pipeline.

bulk volume, *n* – [AGRONOMY] the volume, including the SOIL and the PORES, of a soil mass. *Also see bulk density.*

bulldozer, *n* – [ENVIRONMENTAL INVESTIGATION] a tractor on the front end of which is mounted a vertically curved steel blade held at a fixed distance by arms secured on a pivot or shaft near the horizontal center of the tractor. The blade can be lowered or tilted vertically by cables or hydraulic rams. It is a highly versatile piece of earth excavating and moving equipment esp. useful in land clearing and leveling work, in stripping topsoil, in road and ramp building, and in floor or bench cleanup and gathering operations. *Also called dozer*.

bunker C oil – [PETROLEUM CHEMISTRY] a marine FUEL also known as ASTM Grade No.6. The specifications for Bunker C Fuel are fairly loose and minimal, with limited restrictions applying only to flash point (60°C min), water (2% max.), sediment (2% max.) and viscosity at 100°C (15 cSt min and 50 cSt max)[38]. *Also see heating oil no. 6.*

buoyancy, *n* – [PHYSICS] resultant FORCE, in an upward direction, exerted by WATER on a body which is wholly or partly immersed[4]. *Also see Archimedes' Principle.*

buoyancy support, *n* – [HYDROGEOLOGY] the support offered by GROUND WATER to the roof of a CAVE or other subsurface void[61].

buried hill, *n* – [GEOLOGY] a HILL consisting of resistant older ROCK over which later SEDIMENTS were deposited[4].

buried valley, *n* – [GEOLOGY] an ancient VALLEY buried by recent, often GLACIAL DEPOSITS.

buried-valley aquifer, *n* – [HYDROGEOLOGY] an AQUIFER composed of GLACIAL OUTWASH located at the base of a VALLEY and covered by impervious or semi-pervious material, such as glaciolacustrine CLAY. Wells installed into some buried-valley aquifer yield extremely large quantities of water. *Also see glacial outwash.*

burn—*See bourne.*

burnie—*See bourne.*

burrow, *n* – [GEOLOGY] a cylindrical or near-cylindrical tube, often filled with CLAY or SAND, which may lie along a BEDDING PLANE or penetrate a ROCK, made by an animal that lived in the soft SEDIMENT[4].

bush, *n* – [BIOLOGY] a low, densely-branched shrub[15].

business, *n* – [COMMERCE] a commercial firm[15].

business park, *n* – [COMMRECE] an area of land usually located near the rural-urban fringe and with

good accessibility, set aside for office development and high-tech companies involved in research and development or producing such things as computer software[45].

butane, *n* -- [PETROLEUM CHEMISTRY] normally gaseous straight-chain or branch-chain HYDROCARBON (C_4H_{10}) extracted from natural gas or refinery gas streams. It includes normal butane and refinery-grade butane and is designated in ASTM Specification D1835 and Gas Processors Association Specifications for commercial butane[34].

butte, *n* – [GEOLOGY] an isolated, flat-topped HILL or MOUNTAIN with steep sides common in arid regions[4]. *Also see cuesta and hogback*.

buttonbush swamp—*See shrub swamp.*

button drainage—*See beaded stream.*

bypass, *n* – [GEOGRAPHY] a road which skirts the margin of some locality, frequently a town or city, thus enabling through-traffic to avoid passing through the locality and so relieve possible traffic congestion[45].

byproduct, *n* – [CHEMISTRY] a COMPOUND formed during a CHEMICAL REACTION at the same time as the main product[24].

bysmalith, *n* – [GEOLOGY] a PLUTONIC plug or mass of IGNEOUS ROCK which has forced up into a DOME shape, the layers of ROCK into which it was intruding[4].

byte, *n* -- the amount of memory needed to represent one character on a computer, typically 8 bits.

Cc

caballing, *n* – [HYDROLOGY] the mixing of two water bodies of differing TEMPERATURES and SALINITIES, but with the same DENSITY[16].

cable-tool drilling—*See percussion drilling.*

cabo—*See cape.*

cadastral map, *n* – [GEOGRAPHY] a map showing ownership of land, usually drawn at a large scale so that all individual landholdings may be accurately depicted[6].

cairn, *n* – [GEOGRAPHY] *from Gaelic, 1*. an artificial pile of stones erected on a mountain summit or along a mountain path as a guide. *2*. a place name or part of a placename in mountainous districts[6].

caisson, *n* – [HYDROLOGY] a watertight chamber in which underwater construction work can be performed[6].

calanque, *n* – [GEOGRAPHY] *from French*, *1*. COVE or small BAY. *2*. a VALLEY excavated in LIMESTONE or formed by collapse of the roof of a cave and subsequently submerged by a rise in sea level[6].

calcarenite, *n* – [GEOLOGY] a rock formed by the percolation of water through a mixture of calcareous shell fragments and quartz sand causing dissolved lime to cement the rock together.

calcareous, *adj* – [GEOLOGY] containing CALCIUM CARBONATE ($CaCO_3$)[6].

calcification, *n* – [AGRONOMY] a dry ENVIRONMENT soil-forming process that results in the accumulation of CALCIUM CARBONATE in surface soil layers[6]. *Also see caliche.*

calcimorphic soils, *n* – [AGRONOMY] SOILS which have developed on a calcium-rich parent material[6].

calcite, *n* – [GEOLOGY] a MINERAL composed of calcium carbonate, $CaCO_3$ in a hexagonal crystal structure. LIMESTONE and MARBLE are composed predominantly of calcite[6]. *Also see aragonite, carbonate, chalk, dolomite, karst and limestone.*

calcium (Ca), *n* – [CHEMISTRY] a metallic ELEMENT of the ALKALINE-EARTH group; never found in nature uncombined, occurs abundantly as LIMESTONE ($CaCO_3$), GYPSUM ($CaSO_4 \cdot 2H_2O$), and fluorite (CaF_2). Used as a reducing agent, deoxidizer, desulfurizer, or decarburizer for alloys; as quicklime (CaO), it is the great cheap base of the chemical industry with countless uses[17].

calcrete, *n* – [GEOLOGY] CONGLOMERATE consisting of surficial SAND and GRAVEL cemented into a hard mass by calcium carbonate precipitated from solution and redeposited through the agency of infiltrating waters, or deposited by the escape of carbon dioxide from vadose water[6].

calculus, *n* – [MATHEMATICS] integral and differential calculus is a central branch of MATHEMATICS, developed from ALGEBRA and GEOMETRY. The word calculus stems from the nascent development of mathematics: the early Greeks used pebbles arranged in patterns to learn arithmetic and geometry, and the Latin word for pebble is calculus, a diminutive of *calx* (genitive *calcis*) meaning LIMESTONE. Calculus is built on two major complementary ideas. The first is differential calculus, which studies the rate of change in one quantity relative to the rate of change in another quantity. This can be illustrated by the slope of a line. The second is integral calculus, which studies the accumulation of quantities, such as areas under a curve, linear distance traveled, or volume displaced. These two processes act inversely to each other, in a sense made specific by the fundamental theorem of calculus[24]. *Also see algebra, geometry, mathematics and statistics.*

caldera, *n* – [GEOLOGY] roughly circular, steep-sided volcanic basin with diameter at least three or four times depth. Commonly at summit of a VOLCANO[4]. *Also see crater.*

calendar date, *n* – [AGE DATING] date referring to a terrestrial calendar.

calf, *n* – [GEOGRAPHY] an ISLET or small ISLAND adjacent to a larger island[6]. *Also see islet and island.*

calibration, *n* – [CHEMISTRY] PROCESS of adjusting an instrument's read out so that it corresponds to actual CONCENTRATIONS[15]. It involves checking the instrument with a known concentration of a surrogate to insure that the instrument provides a proper response. *Also see accuracy and precision.*

calibration standards, *n* – [CHEMISTRY] a series of known standard solutions used by the analyst for CALIBRATION of the instrument (such as preparation of the analytical curve). *Also see calibration.*

caliche, *n* – [GEOLOGY] a white SOIL HORIZON consisting of calcium CARBONATE, typical of arid and semi-arid areas. Brief heavy rains dissolve calcium carbonate in the upper layers of soil and transport it downward; the rainwater then evaporates rapidly, leaving the calcium carbonate to form a new, solid layer of soil[4]. *Also see bauxite, calcification and laterite.*

caliper log, *n* – [GEOPHYSICS] a well log that shows the variations with depth in the DIAMETER of an uncased BOREHOLE. It is produced by spring-activated arms that measure the varying widths of the hole as

the device is drawn upward[4]. *Also see geophysical borehole log*.

cambium, *n* – [DENDROLOGY] LAYER or zone of dividing cells that produce XYLEM in the inner portions of the plant, and phloem in the outer portions of the plant[12]. *Also called vascular cambium*. *Also see phloem and xylem.*

Cambrian Period, *n* – [GEOLOGY] the oldest of the systems into which the PALEOZOIC stratified rocks are divided; also, the corresponding oldest period of the Paleozoic era occurring about 510 to 570 million years ago[4].

camphene, *n* – [DRY CLEANING TECHNOLOGY] an unsaturated terpene HYDROCARBON ($C_{10}H_{16}$) originally used in DRY CLEANING until around 1870 when it was replaced by BENZENE.

canal, *n* – [HYDROLOGY] an ARTIFICIAL WATERCOURSE cut through a land area for use in navigation, irrigation, etc[6].

cannel coal, *n* – [GEOLOGY] oil-prone COAL that consists mainly of liptinite MACERALS (such as spores and pollen) with little or no alginite[34].

cannon-shot gravel, *n* – [GEOLOGY] a coarse-grained gravel deposit characterized by large, almost perfectly-rounded stones, thought to have been laid down by Pleistocene-age melt-water streams at ice-sheet margins[6].

cáno, *n* – [HYDROLOGY] *from Spanish*, STREAM[16].

canopy, *n* – [DENDROLOGY] the uppermost layers of foliage in a FOREST[6]. *Also see understorey.*

canyon (cañon), *n* – [GEOLOGY] *from Spanish*, deep VALLEY with high, steep slopes, often with a RIVER flowing along its bottom[4]. *Also see gorge and valley.*

cap, *n* – [HYDROGEOLOGY] any physical barrier, such as a building or a layer of asphalt or concrete, on the surface of a site that prevents people from coming into contact with contamination in the ground beneath the barrier.

cape, *n* – [GEOGRAPHY] a point or extension of LAND jutting out into WATER as a PENINSULA or as a projecting point[6]. *Also known as a "cabo" (Spanish or Portuguese) or a "cap" (French). Also see point and promontory.*

capillarity--*See capillary action*

capillary action (capillarity), *n* — [HYDROLOGY] *1*. the rise or movement of WATER in the INTERSTICES of a SOIL or ROCK due to CAPILLARY FORCES. *2*. movement of water along microscopic channels. This movement is the result of two forces: the adhesion and absorption of water to the walls of the channels; and cohesion of water molecules to each other[16].

capillary fringe, *n* — [HYDROLOGY] the basal region of the VADOSE ZONE comprising SEDIMENTS that are SATURATED, or nearly saturated, near the WATER TABLE, gradually decreasing in water content with increasing elevation above the water table. The water pressure in the capillary fringe is less than atmospheric pressure[16].

> DISCUSSION – The water table is the location where water will occur in a well; however, it is not where the soil, sediment or rock is first water saturated. This location can occur in the capillary fringe. The water table is where the water pressure equals or exceed the atmospheric pressure. Water in the capillary fringe can be under saturated conditions, but it does not flow into a well because its pressure is less than atmospheric.

capillary fringe conversion, *n* – [HYDROLOGY] process by which the WATER TABLE rises very rapidly by a height equal to the prior thickness of the CAPILLARY FRINGE, as tension-saturation changes to pressure-saturation[61].

capillary head, *n, h* — [HYDROLOGY] the potential, expressed in head of water, that causes the WATER to flow by CAPILLARY ACTION[16].

capillary rise (height of capillary rise), *n,* — [HYDROLOGY] the height above a FREE WATER ELEVATION to which water will rise by CAPILLARY ACTION[16].

capillary water, *n* — [HYDROLOGY] water subject to the influence of CAPILLARY ACTION[16]. *Also known as fringe water*.

cap rock, *n* – [GEOLOGY] a bed of resistant rock which overlies a less resistant rock. Often used to describe the rock overlying an oilfield[4]. *Also see reservoir.*

capture, *n* – [HYDROGEOLOGY] water withdrawn artificially from an aquifer is derived from a decrease in storage in the aquifer, a reduction in the previous discharge from the aquifer, an increase in the recharge, or a combination of these changes. The decrease in discharge plus the increase in recharge is termed capture. Capture may occur in the form of decreases in the ground-water discharges to streams, lakes, and the ocean, or from decreases in that component of EVAPOTRANSPIRATION derived from the saturated zone[65].

capture zone, *n* – [HYDROGEOLOGY], the HORIZONTAL and VERTICAL extent of AQUIFER contributing water to a pumping WELL (L^2 or L^3). The equations needed to calculate a capture zone are:

$$x = -y/(\tan(2\pi Q_o y/Q_{well}))$$

$$Q_o = Kbi$$

where x and y are the CARTESIAN COORDINATES with x being parallel with the original GROUND-WATER FLOW DIRECTION, Q_{well} is the pumping rate, K is the HYDRAULIC CONDUCTIVITY, b is the aquifer thickness and *i* is the original HYDRAULIC GRADIENT[55].

carapace, *n* – [GEOLOGY] *1*. a hard crust at the surface of a SOIL, especially a calcrete or silcrete. *2*. the upper limb of a RECUMBENT FOLD[6].

carbohydrate, *n* – [CHEMISTRY] organic compounds with the approximate general formula $(CH_2O)_n$, where *n* is 4 or greater[34].

carbon (C) , *n* – [CHEMISTRY] an ELEMENT with ATOMIC NUMBER 6. Carbon is a nonmetal found in all organic compounds. Carbon occurs naturally as diamond and graphite[17].

carbonaceous, *n* – [GEOLOGY] containing carbon and derived from organic substances such as coal, coconut shells, and wood[4].

carbonation, *n* – [CHEMISTRY] a form of chemical WEATHERING where carbonate and bicarbonate ions react with minerals that contain CALCIUM, MAGNESIUM, POTASSIUM, and SODIUM[4].

carbon cycle, *n* – [CHEMISTRY] one of the major cycles of chemical ELEMENTS in the environment. CARBON, in the form of CO_2, is taken up from the ATMOSPHERE and incorporated into plant tissues in PHOTOSYNTHESIS. It may then pass into the bodies of animals as the plants are eaten. During the respiration of plants, animals and organisms that bring about decomposition, CO_2 is returned to the atmosphere. The combustion of fossil fuels also releases CO_2 to the atmosphere[34]. *Also see nitrogen cycle, photosynthesis and respiration.*

carbon-14 (^{14}C) dating, *n* – [ISOTOPES] a form of ISOTOPE dating that relies on the 5,730-year HALF-LIFE of RADIOACTIVE ^{14}C, which decays into ^{14}N, to determine the AGE of rocks in which ^{14}C is present. ^{14}C dating is used for rocks or other materials and artifacts from 100 to 100,000 years old[4]. *Also see radiometric dating and radioisotope.*

carbonate, *n* – [GEOLOGY] one of several MINERALS containing one central CARBON ATOM with strong covalent BONDS to three OXYGEN atoms and typically having ionic bonds to one or more positive IONS[4]. *Also see aragonite, calcite, dolomite, karst and limestone.*

> DISCUSSION – Carbonate is more soluble in cold water than in warm water. This is why, in warm waters such as the area surrounding the Bahamas, carbonate precipitates forming these island complexes.

carbon dioxide, *n* – [CHEMISTRY] a colorless, odorless GAS (CO_2) produced by RESPIRATION and COMBUSTION of carbon-containing fuels[4]. Excessive CO_2 in the ATMOSPHERE is one of the causes of global warming[56].

carbon fixation, *n* – [CHEMISTRY] conversion of CARBON DIOXIDE or other single-carbon compound to organic matter, such as CARBOHYDRATE[34]. *Also see carbon dioxide.*

carbonic acid, *n* – [CHEMISTRY] a dibasic acid, H_2CO_3, formed in solution when CO_2 is dissolved in water[17].

Carboniferous Period, *n* – [GEOLOGY] the MISSISSIPPIAN and PENNSYLVANIAN PERIODS combined, ranging from about 345 million years to about 280 million years ago; also, the corresponding systems of rocks. In European usage, the Carboniferous is considered as a single period and is divided into upper and lower parts. The PERMIAN PERIOD is sometimes included[4].

carbonization, *n* – [GEOLOGY] *1*. in the process of coalification, the accumulation of residual carbon by the changes in organic matter and decomposition products. *2*. the accumulation of carbon by the slow, underwater decay of organic matter. *3*. The conversion into carbon of a carbonceous substance such as coal by driving off the other components, either by heat under laboratory conditions or by natural processes[34].

carbon preference index (CPI), *n* – [PETROLEUM TECHNOLOGY] the ratio of odd to even *N*-ALKANES. Odd/even CPI alkanes are equally abundant in petroleum but not in biological material. A CPI near 1 is an indication of PETROLEUM[51].

carbon sequestration, *n* – [BIOLOGY] the uptake and storage of CARBON. Trees and plants, for example, absorb CARBON DIOXIDE, release the OXYGEN and store the carbon. Fossil fuels were at one time biomass and continue to store the carbon until burned.

carbonyl group, *n* – [CHEMISTRY] a functional group composed of a carbon atom double-bonded to an oxygen atom: C=O. The term carbonyl can also refer to carbon monoxide as a ligand in an inorganic or organometallic complex (a metal carbonyl, such as nickel carbonyl); in this situation, carbon is triple-bonded to oxygen: C≡O.

carboxylic acids, *n* – [CHEMISTRY] FATTY ACIDS containing the CARBOXYL GROUP, COOH. They are weak acids which occur widely throughout nature. The best known is acetic acid, or vinegar, CH_3COOH[34].

carbureted water gas—*See water gas.*

carcinogenic, *adj* – [TOXICOLOGY] CHARACTERISTIC of any SUBSTANCE that can cause or aggravate cancer[22]. *Also see mutagenic and teratogenic.*

cardinal number, *n* – [MATHEMATICS] a NUMBER that indicates the quantity but not the order of things[15].

cardinal points, *n* – [GEOGRAPHY] the four main compass directions: north, south, east and west[6].

carotane, *n* – [PETROLEUM TECHNOLOGY] (β-carotane, perhydro-β-carotene), a saturated tetraterpenoid BIOMARKER ($C_{40}H_{78}$) typical of PETROLEUM from saline, LACUSTRINE ENVIRONMENTS[34]. *Also see biomarker.*

carr, *n* — [GEOGRAPHY] *1*. a pool; also, a wooded FEN or a BOG[6]. *2*. the yellow or brown SEDIMENT of humate of IRON in water flowing from a peaty bog. *Also spelled car.*

carse, *n* – [GEOGRAPHY] *a Scottish term,* low-lying, alluvial lands along RIVER ESTUARIES[6].

carstone, *n* – [GEOLOGY] a brown SANDSTONE with a limonite cement[6].

Cartesian coordinates, *n* – [MATHEMATICS] COMPONENTS used in coordinate GEOMETRY to define the position of a point by its PERPENDICULAR distance from a set of two or more axes[11]. Named after the French mathematician and philosopher, René Descartes.

cartography, *n* – [GEOGRAPHY] the art and SCIENCE of making MAPS[24]. *Also see chart, map and cross section.*

cartouche, *n* – [GEOGRAPHY] a type or decorative key or panel on a MAP or CHART in which information such as distance, SCALE, title, date, etc. are portrayed, often in a highly decorative way[6].

cascading water, *n* — [HYDROGEOLOGY] PERCHED GROUND WATER that enters a WELL casing via cracks or uncovered perforations, trickling, or pouring down the inside of the CASING[33].

cased direct-push (DP) system, *n* – [DRILLING TECHNOLOGY] a rod system consisting of inner rods and outer drive casing. Also referred to as "dual-tube" DP systems. The soil sampling barrel is attached to inner rods. The inner rods and outer casing are typically driven simultaneously. The sampling tool is then withdrawn, emptied, and re-inserted, while the outer drive casing is left in the ground to keep the hole open. Minimizes sloughing and contamination of soil samples.

case law, *n* – [LAW] the LAW created by JUDGES when deciding individual disputes or cases. Non-statutory law[19]. *Also known as Common Law. Also see precedent.*

casing, *n* — [DRILLING TECHNOLOGY] pipe, finished in sections with either threaded connections or bevelled edges to be field welded which is installed temporarily or permanently to counteract caving, to advance the BOREHOLE, or to isolate the zone being monitored, or combination thereof. *Also see monitoring well and well.*

casing, protective, *n* — [DRILLING TECHNOLOGY] a section of larger diameter pipe that is emplaced over the upper end of a smaller diameter MONITORING WELL riser or casing to provide structural protection to the well and restrict unauthorized access into the well.

casing, surface, *n* — [DRILLING TECHNOLOGY] pipe used to stabilize a BOREHOLE near the surface during the drilling of a borehole that may be left in place or removed once drilling is completed.

castle kopje, *n* – [GEOLOGY] a small-scale INSELBERG[6].

catabolism, *n* – [BIOCHEMISTRY] the BIOCHEMICAL breakdown of ORGANIC COMPOUNDS, resulting in the production of ENERGY[34].

cataclasite, *n* –[GEOLOGY] a type of cataclastic rock that is formed by fracturing and comminution during faulting. It is normally cohesive and non-foliated, consisting of angular clasts in a finer-grained matrix.

catagenesis, *n* – [PETROLEUM TECHNOLOGY] THERMAL ALTERATION of ORGANIC MATTER by burial and heating in the range of ~50° – 200°C, typically requiring millions of years. This is the stage where KEROGEN thermally decomposes to BITUMEN, then OIL, CONDENSATE and GAS[34]. *Also see diagenesis and metagenesis.*

catalysis, *n* – [CHEMISTRY] the PHENOMENON of increasing the rate of a chemical reaction by a chemical present in the reaction medium (hogeneous catalysis), or by a solid surface on which the reaction can occur (heterogeneous catalysis). The catalyst itself is not consumed or transformed in any way during such reactions[17].

catalyst, *n* – [CHEMISTRY] a SUBSTANCE that changes the speed or yield of a CHEMICAL REACTION without being consumed or chemically changed by the chemical reaction[34].

catalytic cracking, *n* – [PETROLEUM TECHNOLOGY] a PETROLEUM-REFINING PROCESS whereby heavy HYDROCARBONS and other COMPOUNDS break down (crack) into lighter MOLECULES in the presence of heated CATALYSTS[34]. *Also see alkylation, cat gasoline, cracking, isomerization and reformation.*

catalytic desulfurization, *n* – [PETROLEUM TECHNOLOGY] a REFINERY PROCESS in which SULFUR is removed from a HYDROCARBON stream by combining it with hydrogen in the presence of a catalyst and then stripping out the hydrogen sulfide thus formed[26].

catalytic reforming, *n* – [PETROLEUM TECHNOLOGY] a REFINERY PROCESS which converts low-octane quality NAPHTHA to a high octane blendstock (catalytic reformate) in the presence of a CATALYST, mainly by converting naphthenes and paraffins into AROMATICS. There are many commercially licensed versions of the process[26].

cataract—*See cateract.*

catastrophic release, *n* – [ENVIRONMENTAL INVESTIGATION] a major uncontrolled emission, fire, or explosion, involving one or more regulated substances that presents imminent and substantial endangerment to public health and the environment.

catch basin, *n* – [HYDROLOGY] a device placed within roadways to catch and direct RUNOFF to the underlying STORM SEWER. *Also see storm sewer and storm water.*

catchment, *n* – [HYDROLOGY] area having a common outlet for its SURFACE RUNOFF[16]. *Also see drainage basin.*

catena, *n* – [AGRONOMY] a sequence of SOIL types arising from the same PARENT ROCK[6].

cateract , *n* – [HYDROLOGY] a step-like succession of WATERFALLS[6]. *Also spelled cataract.*

catface, *n* – [DENDROLOGY] a large scar on the surface of a tree from a wound caused by fire, rock slide, etc., where healing has not re-established the normal cross-section[12].

cat gasoline, *n* – [PETROLEUM TECHNOLOGY] a gasoline blending component made in a CATALYTIC CRACKER[37]. *Also known as cat naphtha. Also see catalytic cracking.*

cathode, *n* – [PHYSICS] negatively charge ELECTRODE[24]. *Also see anode and electrode.*

cathodic protection, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] a TECHNIQUE to prevent CORROSION of a metal surface by making it the cathode of an electrochemical cell. Often applied to underground tanks[48].

cation, *n* — [CHEMISTRY] an ION that moves, or would move toward a CATHODE; thus nearly always synonymous with positive ion[24]. *Also see anion and ion.*

cation-anion balance, *n* – [GEOCHEMISTRY] the difference between the sums of concentrations of all cations and the sum of all anions (both expressed in milliequivalents per liter), normalized by dividing with the sum of both[61].

cation exchange — *See base exchange.*

cation exchange capacity (CEC), *n* — [CHEMISTRY] the total capacity of a porous system to absorb CATIONS from a SOLUTION[20].

cation-exchange chromatography, *n* – [CHEMISTRY] a form of ION-EXCHANGE CHROMATOGRAPHY that uses resins or packings with functional groups that can separate cations[34].

cat naphtha—*See cat gasoline.*

causality, *n* – [MATHEMATICS] given an event *x* in a physical system or a corresponding feature in a partial differential equation, a trichotomy which divides other events into those that may have caused or modified *x*, those which *x* can cause or alter, and those which are causally independent from *x*.

cause, *n* – [LOGIC] a PROCESS, such as an input system, which produces an EFFECT[6].

causeway, *n* – [HYDROLOGY] a raised road or track across low or wet ground or a stretch of water[16].

caustic, *adj* – [CHEMISTRY] capable of destroying the texture of anything or eating away its SUBSTANCE by CHEMICAL action; burning; CORROSIVE. Normally exhibits a very high PH[17]. Can refer to any compound with a very high pH, but commonly it is NaOH. *Also see base.*

cave, *n* – [GEOLOGY] a NATURALLY formed opening beneath the SURFACE of the Earth, generally formed by DISSOLUTION of CARBONATE BEDROCK. Caves may also form by erosion of coastal bedrock, partial melting of *glaciers*, or solidification of *lava* into hollow tubes[6]. *Also see cavern and cavity.*

cavern, *n* – [GEOLOGY] a CAVE, one of large or indefinite extent[6]. *Also see cave and cavity*.

cavitation, *n* — [HYDROLOGY] *1*. a process of EROSION in a STREAM CHANNEL caused by sudden collapse of VAPOR bubbles against the channel wall. *2*. The formation of cavities filled with air and water vapor due to internal pressure reduced below atmosphere. *3*. the formation and collapse of gas pockets or bubbles on the blade of an impeller or the gate of a valve; collapse of these pockets or bubbles drives water with such force that it can cause pitting of the gate or valve surface[16].

cavity, *n* — [GEOLOGY] a natural underground opening that may be small or large[4]. *Also see cave and cavern.*

cell, *n* – [BIOLOGY] the structural and functional unit of an ORGANISM, consisting of cytoplasm and a nucleus surrounded by a membrane.

cay—*See key.*

Celsius (^{o}C), *n* – [PHYSICS] MEASURE of TEMPERATURE where, $^{o}C = 5/9(^{o}F) - 18$[24]. *Also known as Centigrade*. *Also see Fahrenheit.*

cement, *n* – [GEOLOGY] *1*. a powder consisting of alumina, SILICA, lime, and other substances that hardens when mixed with water. *2*. chemically

precipitated mineral material that occurs in the spaces among the grains of a sedimentary rock, thus binding the grains into a rigid mass[4]. *Also see grout, lime and mortar*.

cementation, *n* – [GEOLOGY] the DIAGENETIC PROCESS by which SEDIMENT GRAINS are bound together by PRECIPITATED MINERALS originally dissolved during the CHEMICAL WEATHERING of preexisting ROCKS[4].

cenote, *n* – [GEOLOGY] a SINKHOLE with exposed rocky edges containing GROUND WATER.

Cenozoic Era, *n* – [GEOLOGY] the time span between 66.4 million years ago to the present[4].

Centigrade – *See Celsius*.

centrifugal, *adj* – [PHYSICS] moving away from the center[24]. *Also see centripetal.*

centrifugal pump, *n* – [PUMPING TECHNOLOGY] a PUMP with an impeller or rotor, an impeller shaft, and a casing, which discharges fluid by centrifugal force. An electric SUBMERSIBLE PUMP is a centrifugal pump[24].

centripetal, *adj* – [PHYSICS] moving towards the center[24]. *Also see centrifugal*.

centripetal drainage pattern, *n* – [HYDROLOGY] a pattern of DRAINAGE in which STREAMS drain radially inwards, either towards a single trunk river which drains the basin, or to a lake which may or may not have an outlet[6]. *Also see arheic*.

centroclinal, *adj* – [GEOLOGY] relating to a structure in which the STRATA dip inwards to a central low point, sometimes referred to as a centrocline[6].

CERCLA — *See Comprehensive Environmental Response, Compensation, and Liability Act.*

cesspool, *n* – [HYDROLOGY] an underground RESERVOIR for LIQUID WASTE (as household sewage) without TREATMENT[15]. *Also see dry well, leachfield, seepage pit and septic tank.*

cetane, *n* – [PETROLEUM TECHNOLOGY] a PARAFFINIC HYDROCARBON, hexadecane ($C_{16}H_{34}$), found in crude oil and some refined products; a primary reference fuel on which the CENTANE NUMBER scale is based[38].

cetane index, *n* – [PETROLEUM TECHNOLOGY] an approximation of CETANE NUMBER based on the specific gravity and mid-boiling point of the fuel[38]. *Also see cetane number.*

cetane number, *n* – [PETROLEUM TECHNOLOGY] cetane number (CN) is to DIESEL FUEL what OCTANE RATING is to GASOLINE. It is a measure of the fuel's COMBUSTION quality. Cetane is an ALKANE MOLECULE that ignites very easily under compression, so it was assigned a cetane number of 100. All other HYDROCARBONS in diesel fuel are indexed to cetane as to how well they ignite under compression. The cetane number therefore measures how quickly the fuel starts to burn (auto-ignites) under diesel engine conditions. Since there are hundreds of components in diesel fuel, with each having a different cetane quality, the overall cetane number of the diesel is the average cetane quality of all the components. A fuel with a high cetane number starts to burn shortly after it is injected into the cylinder; it has a short ignition delay period. Conversely, a fuel with a low cetane number resists auto-ignition and has a longer ignition delay period[38]. *Also see cetaane, cetane index and octane rating.*

chain of custody, *n* – [LAW] a process used to maintain and document the chronological history of a SAMPLE or other type of EVIDENCE. Documents should include name or initials of the individual collecting the sample, each person or entity subsequently having custody of it, dates the items were collected or transferred, agency and case number, if applicable and a brief description of the item.

chain reaction, *n* – [CHEMISTRY] a REACTION that stimulates its own repetition, in particular where the NEUTRONS originating from nuclear fission cause an ongoing series of fission reactions[17].

chalk, *n* – [GEOLOGY] a form of LIMESTONE with a COMPOSITION of $CaCO_3$. This SEDIMENTARY ROCK is composed of the shells and skeletons of MARINE MICROORGANISMS[4]. *Also see dolomite and limestone.*

chalybeate, *n* – [HYDROGEOLOGY] SPRING water which contains a high CONCENTRATION of IRON compounds and is reputedly of therapeutic value. Thus, it is commonly utilized in spa towns[6].

chambers, *n* – [LAW] the offices of a JUDGE and his or her staff[19].

chance, *n* – [STATISTICS] likelihood or PROBABILITY that an event will take place, expressed as a fraction or percent[15]. *Also see probability.*

channel, *n* – [HYDROLOGY] *1*. deepest portion of a RIVER bed, in which the main CURRENT flows. *2*. NATURAL or ARTIFICIAL waterway, clearly distinguished, which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water[16]. *Also see narrows and straits.*

channel bar, *n* – [HYDROLOGY] the lowest prominent GEOMORPHIC features higher than the CHANNEL BED[47].

channel capacity, *n* – [HYDROLOGY] the maximum volume of flow of a RIVER within its CHANNEL without overtopping its BANK[6].

chaos, *n* – [PHYSICS] a state of apparent randomness and unpredictability which can be observed in any complex DYNAMIC system that is highly sensitive to small changes in external conditions[24]. *Also see chaos theory and entropy*.

chaos theory, *n* – [PHYSICS] an attempt to describe irregular, unpredictable systems – that is, systems whose behavior is difficult to predict because there are so many variables or unknown factors. Weather is an example of a chaotic system[6]. *Also see chaos and entropy*.

characteristic, *n* — [STATISTICS] a PROPERTY of items in a SAMPLE or POPULATION that can be MEASURED, counted, or otherwise observed[28].

> DISCUSSION—A characteristic of interest may be the cadmium concentration or ignitability of a population.

Also see attribute, property and quality.

characterization, *n* – [SCIENTIFIC METHOD] a description or the task of describing the features and PROPERTIES of a certain object, place, etc[15].

charco, *n* – [GEOGRAPHY] a small, natural DEPRESSION in which water collects, as in a DESERT alluvial plain; a tank or water hole[16].

charge, *n* – [PHYSICS] a definite quantity of ELECTRICITY; especially**:** an excess or deficiency of ELECTRONS in a body[17]. *Also see valency*.

chart, *n* – [GEOGRAPHY] a base MAP conveying information about something other than the purely GEOGRAPHIC; also, a special-purpose map; especially one designed for purposes of navigation, such as a hydrographic chart or a bathymetric chart[4]. *Also see cross-section and map.*

chasm, *n* – [GEOLOGY] *1*. a deep, fairly narrow breach in the earth's surface; an ABYSS; a GORGE; a deep CANYON[4]. *2*. a deep, wide, elongated gap in the floor of a CAVE.

Chebyshev's Theorem, *n* – [STATISTICS] for any DATA set (POPULATION or SAMPLE) and any CONSTANT k greater than 1, at least $1 - 1/k^2$ of the data must lie within k STANDARD DEVIATIONS on either side of the MEAN[11].

check standard, *n* – [CHEMISTRY] an ANALYTE with a well-characterized property of interest, such as CONCENTRATION, DENSITY, etc... used to verify method, instrument and operator performance during regular operation. Check standards may be obtained from a certified supplier, may be a pure substance with properties obtained from the literature or may be developed in-house[51].

check valve, *n* – [PUMPING TECHNOLOGY] used to hold the FUEL or LIQUID line PRIME in suction systems, "checking" the backward flow of product when a PUMP is turned off.

check-valve tubing pump, *n* – [PUMPING TECHNOLOGY] a water sampling tool consisting of plastic tubing with a check valve attached to the bottom. Oscillation of the tubing moves water up through it. The check valve prevents water from draining out of the tubing when it is withdrawn from the well. In this way, the tubing acts like a long, skinny bailer.

cheiorographic coast, *n* – [GEOGRAPHY] a coastline which has experienced complex, TECTONIC uplift and subsidence, resulting in alternate BAYS and HEADLANDS[6].

chelation, *n* **–** [CHEMISTRY] the PROCESS of forming complex CHEMICAL COMPOUNDS in which certain METAL IONS are bound into stable ring structures, keeping the ions in solution and eliminating or reducing normal (and often undesirable) effects of the ions[4].

chemical, *n* – [CHEMISTRY] *1*. of or pertaining to CHEMISTRY. *2*. a SUBSTANCE[15]. *Also see component, constituent and substance*.

chemical activity, *n* – [CHEMISTRY] the molal concentration or MOLALITY of an ION multiplied by a factor known as the ACTIVITY coefficient[33].

chemical constituent, *n* – [GEOCHEMISTRY] those chemical substances (ELEMENTS, COMPOUNDS, IONS) which are present within a given water sample[61].

chemical dispersion, *n* – [CHEMISTRY] in relation to oil spills, this term refers to the creation of oil-in-water EMULSIONS by the use of chemical dispersants made for this purpose[51].

chemical induction, *n* – [CHEMISTRY] the process where one reaction accelerates another in a chemical system. It is often observed in oxidation-reduction reactions[62]. *Also known as coupling*.

chemicals of concern, *n* — [ENVIRONMENTAL REGULATION] the specific compounds and their breakdown products that are identified for evaluation in the corrective action process. Identification can be based on their historical and current use at a site, detected concentrations in environmental media and their MOBILITY, TOXICITY and PERSISTENCE in the environment. Because chemicals of concern may be identified at many points in the corrective action process, including before any determination that they pose an unacceptable risk to human health or the environment, the term should not automatically be construed to be associated with increased or unacceptable risk.

chemical oxygen demand (COD), *n* – [CHEMISTRY] MASS CONCENTRATION of OXYGEN equivalent to the amount of a specified oxidant consumed by dissolved or suspended MATTER when a water sample is treated with that oxidant under defined conditions[7]. *Also see biological oxygen demand (BOD).*

chemical potential, *n* – [CHEMISTRY] the ENERGY contents of given dissolved substances, as functions of TEMPERATURE, PRESSURE and composition[61].

chemical precipitate, *n* – [GEOLOGY] a SEDIMENTARY DEPOSIT formed from material precipitated by solution or colloidal suspension[6].

chemical sediments, *n* – [GEOLOGY] SEDIMENTS precipitated from a SOLUTION either through ORGANIC or inorganic processes and include MINERALS such as CALCITE and DOLOMITE. *Also see detrital sediments and evaporite.*

chemical weathering, *n* – [GEOLOGY] attack and dissolving of PARENT ROCK by exposure to rainwater, surface water, oxygen, and other gases in the atmosphere, and compounds secreted by organisms[6]. *Also see decomposition and degradation.*

chemistry, *n* – the study of MATTER and its TRANSFORMATIONS[24]. *Also see biochemistry and geochemistry.*

chemosynthesis, *n* – [CHEMISTRY] process in which specific AUTOTROPHIC ORGANISMS extract inorganic compounds from their environment and convert them into organic nutrient compounds without the use of sunlight[34]. *Also see photosynthesis*.

chemotaxis, *n* – [MICROBIOLOGY] the movement of bacteria under the influence of a chemical gradient.

chenier ridge , *n* – [GEOGRAPHY] a BEACH RIDGE that is surrounded by low-lying SWAMP DEPOSITS[4].

chert, *n* – [GEOLOGY] a member of a group of SEDIMENTARY ROCKS that consist primarily of MICROSCOPIC SILICA CRYSTALS (SiO_2). Chert may be either ORGANIC or INORGANIC, but the most common forms are inorganic[4]. *Also see chalk, quartz and silica.*

chernozem soil, *n* – [AGRONOMY] type of SOIL commonly found in grassland environments. These soils are often black in color and have a well developed A HORIZON rich in HUMUS[20].

chevron fold, *n* – [GEOLOGY] a FOLD with a sharp angular hinge and planar limbs of equal length[4].

Chézy equation, *n* – [HYDROLOGY] an EQUATION used to compute the VELOCITY of uniform flow in an open CHANNEL: mean velocity of flow (V) equals the Chézy coefficient times the square root of the product of hydraulic radius in feet (r) times the slope of the channel[16]. *Also see Froude number, Manning equation and Reynolds number.*

chimney, *n* – [GEOLOGY] *1*. a vertical shaft leading up from the passage of a SUBTERRANEAN CAVE. *2*. a volcanic vent[6].

chine, *n* – [GEOGRAPHY] a small RAVINE or CANYON reaching down to the COAST[6].

chiral, *adj* – [CHEMISTRY] ORGANIC CHEMICAL existing as two mirror images known as ENANTIOMERS[17]. *Also see enantiomers and stereoisomers.*

chi-square test, *n* – [STATISTICS] a statistical procedure to measure the significance of the discrepancy existing between observed and theoretical frequencies in a set of possible events[6].

chlordecone—*See kepone.*

chloride–*See halide*.

chlorinated hydrocarbon–*See chlorinated solvent.*

chlorinated solvents, *n* – [CHEMISTRY] HYDROCARBONS containing chlorine that are used primarily as DEGREASERS and cleaners in industrial operations and DRY CLEANING. Most chlorinated solvents are heavier than water and are considered DENSE NON-AQUEOUS PHASE LIQUIDS (DNAPLs). Because most of these solvents have very low drinking-water standards and their widespread use, ground-water contamination has become widespread[41]. *Also see coal tar, DNAPLs, tetrachloethylene and trichloroethylene.*

chlorination, *n* – [TREATMENT TECHNOLOGY] the application of CHLORINE or hypochlorite to water for purposes of disinfection, oxidation of organic matter, or retardation of putrefaction[63].

chlorine (Cl), *n* – [CHEMISTRY] (Cl_2) a GAS widely used in the disinfection of water and as an oxidizing agent for organic matter, manganese, iron, and hydrogen sulfide. Chlorine is known to react with organic matter in the water to form TRIHALOMETHANES (THMs), a suspected CARCINOGEN[17].

chlorine-36, *n* – [ISOTOPES] an ISOTOPE of CHLORINE containing 16 PROTONS and 20 NEUTRONS in the NUCLEUS produced by cosmic RADIATION of the upper ATMOSPHERE and weapons testing. ^{36}Cl can be used to estimate the age of GROUND-WATER RECHARGE[40].

chlorine-contact chamber, *n* – [TREATMENT TECHNOLOGY] in a waste-treatment plant, a chamber in which EFFLUENT is disinfected with CHLORINE before it is discharged to the receiving waters[63].

chlorine demand, *n* – [TREATMENT TECHNOLOGY] the difference between the amount of chlorine applied to a treated supply and the amount of free, combined or total available chlorine remaining at the end of the contact period. The chlorine demand is determined by the amount of oxidizable material present in the water[63].

chlorofluorocarbons (CFCs), *n* – [CHEMISTRY] HYDROCARBONS containing FLUORINE which are used a refrigerants and SOLVENTS and can be used to AGE-DATE GROUND WATER[6]. These compounds are known to degrade the OZONE layer in the ATMOSPHERE.

DISCUSSION – Because of their known concentrations in precipitation over the years, CFCs can be used to assess the age of ground water.

Also see krypton-85, sulfur hexafluoride and tritium.

chlorophyll, *n* – [BIOLOGY] green pigment found in plants and some BACTERIA used to capture the energy in light through PHOTOSYNTHESIS[24]. *Also see chloroplast and photosynthesis.*

chloroplast, *n* -- [BIOLOGY] organelle in a CELL that contains CHLOROPHYLL and produces organic energy through PHOTOSYNTHESIS[24]. *Also see chlorophyll and photosynthesis.*

cholestane, *n* – [PETROLEUM CHEMISTRY] C_{27} saturated sterane derived from cholesterol. A major BIOMARKER in PETROLEUM[34].

chonolith, *n* – [GEOLOGY] an *intrusive igneous rock* of an irregular form. *Also see batholith, laccolith and pluton.*

chord, *n* – [MATHEMATICS] the LINE joining two POINTS on a curve[11].

chott, *n* – [GEOGRAPHY] a seasonal, often SALINE, LAKE flooded only in the winter months[6]. *Also spelled shott.*

Christensen & Larsen Method, *n* – [AGE DATING] a METHOD used to estimate the time frame of DIESEL FUEL or HEATING OIL RELEASES with the ASSUMPTION that the *n*-C_{17}/PRISTANE RATIO is proportional, with several limiting conditions, to the AGE of the PETROLEUM where, the age (T) is proportional to the *n*-C_{17} and pristane (Pr) concentrations[30]:

$$T = 8.4\ n\text{-}C_{17}/Pr + 19.8$$

DISCUSSION – The Christensen & Larsen method assumes that the initial *n*-C_{17}/pristane ratio in the unweathered fuel ranges from 2.0 to 2.4. However, as of 2007, this ratio has been found to range from 0.95 to 1.5 in northeastern US motor diesel fuels and heating oils.

Also see age-dating, fingerprinting, isoprenoid, n-alkane, phytane and pristane.

chromatogram, *n* – [CHEMISTRY] *1*. a record obtained by CHROMATOGRAPHY typically depicting response versus TIME. 2. a plot of the detector signal for separated components as peaks versus time or elution volume during chromatography. Each peak on the chromatogram may represent more than one compound[34].

chromatography, *n* – [CHEMISTRY] a TECHNIQUE used in ANALYTICAL CHEMISTRY for analyzing or separating mixtures of GASES, LIQUIDS or DISSOLVED SUBSTANCES. A detector can then be used to determine the COMPOSITION and CONCENTRATION of the SUBSTANCE[34]. *Also see electron capture detector, flame ionization detector and mass spectrometer.*

chronic, *n* – [TOXICOLOGY] affecting a person over a long period of TIME[15]. *Also see acute.*

chronology, *n* – [FORENSICS] *1*. the SCIENCE that deals with measuring TIME by regular divisions and that assigns to events their proper dates. *2*. an arrangement (as of events) in order of occurrence[15].

chronometric method, *n* – [DENDROLOGY] a method used to determine or estimate the relative or absolute date of an event, as for example, radiocarbon (^{14}C) dating or DENDROCHRONOLOGY[12].

chronostratigraphy, *n* – [GEOLOGY] one of the branches of STRATIGRAPHY concerned with time rather than spatial distributions and LITHOLOGY[6].

chute, *n* – [GEOGRAPHY] *from French*, a narrow CHANNEL with a fast-flowing current in RIVERS and in STRAITS between ISLANDS and MAINLANDS[6].

ciénaga, *n* – [GEOGRAPHY] *from Spanish*, wetland or spring. *Also spelled cienega.*

cinder, *n* – [GEOLOGY] *1*. a bubbly (vesicular) VOLCANIC ROCK fragment that forms when molten, gas-filled LAVA is thrown into the air, then solidifies as it falls. *2*. the slag from a metal furnace. *3*. a fragment of ASH. *4*. a partly burned combustible in which fire is extinct. *5*. a hot coal without flame. *6*. a partly burned coal capable of further burning without flame[4].

circle, *n* -- [MATHEMATICS] a set of points equidistant from a given point (the center)[15].

circulation drilling, *n* – [DRILLING TECHNOLOGY] the passage of LIQUID, primarily DRILLING MUD, but can be air, down the interior of the drill-stem and back to surface through the ANNULUS. The circulation is necessary to remove the debris that is created when DRILLING[4]. *Also see mud-rotary drilling.*

circumference, *n* – [MATHEMATICS] *1*. the enclosing BOUNDARY, especially of a CIRCLE or other figure enclosed by a curve. *2*. the distance round[15]. *Also see circle, diameter and radius.*

circumference of the Earth, *n* – [GEOGRAPHY] because the Earth is an oblate spheroid, its CIRCUMFERENCE at the Equator differs from that between the Poles. The equatorial circumference is 40,076 kilometers (24,902 miles), while that at the poles is 40,008 km (24,860 mi)[6].

circum-neutral, *adj* – [CHEMISTRY] displaying a pH in the range of 6.5 to 8.5[61]

circumstantial evidence, *n* – [LAW] TESTIMONY not based on actual personal KNOWLEDGE or OBSERVATION of FACTS in controversy, but of other facts from which

DEDUCTIONS are drawn, showing indirectly the facts sought to be proved[19].

cirque, *n* – [GEOLOGY] *from French,* a deep, semi-circular basin eroded out of a mountain by an ALPINE GLACIER[4].

cistern, *n* – [HYDROLOGY] an artificial RESERVOIR or TANK for holding water[16].

***cis, trans* isomers**, *n* – [CHEMISTRY] the difference in position of atoms (or groups of atoms) relative to a reference plane in an organic molecule. In a *cis*-isomer, the atoms are on the same side of the molecule, but are on opposite sides in the *trans*-isomer. Sometimes called STEREOISOMERS, these arrangements are common in ALKENES and *CYCLO*-ALKANES[62].

civil, *n* – [LAW] this word has various significations. It is used in contradistinction to barbarous or savage, to indicate a state of society reduced to order and regular government; thus we speak of civil life, civil society, civil government and civil liberty. It is sometimes used in contradistinction to criminal to indicate the private rights and remedies of men, as members of the community, in contrast to those which are public and relate to the government; thus we speak of civil process and criminal process, civil jurisdiction and criminal jurisdiction[19].

civil action, *n* – [LAW] action brought to enforce, redress or protect private rights. In general, all types of actions other than criminal proceedings[19].

claim, *n* – [INSURANCE] the act or process of requesting payment, through an insurance policy, for a LOSS[15].

clarifier, *n* – [TREATMENT TECHNOLOGY] a basin or tank in which solids float to the surface or settle to the bottom by gravity[63].

clarifying system, *n* – [DRY-CLEANING TECHNOLOGY] a tank in which contaminated DRY-CLEANING FLUID is placed. Over a period of time, the solids settle to the bottom of the tank and the liquid can be recovered[41].

class action, *n* – [LAW] a lawsuit in which one or more members of a large group, or class, of individuals or other entities sue on behalf of the entire class. The district court must find that the claims of the class members contain questions of law or fact in common before the lawsuit can proceed as a class action[19].

classification exception area (CEA), *n* – [ENVIRONMENTAL REGULATION] an area within which one or more constituent standards and designated uses are suspended by a regulatory agency[18].

clast, *n* – [GEOLOGY] pertaining to a ROCK or SEDIMENT composed principally of broken fragments that are derived from pre-existing rocks or MINERALS and that have been transported some distance from their places of origin[4].

clastic, *adj* – [GEOLOGY] being or pertaining to a SEDIMENTARY ROCK composed primarily from fragments of preexisting ROCKS or FOSSILS[4]. *Also see detrital sediments and sedimentary rock.*

clastic wedge, *n* -- [GEOLOGY] an accumulation of mainly CLASTIC SEDIMENTS deposited adjacent to uplifted areas. Sediments in the wedge become finer and the section thinner in a direction away from the upland source area[4]. *Also see clastic, detrital sediments and sedimentary rock.*

clay (clay soil), *n* — [GEOLOGY] FINE-grained SOIL or the fine-grained portion of soil that can be made to exhibit plasticity (putty-like properties) within a range of water contents, and that exhibits considerable strength when air-dry. The term has been used to designate the percentage finer than 0.002 mm (0.005 mm in some cases), but it is strongly recommended that this usage be discontinued, since there is ample evidence from an engineering standpoint that the properties described in the above definition are many times more important[4]. Clay includes minerals such as illite, kaolinite or montmorillonite.

clay pan, -- [AGRONOMY] a slowly PERMEABLE SOIL HORIZON that contains much more CLAY than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet[16]. *Also see duripan, fragipan, hardpan ironpan and pan.*

clay parting, *n* – [AGRONOMY] *1*. clayey material between a vein and its wall. *2*. a seam of hardened carbonaceous clay between or in beds of coal, or a thin layer of clay between relatively thick beds of some other rock (such as sandstone)[4].

clay seal, *n* – [MINING] abarrier constructed of IMPERMEABLE CLAY that stops the flow of water[66].

clay size, *n* — [AGRONOMY] that portion of the SOIL FINER than 0.002 millimeter (0.005 millimeter in some cases). *See also clay*.

clay soil—*See clay*.

claystone, *n* – [GEOLOGY] a CLASTIC SEDIMENTARY ROCK that is composed primarily of clay-sized particles (less than 1/256 millimetre in diameter). *Also see argillite and shale.*

clay treating, *n* – [PETROLEUM TECHNOLOGY] the removal of certain polar compounds conducted during the refining process In this relatively simple process, the fuel is allowed to pass through a bed of clay. Certain classes of polar compounds, especially

those that act as surfactants, adsorb onto the surface of the clay and thus are removed from the fuel[37].

Clean Water Act (CWA), *n* – [ENVIRONMENTAL REGULATION] more formally referred to as the Federal Water Pollution Control Act, the Clean Water Act constitutes the basic federal water pollution control statute for the United States. Originally based on the Water Quality Act of 1965 which began setting water quality standards. The 1966 amendments to this act increased federal government funding for sewage treatment plants. Additional 1972 amendments established a goal of zero toxic discharges and "fishable" and "swimmable" surface waters. Enforceable provisions of the CWA include technology-based effluent standards for point sources of pollution, a state-run control program for nonpoint pollution sources, a construction grants program to build or upgrade municipal sewage treatment plants, a regulatory system for spills of oil and other hazardous wastes, and a Wetlands preservation program.

cleanup, *n* – [REMEDIATION TECHNOLOGY] actions taken to deal with a release or threat of release of a HAZARDOUS SUBSTANCE that could affect humans and/or the ENVIRONMENT[16].

clearing effect, *n* – [DENDROLOGY] abrupt growth release in a tree which as been freed from competition[12].

cleavage, *n* – [MINERALOGY] the tendency of a MINERAL to break along planes of weak bonding[4].

cleavage, *n* – [CHEMISTRY] the breaking of a CHEMICAL BOND in a MOLECULE to form smaller molecules[4].

cleft, *n* – [GEOLOGY] a usually V-shaped indented FORMATION; a HOLLOW between RIDGES or protuberances[6].

cliff, *n* – [GEOLOGY] a steep ROCK face especially at the edge of the SEA[6]. *Also see crag.*

climate, *n* – [METEOROLOGY] synthesis of WEATHER conditions in a given area, characterized by long-term STATISTICS (MEAN VALUES, VARIANCES, PROBABILITIES of extreme values, etc.) of the METEOROLOGICAL elements in that area[4]. *Also see meteorology and weather.*

clinical, *adj* – [SCIENTIFIC METHOD] diagnosable by or based on OBSERVATION[15]. *Also see diagnostic and empirical.*

clint, *n* – [GEOLOGY] *1*. flat or sloping bare LIMESTONE OUTCROPS (limestone pavements) weathered into straight-sided or furrowed blocks and RIDGES of limestone which are separated by deep CLEFTS or solutionally widened JOINTS (GRIKES) that often crisscross. *2*. Slabs of limestone, parallel to the BEDDING, forming a pavement[6].

clitter , *n* – [GEOLOGY] large GRANITE BOULDERS[6].

clod, *n* — [AGRONOMY] a compact, coherent mass of soil ranging in size from 5 to 10 millimeters (0.20 to 0.39 inch) to as much as 200 to 250 millimeters (7.87 to 9.84 inches) produced artificially, usually by the activity of man by plowing, digging, etc., especially when these operations are performed on soils that are either too wet or too dry for normal tillage operations[20].

closed basin, *n* — [HYDROLOGY] a hydrographic basin (basin, area or sub-area) is considered closed with respect to surface water flow if its TOPOGRAPHY prevents the occurrence of visible surface water outflow. It is closed hydrologically if neither surface nor underground water outflow can occur[4]. *Also see arheic and bolson.*

closed process, *n* – [INDUSTRIAL TECHNOLOGY] an industrial or manufacturing process with the goal is to obtain zero emissions; this means that all the residual products are used in the process and no residual products are discharged into the environment. In practice, however, closed processes mean that residual products are conducted back into the process, but nonetheless some waste is produced and ends up in the environment.

closed talik, *n* – [GEOLOGY] a form of localized unfrozen ground (talik) in an area of PERMAFROST. It is completely enclosed by permafrost in all directions.

closed traverse, *n* – [GEOGRAPHY] a TRAVERSE which begins and ends at survey points with known COORDINATES and orientation or at the same point.

closure, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] the decommissioning of a disposal facility or an UNDERGROUND STORAGE TANK.

coagulation, *n* – [TREATMENT TECHNOLOGY] *1*. the use of CHEMICALS to make suspended solids gather or group together into small FLOCS[17]. *2*. the introduction of sulfate of alumina into polluted water; this causes organic matter to form a mass that entangles or traps all particulate matter in the water, thereby increasing the rate of sedimentation[63].

coal, *n* – [GEOLOGY] ROCK containing more than 50% ORGANIC MATTER. Most coals, but not all, are of higher-plant origin. Increasing burial maturation results in LIGNITE, BITUMINOUS and ANTHRACITE coals[4]. *See anthracite coal, bituminous coal and lignite.*

coal ash, *n* -- [COAL TECHNOLOGY] a collective term referring to any solid materials or residues (such as FLY ASH, BOTTOM ASH or BOILER SLAG) produced primarily from the COMBUSTION of COAL.

coal gas, *n* – [COAL TECHNOLOGY] GAS, formerly used for lighting, heating and other purposes, produced

through the COMBUSTION of COAL. A waste product from the production of coal gas is coal tar. Typically, it contains 50% hydrogen, 35% methane and 8% CO_2[4]. *Also known as manufactured gas or town gas. Also see manufactured gas plant (MGP).*

coal measures, *n* – [GEOLOGY] accumulations of COAL seams with interbedded SHALE, SANDSTONE and LIMESTONE[4].

coal tar, *n* – [COAL TECHNOLOGY] a thick LIQUID obtained as a byproduct of COAL DISTILLATION that includes ORGANIC COMPOUNDS such as BENZENE, methyl benzene, naphthalene, phenol, cresol and anthracene. Normally exhibits a specific gravity of between 1.02 and 1.10[24]. *Also see coal gas, dense non-aqueous phase liquid (DNAPL) and manufactured gas plant (MGP).*

coarse material, *n* — [GEOLOGY] material COARSER than a No. 200 (75-µm) U.S. standard sieve.

coast, *n* – [GEOGRAPHY] the area of dry LAND that borders on a body of WATER[6].

cobble (cobblestone), *n* — [GEOLOGY] a ROCK fragment, usually ROUNDED or semi-rounded, with an average DIMENSION between 3 and 12 inch (75 and 305 millimetres)[4]. *Also see boulder, gravel and pebble.*

cockpit karst, *n* – [GEOLOGY] the scenery produced by the SOLUTION of LIMESTONE resulting in a HUMMOCKY TERRAIN of conical residual HILLS[6].

code, *n* – [LAW] a systematic collection, compendium or revision of LAWS, rules or REGULATIONS[19].

coefficient, *n* – [MATHEMATICS] the constant multipliers of the indeterminate variable in a polynomial. For example, in the polynomial x^2+3x+7, the coefficients are 1, 3, and 7.

coefficient of permeability (permeability) — [HYDROGEOLOGY] the RATE of DISCHARGE of WATER under LAMINAR FLOW conditions through a unit cross-sectional area of a POROUS MEDIUM under a unit HYDRAULIC GRADIENT and standard TEMPERATURE conditions (usually 20°C)[16]. *Also see intrinsic permeability and hydraulic conductivity.*

coefficient of transmissibility, *n* — [HYDROGEOLOGY] the RATE of flow of WATER in gallons per day through a vertical strip of the AQUIFER 1 foot (0.3 meter) wide, under a unit HYDRAULIC GRADIENT[16].

coefficient of viscosity (coefficient of absolute viscosity), *n,* — [HYDROLOGY] the shearing FORCE per unit area required to maintain a unit difference in velocity between two PARALLEL LAYERS of a FLUID a unit distance apart[16].

cofferdam, *n* — [HYDROLOGY] a temporary watertight enclosure that is pumped dry to expose the bottom of a body of water so that construction, as of piers, a dam, and bridge footings, may be undertaken. Also, a watertight chamber attached to the side of a ship to facilitate repairs below the water line. A DIVERSION COFFERDAM prevents all downstream flow by diverting the flow of a river into a pipe, channel, or tunnel.

cogener, *n* – [BIOLOGY] member of the same genus. Scientific names are termed binomials, bi- for two and -nomials for names, because they consist of two names. The first name is the genus, the second the species.

cohesion, *n* – [PHYSICS] a MOLECULAR attraction by which the particles of a body are united throughout the mass whether like or unlike. *Also see adhesion.*

cohesive forces, *n* – [PHYSICS] attractive forces between each molecule in a separate-fluid phase which are manifested by a material holding itself together. *Also see adhesive forces.*

cohort, *n* – [DENDROLOGY] an area where TREES had been removed by some time of hydrogeomorphic event, such as a FLOOD, DEBRIS FLOW, etc. and new trees have grown on the SEDIMENT[12]. *Also see forestation.*

coke, *n* – [PETROLEUM CHEMISTRY] solid CARBONACEOUS RESIDUES that can form during REFINERY PROCESSES[34].

coker unit, *n* – [PETROLEUM TECHNOLOGY] an petroleum refinery processing unit that converts residual oil from the VACUUM DISTILLATION column or the ATMOSPHERIC DISTILLATION column into low-molecular-weight HYDROCARBON gases, naphtha, light and heavy gas oils, and petroleum coke. The process thermally cracks the long-chain hydrocarbon molecules in the residual oil feed into shorter chain molecules.

coking, *n* – [PETROLEUM CHEMISTRY] a form of THERMAL CRACKING conducted under high PRESSURE, promoting the formation of COKE as well as lighter product[52].

col, *n* – [GEOLOGY] saddle like depression found between two MOUNTAIN PEAKS. Formed when two opposing CIRQUE GLACIERS back erode an ARÊTE[14].

colc—*See kolk.*

cold cleaning, *n* – [INDUSTRIAL TECHNOLOGY] similar to VAPOR DEGREASING except that the SOLVENT is maintained at room TEMPERATURE or is heated to a temperature below the solvent's BOILING POINT[41].

cold spring, *n* – [HYDROLOGY] a SPRING whose water has a TEMPERATURE appreciably below the mean annual atmospheric temperature in the area; also, a nonpreferred usage for any nonthermal spring in an area having thermal springs[16].

coliform bacteria, *n* – [MICROBIOLOGY] a group of BACTERIA that is normally abundant in the intestinal

tracts of humans and other warm-blooded animals, used as indicators of SEWAGE impacts to water[16].

coliform index, *n* – [MICROBIOLOGY] an index of the purity of water based on a count of its coliform bacteria[63].

coliphages, *n* – [MICROBIOLOGY] VIRUSES that infect and replicate in COLIFORM BACTERIA. They are indicative of SEWAGE CONTAMINATION of water and of the survival and transport of viruses in the environment[47].

collapse doline, *n* – [GEOLOGY] an approximately circular, steep-sided depression in the Earth's surface, formed by collapse of an underground CAVE followed by migration of the resultant void to the surface[61].

collecting sewer, *n* – [TREATMENT TECHNOLOGY] a sewer that collects wastewater from a LATERAL SEWER and connects to a TRUNK SEWER[63].

collective parameters, *n* – [GEOCHEMISTRY] measurements of water quality which reflect the influence of more than one dissolved chemical constituent such as HARDNESS, representing the dissolved concentrations of calcium and magnesium[61].

colloid, *n* – [CHEMISTRY] a HETEROGENEOUS mixture composed of tiny PARTICLES suspended in another material. The particles are larger than MOLECULES but less than 1 μm in DIAMETER. Particles this small do not settle out and pass right through FILTER paper. Milk is an example of a colloid. The particles can be solid, tiny droplets of LIQUID, or tiny bubbles of GAS; the suspending MEDIUM can be a SOLID, liquid, or gas (although gas-gas colloids are not possible)[34].

colluvium, *n* – [GEOLOGY] SOIL material, ROCK fragments, or both moved by CREEP, slide, or local wash and DEPOSITED at the base of steep SLOPES[4]. *Also see alluvium.*

color, *n* – [PHYSICS] the visual perception of LIGHT associated with its FREQUENCY or WAVE LENGTH[15].

colorimetric indicators, *n* – [CHEMISTRY] chemical reaction-based indicators that are used to produce compound reactions to individual compounds or classes of compounds. The reactions, result in visible changes of color or other easily noted indications and are used to detect and quantify contaminants[24].

combe/coombe, *n* – [GEOGRAPHY] a short, deep VALLEY found in CHALK LANDSCAPES[6].

combination, *n* – [MATHEMATICS] the different selections that can be formed from a given number of items, order within each group being immaterial. The number of ways in which *r* objects can be selected from a set of *n* distinct of objects is

$$(n_r) = n!/[r!(n - r)!]$$

Also see permutation.

combined sewer, *n* – [HYDROLOGY] a SEWER SYSTEM that carries both SEWAGE and RUNOFF[16]. *Also see sewer.*

combustible gas indicator (CGI)--*See explosivity meter.*

combustion, *n* – [CHEMISTRY] CHEMICAL REACTION between a FUEL and an oxidizing agent that produces heat (and usually, LIGHT). For example, the combustion of METHANE is represented as $CH_4(g) + 2\ O_2(g) = CO_2(g) + 2\ H_2O(aq)$[17]. *Also see ignition.*

co-metabolic bioventing, *n* – [REMEDIATION TECHNOLOGY] a form of BIOVENTING where a COMPOUND (primary SUBSTRATE) is added that can support microbial growth or stimulate the appropriate ENZYMES to degrade the compound of concern. *Also see bioventing.*

co-metabolism, *n* – [CHEMISTRY] a REACTION in which MICROBES transform a CONTAMINANT even though the contaminant cannot serve as an energy source for the ORGANISMS. To degrade the contaminant, the microbes require the presence of other compounds (primary substrates) that can support their growth.

commerce, *n – 1.* the exchange or buying and selling of commodities on a large scale involving transportation from place to place. *2.* social intercourse: interchange of ideas, sentiments or opinions.

commercial hazardous waste facility, *n* – [TREATMENT TECHNOLOGY] any HAZARDOUS WASTE facility which accepts hazardous waste from more than one intercompany GENERATOR for TREATMENT, storage or disposal at a site other than where the hazardous waste was generated. *Also see generator.*

commingling, *n* – [TREATMENT TECHNOLOGY] the transferring, bulking, or mixing of hazardous waste from one or more hazardous waste packages, containers, transport units or transport vehicles into another.

comminution, *n* – [CHEMISTRY] the reduction of a substance to a fine powder; pulverization; trituration.

comminutor, *n* – [TREATMENT TECHNOLOGY] an a waste-treatment plant, a device that grinds solids to make them easier to treat[63].

common denominator, *n* – [MATHEMATICS] a multiple shared by the denominators of two or more fractions. Often used as a metaphor to describe beliefs or actions held by two different sides.

common-ion effect, *n* – [CHEMISTRY] the decrease in the SOLUBILITY of a SALT dissolved in WATER already containing some of the IONS of the salt[16].

Common Law, *n* – [LAW] a body of COURT DECISIONS based on custom, traditional usage and PRECEDENT, as that of England, rather than codified written laws. Riparian water rights is a common practice under the common law doctrine.

community, *n* — [ECOLOGY] *1*. a naturally occurring, distinctive group of different ORGANISMS which inhabit a common ENVIRONMENT, interact with each other, and are relatively independent of other groups. *2*. a group of people who participate in a social and economic network of statistically significant frequency and within the cultural and geographic boundaries of the network.

community water system, *n* – [HYDROLOGY] a water system which supplies drinking water to 25 or more of the same people year-round in their residences[48].

compaction, *n* – [PHYSICS] the act or PROCESS of pressing together.

compass, *n* –[GEOGRAPHY] a device for determining directions by means of a magnetic needle or group of needles turning freely on a pivot and pointing to the magnetic north. *Also see Brunton compass and sextant.*

complaint, *n* – [LAW] the original or initial pleading by which an action is commenced under codes or Rules of Civil Procedure. *Also see summons*.

complex, *n* – [CHEMISTRY] a combination of two or more ATOMS in a MOLECULAR species, usually charged, and existing in WATER or some other FLUID[17].

complex modulus, *n* – [PHYSICS] a measure of the overall resistance of a material to flow under an applied STRESS, in units of force per unit area. It combines viscosity and elasticity elements to provide a measure of "stiffness", or resistance to flow. The complex modulus is more useful than viscosity for assessing the physical behaviour of very non-Newtonian materials such as emulsions[51].

complex number, *n* – [MATHEMATICS] a number consisting of a real and imaginary part. It can be written in the form a + b*i*, where a and b are real numbers, and *i* is the standard imaginary unit with the property $i^2 = -1$.

compliance, *n* – [LAW] the act or PROCESS of acting in accordance with a wish, command or ORDER.

compliance inspection, *n* – [ENVIRONMENTAL REGULATION] a site inspection performed by a representative of regulatory agency's enforcement program of a generator, transporter, or facility to verify compliance with previously cited violations.

compliance monitoring, *n* – [ENVIRONMENTAL REGULATION] periodic SAMPLING, and often LABORATORY ANALYSIS, to determine COMPLIANCE with the conditions, REQUIREMENTS or STANDARDS within a REGULATORY PERMIT.

composite sample, *n* — [ENVIRONMENTAL INVESTIGATION] a combination of two or more SAMPLES. *Also see grab sample.*

composite underground storage tank, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] a fiberglass-coated steel underground TANK.

composition, *n* – [CHEMISTRY] the qualitative and quantitative makeup of a CHEMICAL COMPOUND.

compost, *n* – [AGRONOMY] ORGANIC material decomposed by BACTERIA under controlled conditions to make a nutrient-rich, natural FERTILIZER for use in gardening or farming.

compound, *n* – [CHEMISTRY] an electrically neutral SUBSTANCE that consists of two or more ELEMENTS combined in specific, constant proportions. A compound typically has PHYSICAL characteristics different from those of its CONSTITUENT elements[17]. *Also see chemical, constituent and element.*

compound-specific stable isotope analysis (CSSIA), *n* – [ISOTOPES] the process of obtaining ISOTOPE ratio values for specific compounds within a mixture, such as BENZENE within GASOLINE or gasoline components dissolved in water. These analyses are conducted with a gas chromatograph - isotope ratio – mass spectrometer (GC-IR-MS)[34]. *Also see bulk isotope analyses.*

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), *n* – [ENVIRONMENTAL REGULATION] enacted in 1980, and as amended by SUPERFUND Amendments and Reauthorization Act of 1986 (42 U.S.C. 9601 et seq.). Also referred to as the Superfund Law, this statute, originally enacted in 1980 and substantially modified in 1986, establishes the U.S. Environmental Protection Agency's (EPA) authority for emergency response and cleanup of hazardous substances that have been spilled, improperly disposed of, or released into the environment. The primary responsibility for response and cleanup is on the generators or disposers of the hazardous substances, with a backup federal response using a trust fund provision.

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) — [ENVIRONMENTAL REGULATION] the list of sites compiled by EPA that EPA has investigated or is currently investigating for potential hazardous

substance contamination for possible inclusion on the National Priorities List (NPL).

compressibility, *n* – [HYDROGEOLOGY] the change in VOLUME of a POROUS MEDIUM in response to an applied STRESS which is counterbalanced by the incompressibility of the saturating fluid and the granular skeleton of the porous medium which it saturates[33]. Compressibility has units of inverse force (Pa^{-1}).

compression, *n* – [PHYSICS] the act or process of bringing an object or material into a smaller space or extent. *Also see adiabatic and compaction.*

compression wood, *n* – [DENDROLOGY] REACTION WOOD which in CONIFEROUS TREES is formed typically on the lower sides of branches and the lower or downhill sides of stems or crooked stems[12].

computer code (computer program), *n* -- [MATHEMATICS] the assembly of numerical techniques, bookkeeping, and control language that represents the model from acceptance of input data and instructions to delivery of output. Examples include MODFLOW, BIOSCREEN, MT3D, etc.

concave, *adj* – [MATHEMATICS] having an outline or surface curved like the interior of a CIRCLE or SPHERE. *Also see convex.*

concentration – [CHEMISTRY] the MASS of a SUBSTANCE divided by the VOLUME of the MEDIUM in which it is dissolved or held. Units of measure are usually milligrams per kilogram (for soil, sediment or solids) and micrograms per liter (aqueous). *Also see activity.*

concept, *n* – [SCIENTIFIC METHOD] any abstract notion or idea by virtue of which we apply general terms to things.

conceptual, *adj* – [SCIENTIFIC METHOD] of the faculty of conceiving in the mind.

conceptual model, *n* — [LOGIC] an assemblage of justifiable ASSUMPTIONS which simplify a real-world system in a manner which makes it amenable to analysis[61].

conclusion, *n* – [SCIENTIFIC METHOD] a reasoned judgment, the necessary consequence of two or more propositions taken as premises; especially, the inferred proposition of a syllogism

conclusive, *n* - [LAW] what puts an end to a thing. A conclusive presumption of LAW is one which cannot be contradicted even by direct and positive PROOF. Take, for example, the presumption that an infant is incapable of judging whether it is or is not against his interest. When infancy is pleaded and proved the plaintiff cannot show that the defendant was within one day of being of age when the contract was made and perfectly competent to make a contract.

conclusive evidence, *n* – [LAW] that which cannot be contradicted by any other EVIDENCE. For example, a record, unless impeached for fraud, is conclusive evidence between the parties.

concrete, *n* – [CONSTRUCTION TECHNOLOGY] a hard, strong, building material made by mixing a cementing material (as portland cement) and a mineral aggregate (as sand and gravel) with sufficient water to cause the cement to set and bind the entire mass[15].

concretion, *n* – [GEOLOGY] the localized deposition of MINERAL matter going out of SOLUTION in SEDIMENTS or tuffs, usually nodular or irregular in shape4.

condensate, *n* – [PETROLEUM CHEMISTRY] the LIQUID HYDROCARBON resulting from cooling VAPORS[34].

conduit, *n* — [HYDROLOGY] a NATURAL or ARTIFICIAL CHANNEL through which FLUIDS may be conveyed[6].

cone of depression, *n* – [HYDROGEOLOGY] a depression of the POTENTIOMETRIC SURFACE in the shape of an inverted cone that develops around a WELL that is being pumped33. It defines the area of influence. Synonym: cone of pressure relief (applied to artesian aquifers only).

cone of impression, *n* — [HYDROGEOLOGY] a rise of the POTENTIOMETRIC SURFACE in the approximate shape of an inverted cone that develops around an INJECTION WELL[33].

cone penetrometer testing (CPT), *n* – [DRILLING TECHNOLOGY] a direct-push DP system used to measure lithology based on the penetration resistance of the soil. Sensors are mounted in the tip (cone) of the DP rods to measure tip resistance and side-wall friction. Electrical signals are carried to digital processing equipment at the ground surface, where plots of soil type versus depth are recorded. It defines the type of soil based on calibration curves, not site-specific conditions. Therefore, CPT data requires on-site calibration/correlation with actual soil cores.

confidence, *n* – [SCIENTIFIC METHOD] *1*. firm trust. *2*. a feeling of reliance or certainty.

confidence interval, *n* — [STATISTICS] an interval used to bound the value of a POPULATION PARAMETER with a specified DEGREE of confidence (this is an interval that has different VALUES for different samples).

> DISCUSSION—The specified degree of confidence is usually 90, 95, or 99 %. *Confidence intervals* may or may not be symmetric about the mean, depending on the underlying statistical distribution. For example, *confidence intervals* for the variances are not symmetric.

confidence limits, *n* — [STATISTICS] the limits on either side of the MEAN VALUE of a group of

OBSERVATIONS which will, in a stated fraction or percent of the cases, include the expected value. Thus the 95% confidence limits are the values between which the population mean will be situated in 95 out of 100 cases.

> DISCUSSION—A one-sided upper or lower confidence limit can also be used when appropriate. An upper confidence limit is a value below which the population mean is expected to be with the specified confidence. Similarly, a lower confidence limit is a value above which the population mean is expected to be with the specified confidence. It is to be noted that confidence limits are calculated after the collection of sample data.

confinement, *n* – [REMEDIATION] action to restrict contamination within defined boundaries.

confining bed, *n* — [HYDROGEOLOGY] a HYDROGEOLOGIC unit of less PERMEABLE material bounding one or more AQUIFERS[33].

confining unit, *n* — [HYDROGEOLOGY] a term that is synonymous with AQUICLUDE, AQUITARD, and AQUIFUGE: defined as a body of relatively low permeable material STRATIGRAPHICALLY adjacent to one or more aquifers[33]. *Also see aquiclude, aquifuge and aquitard.*

confined aquifer. *See aquifer, confined*

confirmation sampling, *n* – [ENVIRONMENTAL INVESTIGATION] AIR, SOIL, GROUNDWATER, SURFACE WATER, or SEDIMENT SAMPLES taken after a cleanup to confirm that the cleanup was effective in removing HAZARDOUS SUBSTANCES. Also refers to sampling conducted to update old sampling data.

conflict of interest, *n* -- [LAW] term used in connection with public officials and fiduciaries and their relationship to matters of private interest or gain to them.

confluence, *n* – [HYDROLOGY] the act of flowing together; the meeting or junction of two or more STREAMS; also, the place where these streams meet[16].

conformable, *n* – [GEOLOGY] ROCK LAYERS that were deposited in sequence without episodes of EROSION between deposition of layers[4].

congelifraction, *n* – [GEOLOGY] the process of freeze-thaw WEATHERING.

conglomerate, *n* – [GEOLOGY] a CLASTIC ROCK composed of particles more than 2 millimeters in DIAMETER and marked by the roundness of its component GRAINS and rock fragments. This type of rock is normally deposited in high-energy environments[4]. *Also see fanglomerate*.

congruent dissolution, *n* – [GEOCHEMISTRY] the DISSOLUTION of MINERALS which dissociate completely in water without depositing any new solid phases[61].

coniferous, *n* – [DENDROLOGY] cone-bearing VEGETATION of middle and high LATITUDES that is mostly evergreen and has needle-shaped or scale-like leaves[12]. *Also see deciduous.*

connate water, *n* — [GEOLOGY] WATER entrapped in the voids of a SEDIMENTARY or EXTRUSIVE IGNEOUS rock at the time of its deposition or emplacement[4].

conscience, *n* – [PHILOSOPHY] inner awareness of the difference between right and wrong in one's own actions, often understood (despite the lack of evidence) to be divinely-inspired moral sense, but many believe otherwise[15].

consequent river, *n* – [HYDROLOGY] a RIVER flowing down the original slope of GEOLOGIC BEDS or general slope of TOPOGRAPHY[16].

conservation, *n* – [ECOLOGY] the sensible use of the Earth's NATURAL RESOURCES in order to avoid excessive DEGRADATION and impoverishment of the ENVIRONMENT. *Also see preservation.*

conservation law, *n* – [PHYSICS] a LAW stating that the total MAGNITUDE of a certain PHYSICAL PROPERTY of a SYSTEM, such as its MASS, ENERGY or CHARGE, remains unchanged even though there may be exchanges of that property between components of the system.

conservative, *adj* – [HYDROGEOLOGY] averse to rapid change[15]. With regard to GROUND-WATER TRACERS, meaning that it migrates at the same RATE as the ground water.

conservative solute, *n* – [HYDROGEOLOGY] a dissolved COMPOUND or ION that does not react readily with MINERALS or other dissolved compounds or undergo BIOLOGICAL or RADIOACTIVE DECAY[16]. *Also known as a conservative tracer.*

consignment state, *n* – [ENVIRONMENTAL REGULATION] the geographic state in which the designated facility is located.

conservative tracer—*See conservative solute.*

consistence, *n* -- [AGRONOMY] the feel of the SOIL and the ease with which a lump can be crushed by the fingers[20]. Terms commonly used to describe consistence are:

> ***Loose***: noncoherent when dry or moist; does not hold together in a mass.
>
> ***Friable***: When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm: When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic: When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a ""wire" when rolled between thumb and forefinger.

Sticky: When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard: When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft: When dry, breaks into powder or individual grains under very slight pressure.

Cemented: Hard, little affected by moistening.

consistency, *n* — [AGRONOMY] the relative ease with which a SOIL can be deformed[20].

consolidated, *adj* — [GEOLOGY] the characteristic of being CEMENTED or COMPACTED, or both, and not separated easily into smaller PARTICLES. *Also see unconsolidated.*

consolidation, *n* — [GEOLOGY] the gradual reduction in VOLUME of a SOIL mass resulting from an increase in compressive stress.

initial consolidation (initial compression) — a comparatively sudden reduction in volume of a soil mass under an applied load due principally to expulsion and compression of gas in the soil voids preceding primary consolidation.

primary consolidation (primary compression) (primary time effect)—the reduction in volume of a soil mass caused by the application of a sustained load to the mass and due principally to a squeezing out of water from the void spaces of the mass and accompanied by a transfer of the load from the soil water to the soil solids.

secondary consolidation (secondary compression) (secondary time effect)—the reduction in volume of a soil mass caused by the application of a sustained load to the mass and due principally to the adjustment of the internal structure of the soil mass after most of the load has been transferred from the soil water to the soil solids.

constant, *n* – [PHYSICS] *1.* continuous, occurring frequently. *2.* a COMPONENT of a relationship of VARIABLES that does not change its VALUE.

constant-head boundary, *n* — [HYDROGEOLOGY] the CONCEPTUAL representation of a NATURAL feature such as a LAKE or RIVER that effectively fully penetrates the AQUIFER and prevents water-level change in the aquifer at that location. *Also see boundary conditions and Dirichet boundary.*

constant-head test, *n* – [HYDROGEOLOGY] a means of measuring the PERMEABILITY of a sample of AQUIFER material in the LABORATORY, by recording the amount of water which needs to be fed into a cylinder containing the sample in order to maintain a predetermined head gradient across the cylinder. The technique is best suited for high permeability materials (K>0.1 m/day)[61]. *Also see falling-head test.*

constant-rate pumping test, *n* – [HYDROGEOLOGY] an aquifer PUMPING TEST where the rate of pumping is held at a single, constant rate for the duration of the test[61].

constituent, *n* – [CHEMISTRY] a specific CHEMICAL SUBSTANCE (that is, an ELEMENT or COMPOUND) or water quality parameter (for example, TEMPERATURE, ODOR, COLOR). *Also see chemical, compound and element.*

Constitution, *n* – [LAW] the fundamental LAW of the state, containing the principles upon which the GOVERNMENT is founded and regulating the divisions of the sovereign powers, directing to what persons each of these powers is to be confided and the manner it is to be exercised. Such as the Constitution of the United States.

constrictivity, *n* – [HYDROGEOLOGY] a dimensionless parameter used to model transport processes (such as molecular diffusion) in porous media. Constrictivity depends on the ratio of the size of the diffusing particle to the pore diameter. The value of constrictivity is always less than 1. The constrictivity is defined not for a single pore, but as the parameter of the entire pore space.

construction debris, *n* – [CONSTRUCTION TECHNOLOGY] concrete, brick, asphalt and such other building materials discarded in the construction of a building or other improvement to a property. *Also see demolition debris.*

consumptive use, *n* – [HYDROLOGY] a use of water which effectively removes it from the local natural environment, such as EVAPORATION of cooling waters, or export as MOISTURE in fruit grown with IRRIGATION WATERS[61].

contact, *n* – [GEOLOGY] the INTERFACE or BOUNDARY between adjacent but dissimilar ROCK types[6].

contact metamorphism, *n* – [GEOLOGY] small scale METAMORPHIC alteration of rock due to localized

heating. It is usually cause by an IGNEOUS intrusion like a SILL or a DIKE[4].

contact spring, *n* – [HYDROLOGY] a type of gravity SPRING whose WATER flows to the land surface from permeable STRATA over less permeable or impermeable strata that prevent or retard the downward PERCOLATION of the water[16].

containment, *n* – [ENVIRONMENTAL REGULATION] the prevention of the spreading of a spilled contaminant, such as oil or other hazardous materials, by placing booms or physical barriers and the use of absorbents, gelling, or herding agents or other materials to restrain, entrap, and collect the spill[16].

contaminant, *n* — [CHEMISTRY] an undesirable SUBSTANCE not normally present in WATER, AIR or SOIL. Any substance potentially HAZARDOUS to human health or the ENVIRONMENT and present in the environment above BACKGROUND CONCENTRATION. *Also see pollutant.*

contaminant exclusion zone—*See exclusion zone.*

contaminant transport model, *n* -- [HYDROGEOLOGY] a MODEL describing the movement of CONTAMINANTS in the ENVIRONMENT.

contaminated site, *n* -- [ENVIRONMENTAL REGULATION] all portions of environmental media at a site and any location where contamination is emanating, or which has emanated, therefrom, that contain one or more contaminants at a concentration which fails to satisfy any applicable remediation standard[18].

contamination reduction zone – [ENVIRONMENTAL INVESTIGATION] transition zone between CONTAMINATED area (exclusion zone) and clean area. The zone is where all personnel decontamination of HAZARDOUS WASTE is conducted.

contiguity, *n* – [PHYSICS] the state of being in contact or contiguous, or touching without being fused together[6].

continent, *n* – [GEOGRAPHY] one of the six or seven great divisions of LAND on the globe: North America, South America, Europe, Asia, Africa, Australia and Antarctica. *Also see mainland and subcontinent.*

continental crust, *n* – [GEOLOGY] that part of the Earth's crust which is composed of SIAL and constitutes the continents. It has an average thickness of 33 km, but can be as thick as 50 km beneath high mountain regions[6].

continental ice sheet, *n* – [GEOLOGY] an unconfined GLACIER that covers much or all of a CONTINENT.

continental shelf, *n* – [GEOLOGY] a gently sloping (<1°) offshore extension of a CONTINENT, submerged by a shallow sea and which extends to the continental slope[6].

continuance, *n* – [LAW] when a COURT postpones a hearing, TRIAL or other scheduled appointment such as for a SETTLEMENT conference.

continuous monitoring, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] a monitoring system that incorporates automatic equipment that can detect LEAKS and/or discharges without interruption[48].

continuous permafrost, *n* – [HYDROLOGY] permafrost occurring everywhere beneath the exposed land surface throughout a geographic regional zone, with the exception of widely scattered sites. *Also see discontinuous permafrost and permafrost.*

continuous stream, *n* -- [HYDROLOGY] a STREAM that is continuous in space from source to discharge point.

contour, *n* – [GEOGRAPHY] a line joining places of equal value on a MAP[6].

contour interval, *n* – [GEOGRAPHY] the difference in value between two successive CONTOURS on a MAP[6].

contourite, *n* – [GEOLOGY] a sedimentary deposit produced by deep-water bottom currents, which result from thermohaline, wind or tidal forces. Most contourites are formed along the continental rise to lower slope settings; however, they can occur anywhere that is below storm wave base. Contourite deposits are generally referred to as drifts.

contract, *n* – [LAW] an AGREEMENT between two or more competent parties in which an offer is made and accepted, and each party benefits. The agreement can be formal, informal, written, oral or just plain understood. Some contracts are required to be in writing in order to be enforced[19]. *Also see agreement.*

contracting plume—*See shrinking plume.*

control rinse water, *n* — [ENVIRONMENTAL INVESTIGATION] WATER used for equipment washing and rinsing having a known CHEMISTRY.

control sample, *n* – [ENVIRONMENTAL INVESTIGATION] a SAMPLE normally collected outside of the subject area to assess BACKGROUND conditions.

control well, *n* — [HYDROGEOLOGY] WELL by which the AQUIFER is stressed, for example, by PUMPING, INJECTION, or change of HEAD[33].

convection, *n* – [PHYSICS] a PROCESS by which HEAT is transferred from one part of a FLUID to another by movement of the fluid itself.

conversion processes, *n* – [PETROLEUM CHEMISTRY] a PROCESS used in PETROLEUM REFINING that fundamentally changes the MOLECULAR structure of the FEEDSTOCK, usually by cracking large molecules into small ones, for example, CATALYTIC CRACKING and HYDROCRACKING[34].

convex, *adj* – [MATHEMATICS] having an outline or surface curved like the exterior of a CIRCLE or SPHERE. *Also see concave.*

cooling water, *n* – [HYDROLOGY] water used for cooling in an industrial or manufacturing process; because its temperature after use is normally higher than that of the lake or stream into which it is discharged, it may constitute a source of thermal pollution[63].

cooling-water load, *n* – [HYDROLOGY] the energy in the form of heat dissipated by cooling water[63].

coomb, *n* – [GEOMORPHOLOGY] a dry valley.

coordinate, *n* – [MATHEMATICS] a number that defines the position of a point relative to a POINT or AXIS (reference line).

coquina, *n* – [GEOLOGY] a coarse-grained rock consisting of poorly-cemented shells and shell fragments.

cordillera, *n* – [GEOGRAPHY] *from Spanish,* a SYSTEM of MOUNTAIN RANGES often consisting of a number of more or less parallel chains[6].

core—*See inner core or outer core.*

core, *n* — [DRILLING TECHNOLOGY] a cylindrical SAMPLE of hardened GROUT, CONCRETE, ROCK, or grouted DEPOSITS, usually obtained by means of a core DRILL[6].

core analysis, *n* – [HYDROGEOLOGY] LABORATORY ANALYSIS of a core SAMPLE that may determine POROSITY, PERMEABILITY, LITHOLOGY, FLUID CONTENT, ANGLE of DIP, etc.

core barrel, *n* – [DRILLING TECHNOLOGY] a tubular device, usually from 10 to 60 feet (3 to 18 meters) long, run in place of a bit and used to cut a CORE sample[16].

core drilling; diamond drilling, *n* — [DRILLING TECHNOLOGY] a rotary DRILLING TECHNIQUE, using diamonds in the cutting bit, that cuts out cylindrical ROCK SAMPLES[16].

core recovery, *n* — [DRILLING TECHNOLOGY] ratio of the length of CORE recovered to the length of hole drilled, usually expressed as a percentage.

corestone, *n* – [GEOLOGY] a BOULDER field[6].

corporation, *n* – [COMMERCE] a group of people authorized to act as an individual especially in matters of business. *Also see business*.

corrasion, *n* – [GEOLOGY] mechanical EROSION performed by such moving agents as WATER, ICE, and WIND, especially when armed with rock fragments. *Also see corrosion.*

corrected NAPL thickness, *n* – [HYDROGEOLOGY] the actual thickness of a NAPL, usually an LNAPL, as opposed to the thickness measured in a well. The true thickness can be calculated by:

$$\Delta h_{aquifer} = \Delta h_{well}(\rho_{water} - \rho_{NAPL})/\rho_{NAPL}$$

where $\Delta h_{aquifer}$ is the NAPL thickness in the aquifer, Δh_{well} is the NAPL thickness in the well, ρ_{water} is the density of water and ρ_{NAPL} is the NAPL density. *Also see DNAPL, LNAPL and NAPL.*

corrective action, *n* – [REMEDIATION TECHNOLOGY] the requirement of treatment, storage and disposal (TSD) facilities handling HAZARDOUS WASTE to undertake corrective actions to clean up spills resulting from failure to follow hazardous waste management PROCEDURES or other mistakes. The process includes cleanup procedures designed to guide TSDFs toward in response to *spills. Also see Resource Conservation and Recovery Act (RCRA)*.

corrective measure study (CMS), *n* – [REMEDIATION TECHNOLOGY] if the need for corrective measures is verified during a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI), the owner or operator of a facility becomes responsible for performing a CMS. A CMS is conducted to identify, evaluate, and recommend specific corrective measures, as indicated by detailed engineering evaluation. Drawing on data collected during the RFI, the CMS demonstrates that the measures proposed will be effective in controlling the source of contamination, as well as problems posed by the migration of substances from the original source into the environment. The measures also must be assessed for technical feasibility, ability to meet requirements related to the protection of public health and the environment, possible adverse environmental effects, and institutional constraints.

correlation, *n* – [STATISTICS] *1*. a mutual relation or degree of relationship between two or more things[6]. *2*. interdependence of variable qualities.

correlation coefficient, *n* – [STATISTICS] a STATISTIC used to measure the strength of a relationship between two VARIABLES. *Also see regression analysis*.

corrosion, *n* – [CHEMISTRY] a REACTION that involves action of an oxidizing agent on a METAL. The oxidizing agent is often OXYGEN dissolved in WATER. *Also see corrasion*.

corrosion inhibitors, *n* – [PETROLEUM CHEMISTRY] CARBOXYLIC ACIDS and carboxylates added to GASOLINE. The facilities – TANKS and PIPELINES – of the gasoline distribution and marketing system are constructed

primarily of uncoated steel. Corrosion inhibitors prevent free water in the gasoline from rusting or corroding these facilities. Corrosion inhibitors are less important once the gasoline is in the vehicle. The metal parts in the fuel systems of today's vehicles are made of corrosion-resistant alloys or of steel coated with corrosion-resistant coatings. More plastic and elastomeric parts are replacing metals in the fuel systems. In addition, service station systems and operations are designed to prevent free water from being delivered to a vehicle's fuel tank[32].

corrosivity, *n* – [CHEMISTRY] the PROPERTY of a CHEMICAL agent that reacts with the SURFACE of a material causing it to deteriorate or wear away[17].

cosmic radiation, *n* – [CHEMISTRY] highly penetrating ionizing radiation, both particulate and electromagnetic, originating in outer space[64].

cosmogenic isotope, *n* – [ISOTOPES] ISOTOPES created when a high-energy cosmic ray interacts with the NUCLEUS of an in-situ ATOM. These isotopes are produced within earth materials such as rocks or soil, in Earth's atmosphere, and in extraterrestrial items such as METEORITES. By measuring cosmogenic isotopes, scientists are able to gain insight into a range of geological and astronomical processes. There are both radioactive and stable cosmogenic isotopes. Some of these radioisotopes are TRITIUM, CARBON-14 and phosphorus-32.

cosmology, *n* – [ASTRONOMY] the study of the largest-scale structures and dynamics of the UNIVERSE and is concerned with fundamental questions about its formation and evolution.

coulée *n* – [GEOLOGY] *from French,* a flow of LAVA which has cooled and solidified[6].

coulée *n* – [HYDROLOGY] *from French,* an intermittent stream; a dry creek bed that may run in a wet season; a steep-walled valley, often having a stream at the bottom[63].

couloir, *n* – [GEOLOGY] *from French,* a deep MOUNTAIN GORGE or GULLY[6].

counselor at law, *n* – [LAW] an officer in the Supreme Court of the United States, and in some other COURTS, who is employed by a party in a cause, to conduct the same on its TRIAL on his behalf. He or she differs from an ATTORNEY AT LAW. Generally in the other courts of the U.S., as well as in the courts of some states, the same person performs the duty of counselor and attorney at law[19]. *Also see attorney and lawyer.*

country rock, *n* – [GEOLOGY] a geological term referring to the rock native to an area.

coupling – *See chemical induction*.

course, *n* – [HYDROLOGY] the path followed by WATER, or the channel through which it flows; a WATERCOURSE[16].

court, *n* – [LAW] an organ of the GOVERNMENT, belonging to the judicial branch, whose function is the application of the LAWS to controversies brought before it and the public administration of JUSTICE[19].

court clerk, *n* – [LAW] the court officer who oversees administrative functions, especially managing the flow of cases through the COURT. The clerk's office is often called a court's central nervous system[19].

court reporter, *n* – [LAW] a person who makes a word-for-word record of what is said in COURT and produces a transcript of the proceedings upon request[19].

covalent bond, *n* – [CHEMISTRY] a strong force of attraction holding ATOMS together in a MOLECULE or crystal[17].

cove, *n* – [GEOGRAPHY] *1*. a small sheltered INLET or BAY. *2*. a deep recess or small VALLEY in the side of a MOUNTAIN. *3*. a level area sheltered by HILLS or mountains[6]. *Also see bay and inlet.*

coversand, *n* – [GEOLOGY] a thin layer of sandy material of wind-blown origin which has been reworked by RIVERS, GLACIAL or PERIGLACIAL processes[6].

cracked fuel, *n* – [PETROLEUM CHEMISTRY] RESIDUE remaining after a straight run fuel has been processed by enhanced refining methods such as CATALYTIC CRACKING[37].

cracking processes, *n* – *Also known as catalytic cracking.*

crag, *n* – [GEOGRAPHY] steep or rugged ROCK. *Also see cliff.*

crankcase oil, *n* – [PETROLEUM CHEMISTRY] used MINERAL-based crankcase oil is the brown-to-black, oily liquid removed from the engine of a motor vehicle when the oil is changed. It is similar to unused oil except it contains additional chemicals from its use as an engine LUBRICANT. The CHEMICALS in oil include HYDROCARBONS, which are DISTILLED from CRUDE OIL, and various additives that improve the oil's performance. Used oil also contains chemicals formed when the oil is exposed to high TEMPERATURES and PRESSURES inside an engine. It also contains some METALS from engine parts and small amounts of GASOLINE, antifreeze, and CHEMICALS that come from gasoline when it burns inside the engine. The chemicals found in used mineral-based crankcase oil vary depending on the brand and type of oil, whether gasoline or diesel fuel was used, the mechanical condition of the engine that the oil came from, and

the amount of use between oil changes. Used oil is not naturally found in the environment.

crater, *n* – [GEOLOGY] a circular DEPRESSION around the vent of a VOLCANO[6]. *Also see caldera.*

craton, *n* – [GEOLOGY] the segment of the Earth's CONTINENTS that remains TECTONICALLY stable and relatively earthquake-free for a vast period of TIME. The craton is composed of the continental shield and the surrounding continental platform[4].

creek, *n* – [HYDROLOGY] a NATURAL STREAM of WATER normally smaller than and often a TRIBUTARY to a RIVER[16]. *Also see brook, river, run and stream***.**

creep, *n* – [GEOLOGY] the slowest form of mass movement, measured in millimeters or centimeters per year and occurring on virtually all SLOPES[4]. *Also see mass wasting and soil creep.*

crenulation, *n* — [GEOLOGY] small-scale FOLDING that is superimposed on larger-scale folding. Crenulations may occur along the CLEAVAGE planes of a deformed ROCK[4]. *Also see cleavage and fold.*

creosote, *n* – [PETROLEUM CHEMISTRY] a name used for a variety of products: wood creosote, COAL TAR creosote, coal tar, coal tar pitch, and coal tar pitch volatiles. These products are mixtures of many CHEMICALS created by high-TEMPERATURE TREATMENT of beech and other woods, coal, or from the resin of the creosote bush. Wood creosote is a colorless to yellowish greasy LIQUID with a smoky ODOR and burned taste. Coal tar creosote is a thick, oily LIQUID that is typically amber to black in COLOR. Coal tar and coal tar pitch are usually thick, black, or dark-brown liquids or semisolids with a smoky odor. Wood creosote has been used as a disinfectant, a laxative, and a cough treatment, but is rarely used these ways today. Coal tar products are used in medicines to treat skin diseases such as psoriasis, and are also used as animal and bird repellents, insecticides, restricted pesticides, animal dips, and fungicides. Coal tar creosote is the most widely used wood preservative in the United States. Coal tar, coal tar pitch, and coal tar pitch volatiles are used for roofing, road paving, aluminum smelting, and coking[24]. *Also see coal tar*.

crest, *n* – [GEOLOGY] the top line of a MOUNTAIN or HILL[6]. *Also see hill, mountain, peak and ridge*.

Cretaceous Period, *n* – [GEOLOGY] the third and final PERIOD of the MESOZOIC ERA, occurring 65 to 146 million years BP. Extensive MARINE CHALK beds were deposited during this period[4].

crevasse splay, *n* – [LAW] SEDIMENT diverted through a breached LEVEE progressively building a small DELTA. *Also see delta and levee.*

criminal act, *n* – [LAW] any crime, including an act, omission, or possession under the laws of the United States or a State or unit of general local government, which poses a substantial threat of personal injury, notwithstanding that by reason of age, insanity, intoxication or otherwise, the person engaging in the act, omission, or possession was legally incapable of committing a crime. Environmental infractions are normally, but not always, not considered criminal acts[19]. *Also see felony and misdemeanor.*

cross bedding, *n* – [GEOLOGY] a ROCK or SEDIMENT STRUCTURE formed by CURRENTS of WIND or WATER. It is characterized by relatively thin layers of sediment that are inclined at an ANGLE to the dominant BEDDING[4].

cross-contamination, *n* – [ENVIRONMENTAL INVESTIGATION] the movement of underground CONTAMINANTS from one level or area to another due to invasive subsurface activities such as an improperly constructed MONITORING WELL.

cross dating, *n* – [DENDROLOGY] the procedure of matching variations in tree-ring widths or other ring characteristics among several tree-ring sequences, allowing the identification of the exact year in which each tree ring was formed[12].

cross examination, *n* – [LAW] the questioning of an opposing party's WITNESS about matters brought up during DIRECT EXAMINATION[19]. *Also see direct examination, rebuttal and testimony.*

cross-section, *n* – [GEOLOGY] a DIAGRAM or drawing that shows features transected by a given PLANE; specifically, a vertical section drawn at right ANGLES to the longer AXIS of a GEOLOGIC feature, such as the TREND of an orebody[16]. *Also see chart and map.*

crude oil, *n* – [PETROLEUM CHEMISTRY] NATURAL OIL that consists of a mixture of HYDROCARBONS and other COMPOUNDS that have not been REFINED[34]. *Also see hydrocarbon and petroleum.*

crust, *n* – [GEOLOGY] Earth's outer most LAYER of solid ROCK between 7 to 70 kilometers thick. Two types of crust exist: OCEANIC crust and CONTINENTAL crust[4]. *Also see inner core, lithosphere, mantle and outer core.*

cryogenesis, *n* – [HYDROLOGY] the combination of thermophysical, physico-chemical and physico-mechanical processes occurring in freezing, frozen and thawing earth materials.

cryogenic aquiclude, *n* — [HYDROLOGY] a layer of ground which, because of its frozen state, has a low enough PERMEABILITY to act as a confining bed for an underlying AQUIFER.

cryolithology, *n* — [HYDROLOGY] the study of the genesis, structure and lithology of earth materials having temperatures below 0°c.

cryology, *n* — [HYDROLOGY] the study of the PROPERTIES of SNOW, ICE, and frozen ground[16]. *Also see permafrost.*

cryopedology, *n* — [HYDROLOGY] the study of SOILS (the solum) at TEMPERATURES below 0°C, with particular reference to soils subject to intensive frost action and to soils overlying PERMAFROST. *Also see permafrost.*

cryosuction, *n* – [HYDROLOGY] a process in freezing soils, where water migrates from the water table through soil pores to the freezing zone (through capillary action). It is the predominant process in ice lens formation.[

cryptosporidium, *n* – [MICROBIOLOGY] a MICROORGANISM commonly found in LAKES and RIVERS which is highly RESISTANT to DISINFECTION. Cryptosporidium has caused several large outbreaks of gastrointestinal illness, with symptoms that include diarrhea, nausea, and/or stomach cramps. People with severely weakened immune systems (that is, severely immuno-compromised) are likely to have more severe and more persistent symptoms than healthy individuals.

crystal, *n* – [MINERALOGY] a SAMPLE of a CRYSTALLINE solid that has a regular shape bound by PLANE SURFACES (FACETS) that intersect at characteristic ANGLES. The shape results from the arrangement of the SUBSTANCES ATOMS, IONS, or MOLECULES. Most crystals contain defects that can strongly affect their optical and ELECTRICAL PROPERTIES[4]. *Also see crystallography and mineralogy.*

crystalline rocks, *n* – [GEOLOGY] an inexact, but convenient term designating an IGNEOUS or METAMORPHIC ROCK, as opposed to a SEDIMENTARY rock[4]. *Also see igneous and metamorphic rocks.*

crystallography, *n* – [MINERALOGY] the study of CRYSTALS, including their growth, STRUCTURE, PHYSICAL PROPERTIES, and classification by form[4]. *Also known as optical mineralogy.*

cuesta, *n* – [GEOLOGY] a HILL or RIDGE with a gentle slope on one side and a steep SLOPE on the other; specifically an asymmetric RIDGE (as in the Southwestern United States) with one face (dip slope) long and gentle and conforming with the dip of the resistant BED or beds that form it, and the opposite face (scarp slope) steep or even CLIFF like and formed by the OUTCROP of the RESISTANT rocks, the FORMATION of the ridge being controlled by the differential EROSION of the gently inclined STRATA[4]. *Also see butte and hogback*.

cueva, *n* – [GEOLOGY] *from Spanish*, CAVE, especially one that is horizontal or nearly so[6]. *Also see cave and cavern.*

culvert, *n* – [HYDROLOGY] any covered structure, not classified as a bridge, that constitutes a transverse drain, waterway or other opening under a road, railroad, canal or similar structure[16].

cupola, *n* – [GEOLOGY] a hemispheric HILL of LIMESTONE[4].

curie, *n* – [CHEMISTRY] the amount of RADIOACTIVITY in 1 gram of radium-226. One curie equals 37 billion radioactive disintegrations per second. To convert curies to microcuries, multiply by one million. Conversely, to convert microcuries to curies, divided by one million. The curie is not an SI unit and is mainly used by U. S. scientists. The corresponding SI unit is the BECQUEREL. One microcurie equals 37,000 becquerel. *Also see becquerel, picocurie and radiation.*

current, *n* – [HYDROLOGY] a body of WATER or AIR, etc. moving in a definite direction especially through a stiller surrounding body[16]. *Also see flow.*

cut bank, *n* – [GEOMORPHOLOGY] an erosional feature of streams. Cut banks are found in abundance along mature or meandering streams. They exist on the outside of a stream bend (the meander). They are shaped much like a small cliff, and are formed by the erosion of soil as the stream collides with the river bank.

cuttings, *n* — [DRILLING TECHNOLOGY] the fragments of ROCK dislodged by the bit and brought to the SURFACE in the DRILLING MUD or fluid. Washed and dried cuttings samples are analyzed by geologists to obtain information about the FORMATIONS drilled[16]. *Also see drill cuttings.*

cyanazine, *n* — [CHEMISTRY] an herbicide listed by the U.S. Environmental Protection Agency (EPA) as a "possible human carcinogen" and found frequently in streams and rivers, particularly following floods and periods of heavy rain and runoff from agricultural lands. Cyanazine is used extensively for weed control for corn, sorghum, and sugarcane. Along with another common farm herbicide, ATRAZINE, Cyanazine concentrations can soar to levels much higher than federal standards during the peak growing season.

cyanides, *n* – [CHEMISTRY] a class of chemical compounds which contain a carbon-nitrogen triple bond. Free cyanide, in which the cyanide ion is found by itself (not complexed with other ions) is highly

toxic. In most cases, MGP wastes such as purifier waste contain complexed cyanides, in which other ions are tightly bound to the cyanide. This complexity appears to lower the toxicity significantly, but there are some concerns that complexed cyanide compounds may be able to decompose and release free cyanide[17].

cyanobacteria—*See blue green algae.*

cycle, *n* – [PHYSICS] a periodic, repetitive fluctuation in time series data from either a constant mean or trend line[15]. *Also see fluctuation and oscillation.*

***cyclo*-alkane**, *n* – [PETROLEUM CHEMISTRY] a saturated, cyclic compound containing carbon and hydrogen. One of the simplest cycloalkanes is cyclohexane (C_6H_{12})[34]. *Also aliphatic, iso-alkane and n-alkane.*

cyclopean stairs, *n* – [GEOLOGY] the longitudinal profile of a glaciated valley that has several consecutive hanging valleys formed through erosion.

Dd

d-10 — [GEOLOGY] the DIAMETER of a SOIL PARTICLE (preferably in millimeters) at which 10 % by WEIGHT (dry) of the particles of a particular SAMPLE are FINER. Synonymous with the effective size or effective grain size[13].

d-60 — [GEOLOGY] the DIAMETER of a SOIL PARTICLE (preferably in millimeters) at which 60 % by WEIGHT (dry) of the PARTICLES of a particular SAMPLE are FINER[13].

dacite, *n* – [GEOLOGY] a group of PLUTONIC ROCKS containing alkali FELDSPAR (usually orthoclase, microcline, or perthite), a small amount of plagioclase (less than in "monzonite"), one or more mafic minerals (esp. hornblende), and QUARTZ, if present, only as an accessory; also, any rock in that group; the intrusive equivalent of "trachyte." With an increase in the quartz content, syenite grades into "granite"[4]. *Also see granite, igneous and plutonic.*

daily-record station, *n* -- **[**HYDROLOGY**]** a site where DATA are collected with sufficient frequency to develop a record of one or more data values per day. The frequency of data collection can range from continuous recording to periodic sample or data collection on a daily or near-daily basis[46].

dale, *n* – [GEOGRAPHY] a VALLEY[25].

dalles, *n* – [HYDROLOGY] the rapids in a deep, narrow STREAM confined between the rock walls of a CANYON. 2. the steep sided part of a STREAM CHANNEL, marked by CLEFTS, RAVINES or GORGES[4].

Dalton's atomic theory, *n* – [CHEMISTRY] THEORY that involves the following: ELEMENTS consist of indivisible small particles (atoms); all ATOMS of the same element are identical; atoms can be neither created nor destroyed; compounds are formed when atoms of different elements join in simple ratios[24].

Dalton's Law of Partial Pressure, *n* – [CHEMISTRY] LAW that states that the total PRESSURE of a mixture of GASES is equal to the sum of the PARTIAL PRESSURES of each gas[24].

dam, *n* – [HYDROLOGY] a structure of EARTH, ROCK, or CONCRETE designed to form a basin and hold water back to make a pond, lake, or reservoir. A barrier built, usually across a watercourse, for impounding or diverting the flow of water[24].

damages, *n* – [LAW] the loss caused by one person to another or to his or her property, either with the design of injuring him or her, with negligence and carelessness, or by inevitable accident. The loss which some one has sustained, and the gain which he or she has failed to make[19].

damages, actual—*See actual damages.*

dambo, *n* – [HYDROLOGY] a shallow and low-lying area with no distinct DRAINAGE CHANNELS, located at the head of a drainage system[6].

Darcy's Law, *n* **--** [HYDROGEOLOGY] LAW expressing the proportionality of the *specific discharge* of a *liquid* flowing through a *porous medium* to the *hydraulic gradient* under *laminar flow* (low *Reynolds number*) conditions where[33],

$$Q = K(dh/dl)A$$

and Q = the *discharge rate* (L^3), K = the *hydraulic conductivity* (L/T), *dh/dl* is the hydraulic gradient (L/L) and A is the area (L^2).

> DISCUSSION – A form of Darcy's Law can be used to evaluate ground-water migration rates, where
>
> $$V = K(dh/dl)/n_e$$
>
> and V is the ground-water migration rate (LT^{-1}), K is the hydraulic conductivity (LT^{-1}), dh/dl is the hydraulic gradient (LL^{-1}) and n_e is the effective porosity (L^3L^{-3}).

Also see ground-water migration rate and seepage velocity.

data (pl.), datum (s.), *n* – [SCIENTIFIC METHOD] *1*. FACTS or INFORMATION to be used as a basis for discussing or deciding something. *2*. an agreed-upon standard point or plane of reference[24].

database, *n* – [SCIENTIFIC METHOD] comprehensive set of related DATA files for a specific application, usually on a direct access storage device[24].

data collection platform (DCP), *n* – [SCIENTIFIC METHOD] an electronic instrument that collects, processes, and stores data from various sensors, and transmits the data by satellite data relay, line-of-sight radio, and/or landline telemetry[46].

data fusion, *n* – [SCIENCE] the process whereby all the information about a site is considered intelligently in making decisiona about characterization, risk, remediation and monitoring[67].

data logger, *n* – [ENVIRONMENTAL INVESTIGATION] a microprocessor-based data acquisition system designed specifically to acquire, process, and store data. Data are usually downloaded from onsite data loggers for entry into office data systems[46].

dating, *n* – [AGE DATING] AGE determination of naturally occurrring substances or relicts by any of a variety of methods based on the amount of change, happening at a constant measurable rate, in a

component. The changes may be chemical, or induced or spontaneous nuclear, and may take place over a period of time. *Also see age dating.*

datum, *n* – [GEOGRAPHY] *1*. a geographical or numerical quantity or fact which serves as a base of reference point. It is the starting point in any type of measurement or in reasoning[6]. *2*. a surface or point relative to which measurements of height and/or horizontal position are reported. A vertical datum is a horizontal surface used as the zero point for measurements of gage height, stage, or elevation; a horizontal datum is a reference for positions given in terms of latitude-longitude, State Plane coordinates, or UTM coordinates. (See also "Gage datum," "Land-surface datum," "National Geodetic Vertical Datum of 1929," and "North American Vertical Datum of 1988")[46]

datum level, *n* – [GEOGRAPHY] *horizontal surface* used as a reference to which *elevations* are related. *Also see sea level*[6]. *Also known as datum plane.*

Daubert challenge, *n* – [LAW] an attempt to prevent or QUASH an EXPERT'S TESTIMONY based PRECEDENCE of the *Daubert v. Merrell Dow Pharmaceuticals, Inc 509 U.S. 579 [1993]* case. In this case, the Supreme Court effectively made TRIAL JUDGES the gatekeepers of scientific expert testimony on the basis of four criteria: 1. whether the theory used by the expert can be and has been tested. 2. whether the theory or technique has been subjected to peer review. 3. the known or potential rate of error of the method used. 4. the degree of the methods or conclusion's acceptance within the relevant scientific community.

daughter product, *n* – [CHEMISTRY] the immediate product of RADIOACTIVE DECAY of an ELEMENT[17]. *Also see parent material, radioactivity and short-lived daughters.*

daylighting, *n* – [MINING] the procedure of exposing an entire underground mined area to remove all of the mineral underlying the surface[66].

DDT – *See dichloro-diphenyl-trichloroethane.*

dead, *adj* – [GEOLOGY] describing a LANDFORM that is no longer active.

dead water, *n* – [HYDROLOGY] WATER in a state of slow or no circulation, usually leading to an OXYGEN deficiency[16].

debacle, *n* – [HYDROLOGY] any sudden, violent, destructive FLOOD, deluge, or rush of water that breaks down opposing barriers and sweeps before it debris of all kinds.

debouchure, *n* — [HYDROLOGY] an opening or MOUTH, as of a RIVER or STREAM[16].

debris, *n* – [GEOLOGY] any accumulation of loose material arising from the WASTE of ROCKS. It may occur in the place where it is produced, or it may be transported by STREAMS or ICE and deposited in other localities[16].

debris flow, *n* – [GEOLOGY] *1*. the rapid, downward mass movement of PARTICLES COARSER than SAND, often including BOULDERS one meter or more in DIAMETER, at a RATE ranging from 2 to 40 kilometers per hour. Debris flows occur along fairly steep SLOPES. *2*. the material that descends in such a flow[16]. *Also see creep, mass wasting, mud flow and soil creep.*

Debye-Hückel equation, *n* – [CHEMISTRY] an equation that can be used to compute the activity coefficient for an ionic species where,

$$-\log\gamma_i = (Az_i^2\sqrt{I})/(1+a_iB\sqrt{I})$$

where γ_i is the activity coefficient of ionic species *i*; z_i is the charge of ionic species i; I is the ionic strength of the solution; A is a constant that is temperature dependent; B is a constant that is temperature dependent, and a_i is the effective diameter of the ion[33].

decalcification, *n* – [AGRONOMY] the leaching out of calcium carbonate from a SOIL by the downward movement of water[20]. *Also see calcite and limestone.*

decarboxylation, *n* – [CHEMISTRY] the loss of CO_2 from an ORGANIC COMPOUND such as the conversion of ACIDS to ALKANES[34].

decay, *v* – [CHEMISTRY] to undergo DECOMPOSITION[15]. *Also see disintegration.*

decay chain, *n* – [CHEMISTRY] a series of RADIONUCLIDES each of which disintegrates into the next until a stable nuclide is reached[64].

decay constant, *n* – [CHEMISTRY] the fraction of the amount of a radionuclide that undergoes transition per unit time[64].

decay product—*See daughter product*.

deciduous, *n* – [HYDROLOGY] type of VEGETATION that sheds its leaves during winter or dry seasons. *Also see coniferous*[12].

decision, *n* – [LAW] the JUDGMENT rendered by a court after a consideration of the FACTS and LEGAL issues before it[19]. *Also see judgment.*

declaratory judgment, *n* – [LAW] a JUDGE'S statement about someone's rights. For example, a PLAINTIFF may seek a declaratory judgment that a particular statute, as written, violates some constitutional right[19].

declination, *n* – [GEOGRAPHY] the HORIZONTAL ANGLE in any given location between true north and

magnetic north; it is one of the magnetic elements[4]. *Also see geographic north and magnetic north.*

decommissioning (closure), *n* — [HYDROGEOLOGY] the ENGINEERED closure of a WELL, BOREHOLE, or other subsurface monitoring device sealed with plugging materials. Decommissioning also includes the planning and documenting of all associated activities. *A synonym is abandonment.*

decomposition, *n* – [BIOCHEMISTRY] chemical weathering[4]; the breakdown of MATTER by BACTERIA and fungi, changing the chemical makeup and PHYSICAL appearance of materials. *Also see degradation.*

decontamination, *n* — [ENVIRONMENTAL INVESTIGATION] the PROCESS of removing undesirable PHYSICAL or CHEMICAL CONSTITUENTS, or both, from equipment to reduce the potential for CROSS-CONTAMINATION; The process of removing or reducing to a known level undesirable physical or chemical constituents, or both, from a sampling apparatus to maximize the REPRESENTATIVENESS of physical or chemical ANALYSIS proposed for a given sample.

decree, *n* — [LAW] the JUDGEMENT of a COURT, an official order, or SETTLEMENT[19].

deduction, *n* -- [LOGIC] *1*. logical REASONING that something must be true because it is a particular case of a general LAW that is known to be true[15]. *2*. making a prediction from evidence. Generalisation arising from the particular. *Also see induction and reasoning.*

deed notice, *n* – [LAW] a document which provides notice of the following for a specific real property: *1*. that the CONTAMINATION on the real property exists at a level above the applicable unrestricted use soil remediation standards; *2*. the restrictions to the applicable property due to contamination; and *3*.the engineering controls applicable to the property.

deed restriction, *n* – [LAW] a legal document that places restrictions on how a property may be used. Deed restrictions are used to prevent property owners from conducting certain activities (for example, digging into the ground) that may cause them to come into contact with contamination.

deep mine, *n* – [MINING] an underground MINE.

deep percolation, *n* – [AGRONOMY] water which moves below the root zone and can not be utilized by plants, and eventually may recharge ground water[16].

deep well disposal, *n* – [HYDROGEOLOGY] disposal of liquid WASTE by injection into WELLS, usually constructed especially for the purpose, that penetrate deep, porous and permeable FORMATIONS that are confined vertically by relatively impermeable beds[16]. *Also see injection well.*

de facto, *n* – [LAW] *from Latin*, meaning "in fact" or "actually." Something that exists in fact but not as a matter of law[19].

defeated stream, *n* – [HYDROLOGY] a STREAM that, owing to uplift or other cause, is unable to degrade as fast as the land rises and thereby fails to maintain its original course, becomes ponded and diverted into a new course and resumes as a CONSEQUENT STREAM[16]. *Also see consequent stream.*

defendant, *n* – [LAW] the person defending or denying; the party against whom relief or recovery is sought in an action or suit or is the accused in a criminal case[19]. *Also see plaintiff.*

definition, *n* – [LANGUAGE] an explanation of the meaning of a word[15]. The five major kinds of definition (distinguished by the functions they may be used to perform) include: stipulative, lexical, precising, theoretical, and persuasive.

deflation, *n* – [GEOLOGY] the process by which wind erodes BEDROCK by picking up and transporting loose rock particles[4].

defoliant, *n* – [CHEMISTRY] an HERBICIDE that removes leaves from TREES and growing plants. *Also see herbicide.*

deformation, *n* – [GEOLOGY] FOLDING, FAULTING, SHEARING, COMPRESSION or extension of ROCKS due to the Earth's forces[34].

deglaciation, *n* – [GEOLOGY] when a GLACIER or ice sheet retreats and removes itself from an area[4].

degradation, *n* – [GEOLOGY] the act or process of impairing with respect to some physical property or to wear down by EROSION or other chemical or WEATHERING process[4].

degrading stream, *n* – [HYDROLOGY] a STREAM that is actively cutting down its CHANNEL or VALLEY and that is capable of transporting more LOAD than is supplied to it[16].

degreaser, *n* – [INDUSTRIAL TECHNOLOGY] a substance which is used to remove GREASE, especially from tools and mechanical parts. Often composed of some type of ORGANIC SOLVENT. *Also see chlorinated solvents and dense, non-aqueous phase liquids (DNAPLs).*

degreasing, *n* – [INDUSTRIAL TECHNOLOGY] process for removal of GREASE, OIL, etc from metal surfaces in preparation for ELECTROPLATING. Typically, the metal is immersed in hot, strongly BASIC solution or in ORGANIC SOLVENTS to remove and dissolve these coatings.

degree, *n* – [MATHEMATICS] the extent, MEASURE, or scope of an action, condition, or relation[15]. *Also see magnitude.*

degree of saturation, *n* — [HYDROGEOLOGY] the extent or DEGREE to which the VOIDS in ROCK (consolidated or unconsolidated) contain FLUID (WATER, GAS, or OIL). Usually expressed in percent related to total void or pore space[33].

dehydration, *n* – [HYDROLOGY] loss of one or more MOLECULES of WATER from a compound. For example, dehydration of ethyl alcohol (CH_3CH_2OH) results in ethylene (CH_2=CH_2) and water[34].

dehydrogenation, *n* – [PETROLEUM CHEMISTRY] a CHEMICAL REACTION that involves removing HYDROGEN ATOMS from ALKANES or NAPHTHENES to give OLEFINS or AROMATICS[28].

dehydrohalogenation, *n* – [CHEMISTRY] CHEMICAL removal of HYDROGEN and a HALOGEN from a COMPOUND. *Also known as dehydrodehalogenation.*

deionized water, *n* – [CHEMISTRY] WATER prepared by passing feedwater through a mixed-bed ion exchanger, consisting of strong ANION and strong CATION resins mixed together. The resultant water shall have the same CHARACTERISTICS as those for distilled WATER noted below. The difference between deionized water and distilled water is in the process that they are produced. *Also see distilled water*.

DISCUSSION – Deionized water is actually not a healthy beverage because it can remove from the body many essential salts.

de jure, *n* – [LAW] *from Latin*, meaning "in law." Something that exists by operation of law[19].

delayed yield, *n* – [HYDROGEOLOGY] a dampening of DRAWDOWN levels caused by GRAVITY DRAINAGE in an UNCONFINED AQUIFER[33].

delineation, *n* – [ENVIRONMENTAL INVESTIGATION] the act or PROCESS of assessing the extent of a CONTAMINANT PLUME in SOIL and/or GROUND WATER.

dell, *n* – [GEOGRAPHY] a small, secluded wooded VALLEY or natural HOLLOW[16].

delta, *n* – [GEOLOGY] an ALLUVIAL FAN having its apex at the MOUTH of a STREAM[16]. *Also see alluvial fan, distributary, mouth and tributary.*

de minimis — [LAW] *from Latin,* meaning that the law does not care for or take notice of very small or trifling matters. De minimis water uses are those deemed by law to be too insignificant to notice.

demographics, *n* — [STATISTICS] relating to the statistical study of human populations to include such characteristics and factors as population counts, births, deaths, migration, sex, age, and related statistics.

demoiselle, *n* – [GEOLOGY] an earth pillar with a protective cap of ROCK[6]. *Also see inselberg.*

demolition debris, *n* – [WASTE DISPOSAL] concrete, brick, asphalt and such other building materials discarded in the demolition of a building or other improvement to a property. *Also see construction debris.*

demurrage, *n* – [COMMERCE] the detention of a vessel, railroad car, or other vehicle beyond an allotted TIME and for which a fee is usually charged.

dendroecology, *n* – [DENDROLOGY] the SCIENCE that uses TREE RINGS to study factors that affect the EARTH'S ecosystems. *Example*: analyzing the effects of AIR POLLUTION on tree growth by studying changes in ring widths over TIME[12]. *Also see dendrochronology and dendrology.*

dendrochronology, *n* – [DENDROLOGY] the use of TREE-RING analysis to estimate the AGE of a TREE and local ENVIRONMENTAL conditions in the past[12]. These METHODS can also be used to estimate the ages of past POLLUTION events. *Also see dendroecology and dendrology.*

dendrogeomorphology, *n* – [DENDROLOGY] a subfield of DENDROECOLOGY which utilizes dated TREE RINGS to study and date geomorphic processes such as rock slides, rock movements, soil creep, etc.[12]

dendrohydrology, *n* – [DENDROLOGY] the study of TREE RINGS to study HYDROLOGICAL PHENOMENA[12]. *Also see dendroecology.*

dendrology, *n* – [SCIENCE] the SCIENCE of studying TREES[24].

dendrometer, *n* – [DENDROLOGY] a device with which radial increment of a TREE is measured[12].

dendroyear, *n* – [DENDROLOGY] a date determined with help of dendrochronological methods as opposed to a radiocarbon dates[12].

Denison sampler, *n* – [ENVIRONMENTAL INVESTIGATION] a large-size, swivel-type double-tube core barrel designed for soil-testing work to obtain relatively undisturbed corelike samples of soft rock and/or soil formations. The inner tube is provided with a thin wall liner and a finger- or basket-type core lifter or core-retaining device. *Also known as a Denison core barrel.*

denitrification, *n* — [AGRONOMY] the removal of nitrate ions (NO_3) from soil or water; involves the ANAEROBIC biological reduction of nitrate to nitrogen gas. The process reduces desirable fertility of an agricultural field or the extent of undesirable aquatic weed production in aquatic environments[20]. *Also see denitrifying bacteria, nitrate and nitrogen*.

denitrifying bacteria, *n* — [BIOLOGY] BACTERIA in SOIL or WATER that are capable of ANAEROBIC RESPIRATION, using the NITRATE ION as a substitute for MOLECULAR OXYGEN during their METABOLISM. The nitrate is reduced to NITROGEN GAS (N_2), which is lost to the ATMOSPHERE during the process. *Also see denitrification, nitrate and nitrogen.*

de novo, *n* – [LAW] *from Latin*, meaning "anew." A trial de novo is a completely new trial. Appellate review de novo implies no deference to the trial judge's ruling[19].

density, *n* — [PHYSICS] the MASS per unit VOLUME[13], with dimensions of ML^{-3} and normally kg/m^3.

- ***density of dry soil or rock***, r_d (ML^{-3}) kg/m^3—the mass of *solid particles* per the total volume of *soil* or *rock*.
- ***density of saturated soil or rock***, r_{sat} (ML^{-3}) kg/m^3—the total mass per total volume of completely *saturated* soil or rock.
- ***density of soil or rock (bulk density)***, r (ML^{-3}) kg/m^3—the total mass (solids plus water) per total volume.
- ***density of solid particles***, r_s(ML^{-3}) kg/m^3 —the mass per volume of solid *particles*.
- ***density of submerged soil or rock***, r_{sub} (ML^{-3}) kg/m^3 — the difference between the density of saturated soil or rock, and the density of water.
- ***density of water***, r_w(ML^{-3}) kg/m^3 — the mass per volume of water.

dense non-aqueous phase liquid (DNAPL), *n* -- [HYDROGEOLOGY] a LIQUID that is not MISCIBLE in WATER, which is denser than water and can exist in the earth as a SEPARATE PHASE[33]. *Also see chlorinated solvent, DNAPL pool and light non-aqueous phase liquid (LNAPL).*

denudation, *n* – [GEOLOGY] *1*. EROSION by RAIN, frost, WIND or WATER of the solid matter of the EARTH. Often implies the removal of the soil down to the BEDROCK. *2*. removal, by NATURAL or ARTIFICIAL means, of all VEGETATION and ORGANIC MATTER[4].

deoxyribonucleic acid (DNA), *n* -- [BIOLOGY] a nucleic acid with 2-deoxy-D-ribose as the sugar in its nucleotides. DNA contains encoded genetic information, specifically templates for the SYNTHESIS of all of an organism's proteins and enzymes[24].

> DISCUSSION – DNA analyses can be used in forensic investigations as a fingerprinting tool.

Also see ribonucleic acid (RNA).

depleted uranium, *n* – [CHEMISTRY] uranium which has less of the fissionable ^{235}U isotope than the approximate 0.7% by weight found in natural uranium. It is rich in the ^{238}U isotope[64]. *Also see highly-enriched uranium, low-enriched uranium and uranium.*

deposit, *n* – [GEOLOGY] *1*. something laid down, especially, MATTER deposited by a NATURAL PROCESS. *2*. a NATURAL accumulation (as of iron ORE, COAL, or GAS)[4].

deposition, *n* – [GEOLOGY] laying down of SEDIMENT transported by WIND, WATER, or ICE[4].

deposition, *n* – [LAW] the TESTIMONY of a WITNESS taken upon oral question or written INTERROGATORIES, not in open COURT, but in pursuance of a commission to take testimony issued by a court[19].

depositional environment, *n* – [GEOLOGY] the ENVIRONMENT in which a ROCK or SEDIMENT originated from. *Also see facies, paleontology and stratigraphy.*

depositional landform, *n* – [GEOLOGY] a LANDFORM formed from the DEPOSITION of weathered and eroded surface materials. On occasion, these deposits can be compressed, altered by pressure, heat and chemical processes to become SEDIMENTARY ROCKS. This includes landforms with some of the following geomorphic features: BEACHES, DELTAS, FLOODPLAINS, and GLACIAL MORAINES[4].

depression, *n* – [GEOGRAPHY] a sunken place or hollow on a surface[15]. *Also see basin.*

depression spring, *n* – [HYDROGEOLOGY] a SPRING formed when the WATER TABLE reaches a land surface because of a change in TOPOGRAHY[33].

depression storage, *n* – [HYDROLOGY] the water that accumulates in shallow DEPRESSIONS on the land surface as a result of PRECIPITATION[33].

derivative, *n* – [MATHEMATICS], the limit of the gradient of a chord linking two points on a curve as the distance between the two points approaches zero[24]. *Also see calculus and differentiation.*

derived fuel, *n* – [PETROLEUM CHEMISTRY] a FUEL obtained from a raw fuel by some process of preparation for use, for example, COKE, CHARCOAL, BENZENE, and GASOLINE[37].

desalter, *n* – [PETROLEUM TECHNOLOGY] unit within a REFINERY that removes salt from the CRUDE OIL before it enters the ATMOSPHERIC DISTILLATION unit.

desert, *n* – [GEOGRAPHY] a region with an average annual rainfall of 10 inches (about 25 cm) or less per year and sparse VEGETATION, typically having thin, dry, and crumbly SOIL[6]. *Also see arid and hamada.*

desorption, *n* – [HYDROLOGY] a PHENOMENON and PROCESS opposite of ADSORPTION, ABSORPTION or more general SORPTION. Desorption process occurs in a system being in the state of adsorption equilibrium between bulk PHASE (FLUID, such as GAS or liquid solution) and adsorbing surface (SOLID, or BOUNDARY

separating two fluids) and when the CONCENTRATION (or PRESSURE) of adsorbed/absorbed/sorbed substance in the bulk phase is lowered. The result is the decrease of the amount of adsorbed/absorbed/sorbed substance[20]. *Also see absorption, adsorption and sorption.*

desiccation, *n* – [AGRONOMY] a condition where a drying soil shrinks because of lost water content, frequently accompanied by cracks forming in the surface zones, because of the reduction in the overall volume[4].

destination facility, *n* – [TREATMENT TECHNOLOGY] a facility that treats, disposes of, or recycles a particular category of universal waste. A facility at which a particular category of universal waste is only accumulated is not a destination facility for purposes of managing that category of universal waste.

desulfurization, *n* – [PETROLEUM CHEMISTRY] SULFUR removal, or desulfurization, traditionally has been a specialized example of a HYDROTREATING process in the REFINING of GASOLINE. The lower sulfur limits for REFORMULATED GASOLINE may require the desulfurization of a significant proportion of FLUID CATALYTICALLY CRACKED (FCC) GASOLINE. There are also processing reasons to desulfurize refinery streams. In reforming, excess sulfur in the feed deactivates the CATALYST. In FCC, excess sulfur in the feed results in high levels of sulfur in the FCC gasoline and greater production of sulfur dioxide during catalyst regeneration[38]. *Also catalyst, fluid catalytically cracked gasoline and hydrotreating.*

detectable leak rate, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] the smallest LEAK (from a STORAGE TANK), expressed in terms of gallons- or liters-per-hour, that a test can reliably discern with a certain PROBABILITY of detection or false alarm.

detection limit, *n* – [CHEMISTRY] the lowest CONCENTRATION of a CHEMICAL that can reliably be distinguished from a zero concentration.

detection monitoring, *n* — [ENVIRONMENTAL REGULATION] a program of MONITORING for the express purpose of determining whether or not there has been a CONTAMINANT RELEASE to GROUND WATER.

detergent, *n* – [CHEMISTRY] a SUBSTANCE added to WATER to improve its cleaning PROPERTIES[22]. Normally, reduces the surface tension and allows the contaminant to be more easily displaced. Biodegradable detergents are defined as having at least 90 percent surfactant reduction, or as having a surfactant concentration no higher than 0.5 milligrams per liter[63]. *Also see dispersant.*

deterministic modeling, *n* – [Mathematics] an approach to the application of a mathematical model in which a single set of input values is used and a single set of values obtained. Deterministic modeling is based on a (often deliberately naïve) "cause-and-effect" premise[61].

detrital sediments, *n,* **--** [GEOLOGY] pertaining to ROCK formed from the accumulation of MINERALS and rocks derived from the EROSION of previously existing rocks or from WEATHERED products of these rocks. *Also see clastic.*

deuterated tracer, *n* – [ISOTOPES] an organic compound, such as toluene or benzene, which contains a known quantity of DEUTERIUM (^2H) and can be used to trace the fate, tansport and BIODEGRADATION of organic compounds in the subsurface.

deuterium, *n* – [ISOTOPES] a rare, STABLE ISOTOPE of HYDROGEN (^2H), which has one PROTON and one NEUTRON in its NUCLEUS, and thus has an ATOMIC WEIGHT close to 2[24]. *Also see isotope, radioisotope and tritium.*

deuterium oxide—*See heavy water.*

development, *n* – [PHYSICS] *1.* the act or PROCESS of making or becoming bigger or fuller or more elaborate or systematic[15]. *2.* to construct new buildings on LAND. In some instances, it could be synonymous with URBANIZATION.

deviation, *n* – [DRILLING TECHNOLOGY] the departure of a drilled hole from being straight. The hole may be either vertical or inclined, and the departure may be in any direction. Deviation may be intentional, as in directional drilling, or undesirable[4].

Devonian Period, *n* – [GEOLOGY] the fourth period, in order of decreasing age, of the periods making up the PALEOZOIC ERA[4]. It followed the SILURIAN PERIOD and was succeeded by the MISSISSIPPIAN PERIOD, occurring between 363 and 409 million years BP. Also, the system of strata deposited at that time. Sometimes called the Age of Fishes.

dewatering, *n* – [HYDROGEOLOGY] the procedure used to remove water from a construction area, such as pumping from an excavation or location where water covers the planned working surface; the procedure used to lower the water table in order to obtain a "dry" area in the vicinity of an excavation that would otherwise extend below water[16].

dew point, *n* – [METEOROLOGY] TEMPERATURE at which the ATMOSPHERE, being cooled, becomes saturated with WATER VAPOR; by CONDENSATION, the water vapor is deposited as drops of dew[63].

diabase, *n* – [GEOLOGY] rock of BASALTIC composition, essentially labradorite and pyroxene, of an INTRUSIVE NATURE[4].

> DISCUSSION – Much of the oceanic crust is composed of basalt. For example, the Hawaiian Islands are composed mostly of basalt or basalt-like rocks. However, basaltics rock that do not reach the surface are considered to be diabase.

Also see basalt and intrusive rock. Also known as dolerite.

diachronous, *adj* – [GEOLOGY] describing a rock unit that is of varying age in different areas or that cuts across time planes or biozones; such as a SEDIMENTARY FORMATION related to a narrow DEPOSITIONAL ENVIRONMENT, such as a marine sand that was formed during an advance or recession of a shoreline and becomes younger in the direction in which the sea was moving[4].

diagenesis, *n* – [GEOLOGY] the set of PROCESSES that cause PHYSICAL and CHEMICAL changes in SEDIMENT after it has been DEPOSITED and buried under another LAYER of sediment. Diagenesis may culminate in LITHIFICATION[34]. *Also see catagenesis, induration, lithification and metagenesis.*

diagnostic, *n* – [SCIENTIFIC METHOD] using the METHODS of or yielding a diagnosis[15]**.**

diagram, n – [SCIENCE] *1.* a graphic design that explains rather than represents. *2.* a line drawing made for mathematical or scientific purposes[15]. *Also see graph.*

dialectic *n* – [LOGIC] this is the logic of reasoning. By the assertion of a THEORY (or thesis) and its denial (or antithesis) a new theory can be synthesised.

diamantine—*See diamonoid*.

diameter, *n* -- [MATHEMATICS] a straight LINE passing from side to side through the center of a body or figure, especially a CIRCLE or SPHERE[15]. *Also see circumference and radius.*

diamict, *n* – [GLACIAL GEOLOGY] a poorly-sorted deposit, commonly glacial in origin, but not always, showing great lateral and vertical variations in thickness, composition and texture[6].

diamicton–*See diamict.*

diamonoid, *n* – [PETROLEUM CHEMISTRY] a class of SATURATED HYDROCARBONS that consist of three or more fused cyclohexane rings, which results a 'cage-like' structure. The diamonoids that can be found in light PETROLEUM LIQUIDS (such as NATURAL GAS CONDENSATES), intermediate petroleum DISTILLATES (such as NAPHTHAS), and finished petroleum products (such as automotive GASOLINE) include ADAMANTANE (boiling point of ~190°C) and diamantane (boiling point of ~272°C) and their various substituted equivalents. These naturally occurring compounds are THERMODYNAMICALLY stable and extremely RESISTANT to WEATHERING. As such, their distribution and relative abundance in ENVIRONMENTAL SAMPLES can be useful in the chemical fingerprinting of light PETROLEUM and GASOLINE[57].

diapir, *n* – [GEOLOGY] a DOME or ANTICLINAL FOLD in which the overlying ROCKS have been ruptured by the squeezing-out of plastic core material. Diapirs in SEDIMENTARY strata usually contain cores of SALT or SHALE; IGNEOUS intrusions may also show diapiric structure[4]. *Also see dome.*

diastem, *n* – [GEOLOGY] a depositional break of minor extent presumed to represent a hiatus of brief duration. It records little or no EROSION before deposition resumed[4]. *Also see unconformity*.

diasterane (rearranged sterane), *n* – [PETROLEUM CHEMISTRY] rearrangement product from sterol precursors through diasterenes. The rearrangement involves migration of C_{10} and C_{13} METHYL GROUPS to C_5 and C_{14} and is favored by acidic conditions, clay catalysis and/or high temperatures. They are low in clay-poor carbonate source rocks and related oils[34].

diasterane index, *n* – [PETROLEUM CHEMISTRY] the ratio of rearranged (diasteranes) to regular steranes. Diasterane concentrations in petroleum depend on anoxicity and pH of the DEPOSITIONAL ENVIRONMENT and clay content and thermal maturity of the source rock[34].

diastrophism, *n* – [GEOLOGY] the processes of DEFORMATION in the Earth's crust that produce its continents and ocean basins, plateaus and mountains, and major FOLDS and FAULTS[4].

diatomaceous earth, *n* – [GEOLOGY] a light-colored, soft, siliceous earth composed of the shells of diatoms, a form of algae. Some deposits are of lake origin but the largest are marine.

diatreme, *n* – [GEOLOGY] *1.* a sloping upward passage which has been forced through SEDIMENTARY COUNTRY ROCK by VOLCANIC activity[4]. *2.* a BRECCIA-filled volcanic pipe that was formed by a gaseous explosion. Diatremes often breach the surface and produce a TUFF cone, a filled relatively shallow crater known as a MAAR, or other volcanic pipes.

dichloroelimination, *n* -- [CHEMISTRY] the removal of two chlorine atoms from an alkane compound and the formation of an alkene compound within a reducing environment[62].

1,2-dichloroethane – *See ethylene dichloride.*

dibenzothiophenes, *n* – [PETROLEUM CHEMISTRY] HETEROCYCLIC HYDROCARBONS and a BIOMARKER found in PETROLEUM containing SULFUR. Because of their

stability and resistance to WEATHERING, they can sometimes be used to FINGERPRINT spilled petroleum products[34].

DISCUSSION – Analysis for dibenzothiophenes can help to identify the sulfur content of diesel fuels and heating oil. Knowledge of the sulfur content may help to identify when the petroleum product was manufactured. As of 1993, the sulfur content of on-road diesel fuel was limited by the US federal government to 0.05%.

dichloromethane – *See methylene chloride.*

dichloro-diphenyl-trichloroethane (DDT), *n* -- [CHEMISTRY] the first CHLORINATED HYDROCARBON INSECTICIDE. It has a HALF-LIFE of 15 years and can collect in fatty tissues of certain animals. EPA banned registration and interstate sale of DDT for virtually all but emergency uses in the United States in 1972 because of its PERSISTENCE in the ENVIRONMENT and accumulation in the food chain. *Also see pesticide.*

dichloro-diphenyl-dichloroethylene (DDE), *n* – [CHEMISTRY] a product of degradation of DDT resulting from the loss of one molecule of hydrochloric acid (dehydrohalogenation). DDE degrades to DDA by the loss of two molecules of hydrochloric acid.

dieldrin, *n* – [CHEMISTRY] an INSECTICIDE used in mothproofing carpets and furniture. Also used for control of soil insects, termites and other pests. Except for termites, its use is prohibited in the United States.

dielectric constant, *n* – [CHEMISTRY] the relationship between two CHARGES, that is their distance of separation in relation to the FORCE of attraction[17].

diene, *n* – [PETROLEUM CHEMISTRY] a HYDROCARBON that contains two CARBON DOUBLE BONDS. Dienes occur occasionally in nature but are widely synthesized.

diesel fuel, *n* – [PETROLEUM CHEMISTRY] a straight-run REFINERY DISTILLATION cut that contains HYDROCARBONS between the C_{10} and C_{20} range. In the United States, MOTOR DIESEL FUEL is essentially the same as home HEATING OIL, although in some states, for example, New Jersey, heating oil is dyed to distinguish it for taxing purposes[38].

diesel fuel, no. 1, *n* – [PETROLEUM CHEMISTRY] a light DISTILLATE FUEL OIL that has a DISTILLATION TEMPERATURE of 550 degrees Fahrenheit at the 90-percent recovery point and meets the specifications defined in ASTM Specification D 975. It is used in high speed diesel engines generally operated under frequent speed and load changes, such as those in city buses and similar vehicles[38].

diesel fuel, no. 2, *n* – [PETROLEUM CHEMISTRY] a DISTILLATE FUEL OIL that has a DISTILLATION TEMPERATURE of 640 degrees Fahrenheit at the 90-percent recovery point and meets the specifications defined in ASTM Specification D 975. It is used in high-speed diesel engines that are generally operated under uniform speed and load conditions, such as those in railroad locomotives, trucks, and automobiles[38].

diesel fuel, low sulfur no. 2, *n* -- [PETROLEUM CHEMISTRY] no. 2 diesel fuel that has a sulfur level no higher than 0.05 percent by WEIGHT. It is used primarily in motor vehicle diesel engines for on-highway use[38].

DISCUSSION – As of November 1993, the federal limit of total sulfur in on-road diesel fuel is 0.05%. Therefore, the age of spilled diesel fuels can be estimated based on their sulfur content.

diesel fuel, high sulfur no. 2, *n* -- [PETROLEUM CHEMISTRY] no. 2 diesel fuel that has a SULFUR level above 0.05 percent by weight[38].

diesel index, *n* – [PETROLEUM CHEMISTRY] a measure of the ignition quality of diesel calculated from a formula involving its gravity and its aniline point[26].

diesel-range organics (DRO), *n* – [CHEMISTRY] a LABORATORY ANALYTICAL PARAMETER used to determine the portion of the HYDROCARBONS derived from diesel fuel. *Also see gasoline-range organics (GRO) and total petroleum hydrocarbons (TPHs).*

differential compaction, *n* – [GEOLOGY] reduction in bulk volume of fine-grained sediments produced by uneven settling or by differing degrees of compactibility[4].

differential equation, *n* – [MATHEMATICS] an equation containing differentials or derivatives of functions[24]. *Also see calculus, deivative and mathematics.*

differential erosion, *n* – [GEOLOGY] when a ROCK STRATA is more RESISTANT to EROSION and stands out as ridges between DEPRESSIONS of softer rocks[4].

differential settlement, *n* — [GEOLOGY] settlement that varies in RATE or amount, or both, from place to place across a structure.

differential weathering, *n* – [GEOLOGY] WEATHERING that occurs at different rates, as a result of variations in COMPOSITION and RESISTANCE of ROCKS or differences in intensity of weathering, and usually resulting in an uneven surface[4].

differentiation, *n* – [MATHEMATICS] the procedure for determining the DERIVATIVE or gradient of the tangent to a curve f(x) at any point x[24]. *Also see calculus and derivative.*

diffraction, *n* – [PHYSICS] the bending of LIGHT around an obstacle[4].

diffraction spectrum, *n* – [PHYSICS] parallel light and dark bands of LIGHT produced by DIFFRACTION[4]. *Also known as diffraction pattern.*

diffusion, *n* – [CHEMISTRY] the PROCESS by which IONIC and MOLECULAR SPECIES dissolved in WATER or GAS move from areas of higher CONCENTRATION to areas of lower concentration[33]. *Also see dispersion.*

diffusion coefficient, *n* – [HYDROGEOLOGY] a statistical parameter used in the calculation of rates of diffusion[6].

diffusivity—*See hydraulic diffusivity.*

dig-and-haul, *n* - [REMEDIATION TECHNOLOGY] a cleanup method for contaminated soil where the soil is excavated and transported to a disposal or recycling facility.

digester, *n* – [TREATMENT TECHNOLOGY] in a waste-treatment plant, a closed tank that decreases the volume of solids and stabilizes raw sludge by bacterial action into a material that can be disposed of[63].

digestion, *n* – [BIOLOGY] BIOLOGICAL DECOMPOSITION of ORGANIC MATTER in SLUDGE, resulting in partial gasification, liquefaction, and mineralization[24].

dihaloelimination, *n* – [CHEMISTRY] removal of two halide atoms from an alkane compound and the formation of an alkene compound in a reducing environment[62].

diisopropyl ether (DIPE), *n* -- [PETROLEUM CHEMISTRY] an OXYGENATE [$(CH_3)_2CHOCH(CH_3)_2$] added to GASOLINE since at least the late 1970s[26]. *Also see additive and oxygenate.*

dike, *n* – [GEOLOGY] a discordant PLUTON that is substantially wider than it is thick. Dikes are often steeply inclined or nearly VERTICAL[14]. *See also sill.*

dike, *n* – [HYDROLOGY] *1*. WATER-retaining earthwork used to confine streamflow within a specified area along the STREAM or to prevent flooding due to waves or TIDES[16]. *2*. an artificial watercourse, especially a deep drainage ditch. *3*. a small pond or pool. *Also see embankment and levee.*

dilatancy, *n* – [AGRONOMY] a condition for SOIL where the surface of a volume becomes noticeably wetter when shaken or vibrated because of movement of the included moisture as some VOID spaces temporarily change/enlarge to permit free passage of water (moist silts typically will exhibit this property but clays will not because of the strong bonds between soil particles and the water molecule - day particle surfaces)[4].

dilitant, *n* – [PHYSICS] a material that can increase in volume when its shape is changed[4].

diligence, *n* – [LAW] the doing of things in a proper amount of TIME. It may be divided into three degrees; ordinary diligence, extraordinary diligence, and slight diligence. It is the reverse of negligence. Under that article is shown what degree of negligence, or want of diligence, will make a party to a contract responsible to the other[15].

diligent inquiry, *n* – [LAW] *1*. diligent search of all documents which are reasonably likely to contain information related to the object of the inquiry, which documents are in such person's possession, custody or control, or in the possession, custody or control of any other person from whom the person conducting the search has a legal right to obtain such documents; and *2*. making reasonable inquiries of current and former employees and agents whose duties include or included any responsibility for hazardous substances, hazardous wastes, or pollutants, and any other current and former employees or agents who may have KNOWLEDGE or documents relevant to the inquiry[18].

diluent, *n* – [CHEMISTRY] a diluting agent.

dilute-and-disperse, *n* – [HYDROGEOLOGY] the outmoded concept that the DILUTION capacity of natural AQUIFERS will be sufficient to disperse polluted leachates without causing any problems[61].

dilution, *n* – [CHEMISTRY] the VOLUME of solvent in which a given amount of SOLUTE is dissolved[16].

dilution ratio, *n* – [HYDROLOGY] the ratio of water of a stream to the incoming waste; the capacity of a stream to assimilate waste is partially dependent on the dilution ratio; in a waste-treatment plant design, the dilution ratio is the ratio of the maximum waste flow actually treated to the dry weather flow of the plant[63].

diluvial, *adj* – [HYDROLOGY] pertaining to, produced by or resembling a FLOOD[4].

diluvium, *n* – [GEOLOGY] unsorted and sorted deposits of GLACIAL origin[4].

dimension, *n* – [PHYSICS] MEASURE in one direction, specifically, one of three COORDINATES determining a position in SPACE or four coordinates determining a position in space and TIME.

dimension, *n* – [MATHEMATICS] one of a group of PROPERTIES whose number is necessary and sufficient to determine uniquely each ELEMENT of a SYSTEM of usually MATHEMATICAL entities (as an aggregate of points in real or ABSTRACT space).

dimensional analysis, *n* -- [PHYSICS] drawing conclusions by considering the DIMENSIONS of the various terms in the equations describing a PHYSICAL PROCESS.

dimorphism, *n* – [CHEMISTRY] SUBSTANCE that can crystallize in two forms with the same CHEMICAL COMPOSITION[4].

dingle, *n* – [GEOGRAPHY] a small, narrow, well-wooded VALLEY[6].

diolefin, *n* – [PETROLEUM CHEMISTRY] an ALIPHATIC COMPOUND that contains two DOUBLE BONDS in the MOLECULE.

diols, *n* – [CHEMISTRY] chemical compounds that contain two hydroxy (--OH) groups, generally assumed to be, but not necessarily alcoholic. ALIPHATIC diols are known as glycols[62].

diorite, *n* – [GEOLOGY] coarse-grained IGNEOUS ROCK with composition of ANDESITE (no QUARTZ or orthoclase), composed of 75 percent PLAGIOCLASE feldspars and balance ferromagnesian silicates[4].

1,4-dioxane, *n* – [CHEMISTRY] a clear LIQUID that dissolves in water at all CONCENTRATIONS. It is used primarily as a SOLVENT in the manufacture of CHEMICALS and as a LABORATORY reagent; 1,4 dioxane also has various other uses that take advantage of its solvent PROPERTIES. 1,4-Dioxane is a trace CONTAMINANT of some chemicals, in particular some CHLORINATED SOLVENTS, and is used in cosmetics, detergents, and shampoos.

dip, *n* – [GEOLOGY] direction PERPENDICULAR to the STRIKE of a geologic unit including its angle to the HORIZONTAL[4]. *Also see strike*.

dipole, *n* – [PHYSICS] a pair of equal and opposite electric charges or magnetic poles of opposite sign separated especially by a small distance[24]. *Also see dipole moment and polar*.

dipole moment, *n* – [PHYSICS] the product of the distance between the two poles (as magnetic or electric) of a dipole and the magnitude of either pole[24]. *Also see dipole and polar*.

dip-slip fault, *n* – [GEOLOGY] a FAULT in which two sections of ROCK have moved apart VERTICALLY, PARALLEL to the DIP of the FAULT PLANE[4]. *Also see normal fault and thrust fault.*

direct evidence, *n* – [LAW] EVIDENCE that stands on its own to prove an alleged FACT, such as TESTIMONY of a WITNESS who says she saw a DEFENDANT pointing a gun at a victim during a robbery. Direct PROOF of a fact, such as testimony by a witness about what that witness personally saw or heard or did[19]. *See circumstantial evidence.*

direct examination, *n* – [LAW] the initial questioning of a WITNESS by the party that called the witness[19]. *Also see cross examination, rebuttal and testimony.*

direct exposure pathway, *n* – [TOXICOLOGY] an exposure pathway where the point of exposure is at the source, without a release to any other MEDIUM and without an intermediate biological transfer step.

directional drilling, *n* – [DRILLING TECHNOLOGY] intentional DEVIATION of a BOREHOLE from the VERTICAL. Although wellbores are normally drilled vertically, it is sometimes necessary or advantageous to DRILL at an ANGLE from the vertical. Controlled directional drilling makes it possible to reach subsurface areas laterally remote from the point where the bit enters the EARTH[4].

direct-push drilling rig, *n* – [DRILLING TECHNOLOGY] TECHNOLOGY used for performing subsurface INVESTIGATIONS by driving, pushing, and/or vibrating small-diameter hollow steel rods into the GROUND. *Also known as direct drive, drive point, or push technology. Sometimes known as a geoprobe.*

direct recharge, *n* – [HYDROLOGY] RECHARGE which occurs by rainfall soaking downwards immediately below its point of impact, passing beyond the ROOT-SUCTION BASE and continuing all the way to the WATER TABLE[61].

Dirichlet boundary, *n* – [HYDROGEOLOGY] a specific HEAD BOUNDARY that is established at a model boundary[16].

disappearing stream, *n* – [HYDROLOGY] a surface STREAM that drains rapidly and completely into a SINKHOLE[16].

discharge, *n* – [ENVIRONMENTAL INVESTIGATION] any intentional or unintentional action or omission resulting in the releasing, spilling, leaking, pumping, pouring, emitting, emptying or dumping of a hazardous substance, hazardous waste or pollutant into the waters or onto lands or into waters outside the jurisdiction of a governing body when damage may result to the lands, waters, or natural resources within that jurisdiction.

discharge, *n* – [HYDROLOGY] the VOLUME of WATER flowing in a STREAM or through an AQUIFER past a specific point in a given period of TIME[16]. *Also see recharge.*

discharge area, *n* – [HYDROGEOLOGY] an area in which there is an upward COMPONENT of HYDRAULIC HEAD in the AQUIFER. *Also see recharge area*[16].

discharge detection system, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] a method of detecting a DISCHARGE of HAZARDOUS SUBSTANCES from an UNDERGROUND STORAGE TANK system. *Also see underground storage tank.*

discharge velocity, *n,* — [HYDROGEOLOGY] the RATE of DISCHARGE of GROUND WATER through a POROUS MEDIUM per unit of total area PERPENDICULAR to the direction of FLOW[33].

disconformity, *n* -- [GEOLOGY] an irregular SURFACE of EROSION between two units of PARALLEL STRATA[4]. *Also see angular disconformity, nonconformity paraconformity and unconformity.*

discontinuity surface, *n* — [GEOLOGY] any SURFACE across which some PROPERTY of a ROCK MASS is discontinuous. This includes FRACTURE SURFACES, weakness PLANES, and BEDDING PLANES, but the term should not be restricted only to mechanical continuity[4].

discontinuous permafrost, *n* – [HYDROLOGY] PERMAFROST occurring in some areas beneath the ground surface where other areas are free of permafrost.

discounted sample, *n* – [ENVIRONMENTAL INVESTIGATION] a SAMPLING result, that for one reason or an other, is not included in the forthcoming ANALYSIS. Typically, the cause for being discounted is that the sample, the sampling procedure or LABORATORY ANALYSIS was compromised in some manner.

discovery, *n* – [SCIENTIFIC METHOD] the act or PROCESS of finding out or becoming aware of, whether by RESEARCH, searching or by chance[15].

discovery, *n* – [LAW] part of the pre-trial LITIGATION PROCESS during which each party requests relevant information and DOCUMENTS from the other side in an attempt to "discover" pertinent facts. Generally discovery devices include DEPOSITIONS, INTERROGATORIES, requests for admissions, document production requests and requests for inspection[19].

discretization, *n* -- [HYDROGEOLOGY] the process of subdividing the continuous MODEL and/or time domain into discrete segments or cells. ALGEBRAIC equations which approximate the governing FLOW and/or transport equations are written for each segment or cell. *Also see ground-water modeling.*

disembogue, *v* – [HYDROLOGY] to DISCHARGE WATER through an outlet or into another body of water, such as a STREAM, disemboguing into the OCEAN[16].

disinfectant, *n* – [CHEMISTRY] a SUBSTANCE having the ability to kill or inactivate BACTERIA.

disinfection byproducts (DBP), *n* – [CHEMISTRY] CHEMICALS formed during the DISINFECTION PROCESS, often CHLORINATION, of WASTEWATER. These chemicals are often TRIHALOMETHANES, such as CHLOROFORM, or HALOACETIC ACIDS. *Also see haloacetic acid and trihalomethanes*.

disintegration, *n* – [CHEMISTRY] *1*. to break or separate into CONSTITUENT ELEMENTS or parts. *2*. to lose unity or integrity by or as if by breaking into parts[15]. *3*. to undergo a change in COMPOSITION. *4*. DECAY of a RADIOACTIVE ELEMENT.

dismissal with prejudice, *n* – [LAW] COURT action that prevents an identical LAWSUIT from being filed later[19].

dismissal without prejudice, *n* – [LAW] COURT action that allows a later filing[19].

dispenser, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] a device that discharges LIQUID FUEL from the STORAGE TANK into the motor vehicle or equipment tank, while simultaneously measuring the amount dispensed. Commonly referred to as the "pump" or "gas pump". The DISPENSER can be located adjacent to the tank or remote from the tank. If located adjacent to and aboveground tank, the dispenser can be top-mounted, or sidemounted (normally at one end). Dispensers can operate by PRESSURE, SUCTION or GRAVITY.

dispenser sump, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] a liquid-tight container designed to contain leaks from DISPENSERS, PUMPS and associated fittings[48].

dispersant, *n* – [REMEDIATION TECHNOLOGY] *1*. a CHEMICAL agent used to break up CONCENTRATIONS of ORGANIC material such as spilled oil. *2*. a surfactant additive designed to hold particulate matter dispersed in a liquid[26]. Laundry detergent is an example of a dispersant.

dispersion, *n* – [HYDROGEOLOGY] the PHENOMENON by which a SOLUTE in FLOWING FLUID such as GROUND WATER or GAS is mechanically mixed with uncontaminated fluid and becomes reduced in CONCENTRATION[16]. The dispersion coefficient (D) is equal to the flow velocity multiplied by the DISPERSIVITY (α).

> DISCUSSION -- Dispersion in ground water exists in three forms: longitudinal (D_x), transverse (D_y) and vertical (D_z) corresponding to the *x*-, *y*- and *z*-directions.

Also see diffusion and dispersivity.

dispersion coefficient, *n* – [HYDROGEOLOGY] a quasi-FICKIAN mathematical description of dispersion which is assumed to equal the product of the rate of ADVECTION and a constant known as the DISPERSIVITY[61]. A coefficient exists for each of the three directions: longitudinal (D_x), transverse (D_y) and vertical (D_z) corresponding to the *x*-, *y*- and *z*-directions.

dispersive clays, *n* – [AGRONOMY] CLAY SOILS that deflocculate in still WATER and erode when exposed to a low-velocity flow of water. A clay-pore water system that has a high concentration of sodium ions tends to have high dispersivity.

dispersivity (α), *n* – [HYDROGEOLOGY] a geometric property of a POROUS MEDIUM which determines the DISPERSION characteristics of the medium by relating the components of pore velocity to the dispersion coefficient.

DISCUSSION – Dispersivity (α_x, α_y or α_z) times the ground-water flow rate (V) equals the dispersion coefficient (D_x, D_y or D_z). Accordingly, as the ground-water flow rate increases, so does the dispersion.

Also see dispersion and diffusion.

displacement, *n* – [CHEMISTRY] REACTION in which an ATOM, RADICAL, or MOLECULE displaces and sets free an ELEMENT of a COMPOUND.

displacement, *n* — [GEOLOGY] the distance by which portions of the same GEOLOGICAL LAYER are offset from each other by a FAULT[4].

disposal, *n* – [WASTE DISPOSAL] final placement or destruction of TOXIC, RADIOACTIVE, or other WASTES; surplus or banned PESTICIDES or other CHEMICALS; POLLUTED SOILS; and drums containing HAZARDOUS MATERIALS from removal actions or accidental RELEASES. Disposal may be accomplished through use of approved secure LANDFILLS, SURFACE IMPOUNDMENTS, LANDFARMING, deep-well injection, ocean dumping, or incineration.

dispute, *n* – [LOGIC] an ARGUMENT or DEBATE; a quarrel.

dispute resolution, *n* – [LAW] the reaching of a DECISION concerning an ARGUMENT or debate, often with the use of an arbitrator or JUDGE.

dissimilatory Fe (III) reduction, *n* – [CHEMISTRY] Fe (III) can be used as an ELECTRON ACCEPTOR after the available DISSOLVED OXYGEN and NITRATE in an AQUIFER have been depleted.

dissociation, *n* – [CHEMISTRY] the PROCESS that may occur when a CHEMICAL COMPOUND is dissolved in a solvent (such as water). The MOLECULES of the compound will break up ("dissociate") into two or more ions resulting in an ionically conducting electrolyte solution. For example, the common table salt (sodium chloride) will dissociate into a single charged sodium cation and a single charged chloride anion.

dissociation constant, *n* – [CHEMISTRY] a CONSTANT whose value depends on the EQUILIBRIUM between the undissociated and dissociated forms of a MOLECULE. In an AQUEOUS SOLUTION, an ACID (HA) will dissociate into CARBOXYLATE ANION (A^-) and HYDROGEN ION (H^+) where $HA_{aq} \leftrightarrow H^+ + A^-$. The dissociation constant is normally expressed as $pK_a = -\log_{10}K_a$.

dissolution, *n* – [CHEMISTRY] the dissolving of a particular SUBSTANCE into WATER or other LIQUIDS. Dissolution is one of the components of WEATHERING. *Also known as solubilization*.

DISCUSSION – With regard to spilled petroleum products, one weathering process is dissolution or "water washing". Through this process, the more soluble compounds within a petroleum product are leached away.

dissolved inorganic carbon (DIC), *n* – [CHEMISTRY] the CONCENTRATION of INORGANIC CARBON within a certain MEDIUM[17].

dissolved inorganic nitrogen, *n* — [CHEMISTRY] nitrogen primarily in the form of NITRITE, NITRATE, or AMMONIA[17].

dissolved organic carbon (DOC), *n* – [CHEMISTRY] a measure of the ORGANIC COMPOUNDS that are dissolved in water. In the analytical test for DOC, a water SAMPLE is first filtered to remove particulate material, and the organic compounds that pass through the filter are chemically converted to CARBON DIOXIDE, which is then measured to compute the amount of organic material dissolved in the water16.

dissolved oxygen (DO) content, *n* – [CHEMISTRY] the OXYGEN freely available in WATER, vital to fish and other aquatic life and for the prevention of ODORS. DO levels are considered a most important indicator of a water body's ability to support desirable aquatic life. Secondary and advanced WASTE TREATMENT are generally designed to ensure adequate DO in waste-receiving waters[17].

DISCUSSION – The DO content of ground water is one of several criteria used to assess its oxic nature. For example, a DO content of less than 0.2 milligrams per liter (mg/l) is considered anoxic, whereas a content of greater than 2 mg/l is considered oxic. DO contents of between 0.2 and 2 mg/l is considered to be dysoxic.

dissolved product, *n* – [HYDROGEOLOGY] water-soluble components of a PLUME of ORGANIC CHEMICALS in GROUND WATER. Normally, when dealing with petroleumproducts, dissolved product consists of BENZENE, TOLUENE, ETHYLBENZENE AND XYLENES (BTEX) plus oxygenates (such as MTBE and/or TBA) and other soluble components of petroleum.

distal, *adj* – [GEOLOGY] further away.

distance-drawdown equation, *n* – [HYDROGEOLOGY] an equation used to determine CHARACTERISTICS such as TRANSMISSIVITY (T) and STORATIVITY based on the rate of DRAWDOWN in a PUMPING WELL and nearby OBSERVATION WELLS where,

$$s = \frac{Q}{4\pi T} \ln\left(\frac{2.25Tt}{r^2S}\right)$$

and Q is the pumping rate (L^3T^{-1}), r is the distance from the pumping well (L), s is the drawdown (L), T is the transmissivity (L^2T^{-1}) and S is storativity (L^3L^{-3}). *Also see Theis Equation, Thiem Equation and time-drawdown equation.*

distillate, *n* – [CHEMISTRY] the VAPOR collected and condensed from a DISTILLATION. *Also see distillation.*

distillate fuel, *n* – [PETROLEUM CHEMISTRY] refers to a category of FUELS, largely classified depending upon their intended use. They include civilian and military jet engine fuels, on-road diesel (truck and bus), off-road diesel (rail, heavy equipment, and farm machinery), marine diesel engine fuels, non-aviation gas turbine fuels, and domestic and commercial heating fuels. As their name implies, the production of distillate fuels involves vaporizing and re-condensing, which distinguishes them from the higher boiling,residual fuels (fuel oil no. 6). Volumetrically, on-road diesel fuel no. 2 and civilian jet fuel (Jet A) comprise the bulk of distillate fuel produced at U.S. refineries. With minor exceptions, distillate fuels generally boil within the range of approximately 100°C to 400°C, which roughly corresponds to a carbon range of C_7 to C_{25}.

distillation, *n* – [CHEMISTRY] the act of purifying LIQUIDS through BOILING, so that the steam or GASEOUS vapors condense to a pure liquid. POLLUTANTS and CONTAMINANTS may remain in a concentrated RESIDUE.

distillation, *n* – [PETROLEUM CHEMISTRY] part of the REFINING PROCESS, heating of CRUDE OIL or other materials to separate COMPONENTS according to their relative VOLATILITY[34]. *Also see distillate and condensate.*

distilled water, *n* – [CHEMISTRY] prepared by thermal DISTILLATION using a still of all-borosilicate glass, fused QUARTZ, tin or titanium with the distillate meeting the following characteristics of Type I (Type II) water: RESISTIVITY (megohm-cm at 25°C) greater than 10 (greater than 1); CONDUCTIVITY (µmho/cm at 25°C) less than 0.1 (equal to 1); total oxidizable ORGANIC CARBON (mg/L) less than 0.05 (less than 0.2); total solids (mg/L) less than or equal to 0.1 (equal to 1), and SiO_2 (mg/L) less than 0.05 (less than 0.1). *Also see deionized water.*

distributary, *n* – [HYDROLOGY] one of a network of small STREAMS carrying water and sediment from a trunk stream into an ocean. *Also see delta and tributary.*

distribution coefficient — *See partitioning coefficient.*

distribution octane number (DON), *n* – [PETROLEUM CHEMISTRY] a measure of the way octane quality is distributed across the BOILING RANGE of a GASOLINE, as measured with a modified CFR engine[26].

ditch, *n* – [HYDROLOGY] MAN-MADE small open CHANNEL constructed through EARTH or ROCK for the purpose of conveying WATER[16]. *Also see gulch, gulley and trench.*

diterpanes, *n* – [PETROLEUM CHEMISTRY] class of BIOMARKERS containing four ISOPRENE subunits that are mainly bi- and tricyclic compounds. Many diterpanes originate from higher plants[34]. *Also see biomarker.*

divide, *n* – [HYDROLOGY] summit or BOUNDARY line separating adjacent DRAINAGE BASINS[16].

DNA—*See deoxynucleic acid.*

DNAPL—*See dense nonaqueous phase liquid.*

DNAPL entry location, *n* – [HYDROGEOLOGY] an area where a chemical or mixture that can form a DNAPL has entered the subsurface by way of a leak, spill, discharge, or any other escape[67].

DNAPL lens, *n* – [HYDROGEOLOGY] a zone of free-phase DNAPL, smaller than a pool, resting on low-permeability strata[67].

DNAPL pool, *n* – [HYDROGEOLOGY] a contiguous accumulation of DNAPL with a hydrostatically level upper surface. In the absence of capillary forces, the upper surface of a pool is typically flat and horizontal. DNAPL pools are typically greater than a few millimeters in depth.

DNAPL zone, *n* – [HYDROGEOLOGY] the portion of either the vadose zone or saturated zone, or both zones, affected by the presence of free-phase or residual-phase DNAPL that can cause contamination as a vapor in the vadose zone and as a water solute in both the vadose and saturated zones[67].

DO—*See dissolved oxygen content.*

docket, *n* – [LAW] a log containing brief entries of COURT proceedings. A formal record of JUDICIAL proceedings[19].

doctrine, *n* — [PHILOSOPHY] a particular PRINCIPLE or tenet that is presented for acceptance or BELIEF[15].

doctrine of appropriation, *n* – [LAW] the doctrine that whoever puts water to a beneficial use may continue to take it so long as the use does not conflict with use by someone with an earlier claim to the same souce[63].

documents, *n* – [LAW] the deeds, AGREEMENTS, title papers, letters, receipts, and other written instruments used to prove a fact. Documents are also understood evidence delivered in the forms established by *law*, of whatever nature such EVIDENCE may be, but applied principally to the TESTIMONY of WITNESSES[19].

dolerite—*See diabase.*

doline, *n* – [HYDROLOGY] funnel-shaped CAVITY at the GROUND SURFACE which communicates with the underground DRAINAGE SYSTEM in LIMESTONE regions and which is caused by SOLUTION of the ROCK[6]. *Also see sinkhole.*

doline lake, *n* – [HYDROLOGY] a small KARST LAKE occupying a DOLINE or closed depression in LIMESTONE. The term implies that the doline is at or near the WATER TABLE and in hydrological continuity with it, or that the base of the doline is sealed with an impermeable layer such as CLAY. *Also see doline and karst.*

dolomite, *n* – [GEOLOGY] *1*. SEDIMENTARY ROCK formed from $CaMg(CO_3)_2$. *2*. MINERAL with the CHEMICAL formula $CaMg(CO_3)_2$.

DISCUSSION – Dolomite is believed to form in areas known as sabkhas which form along arid, coastal area.

Also see anhydrite, chalk, gypsum and limestone.

dolostone, *n* – [GEOLOGY] a rock composed predominantly of the MINERAL DOLOMITE.

dome, *n* – [GEOLOGY] a curved STRATUM of ROCK in which the DIP is in all directions away from a central point rather than an AXIS. *Also see diapir.*

domestic use, *n* – [HYDROLOGY] water use in homes and on lawns, including use for laundry, washing car, cooling, and swimming pools[63].

domestic well, *n* – [HYDROGEOLOGY] a *well* used by a private residence for domestic (drinking water, bathing, etc.) purposes. *Also known as a potable well or private well.*

donga, *n* – [GEOGRAPHY] a steep sided GULLEY resulting from severe SOIL EROSION.

dormant season, *n* – [DENDROLOGY] the period in which growth and development are temporarily suspended in a tree, such as in winter or dry periods[12]. *Also see growing season.*

dormant volcano, *n* – [GEOLOGY] a VOLCANO that is not now erupting but that has erupted within historic time and is considered likely to do so in the future. There is no precise distinction between a dormant and active volcano[4]. *Also see active volcano and volcano*.

dose, *n* – [TOXICOLOGY] a portion of a SUBSTANCE added during a process.

double bond, *n* – [CHEMISTRY] a CHEMICAL BOND in which two pairs of ELECTRONS are shared by two ATOMS in a MOLECULE[17].

double-walled tank, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] an UNDERGROUND STORAGE TANK in which a rigid secondary container is attached to the primary container and which has an ANNULAR SPACE[48]. *Also see underground tank.*

doubt, *n* – [LOGIC] the UNCERTAINTY which exists in relation to a FACT, a proposition or other thing. An equipoise of the mind arising from an equality of contrary reasons. *Also see error range and uncertainty.*

down, *n* – [GEOGRAPHY] a tract of open, mainly treeless, hilly land and sparsely covered with soil[6]. Derived from the German or Norse word “dun” or hill. *Also known as downlands.*

downgradient, *adj* – [HYDROLOGY] *1*. the direction that GROUND WATER flows; similar to "downstream" for SURFACE WATER. *2*. in the direction of lower ELEVATION. *Also see upgradient.*

downhole, *n* – [HYDROGEOLOGY] a collective term, the expression covers any equipment, measurement, etc., in a well or designed for use in one. The meaning is the same as down a well.

downstream – *See downgradient.*

drag reducer, *n* – [PETROLEUM CHEMISTRY] high-molecular-weight polymers that improve the fluid flow characteristics of low-viscosity petroleum products. As energy costs have increased, pipelines have sought more efficient ways to ship products. Drag reducers lower pumping costs by reducing friction between the flowing gasoline and the walls of the pipe[32].

drain, *n* — [HYDROLOGY] a means for intercepting, conveying, and removing water[15].

drainage basin, *n* – [HYDROGEOLOGY] an area in which surface RUNOFF collects and from which it is carried by a DRAINAGE SYSTEM, as a RIVER and its TRIBUTARIES[33]. *Also known as catchment, drainage area, feeding ground, gathering ground, hydrographic basin*.

drainage divide, *n* – [HYDROLOGY] an area of raised, dry LAND separating two adjacent DRAINAGE BASINS[33]. *Also known as a topographic divide. Also see divide.*

drainage pattern, *n* – [HYDROLOGY] a PATTERN formed by the STREAMS, RIVERS, and LAKES in a particular WATERSHED. They are governed by the TOPOGRAPHY of the LAND, whether a particular region is dominated by hard or soft ROCKS, the GRADIENT of the land and sometimes the underlying STRUCTURAL GEOLOGY[43]. Some of the mosy common types of drainage patterns are:

dendritic – a tree-like, branched form of pattern, in which the smaller streams take a wide variety of directions and show no parallelism or trend.

trellis - characterized by a dominant parallel set of major subsequent streams joined at right ANGLES by numerous short tributaries

typical of coastal plains and belts of eroded folds.

radial – a pattern of streams fanning out away from a central location, such as occurs around volcanoes and domes.

rectangular – in which subsequent streams develop in two sets at about right ANGLES.

annular – a pattern similar to radial, but the streams have two distinct directions at right angles to each other.

parallel – a pattern the subsequent and trunk streams are flow generally in the same direction and subparallel to each other.

deranged -- a pattern that is highly irregular. Areas that have experienced continental glaciation may have this type of drainage pattern.

Also see drainage, geomorphology, landform and watershed.

drain tile, *n* – [HYDROLOGY] pipes of various MATERIALS, in short lengths, laid in covered TRENCHES underground, in most cases quite loosely and with open joints, to collect and carry off excess GROUND WATER or to dispose of WASTE WATER in the ground.

draw, *n* – [GEOGRAPHY] *1*. a small RAVINE or shallow GULCH, usually dry but containing water after a rainfall. 2. a sag or depression leading from a valley to a gap between two hills[4].

drawdown, *n* — [HYDROGEOLOGY] VERTICAL distance the GROUND-WATER ELEVATION is lowered or the PRESSURE HEAD is reduced due to the removal of GROUND WATER[33].

drawdown curve, *n* – [HYDROGEOLOGY] a GRAPH relating the POTENTIOMETRIC or PIEZOMETRIC SURFACE versus the distance from the pumping well[16].

drawdown cone, *n* – [HYDROGEOLOGY] the lowering of a WATER TABLE or POTENTIOMETRIC SURFACE by the extraction of water from a WELL. In HOMOGENEOUS AQUIFERS, a CONE OF DEPRESSION is roughly conical in shape. As the anisotropy of the aquifer increases, the shape of the cone will changes. Furthermore, the slope of the original potentiometric surface will alter the shape of the cone. *Also see drawdown and cone of depression.*

dredging, *n* – [HYDROLOGY] the removal of material normally submerged in a body of water. DREDGE SPOILS obtained from large harbours are often highly contaminated and their disposal can be problematic.

dredge spoils, *n* – [HYDROLOGY] material dug up to deepen navigable waterways. These spoils are often found in and around harbors.

dreikanter, *n* – [GEOLOGY] *from German,* any pebble that has been shaped by aeolian sanblasting into a faceted ventifact displaying plane faces with three (*drei in German*) sharp ANGLES or edge (*Kanten in German*) bounding them[6].

drift, *n* – [GEOLOGY] a catchall term that includes all geologic materials that were deposited by GLACIERS (or their meltwater streams). Drift is composed of stratified and unstratified materials ranging in size from CLAY to BOULDERS[6]. *Also see glacial and periglacial.*

drift, *n* – [MINING] a DEEP MINE entry driven directly into a horizontal or near-horizontal mineral seam or vein when it outcrops or is exposed at the ground surface66.

drill, *n* — [DRILLING TECHNOLOGY] a machine or piece of equipment designed to penetrate EARTH or ROCK FORMATIONS, or both.

drilling contractor, *n* – [COMMERCE] the company that owns and operates a DRILLING RIG. The drilling contractor usually charges a fixed daily rate for its hardware (the rig) and software (the people), plus certain extraordinary expenses. Under this arrangement, the cost of the well is largely a function of the time it takes to drill and complete the well. The other primary contracting methods are footage rates (where the contractor receives an agreed upon amount per foot of hole drilled), or turnkey operations, where the contractor may assume substantial risk of the operations and receives a lump sum payment upon supplying a well of a given specification to the operator.

drill cuttings, *n* — [DRILLING TECHNOLOGY] fragments or PARTICLES of SOIL or ROCK, with or without GROUND WATER, created by the DRILLING PROCESS.

DISCUSSION: On contaminated sites, the drill cuttings often need to be drummed and properly disposed of, especially if the borehole was drilled through a zone of hazardous wastes or hazardous substances.

drilling fluid, *n* — [DRILLING TECHNOLOGY] a FLUID (LIQUID or GAS) that may be used in DRILLING operations in remove cuttings from the BOREHOLE, to clean and cool the drill BIT, and to maintain the integrity of the borehole during drilling. *Also see bentonite clay.*

drilling log, *n* -- [GEOLOGY] the brief included as part of a driller's or geologist's report detailing the characteristics of the well cuttings.

drilling mud, *n* — [DRILLING TECHNOLOGY] a dense FLUID or SLURRY, often composed of BENTONITE, used in ROTARY DRILLING; to prevent caving of the BOREHOLE walls, as a circulation MEDIUM to carry cuttings away

from the bit and out of the hole, and to seal FRACTURES or PERMEABLE FORMATIONS, or both, preventing loss of circulation fluid[4].

> DISCUSSION—The most common drilling mud is a water-bentonite mixture, however, many other materials may be added or substituted to increase density or decrease viscosity. One example is Revert, a vegetable-based drilling mud.

Also see bentonite clay and drilling fluid.

drill stem, *n* – [DRILLING TECHNOLOGY] tubular steel conduit fitted with special threaded ends called tool joints. The drillpipe connects the rig surface equipment with the bottomhole assembly and the bit, both to pump drilling fluid to the bit and to be able to raise, lower and rotate the bottomhole assembly and bit[4]. *Also known as drill pipe or drill string.*

drill string, *n* – [DRILLING TECHNOLOGY] the assemblage in the borehole of drill pipe, drill collars, drill bit and core barrel (if in use) for a rotary drilling rig, connected to and riotated by the drilling rig at the surface[4].

drinking-water standard, *n* – [ENVIRONMENTAL REGULATION] the maximum CONCENTRATION of a certain CONTAMINANT allowable in drinking-water supplies as specified by a regulating authority. *Also see maximum contaminant level.*

drip-drying, *n* – [DRY-CLEANING TECHNOLOGY] a form of DRY CLEANING where the clothes were hung and the dry-cleaning fluid, often GASOLINE, was allowed to evaporate and, hopefully, the gasoline odor would disappear[41].

driven well, *n* – [DRILLING TECHNOLOGY] a shallow WELL, usually of a small diameter (3 cm to 10 cm), constructed by driving a series of connected lengths of metal pipe into unconsolidated materials until a water-bearing stratum is reached, without actual drilling, boring or jetting[4].

drought, *n* – [HYDROLOGY] prolonged absence or marked deficiency of PRECIPITATION[16].

drowned valley, *n* – [HYDROLOGY] a RIVER VALLEY now occupied by the sea[4]. *Also known as a ria*.

drum, *n* — [PETROLEUM TECHNOLOGY] a container (typically, but not necessarily, holding 55 gal [208 L] of liquid in the USA) that may have been used to store HAZARDOUS SUBSTANCES or PETROLEUM PRODUCTS. *Also see barrel.*

drumlin, *n* – [GEOLOGY] elliptical or oblong HILLS lying PARALLEL to the direction of the GLACIAL ice flow[4].

druse, *n* – [GEOLOGY] a coating of fine crystals on a rock fracture surface, vein or within a cavity or geode.

druzy—*See druse.*

dry cleaning, *n* – [DRY-CLEANING TECHNOLOGY] to remove dirt or other CONTAMINATING MATTER from clothes and other garments with some type of solvent, usually an ORGANIC SOLVENT, without WATER[41]. *Also known as French cleaning.*

> DISCUSSION -- Dry cleaning was originally performed, in the 1800s, first with camphene ($C_{10}H_{18}$), then with benzene and gasoline. At the turn of the century, Stoddard Solvent and naphtha were also used. In the early 1900s, gasoline was replaced as a solvent by carbon tetrachloride. More recently, tetrachloroethylene (PCE) has been widely used, but is being replaced by solvents which have less of an adverse impact on the environment.

Also see drip-drying.

dry-cleaning fluid, *n* – [DRY-CLEANING TECHNOLOGY] SOLVENT used in the dry-cleaning process. Modern dry-cleaning fluids include TETRACHLOROETHYLENE (PCE), while fluids used in the past include CARBON TETRACHLORIDE, KEROSENE and GASOLINE[41]. *Also see dry cleaning and tetrachloroethylene (PCE).*

dry gas, *n* – [PETROLEUM CHEMISTRY] NATURAL GAS consisting primarily of METHANE and devoid of readily condensable constituents such as GASOLINE. Dry gas contains less than 0.1 gallon natural gas liquid vapors per 1,000 cubic feet (1.3 liters per 100 cubic meters)[34].

dry gas well, *n* – [PETROLEUM GEOLOGY] a well that only produces gas.

dry hole, *n* – [HYDROGEOLOGY] *1.* an unsuccessful well that does not produce oil or gas in commercial quantities. *2.* a BOREHOLE or WELL that does not extend into the WATER TABLE[4].

dry lake, *n* – [HYDROLOGY] the site of a former lake, which need not be literally dry, but may support marsh or even aquatic vegetation[63].

dry spell—*See absolute drought.*

dry valley, *n* – [HYDROLOGY] VALLEY that lacks a permanent surface STREAM. Dry valleys are common on CARBONATE ROCKS with good primary PERMEABILITY and occur on other permeable rocks such as SANDSTONE. Dry valleys on CAVERNOUS LIMESTONE were formed when streams flowed on the surface, either before secondary permeability and cave systems developed, or when caves were blocked by ground ice in periglacial climates. The valleys became dry when underground drains formed or were re-opened, capturing first part and then all of the surface drainage[4].

dry well, *n* – [HYDROLOGY] an underground storage facility for WATER, typically storm water RUNOFF. Simple dry wells consist of a pit full of riprap or

other DEBRIS. More complex dry wells may be made of plastic or CONCRETE. They have holes in the sides and bottom to let stored water PERCOLATE out to surrounding SOIL, and are sometimes used at the end of a FRENCH DRAIN to store runoff. Often used for the domestic disposal of GRAY WATER. *Also see cesspool, leachfield, seepage pit and septic tank.*

dual-phase extraction, *n* – [REMEDIATION TECHNOLOGY] active withdrawal of both LIQUID and GAS PHASES from a WELL usually involving the use of a vacuum PUMP. *Also see pump-and-treat.*

due diligence, *n* – [LAW] *1*. the care that a reasonable person exercises under the circumstances to avoid harm to other persons or their property. *2*. the care that a prudent person might be expected to exercise in the examination and evaluation of risks affecting a business transaction[19].

due process, *n* – [LAW] the idea that LAWS and legal proceedings must be fair. The U. S. Constitution guarantees that the GOVERNMENT cannot take away a person's basic rights to 'life, liberty or property, without due process of law.' COURTS have issued numerous rulings about what this means in particular cases[19].

duff, *n* — [AGRONOMY] a general, non-specific term referring to the more or less firm ORGANIC layer on top of MINERAL SOIL, consisting of fallen vegetative matter in the process of DECOMPOSITION, including everything from litter on the surface to pure HUMUS[20].

dug well, *n* – [HYDROGEOLOGY] a WELL constructed manually and often built with STONES or ROCKS lining the ANNULUS[4]. *Also see abyssinian well and qanat.*

dump, *n* – [WASTE DISPOSAL] a SITE used to DISPOSE of SOLID WASTE without ENVIRONMENTAL controls. A rubbish heap[15]. *Also see landfill and open dump.*

dune, *n* – [GEOLOGY] a mound or ridge of SAND formed, either in a DESERT or along a SEA COAST, through transportation by WIND[4]. *Also see barchan and desert.*

dunite, *n* – [GEOLOGY] an igneous, plutonic rock of ultramafic composition with a coarse-grained or phaneritic texture. The mineral assemblage is greater than 90% olivine, with minor amounts of other minerals such as pyroxene, chromite and pyrope. *Also see peridotite.*

duplicate sample, *n* — [ENVIRONMENTAL INVESTIGATION] one of two REPRESENTATIVE portions taken from the same SAMPLE or sample SOURCE. *Also see blind sample*.

du Puit's Assumption, *n* – [HYDROGEOLOGY] in steady, nearly HORIZONTAL GROUND-WATER FLOW in an AQUIFER, it is assumed that the stream lines are horizontal and the EQUIPOTENTIALS are VERTICAL, and that the HYDRAULIC GRADIENT (dh/dz) is CONSTANT over a VERTICAL section, whereas dh/dx is equal to the SLOPE of the PHREATIC SURFACE[33]. *Also see hydraulic gradient.*

du Puit - Forchheimer Equation, *n* – [HYDROGEOLOGY] a MATHEMATICAL EXPRESSION used to approximate GROUND-WATER FLOW in an UNCONFINED AQUIFER where,

$$Q = (-1/2)\, K[(h_1^2 - h_2^2/L)]$$

and Q is the flow rate (L^3T^{-1}), K is the saturated hydraulic conductivity (LT^{-1}), h_1 is the height of the water table in well no. 1 above an impermeable BOUNDARY (L), h_2 is the height of the water table in well no. 2 above an impermeable boundary (L) and L is the distance of the flow path between the two wells[33]. *Also see Darcy's Law, the Thiem Equation and the Theis Equation.*

duricrust, *n* – [AGRONOMY] a hard, surface layer above relatively soft and sometimes unconsolidated sediments, formed by the zonal concentration of aluminous, calcareous, ferruginous and siliceous elements drawn to the surface in solution by CAPILLARY ACTION[6].

duripan, *n* – [AGRONOMY] DIAGNOSTIC SOIL term used to describe a subsurface HORIZON at least half cemented by silica oxide[4]. *Also see claypan, fragipan, ironpan and pan.*

dust, *n* – [METEOROLOGY] tiny PARTICLES of solid MATTER (less than 0.66 mm in diameter) occurring anywhere in the ATMOSPHERE and light enough to be carried in suspension, by the wind, sometimes for vast distances around the globe before falling to the earth[6].

dwelling, *n* – [CONSTRUCTION TECHNOLOGY] STRUCTURE or portion thereof used for residential habitation[15]. *Also known as a home, house or residence.*

dwell time, *n* – [CHEMISTRY] the time spent by the detector at a given mass during scanning by the MASS SPECTROMETER. Longer dwell times result in more accurate measurements of peaks by increasing the signal-to-noise ratio[34].

dye, *n* – [CHEMISTRY] a colored SUBSTANCE that imparts more or less permanent COLOR to other materials[15]. Often used to distinguish different grades of gasoline.

dynamic, *adj* – [PHYSICS] referring to a FORCE producing MOTION, as opposed to STATIC[24]. *Also see statics*.

dynamic equilibrium, *n* – [PHYSICS] when activity in one sense or direction is in aggregate balance with a comparable reverse activity[6]. *Also see equilibrium*.

dysaerobic, *adj* – [BIOLOGY] refers to METABOLISM under DYSOXIC conditions with limited MOLECULAR OXYGEN[34].

dysoxic, *adj* – [HYDROLOGY] refers to water column or sediments with molecular oxygen contents of 0.2 milligrams per liter (mg/l) to 2 ml/l of INTERSTITIAL WATER.

dystrophic, *adj* – [HYDROLOGY] of a lake, brownish, with much dissolved HUMUS matter, a small bottom fauna, and a notably high oxygen consumption[63].

Ee

eager, *n* – [HYDROLOGY] a TIDAL BORE[6].

earliest demonstrative inception date (EDID), *n* – [AGE DATING] the earliest date that an ENVIRONMENTAL RELEASE could have occurred based on the available data and information[44]. *Also see latest possible inception date (LPID).*

earlywood, *n* – [DENDROLOGY] the XYLEM cells produced in TREE RINGS during the early part of the growing season, characterized by large, thin-walled tracheids in GYMNOSPERMS and numerous large vessels in ANGIOSPERMS[12]. *Also see latewood.*

earth (Earth), *n* — [GEOLOGY] 1. the solid material of the globe that constitutes the land surface, in contrast to the water surface. 2. the loose surface material (including soil) as distinct from solid rock. 3. the fifth in size of the nine major planets which orbit the Sun. Mean density = 5,517 x 10^3 kg m^{-3}; mass = 5,976 x 10^{24} kg; volume = 1,083 x 10^{21} m^3; gravity acceleration = 9.812 m sec^{-2}; total surface area = 510 million km^2 (196.9 million sq mi); land area (29.22%) = 149 million km^2 (57.5 million sq mi); ocean area (70.78%) = 361 million km^2 (139.4 million sq mi); mean radius = 6,371 km (3,956 mi); equatorial radius = 6,378 km (3,956 mi); polar radius = 6,357 km (3,950 mi)[6]. *Also see soil.*

earthflow, *n* – [GEOLOGY] a form of mass movement in which debris moves down slope. This usually occurs under the force of gravity[6].

earth material—*See soil, bedrock, or fill.*

easement, *n* — [LAW] a legal instrument enabling the giving, selling, or taking or certain LAND or WATER rights without transfer of title, such as for the passage of utility lines. An affirmative easement gives the OWNER of the easement the right to use the land for a stated purpose. A negative easement is an agreement with a private property owner to limit the DEVELOPMENT of his land in specific ways.

ebb, *n* – [HYDROLOGY] the falling TIDE[6].

echard, *n* — [AGRONOMY] SOIL WATER not available for ABSORPTION by plants[20].

ecological assessment, *n* – [ECOLOGY] a qualitative appraisal of the actual or potential effects of chemical(s) of concern on plants and animals other than people and domestic species.

ecological balance, *n* – [ECOLOGY] the quality of a stable ecosystem. This balance is increasingly upset by human actions: pollution, removal of natural vegetation and the introduction of foreign species.

ecological footprint, *n* – [ECOLOGY] something which has had a permanent (and damaging) EFFECT on the surrounding ENVIRONMENT.

ecology, *n* – [SCIENCE] SCIENCE of the interrelationship among ORGANISMS and their ENVIRONMENT.

ecosphere, *n* – [ECOLOGY] the parts of the earth's atmosphere and crust fostering living organisms. This can be known as the 'biosphere'.

ecosystem, *n* – [ECOLOGY] the community of ORGANISMS and the ENVIRONMENT in which they live. *Also see environment, fauna, flora and habitat.*

ecotone, *n* – [ECOLOGY] a transitional zone in which one ECOSYSTEM gives way to its neighbor; typically, this will be a zone in which elements of both ecosystems are identifiable[61].

ecozone, *n* – [ECOLOGY] the largest scale biogeographic division of the Earth's land surfaces, based on the historic and evolutionary distribution patterns of terrestrial plants and animals. Ecozones represent large areas of the Earth's surface where plants and animals developed in relative isolation over long periods of time, and are separated from one another by geologic features, such as oceans, broad deserts, or high mountain ranges, that formed barriers to plant and animal migration. *Also see biome.*

ecumene, *n* – [ECOLOGY] the inhabited areas of the world.

eddy, *n* – [HYDROLOGY] rotational movement occurring in flowing FLUID[6]. *Also see current and flow.*

effect, *n* – [SCIENTIFIC METHOD] the result or consequence of an action, etc., the significance or implication of this. 2. a physical PHENOMENON[15]. *v* – to bring about, accomplish. *Also see affect.*

effective drainage porosity—*See effective porosity.*

effective grain size, *n* – [HYDROGEOLOGY] the GRAIN SIZE corresponding to the one that is 10% finer by weight line on the grain-size distribution curve[33].

effective hydraulic conductivity, *n* – [HYDROGEOLOGY] [LT^{-1}] the rate of flow of water through a porous medium that contains more than one fluid, such as water and air in the unsaturated zone, and should be specified in terms of both the fluid type and content and the existing pressure[65]. Also known as capillary conductivity by soil physicists. *Also see hydraulic conductivity.*

effective permeability, *n* – [HYDROGEOLOGY] [LT^{-1}] the ability of a ROCK to conduct one FLUID, such as GAS, in the presence of other fluids, such as OIL or WATER[16]. This term is predominantly used in the petroleum industry. *Also see absolute permeability,*

intrinsic permeability, permeability and relative permeability.

effective porosity (effective drainage porosity), *n,* — [HYDROGEOLOGY] [L^3/L^3] the ratio of: (*1*) the VOLUME of the VOIDS of a SOIL or ROCK MASS that can be drained by GRAVITY, to (*2*) the total volume of the mass[33]. The equation to calculate effective porosity (n_e)is:

$$n_e = [(W_s - W_r)/(W_s - W_o)][V_v/V] \times 100\%$$

where n_e is the effective porosity, W_s is the weight of the saturated soil, W_r is the weight of the soil after gravity drainage, W_o is the weight of the air-dried soil, V_v is the volume of void space and V is the total volume of the soil.

effective rainfall, *n* – [HYDROLOGY] rainfall that produces surface runoff[16].

effective solubility, *n* – [CHEMISTRY] the theoretical aqueous solubility of an organic constituent in ground water that is in chemical equilibrium with a separate phase mixed product (product containing several organic chemicals). The effective solubility of a particular organic chemical can be estimated by multiplying its mole fraction in the product mixture by its pure phase solubility[18].

effluent, *n* – [HYDROLOGY] *1*. WASTEWATER--treated or untreated--that flows out of a TREATMENT plant, SEWER, or industrial outfall. Generally refers to WASTES discharged into SURFACE WATERS[16]. *2*. a surface stream that flows out of a lake or a stream or branch that flows out of a larger stream. *Also see wastewater and wastestream.*

effluent stream–-*See preferred term: gaining stream.*

Eh, *n* – [CHEMISTRY] also known as REDOX POTENTIAL. Eh is a numerical measure of the intensity of OXIDATION or REDUCING conditions. A positive potential indicates oxidizing conditions and a negative potential indicates reducing conditions[17]. *Also see oxidation-reduction potential.*

Eh-pH diagram, *n* – [CHEMISTRY] a useful way to summarize REDOX properties and chemical speciation. A DIAGRAM which shows the Eh-pH domains for a number of aqueous systems. The vertical scale is Eh in volts, while the horizontal scale is pH in standard units. The diagram shows where certain chemical species, at a particular temperature and pressure, will be stable.

eigenvalue, *n* – [STATISTICS] *1*. possible values for a parameter of an equation for which the solution will be compatible with the BOUNDARY conditions. *2*. of a matrix[11].

einkanter, *n* – [GEOLOGY] a VENTIFACT having only one wind-cut face or single sharp edge; it implies a steady, unchanging wind[4]. *Also see ventifact.*

elastic, *n* – [PHYSICS] capable of recovering size and shape.

elastic storage, *n* – storage of GROUND WATER which is achieved by COMPRESSION of the water and dilation of the pores; the predominant form of storage in a CONFINED AQUIFER[61].

elastomer, *n* – [PHYSICS] a polymer with the property of viscoelasticity (colloquially "elasticity"), generally having notably low YOUNG'S MODULUS and high yield strain compared with other materials. The term, which is derived from ELASTIC POLYMER, is often used interchangeably with the term RUBBER.

electrical conductivity (EC), *n* – [CHEMISTRY] measure of how well a material accommodates the transport of electric charge[17].

electrical resistivity, *n* – [PHYSICS] the property of a substance to impede the flow of an electrical current through it; measured per unit length through a unit cross-sectional area.

electricity, *n* – [PHYSICS] a form of ENERGY resulting from the existence of CHARGED PARTICLES (ELECTRONS, PROTONS, etc.), either STATICALLY as an accumulation of CHARGE or DYNAMICALLY as a CURRENT[24].

electric log, *n* – [GEOPHYSICS] the generic term for a WELL LOG that displays ELECTRICAL MEASUREMENTS of induced CURRENT FLOW (RESISTIVITY LOG, INDUCTION LOG) or natural potentials (spontaneous-potential curve) in the ROCKS of an uncased BOREHOLE. An ELECTRIC LOG typically consists of the spontaneous-potential curve and one or more resistivity or INDUCTION curves. The Archie equations form the basis for INTERPRETATION of electric logs[4]. *Also see gamma log, gamma-gamma log, induction log, neutron log, resistivity log, sonic log and spontaneous potential log.*

electrochemistry, *n* – [CHEMISTRY] the study of the relationship between electrical and chemical phenomena[17].

electrode, *n* – [PHYSICS] a conductor through which ELECTRICITY enters or leaves an ELECTROLYTE, GAS, VACUUM, etc.[24] *Also see anode and cathode.*

electrodialysis, *n* -- [TREATMENT TECHNOLOGY] a process whereby water flows through an electrically-charged stack of ion-permeable membranes; mineral salts separate into positive and negative ions that migrate through the membranes, leaving the water behind[63].

electrolysis, *n* – [PHYSICS] the CHEMICAL splitting of an ELECTROLYTE by passing an electrical current through the solution[24].

electrolyte, *n* – [CHEMISTRY] a CHEMICAL that dissociates into positive and negative IONS when dissolved in a SOLUTION, thereby increasing the ELECTRICAL CONDUCTIVITY of the solution[17].

electrolytic degreasing, *n* – [INDUSTRIAL TECHNOLOGY] PROCESS for removal of GREASE, OIL, etc from metal surfaces in preparation for ELECTROPLATING. The metal is made the cathode in an electrolytic cell containing strongly basic (sometimes hot) solution that dissolves these coatings. The strong hydrogen evolution occurring on the cathode may reduce some of the coatings, and the strong bubble evolution removes the coatings mechanically, while the agitation of the solution helps the chemical dissolution of the coatings by the base. *Also see degreasing.*

electrolytic pickling, *n* – [INDUSTRIAL TECHNOLOGY] process for removal of oxide scales from metal surfaces in preparation for electroplating. The metal is made the cathode in an electrolytic cell containing strongly acidic (sometimes hot) solution that dissolves the oxide scales. The strong hydrogen evolution occurring on the cathode may reduce some of the oxides, and the strong bubble evolution removes the scales mechanically, while the agitation of the solution helps the chemical dissolution of the scales by the acid.

electromagnetic radiation, *n* – [PHYSICS] a form of RADIATION including visible LIGHT, radio waves, GAMMA RAYS, X-RAYS, etc. in which ELECTRICITY and MAGNETIC FIELDS vary simultaneously[24].

electron, *n* – [CHEMISTRY] a subatomic PARTICLE with a CHARGE of -1 and a MASS of 9.11 x 10^{-28} gram[24]. *Also see neutron and proton.*

electron acceptor, *n* – [CHEMISTRY] an oxidizing agent; a small ORGANIC or INORGANIC COMPOUND that accepts an ELECTRON during a REDOX REACTION and is reduced to complete an electron-transport chain[29]. Examples of electron acceptors include oxygen, nitrate, iron (III), manganese (IV), sulfate and carbon dioxide. *Also see electron donor.*

electron capture detector (ECD), *n* – [CHEMISTRY] a very sensitive detector for COMPOUNDS with a strong ELECTRON affinity, such as polychlorinated biphenyls (PCBs) and organochlorinated PESTICIDES. The detector is semi-specific in that it responds to MOLECULES with several *halogen atoms* and conjugated DOUBLE BONDS. Used in conjunction with gas chromatography.

electron configuration, *n* – [CHEMISTRY] the orbital and spin arrangement of the ELECTRONS of an ATOM[17].

electron donor, *n* – [CHEMISTRY] a small ORGANIC or INORGANIC COMPOUND that donates an ELECTRON during a REDOX REACTION and is oxidized to complete an electron-transport chain[29]. Petroleum hydrocarbons, less chlorinated solvents like vinyl chloride, soil organic matter, and reduced inorganic compounds are all compounds that can act as electron donors. *Also see electron acceptor.*

electronegativity, *n* – [CHEMISTRY] the power of an ATOM to attract ELECTRONS to itself[62].

electron mass, *n* – [CHEMISTRY] a fundamental physical CONSTANT equal to 9.109 x 10^{-31} kilogram[17].

electron number, *n* – [CHEMISTRY] the number of ELECTRONS in an ION or ATOM[17].

electroplating, *n* -- [INDUSTRIAL TECHNOLOGY] the process that produces a thin, metallic coating on the surface on another metal (or any other conductor, such as graphite). The metal substrate to be coated is made the cathode in an electrolytic cell where the cations of the electrolyte are the positive ions of the metal to be coated on the surface. When a current is applied, the electrode reaction occurring on the cathode is the reduction of the metal ions to metal. For example, gold ions can be discharged from a gold solution to form a thin gold coating on a less expensive metal to produce "custom" jewelry. Similarly, chromium coating is often applied to steel surfaces to make them more "rust resistant." Electroplating is also used in the production of integrated circuits on computer chips and for other modern electronic instrumentation. The anode material can either be the metal to be deposited (in this case the electrode reaction is electrodissolution that continuously supplies the metal ions) or the anode can be of inert material and the anodic reaction is oxygen evolution (in this case the plating solution is eventually depleted of metal ions). Also called "electrodeposition."

electropositivity, *n* – [CHEMISTRY] a measure of an ELEMENT's ability to donate ELECTRONS. *Also see electronegativity.*

element, *n* – [CHEMISTRY] any SUBSTANCE identified by a specific number of PROTONS in its NUCLEUS (known as the ATOMIC NUMBER) that cannot be separated into smaller COMPONENT substances except by nuclear DISINTEGRATION (RADIOACTIVITY)[17].

elementary particle, *n* – [PHYSICS] a particle not known to have substructure; that is, it is not known to be made up of smaller particles. If an elementary particle truly has no substructure, then it is one of the

basic building blocks of the UNIVERSE from which all other particles are made.

elevation, *n* – [GEOGRAPHY] VERTICAL distance of a level, a point or an object considered as a point, measured from MEAN SEA-LEVEL[4]. *Also see altitude and relief.*

elevation head, *n* – [HYDROGEOLOGY] the elevation of the water surface at a point above a DATUM. *Also see pressure head,static head and total head.*

elimination, *n* -- [CHEMISTRY] REACTION where two groups, such as CHLORINE and HYDROGEN, are lost from adjacent CARBON ATOMS and a DOUBLE BOND is formed in their place[62].

elution, *n* – [CHEMISTRY] the process of passing a mobile phase through a chromatographic column to transport solutes.

embankment, *n* – [HYDROLOGY] water-retaining earthwork used to confine streamflow within a specified area along the STREAM or to prevent FLOODING as a result of waves or *tides*. *Also see dike and levee.*

emergency response action, *n* – [REMEDIATION TECHNOLOGY] those activities conducted by a local unit to clean up, remove, prevent, contain, or mitigate a discharge that poses an immediate threat to the environment or to the public health, safety, or welfare.

emerging technology, *n* – [REMEDIATION TECHNOLOGY] an innovative technology that currently is undergoing bench-scale testing. During BENCH-SCALE TESTING, a small version of the technology is built and tested in a laboratory. If the technology is successful during bench-scale testing, it is demonstrated on a small scale at field sites. If the technology is successful at the field demonstrations, it often will be used at full scale at contaminated waste sites. As the technology is used and evaluated at different sites, it is improved continually.

eminent domain, *n* — [LAW] *1*. the right of a government to appropriate private property for public use, usually with fair compensation to the owner. *2*. The authority of the federal or state government, or an agency or party authorized by the federal government, to condemn all interest in land for public purposes, after payment of just compensation.

empirical, *adj* – [SCIENTIFIC METHOD] *1*. originating in or based on OBSERVATION or experience, such as empirical data. *2*. relying on experience or observation alone often without due regard for system and THEORY. *3*. capable of being verified or disproved by observation or EXPERIMENT, such as empirical laws. *Also deduction, induction and reasoning.*

empirical formula, *n* -- [CHEMISTRY] empirical formulas show which ELEMENTS are present in a COMPOUND, with their MOLE ratios indicated as subscripts. For example, the empirical formula of glucose is CH_2O, which means that for every mole of CARBON in the compound, there are two moles of HYDROGEN and one mole of OXYGEN.

emplacement, *n* — [HYDROGEOLOGY] the establishment of CONTAMINANT residence in the VADOSE ZONE in a particular PHASE.

emulsion, *n* – [CHEMISTRY] a stable MIXTURE of two IMMISCIBLE LIQUIDS, consisting of a continuous phase and a dispersed phase. Oil and water can form both oil-in-water and water-in-oil emulsions. The former is termed a dispersion, while emulsion implies the latter. Water-in-oil emulsions formed from petroleum and brine can be grouped into four stability classes: stable, a formal emulsion that will persist indefinitely; meso-stable, which gradually degrade over time due to a lack of one or more stabilizing factors; entrained water, a mechanical mixture characterized by high viscosity of the petroleum component which impedes separation of the two phases; and unstable, which are mixtures that rapidly separate into immiscible layers. Emulsion stability is generally accompanied by a marked increase in viscosity and elasticity, over that of the parent oil which significantly changes behaviour. Coupled with the increased volume due to the introduction of brine, emulsion formation has a large effect on the choice of countermeasures employed to combat a spill[51]. *Also see colloid, mixture and suspension.*

emulsification, *n* – [CHEMISTRY] the process of emulsion formation, typically by mechanical mixing. In the environment, emulsions are most often formed as a result of wave action. Chemical agents can be used to prevent the formation of emulsions or to "break" the emulsions to their component oil and water phases.

enantiomer, *n* – [CHEMISTRY] one of two mirror images of an ORGANIC CHEMICAL. Enantiomers usually differ in their biological properties as a result of their interaction with ENZYMES and other naturally occurring CHIRAL molecules. *Also see chiral and stereoisomer.*

encroachment, *n* — [HYDROLOGY] *1*. any physical object placed in the FLOODPLAIN that hinders the passage of WATER or otherwise affects FLOOD flows, such as FILL, EXCAVATION, storage of equipment and materials, or buildings. *2*. the advance or

infringement of uses, plant growth, fill, excavation, buildings, permanent structures or development into a floodplain which may impede or alter the flow capacity of a floodplain.

endergonic reaction, *n* – [CHEMISTRY] a chemical reaction that requires energy to proceed. A chemical reaction is endergonic when the change in free energy is positive[62].

endocrine-disrupting chemicals, *n* – [TOXICOLOGY] an EXOGENOUS NATURAL or ANTHROPOGENIC agent that produces reversible or irreversible adverse effects at the level of the individual, population and/or community. Substances that stop the production or block the transmission of hormones in the body.

endogenetic, *n* – [GEOLOGY] those PROCESSES that are from within the earth[4].

endogenous influence, *n* – [DENDROLOGY] an ENVIRONMENTAL impact which is on a local scale. For example, the burial of a group of trees by sediment. *Also see exogenous influence*.

endoreic, *n* — [HYDROLOGY] a term used to describe areas with terminal LAKES and an interior drainage basin. Approximately 27 percent of the earth's total land surface is endoreic; only about 5 percent of the North American continent is endoreic.

endosulfan, *n* – [CHEMISTRY] an INSECTICIDE which controls aphids, bollworms and slugs on fruit trees, vegetables and numerous crops. *See insecticide and pesticide.*

endothermic, *adj* — [CHEMISTRY] pertaining to a REACTION that occurs with the ADSORPTION of HEAT[17]. *Also see exothermic.*

energy, *n* – [PHYSICS] an abstract PROPERTY associated with the capacity to do WORK[15]. *Also see force and work.*

enforcement, *n* – [ENVIRONMENTAL REGULATION] an ENVIRONMENTAL REGULATORY PROGRAM where the regulated community is compelled to obey particular environmental LAWS or REGULATIONS.

engineering, *n* – [SCIENCE] the application of SCIENCE and MATHEMATICS by which the PROPERTIES of MATTER and the sources of ENERGY in NATURE are made useful to people.

engineering controls, *n* – [REMEDIATION TECHNOLOGY] any PHYSICAL mechanism to contain or stabilize CONTAMINATION or ensure the effectiveness of a REMEDIAL ACTION. Engineering controls may include, without limitation, caps, covers, DIKES, TRENCHES, LEACHATE collection systems, signs, fences, physical access controls, GROUND-WATER MONITORING SYSTEMS and ground-water containment systems including, without limitation, SLURRY WALLS and ground-water pumping systems[18].

englacial, *n* — [GEOLOGY] located or occurring within a GLACIER.

ENGLISH Rule, *n* – [LAW] a ground-water doctrine that holds that property owners have the right of absolute ownership of the ground water beneath the land[33].

enhanced fluid recovery (EFR), *n* – [REMEDIATION TECHNOLOGY] the removal of fluid, either water or a separate-phase, from a well under a complete or semi-complete vacuum. This process is often conducted with a vacuum truck.

enhanced natural attenuation, *n* – [REMEDIATION TECHNOLOGY] interventions in NATURAL ATTENUATION which increases the rates of key biogeochemical reactions. Usually undertaken if MONITORED NATURAL ATTENUATION indicates that outcomes are not satisfactory from an environmental protection perspective[61]. *Also see attenuation, monitored natural attenuation and natural attenuation.*

enhanced oil recovery, *n* — [PETROLEUM TECHNOLOGY] techniques for the removal of the remaining thick, heavy oil from reservoirs after primary recovery and secondary recovery techniques have been used. Typically, steam is injected into the reservoir to reduce the viscosity and provide pressure to force the oil into collection wells.

Enlightenment, **The,** *n* – [PHILOSOPHY] an intellectual movement in modern Europe from the sixteenth until the eighteenth centuries that believed in the power of human REASON to understand the WORLD and to guide human conduct.

enrichment, *n* – [ISOTOPES] the accumulation of one ISOTOPE of an ELEMENT versus a second because of physical processes such as BIODEGRADATION, VOLATILIZATION, DISSOLUTION, or others.

enrichment factor, *n* – [ISOPTOPES] a variable (α) in an EQUATION to describe ISOTOPE FRACTIONATION that occurs in a closed culture where the product accumulates during the depletion of the SUBSTRATE and a positive enrichment factor indicates discrimination against the heavy isotope. *Also see isotope, isotope fractionation and Rayleigh Equation.*

enteric virus, *n*—[MICROBIOLOGY] any virus known to be excreted in quantity in feces; infectious hepatitis virus is such a virus[63].

enthalpy, *n* – [PHYSICS] the HEAT absorbed or released by a PROCESS running at constant PRESSURE. While changes in enthalpy can be measured using calorimetry, absolute values of enthalpy usually cannot be determined. Enthalpy is formally defined

as H = U + PV, where U is the internal energy, P is the pressure, and V is the VOLUME.

entity, *n* – [PHILOSOPHY] *1*. a thing with distinct existence, as opposed to a quality or relation. *2.* a thing's existence regarded distinctly; a thing's essential nature.

entrainment, *n* – [HYDROLOGY] the carrying of PARTICLES within a FLUID along its FLOW. *Also see flow and particle.*

entrapment zone, *n* — [HYDROLOGY] an area of an ESTUARY or other watercourse where seaward-flowing fresh water overlays more dense, saline ocean water resulting in a two-layer mixing zone characterized by FLOCCULATION, aggregation, and accumulation of suspended materials from upstream.

entrapped LNAPL, *n* **--** [HYDROGEOLOGY] residual LNAPL in the form of discontinuous blobs entrapped in the void space of a porous medium in the lower part of a smear zone resulting from the upward movement of water into a mobile LNAPL plume. *Also see light nonaqueous phase liquid (LNAPL) and residual saturation.*

entropy, *n* – [PHYSICS] *1*. a measure of ENERGY dispersal. Any spontaneous change disperses energy and increases entropy overall. For example, when water EVAPORATES, the internal energy of the water is dispersed with the WATER VAPOR produced, corresponding to an increase in entropy. *2*. the degree of disorder or physical randomness of the constituents of any physical system, expressed as the probability of occurrence of its particular arrangement of particles. *See chaos and chaos theory*.

environment, *n* – [BIOLOGY] *1*. ABIOTIC and BIOTIC factors that influence the life of an ORGANISM. *2*. abiotic and biotic factors that influence the function of some non-living NATURAL SYSTEM. *Also see nature.*

environmental and health impact statement, *n* – [ENVIRONMENTAL INVESTIGATION] a statement as to the realistically identifiable, probable impact of the proposed hazardous waste facility upon the geology, soils, hydrology, air quality, ecology, land use, socioeconomics, aesthetics, history and archeology; a listing of adverse environmental impacts which cannot be avoided; a description of the steps to be taken to minimize adverse environmental impacts during construction and operation both at the project site and in the surrounding region; and a reference list of pertinent published information relating to the project, the project site and the surrounding region.

environmental chemistry, *n* – [CHEMISTRY] the study of natural and MAN-MADE SUBSTANCES in the ENVIRONMENT, including the DETECTION, MONITORING, transport, and CHEMICAL TRANSFORMATION of chemical substances in AIR, WATER, and SOIL.

environmental forensics, *n – 1*. the use of EXPERTISE to settle ENVIRONMENTAL disputes[58]. *2*. the use of environmental expertise to settle disputes (note the difference between definitions 1 and 2). *3*. the systematic and scientific evaluation of physical, chemical and historical information for the purpose of developing defensible scientific and legal conclusions regarding the source or age of a contaminant release into the environment[59].

environmental hazard, *n* – [ENVIRONMENTAL INVESTIGATION] a source of danger which arises from the ENVIRONMENT. Examples of these are hurricanes, floods, droughts, earthquakes and volcanoes.

environmental impact statement (EIS), *n* – [ENVIRONMENTAL INVESTIGATION] a report required by Section 102(2)(c) of Public Law 91-190, National Environmental Policy Act (NEPA), for all major projects which significantly impact on the quality of the human environment or are environmentally controversial. The EIS is a detailed and formal evaluation of the favorable and adverse environmental and social impacts of a proposed project and its alternatives. A tool for decision making, the EIS describes the positive and negative effects of an undertaking and cites possible, less environmentally disruptive alternative actions. Also see Environmental Assessment (EA).

environmentalism, *n* – [ECOLOGY] concern with or advocacy of the protection of the ENVIRONMENT.

environmental audit, *n* – [ENVIRONMENTAL INVESTIGATION] the investigative process to determine if operations of an existing facility are in compliance with applicable environmental laws and regulations.

environmental lien, *n* — [LAW] a charge, security, or encumbrance upon title to a property to secure the payment of a cost, damage, debt, obligation, or duty arising out of response actions, cleanup, or other remediation of *hazardous substances* or *petroleum products* upon a property.

environmental professional, *n* – [ENVIRONMENTAL INVESTIGATION] person possessing the sufficient training and experience necessary to conduct environmental investigative work, and from the information gathered, have the ability to develop opinions and conclusions regarding recognized environmental conditions.

environmental science, *n* – [BIOLOGY] field of KNOWLEDGE that studies how humans and other species interact with one another and with the

nonliving ENVIRONMENT. It is both a physical and social SCIENCE that integrates KNOWLEDGE from a wide range of disciplines, including PHYSICS, CHEMISTRY, BIOLOGY, GEOLOGY, GEOGRAPHY, economics, political science, sociology, psychology, and PHILOSOPHY.

environmental site assessment, *n* – [ENVIRONMENTAL INVESTIGATION] the PROCESS by which a person or entity seeks to determine if a particular parcel of real property is subject to adverse ENVIRONMENTAL conditions or if environmental RELEASES have occurred in the past or are suspected.

enzyme, *n* – [CHEMISTRY] protein or protein-based MOLECULES that speed up CHEMICAL REACTIONS occurring in living things. Enzymes act as CATALYSTS for a single reaction, converting a specific set of reactants (called substrates) into specific products. Without enzymes, life as we know it would be impossible.

Eocene, *n* – [GEOLOGY] the EPOCH succeeding the PALEOCENE and preceding the OLIGOCENE. It extends from about 56.5 million years BP to about 35.4 million years BP[6].

eolian deposits—*See aeolian deposits.*

eon, *n* – [GEOLOGY] the largest division of geologic time consisting of several *eras*. *Also see geologic time scale.*

epeirogenesis, *n* -- [GEOLOGY] the regional uplift of extensive areas of the EARTH'S CRUST. *Also see tectonics.*

ephemeral, *adj* – [GEOLOGY] lasting a very short TIME. As in, an EPHEMERAL STREAM: a stream which runs only during wet periods[16].

epidemiology, *n* – [BIOLOGY] study of the distribution and causes of diseases and injuries in human populations.

epipedon, *n* – [AGRONOMY] literally: "above the soil"; the uppermost LAYER of SOIL.

epistomology, *n* – [PHILOSOPHY] the philosophical theory of KNOWLEDGE.

epoch, *n* – [GEOLOGY] a subdivision of a geologic period. *Also see geologic time scale.*

epoxidation, *n* – [CHEMISTRY] a reaction wherein an oxygen molecule is inserted in a carbon-carbon double bond and an epoxide is formed[62].

equation, *n* – [MATHEMATICS] a statement that two mathematical expressions are equal, indicated by the sign "=". *Also see formula*.

equation of state, *n* – [CHEMISTRY] EQUATION for the relationship between PRESSURE, TEMPERATURE, and DENSITY. The simplest and best-known equation of state is the ideal-gas equation.

$$PV = RT$$

where P is pressure, V is volume, R is the ideal gas constant and T is temperature.

Equator, *n* – [GEOGRAPHY] location on the EARTH that has a LATITUDE of 0°. *Also see latitude, Tropic of Cancer and Tropic of Capricorn.*

equilibrium, *n* – [PHYSICS] where FORCE and REACTION are balanced and the PROPERTIES of the SYSTEM remain unchanged over TIME. *Also see dynamic equilibrium.*

equilibrium constant, *n* – [CHEMISTRY] the product of the CONCENTRATIONS of the products, divided by the product of the concentrations of the REACTANTS, for a chemical reaction at EQUILIBRIUM. For example, the equilibrium constant for A + B = C + D is equal to [C][D] / ([A][B]), where the square brackets indicate equilibrium concentrations. Each concentration is raised to a power equal to its stoichiometric coefficient in the expression. The equilibrium constant for A + 2B = 3C is equal to $[C]^3/([A][B]^2)$. For GASEOUS PHASE REACTIONS, PARTIAL PRESSURES can be used in the equilibrium constant expression in place of concentrations.

equinox, *n* – [GEOGRAPHY] *1*. having a day and night of equal length. *2*. either of the two points on the celestial sphere where the celestial equator intersects the ecliptic. *3*. either of the two times each year (as about March 21 and September 23) when the sun crosses the equator and day and night are everywhere of equal length. *Known as vernal and autumnal equinoxes. Also see solstice.*

equipment blank, *n* – [CHEMISTRY] a chemically pure SOLVENT, typically reagent grade water, which is passed through field sampling equipment that is in contact with the sample during collection. The equipment blank is returned to the laboratory for analysis to determine the effectiveness of the equipment decontamination procedures. *Also see field blank.*

equipotential line, *n* — [HYDROGEOLOGY] a line connecting points of equal HYDRAULIC HEAD. A set of such lines provides a CONTOUR map of a POTENTIOMETRIC SURFACE. Based on this information, the GROUND-WATER FLOW DIRECTION can be estimated[33].

equipotential surface, *n* – [HYDROGEOLOGY] a surface in a three-dimensional ground-water flow field such that the total HYDRAULIC HEAD is the same everywhere on the surface[33].

equivalent weight, *n* – [CHEMISTRY] the MOLECULAR WEIGHT divided by the VALENCE[33].

era, *n* – [GEOLOGY] a division of geologic time that is less than an EON and consists of several PERIODS. *Also see geologic time scale.*

erg, *n* – [GEOGRAPHY] an arid, sandy DESERT.

ERNS list — [ENVIRONMENTAL REGULATION] EPA's Emergency Response Notification System list of reported CERCLA hazardous substance releases or spills in quantities equal to or greater than the Response Center. Notification requirements for such releases reportable quantity, as maintained by the National or spills are codified in 40 CFR Parts 302 and 355.

erosion, *n* – [GEOLOGY] the PROCESS by which PARTICLES of ROCK and SOIL are loosened, as by WEATHERING, and then transported elsewhere, as by WIND, WATER, ICE, or GRAVITY. There is both mechanical erosion and CHEMICAL erosion. Erosion is the backbone of all SURFICIAL, GEOLOGIC PROCESSES. *Also see resistant and weathering.*

erratic, *n* -- [GEOLOGY] a BOULDER, or other geologic material, carried by GLACIAL ICE far from its place of origin.

error, *n* — [STATISTICS] the amount of INACCURACY in a calculation or a MEASURING device. The RANDOM or systematic DEVIATION of the observed sample VALUE from its true value. *Also see accuracy, bias, precision and sampling error.*

escarpment, *n* – [GEOLOGY] a steep slope or long CLIFF that results from EROSION or faulting and separates two relatively level areas of differing elevations; the topographic expression of a fault. *Also see cliff.*

esker, *n* – [GEOLOGY] a sinuously curving, narrow DEPOSIT of COARSE-GRAINED GRAVEL that forms along a melt-water STREAM CHANNEL, developing in a tunnel within or beneath the GLACIER. The ice-contact margins of the esker are often slumped and mixed with TILL. *Also see drumlin and kame.*

ester, *n* – [CHEMISTRY] ORGANIC compounds formed by the reaction between an ALCOHOL and an organic acid, with the elimination of water. Unlike salts, esters are covalent compounds.

estevelle, *n* – [HYDROGEOLOGY] a type of depression SPRING which discharges ground water when the WATER TABLE is high, but can also drain water back when the water table is low[61].

estimate, *n* – [SCIENTIFIC METHOD] *1.* an approximate JUDGMENT, especially of cost, VALUE, size, etc. *2.* OPINION, judgment or estimation. *Also see conclusion and opinion.*

estuary, *n* – [HYDROLOGY] region of interaction between RIVERS and near-shore OCEAN waters, where TIDAL action and RIVER flow mix fresh and SALT WATER. Such areas include BAYS, MOUTHS of rivers, salt MARSHES, and LAGOONS. These BRACKISH WATER ECOSYSTEMS shelter and feed marine life, birds, and wildlife. *Also see subterranean estuary*.

ethane, *n* – [CHEMISTRY] a normally gaseous straight-chain HYDROCARBON (C_2H_6) or *n*-alkane. It is a colorless PARAFFINIC GAS that BOILS at a TEMPERATURE of -127.48 degrees Fahrenheit. It is extracted from NATURAL GAS and REFINERY gas streams.

étang, *n* – [GEOGRAPHY] *from French*, a small, shallow LAKE of BRACKISH WATER, located among coastal DUNES or behind old BEACH ridges[6].

ethanol, *n* – [CHEMISTRY] an alternative automotive FUEL (CH_3CH_2OH) derived from grain and corn; usually blended with GASOLINE to form gasohol.

> DISCUSSION – In Brazil, both gasoline and alcohol are sold at service stations and a significant number of vehicles have been modified to run completely on alcohol. Brazilian gasoline contains up to 24% ethanol.

Also see alternative fuel and methanol.

ether, *n* – [CHEMISTRY] any class of ORGANIC COMPOUND having an OXYGEN ATOM attached to two ALKYL groups, for example diethyl ether ($C_2H_5OC_2H_5$). *Also see ethyl-tert-butyl ether (ETBE), methyl-tert-butyl ether (MTBE) and tert-amyl methyl ether (TAME).*

etherification, *n* – [CHEMISTRY] high-octane OXYGENATES called ETHERS may be produced at the REFINERY by reacting suitable ALCOHOLS such as METHANOL and ETHANOL with branched OLEFINS from the fluid catalytic cracking (FCC), such as isobutene and isopentene, under the influence of acid catalysts.

> DISCUSSION – In the mid-1990s MTBE, made by etherification of *iso*-butene with methanol, became the predominant oxygenate used to meet EPA reformulation requirements for adding oxygen to mitigate emissions from gasoline-powered vehicles. By 2002, some 38 etherification plants were in place at refineries in the U.S. By this time, many gasolines in the US contained 15% MTBE. Because of the adverse impact of MTBE on ground-water supplies, as of 2010 usage of MTBE has lessened significantly. Use of MTBE in some states has been banned.

ethics, *n* – [PHILOSOPHY] MORAL PHILOSOPHY or moral PRINCIPLES[15]. *Also see moral and philosophy*

ethylbenzene, *n* – [CHEMISTRY] a colorless, FLAMMABLE LIQUID, C_8H_{10}, derived from the refining of CRUDE OIL, used as a SOLVENT and is a COMPONENT of many FUELS such as GASOLINE or DIESEL FUEL. *Also see benzene, toluene and xylenes.*

ethylene, *n* – [CHEMISTRY] an OLEFINIC HYDROCARBON (C_2H_4) recovered from REFINERY PROCESSES or petrochemical processes. Ethylene is used as a petrochemical feedstock for numerous CHEMICAL applications and the production of consumer goods. *Also see olefin.*

ethylenediaminetetraacetic acid (EDTA), *n* – [CHEMISTRY] otherwise known as edetate, versene, or diaminoethanetetraacetic acid disodium salt. EDTA or its disodium salt is a chelating agent, forming coordination compounds with most divalent (or trivalent) METAL ions, such as CALCIUM (Ca^{2+}) and MAGNESIUM (Mg^{2+}) or COPPER (Cu^{2+}). It is also a hydrophilic compound and its recommended storage is in a dry area with a desiccator. EDTA is a common preservative and often found as an artifact in environmental samples.

ethylene dibromide (EDB), *n* – [CHEMISTRY] *1.* a CHEMICAL used as an AGRICULTURAL fumigant ($BrCH_2CH_2Br$) and in certain INDUSTRIAL processes. Extremely TOXIC and found to be a CARCINOGEN in LABORATORY animals, EDB has been banned for most agricultural uses in the United States. Used as an LEAD SCAVENGER in GASOLINE in conjunction with ETHYLENE DICHLORIDE (EDC). *Also known as 1,2-dibromoethane. Also see ethylene dichloride and lead scavenger*.

ethylene dichloride (EDC), *n* – [CHEMISTRY] a CHEMICAL used as a LEAD SCAVENGER in GASOLINE, first introduced in the 1920s and continuing through the use of LEADED GASOLINE in the mid- to late-1980s. Can often be used as evidence that a release of leaded gasoline had taken place. *Also known as 1,2-dichloroethane. Also see ethylene dibromide and lead scavenger.*

ethyl group, *n* – [CHEMISTRY] a MONOVALENT RADICAL (C_2H_5) derived from *ethane* by the removal of a HYDROGEN ATOM. *Also see methyl group and radical.*

ethyl-*tert*-butyl ether (ETBE), *n* – [PETROLEUM CHEMISTRY] an OXYGENATE additive used in GASOLINE since the early 1990s formed by the catalytic etherification of *iso*-butylene with ethanol. *Also see methyl-tert-butyl ether (MTBE).*

euphotic, *adj* — [BIOLOGY] of, relating to, or being the uppermost layer of a body of water that receives sufficient LIGHT for PHOTOSYNTHESIS and the growth of green plants.

eukaryote, *n* – [BIOLOGY] an ORGANISM whose cells contain complex structures enclosed within membranes. The defining membrane-bound structure that sets eukaryotic cells apart from prokaryotic cells is the nucleus, or nuclear envelope, within which the genetic material is carried. *Also see microbe, microorganism and prokaryote.*

eustasy, *n* – [HYDROLOGY] a worldwide change of sea level, which may be caused by the growth and decay of ice sheets. *Also see isostasy.*

eutrophication, *n* – [HYDROLOGY] the slow aging PROCESS during which a LAKE, ESTUARY, or BAY evolves into a BOG or MARSH and eventually disappears. During the later stages of eutrophication the WATER body is choked by abundant plant life due to higher levels of nutritive COMPOUNDS such as NITROGEN and phosphorus. Human activities can accelerate the process.

euxinic, *n* – [GEOLOGY] an ANOXIC restricted DEPOSITIONAL ENVIRONMENT, a barred basin such as the Black Sea.

evaluation, *n* – [SCIENTIFIC METHOD] to determine the significance, worth, or condition of usually by careful appraisal and study. *Also see assessment and investigation.*

evaporation, *n* – [PHYSICS] the change of STATE of a LIQUID into a VAPOR at a TEMPERATURE below the BOILING POINT of the liquid. *Also see evaporite and volatilization.*

evaporite, *n* – [GEOLOGY] a natural SALT or MINERAL DEPOSIT formed by EVAPORATION of WATER, such as GYPSUM. *Also see evaporation and chemical sediment.*

evapotranspiration, *n* – [HYDROLOGY] the loss of WATER from a LAND area through the TRANSPIRATION of plants and EVAPORATION from the SOIL. *Also see transpiration.*

event, *n* – [LOGIC] a thing that happens or takes place, especially one of importance.

everglade, *n* – [GEOGRAPHY] a tract of marshland, usually under water and covered in places with tall grass. Usually used in the plural.

evidence, *n* – [LAW] any species of PROOF, or probative matter, legally presented at the TRIAL of an ISSUE, by the act of the parties and through the medium of WITNESSES, RECORDS, DOCUMENTS, exhibits, concrete objects, etc. for the purpose of inducing BELIEF in the minds of the COURT or JURY as to their contention. *Also see proof.*

evolution, *n* – [BIOLOGY] a process by which species come to possess genetic adaptations to their environment. Its mechanism is natural selection. It also requires genetic mutations.

evorsion, *n* – [GEOLOGY] the EROSION of ROCK or SEDIMENTS in a RIVER or STREAM BED[54].

excavation, *n* – [GEOLOGY] a CAVITY formed by cutting, digging, or scooping. *Also see cavity.*

exclusion, *n* – [INSURANCE] a provision in an insurance policy that eliminates coverage for certain risks, people, property classes, or locations.

exceedance, *n* – [ENVIRONMENTAL REGULATION] a VIOLATION of the POLLUTANT CONCENTRATIONS permitted by ENVIRONMENTAL protection standards.

excitation, *n* – [CHEMISTRY] the PROCESS in which an ATOM or MOLECULE gains ENERGY from ELECTROMAGNETIC RADIATION or by collision, raising it to an excited state.

exclusion zone, *n* – [ENVIRONMENTAL INVESTIGATION] designated zone of a HAZARDOUS WASTE SITE where CONTAMINATION is known to or may occur and can only be entered with appropriate personnel protection. *Also known as the contaminant exclusion zone.*

exogenetic, *adj* – [GEOLOGY] those processes which occur at, or near the EARTH's surface.

exogenous influence, *n* – [GEOLOGY] an ENVIRONMENTAL IMPACT which is on a regional scale. For example, the impact of climate on a stand of trees. *Also see endogenous influence.*

exoreic, *adj* – [HYDROLOGY] DRAINAGE that flows to the sea.

exosphere, *n* – [GEOLOGY] the outermost layer of the Earth's atmosphere, starting about 400 kilometers above the Earth's surface[64]. *Also see atmosphere, stratosphere and trophosphere.*

exothermic, *adj* — [PHYSICS] pertaining to a REACTION that occurs with the evolution of HEAT. *Also see endothermic*.

exotic river, *n* – [HYDROLOGY] a RIVER which maintains its course through an area which has insufficient rainfall to support the CHANNEL FLOW.

expansion, *n* – [PHYSICS] the act or an instance of increasing in size or importance.

expansive clays, *n* – [AGRONOMY] CLAY SOILS that experience significant volume expansion in the presence of water and shrink upon drying. Clays including the montmorillonite mineral are especially noted for their volume-change characteristics. *Also see clay.*

experience, *n* – [SCIENTIFIC METHOD] *1*. direct observation of or participation in events as a basis of KNOWLEDGE. *2*. the fact or state of having been affected by or gained knowledge through direct observation or participation. *3*. practical knowledge, skill, or practice derived from direct observation of or participation in events or in a particular activity.

experiment, *n* – [SCIENTIFIC METHOD] direct OBSERVATION under controlled conditions. Most experiments involve carefully changing one VARIABLE and observing the effect on another variable (for example, changing TEMPERATURE of a WATER SAMPLE and recording the change VOLUME that RESULTS).

expert, *n* – [LAW] one who is KNOWLEDGEABLE in a specialized FIELD, that knowledge being obtained from either education or experience. In litigation, also known as an EXPERT WITNESS.

expert witness, *n* – [LAW] a person who testifies at a TRIAL because he or she has special KNOWLEDGE in a particular FIELD. This entitles them to testify about their OPINION on the meaning of FACTS. Non-expert witnesses are only permitted to TESTIFY about facts they observed and not their opinions about these facts.

exponent, *n* – [MATHEMATICS] a symbol written above and to the right of a MATHEMATICAL EXPRESSION to indicate the operation of raising to a power.

explosivity meter, *n* – [ENVIRONMENTAL INVESTIGATION] an instrument that detects gas vapor in air and indicates whether or not the test atmosphere contains a flammable concentration. *Also known as a combustible gas indicator.*

exposure, *n* – [TOXICOLOGY] MAGNITUDE that a SUBSTANCE is made available in the vicinity of a portal of entry to the body such as lungs, mouth or skin that may be available for ABSORPTION.

exposure, *n* – [INSURANCE] the possibility of loss.

exposure level, *n* – [TOXICOLOGY] the condition, MAGNITUDE or CONCENTRATION of a PHYSICAL or CHEMICAL HAZARD to which a person is or was in contact with.

exposure limit, *n* – [TOXICOLOGY] CONCENTRATION of SUBSTANCES (and conditions) under which it is believed that nearly all workers may be repeatedly in contact with day after day without adverse effects.

exposure pathway, *n* – [TOXICOLOGY] the course a CHEMICAL(S) of concern takes from source area(s) to an exposed ORGANISM. An exposure pathway describes a unique mechanism by which an individual or population is exposed to a chemical of concern.

ex-situ, *adj* – [GEOLOGY] moved from its original location, excavated, removed or recovered from the subsurface. *Also see in-situ*.

extinct volcano, *n* – [GEOLOGY] a VOLCANO that is no longer liable to erupt. *Also see eruption and volcano.*

extractable organic halides (EOX), *n* – [CHEMISTRY] ORGANIC COMPOUNDS that contain HALOGEN ATOMS such as chlorine. These organic compounds are semivolatile and extractable by ethyl acetate from air-dried streambed sediment. The ethyl acetate extract is

combusted, and the concentration is determined by microcoulometric determination of the halides formed. The concentration is reported as micrograms of chlorine per gram of the dry weight of the streambed sediment[47].

extraction, *n* – [PHYSICS] the act or PROCESS of removing or taking out especially by effort or force.

extrapolation, *n* – [STATISTICS] the act or PROCESS of predicting a response or making an estimate of (something unknown and outside of the range of the existing data) on the basis of available data. *Also see statistics.*

extrusive rock, *n* – [GEOLOGY] an IGNEOUS rock formed from LAVA that has flowed out onto the Earth's SURFACE, characterized by rapid solidification and grains that are so small as to be barely visible to the naked eye. *Also see igneous rock, intrusive rock and lava.*

eyot, *n* – [GEOGRAPHY] an old name for a small ISLAND. *Also known as ait.*

Ff

fabric, *n* — [GEOLOGY] the spatial configuration of all TEXTURAL and STRUCTURAL features as manifested by every recognizable material unit from CRYSTAL LATTICES to large scale features requiring field studies[6].

fabrication, *n* – [SCIENTIFIC METHOD] making up or falsifying DATA, EXPERIMENTS or other significant information in proposing, conducting or reporting research.

facies, *n* – [GEOLOGY] assemblage of MINERAL, ROCK, or FOSSIL features reflecting the ENVIRONMENT in which a ROCK was formed[6].

facility, *n* – [ENVIRONMENTAL REGULATION] all contiguous land, structures and other appurtenances and improvements on the land used for treating, storing or disposing of hazardous substances and/or hazardous wastes. A facility may consist of several treatment, storage or disposal operation units (such as one or more landfills, surface impoundments, or combinations of them).

fact, *n* – [LOGIC] *1*. the quality of being actual. *2*. something that has actual existence or occurrence. *3*. a piece of information presented as having objective reality[15]. *Also see truth.*

factor, *n* – [LOGIC] anything that entirely, or partly, influences an outcome[15].

factual witness–*See witness*.

facultative, *adj* -- [BIOLOGY] a life form or process that can proceed in either the presence or absence of oxygen (air).

Fahrenheit (^oF), *n* – [PHYSICS] measure of TEMPERATURE where $^oF = 9/5(^oC) + 32$. *Also see Celsius and temperature.*

failure, *n* – [GEOLOGY] a fracturing or giving way under stress.

failure, *n* – [LAW] omission of occurrence or performance; specifically, a failing to perform a duty or expected action.

failure, *n* – [LOGIC] lack of success.

fajãs, *n* – [GEOLOGY] *from Portuguese*, LITTORAL platforms formed by the accumulation of SLOPE DEPOSITS or by LAVA DELTAS[4].

falesia, *n* – [GEOMORPHOLOGY] a vertical rock sheer on the sea.

fall, *n* – [HYDROLOGY] a WATERFALL or other precipitous descent of water. The plural "falls" is commonly used[16].

fallacy, *n* – [LOGIC] a MISTAKE in REASONING[15]; an ARGUMENT that fails to provide adequate logical support for the TRUTH of its CONCLUSION, yet appears convincing or persuasive in some other way. Common examples include both formal fallacies (structural errors in deductive logic) and informal fallacies (efforts to persuade by non-rational appeals).

falling-head test, *n* – [HYDROGEOLOGY] a means of measuring the PERMEABILITY of a sample of AQUIFER material in the LABORATORY, by recording the decline in head over time as water moves through a cylinder containing the sample. The technique is best suited for low permeability materials ($K<0.1$ m/day)[61]. *Also see constant-head test.*

falling tide, *n* – [HYDROLOGY] that part of the TIDAL CYCLE between high water and the following low water, characterized by seaward or receding movement of water. Also, an outgoing tidal river[16].

fall line, *n* – [GEOLOGY] the BOUNDARY between the ancient, RESISTANT CRYSTALLINE ROCKS of the Piedmont Plateau and the younger, softer SEDIMENTS of the Atlantic Coastal Plain in the Eastern United States[6].

fall overturn, *n* – [HYDROLOGY] a PHYSICAL PHENOMENON that may take place in a body of water during early autumn. The sequence of events leading to fall overturn include: *1*. cooling of surface waters; *2*. a density increase in surface waters which produces an unstable DENSITY inversion in the water column, and *3*. convective mixing of the surface and deep waters often aided by wind action. The overturn mixes and homogenizes the physical and chemical properties of the entire water mass.

false negative, *n* – [STATISTICS] term used to describe an event, such as CONTAMINATION, that has occurred, but was not detected. *Also see false positive.*

false positive, *n* – [STATISTICS] term used to describe an event, such as CONTAMINATION, that did not occur, but was detected. *Also see false negative.*

false rings, *n* – [DENDROLOGY] additional, apparently complete growth zones with well-marked boundaries within a tree, formed with one growing season[12].

false stream, *n* – [HYDROLOGY] an accumulation of water in a HOLLOW along the side of a FLOOD PLAIN that slopes away from the main STREAM toward the side of the VALLEY[16].

fan, *n* – [GEOLOGY] a fan-shaped SEDIMENTARY DEPOSIT that forms where rapidly flowing water enters a relatively open, flat area. As water slows down, it deposits SEDIMENT and gradually builds a fan[4]. *Also see alluvial fan.*

fanglomerate, *n* – [GEOLOGY] HETEROGENEOUS materials that were originally deposited in an ALLUVIAL FAN but since deposition have been

cemented into solid rock[6]. *Also see alluvial fan and conglomerate.*

fanlette, *n* — [GEOLOGY] a very small, normally undissected ALLUVIAL FAN, something less than a few tenths of a square mile in area that may occur below a GULLY, inset fan, or RAVINE in a variety of positions on the piedmont slope or within mountain valleys[4].

fan bay, *n* – [GEOLOGY] the head of an ALLUVIAL FAN that extends a considerable distance into a mountain CANYON[4].

fan skirt, *n* — [GEOLOGY] a major LANDFORM comprised of laterally coalescing, small ALLUVIAL FANS that issue from GULLIES cut into, or are extensions of inset fans of the fan piedmont and that merge along their toeslopes with the basin floor. Fan skirts are smooth or only slightly dissected and ordinarily do not comprise component landforms.

farm, *n* – [GEOGRAPHY] *1*. a tract of land devoted to AGRICULTURAL purposes. *2*. a plot of land devoted to the raising of animals and especially domestic livestock.

farm pond, *n* – [HYDROLOGY] a small body of water retained behind a DAM or held in a hole dug in the ground; of lesser area than a LAKE. The water often contains elevated concentrations of farm-derived CONTAMINANTS such as NITRATES or PESTICIDES among many others.

faro, *n* – [GEOLOGY] a minor elongated REEF enclosing a LAGOON at the edge of an ATOLL or BARRIER REEF[6].

fate and transport, *n* – [HYDROGEOLOGY] CHEMICAL changes and REACTIONS that change the chemical NATURE of the CONTAMINANT, effectively removing the contaminant from the subsurface HYDROLOGIC system.

fathom, *n* – [HYDROLOGY] a unit of measurement used in BATHYMETRY, equal to 6 feet or 1.83 meters[16].

fatty acid, *n* – [CHEMISTRY] an ALIPHATIC ACID (C_nH_{2n}+COOCH), either saturated or unsaturated, whose MOLECULE consists of an alkyl chain containing from 1 to over 30 CARBON ATOMS, terminating in a CARBOXYL GROUP (COOH)[34].

fault, *n* — [GEOLOGY] a FRACTURE or fracture zone along which there has been displacement of the two sides relative to one another parallel to the fracture (this displacement may be a few centimeters or many kilometers)[4]. *Also see also joint fault set, joint fault system, normal fault, strike-slip fault and thrust fault.*

fault breccia, *n* — [GEOLOGY] the assemblage of broken ROCK FRAGMENTS frequently found along FAULTS. The fragments may vary in size from inches to feet[6]. *Also see breccia.*

fault gouge, *n* — [GEOLOGY] a CLAY-like material occurring between the walls of a FAULT as a result of the movement along the fault surfaces[4].

fault scarp, *n* – [GEOLOGY] a CLIFF formed directly by the DISPLACEMENT of a recent FAULT, but usually on a small scale (<10 m in height)[6].

fault spring, *n* – [GEOLOGY] a SPRING created by the movement of two rock units on a FAULT[33].

fauna, *n* – [BIOLOGY] the animal life in a region[6]. *Also see flora.*

feasibility study (FS), *n* – [ENVIRONMENTAL INVESTIGATION] *1*. ANALYSIS of the practicability of a proposal; such as a description and analysis of potential CLEANUP alternatives for a site such as one on the National Priorities List. The feasibility study usually recommends selection of a cost-effective alternative. It usually starts as soon as the REMEDIAL INVESTIGATION is underway; together, they are commonly referred to as the RI/FS. *2*. A small-scale investigation of a problem to ascertain whether a proposed RESEARCH approach is likely to provide useful DATA.

fecal coliform, *n* – [BIOLOGY] BACTERIA found in the intestinal tracts of mammals. Their presence in WATER or SLUDGE is an indicator of POLLUTION and possible CONTAMINATION by PATHOGENS[16]. *Also see bacteria and pathogen.*

fecal streptococcus, *n* -- [BIOLOGY] a group of BACTERIA normally present in large numbers in the intestinal tracts of warm-blooded animals other than humans. By assessing the ratio of coliforms to streptococci in a water sample, a rough estimate can be made of the relative contribution of fecal contamination from human versus animal sources.

Federal Register (FR) — [ENVIRONMENTAL REGULATION] publication of the United States government published daily (except for Federal holidays and weekends) containing all proposed and final regulations and some other activities of the Federal government. When regulations become final, they are included in the Code of Federal Regulations (CFR) as well as published in the Federal Register.

feedlot, *n* – [AGRONOMY] a confined area for the controlled feeding of animals. Tends to CONCENTRATE large amounts of animal WASTE that cannot be absorbed by the SOIL and, hence, may be carried to nearby STREAMS or LAKES by rainfall RUNOFF.

feedlot runoff, *n* – [PHYSICS] DRAINAGE from a large area of small pens in which beef cattle are fattened for slaughter. Food, mainly grains, is brought to the animals. The concentration of large quantities of

sewage from feedlots causy heavy contamination of waste streams[16].

feet, *n* -- [PHYSICS] MEASURE of length in the English System equal to 12 inches or 0.304 meter. *Also see inch, kilometer, meter and mile.*

feldspar, *n* – [MINERALOGY] SILICATE MINERALS composed of silicon-oxygen and aluminum-oxygen tetrahedral linked together in three-dimensional networks with positive IONS fitted into INTERSTICES of a negatively CHARGED network of a tetrahedral. Classed as aluminosilicates. When the positive ion is K, the mineral is orthoclase. When Na, the mineral is albite, when Ca, the mineral is anorthite[4]. *Also see plagioclase.*

fell, *n* == [GEOGRAPHY] a word used to refer to MOUNTAINS, or certain types of mountainous landscape, in Scandinavia, the Isle of Man, and parts of England.

fellfield, *n* -- [GEOGRAPHY] an environment along a slope, usually within an alpine or tundra setting, where the frost dynamics (repetitive freeze and thaw cycles) and of wind allow characteristic plant forms to occur in scree interstices.

felony, *n* – [LAW] one of several grave crimes, such as murder, rape, or burglary, punishable by a more stringent sentence than that given for a misdemeanor; an offense punishable by a maximum term of imprisonment of more than one year[19].

felsenmeer, *n* – [GEOLOGY] *from Dutch*, a surface of broken fragments resulting from the frost shattering exposed bedrock and found in PERIGLACIAL ENVIRONMENTS[6].

felsic, *adj* – [GEOLOGY] a mnemonic adjective derived from (fe) for FELDSPAR, and (s) for SILICA, and applied to light-colored ROCKS containing an abundance of one or all of these CONSTITUENTS[4]. *Also see mafic and ultramafic.*

fen, *n* – [HYDROLOGY] a type of WETLAND that accumulates *peat* deposits. Fens are less acidic than BOGS, deriving most of their WATER from GROUND WATER rich in calcium and magnesium[6]. *Also see bog, marsh, swamp and wetland.*

Fenton's Reagent, *n* – [CHEMISTRY] a mixture of H_2O_2 and Fe^{2+} often used to perform an oxidative PROCESS removing ORGANIC CHEMICALS from impacted GROUND WATER.

feral relief, *n* – [GEOLOGY] a term given to a TERRAIN in which VALLEY sides are deeply dissected by insequent drainage related to rapid runoff[6].

fermentation, *n* – [CHEMISTRY] *1*. a class of BIOCHEMICAL REACTIONS that break down complex ORGANIC MOLECULES (such as carbohydrates) into simpler materials (such as ETHANOL, CARBON DIOXIDE, and WATER). Fermentation reactions are catalyzed by enzymes[17]. *2*. microbial metabolism in which a particular compound is used both as an electron donor and an electron acceptor resulting in the production of oxidized and reduced daughter products[62].

fermion, *n* – [PHYSICS] particles which obey Fermi–Dirac statistics; they are named after Enrico Fermi and Paul Dirac. In contrast to BOSONS, which have Bose–Einstein statistics, only one fermion can occupy a quantum state at a given time.

ferralitic soils, *n* – [AGRONOMY] characteristic of the tropical rain forest where the HUMUS is poor due to rapid destruction of organic residue.

ferric iron, *n* – [CHEMISTRY] trivalent iron (Fe^{+3}). *Also see ferrous iron.*

ferricrete, *n* – [AGRONOMY] a SOIL HORIZON, at or near the land surface, made up of the CEMENTATION or iron oxides[16].

ferruginous *adj* – [MINERALOGY] of or containing iron[4].

ferruginous soil, *n* – [AGRONOMY] SOILS found in regions which experience marked wet and dry seasons. These soils develop to a great depth due to the intensity of tropical WEATHERING[20].

ferrocene, *n* – [PETROLEUM CHEMISTRY] an ANTIKNOCK COMPOUND ($Fe(C_5H_5)_2$), in general no longer in use, but has been around for nearly 50 years. It has not been widely marketed as an antiknock, although it has seen limited use in Europe. When COMBUSTED, it forms ferric oxides (also known as jeweler's rouge), a fine abrasive. Early studies of ferrocene showed excessive piston ring, cylinder bore, and camshaft engine wear at the concentrations investigated. Recent studies by the auto industry at lower iron concentrations have shown premature spark plug failures at the current recommended concentration of 30 milligrams per liter (9 mg/l Fe). Concern also has been expressed that the ferric oxide will act as a physical barrier on oxygen sensors and exhaust catalyst surfaces and possibly cause catalyst plugging in modern vehicles. In the U.S., ferrocene cannot be used in reformulated gasoline because of a ban on the use of heavy metals. Further, it cannot be used in conventional gasoline without first obtaining a waiver from EPA, which requires extensive vehicle emission testing[37].

ferrous iron, *n* – [CHEMISTRY] divalent iron (Fe^{+2}). *Also see ferrous iron.*

fertilizer, *n* – [AGRONOMY] a CHEMICAL, MAN-MADE or NATURAL, added to SOIL to make it more fertile. Often

contains high CONCENTRATIONS of NITROGEN and PHOSPHOROUS which, if applied heavily, can adversely impact GROUND WATER and SURFACE WATER.

fiard, *n* – [GEOLOGY] a sea INLET with low banks on either side[6].

fiber, *n* — [BIOLOGY] a fragment or piece of plant tissue that retains a recognizable cellular structure and is large enough to be retained after wet sieving on a 100-mesh sieve (openings 0.15 mm).

fiber, *n* – [MINERALOGY] elongate crystalline structure ranging in length from a few millimeters to several feet and in diameter from one micron to 0.05 inch.

Fiberglas, Fiberglass, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] glass in fibrous form; material made from or containing this. Plastic reinforced by glass fibers making it a strong, lightweight, STRUCTURAL material. Underground storage tanks, especially for the storage of gasoline, are often constructed of fiberglas.

fibric soil, *n* – [AGRONOMY] a SOIL in which ORGANIC FIBERS comprise two thirds of the mass.

Fickian diffusion, *n* – [CHEMISTRY] the spreading of solutes from regions of highest to regions of lower concentrations caused by the CONCENTRATION GRADIENT. In slow moving ground water, this is the dominant mixing process.

Fick's First Law, *n* – [CHEMISTRY] an EQUATION describing the rate at which GAS transfers into SOLUTION. The change in CONCENTRATION of gas in solution is proportional to the product of an overall transfer coefficient and concentration GRADIENT where,

$$F = -D(dC/dx)$$

and F is the mass flux or the mass of solute per unit area per time ($ML^{-2}T^{-1}$), D is the diffusion coefficient (L^2T^{-1}) and dC/dx is the concentration gradient which is negative in the direction of diffusion.

field, *n* – [GEOGRAPHY] an area of open land, especially one used for pasture or crops, often bounded by hedges or fences. *Also see meadow and pasture.*

field, *n* – [SCIENCE] an area of operation or activity; a subject of study.

field, in the, *phrase* – out of the office performing physical investigative work.

field analytical methods, *n* – [ENVIRONMENTAL INVESTIGATION] methods or techniques that measure physical properties or chemical presence in soil, soil vapor, and ground water immediately or within a relatively short period of time to be used during a site characterization. Measurement capabilities range from qualitative (positive/negative) response to below parts per billion (sub-ppb) quantitation. Accuracy and precision of data from these methods depends on the method detection limits and QA/QC procedures.

field blank, *n* – [ENVIRONMENTAL INVESTIGATION] a laboratory-prepared SAMPLE of REAGENT-grade water or pure SOLVENT which is transported to the sampling site for use in QUALITY ASSURANCE/QUALITY CONTROL evaluation of field sampling procedures[33]. *Also see equipment blank, method blank and trip blank. Also known as rinse blank.*

field capacity, *n* – [AGRONOMY] amount of WATER held in a SOIL after GRAVITATIONAL WATER has drained away[33]. *Also see residual saturation and specific retention.*

field geology, *n* – [GEOLOGY] GEOLOGY as practiced by direct observation in the FIELD; original, primary reconnaissance; field work.

field work, *n* – [ENVIRONMENTAL INVESTIGATION] work done, OBSERVATIONS taken, or other operations, as triangulation, leveling, making GEOLOGICAL observations, etc., in the FIELD or upon the GROUND.

filamentous green algae, *n* – [BIOLOGY] algal form that in severe bloom conditions creates long strings or floating mats.

file, *v* – [LAW] to place a paper in the official custody of the clerk of court to enter into the files or records of a case.

fill, *n* — [GEOLOGY] man-made DEPOSITS of NATURAL SOILS or ROCK products and WASTE materials[16]. *Also see backfill.*

fill cap, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] the cap, often lockable, which covers the top of the FILL PIPE.

fill pipe, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] the pipe through which the TANK is filled, generally extending to within 6 inches (0.15 meter) of the tank bottom.

film, *n* – [PHYSICS] a thin coating or covering LAYER[15], especially, a layer of PETROLEUM on a WATER SURFACE. A film may be discontinuous. *Also see free product and sheen.*

film water, *n* – [AGRONOMY] a layer of water surrounding SOIL PARTICLES, varying in thickness between 1 to 100 molecule layers and not available for plant growth[6].

filter, *n* – [CHEMISTRY] a POROUS device for removing IMPURITIES or SOLID PARTICLES from a LIQUID or GAS passed through it[6].

filtered, *adj* – [CHEMISTRY] pertains to constituents in a water sample passed through a FILTER of specified pore diameter, most commonly 0.45 micrometer or less for inorganic analytes and 0.7 micrometer for organic analytes[47].

filtered, recoverable, *n* – [CHEMISTRY] the amount of a given constituent that is in SOLUTION after the part of a representative water-suspended SEDIMENT SAMPLE that has passed through a filter has been extracted. Complete recovery is not achieved by the extraction procedure and thus the analytical determination represents something less than 95 percent of the total constituent concentration in the sample. To achieve comparability of analytical data, equivalent extraction procedures are required of all laboratories performing such analyses because different procedures are likely to produce different analytical results[47].

filter pack, *n* – [HYDROGEOLOGY] SAND that is placed in the ANNULUS of the wall between the BOREHOLE wall and the well SCREEN to prevent formational material from entering the well screen. The filter pack should also extend some distance above the well screen, but not so much that it could cause CROSS-CONTAMINATION.

filter press, *n* -- [CHEMISTRY] a press operated mechanically for partially separating water from solid materials.

filtrate, *n* – [CHEMISTRY] the LIQUID which has passed through a FILTER.

filtration, *n* – [TREATMENT TECHNOLOGY] the mechanical process that removes particulate matter by separating water from solid material, usually passing it through sand[63].

finding of acts, *n* – [LAW] after many BENCH TRIALS or the hearing of MOTIONS, the JUDGE often will issue findings of fact and CONCLUSIONS of LAW, especially if requested to do so by a party. These set forth the facts the judge found to be true and the conclusions of law he reached regarding those facts. This allows a losing party to know how and why the judge reached his decision and whether an appeal is warranted. If the losing party appeals, the APPELLATE COURT will determine whether the factual findings are supported by the evidence and whether the LEGAL conclusions are correct. If the court answers either question in the negative, the case will usually be reversed and sent back to the trial court for a new trial. The lower court is sometimes required to issue such findings for there to be a valid JUDGMENT[19].

fineness, *n* — [GEOLOGY] a MEASURE of PARTICLE-size.

fineness modulus, *n* — [GEOLOGY] an EMPIRICAL factor obtained by adding the total percentages of an aggregate sample retained on each of a specified series of sieves, and dividing the sum by 100; in the United States, the U.S. Standard sieve sizes are: No. 100 (149 µm), No. 50 (297 µm), No. 30 (590 µm), No. 16 (1,190 µm), No. 8 (2,380 µm), and No. 4 (4,760 µm) and 3/8 in. (9.5 mm), 3/4 in. (19 mm), 11/2 in. (38 mm), 3 in. (76 mm), and 6 in. (150 mm).

fines, *n* — [GEOLOGY] portion of a SOIL finer than a No. 200 (75-µm) U.S. standard sieve.

fingering, *n* – [HYDROGEOLOGY] displacement process of one FLUID by another whereby irregular movement (in the form of fingers) is caused by FLOW instability.

finger lake, *n* – [GEOGRAPHY] a narrow, long LAKE in a GLACIAL TROUGH[6].

fingerprint, *n* – [ENVIRONMENTAL INVESTIGATION] *1*. correlating a PATTERN or SIGNATURE to a known standard; used to compare known and unknown CONTAMINANTS or groups of contaminants. *2*. something that identifies as a trait, trace or characteristic revealing origin and/or responsibility[15].

finished water, *n* – [HYDROLOGY] WATER that has been treated and is ready to be delivered to customers.

finite-difference method, *n* – [MATHEMATICS] a discretization technique for solving a partial differential equation (PDE) by: *1*. replacing the continuous domain of interest by a finite number of regularspaced mesh- or grid-points (such as NODES) representing volume-averaged sub-domain properties; and *2*. by approximating the derivatives of the PDE for each of these points using finite differences; the resulting set of linear or nonlinear algebraic equations is solved using direct or iterative matrix solving techniques[33].

finite difference model, *n* – [MATHEMATICS] a type of NUMERICAL MODEL that uses a mathematical technique called the finite-difference method to obtain an approximate solution to the governing partial differential equation (in space and time)[33].

finite element method (FEM), *n* – [MATHEMATICS] similar to FINITE DIFFERENCE METHOD with the exception that: *1*. the mesh may consist of regular or irregular-spaced grid points which may have irregular shapes; and *2*.the PDE is approximated using the method of weighted residuals to obtain a set of algebraic equations. These algebraic equations are solved using direct or iterative matrix solving techniques[33].

finite element model, *n* – [MATHEMATICS] a NUMERICAL MODEL that uses a mathematical technique called the FINITE ELEMENT METHOD to obtain an approximate solution to the governing partial differential equation (in space and time)[33].

fiord—*See fjord.*

fire, *n* – [PHYSICS] the PHENOMENON of COMBUSTION manifested in LIGHT, flame, and HEAT[15].

fire clay, *n* – [GEOLOGY] CLAY capable of withstanding high temperatures that is used especially for firebrick and crucibles[15].

fire insurance maps, *n* – [ENVIRONMENTAL INVESTIGATION] maps produced for private fire insurance companies that indicate uses of the property at specific dates and that encompass the property.

firn, *n* – [METEOROLOGY] granular consolidated snow that has passed through one summer melt season but is not yet glacial ice. *Also known as old snow*.

first law of thermodynamics, *n* – [PHYSICS] the first law states that ENERGY cannot be created or destroyed. *Also see the second, third and zeroth laws of thermodynamics.*

first party coverage, *n* – [INSURANCE] coverage for the policyholder's own property or person.

firth, *n* – [GEOGRAPHY] narrow INLET or ARM of the SEA; an ESTUARY[6].

Fischer-Tropsch process, *n* – [PETROLEUM CHEMISTRY] a PROCESS for the manufacture of LIQUID HYDROCARBON FUELS that consists of a catalyzed REACTION of carbon monoxide and hydrogen which yields ALIPHATIC HYDROCARBONS and oxygen-containing ORGANICS. The GASEOUS mixture of HYDROGEN and carbon monoxide can be obtained from PETROLEUM or coal (WATER GAS or SYNTHESIS GAS).

fish, *n* – [DRILLING TECHNOLOGY] any unwanted object down a WELL, commonly the lower end of a DRILL STRING that has broken off or any equipment mistakenly dropped down the hole. The term "fishing" describes the attempts to recover the fish, using various attachments to the drill stem or wireline. These attachments are known as fishing tools.

fish kill, *n* – [BIOLOGY] the destruction of fish in a water body; in winter, due to prolonged ice and snow cover or freezing of the water; in summer, caused by oxygen deficiency resulting from excessive organic matter; in any season, as a result of toxic pollutants or disease[63].

fissile, *adj* – [CHEMISTRY] capable of fission.

fissile material, *n* – although sometimes used as a synonym for fissionable material, this term has acquired a more restricted meaning; namely, any material fissionable by thermal (slow) neutrons. The three primarily fissile materials are ^{233}U, ^{235}U and ^{239}Pu[64].

fissility, *adj* – [GEOLOGY] the quality of tending to split, being cleavable as in a SHALE which splits into many thin layers[4]. *Also see shale.*

fission, *n* – [PHYSICS] the splitting of an ATOMIC NUCLEUS into two smaller nuclear PARTICLES coupled with the release of one or more NEUTRONS and nuclear energy.[2]

fission products, *n* – [PHYSICS] the two smaller atoms produced as fragments when a large atom is fissioned.

fissure, *n* — [GEOLOGY] an opening, usually long and narrow, made especially by cracking, splitting or separation of parts[16]. *Also see joint and fracture.*

fissure water, *n* – [HYDROGEOLOGY] water in open FRACTURES, usually abundant only near the ground surface[16].

fixed ground water, *n* – [HYDROGEOLOGY] GROUND WATER in material having INTERSTICES so small that the water is held permanently to the walls of the interstices, or moves so slowly that it is not available for withdrawal at useful rates[16].

fjeld, *n* – [GEOLOGY] a rocky upland[6].

fjord, *n* – [GEOGRAPHY] a long, narrow INLET of the SEA between high CLIFFS[6]. *Also spelled fiord*.

flagstone, *n* – [GEOLOGY]a sandy LIMESTONE or MICACEOUS SANDSTONE with very marked FISSILITY. It was formerly used extensively for paving stones (flags), roofing and building stones[6].

flame, *n* – [PHYSICS] the glowing, gaseous part of a FIRE[15].

flame ionization detector (FID), *n* – [ENVIRONMENTAL INVESTIGATION] an AIR MONITORING instrument that utilizes the PRINCIPLE of hydrogen flame IONIZATION for detection and measurement of ORGANIC VAPORS. *Also known as an organic vapor analyze (OVA). Also see photo-ionization detector (PID).*

flammable, *adj* – [PHYSICS] capable of being easily IGNITED and of burning with extreme rapidity. This adjective is now used technically in preference to inflammable because of the possible ambiguity of the "in" prefix.

flark, *n* – [HYDROLOGY] a low spot between PEAT ridges (strangs), occupied by SEDGES, if occupied by standing water then the feature is called a POOL. Strangs, flarks and pools often occur in extensive complexes known as patterned FENS.

flash flood, *n* – [HYDROLOGY] a short-lived but rapid rise of water in a STREAM caused by snowmelt, heavy rainfall, the collapse of an ice dam, log-jam or artificial dam[6].

flash point, *n* – [PHYSICS] the TEMPERATURE when the VAPOR PRESSURE of a SUBSTANCE becomes high enough to allow the air/vapor layer over the substance to be ignited. ETHER and ACETONE have flash points below room temperature, which makes them very dangerous.

flat, *n* – [GEOLOGY] level LANDFORM composed of UNCONSOLIDATED SEDIMENTS usually MUD or SAND. Flats may be irregularly shaped or elongate and continuous with the shore, whereas bars are generally elongate, parallel to the shore, and separated from the shore by water[6].

flatiron, *n* – [GEOLOGY] a triangular-shaped steeply-tilted or inclined MESA-like LANDFORM occurring one of a series of ROCK FORMATIONS on the flank of a MOUNTAIN[6].

flexicoking, *n* – [PETROLEUM REFINING] a thermal cracking process which converts heavy hydrocarbons such as crude oil, tar sands and distillation residue into light hydrocarbons.

floaters, *n* – [HYDROGEOLOGY] lighter-than-water, ORGANIC LIQUIDS present on the WATER TABLE or a water surface which can form an IMMISCIBLE PHASE. *Also see film and sheen*.

floating chronology—*See relative date.*

float recorder, *n* – [HYDROLOGY] an instrument for measuring the level of water in a LAKE, RIVER or WELL. The float is connected to a cable to a counterweight, the cable passing over a pulley which then transmits vertical float movements to a recording mechanism[6].

floc, *n* — [CHEMISTRY] generally, a very fine, fluffy mass formed by the aggregation of fine suspended particles, as in a precipitate. In terms of water quality, clumped solids or precipitates formed in sewage by biological or chemical activity.

flocculate, *v* – [CHEMISTRY] to form into loosely-massed PRECIPITATES[16]. *Also see precipitation.*

flood, *n* – [HYDROLOGY] *1*. rise, usually brief, in the water level in a STREAM to a peak from which the water level recedes at a slower rate. *2*. relatively high flow as measured by STAGE height or discharge. *3*. rising TIDE.

flood insurance, *n* – [INSURANCE] coverage for flood damage is available from the federal government under the National Flood Insurance Program but is sold by licensed insurance agents. Flood coverage is excluded under homeowners policies and many commercial property policies. However, flood damage is covered under the comprehensive portion of an auto insurance policy.

flood plain, *n* – [HYDROLOGY] nearly level LAND along a STREAM flooded only when the streamflow exceeds the water carrying capacity of the CHANNEL[6].

floodplain playa, *n* — [GEOLOGY] a component LANDFORM consisting of very low gradient, broad, barren, axial-stream channel segments in an intermontane basin. It floods broadly and shallowly and is veneered with barren fine textured sediments that crusts. Commonly, a floodplain playa is segmented by transverse, narrow bands of vegetation, and it may alternate with ordinary, narrow or braided channel segments.

flood stage, *n* – [HYDROLOGY] the stage of a river flow which succeeds the bank-full stage, commencing at the time when the flow overtops the natural or artificial river banks[6].

flood-water mounding, *n* – [HYDROLOGY] increase in the WATER height as a result of some type of STRUCTURE. For example, the construction of a building will displace water, causing the level to increase.

floodway, *n* – [HYDROLOGY] the CHANNEL of a STREAM plus any adjacent FLOODPLAIN areas that must be kept free of encroachment in order that the 100-YEAR FLOOD can be carried without substantial increases in flood heights, velocities or changes in direction. *Also see floodway fringe.*

floodway fringe, *n* – [HYDROLOGY] an area which is outside a FLOODWAY and is flooded with an average frequency of once or more in each 100 years as determined by the secretary of natural resources with full consideration given to upstream impoundments and flood control projects.

flora, *n* – [BIOLOGY] the plant life in a region. *Also see fauna.*

floss, *n* – [HYDROLOGY] a stream[16].

flow, *v* – [PHYSICS] to move freely like a LIQUID or a GAS.

flowing artesian, *n* – [HYDROGEOLOGY] *from French,* of, being, or concerning an AQUIFER in which the water rises to the ground surface due to PRESSURE from overlying water. *Also see aquifer, confined and artesian.*

flowing artesian well, *n* – [HYDROGEOLOGY] an artesian well whose HEAD is sufficient to raise the water above the land surface[16].

flowing well, *n* – [HYDROGEOLOGY] a well that yields water at the land surface without pumping. It is distinguished from a flowing artesian well by the possibility that the flow may be due to gas rather than artesian pressure[16].

flow line, *n* — [HYDROGEOLOGY] the path that a PARTICLE of WATER follows in its course of SEEPAGE under LAMINAR FLOW conditions[16].

flow net, *n* — [HYDROGEOLOGY] a GRAPHICAL representation of FLOW LINES and EQUIPOTENTIAL (PIEZOMETRIC) LINES used in the study of seepage PHENOMENA[33].

flow path, *n* — [HYDROGEOLOGY] represents the area between two flow lines along which GROUND WATER can flow.

flow regime, *n* – [HYDROGEOLOGY] the four hydrological regimes are defined by specific open channel flow criteria that are closely related to the channel geometry, the roughness of the stream bed and the sediment transport rate. They are based on a combination of the FROUDE NUMBER (*Fr*) and the REYNOLDS NUMBER (*Re*). The Froude Number distinguishes between sub-critical flow (Fr<1) and supercritical flow (Fr>1). The Reynolds Number contrasts laminar flow (Re<500) with TURBULENT FLOW (Re>2000)[6].

flowstone, *n* – [GEOLOGY] sheet-like deposits of CALCITE formed where water flows down the walls or along the floors of a CAVE.

flow-through process tank, *n* – [INDUSTRIAL TECHNOLOGY] a TANK that forms an integral part of a production process through which there is a steady, variable, recurring, or intermittent flow of materials during the operation of the process. Flow-through process tanks do not include tanks used for the storage of materials prior to their introduction into the production process or for the storage of finished products or by-products from the production process[48].

flow tube, *n* – [HYDROGEOLOGY] the area enclosed between two FLOW LINES[61].

flow velocity—*See specific discharge*.

fluctuation, *n* – [PHYSICS] the act of being unstable, varying regularly, vacillating, rising and falling, moving to and fro[15].

fluid, *n* – [PHYSICS] having PARTICLES that easily move and change their relative position without a separation of the MASS and that easily yield to PRESSURE, capable of flowing.

fluid catalytic cracking (FCC), *n* – [PETROLEUM TECHNOLOGY] the most important conversion process used in petroleum refineries. It is widely used to convert the high-boiling, high-molecular weight HYDROCARBON fractions of PETROLEUM CRUDE OILS to more valuable GASOLINE, olefinic gases and other products. Cracking was previous performed thermally, but today it is employed through the use of catalysts, such as ZEOLITES. *Also see cracking and catalytic cracking*.

fluid mechanics, *n* – [PHYSICS] branch of MECHANICS dealing with the PROPERTIES of LIQUIDS and GASES[16].

fluid potential, *n* – [HYDROGEOLOGY] [L^2T^{-2}] MECHANICAL ENERGY per unit mass of fluid at any given point in space and time with respect to an arbitrary state and datum. A loss of fluid potential occurs as a fluid moves from a region of high potential to one of low potential[16].

fluid pressure, *n* – [HYDROLOGY] the force per unit area on a point; for a water column, it is the force per unit area that acts at that point on the water column.

fluorene, *n* – [CHEMISTRY] a HYDROCARBON ($C_{13}H_{10}$) present in the middle oil fraction of COAL TAR. It can also be found at low concentrations in CRUDE OIL.

fluorescein, *n* – [HYDROGEOLOGY] a reddish-yellow CRYSTALLINE COMPOUND that imparts a brilliant green fluorescent color to water in very dilute solutions; used to label or trace underground water for identification of an emergence.

fluorescence, *n* – [PHYSICS] LIGHT emission by ORGANIC MATTER when excited by ENERGY such as ULTRAVIOLET light.

flow till, *n* – [GEOLOGY] a TILL that has been glacially induced to move downslope when glacial ice is still present, so that any structures inherited from the parent ice are destroyed by the subsequent motion[6].

flume, *n* – [HYDROLOGY] an open channel or conduit on a prepared grade.

flushing, *n* – [HYDROGEOLOGY] the PROCESS by which CONTAMINANT CONCENTRATIONS in a body of WATER, whether an AQUIFER or SURFACE WATER, are diluted or exchanged through the influx of new water.

flushing rate, *n* – [HYDROLOGY] TIME required for a LAKE or AQUIFER to exchange its water; may be days, months or years.

fluting, *n* – [GEOLOGY] small RIDGES and HOLLOWS in ROCK STRATA of varying resistance caused by differential EROSION by WATER or WIND[6].

fluve, *n* — [HYDROLOGY] a linear DEPRESSION, RILL, GULLY, ARROYO, CANYON, VALLEY, etc., of any size, along which flows at some time, a drainageway.

fluvial, *adj* – [HYDROLOGY] involving running WATER. Usually pertaining to STREAM processes[6].

fluvial geomorphology, *n* – [GEOLOGY] the SCIENCE concerned specifically with the influences of WATER and RIVERS on the erosional cycle of land deposition and degradation over TIME. While HYDROLOGY concentrates on the description, measurement, and analysis of PRECIPITATION and the flow of water on the EARTH'S SURFACE and underground, fluvial

GEOMORPHOLOGY concentrates on understanding the processes that govern the influence of water on the LANDSCAPE over time.

fluviotrophic, *n* – [HYDROLOGY] describing WETLANDS which receive their water mainly from inflows of surface water[61].

flux, *n* – [PHYSICS] *1*. a general state of change[6]. *2*. the rate of transfer of FLUID, PARTICLES, or ENERGY across a given SURFACE.

fly ash, *n* – [COAL TECHNOLOGY] the finely divided RESIDUE resulting from the COMBUSTION of ground or powdered COAL and which is transported from the firebox through the boiler by FLUE GASES.

flyggberg, *n* – [GEOLOGY] *from Swedish,* an asymmetrical hill, up to 300 m in height and 1-3 km broad, which is shaped by an overriding ice mass[6].

flysch, *n* – [GEOLOGY] SEDIMENTS derived from the erosion of uprising FOLD STRUCTURES and which are subsequently deformed by the continuing orogenic events[6]. *Also see molasse.*

foam, *n* – [PHYSICS] a LIQUID or SOLID EMULSION-like system in which GAS is more or less uniformly distributed. The entrapped vacuoles range in size from COLLOIDAL to optically visible.

fog, *n* – [METEOROLOGY] fog exists if the ATMOSPHERIC visibility near the EARTH'S SURFACE is reduced to 1 kilometer or less. Fog can be composed of WATER droplets, ICE crystals or smoke particles. Fogs composed primarily of water droplets are classified according to the PROCESS that causes the AIR to cool to SATURATION[6].

foiba, *n* – [GEOLOGY] *from Italian, 1*. a deep wide vertical cavity or the swallow point of a RIVER at the beginning of its underground course. *2*. a natural vertical shaft in soluble ROCK, tending toward cylindrical shape; it may or may not reach the surface. A dome pit.

fold, *n* — [GEOLOGY] a bend in the STRATA or other planar structure within the ROCK MASS[4].

foliation, *n* — [GEOLOGY] the somewhat laminated STRUCTURE resulting from segregation of different MINERALS into LAYERS PARALLEL to the SCHISTOSITY[4].

font, *n* – [HYDROLOGY] a term for a STREAM or a SPRING, fountain or source of a stream; it forms part of place names[16].

foothills, *n* – [GEOGRAPHY] a hilly region at the base of a MOUNTAIN RANGE[6].

footing, *n* — [CONSTRUCTION TECHNOLOGY] portion of the foundation of a structure that transmits loads directly to the SOIL.

foot-slope, *n* – [GEOLOGY] the area at the base of a slope, where the slope starts to flatten, but above the area where the slope nearly completely flattens, the toe-slope. Not all slopes have both foot- and toe-slopes. *Also see toe-slope.*

footwall, *n* – [GEOLOGY] one of blocks of ROCK involved in FAULT movement. One that would be under feet of person standing in tunnel along or across fault. *Also see hanging wall.*

forb, *n* – **[**BIOLOGY] an herb other than grass.

force, *n* – [PHYSICS] process that changes the state of rest or MOTION of a body.

force main, *n* – [HYDROLOGY] a pipe in which waste water is carried under pressure[63].

ford, *n* – [HYDROLOGY] a crossing-point on a STREAM or RIVER that is shallow enough to be crossed without the aid of a bridge[6].

forearc basin, *n* – [GEOLOGY] a DEPRESSION in the SEA floor located between an accretionary wedge and a volcanic arc in a subduction zone, and lined with trapped SEDIMENT[4].

foreland, *n* – [GEOGRAPHY] a HEADLAND or CAPE, (otherwise known as an area of land jutting out into the SEA)[6].

forensic, *adj* – [LAW] relating to or dealing with the application of some type of expertise, such as SCIENTIFIC KNOWLEDGE, to LEGAL problems and/or dispute resolution. *Also see environmental forensics and forensics.*

forensic chemistry, *n* – [CHEMISTRY] the application of CHEMICAL PRINCIPLES to the study of materials or problems in cases where some type of dispute resolution is needed.

forensic geoscience, *n* – [GEOLOGY] a subdiscipline of geoscience that is concerned with the application of geological and wider environmental science information and methods to investigations which may come before a court of law or be used in some type of dispute resolution.

forensics, *n* – [LAW] pertaining to, connected with, or used in COURTS of LAW; suitable or analogous to pleadings in court; belonging to, used in, or suitable to courts of judicature or to public discussion and debate; the art or practice of formal debate and argument; of or used in connection with courts of law, especially in relation to crime detection; the use of expertise to resolve disputes. *Also see forensic and environmental forensics.*

foreshore, *n* — [GEOLOGY] 1. the part of a SHORE that lies between high and low watermarks. 2. the part of a shore between the water and occupied or cultivated land[4].

forest, *n* – [ECOLOGY] ECOSYSTEM dominated by TREES. Major forest biomes include tropical evergreen forest,

tropical SAVANNA, DECIDUOUS forest, and boreal forest[6]. *Also see grove and woods*.

forestry, *n* -- [ECOLOGY] the SCIENCE or management of FORESTS.

forfeited water right, *n* — [LAW] a water right that is no longer valid because of five or more consecutive years of nonuse. *Also see abandoned water right*.

forge, *n* – [INDUSTRIAL TECHNOLOGY] *1*. a furnace or a shop with its furnace where metal is heated and wrought. *2*. a workshop where wrought iron is produced or where iron is made malleable.

fork, *n* – [HYDROLOGY] a place where two or more STREAMS join to form a larger waterway; a confluence[16].

formation, *n* – [GEOLOGY] a distinct STRATIGRAPHIC unit of rock that shares common LITHOLOGIC features and is large enough to be mapped.

formation water, *n* – [GEOLOGY] water present in a water-bearing formation under natural conditions, as opposed to introduced fluids, such as drilling mud[16].

formula, *n* – [CHEMISTRY] a way of representing a CHEMICAL COMPOUND using symbols for the ATOMS present. *Also see equation.*

fors, *n* – [HYDROLOGY] rapids or cataract, or a waterfall of low inclination[16].

forward modeling, *n* – [MATHEMATICS] using a mathematical model to predict the likely outcome from known starting conditions[61]. *Also see inverse modeling.*

foso, *n* – [HYDROLOGY] a STREAM CHANNEL without conspicuous BANKS or BLUFFS[16].

fosse, *n* – [GEOLOGY] an ARTIFICIAL TRENCH or DITCH around an earthwork[6].

fossil, *n* – [GEOLOGY] ancient plant and animal remains or their traces or impressions preserved in SEDIMENTARY ROCKS.

fossil fuel, *n* -- [PETROLEUM CHEMISTRY] a nonrenewable ENERGY source, such as OIL, GAS, or COAL, that derives from the ORGANIC remains of past life. Fossil fuels consist primarily of HYDROCARBONS.

foundation, *n* — [CONSTRUCTION TECHNOLOGY] lower part of a STRUCTURE that transmits the load to the SOIL or ROCK.

foundry, *n* – [METALLURGY] a workshop for or a business of casting METAL.

fountainhead, *n* — [HYDROLOGY] 1. a SPRING that is the source or head of a STREAM. 2. the upper end of a CONFINED-AQUIFER CONDUIT, where it intersects the land surface.

Fourier's Law, *n* – [PHYSICS] a law which states that the rate of heat conduction is proportional to the temperature gradient. It is similar in theory to Darcy's Law.

fractional distillation—*See distillation.*

fraction of organic carbon–*See organic carbon content*

fractionation, *n* – [PHYSICS] the separation of a mixture in successive stages, with each stage removing from the mixture some proportion of one of the substances. *Also see isotope fractionation.*

fracture, *n* — [GEOLOGY] *1*. the general term for any mechanical DISCONTINUITY in the rock; it therefore is the collective term for JOINTS, FAULTS, CRACKS, etc. *2*. a break in the mechanical continuity of a body of ROCK caused by stress exceeding the strength of the rock. Includes JOINTS and FAULTS. *Also see fissure and joint.*

fracture aperture, *n* – [GEOLOGY] the width of a BEDROCK FRACTURE. The rate of GROUND-WATER migration through a FRACTURE is exponentially related to the aperture.

fractured rocks, *n* -- [GEOLOGY] ROCKS where the principal mode of GROUND-WATER FLOW is through discontinuities or breakages in the MATRIX, known as fractures.

fracture frequency, *n* — [GEOLOGY] the number of natural DISCONTINUITIES in a ROCK or SOIL MASS per unit length, measured along a CORE or as exposed in a planar section such as the wall of a TUNNEL.

fracture pattern, *n* — [GEOLOGY] spatial arrangement of a group of FRACTURE surfaces.

fracture permeability, *n* – [HYDROGEOLOGY] the PERMEABILITY of a rock material that results from the presence of FRACTURES[16].

fracture porosity, *n* – [HYDROGEOLOGY] POROSITY resulting from the presence of openings produced by the breaking or shattering of an otherwise less PERMEABLE ROCK.

fracture skin, *n* – [HYDROGEOLOGY] the coating of a fracture surface and/or altered zone beneath a fracture zone; fracture skin has different hydrogeological properties from those of the unaltered rock[16].

fracture spacing, *n* – [GEOLOGY] the frequency of FRACTURES within a rock mass.

fracture spring, *n* – [HYDROGEOLOGY] a SPRING created by fracturing or jointing of the rock[33].

fracture trace, *n* – [HYDROGEOLOGY] the expression of a BEDROCK fracture on the GROUND SURFACE. Often viewed with AERIAL PHOTOGRAPHS[33]. *Also see lineament.*

fragipan, *n* – [AGRONOMY] a LOAMY, brittle subsurface HORIZON low in POROSITY and content of ORGANIC MATTER and low or moderate in CLAY but high in SILT

or very FINE SAND. A fragipan appears CEMENTED and restricts roots. When dry, it is hard or very hard and has a higher BULK DENSITY than the horizon or horizons above. When moist, it tends to rupture suddenly under PRESSURE rather than to deform slowly. *Also see claypan, duripan, hardpan, ironpan and pan.*

framestone, *n* – [GEOLOGY] a sedimentary rock containing a solid calcareous or siliceous framework which is maintained by an organism such as a coral or sponge.

Freedom of Information Act (FOIA), *n* – [LAW] Congress enacted FOIA "to open agency action to the light of public scrutiny. The Act's basic purpose reflects a general philosophy of full agency disclosure unless information is exempted under clearly delineated statutory language.

free energy, *n* – [CHEMISTRY] a measure of the driving ENERGY of a CHEMICAL REACTION. *Also see Gibbs free energy.*

free product, *n* — [HYDROGEOLOGY] LIQUID PHASE CONTAMINANTS released into the ENVIRONMENT. Also known as NON-AQUEOUS PHASE LIQUID (NAPL), separate-phase petroleum or just separate phase[18]. *Also see film and sheen.*

free radical, *n* – [CHEMISTRY] a group of ATOMS such as the METHYL GROUP (CH_3) that is part of a larger MOLECULE. Such a group will not normally exist on its own since it has a free ELECTRON, but when it does it is called a free radical and it will rapidly react with other materials such as OXYGEN, forming further free radicals[26].

free vapor phase, *n* — [HYDROGEOLOGY] a condition of CONTAMINANT residence in which VOLATILIZED contaminants occur in porosity that is effective to free and open GASEOUS flow and exchange, such POROSITY generally being MACROPOROSITY.

free water (gravitational water) (ground water) (phreatic water), *n* — [HYDROGEOLOGY] WATER that is free to move through a SOIL or ROCK MASS under the influence of GRAVITY.

free water elevation (water table) (ground water surface) (free water surface) (ground water elevation), *n* — [HYDROGEOLOGY] ELEVATIONS at which the PRESSURE in the WATER is zero with respect to the ATMOSPHERIC PRESSURE.

freeze-thaw action, *n* – [GEOLOGY] a type of WEATHERING process in which water freezes and the resulting ice melts as TEMPERATURES fluctuate above and below the FREEZING POINT. Because water enlarges 9% when it freezes, the resulting enlargement causes fissures in the rock to enlarge and possibly rupture. The result effect is to weaken the rock.

freezing point, *n* – [PHYSICS] the TEMPERATURE at which the VAPOR PRESSURE of a LIQUID is equal to the vapor pressure of the corresponding SOLID form. The liquid and solid forms can coexist at EQUILIBRIUM at the FREEZING POINT. The standard melting point is the melting point at standard pressure. The freezing point for water is 0^oC or 32^oF. *Also see boiling point and melting point.*

french cleaning—*See dry cleaning.*

french drain, *n* – [HYDROLOGY] a DRAIN without a pipe. The WATER collects in a GRAVEL or STONE filled CHANNEL that starts from the SURFACE of just below it. The advantage of a French drain is that is easy to construct and with the use of modern ground fabrics very efficient.

Freon, *n* – [CHEMISTRY] trade name for CHLOROFLUOROCARBONS (CFCs) (normally F-11, F-12 and F-113). CFCs can be used to estimate the time frame of ground-water recharge.

frequency, *n* — [PHYSICS] *1*. number of cycles occurring in unit TIME. *2*. the RATE of recurrence of a vibration, oscillation, cycle, etc. *3*. commonness of occurrence.

fresh water, *n* – [HYDROLOGY] *1*. WATER that generally contains less than 1,000 milligrams-per-liter of DISSOLVED SOLIDS. *2*. water with less than 0.2 percent salinity[6]. *Also see brackish water and sea water.*

freshwater estuary, *n* – [HYDROLOGY] an ESTUARY into which RIVER WATER pours with sufficient volume to exclude SALT WATER[16].

freshwater lens, *n* – [HYDROGEOLOGY] a lenticular fresh ground-water body that underlies an oceanic island. It is underlain by saline water[16].

freshwater wetland, *n* – [HYDROLOGY] an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation[16].

Freundlich isotherm, *n* – [CHEMISTRY] an EMPIRICAL EQUATION that describes the amount of SOLUTE absorbed onto a soil profile[33].

friable, *adj* – [AGRONOMY] capable of being crumbled, pulverized, or reduced to powder by hand pressure. An adjective often used to describe soils.

friction, *n* – [PHYSICS] the FORCE that resists relative motion between two bodies in contact[6].

friction loss, *n* – [HYDROLOGY] HEAD lost by water flowing in a STREAM, CHANNEL or pipe, etc. as a result

of disturbances set up by the contact between the flowing water and the containing conduit and by intermolecular FRICTION[16]. *Also known as friction head.*

fringe water, *n* – [HYDROGEOLOGY] WATER occurring in the CAPILLARY FRINGE above the WATER TABLE that completely fills the smaller INTERSTICES[16].

frost heave, *n* – [GEOLOGY] a condition where the occurrence of low TEMPERATURES in a SOIL causes original WATER in the soil voids, and subsequently ATTACHED WATER, to freeze and expand, resulting in an overall expansion in the low-temperature soil zone; the condition is typically noticeable as arise/heave in the ground surface.

frost ring, *n* – [DENDROLOGY] distorted XYLEM tissue or callous tissue damaged by freezing in the GROWING SEASON during which the cells of the tissue were being formed.

Froude number, *n* – [HYDROLOGY] a dimensionless numerical QUANTITY used as an index to characterize the type of flow in a hydraulic structure that has the force of GRAVITY (as the only force producing motion) in conjunction with the resisting force of INERTIA. It is the ratio of inertia forces to gravity forces, and is equal to the square of a characteristic velocity (mean, surface, or maximum velocity) of the system divided by the product of a characteristic linear dimension (such as diameter or depth) and the gravity constant, acceleration due to gravity, all of which are expressed in consistent units in order that the combinations will be dimensionless. The number is used in open-channel flow studies or where the free surface plays an essential role in influencing motion such as in karst conduits that are not necessarily flowing at pipe-full conditions[16]. *Also see Chézy equation, Manning equation and Reynolds number.*

fruit, *n* – [DENDROLOGY] the seed or seeds of a plant or TREE with its covering, such as an acorn, pea pod or cherry[12].

fuel, *n* – [PHYSICS] material, such as COAL, WOOD or OIL, burnt or used as a source of HEAT or POWER.

fuel oil, *n* – [PETROLEUM CHEMISTRY] heavy DISTILLATES from OIL REFINING that are used mainly for *heating* and FUELING industrial PROCESSES, ships, locomotives, and power stations. Fuel oils are a variety of yellowish to light brown LIQUID mixtures that come from crude petroleum. Some chemicals found in fuel oils may evaporate easily, while others may more easily dissolve in water. Fuel oils are produced by different petroleum refining processes, depending on their intended uses. Fuel oils may be used as fuel for engines, lamps, heaters, furnaces, and stoves, or as SOLVENTS. Some commonly found fuel oils include KEROSENE, DIESEL FUEL, JET FUEL, range oil, and home HEATING OIL. These fuel oils differ from one another by their HYDROCARBON COMPOSITIONS, BOILING POINT RANGES, CHEMICAL ADDITIVES, and uses[38]. *Also see heating oil.*

fugacity, *n* – [CHEMISTRY] a THERMODYNAMIC FUNCTION used in place of PARTIAL PRESSURE in REACTIONS involving REAL GASES and mixtures[17].

fugitive water, *n* – [HYDROLOGY] LEAKAGE from impounding RESERVOIRS or an IRRIGATION SYSTEM[16].

full meander, *n* – [HYDROLOGY] a STREAM MEANDER consisting of two loops, one in a clockwise direction and the other in a counterclockwise direction[16].

fumarole, *n* – [GEOLOGY] a VOLCANIC VENT through which STEAM and GASES are emitted[4].

fumes, *n* – [CHEMISTRY] particulate MATTER consisting of solid PARTICLES generated by CONDENSATION from the GASEOUS STATE, generally after violation from melted SUBSTANCES, and often accompanied by a CHEMICAL REACTION, such as OXIDATION.

fumigant, *n* – [CHEMISTRY] a PESTICIDE vaporized to kill pests. Used in buildings and greenhouses.

function, *n* – [MATHEMATICS] a variable quantity regarded in relation to another or others in terms of which it may be expressed or on which its value depends.

functional group, *n* – [CHEMISTRY] an atom, or group of atoms, attached to the base structure of a compound that has similar chemical properties irrespective of the compound to which it is part. It defines the characteristic physical and chemical properties of families of organic compounds[62].

fundus, *n* – [GEOGRAPHY] the seabed in a tidal river below low water mark.

fungi (*pl.*), fungus (*s.*), *n* – [BIOLOGY] AEROBIC, multicellular, non-PHOTOSYNTHETIC, HETEROTROPHIC MICROORGANISMS including mushrooms, yeast, MOLDS and smuts. Along with BACTERIA, fungi are the principle organisms responsible for the DECOMPOSITION of CARBON in the BIOSPHERE. Fungi have two principle advantages over bacteria: *1*. they can grow in low moisture environments, and *2*. they can grow in low pH environments.

fungible, *adj* – [COMMERCE] being of such a NATURE that one part or quantity may be replaced by another equal part or quantity in the satisfaction of an obligation. OIL, wheat, and lumber are fungible commodities[26].

fungicide, *n* – [CHEMISTRY] PESTICIDES which are used to control, deter, or destroy FUNGI. *Also see herbicide, insecticide and pesticide.*

funnel access, *n* – [HYDROLOGY] a small parcel of riparian land deeded collectively to a group of land owners who have no frontage bordering the water, so as to give them legal access to water[63].

furan, *n* – [CHEMISTRY] a group of ORGANIC COMPOUNDS containing a ring of CARBON ATOMS and one OXYGEN atom.

Gg

gabbro, *n* – [GEOLOGY] any of a group of dark, dense, PHANERITIC, INTRUSIVE ROCKS that are the PLUTONIC equivalent to BASALT[4]. *Also see igneous rock and plutonic rock.*

gage datum, *n* – [HYDROLOGY] a HORIZONTAL surface used as a zero point for measurement of stage or gage height. This surface usually is located slightly below the lowest point of the stream bottom such that the gage height is usually slightly greater than the maximum depth of water. Because the gage datum is not an actual physical object, the datum is usually defined by specifying the elevations of permanent reference marks such as bridge abutments and survey monuments, and the gage is set to agree with the reference marks. Gage datum is a local datum that is maintained independently of any national geodetic datum. However, if the elevation of the gage datum relative to the national datum (North American Vertical Datum of 1988 or National Geodetic Vertical Datum of 1929) has been determined, then the gage readings can be converted to elevations above the national datum by adding the elevation of the gage datum to the gage reading[47].

gage height (GH), *n* – [HYDROLOGY] the water-surface elevation, in feet above the gage datum. If the water surface is below the gage datum, the gage height is negative. Gage height often is used interchangeably with the more general term "stage," although gage height is more appropriate when used in reference to a reading on a gage[47].

gage values, *n* – [HYDROLOGY] VALUES that are recorded, transmitted, and/or computed from a gaging station. Gage values typically are collected at 5-, 15-, or 30-minute intervals[47].

gaging station, *n* – [HYDROLOGY] a site on a STREAM, CANAL, LAKE, or RESERVOIR where systematic observations of stage, discharge, or other hydrologic data are obtained[47].

Gaia hypothesis, *n* – [GEOLOGY] a THEORY first put forward by James Lovelock, that the earth is a single ORGANISM which has evolved over the span of geological time.

gaining stream, *n* — [HYDROLOGY] a STREAM or reach of a stream in which water flows into the stream BED from the GROUND[16].

> DISCUSSION — Gaining streams are more common in humid climates, where ground water feeds the surface water. In drier climates, streams can become dry and some periods of time, the stream feeds the ground water. Synonymous with influent stream.

Also known as an influent stream. Also see losing stream.

gallery, *n* – [HYDROLOGY] an underground structure designed and installed to collect subsurface water[16]. *Also known as an infiltration gallery.*

gallon, *n* – [PHYSICS] measure of VOLUME in the English system equal to 0.1336 cubic feet, 2 quarts, 8 pints and 3.8 liters. *Also see liter, pint and quart.*

galvanizing, *n* – [METALLURGY] process for coating IRON or STEEL with a thin layer of ZINC for CORROSION protection. It can be carried out electrochemically by electroplating (called "electrogalvanizing") or by "hot-dip" galvanizing consisting of immersing the substrate into molten zinc.

gamma log, *n* – [GEOPHYSICS] a type of RADIOACTIVITY WELL LOG that records natural radioactivity around the wellbore. SHALES generally produce higher levels of GAMMA radiation and can be detected and studied with the gamma ray tool. It is often called a "clay log"[16]. *Also see gamma-gamma log, induction log, neutron log, sonic log and spontaneous potential log.*

gamma-gamma log, *n* – [GEOPHYSICS] a borehole, geophysical logging tool in which a source of gamma radiation as well as a detector are lowered into the borehole. This log measures bulk density of the formation and fluids. *Also see gamma log, induction log, neutron log, sonic log and spontaneous potential log.*

gamma radioactivity, *n* – [PHYSICS] RADIATION composed of packets of ENERGY, also known as photons or photon particles, termed collectively as gamma rays, spontaneously emitted from the nucleus of most radioactive elements during radioactive decay. Gamma radiation is ionizing radiation meaning that it strips electrons from adjacent atoms as it passes. Gamma radiation can penetrate through skin into internal tissues as opposed to alpha and beta radiation, which cannot. An accumulation of tissue damage in the cell nucleus from gamma radiation may lead to cell mutation and potential cancer formation.[2]

gamma rays (γ), *n* – [PHYSICS] ENERGY in the form of a wave emitted during the disintegration of radioactive elements[17].

ganat—*See quanat.*

gangue, *n* – [GEOLOGY] a valueless ROCK or MINERAL aggregates in an ORE[4].

gap, *n* – [GEOGRAPHY] any sharp, deep notch in a MOUNTAIN RIDGE or between HILLS[7].

garbage, *n* – [WASTE DISPOSAL] animal and vegetable WASTE resulting from the handling, storage, sale, preparation, cooking, and serving of foods. *Also see refuse, rubbish, solid waste and trash.*

gas, *n* – [PHYSICS] MATTER in a form that has low density, is easily compressible and expandable, and expands spontaneously when placed in a larger container. MOLECULES in a gas move freely and are relatively far apart. VAPOR often refers to a gas made of a *substance* that is usually encountered as a *liquid* or *solid*; for example, gaseous H_2O is called water vapor[16]. *Also see vapor phase*.

gas chromatography (GC), *n* – [CHEMISTRY] an ANALYTICAL TECHNIQUE designed to separate COMPOUNDS, whereby a mobile PHASE passes through a column containing an immobile stationary phase. Compounds separate based on their relative tendencies to partition into the stationary or mobile phases as they move through the column. Various detectors, such as a flame-ionization detector (FID), electron capture detector (ECD), a mass spectrometer (MS) or a photoionization detector (PID), can then be used to measure the separated components as they elute from the column[34].

gas chromatography-isotope ratio-mass spectrometry (GCIRMS), *n* -- [CHEMISTRY] an ANALYTICAL TECHNIQUE that permits acquisition of isotopic-ratio values for individual COMPONENTS in complex mixtures (such as GASOLINE) in real time without the need to physically isolate each COMPOUND[39].

gaseous phase—*See vapor phase.*

gas holder, *n* – [COAL TECHNOLOGY] a large, expandable tank used to store gas at an MGP. The earliest gas holders were housed in circular brick buildings, built around a deep pit foundation which was kept full of water. A steel tank (open at the bottom) would rise and fall according to how much gas was being stored at the time. The water formed a seal at the bottom of the tank to keep the gas from escaping. Later, larger water-seal gas holders were built with an external steel frame to guide the tank as it rose and fell, but with no brick building surrounding the tank. Most MGPs contained at least one water seal holder, and many MGPs had several. As a group, these holders are referred to as pit holders or in-ground holders. *Also known as gasometer*.

gasohol, *n* – [PETROLEUM CHEMISTRY] mixture of GASOLINE and ETHANOL derived from fermented agricultural products containing at least nine percent ethanol. Gasohol emissions contain less CARBON MONOXIDE than those from gasoline[26]. *Also see alternative fuel and ethanol.*

> DISCUSSION – Since at least the 1970s, Brazilian gasoline contains 24% ethanol. Pure ethanol can also be purchased at Brazilian service stations at a reasonable price. Most cars in Brazil are known as "flex-cars"; they can run on either gasoline (containing 24% ethanol) or pure ethanol. Ethanol is produced from sugar cane in Brazil. Because the country is situated in the Tropics and have a 12-month growth growing, it is economically advantageous to use ethanol as opposed to gasoline.

gas oil, *n* – [PETROLEUM CHEMISTRY] a middle-DISTILLATE PETROLEUM fraction with a BOILING RANGE of about 350° F to 750° F, usually includes DIESEL FUEL, KEROSENE, HEATING OIL, and light FUEL OIL[37].

gasoline—*See motor gasoline.*

gasoline-range organics (GRO), *n* – [CHEMISTRY] a laboratory analytical parameter used to determine the portion of the HYDROCARBONS derived from GASOLINE. *Also see diesel-range organics (DRO) and total petroleum hydrocarbons (TPHs).*

gasometer—*See gas holder.*

Gaussian curve, *n* – [STATISTICS] a symmetrical, bell-shaped curve on a GRAPH representing DATA points. Ideal chromatographic peaks are Gaussian curves[34]. *Also see graph.*

geest, *n* – [GEOLOGY] a HEATHLAND area of GLACIAL SANDS and GRAVELS.

gelifluction, *n* – [GEOLOGY] the downslope flow of soil because of the melting of ground ice.

generator, *n* – [ENVIRONMENTAL REGULATION] *1*. a facility or mobile source that emits POLLUTANTS into the AIR or releases HAZARDOUS WASTE into WATER or SOIL. *2*. any person, by site, whose act or PROCESS produces regulated medical waste or whose act first causes such waste to become subject to REGULATION. Where more than one person (such as doctors with separate medical practices) are located in the same building, each business entity is a separate generator.

geo, *n* – [GEOLOGY] a narrow COASTAL INLET bordered by steep CLIFFS. *Also spelled gio*.

geochemical composition of the Earth, *n* – [GEOCHEMISTRY] the composition of the Earth's crust is 47% OXYGEN, 28% SILICON, 8% ALUMINUM, 4.5% IRON, 3.5% CALCIUM, 2.5% SODIUM, 2.5 % POTASSIUM and 2.2% MAGNESIUM. Moving into the MANTLE and core of the Earth, the composition becomes more iron- and NICKEL-rich.

geochemical mass balance, *n* – [GEOCHEMISTRY] calculation of the net changes in dissolved and solid

phases to account for observed geochemical changes[61].

geochemistry, *n* – [GEOLOGY] the study of materials and CHEMICAL REACTIONS in ROCKS, MINERALS, MAGMA, SEAWATER, GROUND WATER and SOIL[16]. *Also see aqueous geochemistry.*

geodesy, *n* – [GEOLOGY] the SCIENCE that measures the SURFACE features of the EARTH. *Also see hydrography.*

geographic information system (GIS), *n* – [GEOGRAPHY] a computer system designed for storing, manipulating, analyzing, and displaying DATA in a GEOGRAPHIC context[16].

geographic north, *n* – [GEOGRAPHY] the location at LATITUDE 90° north. *Also see magnetic north.*

geography, *n* – [SCIENCE] the study of NATURAL and human constructed PHENOMENA relative to a spatial dimension.

geohydrology, *n* – [HYDROLOGY] that branch of HYDROLOGY which deals with GROUND WATER, taking into account the GEOLOGICAL conditions. Geohydrology tends to be more quantitative, whereas hydrogeology tends to be more qualitative. *Also see hydrogeology.*

geological survey, *n* – [GEOLOGY] *1*. INVESTIGATION into the structure and nature of rocks at a particular location. *2*. an organization or research institute specializing in geological investigations[7].

geologic map, *n* – [GEOLOGY] a two-dimensional representation of the geologic formations which intersect the ground surface and may also provide information on the geologic conditions such as the strike and dip of beds and the orientation of joint sets. Specilaized geologic maps may also provide information such as formational thicknesses. Geologic maps often come accompanied by cross sections which provide information on the tpe of geologic formations present with depth and their orientations[16]. *Also see cross section and soil map.*

geologic time scale, *n* – [GEOLOGY] the division of all of Earth history into blocks of TIME distinguished by GEOLOGIC and evolutionary events, ordered sequentially and arranged into eons made up of eras, which are in turn made up of periods, which are in turn made up of epochs.

Eon	Era	Period	Time Before Present (my)
Phanerozoic	Cenozoic	Quaternary	1.64
		Tertiary	65
	Mesozoic	Cretaceous	146
		Jurassic	208
		Triassic	245
	Paleozoic	Permian	290
		Carboniferous	363
		Devonian	409
		Silurian	439
		Ordovician	510
		Cambrian	570
Precambrian	Proterozoic		3500
	Archaeozoic		4600

geology, *n* -- the SCIENTIFIC study of the EARTH, its CRUST and its STRATA.

geomagnetism, *n* – [GEOLOGY] the study of the magnetic properties of the Earth. *Also see electromagnetic field.*

geometry, *n* – [MATHEMATICS] (Greek *γεωμετρία*; geo = earth, metria = measure) arose as a FIELD of KNOWLEDGE dealing with spatial relationships. It was one of the two fields of pre-modern MATHEMATICS, the other being the study of numbers. In modern times, geometric concepts have been generalized to a high level of abstraction and complexity, and have been subjected to the methods of CALCULUS and abstract ALGEBRA, so that many modern branches of the field are barely recognizable as the descendants of early geometry. *Also see algebra, calculus, mathematics and statistics.*

geomorphic channel units, *n* – [GEOLOGY] FLUVIAL GEOMORPHIC descriptors of CHANNEL shape and STREAM velocity. Pools, riffles, and runs are types of geomorphic channel units considered for National Water-Quality Assessment (NAWQA) Program habitat sampling[47].

geomorphology, *n* – [GEOLOGY] the field of KNOWLEDGE that investigates the origin of LANDFORMS on the Earth and other planets. *Also see landform.*

geophysics, *n* – [GEOLOGY] the branch of GEOLOGY that studies the PHYSICS of the Earth, using the PHYSICAL PRINCIPLES underlying such PHENOMENA as seismic waves, HEAT FLOW, GRAVITY, and MAGNETISM to investigate planetary properties[43].

geophysical borehole log, *n* — [GEOPHYSICS] a log obtained by lowering an instrument into a BOREHOLE and continuously recording a PHYSICAL PROPERTY of native or backfill material and contained FLUIDS. Examples include RESISTIVITY, INDUCTION, CALIPER, SONIC, GAMMA-GAMMA and NATURAL GAMMA LOGS.

geopressured aquifer, *n* – [HYDROGEOLOGY] an AQUIFER where the fluid pressure exceeds normal HYDROSTATIC PRESSURE of 0.465 pounds per square inch per foot of depth[16].

geoprobe—*See direct-push drilling rig.*

geoscience, *n* – [SCIENCE] the sciences (as GEOLOGY, GEOPHYSICS, and GEOCHEMISTRY) dealing with the EARTH.

geostatistics, *n* – [GEOLOGY] applies the theories of stochastic processes and statistical inference to geographic phenomena. It was traditionally used in geo-sciences. Methods of geostatistics are used in petroleum geology, hydrogeology, meteorology, oceanography, geochemistry, forestry, environmental control, landscape ecology, agriculture (esp. in precision farming) etc. *Also see statistics.*

geotechnical engineering, *n* – [GEOLOGY] a combination of geological and civil engineering principles that involves the application of soil and rock mechanics to engineering problems.

geothermal gradient, *n* – [HYDROGEOLOGY] the rise in ground-water temperature with depth.

germicide, *n* – [CHEMISTRY] any compound that kills disease-causing MICROORGANISMS.

Ghyben-Herzberg Formula, *n* – [HYDROGEOLOGY] an EQUATION that relates the depth of a SALTWATER INTERFACE in a COASTAL AQUIFER to the height of the fresh WATER TABLE above sea level where,

$$h_s = (\rho_f/(\rho_s - \rho_f))h_f$$

and h_s is the depth of the saltwater interface below sea level, h_f is the height of freshwater above sea level, ρ_f is the fresh water density and ρ_s is the saltwater density.

> DISCUSSION – The Ghyben-Herzberg formula was developed in around 1900 along the coast of The Netherlands. It is used for managing water supplies in coastal and island aquifers.

Also see saltwater intrusion.

giardiasis, *n* – [TOXICOLOGY] a disease that results from an infection by the protozoan parasite Giardia Intestinalis, caused by drinking water that is either not filtered or not chlorinated. The disorder is more prevalent in children than in adults and is characterized by abdominal discomfort, nausea, and alternating constipation and diarrhea.

Gibbs Free Energy, *n* – [PHYSICS] a THERMODYNAMIC PROPERTY devised by Josiah Willard Gibbs in 1876 to predict whether a PROCESS will occur spontaneously at constant PRESSURE and TEMPERATURE. Gibbs Free Energy (*G*) is defined as

$$G = H - TS$$

where *H*, *T* and *S* are the ENTHALPY, TEMPERATURE, and ENTROPY. Changes in ΔG correspond to changes in free energy for *processes* occurring at constant temperature and pressure; the Gibbs free energy change corresponds to the maximum non-expansion work that can be obtained under these conditions. The sign of ΔG is negative for all spontaneous processes and zero for processes at equilibrium. *Also see enthalpy, entropy, the van't Hoff Equation and thermodynamics.*

gill, *n* – [GEOGRAPHY] a deep, narrow, rocky VALLEY, especially a wooded RAVINE with a rapid STREAM running through it[16].

gio—*See geo.*

glacial, *n* – [GEOLOGY] referring to a GLACIER.

glacial aquifer, *n* – [HYDROGEOLOGY] material deposited by a GLACIER or in connection with glacial processes, that is capable of yielding appreciable quantities of water to WELLS[16].

glacial drift, *n* – [GEOLOGY] a generic term applied to all GLACIAL and GLACIOFLUVIAL deposits. *Also see glacial outwash.*

glacial outwash, *n* – [GEOLOGY] stratified deposits of sands and gravel deposited by melt-water streams that flowed from melting GLACIERS[16]. *Also see glacial drift, ice-contact outwash and proglacial outwash.*

glacial till—*See preferred term*: *till.*

glaciation, *n* – [GEOLOGY] a long period of TIME (10,000+ years) characterized by CLIMATIC conditions associated with the maximum GLACIAL extent. Also used to refer to covering of an area by ICE.

glacier, *n* – [GEOLOGY] a moving body of ICE that forms on land from the accumulation and compaction of snow, and that flows downslope or outward due to GRAVITY and the pressure of its own weight[16].

glaciofluvial, *adj* – [GEOLOGY] GEOMORPHIC feature whose ORIGIN is related to the PROCESSES associated with GLACIAL meltwater[16].

glaciolacustrine, *adj* – [GEOLOGY] pertaining to, derived from, or deposited in GLACIAL LAKES, especially said of deposits and LANDFORMS composed of suspended material brought by meltwater streams flowing into lakes bordering the glacier, such as DELTAS, KAME DELTAS, and varved sediments[16].

glauconite, *n* – [MINERALOGY] a greenish CLAY *mineral*, $(K,Na)(Al,Fe,Mg)_2(Al,Si)_4O_{10}(OH)_2$, a hydrous silicate of POTASSIUM, IRON, ALUMINUM, or MAGNESIUM, (found in greensand and used as a FERTILIZER and water softener)[4]. *Also see fertilizer.*

glen, *n* – [GEOGRAPHY] a narrow, steep-sided VALLEY[6].

gleyed soil, *n* – [AGRONOMY] SOIL that formed under poor DRAINAGE, resulting in the reduction of iron and other ELEMENTS in the profile and in gray colors and MOTTLES[20]. *Also see mottling.*

global positioning system (GPS) location, *n* – [GEOGRAPHY] a specific geographic location as determined by satellite radio signals.

global warming, *n* – [METEOROLOGY] an increase in the near SURFACE TEMPERATURE of the EARTH. Global warming has occurred in the distant past as the result of NATURAL influences, but the term is most often used to refer to the warming predicted to occur as a result of increased emissions of GREENHOUSE GASES. Scientists agree that the Earth's surface has warmed by about 1 degree Fahrenheit in the past 140 years. The Intergovernmental Panel on Climate Change (IPCC) recently concluded that increased concentrations of greenhouse gases are causing an increase in the Earth's surface temperature and that increased concentrations of sulfate aerosols have led to relative cooling in some regions, generally over and downwind of heavily industrialized areas. Increased temperatures caused by man's impact to the environment has the potential to drastically affect geological, hydrological and meteological processes[56].

gluon, *n* – [PHYSICS] elementary particles which act as the exchange particles (or gauge BOSONS) for the color force between QUARKS, analogous to the exchange of PHOTONS in the ELECTROMAGNETIC FORCE between two charged particles. *Also see bosons, photons and quarks*.

gnamma, *n* – [GEOLOGY] a small-sized cavity sculped into solid rock which refills with rainwater. *Also known as a weathering pit. Also see panhole.*

gneiss, *n* – [GEOLOGY] a COARSE-grained, FOLIATED METAMORPHIC ROCK marked by bands of light-colored MINERALS such as QUARTZ and FELDSPAR that alternate with bands of dark-colored minerals. This alternation develops through METAMORPHIC differentiation[4]. *See metamorphic rock.*

god, *n* – [PHILOSOPHY] *1*. a being perfect in power, wisdom and goodness who is worshipped as creator and ruler of the universe. *2*. a being believed to have more than natural attributes and powers and to require human worship[15].

good faith, *n* – [LAW] honestly and without deception. An agreement might be declared invalid if one of the parties entered with the intention of defrauded the other[19].

gooseneck, *n* – [GEOLOGY] the part of a winding VALLEY resembling in plan the curved neck of a goose. Normally found as part of an entrenched MEANDER[16].

gorge, *n* – [GEOLOGY] a narrow opening between HILLS[16]. *Also see canyon, gulch and ravine.*

gote, *n* – [HYDROLOGY] a watercourse[16].

gouffre, *n* – [GEOLOGY] a large pipe or shaft in an area of LIMESTONE[6]. *See also abîme*.

government, *n* – [LAW] the organization, machinery, or agency through which a political unit exercises authority and performs functions and which is usually classified according to the distribution of power within it.

graben, *n* – [GEOLOGY] *from German*, a block of ROCK that lies between two FAULTS and has moved downward to form a DEPRESSION between the two adjacent fault blocks[4]. *Also see horst.*

grab sample, *n* — [ENVIRONMENTAL INVESTIGATION] individual SAMPLE collected over a period of time usually not exceeding 15 minutes and in such a manner as to be REPRESENTATIVE of conditions at the time of sampling. Grab samples are sometimes called individual or discrete samples. *Also see composite sample.*

grab sampler, *n* – [ENVIRONMENTAL INVESTIGATION] a device that collects sediment from the bottom of a body of water[16].

gradation (grain-size distribution) (texture), *n* — [GEOLOGY] the proportions by MASS of a SOIL or fragmented rock distributed in specified particle-size ranges.

grade, *n* – [GEOLOGY] *1*. inclination or slope of a stream channel, conduit, or natural ground surface, usually expressed in terms of the ratio or percentage of number of units of vertical rise or fall per unit of horizontal distance. *2*. the ground surface[16].

graded stream, *n* -- [HYDROLOGY] a STREAM, which over a period of years, delicately adjusts it profile to provide, with available discharge and with prevailing channel characteristics, just the velocity required for the transportation of the load (of sediment) supplied from the drainage basin[16].

gradient, *n* – [PHYSICS] the rate of rise or fall of TEMPERATURE, PRESSURE, CONCENTRATION, ELEVATION, etc. in passing from one region to another. *Also see hydraulic gradient.*

grading, *adj* -- [GEOLOGY] degree of mixing of size classes in SEDIMENTARY material. Well graded implies a more or less uniform distribution from COARSE to FINE, whereas poorly graded implies uniformity in size or lack of a continuous distribution.

Graham's Law, *n* – [PHYSICS] law that states that the rates of diffusion of GASES are inversely PROPORTIONAL to the square roots of their DENSITIES.

grain, *n* – [GEOLOGY] a small hard PARTICLE or CRYSTAL. *Also see grading, grain size and granule.*

grain shape, *n* – [GEOLOGY] comprises attributes which refer to the external morphology of particles. These include surface texture, roundness and form. Grain shape is determined by: internal structure,

(mineral cleavage); characteristics of source rock such as jointing and bedding; lithology; hardness; fracture, and transport.

grain size, *n* – [GEOLOGY] refers to the physical dimensions of particles of ROCK or other solid. This is different from the crystallite size, which is the size of a single CRYSTAL inside the solid (a GRAIN can be made of several single crystals). Grain sizes can range from very small COLLOIDAL particles, through CLAY, SILT, SAND, and GRAVEL, to COBBLES and BOULDERS.

grain-size analysis (mechanical analysis) (particle-size analysis), *n* — [GEOLOGY] the PROCESS of determining grain-size distribution.

grainstone, *n* – [GEOLOGY] a SEDIMENTARY ROCK that lacks MUD and is GRAIN supported.

gram, *n* – [PHYSICS] MEASURE of WEIGHT in the Metric System equal to 0.001 kilogram and 0.0022 pound. *Also see kilogram, ounce and pound.*

grammar, *n* – [LANGUAGE] *1*. the characteristic system of inflections and SYNTAX of a language. *2*. a SYSTEM of RULES that defines the grammatical structure of a language.

grandfather clause, *n* -- [LAW] a provision exempting persons or other entities already engaged in an activity from rules or legislation affecting that activity. Grandfather clauses sometimes are added to legislation in order to avoid antagonizing groups with established interests in the activities affected.

granite, *n* – [GEOLOGY] a pink-colored, FELSIC, PLUTONIC rock that contains potassium and usually sodium FELDSPARS, and has a QUARTZ content of about 10%. Granite is commonly found on CONTINENTS but virtually absent from the OCEAN BASINS[4]. *Also see igneous rock and plutonic rock.*

granodiorite, *n* – [GEOLOGY] coarse-grained IGNEOUS ROCK intermediate in composition between GRANITE and DIORITE[4]. *Also see granite, igneous rock and plutonic rock.*

granular activated carbon (GAC), *n* – [TREATMENT TECHNOLOGY] a highly porous adsorbent material, produced by heating organic matter, such as coal, wood and coconut shell, in the absence of air, which is then crushed into granules. Activated carbon is positively charged and therefore able to remove negative ions from the water such as ozone, chlorine, fluorides and dissolved organic solutes by absorption onto the activated carbon. The activated carbon must be replaced periodically as it may become saturated and unable to absorb. Activated carbon is not effective in removing heavy metals. *Also see treatment*.

granule, *n* – [GEOLOGY] small rounded GRAIN or rock fragment[16]. *Also see grain.*

graph, *n* – [MATHEMATICS] *1*. a DIAGRAM showing the relations between VARIABLES, usually of two variables, each measured along one of a pair of axes at right ANGLES. *2*. a collection of points whose coordinates satisfy a given relation.

graphical interface user, *n* – [MATHEMATICS] a computer program which uses clear graphical displays to simplify the process of developing and scrutinizing the inputs and outputs of mathematical models[61].

grass, *n* – [BIOLOGY] any of a large family of monocotyledonous mostly herbaceous plants with jointed stems, slender sheathing leaves, and flowers borne in spikelets of bracts[15].

grass waterway, *n* – [HYDROLOGY] an area of GRASS which runoff water can move in a thin sheet across the land surface and thus proceed more slowly than it does when it moves across cultivated crops, hence causing less erosion[63].

gravel, *n* — [GEOLOGY] ROUNDED or semi-rounded PARTICLES of ROCK that will pass a 3-in. (76.2-mm) and be retained on a No. 4 (4.75-mm) U.S. standard sieve[16]. *Also see boulder, cobble and pebble.*

gravel envelope, *n* – SAND and/or GRAVEL placed around underground utilities such as WATER lines or SEWERS.

gravel pack, *n* — [HYDROGEOLOGY] common nomenclature for the terminology, primary filter of a well. *Also see primary filter pack*.

gravitational water, *n* – [HYDROGEOLOGY] water that moves under the force of GRAVITY[16]. *Also see free water*.

gravitational constant, *n* – [PHYSICS] the CONSTANT in Newton's Law of gravitation relating GRAVITY to the MASSES and separation of PARTICLES equal to 6.67×10^{-11} N m^2 kg^{-2}. *Also see acceleration due to gravity, gravity and physics.*

gravity, *n* – [PHYSICS] *1*. the FORCE of attraction exerted by one body in the universe on another. Gravity is directly proportional to the product of the masses of the two attracted bodies. *2*. the force of attraction exerted by the Earth on bodies on or near its surface, tending to pull them toward the Earth's center[24]. *Also see gravitational constant and physics.*

gravity drainage, *n* – [HYDROLOGY] the movement of MOISTURE downwards through a porous medium due to the force of GRAVITY[61].

gravity potential, *n* – [AGRONOMY] a potential that is due to the position of GROUND WATER or SOIL moisture above a DATUM[16].

gravity segregation, *n* – [GEOLOGY] a process whereby heavier and lighter petroleum components accumulate near the bottom and top of the reservoir, respectively, possibly due to the movement of gas to the top of the reservoir[34].

gravity spring, *n* – [HYDROGEOLOGY] a SPRING issuing from the point where the WATER TABLE and the land surface intersect; an outcrop of the water table[16].

gravity water, *n* – [HYDROLOGY] *1*. free water. *2*. water delivered in canals or pipelines by GRAVITY instead of by pumping, as for irrigation or a public water supply[16].

gray water, *n* – [HYDROLOGY] domestic WASTEWATER composed of wash water from kitchen, bathroom, and laundry sinks, tubs, and washers[16]. *Also see dry well.*

grease, *n* – [PETROLEUM CHEMISTRY]*1*. any thick, semi-solid, oily substance, can be a PETROLEUM derivative. *2*. a group of substances, including fats, waxes, free fatty acids, calcium and magnesium soaps, mineral oils, and certain other non-fatty materials.

grease trap, *n* – [WASTE DISPOSAL] a device for removing floating GREASE or scum from the surface of WASTEWATER in a tank. A malfunctioning grease trap can cause severe problems with SEPTIC SYSTEMS.

greenfield, *n* – [ENVIRONMENTAL REGULATION] an undeveloped, uncontaminated piece of property. *Opposite of a brownfield*.

greenhouse effect, *n* – [METEOROLOGY] the warming of the Earth's ATMOSPHERE attributed to a buildup of CARBON DIOXIDE or other GASES; some scientists think that this build-up allows the sun's rays to heat the Earth, while making the infra-red RADIATION atmosphere opaque to infra-red radiation, thereby preventing a counterbalancing loss of HEAT.

greenhouse gas, *n* – [METEOROLOGY] a GAS, such as CARBON DIOXIDE or METHANE, which contributes to potential climate change.

greensand, *n* – [GEOLOGY] a marine DEPOSIT in which GLAUCONITE predominates[6].

greenstone, *n* – [GEOLOGY] a term used by early geologists for slightly METAMORPHOSED BASIC IGNEOUS ROCKS such as epidorite[6].

greywacke, *n* – [GEOLOGY] an old ROCK name that has been variously defined but is now generally applied to a dark gray, firmly indurated, coarse-grained SANDSTONE that consists of poorly *sorted*, angular to subangular GRAINS of QUARTZ and FELDSPAR, with a variety of dark rock and MINERAL fragments embedded in a compact CLAYEY MATRIX having the general composition of SLATE and containing an abundance of very fine-grained illite, sericite, and chloritic minerals. Greywacke is abundant within the SEDIMENTARY section, especially in the older STRATA, usually occurring as thick, extensive bodies with sole marks of various kinds and exhibiting massive or obscure stratification in the thicker units but marked graded BEDDING in the thinner layers. It generally reflects an ENVIRONMENT in which EROSION, transportation, deposition, and burial were so rapid that complete CHEMICAL WEATHERING did not occur, as in an orogenic belt where SEDIMENTS derived from recently elevated source areas were poured into a geosyncline[4]. *Also see arkose, sandstone and quartzite.*

grèzes litées, *n* – [GEOLOGY] *from French,* deposits down a hillslope of fragments of ROCK bedded parallel to the slope[6].

grike, *n* – [GEOLOGY] a solutionally enlarged vertical or steeply inclined joint in the surface of a karstland, extending for up to a few meters into the LIMESTONE[6]. *Also spelled gryke.*

grit, *n* – [GEOLOGY] dense, INORGANIC MATTER, such as SAND and GRAVEL, present in WATER or SEWAGE[6].

grit-removal chamber, *n* – [TREATMENT TECHNOLOGY] in a waste-treatment plant, a chamber used for settling out stones, CINDERS and SAND[63].

groin—*See groyne.*

gross negligence, *n* – [LAW] failure to use even the slightest amount of care in a way that shows Recklessness or willful disregard for the safety of others[19]. *Also see negligence*.

grotto, *n* – [GEOLOGY] a large CAVE produce in a LIMESTONE region by the SOLVENT action of underground STREAMS and percolating water[4].

ground, *n* – [GEOLOGY] the SURFACE of the EARTH. *Also see land. Also known as ground surface.*

ground moraine, *n* – [GEOLOGY] linear piles of ROCKS, SEDIMENT and DEBRIS that remain after a glacier retreats[4]. *Also known as till. Also see glacial till, lateral moraine, recessional moraine and terminal moraine..*

ground penetrating radar, *n* – [PHYSICS] a GEOPHYSICAL method that uses high FREQUENCY ELECTROMAGNETIC waves to obtain subsurface information. *Also see geophysics.*

ground truth, *n* – [REMOTE SENSING] information obtained on surface/subsurface features to aid in interpretation of remotely sensed data. *Also see aerial photograph and remote sensing.*

ground water, *n* — [HYDROGEOLOGY] that part of the subsurface WATER that is in the saturated zone[4]. Ground water is also considered to be at or greater than atmospheric pressure.

DISCUSSION—Loosely, all subsurface water under saturated conditions as distinct from surface water.

FURTHER DISCUSSION – The term, ground water, is always two words, unless it is used as an adjective, when it would be hyphenated. However, there is much diagreement on this issue.

ground-water age, *n* – [HYDROGEOLOGY] the TIME elapsed since WATER entered the saturated zone and was isolated (through additional recharge). The AGE actually applies to the date of introduction of the CHEMICAL SUBSTANCE in the infiltrating water and not the age of the water itself.

DISCUSSION – The ground-water age can be helpful in assessing the age of contaminants in the ground water, such as gasoline derived from a leaking tank.

Also see chlorofluorocarbons, krypton-85, sulfur hexafluoride and tritium.

ground-water barrier, *n* — [HYDROGEOLOGY] SOIL, ROCK, or ARTIFICIAL material which has a relatively low PERMEABILITY and which occurs below the LAND SURFACE where it impedes the movement of ground water and consequently causes a pronounced difference in the potentiometric level on opposite sides of the barrier[4].

ground-water basin, *n* — [HYDROGEOLOGY] a ground-water system that has defined BOUNDARIES and may include more than one aquifer of PERMEABLE materials, which are capable of furnishing a significant WATER supply[4].

DISCUSSION — A basin is normally considered to include the surface area and the permeable materials beneath it. The surface-water divide need not coincide with ground-water divide.

ground-water discharge, *n* — [HYDROGEOLOGY] the WATER released from the ZONE OF SATURATION; also the VOLUME of water released.

ground-water disinfection rule, *n* – [ENVIRONMENTAL REGULATION] a 1996 amendment of the Safe Drinking Water Act requiring EPA to promulgate national primary drinking water regulations requiring disinfection as for all public water systems, including *surface waters* and ground water systems.

ground-water divide, *n* — [HYDROGEOLOGY] a RIDGE in the WATER TABLE or other POTENTIOMETRIC SURFACE from which GROUND WATER moves away in both directions normal to the ridge line[4]. *Also see catchment, divide, drainage basin and ridge.*

ground-water DNAPL zone, *n* – [HYDROGEOLOGY] DNAPL below the water table in either the residual or free-phase state[67].

ground-water elevation — *See free water elevation.*

ground-water flow, *n* — [HYDROGEOLOGY] the movement of WATER in the ZONE OF SATURATION.

ground-water flow direction, *n* – [HYDROGEOLOGY] the line or course that GROUND WATER is migrating. The average direction is PERPENDICULAR to lines of equal ground-water ELEVATION and in the direction of the maximum HYDRAULIC GRADIENT.

ground-water level, *n* — [HYDROGEOLOGY] the level or the WATER TABLE surrounding a BOREHOLE or WELL. The ground-water level can be represented as an elevation or as a depth below the ground surface.

ground-water mining – *See aquifer mining.*

ground-water migration rate, *n* – [HYDROGEOLOGY] the rate at which GROUND WATER FLOWS through a porous medium where,

$$V = K(dh/dl)/n_e$$

and V is the ground-water migration rate (LT^{-1}), K is the hydraulic conductivity (LT^{-1}), dh/dl is the hydraulic gradient (LL^{-1}) and n_e is the effective porosity (L^3L^{-3}). *Also known as the seepage velocity.*

ground-water model—*See model.*

ground-water mounding, *n* – [HYDROGEOLOGY] mound-shaped or RIDGE-shaped feature in a WATER TABLE, built up by influent seepage.

ground-water, perched—*See perched ground-water.*

ground-water quality criteria, *n* – [ENVIRONMENTAL REGULATION] the designated levels or CONCENTRATIONS of CONSTITUENTS that, when exceeded, will prohibit or significantly impair a designated use of water.

ground-water rebound, *n* – [HYDROGEOLOGY] a widespread rise in ground-water levels following a cessation of pumping[61].

ground-water recharge, *n* — [HYDROGEOLOGY] the PROCESS of WATER addition to the saturated zone; also the VOLUME of water added by this process.

ground-water surface — *See free water elevation.*

grout (monitoring wells), *n* — [HYDROGEOLOGY] a low PERMEABILITY material placed in the ANNULUS between the WELL CASING or RISER PIPE and the BOREHOLE wall (that is, in a single-cased MONITORING WELL), or between the riser and casing (that is, in a MULTI-CASED MONITORING WELL), to maintain the alignment of the casing and riser and to prevent movement of GROUND WATER or SURFACE WATER within the annular space. *Also see cement, lime and mortar.*

grout curtain, *n* – [MINING] a device created by inserting materials (usually grout) into rock units through boreholes to decrease their permeability[66].

grove, *n* -- [GEOGRAPHY] a small WOOD or group of TREES, especially, deliberately planted. *Also see forest, orchard and woods.*

growing season, *n* – [DENDROLOGY] relating to TREES, the season of CAMBIAL activity as opposed to the dormant season.

growth ring, *n* – [DENDROLOGY] the layer of wood produced in a tree during its annual growth period[4].

growth substrate, *n* – [BIOLOGY] an ORGANIC COMPOUND upon which a BACTERIA can grow, usually as a sole CARBON and ENERGY source.

groyne, *n* – [HYDROLOGY] a low wall built out into the SEA, more or less perpendicular to the coastline, to resist the migration of SEDIMENT along a BEACH and to minimize EROSION[4]. *Also spelled groin.*

grus, *n* – [GEOLOGY] coarse-grained SAND and GRAVEL that forms from WEATHERING of GRANITIC ROCKS[4].

gryke—*See grike.*

guano, *n* – [GEOLOGY] an accumulated DEPOSIT of animal excrement. In CAVES, it is most commonly associated with bat colonies, but cave dwelling birds such as swifts may also contribute. Guano is only abundant in tropical regions and may be dry and powdery, or a foul, wet, sludge[4].

guelta, *n* – [HYDROLOGY] a type of WETLAND found in desert regions. They are formed when ground water in lowland depressions spills to the surface and creates permanent pools and reservoirs.

gulch, *n* – [HYDROLOGY] CHANNEL deeply eroded by WATER which flows only due to STORM-WATER RUNOFF and/or during the melting of SNOW[4]. *Also see ditch, gully and trench.*

gulf, *n* – [GEOGRAPHY] a part of an ocean or sea extending into the land[4]. *Also see bay and sound.*

gull, *n* -- [GEOLOGY] a widened FISSURE formed by land slipping along VALLEY sides, generally where massive beds such as LIMESTONE overlie weaker ROCKS.

gullet, *n* – [HYDROLOGY] a narrow opening or DEPRESSION, such as a defile or RAVINE[16].

gully, *n* – [HYDROLOGY] CHANNEL deeply eroded by water which flows only due to storm-water RUNOFF and/or during the melting of snow. *Also see ditch, gulch and trench.*

gully erosion, *n* – [HYDROLOGY] the widening, deepening, and cutting back of small channels and waterways caused by erosion[63].

gumbo, *n* – [HYDROLOGY] a small CHANNEL produced by running water in earth or unconsolidated material, such as soil on a bare slope[4].

gumbotil, *n* – [AGRONOMY] a gray to dark-colored, leached, deoxidized CLAY representing the B HORIZON of fully MATURE SOILS, developed from profoundly weathered clay-rich TILL under conditions of low relief and poor subsurface drainage (as beneath broad, flat uplands).[4]

gut, *n* – [GEOGRAPHY] a very narrow passage or CHANNEL connecting two bodies of water such as a small creek in a marsh or tidal flat[16].

gutter, *n* – [HYDROLOGY] *1*. a shallow, natural channel, furrow, or gully worn by running water. *2*. a shallow, steep-sided valley that drains a marshy upland; it usually marks an area where the drainage is about to be rejuvenated. *3*. shallow waterway provided at the margin of a highway for surface drainage[16]. *Also see catch basin.*

guyot, *n* – [GEOLOGY] a seamount, the top of which has been flattened by WEATHERING, WAVE action, or stream EROSION[4]. *Also see mesa, plain and plateau.*

gypsum, *n* – [MINERALOGY] an EVAPORITE MINERAL with the formula, $CaSO_4 \cdot H_20$, normally formed in or near SALT FLATS[4]. *Also see anhydrite and evaporite.*

gymnosperm, *n* – [DENDROLOGY] vascular plants that produce seeds that are not enclosed in an ovary. Representatives of this group include the CONIFERS[12]. *Also see angiosperm and tree.*

gyttja, *n* – [GEOLOGY] SEDIMENTARY PEAT consisting mainly of plant and animal residues precipitated from standing water[20].

Hh

habitat, *n* – [BIOLOGY] *1*. living place, including the provisions for LIFE. *2*. the native ENVIRONMENT or specific surroundings where a PLANT or ANIMAL naturally grows or lives. The surroundings include physical factors such as TEMPERATURE, MOISTURE, and LIGHT together with biological factors such as the presence of food or predator ORGANISMS. *Also see environment.*

hachure, *n* – [GEOGRAPHY] short lines drawn on a map to run in the direction of maximum slope, which indicate the relief by their thickness and spacing. They are frequently employed to denote precipitous slopes when CONTOUR spacing becomes too close for clarity[6]. *Also see contour.*

hadron, *n* – [PHYSICS] a composite particle made of QUARKS held together by the strong force (as ATOMS and MOLECULES are held together by the ELECTROMAGNETIC force). Hadrons are categorized into two families: BARYONS (made of three quarks), and MESONS (made of one quark and one antiquark). *Also antiquark, baryon, meson and quark.*

haff, *n* – [GEOGRAPHY] a coastal LAGOON separated partially from the sea by a long SPIT[6].

hag, hagg, *n* – [GEOGRAPHY] an eroded CLIFF or residual of PEAT caused by the active dissection of a PEAT BOG[6].

hail, *n* – [METEOROLOGY] PRECIPITATION of small balls or pieces of ice (hailstones) with a DIAMETER ranging from 5 to 50 millimeters, sometimes more, falling either separately or agglomerated into irregular lumps. *Also see precipitation, rain, sleet and snow.*

haldenhang, *n* – [GEOLOGY] *from German,* a rock-cut slope which occurs as a basal slope, generally covered with TALUS, below the steeper rock face above[6].

half-life, *n* – [ISOTOPES] the TIME required for one-half of an original amount of RADIOACTIVE material to DECAY to DAUGHTER PRODUCTS. This concept is widely applied in ENVIRONMENTAL SCIENCE and FORENSICS to CONCENTRATIONS (not in MASS) of common environmental POLLUTANT COMPOUNDS that are not radioactive[16]. *Also see daughter product, isotope, parent product, radioactivity, radioisotope and radionuclide.*

halide, *n* – [CHEMISTRY] a compound of a HALOGEN with another ELEMENT or group. The halides of typical METALS are ionic (such as soldium fluoride, $Na^{+}F$). Metals can also form halides in which the bonding is largely covalent (such as aluminum chloride $AlCl_3$). Organic compounds are also sometimes referred to as halides, such as alkyl halides. Halides are referred to as fluorides, chlorides, bromides and iodides[17]. *Also see halogen*.

haloacetic acid, *n* – [CHEMISTRY] a group of chemicals that are formed along with other disinfection byproducts when chlorine or other disinfectants used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water. The regulated haloacetic acids, known as HAA5, are: monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid. *Also see disinfection byproducts and trihalomethanes.*

haloclasty, *n* – [GEOLOGY] a form of physical WEATHERING caused by the growth of SALT CRYSTALS within a ROCK. The process begins when saline water seeps into cracks and evaporates, depositing the salt crystals. As the rocks heat up, the crystals expand, exerting pressure on the surrounding rock which over time breaks apart.

halocline, *n* – [HYDROLOGY] LAYER in a STRATIFIED body of WATER in which the SALINITY gradient is at a maximum[16].

halogen, *n* – [CHEMISTRY] an ELEMENT of group VIIA (also known as Group 18). The name means "salt former"; halogens react with METALS to form binary ionic compounds. Fluorine (F), chlorine (Cl), bromine (Br), iodine (I), and astatine (At) are known at this time. *Also see periodic table and salt.*

halogenated solvents—*See chlorinated solvents.*

halophyte, *n* – [BIOLOGY] a PLANT able to tolerate and grow in salty (SALINE) conditions.

halorespiration, *n* – [BIOLOGY] REDUCTIVE DECHLORINATION caused by MICROORGANISMS that utilize chlorinated compounds as ELECTRON ACCEPTORS. *Also see reductive dehalogenation*.

hamada, *n* – [GEOGRAPHY] a very flat DESERT area of exposed BEDROCK. *Also see desert.*

hammock, *n* – [GEOMORPHOLOGY] a dense stand of hardwood trees that grow on natural rises of only a few inches higher than surrounding marshland that is otherwise too wet to support the vegetation. Hammocks are distinctive in that they are formed gradually over thousands of years rising in a wet area through the deposits of their own decomposing organic material. As a result they typically have a large and diverse density of various forms of plant and animal life. They appear as teardrop-shaped

islands shaped by the flow of water in the middle of the slough.

handling time – [ENVIRONMENTAL INVESTIGATION] it is generally accepted that all TRIP BLANKS, FIELD BLANKS, and ENVIRONMENTAL SAMPLE containers must be received in the field within one day of preparation in the LABORATORY. They may be held on site for a maximum of two calendar days. They must then be shipped back to the laboratory at the end of the second calendar day. All samples and blanks must be maintained at a TEMPERATURE of 4°C while on site and during shipment.

hanging glacier, *n* – [GEOLOGY] a GLACIER high on a mountainside or PLATEAU that does not extend into the lower areas.

hanging valley, *n* – [GEOLOGY] a VALLEY above the level of a main glaciated valley floor. This was formed by a decending GLACIER that was not as thick as the glacier in the valley, and so did not erode as deeply[16].

hanging wall, *n* – [GEOLOGY] one of blocks involved in FAULT movement. One that would be hanging overhead for person standing in tunnel along or across fault[4]. *Also see fault, footwall and mine.*

harbor, *n* – [GEOGRAPHY] a part of a body of water protected and deep enough to furnish anchorage; especially, one with port facilities.

hardness, *n* — [CHEMISTRY] the polyvalent-CATION CONCENTRATION of WATER (generally calcium and magnesium)[16]. *Also see bicarbonate and carbonate.*

hardpan, *n* – [AGRONOMY] a general term for a relatively hard, impervious, and often clayey soil lying at or just below the surface, produced as a result of the cementation of soil particles by precipitation of relatively insoluble materials such as silica, iron oxide, calcium carbonate and organic matter[16]. *Also see clapan, duripan, fragipan, ironpan and pan.*

hardwood, *n* – [DENDROLOGY] a harder wood variety obtained from temperate deciduous trees such as oak and tropical trees such as mahogony[12].

Hawaiian eruption, *n* – [GEOLOGY] this expression relates to a VOLCANIC FISSURE ERUPTION where large quantities of basic lava spill out with little explosive force. *Also see fissure.*

hazardous substance, *n* — [ENVIRONMENTAL REGULATION] in the United States, a SUBSTANCE defined as a hazardous substance pursuant to CERCLA 42 USC § 9601(14), as interpreted by EPA REGULATIONS and the COURTS: "(*A*) any substance designated pursuant to section 1321(b)(2)(A) of Title 33, (*B*) any ELEMENT, COMPOUND, mixture, solution, or substance designated pursuant to section 9602 of this title, (*C*) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (42 USC § 6921) (but not including any waste the regulation of which under the Solid Waste Disposal Act (42 USC § 6921 *et seq.*) has been suspended by Act of Congress), (*D*) any TOXIC POLLUTANT listed under section 1317(a) of Title 33, (*E*) any hazardous AIR pollutant listed under section 112 of the Clean Air Act (42 USC § 7412), and (*F*) any imminently hazardous chemical substance or mixture with respect to which the Administrator (of EPA) has taken action pursuant to section 2606 of Title 15. The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (*A*) through (*F*) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas)."

hazardous waste, *n* — [ENVIRONMENTAL REGULATION] in the United States, any WASTE having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (42 USC § 6901 *et seq.*) (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress) and so forth.

hazardous waste transport unit, *n* – [ENVIRONMENTAL REGULATION] means any portable non-powered device that is used to contain and transport hazardous waste off-site or to a hazardous waste facility by road, rail, water, or air and that is not normally disposed of with the waste. Hazardous waste transport unit includes, but is not limited to, roll-off containers, hoppers/dumpsters, rail cars, barges, trailer boxes/vans, trailer dumps, trailer tanks, and trailer vacs.

hazardous waste vehicle, *n* – [ENVIRONMENTAL REGULATION] any self-propelled device that is used to move hazardous waste off-site or to a hazardous waste facility. Hazardous waste vehicle is any combination of hazardous waste cab and transport unit, whether detachable or permanently attached, and includes, but is not limited to, straight boxes/vans, straight dumps, straight tanks, straight vacs, straight roll-offs, and pick-up trucks.

hazard ranking system (HRS), *n* – [ENVIRONMENTAL REGULATION] the primary screening tool used by the U.S. Environmental Protection Agency (EPA) to assess the risks posed to human health or the

environment by abandoned or uncontrolled hazardous waste sites. Under the HRS, sites are assigned scores on the basis of the toxicity of the hazardous substances present and the potential that those substances will spread through the air, surface, water, or groundwater, taking into account such factors as the proximity of the substance to nearby populations. Scores are used to help determine which sites should be placed on the National Priorities List (NPL) of sites most in need of cleanup. *Also see National Priorities List (NPL).*

Hazen method, *n* – [HYDROGEOLOGY] an EMPIRICAL EQUATION that can be used to approximate the HYDRAULIC CONDUCTIVITY of a SEDIMENT on the basis of effective GRAIN SIZE[33]. *Also see hydraulic conductivity and permeability.*

hazmat, *n* – [TOXICOLOGY] short for "hazardous material", a material (as flammable or poisonous material) that would be a danger to life or to the environment if released without precautions.

head, *n* — [HYDROGEOLOGY] [L] PRESSURE at a point in a LIQUID, expressed in terms of the vertical distance of the point below the SURFACE of the LIQUID[33].

head-dependent flux boundary, *n* – [HYDROGEOLOGY] a BOUNDARY CONDITION in which the relationship between processes occurring within and outside the mathematical model domain can be summarized as a water flux rate (into or out of the domain) whose direction and magnitude are determined by the HEAD differences across the boundary and its PERMEABILITY[61].

headland, *n* – [GEOGRAPHY] a point of LAND, usually high and with a sheer drop, extending out into a body of water; a PROMONTORY[16].

head (total), *n* — [HYDROGEOLOGY] the sum of three components at a point: (1) ELEVATION HEAD, *h* which is equal to the elevation of the point above a DATUM; (2) PRESSURE HEAD, h_p, which is the height of a column of STATIC WATER than can be supported by the static pressure at the point; and (3) VELOCITY HEAD, h_v, which is the height the kinetic energy of the liquid is capable of lifting the liquid. *Also see Bernoulli's Equation Also see elevation head, pressure head, static head and velocity head.*

headspace, *n* – [CHEMISTRY] the vapor/air mixture trapped above a solid or liquid in a sealed vessel.

head, static, *n* — [HYDROGEOLOGY] the height above a standard DATUM of the surface of a column of WATER (or other LIQUID) that can be supported by the STATIC PRESSURE at a given point. The static head is the sum of the ELEVATION HEAD and the PRESSURE HEAD.

headwaters, *n* – [HYDROLOGY] the source and upper reaches of a stream; also the upper reaches of a reservoir[16].

health & safety plan, *n* – [ENVIRONMENTAL INVESTIGATION] a written plan prepared by a contractor or other entity that describes the procedures and equipment the contractor will have in place at a site to prevent site workers from becoming sick or injured while conducting an investigation or cleanup.

hearsay, *n* – [LAW] EVIDENCE presented by a WITNESS who did not see or hear the incident in question but heard about it from someone else. With some exceptions, hearsay generally is not admissible as evidence at trial[19].

heartwood, *n* – [HYDROLOGY] the inner, mostly dark layer of XYLEM which, in the growing tree, has ceased to contain living cells[12]. Commonly denser than the sapwood. *Also see sapwood.*

heat, *n* – [PHYSICS] THERMAL ENERGY in the PROCESS of being added to or removed from a SUBSTANCE[24].

heat capacity, *n* – [PHYSICS] the measurable physical quantity that characterizes the amount of HEAT required to change a body's TEMPERATURE by a given amount. In the International System of Units, heat capacity is expressed in units of joules per kelvin.

heath, *n* — [GEOGRAPHY] a tract of WASTE LAND; especially in Great Britain, an open, level area clothed with a characteristic vegetation consisting principally of undershrubs of the genus *Erica*, or a large genus of low evergreen shrubs[6]. *Also see peatland.*

heating oil no. 1, *n* – [PETROLEUM CHEMISTRY] DISTILLATE of CRUDE OIL REFINING used for heating and within the CARBON RANGE of about C_8 to C_{14}[38]. Very similar in composition to KEROSENE.

heating oil no. 2, *n* – [PETROLEUM CHEMISTRY] DISTILLATE of CRUDE OIL REFINING used for the heating of residences and within the CARBON RANGE of about C_{12} to C_{20}. Very similar in composition to MOTOR DIESEL FUEL[38].

> DISCUSSION – In many US states, no. 2 heating oil is dyed, often red, to distinguish it from motor diesel fuel. On-road motor diesel fuel is taxed in the USA, whereas heating oil is not.

Also see diesel fuel.

heating oil no. 4, *n* – [PETROLEUM CHEMISTRY] DISTILLATE of CRUDE OIL REFINING used for the heating of apartment buildings and light industrial properties and within a CARBON RANGE of about C_{16} to C_{25}[38].

heating oil no. 6, *n* – [PETROLEUM CHEMISTRY] DISTILLATE of CRUDE OIL REFINING used for the heating of large apartment complexes and industrial sites and within a CARBON RANGE of about C_{20} and greater.

Similar in composition to BUNKER OIL used in ships[38]. The chemical composition of this product can be highly variable. *Also see bunker oil.*

heave, *n* — [AGRONOMY] upward movement of SOIL caused by expansion or displacement resulting from PHENOMENA such as: moisture ABSORPTION, removal of OVERBURDEN, driving of piles, frost action, and loading of an adjacent area.

heavy crude, *n* – [PETROLEUM CHEMISTRY] a thick, viscous, crude oil that exhibits showing an API GRAVITY of $<20^{o}$ [34]. *Also see crude oil.*

heavy gas oil, *n* – [PETROLEUM CHEMISTRY] PETROLEUM DISTILLATES with an approximate BOILING RANGE from 651 degrees Fahrenheit to 1,000 degrees Fahrenheit[38].

heavy metals, *n* – [CHEMISTRY] METALLIC ELEMENTS with high ATOMIC WEIGHTS; (such as MERCURY, CHROMIUM, CADMIUM, ARSENIC, and LEAD); can damage living things at low concentrations and tend to accumulate in the food chain[22].

heavy water, *n* – [ISOTOPES] WATER in which all the hydrogen atoms have been replaced by DEUTERIUM[22]. It is the most effective moderator available for nuclear reactors. Heavy water occurs in natural water in approximately one part in 7,000[64]. *Also known as deuterium oxide.*

hectare, *n* – [GEOGRAPHY] a measure of LAND in the Metric System, equal to 100 ares, 2.471 ACRES or 10,000 square meters. *Also see acre.*

height of capillary rise—*See capillary rise*.

Hele-Shaw model, *n* – [HYDROGEOLOGY] an analog MODEL of GROUND-WATER FLOW based on movement of a viscous fluid between two closely spaced parallel plates[33].

helium (He), *n* – [CHEMISTRY] a colorless, odorless, gaseous, non-metallic ELEMENT belonging to group 18 of the periodic table. It is chemically INERT and does not form any compounds[17].

hematite, *n* – [MINERALOGY] principal ore of iron, consisting mainly of Fe(III) oxide, Fe_2O_3[4]. *Also spelled haematite*.

hemiboreal, *adj* – [ECOLOGY] halfway between the temperate and subarctic (or BOREAL) zones**.**

hemisphere, *n* – [GEOGRAPHY] half of a sphere or half of the Earth, especially as divided by the EQUATOR (into the northern and southern hemispheres) or by a meridian passing through the poles (into the western and eastern hemispheres). *Also see Equator and Prime Meridian.*

Henry's Law, *n* – [CHEMISTRY] predicts that the SOLUBILITY (C) of a GAS or VOLATILE SUBSTANCE in a LIQUID is proportional to the partial PRESSURE (P) of the substance over the liquid:

$$P = k\,C$$

where k is called the Henry's law constant and is characteristic of the solvent and the solute[17]. *Also known as the air-water partitioning coefficient. Also see solubility and volatility.*

heptane ratio, *n* – [PETROLEUM CHEMISTRY] a thermal maturity parameter based on the abundance of *n*-heptane versus other gasoline-range hydrocarbons and commonly used with the *ISO*-HEPTANE RATIO[34].

herbicide, *n* – [CHEMISTRY] a CHEMICAL PESTICIDE designed to control or destroy plants, weeds, or GRASSES[22]. *Also see insecticide and pesticide.*

heteroatoms, *n* -- [PETROLEUM CHEMISTRY] compounds in refined PETROLEUM that contain SULFUR, NITROGEN, and OXYGEN. When heteroatoms are bound into molecular structures with CARBON and HYDROGEN, the resulting compounds no longer are HYDROCARBONS[17]. Typical examples of non-hydrocarbon compounds found in DIESEL include DIBENZOTHIOPHENE and carbazole. Although these compounds are present in small amounts, they play a large role in determining certain fuel properties.

heterocyclic, *n* – [CHEMISTRY] an unsaturated cyclic compound containing one or more atoms other than carbon. As part of the ring structure. The rings may be hexagonal or pentagonal, the latter appearing in furane, purine, and pyrrole families of heterocyclics[17].

heterocyclic polynuclear aromatic hydrocarbons (HPAHs), *n* – [CHEMISTRY] a POLYNUCLEAR AROMATIC HYDROCARBON (PAH) in which one or more of the ring-bound CARBON ATOMS is replaced by an atom of NITROGEN, OXYGEN or SULFUR.

> DISCUSSION – An important group of HPAHs found in diesel fuels and heating oils is the thiophenes. These are the sulfur-containing compounds and they are present in the middle distillates.

heterogeneity, *n* — [PHYSICS] having different PROPERTIES at different points, an important concept when dealing with the characteristics of an aquifer, such as HYDRAULIC CONDUCTIVITY, TRANSMISSIVITY or POROSITY[33]. *Also see homogeneous*.

> DISCUSSION — Although the ultimate interest is in the statistical parameter such as the mean concentration of a constituent of the population, heterogeneity relates to the presence of differences in the characteristics (for example, concentration) of the units in the population. It is due to the presence of fundamental heterogeneity (or fundamental error) in the population that sampling variance arises. Degree of sampling

variance defines the degree of precision in estimating the population parameter using the sample data. The smaller the sampling variance is, the more precise the estimate is.

Also see homogeneity and sampling error.

heterotrophic, *adj* – [BIOLOGY] characteristic of BACTERIA that OXIDIZE ORGANIC MATTER for ENERGY[22]. *Also see autotrophic.*

heuristic, *adj* – [MATHEMATICS] pertaining to an informal method for solving problems in the absence of an ALGORITHM for formal proof[24].

hexane, *n* – [CHEMISTRY] an (ALIPHATIC) ALKANE HYDROCARBON with the CHEMICAL FORMULA $CH_3(CH_2)_4CH_3$. The "hex" prefix refers to its six CARBONS, while the "ane" ending indicates that its carbons are connected by single BONDS. Hexane isomers are largely unreactive, and are frequently used as an inert solvent in organic reactions because they are very non-polar[17]. They are also common constituents of GASOLINE. Hexane is often used to decontaminate sampling equipment.

hexavalent chromium, *n* – [CHEMISTRY] CHROMIUM (Cr^{+6}) with a valence of +6. *Also see chromium and trivalent chromium.*

hiatus, *n* – [GEOLOGY] a gap in a STRATIGRAPHIC sequence of ROCKS, where the missing STRATA either were never deposited or were destroyed by EROSION prior to deposition of the overlying strata[6].

hierarchy, *n* – [MATHEMATICS] any number of objects ranked in grades one above another by classes or orders[6].

high-energy environment, *n* – [GEOLOGY] any FLUVIAL, LACUSTRINE or MARINE ENVIRONMENT having wave action or current motion of such magnitude that deposition of finer-grained SEDIMENT cannot take place[6].

high-frequency electromagnetic (EM) sounding, *n* – [GEOPHYSICS] a technology used for nonintrusive geophysical exploration, projects high-frequency electromagnetic radiation into subsurface layers to detect the reflection and refraction of the radiation by various layers of soil. Unlike ground-penetrating radar, which uses pulses, the technology uses continuous waves of radiation. *Also see ground-penetrating radar.*

highly-enriched uranium, *n* – [CHEMISTRY] uranium in which the proportion of the fissile isotope, ^{235}U, has been increased from the naturally-occurring 0.71% to a high level, normally taken to be at least 90% for weapons purposes, but defined as anything over 20% for regulatory and sageguards purposes[64]. *Also see depleted uranium, low-enriched uranium and uranium*.

highly-permeable soils, *n* – [AGRONOMY] SOILS having less than 15 percent SILTS and/or CLAYS. Soils may be classified in the field using a standard system texture analysis.

high-performance liquid chromatography (HPLC), *n* – [CHEMISTRY] a chromatographic METHOD used to separate petroleum into saturate, AROMATIC and polar fractions[34]. *Also see gas chromatography.*

high-sulfur distillate fuel oil, *n* – [PETROLEUM CHEMISTRY] distillate fuel oil having a sulfur content of greater than 500 milligrams per litre (mg/L).

DISCUSSION -- In 1993, the US federal government mandated that all on-road diesel fuels have a sulfur content of no more than 500 mg/L or 0.05%. This mandate did not include off-road fuels and heating oils.

high-sulfur no. 2 diesel fuel, *n* – [PETROLEUM CHEMISTRY] no. 2 diesel fuel that has a SULFUR content of greater than 0.05 percent by weight. As of 1993, this product cannot be used as an on-road fuel. *Also see high-sulfur distillate fuel oil.*

high tide, *n* – [HYDROLOGY] the maximum height reached by each rising TIDE. The high-high and low-high tides are the higher and lower of the two high tides, respectively, of each tidal day[47]. *Also low tide, neap tide and spring tide.*

highwall, *n* – [MINING] the exposed vertical or near-vertical wall associated with a strip mine or area surface mine[66].

hill, *n* – [GEOGRAPHY] a usually rounded natural ELEVATION of land lower than a MOUNTAIN[6]. *Also see crest, hillock, knoll, mountain, peak and ridge*.

hillock, *n* – [GEOGRAPHY] a small HILL or MOUND[6]. *Also see hill, hummock and knoll*

hinge fault—*See pivotal fault.*

hinterland, *n* – [GEOGRAPHY] the region lying behind a coastline[6].

historical geology, *n* – [GEOLOGY] branch of geology dealing with Earth's history as interpreted from the STRATIGRAPHIC record and its FOSSIL remains, and from any other form of evidence[6].

histogram, *n* – [STATISTICS] a diagrammatic representation of data to show their frequency distribution, usually constructed in the form of a multiple-bar, with frequencies plotted as ordinates and the magnitude as abscissae[6]. *Also see graph and pie-graph*.

historically-recognized environmental condition, *n* – [ENVIRONMENTAL INVESTIGATION] environmental condition which in the past would have been considered a recognized environmental condition, but which may or may not be considered a recognized environmental condition currently. The final decision

rests with the environmental professional and will be influenced by the current impact of the historical recognized environmental condition on the property. If a past release of any hazardous substances or petroleum products has occurred in connection with the property and has been remediated, with such remediation accepted by the responsible regulatory agency (for example, as evidenced by the issuance of a no further action letter or equivalent), this condition shall be considered an historical recognized environmental condition and included in the findings section of the Phase I Environmental Site Assessment report. The environmental professional shall provide an opinion of the current impact on the property of this historical recognized environmental condition in the opinion section of the report. If this historical recognized environmental condition is determined to be a recognized environmental condition at the time the Phase I Environmental Site Assessment is conducted, the condition shall be identified as such and listed in the conclusions section of the report.

historic fill material, *n* – [GEOLOGY] non-indigenous material, DEPOSITED to raise the TOPOGRAPHIC ELEVATION of the SITE, which was CONTAMINATED prior to emplacement, and is in no way connected with the operations at the location of emplacement and which includes, without limitation, construction DEBRIS, DREDGE SPOILS, incinerator residue, demolition debris, FLY ASH, or non-hazardous SOLID WASTE. Historic fill material does not include any material which is substantially chromate *chemical* production waste or any other chemical production waste or waste from processing of metal or *mineral ores*, *residues*, *slag* or tailings. In addition, historic fill material does not include a municipal solid waste landfill site[18].

history-matching, *n* – [HYDROGEOLOGY] a form of inverse modeling, especially used in modeling of ground-water flows, in which observed changes in hydraulic head and/or flow rates from springs or wells are compared with model output, and the model parameters are adjusted until a match is obtained between observed and modeled changes[61].

histosols, *n* — [AGRONOMY] ORGANIC SOILS such as PEATS and MUCKS[20].

Hjuström curve, *n* – [HYDROLOGY] a GRAPH used by hydrologists to determine whether a river will erode, transport, or deposit sediment.

H layer, *n* – [AGRONOMY] in a FOREST SOIL, a LAYER of AMORPHOUS ORGANIC MATERIAL below the litter and the partially decomposed HUMUS[4].

hogback, *n* – [GEOLOGY] any RIDGE with a sharp summit and steep SLOPES of nearly equal inclination on both flanks, and resembling in outline the back of a hog; specifically a sharp-crested ridge formed by the OUTCROPPING edges of steeply inclined RESISTANT ROCKS, and produced by differential EROSION. The term is usually restricted to ridges carved from BEDS dipping at angles greater than 20 degrees[4]. *Also see cuesta.*

hog wallow, *n* – [GEOGRAPHY] a faintly rolling land surface characterized by many low, coalescent or rounded mounds that are slightly higher than the basin-shaped depressions behind them[4].

holding pond, *n* – [HYDROLOGY] a pond or RESERVOIR, usually made of earth, built to store RUNOFF, which may be polluted.

holding time, *n* – [ENVIRONMENTAL INVESTIGATION] the maximum amount of TIME a SAMPLE may be stored before ANALYSIS.

holistic, *adj* — [SCIENTIFIC METHOD] of, concerned with, or dealing with wholes or integrated systems rather than with their parts. With respect to water-related issues, the term most typically describes an analytical and planning approach which examines and considers the inter-related linkages and interdependencies of a socio-economic system with resource use, pollution, environmental impacts, and preservation of an entire ECOSYSTEM.

hollow, *n* – [GEOGRAPHY] a VALLEY or BASIN usually cut within the side of a MOUNTAIN or large HILL. *Also see gulch, gulley, ravine and valley.*

hollow-stem auger drilling rig, *n* – [DRILLING TECHNOLOGY] conventional DRILLING METHOD that uses augers to penetrate the SOIL. As the augers are rotated, soil cuttings are conveyed to the ground SURFACE via auger spirals. Direct-push and sampling tools can be used inside the hollow augers. *Also see air-rotary drilling rig, cable-tool drilling rig, direct-push drilling rig and mud-rotary drilling rig.*

holm, *n* – [GEOGRAPHY] *from Danish*, a small ISLAND[6].

Holocene Epoch, *n* – [GEOLOGY] the second epoch of the QUATERNARY PERIOD, beginning about 11,000 years BP and continuing to the present time[6]. *See also Pleistocene Epoch.*

homeostasis, *n* – [BIOLOGY] the ability to reestablish the initial state of an ECOSYSTEM after some type of disturbance.

homocline, *n* – [GEOLOGY] one of a regular series of hills from a large area of rock STRATA of uniform DIP and thickness[6].

homogeneity, *n* — [PHYSICS] having the same PROPERTIES at all points. *Also see heterogeneity.*

homogeneous mass, *n* — [PHYSICS] a MASS that exhibits essentially the same PHYSICAL PROPERTIES at every point throughout the mass.

homogenization, *n* – [CHEMISTRY] PROCESS whereby a SAMPLE is mixed in a stainless steel bowl or in-situ until a consistent PHYSICAL appearance is achieved. This is performed for all PARAMETERS except VOLATILES.

homologous series, *n* – [CHEMISTRY] compounds those in which their MOLECULAR FORMULAS, when arranged in ascending order, form an arithmetical progression. The physical properties undergo a gradual change from one member to the next. A member of a homologous series is known as a *homologue*[34].

homologue—*See homologous series.*

hoodoo, *n* – [GEOLOGY] an American term for a weirdly shaped pillar of solid rock in a semi-arid environment, similar in form to an earth pillar. It is the result of undercutting by the wind[6].

hopane, *n* – [PETROLEUM CHEMISTRY] the C_{30} HOMOLOGUE in the hopane series of pentacyclic HYDROCARBONS[34].

hopanes, *n* – [PETROLEUM CHEMISTRY] C_{27} through C_{35} pentacyclic triterpanes that originate from bacteriohopanoids in bacterial membranes and generally dominate the triterpanes in PETROLEUM. A very common BIOMARKER used to FINGERPRINT the heavier petroleums[34]. *Also see biomarker and crude oil.*

horizon (soil horizon), *n* — [AGRONOMY] one of the LAYERS of the SOIL profile, distinguished principally by its TEXTURE, COLOR, STRUCTURE, and CHEMICAL content[6].

- ***"A" horizon*** — the uppermost layer of a soil profile from which inorganic COLLOIDS and other soluble materials have been leached. Usually contains remnants of organic life.
- ***"B" horizon*** — the layer of a soil profile in which material leached from the overlying "A" horizon is accumulated.
- ***"C" horizon*** — undisturbed parent material from which the overlying soil profile has been developed.

horizontal, *n* – [MATHEMATICS] PARALLEL to the PLANE of the horizon, at right angles to the VERTICAL. *Also see vertical.*

horn, *n* – [GEOLOGY] a high MOUNTAIN PEAK that forms when the walls of three or more CIRQUES intersect[6].

hornfels, *n* – [GEOLOGY] dense, GRANULAR METAMORPHIC ROCK. Since this term is commonly applied to a metamorphic equivalent of any FINE-grained rock, composition is variable[4]. *Also see metamorphic rock.*

hornito, *n* – [GEOLOGY] a small mound built on the back of a lavaflow (generally PAHOEHOE) formed by the accumulation of clots of fluid lava ejected through an opening in the roof of an underlying lava tube[4].

horst, *n* – [GEOLOGY] *from German*, a block of ROCK that lies between two FAULTS and has moved upward relative to the two adjacent fault blocks[6]. *Also see graben*.

Hortonian overland flow, *n* – [HYDROLOGY] an OVERLAND FLOW of water which occurs more or less simultaneously over a DRAINAGE BASIN when rainfall exceeds the infiltration capacity of the soil in the basin[16]. Named after the hydrologist Robert S. Horton.

hot spot, *n* — [ENVIRONMENTAL INVESTIGATION] a localized area of SOIL or GROUND-WATER contamination.

> DISCUSSION — A hot spot may be considered as a discrete volume of buried waste or contaminated soil where the concentration of a contaminant of interest exceeds some pre-specified threshold value. Although elliptically-shaped hot spots or targets are assumed for the purposes of calculating probabilities of detecting hot spots, hot spots are more likely to have variable sizes and shapes and not have clear and distinct boundaries. However, the concept of hot spots is consistent with known historical patterns of contaminant distributions.

hot spring, *n* – [HYDROLOGY] a thermal SPRING with TEMPERATURES above 37°C, where water follows out of the ground in a continuous and non-explosive way, in contrast to a GEYSER[6].

howe, *n* – [GEOGRAPHY] a Scottish term for a low place or depression[6].

hoya, hoyo, *n* – [GEOLOGY] *from Spanish*, a very large closed DEPRESSION. The term is used in Puerto Rico for DOLINE.

huayco, *n* – [HYDROLOGY] a Peruvian term that refers to a flash FLOOD caused by torrential rains occurring high in the mountains.

hue, *n* – color.

huerta, *n* – [GEOGRAPHY] *from Spanish*, a fertile area, or a field in a fertile area, common in Spain, in which a variety of common vegetables and fruit trees, especially lemons, are cultivated for family consumption and sale.

human, *n* – [BIOLOGY] of or consisting of the SPECIES (*homo sapiens*) to which men and women belong[15]. *Also see man.*

humic substances, *n* – [AGRONOMY] high-molecular-weight, brown to black substances formed in SEDIMENTS by secondary synthesis reactions during DIAGENESIS. The generic term describes the colored material or its fractions obtained on the basis of solubility characteristics, such as humic acid or fulvic acid[34].

humidity, *n* – [PHYSICS] the actual quantity or mass of water vapor present in a given volume of air, generally expressed in grams per cubic foot or in grams per cubic meter[6].

humification, *n* — [AGRONOMY] a PROCESS by which ORGANIC MATTER DECOMPOSES[6].

> DISCUSSION—The degree of humification for peats is indicated by the state of the fibers. In slightly decomposed material, most of the volume consists of fibers. In moderately decomposed material, the fibers may be preserved but may break down with disturbance, such as rubbing between the fingers. In highly decomposed materials, fibers will be virtually absent.

Also see humus.

hummock, *n* – [GEOGRAPHY] characteristic of a hillock or knoll[6]. *Also see hillock and knoll.*

hummocky moraine, *n* – [GEOLOGY] an area of knob-and-kettle topography that may have been formed either along a live ice front or around masses of stagnant ice[4].

humus, *n* — [AGRONOMY] a brown or black material formed by the partial decomposition of vegetable or animal matter; the ORGANIC portion of SOIL[6].

Hvorslev method, *n* – [HYDROGEOLOGY] a procedure for performing a SLUG TEST in a PIEZOMETER that partially penetrates a WATER-TABLE AQUIFER[33]. *Also see slug test.*

hydration, *n* — [CHEMISTRY] formation of a COMPOUND by the combining of WATER with some other SUBSTANCE[6].

hydraulic communication, *n* — [HYDROGEOLOGY] the migration of FLUIDS from one zone to another, can be along a casing grout plug, or through back fill materials or between differing AQUIFERS or geologic formations.

hydraulic conductivity, *n* — [HYDROGEOLOGY] [LT^{-1}] *1*. the volume of WATER at the existing KINEMATIC VISCOSITY that will move in a unit time under a unit HYDRAULIC GRADIENT through a unit area measured at right angles to the direction of flow[16]. *2*. a measure of the ease at which a material can transmit water. *Also see Darcy's Law, intrinsic permeability and permeability.*

hydraulic diffusivity, *n* – [HYDROGEOLOGY] [L^2T^{-1}] *1*. the conductivity of the saturated medium when the unit volume of water moving is that involved in changing the head a unit amount in a unit volume of medium[65]. Can be derived by the equation T/S or K/S_s. *2*. the COEFFICIENT OF TRANSMISSIVITY of an AQUIFER divided by its STORAGE COEFFICIENT or T/S[42]. *Also see storage coefficient, storatvity and transmissivity.*

hydraulic dispersion—*See mechanical dispersion.*

hydraulic fluid, *n* – [PETROLEUM CHEMISTRY] a liquid of low VISCOSITY (such as light OIL) that is used in systems actuated by LIQUID (such as the brake system in a car). *Also known as hydraulic oil. Also see lubricating oil.*

hydraulic fracturing, *n* — [HYDROGEOLOGY] the fracturing of an underground STRATA by PUMPING WATER or GROUT under a PRESSURE in excess of the tensile strength and confining pressure[16]. *Also called hydrofracturing, "fracing" or "fracking".*

hydraulic gradient, *n* — [HYDROGEOLOGY] [LL^{-1}] the change in total HYDRAULIC HEAD of WATER per unit distance of flow or commonly known as the "slope of the water table"[33].

> ***critical hydraulic gradient***, i_c —hydraulic gradient at which the intergranular pressure in a mass of cohesionless soil is reduced to zero by the upward flow of water.

Also see gradient and vertical hydraulic gradient.

hydraulic head, *n* – [HYDROGEOLOGY] *1*. ELEVATION to which WATER will rise in a PIEZOMETER connected to a point in an AQUIFER. *2*. sum of the elevation and the PRESSURE HEAD in a LIQUID, expressed in units of height. *Also see head, total.*

hydraulic lift, *n* – [PETROLEUM TECHNOLOGY] a lift or elevator operated by a long vertical ram, working in a cyclinder to which a liquid is admitted under pressure, such as a hydraulic fluid. Commonly found in automotive repair facilities.

hydraulic lift tank, *n* – [PETROLEUM TECHNOLOGY] a tank holding hydraulic fluid for a closed-loop mechanical system that uses compressed air and hydraulic fluid to operate lifts, elevators and other similar devices[48].

hydraulics, *n* – [HYDROLOGY] concerned with the use of WATER; of water conveyed through pipes or CHANNELS. *Also see geohydrology, hydrogeology and hydrology.*

hydrazine, *n* – [CHEMISTRY] a highly toxic liquid used in rocket propellant, agricultural chemicals, drugs, spandex fibers, antioxidants, plating metals on glass and plastic, explosives, and in boiler feedwater. The

chemical compound causes a severe explosion hazard when exposed to heat.

hydrocarbons, *n* – [PETROLEUM CHEMISTRY] various ORGANIC COMPOUNDS composed of HYDROGEN and CARBON ATOMS that can exist as SOLIDS, LIQUIDS and GASES. Sometimes the term is used loosely to refer to PETROLEUM. *Also see crude oil, oil and petroleum.*

hydrocompaction, *n* – [AGRONOMY] the process whereby soils collapse when wetted.

hydrocracking, *n* – [PETROLEUM TECHNOLOGY] PROCESS used to convert heavier feedstock into lower-boiling, higher-value products. The process employs high PRESSURE, high TEMPERATURE, a CATALYST, and HYDROGEN[26]. *Also see alkylation, catalytic cracking, hydrotreating, hydroprocessing, isomerization and reforming.*

hydrodesulfurization, *n* – [PETROLEUM TECHNOLOGY] a catalytic chemical process used to remove SULFUR from NATURAL GAS and refined petroleum products such as GASOLINE, JET FUEL, KEROSENE, DIESEL FUEL, and fuel oils.

hydrodynamic dispersion, *n* – [HYDROGEOLOGY] the spreading (at the macroscopic level) of the solute front during transport resulting from both mechanical dispersion and molecular diffusion.

> DISCUSSION – Dispersion occurs in all three directions and is known as longitudinal (D_x), transverse (D_y) and vertical (D_z).

Also see diffusion and dispersion.

hydrodynamics, *n* – [HYDROLOGY] the branch of HYDRAULICS which deals with the pressures created by water turbulence and its flow through channels, conduits, pipes and over WEIRS[6].

hydrofracturing—*See hydraulic fracturing.*

hydrogen (H), *n* – [CHEMISTRY] ELEMENT no. 1, ATOMIC WEIGHT 1.00797. The most abundant element in the universe. Hydrogen occurs as H_2 at ambient TEMPERATURE and PRESSURE, a colorless, odorless, and extremely FLAMMABLE GAS. Discovered in 1766 by Cavendish[17]. *Also known as protium. Also see deuterium and tritium.*

hydrogenation, *n* – [CHEMISTRY] the chemical combination of HYDROGEN with another substance via HEAT and PRESSURE in the presence of a CATALYST[34].

hydrogen bonding, *n* – [CHEMISTRY] the bonding of two electronegative ATOMS by a HYDROGEN atom. The hydrogen atom is linked to one electronegative atom by a COVALENT BOND and to the other by an electrostatic bond[34].

hydrogenesis, *n* – [HYDROGEOLOGY] a process of CONDENSATION of moisture in the PORE spaces of a SOIL or an unconsolidated sediment[6].

hydrogen release compound (HRC), *n* – [REMEDIATION TECHNOLOGY] a polylactate ester that is specifically designed to slowly release lactic acid when contacted with WATER. Its purpose is to time release lactic acid when hydrated which is then metabolized by subsurface MICROBES that indirectly produce HYDROGEN. Hydrogen is a key ingredient in an ANAEROBIC CONTAMINANT DEGRADING PROCESS known as REDUCTIVE DECHLORINATION or REDUCTIVE DEHALOGENATION. Reductive dechlorination is the mechanism by which CHLORINATED compounds are BIODEGRADED. *Also see oxygen release compound (ORC).*

hydrogen sulfide (H_2S), *n* –[CHEMISTRY] GAS emitted during ORGANIC DECOMPOSITION. Also a by-product of OIL REFINING and burning. H_2S smells like rotten eggs and, in heavy CONCENTRATION, can kill or cause illness.

hydrogeology, *n* – [GEOLOGY] the study of the interrelationship of GEOLOGIC materials and PROCESSES with WATER, especially GROUND WATER. Hydrogeology tends to be more qualitative, whereas GEOHYDROLOGY is more quantitative. *Also see hydrology and geohydrology.*

hydrograph, *n* – [HYDROLOGY] GRAPH showing the VARIATION in TIME of some HYDROLOGICAL DATA such as STAGE, DISCHARGE, velocity, SEDIMENT LOAD, etc. (hydrograph is mostly used for stage or discharge)[6].

hydrography, *n* – [HYDROLOGY] SCIENCE dealing with the description and MEASUREMENT of open bodies of WATER, such as OCEANS, SEAS, STREAMS, RIVERS, LAKES, RESERVOIRS, etc. In particular, charting the open bodies of water for navigational purposes[6].

hydrologic budget, *n* – [HYDROLOGY] an accounting of the inflow to, outflow from, and storage in a hydrologic unit such as a DRAINAGE BASIN, AQUIFER, soil zone, LAKE or RESERVOIR; the relationship between EVAPORATION, PRECIPITATION, RUNOFF, and the change in water storage, expressed by the hydrologic equation[16].

hydrologic cycle, *n* – [HYDROLOGY] the complete cycle through which WATER passes, from the OCEANS, through the ATMOSPHERE, to the LAND, and back to the ocean[16].

hydrologic unit, *n* — [HYDROLOGY] GEOLOGIC STRATA that can be distinguished on the basis of capacity to YIELD and transmit FLUIDS. AQUIFERS and CONFINING UNITS are types of hydrologic units. BOUNDARIES of a hydrologic unit may not necessarily correspond either laterally or vertically to LITHOSTRATIGRAPHIC FORMATIONS.

hydrology, *n* – [SCIENCE] the SCIENTIFIC study of the distribution, circulation and PROPERTIES of the WATERS of the EARTH.

hydrolysis, *n* – [GEOLOGY] a form of CHEMICAL WEATHERING in which IONS from WATER replace equivalently CHARGED IONS from a MINERAL, especially a SILICATE, or any type of chemical dissolved in water[6].

> DISCUSSION – Hydrolysis is a form of weathering for the chlorinated solvent: 1,1,1-trichloroethane (TCA). When dissolved in water, TCA will convert through hydrolysis to 1,1-dichloroethylene.

hydrophelicity, *n* — [CHEMISTRY] the PROPERTY that defines a material as attracting WATER. Water exhibits an acute contact ANGLE with HYDROPHILIC materials.

hydrophilic, *adj* – [CHEMISTRY] having a strong affinity for WATER. *Also see hydrophobic.*

hydrophobic, *adj* — [CHEMISTRY] the property that defines a material as being WATER repellent. Water exhibits an obtuse contact ANGLE with hydrophobic materials. *Also see hydrophyllic*.

hydrophyte, *n* – [BIOLOGY] PLANT LIFE adapted to growth and reproduction under periodically saturated root zone conditions during at least a portion of the growing season[33].

hydroprocessing, *n* – [PETROLEUM CHEMISTRY] a generic term for a range of PROCESSES that use HYDROGEN and an appropriate CATALYST to remove undesired COMPONENTS from REFINERY streams. The processes range from mild conditions that remove reactive COMPOUNDS like OLEFINS and some SULFUR and NITROGEN compounds, to more severe conditions that saturate AROMATIC RINGS and remove almost all sulfur and nitrogen compounds. Hydroprocessing breaks apart molecules containing sulfur and converts the sulfur to hydrogen sulfide, which is subsequently removed from the fuel[37].

hydrosphere, *n* – [HYDROLOGY] all the water of the EARTH, as distinct from the ATMOSPHERE and LITHOSPHERE. It includes both the comparatively shallow layer of water (in liquid and solid form) which covers nearly three-quarters of the earth's surface, forming the oceans, seas, lakes, ice sheets, etc., water present in the atmosphere and ground water[6]. *Also see atmosphere, bathysphere and lithosphere*.

hydrostatic gradient, *n* – [HYDROGEOLOGY] the pressure increase with depth of a liquid in contact with the surface. The gradient for fresh water is 9.8 kilopascals per meter (or 0.433 pounds per square inch per foot).

hydrostatic head, *n* — [HYDROGEOLOGY] the FLUID PRESSURE of FORMATION WATER produced by the height of WATER above a given point.

hydrostatic pressure, *n,* — [HYDROGEOLOGY] a state of stress in which all the principal stresses are equal (and there is no shear stress), as in a LIQUID at rest; the product of the unit WEIGHT of the liquid and the different in ELEVATION between the given point and the FREE WATER ELEVATION.

> ***excess hydrostatic pressure (hydrostatic excess pressure)*** — the pressure that exists in pore water in excess of the hydrostatic pressure.

hydrotreating, *n* – [PETROLEUM CHEMISTRY] a generic REFINING term for a range of PROCESSES that use HYDROGEN with an appropriate CATALYST to remove IMPURITIES from a refinery stream. The processes run the gamut from mild, selective hydrotreating to remove highly reactive OLEFINS to heavy hydrotreating to convert AROMATICS to NAPHTHENES[37].

hydroxide, *n* – [CHEMISTRY] a metallic compound containg the OH^- ION or containing the HYDROXYL (OH^-) group bound to a METAL ATOM[17].

hydroxyl, *n* – [CHEMISTRY] an ION consisting of OXYGEN and HYDROGEN with a –1 charge (OH^-)[17].

hydroxylation, *n* [CHEMISTRY] addition of a hydroxyl group to a chlorinated aliphatic hydrocarbon[62].

hyetal, *adj* – [HYDROLOGY] pertaining to rain, rainfall, or rainy regions, or the difference in rainfall between two isohyets[16].

hyetometer, *n* – [HYDROLOGY] a rain gage, an instrument used to measure rainfall at a given point on the ground. It comprises a collecting funnel, the rim of which is a standard 30 centimeters from the ground surface and an interchangeable aperture leading to a collecting container. The accumulated water is periodically emptied and measured in a calibrated, cylindrical flask[6, 16].

hygroscopic capacity (hygroscopic coefficient), *n,* — [HYDROGEOLOGY] the ratio of: (*1*) the WEIGHT of WATER ABSORBED by a dry SOIL or ROCK in a saturated ATMOSPHERE at a given TEMPERATURE, to (*2*) the weight of the oven-dried soil or rock.

hygroscopic water content, *n,* — [HYDROGEOLOGY] the WATER content of an air-dried SOIL or ROCK.

hyperbola, *n* – [MATHEMATICS] a curve with the EQUATION $x^2/a^2-y^2/b^2=1$.

hypersaline, *n* – [CHEMISTRY] a high SALT ENVIRONMENT where the AQUEOUS SALINITY exceeds 3.5 parts per thousand[54].

hypertrophic, *n* – [CHEMISTRY] containing a high nutrient content[63].

hypolimnion, *n* – [HYDROLOGY] bottom WATERS of a thermally stratified LAKE. The hypolimnion of a EUTROPHIC lake is usually low or lacking in dissolved OXYGEN[16].

hyporheic, *adj* – [HYDROLOGY] the zone near and under a STREAM or RIVER where GROUND WATER and SURFACE WATER mix. This is where ground-water CONTAMINANTS can enter a stream, and and important place for aquatic insects and developing salmon eggs.

hypothesis, *n* — [SCIENTIFIC METHOD] a supposition or CONJECTURE put forward to account for certain FACTS and used as a basis for further INVESTIGATION by which it may be proved or disproved[16].

hypoxia, *n* – [CHEMISTRY] WATERS with dissolved OXYGEN CONCENTRATIONS of less than 2 milligrams per liter, the level generally accepted as the minimum required for most marine life to survive and reproduce[7]. *Also see oxic and anoxic.*

hysteresis, *n* — [AGRONOMY] when a SOIL is dried and then rewetted, the drying and wetting soil water characteristic curves are not identical. The wetting curve is drier than the drying curve over a wide range of soil water POTENTIALS. This general PHENOMENON is known as hysteresis: a hysteretic relationship between two variables depends not only on the value of the independent variable, but also on whether that VALUE is increasing or decreasing. So the two curves form a closed loop with sharp ends[4].

Ii

ice, *n* – [CHEMISTRY] SOLID form of WATER.

DISCUSSION – Water freezes at 0°C (32°F), whereas sea water or salt water normally does not freeze until –4°C (27°F).

ice age, *n* – [GEOLOGY] *1*. a cold period marked by episodes of extensive GLACIATION alternating with episodes of relative warmth. *2*. the most recent glacial period, which occurred during the PLEISTOCENE EPOCH[4].

ice-contact deposit, *n* – [GEOLOGY] STRATIFIED DRIFT deposited in contact with melting glacier ice, such as an ESKER, a KAME, a KAME TERRACE or a feature marked by numerous KETTLES[4].

ice-contact outwash, *n* – [GEOLOGY] SANDS and GRAVEL originally deposited adjacent to stagnant GLACIAL ICE that collapsed when melted, leaving an irregular, often hilly TERRAIN[4].

ice sheet—*See continental ice sheet.*

ichnology, *n* – [GEOLOGY] a geological study that deals with traces of biological behavior, such as burrows and footprints within geologic formations.

iconic model, *n* – [MATHEMATICS] a MODEL of a real world situation reduced in scale but presenting the same properties. It contrasts with a simulation model[6].

idea, *n* – [SCIENTIFIC METHOD] the content of conscious thought[15].

ideal gas constant (R), *n* – [CHEMISTRY] a proportionality CONSTANT with a numerical value depending on the units in which pressure and volume are measured[17]. If pressure is expressed in atmospheres and volumes in liters, then R is 0.082054 liter atm $deg^{-1}mol^{-1}$.

idle land, *n* – [GEOGRAPHY] land capable of producing materials or services of value, but not at present being used.

igneous rock, *n* – [GEOLOGY] a ROCK made from molten (melted) or partly molten material that has cooled and solidified[4]. *Also see plutonic rock and volcanic rock.*

ignimbrite, *n* – [GEOLOGY] an alternative term for a welded TUFF formed by the fusing together of extremely hot tuff material ejected from a VOLCANO in the form of a NUÉE ARDENTE[6].

ignitability, *n* – [CHEMISTRY] the characteristic of a HAZARDOUS WASTE whereby it is easily combustible or FLAMMABLE.

ignition, *n* – [CHEMISTRY] the act or an instance of starting a FIRE. *Also see combustion.*

Illinois Glacial Stage, *n* – [CHEMISTRY] a time period of glacial advance of the North American ice sheet between about 380,000 years BP and about 550,000 years BP. Occurred before the SANGAMON INTERGLACIAL STAGE.

DISCUSSION – An easy way of remembering the four most recent glacial stages (time periods) in North America is through the phrase "Will Kane", representing Wisconsin, Illinois, Kansas and Nebraska.

Also see Wisconsin, Kansas and Nebrasks Glacial Stages.

illite, *n* – [MINERALOGY] a general name for three-layer, MICA-like CLAY MINERALS in ARGILLACEOUS ROCKS, especially marine SHALES[4].

illuminated relief, *n* – [GEOGRAPHY] the representation of relief on a MAP by the use of shading to simulate the shadow thrown by an apparent light source shining from one or more directions across a three-dimensional TOPOGRAPHY[6].

illuviation, *n* – [AGRONOMY] the movement of material into a portion of the soil profile from an overlying HORIZON[4].

image well, *n* — [HYDROGEOLOGY] an imaginary WELL located opposite a control well such that a BOUNDARY is the perpendicular bisector of a straight line connecting the control and image wells; used to simulate the effect of a boundary on water-level changes.

imaginary number, *n* – [MATHEMATICS] a complex number of the form *xi* where *x* is real and $i=\sqrt{-1}$.

imbibition, *n* -- [HYDROGEOLOGY] PROCESS by which a NON-WETTING FLUID in a porous MEDIUM is displaced by a WETTING FLUID[4]. *Also see wetting fluid and non-wetting fluid.*

immature, *n* – [PETROLEUM CHEMISTRY] refers to conditions too cool (or of too short duration) for thermal generation of PETROLEUM[34].

immature soil, *n* – [AGRONOMY] a SOIL which has not fully developed: recently formed[4]. *Also known as azonal soil.*

immediate environmental concern, *n* – [TOXICOLOGY] a condition which poses an acute threat to human health or a direct threat to drinking water including, but not limited to: *1*. dermal contact, inhalation or ingestion of contaminated materials. *2*. potable WATER supplies CONTAMINATED above the applicable DRINKING WATER STANDARD; and *3*. CONTAMINANTS which are confirmed to exist in an occupied or confined space, producing a TOXIC or harmful gas resulting in a potential for an acute short-

term human health exposure, or producing an OXYGEN deficient ATMOSPHERE, or resulting in demonstrated PHYSICAL damage to essential underground services[18].

immiscibility, *n* – [PHYSICS] the inability of two or more SUBSTANCES or LIQUIDS to readily dissolve into one another, such as soil and water or oil and vinegar[4]. *Also see miscibility and solubility.*

impact, *v* – [LANGUAGE] to cause an effect or influence, especially when strong. A word (*impacted*) often used instead of *contaminated* or *polluted,* when the exact DEGREE or MAGNITUDE is not known.

impartiality, *n* – [LOGIC] the absence of any BIAS toward or away from a particular person or OPINION[15].

impermeable, *adj* – [HYDROLOGY] pertaining to a LAYER of NATURAL and/or MAN-MADE material of sufficient thickness, DENSITY and COMPOSITION so as to have a maximum PERMEABILITY for WATER of 10^{-7} centimeters per second at the maximum anticipated HYDROSTATIC PRESSURE[18]. *Also see permeability.*

impermable boundary, *n* — [HYDROGEOLOGY] the conceptual representation of a NATURAL feature such as a FAULT or depositional contact that places a BOUNDARY of significantly less-permeable material laterally adjacent to an AQUIFER[33].

implication, *n* – [LOGIC] relation between two propositions, one of which may be inferred from the other.

impoundment, *n* – [HYDROLOGY] a body of WATER or SLUDGE confined by a DAM, DIKE, floodgate, or other barrier[4].

impurity, *n* – [CHEMISTRY] the quality or condition of being mixed with foreign matter, adulterated, dirty or ceremonially unclean. *Also see contamination and pollution.*

inceptisol, *n* – [AGRONOMY] a soil order characterized by having one or more HORIZONS in which mineral materials other than carbonates or AMORPHOUS SILICA have been altered or removed but not accumulated to a significant degree[4].

inch, *m* – [PHYSICS] measure of length in the English System equal to 0.083 FOOT or 12 inches to a foot. *Also see foot, kilometer, meter and mile.*

inch, *n* – [GEOGRAPHY] *from Gaelic*, a small ISLAND.

incineration, *n* — [TREATMENT TECHNOLOGY] controlled burning of WASTE products or other COMBUSTIBLE material.

incinerator, *n* – [TREATMENT TECHNOLOGY] any enclosed device using controlled flame COMBUSTION that neither meets the criteria of a boiler nor is listed as an industrial furnace.

incised, *adj* – [HYDROLOGY] STREAMS or RIVERS cut deeply into the LANDSCAPE[16].

incised meander, *n* -- [HYDROLOGY] a BEND in a RIVER formed when a rejuvenated river cuts deeper into the original MEANDER[4].

inclination, *n* – [MATHEMATICS] the measured VERTICAL ANGLE between the HORIZONTAL and a LINE or PLANE. *Also see angle.*

incompetent, *adj* – [GEOLOGY] a weak ROCK which is liable to distort or crack under PRESSURE[4].

inconsequent drainage, *n* – [HYDROLOGY] a DRAINAGE network that shows no relationship with the underlying structure[6].

increment borer, *n* – [DENDROLOGY] an AUGER-like instrument with a hollow shaft that is screwed into the trunk of a TREE, and from which an increment core (or tree core) is extracted using an extractor (a long spoon inserted into the shaft that pulls out the tree core)[12].

> DISCUSSION – Because these instruments are manufactured only in the Scandanavian countries, they can be quite expensive in the USA, normally ranging from US$400 to US$500 or more, as of 2010.

incubation, *n* – [CHEMISTRY] the maintenance of chemical mixtures at specified temperatures for varying time periods for the purpose of studying chemical reactions, such as enzyme activity[17].

index chemical, *n* – [FINGERPRINTING] a CHEMICAL whose usage time frame is known and, therefore, by its presence can help to estimate the age of ENVIRONMENTAL RELEASES.

> DISCUSSION – Because MTBE was only introduced in 1980, its presence in soil or ground-water samples tells us that the release post-dates 1980. There are numerous chemicals with known usage time frame that can help identify when a release occurred.

Also known as a time-dependent chemical or a marker chemical.

indicator parameters, *n* – [CHEMISTRY] parameters that are used as an indicator for the presence of other compounds. Examples include pH, specific conductance, total organic carbon (TOC) and total organic halogens (TOX).

indices (*pl.*), index (*s.*), *n* – [MATHEMATICS] *1*. an indicator of a trend, direction, tendency[15], etc. *2*. a pointer showing a quantity, a position on a scale.

indigenous, *n* – [BIOLOGY] living or occurring naturally in a specific area or ENVIRONMENT[22].

indirect exposure pathway, *n* – [TOXICOLOGY] an EXPOSURE pathway with at least one intermediate release to any media, or an intermediate biological

transfer step, between the source and the point(s) of exposure (such as chemicals of concern from soil through ground water to the point(s) of exposure).

indirect owner, *n* – [LAW] any person who holds a controlling interest in a direct owner or operator, holds a controlling interest in another indirect owner, or holds an interest in a partnership which is the indirect owner or a direct owner or operator, of an industrial establishment.

induced pan—*See pressure pan*

induced radioactivity, *n* – [CHEMISTRY] RADIOACTIVITY that is created when substances are bombarded by NEUTRONS or other particles. For example, the STABLE ISOTOPE ^{59}Co becomes the RADIOISOTOPE ^{60}Co under neutron bombardment[64].

induction, *n* – [SCIENTIFIC METHOD] logical reasoning that a general LAW exists because particular cases that seem to be examples of its existence[15]. *Also see deduction, logic and reasoning.*

induction log, *n* – [GEOPHYSICS] an ELECTRIC well log in which the CONDUCTIVITY of the FORMATION rather than the resistivity is measured. Because oil-bearing formations are less conductive of ELECTRICITY than water-bearing formations, an induction survey, when compared with resistivity readings, can aid in determination of OIL and WATER zones[4]. *Also see gamma log, gamma-gamma log, neutron log, sonic log and spontaneous potential log.*

indurated soil, *n* – [AGRONOMY] SOIL CEMENTED into a hard mass that will not soften when wetted.

induration, *n* – [GEOLOGY] the act or processing of making or becoming hard as in forming ROCKS out of SEDIMENTS[4]. *Also see consolidation, diagenesis and lithification.*

industrial park, *n* – [INDUSTRIAL TECHNOLOGY] a planned area with small, purposely-built factory units often located near transport routes.

industry, *n* – [COMMERCE] a branch of trade or manufacturing[45].

inert, *adj* — [PHYSICS] not participating in any fashion in CHEMICAL REACTIONS[17].

inertia, *n* – [PHYSICS] a property of MATTER by which it remains at rest or in uniform MOTION in the same straight line unless acted upon by some external FORCE[24].

inference, *n* – [LOGIC] the act or PROCESS of deducing or concluding from FACTS and REASONING[15]. *Also see Bayesian inference, deduction, induction, logic and reasoning.*

inferential statistics, *n* – [STATISTICS] STATISTICS which may be used to predict events, such as PROBABILITIES. *Also see probability and statistics.*

infiltrate, *v* – [HYDROLOGY] PROCESS of WATER moving from the land surface into the SOIL[20].

infiltration basin, *n* – [HYDROLOGY] a water IMPOUNDMENT over PERMEABLE SOILS which receives STORMWATER RUNOFF and contains it until it infiltrates the soils. These basins remove FINE-GRAINED SEDIMENT and the pollutants associated with them. COARSE-GRAINED sediment must be removed from the stormwater by other methods prior to entering the basin.

infiltration gallery, *n* – [HYDROLOGY] a sub-surface GROUND-WATER collection system, typically shallow in depth, constructed with open-jointed or perforated pipes that discharge collected water into a watertight chamber from which the water is pumped to treatment facilities and into the distribution system. Usually located close to streams or ponds. *Also see infiltration basin and leach field.*

infinity, *n* – [MATHEMATICS] MATHEMATICAL quantity (∞) that is larger than any fixed assignable quantity. By convention, the result of dividing any number by zero.

influent, *n* – [HYDROLOGY] WATER, WASTEWATER, or other LIQUID flowing into a RESERVOIR, BASIN, or treatment plant. *Also see effluent.*

influent stream--*See preferred term: losing stream.*

information, *n* – [SCIENTIFIC METHOD] facts told, heard or discovered.

infrared, *n* -- [PHYSICS] the ELECTROMAGNETIC SPECTRUM with WAVELENGTHS between 0.1 to 10 micrometers (μm).

infra-red aerial photograph, *n* – [REMOTE SENSING] an AERIAL PHOTOGRAPH taken of only the infra-red spectrum. With the infra-red spectrum, additional information can be obtained concerning the environment. For example, stressed vegetation is more apparent through the infra-red spectrum. *Also see aerial photograph and remote sensing.*

infrared photography, *n* – [REMOTE SENSING] a technique used in remote sensing to record reflected visible and infrared radiation with wavelengths of up to 0.9 micrometer (μm)[6].

infra-red radiation, *n* – [PHYSICS] RADIATION whose WAVELENGTHS are in the infrared spectrum; wavelength of greater than 7,600 angstroms.

ingrown meander, *n* – [HYDROLOGY] a MEANDER which cuts sideways into the BANK so that there is a slight overhang above the STREAM[6].

inhibition, *n* – [CHEMISTRY] a reduction in the rate of a CATALYZED REACTION by substances called inhibitors.

inhibitor, *n* – [CHEMISTRY] a SUBSTANCE that retards or reduces the rate of a CHEMICAL REACTION.

initiator, *n* – [CHEMISTRY] a SUBSTANCE or MOLECULE that initiates a CHAIN REACTION. Polymerization is an example.

injection, *n* – [HYDROGEOLOGY] generally refers to a system of artificially introducing surface water into the ground-water system as a means of storage or recharge. Most typically, this includes the use of recharge wells which work directly opposite of pumping wells to inject surface water into underlying formations. Depending on the water-bearing formation, these methods may have limited usefulness and are generally better used for pumping water into deep, confined aquifers[33].

injection well, *n* -- [HYDROGEOLOGY] a well into which FLUIDS are injected for purposes such as WASTE DISPOSAL, improving the recovery of CRUDE OIL, or solution mining.

injunction, *n* – [LAW] a court order that orders a party to do or refrain from doing a certain act (or acts) as opposed to a money judgment.

injury, *n* – [LAW] any adverse change or impact of a discharge on a NATURAL RESOURCE or impairment of a natural resource service, whether direct or indirect, long term or short term, and includes the partial or complete destruction or loss of the natural resource[18].

inlet, *n* – [GEOGRAPHY] a small arm of the SEA, a LAKE or a RIVER[6]. *Also see bay, gulf and sound.*

inlier, *n* – [GEOLOGY] a mass of old ROCKS surrounded by geologically younger rocks[6]. *Also see outlier*.

inner core, *n* – [GEOLOGY] the innermost portion of the Earth, which is solid and composed mostly of iron and nickel. *Also see crust, lithosphere, mantle and outer core.*

innermost ring. *n* – [DENDROLOGY] first-formed RING in a TREE, immediately next to the PITH[12]. *Also see pith.*

innocent land owner defense, *n* – [LAW] that defense to CERCLA liability provided in 42 USC §9601(35) and §9607(b)(3). One of the requirements to qualify for this defense is that the party make "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice. There are also additional requirements to qualify for this defense.

innovative remedial action technology, *n* – [REMEDIATION TECHNOLOGY] a new or alternative method, procedure or process that does not have a substantial operational record. An innovative remedial action technology with a substantial operational record in one field could be considered innovative if it is proposed for a new or different environmental problem[18].

inorganic, *adj* – [CHEMISTRY] a COMPOUND that does not contain CARBON chemically bound to HYDROGEN. Carbonates, bicarbonates, carbides, and carbon oxides are considered inorganic compounds, even though they contain carbon[17]. *Also see organic.*

inorganic acid, *n* – [CHEMISTRY] a COMPOUND composed of HYDROGEN and a non-metal element or radical such as hydrochloric acid (HCl), hydrofluoric acid (HF) or carbonic acid (H_2CO_3)[17].

> DISCUSSION – Inorganic acids are used in the production of alkylate, a major component in gasoline, through a refining process known as alkylation. The two acids used are HF and sulfuric acid (H_2SO_4). Today, H_2SO_4 is much more commonly used. The alkylation processes impose different chemical compositions onto the gasoline and this can be used to fingerprint products.

insecticide, *n* – [CHEMISTRY] a PESTICIDE COMPOUND specifically used to kill or prevent the growth of insects[22]. *Also see herbicide and pesticide*.

inselberg, *n* – [GEOLOGY] a steep isolated PEAK rising abruptly from a pediment[6].

insequent drainage, *n* – [HYDROLOGY] a DRAINAGE pattern which wanders irregularly across the land surface and is not influenced by topographic features[6].

in-situ, *adj* — [GEOLOGY] applied to a ROCK or SOIL when occurring in the situation in which it is NATURALLY formed or deposited. *Also see ex-situ.*

***in-situ* remediation**, *adj* – [REMEDIATION TECHNOLOGY] remedial activities that are conducted below the ground surface or where the contamination is situated as opposed to either: (1) pumping ground water and treating it above the ground surface or (2) excavating soil and treating or disposing of it.

institutional controls, *n* – [REMEDIATION TECHNOLOGY] a mechanism used to limit human activities at or near a contaminated site, or to ensure the effectiveness of the remedial action over time, when contaminants remain at a site at levels above the applicable remediation standard which would allow for the unrestricted use of the property. Institutional controls may include, without limitation, structure, land, and natural resource use restrictions, well restriction areas, classification exception areas, deed notices, and declarations of environmental restrictions[18].

insulated stream, *n* – [HYDROLOGY] a STREAM neither receiving nor abstracting WATER from a GROUND-WATER body because of an IMPERMEABLE BED[16].

insurance, *n* – [LAW] a CONTRACT whereby, for a stipulated consideration, one party undertakes to

compensate the other for loss on a specified subject by specified perils.

insurance carrier, *n* – [INSURANCE] a company or association that provides INSURANCE coverage to individuals or corporations.

integer, *n* – [MATHEMATICS] a whole number, which may be positive, zero or negative.

integration, *n* – [MATHEMATICS] the method in CALCULUS of determining the solutions of definite or indefinite integrals. A definite integral can be thought of as finding the area beneath a curve as expressed by an algebraic expression or function[24]. *Also see calculus, derivative and differentiation.*

integrity, *n* – [PHILOSOPHY] firm adherence to a code of especially MORAL or artistic values.

integrity testing, *n* -- [UNDERGROUND STORAGE TANK TECHNOLOGY] a method of testing structures where either hydrostatic testing using water or other liquid or pneumatic testing is done in combination with a system of nondestructive testing which includes shell thickness testing. The nondestructive testing procedures shall be adequate to detect cracks, leaks, and corrosion, erosion or other wall thinning to less than a predetermined minimum thickness to ensure sufficient structural strength. Nondestructive integrity test techniques include magnetic particle tests, acoustic emission tests, electromagnetic particle or eddy current tests, radiography and radiation tests, liquid penetrant tests, or ultrasonic tests.

interaquifer flow, *n* – [HYDROGEOLOGY] the flow that occurs between AQUIFERS through FRACTURE openings or through the wellbore[16].

interbedded, *adj* – [GEOLOGY] that which occurs between two layers or beds. A sandstone, for example, may be interbedded between two beds of shale or a lava may be interbedded between beds of sedimentary rocks[6].

intercepting sewer, *n* – [TREATMENT TECHNOLOGY] a SEWER that catches wastewater before it empties into a waterway, and transports it to a treatment plant[63].

interceptor trench, *n* – [REMEDIATION TECHNOLOGY] a ground-water remediation technology whereby a trench or ditch is constructed across the leading edge of a contaminant plume. Contaminants are then either pumped or skimmed from the ground water.

interface, *n* – [PHYSICS] the common BOUNDARY between two SUBSTANCES such as a *water* and a *solid*, WATER and a GAS, or two LIQUIDS such as water and OIL. *Also see surface.*

interface probe, *n* – [ENVIRONMENTAL INVESTIGATION] a device used to distinguish WATER and SEPARATE PHASE (such as OIL or CHLORINATED SOLVENT) inside of a WELL. *Also see LNAPL, DNAPL, NAPL and separate phase.*

interfacial tension, *n* – [PHYSICS] a tensile force that exists in the interface between immiscible fluids. Without interfacial tension, DNAPLs would be fully miscible (infinitely soluble) in water. The fact that interfacial tension exists between a DNAPL and water is a defining feature of a DNAPL. Interfacial tension can be measured in the laboratory; typical units are N/m and dynes/cm (1,000 dynes/cm = 1 N/m). Interfacial tension exists between any pair of immiscible fluids such as air and water, DNAPL and water, and DNAPL and air.

interference, *n* – [HYDROGEOLOGY] the condition occurring when the AREA OF INFLUENCE of a pumping WATER WELL comes into contact with or overlaps that of a neighboring well, as when two wells are pumping from the same AQUIFER or are located near each other.

interfingering, *v* – [GEOLOGY] the overlapping of beds representing different DEPOSITIONAL ENVIRONMENTS[4].

interflow, *n* – [HYDROGEOLOGY] *1*. that portion of the PRECIPITATION which has not passed down to the WATER TABLE, but is discharged from the area as subsurface flow into STREAM CHANNELS. *2*. FLOW of WATER from EPHEMERAL zones of saturation. It moves through the upper STRATA of a formation at a RATE much in excess of normal base-flow seepage[6].

interfluve, *n* – [HYDROLOGY] the RIDGE between two adjacent RIVER VALLEYS[6].

interglacial period, *n* – [GEOLOGY] a time period of relatively warm climate between two periods of glaciation and cold climate during the ice age[6].

intergranular, *adj* – [GEOLOGY] between the individual GRAINS in ROCK or SEDIMENT[4]. *Also see grain and granular.*

interim remedial measure, *n* — [REMEDIATION TECHNOLOGY] a remedial action that implements a partial solution prior to the selection of a final complete remedy. Interim remedial measures may be early actions, but they are often not. *Also see remedial action.*

interlocking spurs, *n* – [GEOGRAPHY] a series of RIDGES of land projecting out on alternate sides of a VALLEY and around which a RIVER winds - usually in the upper course of a river[6].

intermediate treatment, *n* – [TREATMENT TECHNOLOGY] waste-water treatment, such as aeration or chemical treatment, supplementary to primary treatment. Such treatment removes substantial percentages of very finely divided particulate matter,

in addition to the suspended solids removed by primary treatment[63].

intermittent stream, *n* – [HYDROLOGY] a STREAM that carries water only part of the time, generally in response to periods of heavy runoff either from snowmelt or storms; a stream or part of a stream that flows only in direct response to precipitation. It receives little or no water from springs or other sources. It is dry for a large part of the year, generally more than three months. Flow generally occurs for several weeks or months in response to seasonal precipitation, due to groundwater discharge, in contrast to the ephemeral stream that flows but a few hours or days following a single storm[6]. *Also see ephemeral.*

intermontane, *adj* – [GEOLOGY] describing the location between MOUNTAINS[6].

internal drainage, *n* – [HYDROLOGY] drainage in which the waters have no outlet and so do not reach the sea[63].

internal standard (IS), *n* – [CHEMISTRY] a pure ANALYTE added to a sample extract in a known amount, which is used to measure the relative responses of other analytes and SURROGATES that are components of the same SOLUTION. The internal standard must be an analyte that is not a sample component[51].

International Date Line, *n* – [GEOGRAPHY] any place west of 180° LONGITUDE is twelve hours ahead of Greenwich Mean Time and points east of it are twelve hours behind.

International Union of Pure and Applied Chemistry (IUPAC), *n* – [CHEMISTRY] an international organization which provides advice and standards on chemical nomenclature and other aspects of chemistry.

interpolation, *n* – [STATISTICS] the fitting of DATA VALUES between observed values. Frequently interpolation will be used when certain periods of data are missing, but data surrounding these missing data values is available. Interpolation techniques must be careful so as to attempt to repeat the patterns of the missing data with respect to trend, seasonality, and longer-term cycles.

interpretation, *n* – [SCIENTIFIC METHOD] the act or PROCESS of explaining the meaning of (something mysterious, abstruse, foreign words, etc.)[15]

interrogatory, *n* – [LAW] a set or series of questions drawn up for the purpose of being propounded to a party, witness, or other person having information of interest to a case[19].

interrupted river, interrupted stream, *n* – [HYDROLOGY] a RIVER which flows for part of its course on the surface, and part underground in CAVES[6].

interstate waters, *n* – [LAW] waters that flow across or form part of state or international boundaries; such as the Great Lakes, the Mississippi River, or coastal waters.

interstice—*See preferred term: void*.

interstitial, *adj* — [HYDROGEOLOGY] occurring between the GRAINS or in the PORES in ROCK or SOIL[34]. *Also see porosity.*

interstitial monitoring, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] the continuous surveillance of the space between the walls of an UNDERGROUND STORAGE TANK.

intrinsic bioremediation, *n* – [REMEDIATION TECHNOLOGY] a type of in situ BIOREMEDIATION that uses the innate capabilities of naturally occurring MICROBES to degrade CONTAMINANTS without taking any engineering steps to enhance the process.

intrinsic permeability—*See permeability, intrinsic.*

intrinsic remediation, *n* – [REMEDIATION TECHNOLOGY] IN SITU REMEDIATION that uses naturally occurring processes to degrade or remove contaminants without using engineering steps to enhance the process.

intrinsic tracer, *n* – [HYDROLOGY] a CHEMICAL, ISOTOPE or characteristic that is naturally present in a form suitable for tracing a given ELEMENT, COMPOUND or CONTAMINANT through a chemical or physical process.

> DISCUSSION -- An example of an intrinsic tracer would be the use of stable carbon isotope ($\delta^{13}C$) in methyl *tert*-butyl ether (MTBE) in a gasoline plume.

intrusive rock, *n* – [GEOLOGY] an IGNEOUS ROCK formed by the entrance of MAGMA into pre-existing rock[4]. *Also see extrusive rock, igneous rock, plutonic rock and volcanic rock.*

inundation, *n* – [HYDROLOGY] the PROCESS or act of flooding and being under or engulfed by water[4]. *Also see flood.*

inventory controls, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] the techniques used to identify a loss of product that are based on volumetric measurements in the underground storage tank and reconciliation of these measurements with hazardous substance delivery and withdrawal records[48].

inverse modeling, *n* – [MATHEMATICS] modeling in reverse to estimate what occurred in the past. Commonly used as part of a forensic investigation and often used to determine the time frame or onset

of contamination (when the contamination began). *Also see age dating, forward modeling and model.*

invert, *n* — [UNDERGROUND STORAGE TANK TECHNOLOGY] on the cross section, the lowest point of the underground excavation or the lowest point of an UNDERGROUND TANK.

investigation, *n* – [SCIENTIFIC METHOD] the process of observing or studying by close examination and systematic inquiry[15]. *Also see assessment and evaluation.*

investigation-derived waste, *n* – [ENVIRONMENTAL INVESTIGATION] waste materials generated during the collection of air, soil, ground water, surface water and/or sediment samples at a site. These materials often must be handled and disposed of as though they were hazardous waste. Includes materials like disposable personal protective equipment (gloves, etc.) and excess soil and groundwater from installing monitoring wells.

involution, *n* – [GEOLOGY] *1*. a contortion of superficial, rocky material and soils due to slumping, loading and volume changes in sediments. *2*. deformation of unconsolidated surface material by PERIGLACIAL activity[6]. *Also see creep, mass wasting and soil creep.*

ion, *n* – [CHEMISTRY] an ATOM or group of atoms that have either lost one or more ELECTRONS, making it positively charged (a CATION) or gained one or more electrons, making it negatively charged (an ANION)[17]. *Also see anion and cation.*

ion exchange, *n* – [CHEMISTRY] reversible CHEMICAL replacement of an ION bonded at the liquid-solid interface by an ion in SOLUTION[33].

ion exchange capacity, *n* – [AGRONOMY] the measured ability of a formation or SOIL to ADSORB CHARGED ATOMS or MOLECULES. *Also see cation exchange capacity (CEC).*

ionic bond, *n* – [CHEMISTRY] a type of CHEMICAL BOND where ATOMS exchange ELECTRONS[17].

ionic strength, *n* – [CHEMISTRY] an imperical measurement of the interactions among ions in a solution where,

$$\mu = {}^{1/2}\Sigma C_i Z_i^2$$

and μ is the ionic strength of the solution, Σ is the summation of the ionic strengths and concentrations in the solution, C_i is the molar concentration of the ion and Z_i is the charge of the ion[17].

ionization, *n* – [PHYSICS] the PROCESS of producing IONS as a result of solvation, HEAT, RADIATION, etc.

ionization potential, *n* – [PHYSICS] the energy required to remove a given electron from the molecule's atomic orbit (outermost shell) to an infinite distance[4]. It is expressed in electron volts (eV); one eV is equivalent to 23,053 calories per mole.

ionizing radiation, *n* – [PHYSICS] RADIATION that can strip ELECTRONS from ATOMS; such as ALPHA, BETA, and GAMMA radiation. *Also see non-ionizing radiation*.

iron (Fe), *n* – [CHEMISTRY] fourth most abundant ELEMENT, by WEIGHT, making up the CRUST of the Earth. The most common ORE is hematite (Fe_2O_3) from which the METAL is obtained by reduction with carbon. Iron is the cheapest and most abundant, useful, and important of all metals. *Also see ferric iron and ferrous iron.*

iron III reduction, *n* – [TREATMENT TECHNOLOGY] an anaerobic, microbially-facilitated process of transforming Fe^{3+} to Fe^{2+}. This process facilitates the MINERALIZATION of many contaminants, ultimately to CO_2. *Also see aerobic, anaerobic and methanogenesis.*

ironpan, *n* – [AGRONOMY] a thin, INDURATED SOIL HORIZON in which iron forms the major cementing material in the form of hydrous iron oxide, a hydrous oxide of iron and manganese, or an iron/organic complex[6]. *Also see claypan, duripan, fragipan, hardpan and pan*.

ironstone, *n* – [GEOLOGY] any ROCK containing a substantial proportion of an IRON compound, specifically iron-rich SEDIMENTARY rock[4]. *Also see ironpan.*

irradiation, *n* – [CHEMISTRY] the bomarding of atoms with nuclear particles to change the structure of the nucleus and produce radioactive atoms. Fuel that has been in a nuclear reactor is often called irradiated because it has been bombarded with NEUTRONS and has become radioactive[64].

irrational number, *n* – [MATHEMATICS] NUMBERS that cannot be expressed as whole numbers or fractions such as √2, π or *e*. *Also see rational numbers*.

irrigation, *n* – [HYDROLOGY] applying WATER or WASTEWATER to LAND areas to supply the water and NUTRIENT needs of plants[16].

island, *n* – [GEOGRAPHY] LAND mass surrounded on all sides by WATER[6]. *Also see peninsula, isthmus and causeway.*

island arc, *n* – [GEOLOGY] curved chain of islands produced by VOLCANIC activity at a destructive margin (where one tectonic plates slides beneath another)[54]. Japan is an example of an island-arc system.

islet, *n* – [GEOGRAPHY] a small ISLAND. *Also see atoll and island.*

***iso*-alkane**, *n* – [PETROLEUM CHEMISTRY] *1*. a branched-chain ALKANE with each CARBON ATOM having four BONDS. *2*. straight-chain alkanes that have a methyl group attached to the second carbon atom, such as 2-methyl alkanes[34].

isobar, *n* – [CHEMISTRY] NUCLIDES having the same MASS NUMBER (sum of PROTONS plus NEUTRONS).

***iso*-heptane ratio**, *n* – [PETROLEUM CHEMISTRY] a thermal maturity parameter based on the abundance of several C_7 HYDROCARBONS and commonly used with the heptane ratio[34].

isomer, *n* – [CHEMISTRY] COMPOUNDS with the same MOLECULAR FORMULA but different arrangements of their structural groups[34].

isomerization, *n* – [PETROLEUM CHEMISTRY] a REACTION that catalytically converts straight-chain HYDROCARBON MOLECULES into branched-chain molecules of substantially higher OCTANE NUMBER. The reaction rearranges the carbon skeleton of a molecule without adding or removing anything from the original material[34]. *Also see alkylation and catalytic cracking.*

***iso*-octane**, *n* – [PETROLEUM CHEMISTRY] a HYDROCARBON MOLECULE (2,2,4-trimethylpentane) with excellent ANTIKNOCK characteristics[26]. *Iso*-octane is not found in crude oils, but is produced through special alkylation units at refineries. The presence of *iso*-octane is evidence that the petroleum product is gasoline.

> DISCUSSION -- The octane rating of gasoline is generally based on the quantity of *iso*-octane in the mixture. For example, a gasoline containing 100% *iso*-octane would have a rating of 100, whereas gasoline containing 100% *n*-heptane would have a rating of 0.

Also see octane number.

isopach, *n* – [GEOLOGY] line on a MAP drawn through points of equal thickness of a designated GEOLOGICAL unit.

isopach, *n* – [HYDROGEOLOGY] line of equal GROUND-WATER rise or fall during a given period[4]. *Also see contour.*

***iso*-paraffins**–*See iso-alkanes.*

isopleth, *n* – [HYDROGEOLOGY] the line or area represented by an isoconcentration[4]. For example, a map depicting CONTAMINANT CONCENTRATIONS in GROUND WATER. *Also see contour*.

isoprene, *n* – [PETROLEUM CHEMISTRY] the basic structural unit composed of five CARBON ATOMS found in most BIOMARKERS, incluing mono-, sesqui-, di-, sester-, and tri-terpanes, steranes and polyterpanes[34].

isoprene rule, *n* – [CHEMISTRY] a rule which states that chemicals can be considered terpenes if their molecular formulas have a carbon to hydrogen ratio of 5:8.

isoprenoid, *n* – [PETROLEUM CHEMISTRY] HYDROCARBONS composed of, or derived from, polymerized isoprene units. These are branch-chained hydrocarbons containing two or more METHYL GROUPS. Typical acyclic isoprenoids include farnesane (C_{15}), norpristane (C_{18}), PRISTANE (C_{19}) and PHYTANE (C_{20})[34]. The most predominant isoprenoids in middle distillates, such as diesel fuel or heating oil, are pristane (2,6,10,14-tetramethylpentadecane) and phytane (2,6,10,14-tetramethylhexadecane).

> DISCUSSION -- Because of their relative resistance to alteration, pristane and phytane are often used for fingerprinting purposes. For example, the pristane/phytane ratio is commonly used to characterize crude-oil reservoirs and spilled petroleum products.

Also see Christensen & Larsen method.

isostasy, *n* – [GEOLOGY] the state of gravitational equilibrium between the earth's lithosphere and asthenosphere such that the tectonic plates "float" at an elevation which depends on their thickness and density. This concept is invoked to explain how different topographic heights can exist at the Earth's surface.

isotone, *n* – [CHEMISTRY] NUCLIDES with the same number of NEUTRONS.

isotope, *n* – [CHEMISTRY] one of two or more ATOMS of the same ELEMENT that have the same number of PROTONS in their NUCLEUS, but a different number of NEUTRONS[17].

> DISCUSSION – There are two types of isotopes: radioisotopes and stable isotopes. Radioisotopes are specific ISOTOPES of an element that is radioactive (will undergo a form of radioactive decay, either alpha, beta or gamma) such as ^{238}U, whereas a stable ISOTOPE that does not emit RADIATION such as ^{13}C or ^{18}O.

Also see radioisotope and stable isotope.

isotope dating, *n* – [ISOTOPES] the process of using relative proportions of PARENT to DAUGHTER ISOTOPES in radioactive decay to determine the age of a given rock, rock stratum or other material[4]. *Also carbon-14 dating.*

isotope fractionation, *n* – [ISOTOPES] a PROCESS that occurs as a result of differences in RATES of REACTION for different ISOTOPE species, known as the KINETIC ISOTOPE EFFECT. This difference results in a disproportionate CONCENTRATION of one isotope over a second.

DISCUSSION -- Fractionation has been found to occur as a result of the biodegradation of hydrocarbons. Recent studies have revealed that MTBE is susceptible to isotope fractionation processes as a result of biodegradation. Biodegradation tends to favor molecules with lighter isotopic species (such as ^{12}C), resulting in the enrichment of the heavier (such as ^{13}C).

Also see isotope.

isotopic number, *n* – [ISOTOPES] the difference between the number of NEUTRONS in an ISOTOPE and the number of PROTONS[17].

isotopologue, *n* – [CHEMISTRY] a molecular entity that differs only in isotopic composition (number of isotopic substitutions).

isotropic mass, *n* — [PHYSICS] a MASS having the same PROPERTY (or properties) in all directions[33].

isotropic material, *n* — [PHYSICS] a material whose properties do not vary with direction.

isotropy, *n* — [PHYSICS] having the same properties in all directions[6]. The opposite of this property is called ANISOTROPY.

issue, *n* – [LAW] a point in question; an important subject of debate or litigation.

isthmus, *n* – [GEOGRAPHY] a narrow piece of LAND connecting two larger land masses[6]. *Also see island, peninsula and causeway*.

Jj

jaw, *n* – [GEOGRAPHY] the side of a narrow passage such as a GORGE[54].

jebel, *n* – [GEOLOGY] *from Arabic,* a MOUNTAIN or HILL in a hot, DESERT ENVIRONMENT[6].

jet, *n* – [GEOLOGY] an extremely compact form of black LIGNITE utilized as a semi-precious stone[6]. *Also see cannel coal.*

jet-A fuel, *n* – [PETROELUM CHEMISTRY] a DISTILLATE of CRUDE OIL REFINING used for fueling jet engines for commercial aircraft and within the carbon range of about C_8 to C_{16}. Similar in composition to KEROSENE. Jet A is used in the United States while most of the rest of the world uses Jet A-1. The important difference between the two FUELS is that Jet A-1 has a lower maximum FREEZING POINT than Jet A (Jet A: –40ºC, Jet A-1: –47ºC). The lower freezing point makes Jet A-1 more suitable for long international flights, especially on polar routes during the winter[36]. *Also see jet A-1 fuel and jet-B fuel.*

jet A-1 fuel, *n* – [PETROELUM CHEMISTRY] a DISTILLATE of CRUDE OIL REFINING used for fueling jet engines for commercial aircraft and within the carbon range of about C_8 to C_{16}. Similar in composition to KEROSENE. Jet A-1 is used in most countries besides the United States. Jet A-1 has a lower maximum FREEZING POINT and is more suitable for long international flights, especially on polar routes during the winter[36]. *Also see jet-A fuel.*

jet-B fuel, *n* – [PETROLEUM CHEMISTRY] a WIDE-CUT DISTILLATE of CRUDE OIL REFINING (C_5 to C_{15}) used for fueling jet engines for commercial aircraft and within the CARBON RANGE of about C_8 to C_{14}[36]. Similar in composition to KEROSENE. *Also see jet-A fuel, jet A-1 fuel and wide-cut fuel.*

jet pump, *n* – [PUMPING TECHNOLOGY] a commonly available residential water supply pump. It has an interesting clever design that can lift water from a well (up to 25 feet) and allow it to function without a check valve on the suction and furthermore does not require priming. The heart of the design is a venturi (source of water is from the discharge side of the impeller) that creates low pressure providing a vacuum at the suction and allowing the pump to lift fluids.

jetty, *n* – [HYDROLOGY] an engineering structure, such as a breakwater, extending out from the shore, designed to direct the current or tide, protect a harbor, induce scouring, or prevent shoaling of a navigable passage by sand[4].

joint, *n* — [GEOLOGY] a break of GEOLOGICAL ORIGIN in the continuity of a body of ROCK occurring either singly, or more frequently in a set or system, but not attended by a visible movement PARALLEL to the surface of discontinuity[4]. *Also see fissure and fracture.*

joint and severable liability, *n* – [LAW] under CERCLA, this legal concept relates to the liability for Superfund site cleanup and other costs on the part of more than one POTENTIALLY RESPONSIBLE PARTY (such as if there were several owners or users of a site that became CONTAMINATED over the years, they could all be considered potentially liable for cleaning up the site.)[19]

joint block, *n* – [GEOLOGY] a body of rock that is bounded by joints[54].

joint diagram, *n* — [GEOLOGY] a DIAGRAM constructed by accurately plotting the STRIKE and DIP of JOINTS to illustrate the geometrical relationship of the joints within a specified area of GEOLOGIC investigation[4].

joint pattern, *n* — [GEOLOGY] a group of JOINTS that form a characteristic geometrical relationship, and which can vary considerably from one location to another within the same GEOLOGIC FORMATION[4]. *Also see structural geology.*

joint plane, *n* – [GEOLOGY] a surface of fracturing or potential fracture of a joint[54].

joint (fault) set, *n* — [GEOLOGY] a group of more or less PARALLEL JOINTS[4].

joint (fault) system, *n* — [GEOLOGY] a system consisting of two or more joint sets or any group of JOINTS with a characteristic PATTERN, that is, radiating, concentric, etc[4].

jokulhlaup, *n* – [HYDROLOGY] *from Icelandic*, a sudden FLOOD of glacial meltwater released when the ice has been heated by volcanic activity[6].

joule, *n* – [PHYSICS] an SI unit of ENERGY which is equal to the amount of work done by a force of one Newton when moving an object one meter in the direction of a force. A joule is equivalent to 0.239 calories or 1 watt second[6].

JP-4 fuel, *n* – [PETROLEUM CHEMISTRY] a mixture of HYDROCARBONS spanning the GASOLINE to KEROSENE (C_5 to C_{15}) range used to fuel U. S. Air Force military jet engines[36]. *Also see JP-5 fuel, JP-8 fuel and wide-cut fuel.*

JP-5 fuel, *n* – [PETROLEUM CHEMISTRY] a mixture of HYDROCARBONS within the KEROSENE range (C_8 to C_{16}) used to fuel U. S. Navy military jet engines[36]. *Also see JP-4 fuel, JP-8 fuel and wide-cut fuel.*

JP-8 fuel, *n* – [PETROLEUM CHEMISTRY] a high flashpoint KEROSENE-type jet fuel (similar to JP-5) used on aircraft carriers because of safety/flammability considerations[36]. *Also see JP-4 fuel, JP-5 fuel and wide-cut fuel.*

JP-9 fuel, *n* – [PETROLEUM CHEMISTRY] a blend of three hydrocarbons: methylcyclohexane, perhydronorbornadiene dimer, and exo-tetrahydrodicyclopentadiene (JP-10) used for fueling aircraft-launched missiles[36].

JP-10 fuel, *n* – [PETROLEUM CHEMISTRY] a FUEL for powering aircraft-launched missiles and essentially a single-HYDROCARBON exotetrahydrodicyclopenta-diene[36].

JP-10+100 fuel, *n* – [PETROLEUM CHEMISTRY] a FUEL for powering aircraft-launched missiles and essentially a single-HYDROCARBON exo-tetrahydrodicyclopentadiene plus an additive that provides improved thermal stability[36].

judge, *n* – [LAW] an officer so named in his or her commission, who presides in some COURT; a public officer, appointed to preside and to administer the law in a court of justice; the chief member of a court, and charged with the control of the proceedings and the decision of questions of law or discretion[19].

judgment, *n* – [LAW] a court's official decision on the matters before it. The declaration, by a court, of the rights and duties of the parties to a lawsuit which has been submitted to it for decision. Can also include an "injunction" a specific order to do or not to do something[19]. *Also see decision.*

judgment sampling, *n* — [ENVIRONMENTAL INVESTIGATION] taking of a sample(s) based on judgment that it will more or less represent the average condition of the POPULATION.

> DISCUSSION — The sampling location(s) is selected because it is judged to be representative of the average condition of the population. It can be effective when the population is relatively homogeneous or when the professional judgment is good. It may or may not introduce bias. It is a useful sampling approach when precision is not a concern. This is one form of authoritative sampling (see *biased sampling*.)

judicial, *adj* – [LAW] *1*. of, done by or proper to a COURT of LAW. *2*. having the function of JUDGMENT. *3*. impartial. *4*. expressing a judgment. *Also see judgment.*

junction, *n* – [GEOLOGY] the contact-plane between two adjacent ROCK bodies. It may be completely conformable or in the character of an UNCONFORMITY[6].

jungle, *n* – [GEOGRAPHY] a term, originating in India, for wild, uncultivated land with a dense undergrowth[6].

junk science, *n* – [LAW] a pejorative term used to derogate purportedly SCIENTIFIC DATA, RESEARCH, ANALYSES or claims which are perceived to be driven by political, financial or other questionable motives[22]. It is these motives that distinguish junk science from pseudoscience and controversial science.

jurisdiction, *n* – [LAW] a power constitutionally conferred upon a JUDGE or MAGISTRATE, to take cognizance of and decide causes according to law and to carry his sentence into execution. The tract of land or district within which a judge or magistrate has jurisdiction, is called his or her territory and his power in relation to his territory is called his or her territorial jurisdiction.

jurisprudence, *n* – [LAW] the study of law and the structure of the legal system[19].

Jurassic Period, *n* – [GEOLOGY] the second period of the MESOZOIC ERA (after the TRIASSIC and before the CRETACEOUS), thought to have covered the span of time between 208 million years and 146 million years ago; also, the corresponding system of rocks. It is named after the Jura Mountains between France and Switzerland, in which rocks of this age were first studied.

jury, *n* – [LAW] persons, usually twelve, but the number can vary, selected according to law and sworn to inquire into and declare a verdict on matters of fact[19].

jury instructions, *n* – [LAW] a JUDGE'S directions to the jury before it begins deliberations regarding the factual questions it must answer and the legal rules that it must apply[19].

jury trial, *n* – [LAW] a CIVIL or CRIMINAL TRIAL in which a JURY decides any disputed issues of fact. The number of jurors is usually 12 in a criminal trial; the number varies from state to state in a civil trial[19].

justice, *n* – [LAW] *1*. the maintenance or administration of what is just especially by the impartial adjustment of conflicting claims or the assignment of merited rewards or punishments. *2*. the administration of *law*, especially, the establishment or determination of rights according to the rules of law or equity; *3*. the quality of being just, impartial, or fair *4*. the principle or ideal of just dealing or right action. *5*. the quality of conforming to law. *6*. conformity to truth, fact, or reason. *7***.** a judge[15].

juvenile water, *n* – [HYDROLOGY] water which has risen to the earth's surface from a considerable depth and appears there for the first time, for example, via a

hot spring, and has not therefore come from the hydrosphere or atmosphere and was not previously part of the hydrologic cycle[6].

juvenile wood, *n* – [DENDROLOGY] in young trees or in tissues located near the stem apex, an inner core of xylem surrounding the pith, in which the cells are low in density, smaller and/or less structurally developed than those of the outer xylem or older part of the stem[12].

Kk

K-Ar age, *n* – [GEOLOGY] the radioactive age of a rock determined from the ratio of potassium-40 (^{40}K) to argon-40 (^{40}Ar) present in the rock[54].

kame, *n* – [GEOLOGY] a DEPOSIT, composed largely of material sorted by moving WATER, formed in direct contact with GLACIAL ICE[4]. *Also see kame delta and kame terrace.*

kame-and-kettle topography—*See knob-and-kettle topography.*

kame complex, *n* – [GEOLOGY] an assemblage of KAMES, constituting a hilly LANDSCAPE[4].

kame delta, *n* – [GEOLOGY] a DEPOSIT, often triangular, formed where a GLACIAL STREAM entered into a proglacial LAKE. The ice-contact margin of the kame delta is often slumped and mixed with *till*. *Also see kame and kame terrace.*

kame field, *n* – [GEOLOGY] a group of closely spaced KAMES, interspersed in places with KETTLES and ESKERS, and having a characteristic hummocky TOPOGRAPHY[4].

kame moraine, *n* – [GEOLOGY] *1*. an end moraine that contains numerous kames. *2*. a group of kames along the front of a stagnant glacier, commonly comprising the slumped remnants of a formerly continuous outwash plain built up over the foot of rapidly wasting or stagnant ice[4].

kame terrace, *n* – [GEOLOGY] a DEPOSIT, often SLOPING down-VALLEY more steeply than the valley floor, formed where a GLACIAL STREAM ran along the glacier margin. The ice-contact margin of the kame terrace is often slumped and mixed with TILL. *Also see kame and kame delta.*

kanat—*See quanta.*

Kansas Glacial Stage, *n* – [GEOLOGY] time period of advance of the North American ice sheet between about 900,000 years BP and 1,400,000 years BP, occurring before the YARMOUTH INTERGLACIAL STAGE.

kaolinite, *n* – [MINERALOGY] CLAY MINERAL, hydrous aluminous silicate, $Al_4Si_4O_{10}(OH)_8$. Structure consists of one sheet of silicon-oxygen tetrahedra each sharing three oxygens to give ratio of $(Si_4O_{10})^{4-}$ linked with one sheet of aluminum and hydroxyl. Composition of pure kaolinite does not vary as for other clay minerals, MONTMORILLONITE and illite, in which ready addition or substitution of ions takes place.

karoo—*See karroo*.

karren, *n* – [GEOLOGY] collective name for CHANNELS on exposed LIMESTONE caused by SOLUTION. These channels are up to 5 cm in depth[4].

karrenrohren, *n* – [GEOLOGY] TERRAIN created by LIMESTONE SOLUTION and characterized by a virtual absence of surface drainage, a series of surface HOLLOWS, DEPRESSIONS and FISSURES, collapse structures and an extensive subterranean drainage network[6].

karroo, *n* – [GEOGRAPHY] a dry, broad, level, elevated area, often arising to considerable elevations in TERRACE formations; does not support VEGETATION in the dry season but supports GRASSES in the wet season[54]. *Also spelled karoo*.

karst, *n* — [GEOLOGY] a GEOLOGIC setting where CAVITIES are developed in massive LIMESTONE BEDS by SOLUTION of flowing WATER. CAVES, CAVERNS and even underground RIVER CHANNELS are produced into which surface RUNOFF drains and often results in the LAND above being dry and relatively barren[4]. *Also see cave, cavern, doline, dolomite, limestone, sinkhole and solution channel.*

karst barré, *n* – [GEOLOGY] a KARST that is surrounded by rocks of low PERMEABILITY and in which, therefore, GROUND WATER is impounded to some degree[16].

karst base level, *n* – [GEOLOGY] the level below whick KARSTIFICATION ceases in an area of karst topography[54].

karst fenster—*See karst window.*

karstification, *n* – [GEOLOGY] action by WATER, mainly chemical but also mechanical, that produces features of a karst topography, including such surface features as DOLINES and KARREN; and such subsurface features as caves and shafts[16].

karst pond, *n* – [HYDROLOGY] a body of standing water in a closed DEPRESSION of a karst region[16].

karst river, *n* – [HYDROLOGY] a RIVER that originates from a KARST SPRING[16].

karst spring, *n* – [HYDROGEOLOGY] a SPRING emerging from karstified LIMESTONE[16].

karst valley, *n* – [GEOLOGY] *1*. an elongated solution valley. *2*. a valley produced by the collapse of a cavern roof. *3*. a closed depression formed by the coalescence of several SINKHOLES[16].

karst water, *n* – [HYDROLOGY] WATER which issues from KARST SPRINGS and whose CHEMICAL COMPOSITION indicates that it has passed across and through karst LIMESTONE[6].

karst window, *n* – [HYDROGEOLOGY] that part of an underground river in a KARST area revealed by the collapse of a section of roof[6].

kavir, *n* – [HYDROLOGY] small DEPRESSION in DESERTS occasionally filled with WATER[6]. *Also see desert, oasis and wadi.*

kay—*See key.*

kegelharst , *n* – [HYDROGEOLOGY] groups of conical-shaped LIMESTONE HILLS in between DOLINES or shakeholes. Produced by dissolution of the carbonate rock[6]. *Also see doline and karst.*

Kelvin (K), *n* — [PHYSICS] the SI UNIT of TEMPERATURE. The base unit of temperature in the International System of Units that is equal to 1/273.16 of the Kelvin scale temperature of the triple point of water. Zero Kelvin is ABSOLUTE ZERO, and an interval of 1^{o} K is equal to 1^{o} on the CELSIUS SCALE (CENTIGRADE TEMPERATURE SCALE) and 1.8^{o} on the FAHRENHEIT TEMPERATURE SCALE. $0^{o}C = 273.15^{o}$ K. *Also see temperature.*

Kemmerer sampler, *n* – [ENVIRONMENTAL INVESTIGATION] a sampling device that is lowered into a well or lake to retrieve a sample from a particular depth[16].

kepone, *n* – [CHEMISTRY] a CHLORINATED HYDROCARBON INSECTICIDE that is persistent in the environment. The agent was banned in 1976[22]. *Also known as chlordecone.*

kerogen, *n* – [PETROLEUM CHEMISTRY] insoluble particulate ORGANIC MATTER preserved in SEDIMENTARY ROCKS that consist of various MACERALS originating from components of plants, animals and BACTERIA[34].

kerosene, *n* – [PETROLEUM CHEMISTRY] a DISTILLATE from CRUDE OIL REFINING that is used for heating and fuel for jet aircraft engines[37]. *Also see jet fuel.*

ketone, *n* – [CHEMISTRY] any of a class of ORGANIC COMPOUNDS in which two HYDROCARBON groups are linked by a carbonyl group, such as ACETONE[17].

kettle, *n* – [GEOLOGY] LANDFORM produced when an isolated block of ICE persists in a GROUND MORAINE, and OUTWASH PLAIN, or VALLEY floor after a GLACIER retreats; as the block melts, it leaves behind a steep-sided hole that is filled with WATER[6]. A*lso known as kettle hole. Also see lake and pond*.

kettled sandur, *n* – [GEOLOGY] an OUTWASH PLAIN of GLACIOFLUVIAL DEPOSITS, a SANDUR, the proximal parts of which are pitted with KETTLE holes. The sandur was created by icemelt streams flowing in supraglacial, englacial or subglacial locations all of which, however, have anastamosing characteristics[6]. *Also see sandur.*

kettle moraine, *n* – [GEOLOGY] a morainic area characterized by an extremely undulating TERRAIN of KAMES and KETTLE holes[6].

key, *n* – [GEOGRAPHY] a sandbank, REEF or low ISLAND[6]. If the accumulated sediments are predominantly sand, then the island is called a key; if they are predominantly gravel, the island is called a MOTU. *Also known as cay, kay or caye.*

key bed, *n* – [GEOLOGY] a BED with sufficiently distinctive characteristics to make it easily identifiable in correlation[4].

khud, *n* – [GEOGRAPHY] a RAVINE or precipice[16].

kill, *n* –[HYDROLOGY] *from Dutch,* CHANNEL or CREEK, used chiefly in place names in Delaware, Pennsylvania, and New York[16].

kilogram, *n* – [PHYSICS] MEASURE of WEIGHT in the Metric System equal to 1,000 GRAMS and 2.68 POUNDS. *Also see gram, ounce and pound*.

kilometer, *n* – [PHYSICS] MEASURE of length in the Metric System equal to 1,000 meters or 0.62 *mile*. *Also see feet, inch, meter and mile.*

kindred, *n* – [GEOLOGY] a rock association[4].

kinematic viscosity, *n* – [PHYSICS] the DYNAMIC VISCOSITY of a fluid divided by the fluid density[33].

kinetic energy, *n* – [PHYSICS] ENERGY possessed by a moving object or WATER body. *Also see potential energy.*

kinetic isotope effect, *n* – [ISOTOPES] a dependence of the rate or kinetics of a chemical reaction on the isotopic character of an atom in the reaction.

kinetics, *n* – [PHYSICS] *1*. a branch of SCIENCE that deals with the effects of FORCES upon the MOTIONS of material bodies or with changes in a PHYSICAL or CHEMICAL SYSTEM. *2*. the RATE of change in such a system. *3*. the mechanism by which a physical or chemical change is effected[24].

kinetic theory, *n* – [PHYSICS] a THEORY that states that LIQUIDS as well as GASES are in constant agitation[24].

Kjeldahl nitrogen – *See nitrogen, total Kjeldahl.*

klint, *n* – [GEOLOGY] a CLIFF[4].

klippe, *n* – [GEOLOGY] an OUTCROP of ROCK separated from the rock from which it originates by a FAULT, sometimes by great distances[4].

knick, *n* – [GEOLOGY] a sharp break in profile separating the MOUNTAIN front from the upper slopes of the pediment[45].

knickpoint, *n* – [GEOLOGY] any interruption or break of slope, especially a point of abrupt change or inflection in the longitudinal profile of a STREAM or of its VALLEY[4].

knob, *n* – [GEOLOGY] *1*. a rounded eminence, such as a KNOLL, HILLOCK or small HILL or MOUNTAIN and especially a prominent or isolated hill with steep sides. 2. a PEAK or other projection at the top of a hill or mountain[54].

knob-and-kettle topography, *n* – [GEOLOGY] an undulating LANDSCAPE derived from glacial remains in which a disordered assemblage of KNOLLS, MOUNDS and RIDGES of GLACIAL DRIFT is interspersed with irregular DEPRESSIONS, PITS or KETTLES that are commonly undrained and may contain BOGS, SWAMPS, PONDS or small LAKES[4].

knock and lochan, *n* – [GEOLOGY] LANDSCAPE made up of alternating ROCHES MOUTONNÉES and eroded HOLLOWS often containing LAKES. A glacially-scoured lowland area. *Also see roche moutonée.*

knocking, *n* – [PETROLEUM CHEMISTRY] normal combustion in a spark-ignition, internal combustion engine is initiated by a spark. The flame front fans out from the spark plug and travels across the combustion chamber rapidly and smoothly until almost all the fuel is consumed. Knocking – often called detonation – is the sound produced by abnormal combustion. Some of the unburned mixture ignites spontaneously (autoignites) and burns very rapidly. The resulting precipitous rise in cylinder pressure creates the characteristic knocking or pinging sound[38]. It is because of the knocking that gasolines have contained anti-knock additives such as LEAD ALKYLS.

knoll, *n* – [GEOGRAPHY] a small HILL or MOUND[4]. *Also see hill, hillock and hummocky*.

knowledge, *n* – [SCIENTIFIC METHOD] awareness or familiarity gained by experience of a person, FACT or thing[15].

kolk, *n* – [HYDROLOGY] a deep, isolated hole or depression, scoured out by eddying water in soft rock[16]. *Also known as colc.*

koppie, *n* – [GEOLOGY] a small, rocky hill[45].

Kreb's Cycle, *n* – [BIOLOGY] a cyclical series of biochemical reactions that is fundamental to the metabolism of AEROBIC ORGANISMS, such as animals, plants and many microorganisms[24].

kriging, *n* – [STATISTICS] a GEOSTATISTICAL TECHNIQUE, which interpolates CONCENTRATION VALUES for locations between SAMPLING points[16]. *Also see statistics.*

krotovina, *n* – [GEOLOGY] infilled animal burrows or filaments in LOESS.

krummholz, *n* – [GEOGRAPHY] *from German,* stunted and gnarled woodlands characteristic of high altitudes and latitudes. Wind and cold create the gnarling effects[4].

Kutter's formula, *n* – [HYDROLOGY] a formula that expresses the value of the Chézy coefficient in the CHÉZY EQUATION in terms of the friction slope, hydraulic radius, and a roughness coefficient[16].

kyle, *n* – [GEOGRAPHY] a CHANNEL or narrow STRAIT between two ISLANDS or an island and the MAINLAND[6].

krypton-85 (^{85}Kr), *n* – [ISOTOPES] a TRACER found throughout the atmosphere at low CONCENTRATIONS. It is produced by the fissioning of URANIUM and plutonium and is present in spent nuclear fuel. Its presence in GROUND WATER can be used to estimate recharge dates. *Also see chlorofluorocarbons, sulfur hexafluoride and tritium.*

kurtosis, *n* – [STATISTICS] the peakedness or flatness of the graphic representation of a statistical distribution, specifically a measure of the peakedness of a frequency distribution. Various coefficients of kurtosis have been devised in an attempt to assign genetic significance to sediment distributions[4]. *Also see geostatistics.*

K_{xy}, *n* — [HYDROGEOLOGY] HYDRAULIC CONDUCTIVITY in the HORIZONTAL PLANE, radially from the control WELL.

L1

labile, *adj* – [GEOLOGY] ROCK or MINERALS that are easily decomposed[4].

laboratory, *n* – [SCIENTIFIC METHOD] a place equipped for EXPERIMENTAL study in a SCIENCE or for TESTING and ANALYSIS, broadly, a place providing opportunity for experimentation, OBSERVATION, or practice in a FIELD of study.

laboratory analysis, *n* – [CHEMISTRY] TESTING of SUBSTANCES, such as WATER, AIR, SOIL or SLUDGE, among others, to determine their CHEMICAL COMPOSITION and often the respective CONCENTRATION of the CONSTITUENTS.

laboratory control sample, *n* — [CHEMISTRY] an ALIQUOT of the SAMPLE MATRIX, FREE from the ANALYTES of interest, spiked with verified known amounts of analytes, or a material containing known and verified amounts of analytes.

laboratory reporting level (LRL), *n* – [CHEMISTRY] the minimum concentration pre-determined by laboratory personnel before the sample analysis begins; generally, it is based on typical counting results under routine analytical instrument operating conditions in a given sample matrix using known standards and blank samples, which the laboratory personnel define as a level of detection they can routinely achieve. It is generally defined by the requirement that the counted radioactivity must differ from the background count by three to six times the standard deviation of the background count.[2]

laboratory blank, *n* – [CHEMISTRY] an artificial SAMPLE, usually distilled or deionized water, introduced to a chemical analyzer to observe the response of the instrument to a sample that does not contain the material being measured[22].

lab pack, *n* – [CHEMISTRY] a container containing laboratory waste, often in numerous individual packages with a wide variety of individual compounds, complicating proper treatment and disposal[22].

labyrinth karst, *n* – [GEOLOGY] deep CANYONS of LIMESTONE formed by CARBONATION[4].

lac, *n* – [HYDROLOGY] *from French,* a LAKE[16].

laccolith, *n* – [GEOLOGY] a large concordant PLUTON that is shaped like a dome or a mushroom. Laccoliths tend to form at relatively shallow depths and are typically composed of granite. The country rock above them often erodes away completely. *Also see batholith and lopolith.*

lacine, *n* – [HYDROLOGY] one of a series of detached, tongue-shaped, ridgelike MEANDER scrolls, frequently found spread apart like rays of a fan[16].

lactate, *n* – [CHEMISTRY] a SALT or ESTER of lactic acid[24].

lactic acid, *n* – [CHEMISTRY] a clear, odorless HYGROSCOPIC, syrupy liquid, $CH^3CH(OH)COOH$ with a sour taste. Manufactured by the fermentation of lactose (from milk) and used in the dyeing and tanning industries[24].

lacuna, *n* – [GEOLOGY] the missing time interval which intervenes between beds above and below an UNCONFORMITY[6].

lacustrine, *adj* – [HYDROLOGY] of or pertaining to LAKES[4].

lade, *n* – [HYDROLOGY] *1*. the MOUTH of a RIVER. *2*. a WATERCOURSE[16].

lag deposits, *n* – [GEOLOGY] COARSER DEPOSITS that are left behind after the FINER materials have been washed away.

lag fault, *n* – [GEOLOGY] a low-angled FAULT with more displacement of the ROCKS at the top than of the rocks at the bottom.

lagoon, *n* — [HYDROLOGY] *1*. MAN-MADE or natural DEPRESSIONS in a GROUND SURFACE that are likely to hold LIQUIDS or SLUDGE containing HAZARDOUS SUBSTANCES or PETROLEUM PRODUCTS. The likelihood of such liquids or sludge being present is determined by evidence of factors associated with the pit, POND, or lagoon, including, but not limited to, discolored water, distressed vegetation, or the presence of an obvious wastewater discharge. *2*. shallow body of water, often separated from the sea by coral reefs or sandbars[4]. *Also see atoll and lake.*

lag time, *n* -- [MICROBIOLOGY] the growth interval (adaption phase0 between microbial inoculation and the start of the exponential growth phase during which there is little or no microbial growth[62].

laguna, *n* – [HYDROLOGY] *1*. a shallow, EPHEMERAL LAKE in a BOLSON. *2*. *from Spanish,* a LAGOON[4].

lahar, *n* — [GEOLOGY] a mudslide (mass movement) made by large amounts of water and volcanic dust flowing in a volcanic area, usually after an eruption[4].

lake, *n* – [HYDROLOGY] inland body of *water* of considerable size[4]. *Also see kettle and pond*.

lake basin, *n* – [HYDROLOGY] a DEPRESSION in the Earth's surface occupied or formerly occupied by a lake and containing its shore features[16].

lakebed, *n* – [HYDROLOGY] *1*. the flat to gently undulating ground underlain by fine-grained SEDIMENTS deposited in a former LAKE. *2*. the bottom of a lake[16].

lake delta, *n* – [GEOLOGY] a DELTA, usually arcuate with a step front, built out by a river into a fresh-water LAKE, such as the delta of the Rhône River into Lake Geneva[16].

lake deposit, *n* – [GEOLOGY] a SEDIMENTARY DEPOSIT laid down conformably on the floor of a LAKE, usually consisting of coarse-grained material near the shore and sometimes passing rapidly into clay and limestone in deeper water[16].

lamellae, *n* – [MINERALOGY] the stacked composite layer of a CLAY PARTICLE.

lamellar flow, *n* – [HYDROLOGY] the FLOW of a LIQUID in which layers glide over one another[16].

laminar flow (streamline flow) (viscous flow), *n* — [HYDROLOGY] flow in which the HEAD loss is proportional to the first power of the velocity[16]. *Also see Froude Number, Reynolds Number and turbulent flow.*

lamination, *n* – [GEOLOGY] a LAYER of BEDDING that is less than one centimeter thick in SEDIMENTARY ROCKS[4].

land, *n* -- [GEOGRAPHY] *1.* the SOLID part of the SURFACE of the earth[6]. *2.* a portion of the EARTH'S SOLID SURFACE distinguishable by BOUNDARIES or ownership. *Also see ground and landscape.*

land application, *n* – [WASTE DISPOSAL] a method for the disposal of treated domestic wastewater. The wastewater which has been subjected to primary treatment and secondary treatment as well as disinfection to kill or inactivate dangerous microorganisms, is sprayed over the ground to remove plant nutrients and promote the growth of vegetation[22].

landfarm—*See land treatment.*

landfill, *n* — [WASTE DISPOSAL] a place, location, tract of LAND, area, or premises used for the disposal of SOLID WASTES as defined by state solid waste regulations. The term is synonymous with the term solid waste disposal site and may also be known as a garbage DUMP, trash dump, or similar term[7]. *Also see dump.*

landform, *n* – [GEOLOGY] a natural feature of the Earth's surface. It includes broad features, such as PLAINS, PLATEAUS, MOUNTAINS, and also minor features, such as HILLS, VALLEYS, SLOPES, CANYONS, ARROYOS and ALLUVIAL FANS[4]. *Also see geomorphology.*

Landsat, *n* – [REMOTE SENSING] series of satellites launched by the U. S. National Aeronautic and Space Administration (NASA) for the purpose of remotely monitoring resources on the Earth. The first Landsat satellite was launched in 1972[4].

landscape, *n* – [GEOGRAPHY] the traits, PATTERNS, and STRUCTURE of a specific geographic area, including its biological COMPOSITION, its PHYSICAL ENVIRONMENT, and its ANTHROPOGENIC or social patterns. An area where interacting ECOSYSTEMS are grouped and repeated in similar form[7].

landslide, *n* – [GEOLOGY] term used to describe the downslope movement of SOIL, ROCK, and other weathered materials because of GRAVITY[4]. *Also see debris flow and mud flow.*

land surveying, *n* – [GEOGRAPHY] the calculation or determination of elevations, especially land-surface elevation, with equipment such as transits or theodolites.

land treatment, *n* – [TREATMENT TECHNOLOGY] a waste management system in which wastes are deposited and worked into the SOIL to allow soil MICROORGANISMS to degrade and demobilize the waste within the soil; also known as land spreading, reuse farming and sludge farming. *Also see landfill.*

Langelier index, *n* – [CHEMISTRY] an expression of the ability of water to dissolve or deposit calcium carbonate scale in pipes. The index is important in industrial water systems, where the formation of scales or sludge can cause equipment of process failure[22].

langley, *n* – [PHYSICS] a unit of energy equal to one gram calorie per square centimeter.

language, *n* – the words, their pronunciation, and the methods of combining them used and understood by a community[17].

lapié—*See karren.*

Laplace Equation, *n* – [HYDROGEOLOGY] second-order partial DIFFERENTIAL EQUATION of the elliptic type. In GROUND-WATER FLOW, describing the flow of an incompressible, HOMOGENEOUS FLUID through a homogeneous, ISOTROPIC non-deformable POROUS MEDIUM. The VARIABLE in the equation is the PIEZOMETRIC HEAD or potential where,

$$\frac{\partial^2 H}{\partial x^2} + + \frac{\partial^2 H}{\partial y^2} = 0$$

and H is the hydraulic head and x and y are the coordinates. The Laplace Equation is the basis for many numerical ground-water models. *Also see finite-difference method, finite-element method, model and numerical method.*

large-quantity generator, *n* – [WASTE DISPOSAL] person or facility generating more than 2,200 pounds of HAZARDOUS WASTE per month. Such generators produce about 90 percent of the nation's hazardous

waste, and are subject to all RCRA requirements[22]. *Also see small-quantity generator and RCRA.*

large quantity generator inspection, *n* -- [WASTE DISPOSAL] an inspection of a generator who generates 1,000 kilograms or more of non-acutely toxic hazardous waste per month, or one kilogram of acutely hazardous waste per month; and those who generate less than these amounts but accumulate greater than 6,000 kilograms of non-acutely toxic hazardous waste at any one period of time. A generator's category will be based upon hazardous waste manifest history and the quantity of hazardous waste present at the facility at the time of inspection by enforcement personnel.

laser induced fluorescence, *n* – [CHEMISTRY] a method for measuring the relative amount of soil and/or ground-water contamination with an *in situ* sensor. Laser light is transmitted to the sensor, where it fluoresces in proportion to the concentration of petroleum hydrocarbons adjacent to the sensor.

laser spectroscopy, *n* – [CHEMISTRY] a branch of spectroscopy in which a laser is used as an intense, monochromatic light source.

latent heat, *n* – [CHEMISTRY] the HEAT which required to change the state of unit mass of a substance from solid to liquid or from liquid to gas, without change of temperature. Most substances have a latent heat of fusion and a latent heat of vaporization. The specific latent heat is the difference in ENTHALPIES of the substance in its two states[45].

lateral moraine, *n* – [GEOLOGY] MORAINE that is found along the sides of a GLACIER. Commonly found on glaciers that occupy a VALLEY[6]. *Also see ground moraine, recessional moraine and terminal moraine.*

lateral root, *n* – [DENDROLOGY] a root branch arising from the main AXIS[7].

lateral sewer, *n* – [HYDROLOGY] a SEWER that discharges into a branch or other sewer and has no other common sewer tributary to it. Lateral sewers often discharge into a collecting submain, main or TRUNK SEWER[16].

lateral valley, *n* – [GEOLOGY] a longitudinal valley developed parallel to the regional structure[16].

laterite, *n* – [GEOLOGY] a red or yellow, iron-rich CLAY, friable and hardening in air, used for making roads in the TROPICS[4]. *Also see bauxite and caliche.*

laterization, *n* – [GEOLOGY] a WEATHERING process involving the increase of alumina or iron oxides, or both, and the removal of silica from the soil.

latest possible inception date (LPID), *n* – [AGE DATING] the latest time period that an environmental release could have occurred based on the available data and information[44]. *Also see earliest demonstrable inception date (EDID).*

latewood, *n* – [DENDROLOGY] dense and often dark WOOD produced in the TREE RING during the later part of the GROWING SEASON characterized by small, thick-walled cells in GYMNOSPERMS, or a zone with few small vessels in ANGIOSPERMS[12].

latex, *n* – [CHEMISTRY] an aqueous suspension of proteins and resins occurring in some plants, trees and shrubs from which natural rubber latex is derived.

latitude, *n* – [GEOGRAPHY] a north-south MEASUREMENT of position on the Earth. It is defined by the angle measured from a HORIZONTAL PLANE located at the Earth's center that is PERPENDICULAR to the polar AXIS. A line connecting all places of the same latitude is termed a PARALLEL. Latitude is measured in degrees, minutes, and seconds. Measurements of latitude range from equator (0°) to 90° North and South from this point[4]. *Also see equator and longitude.*

latosols, *n* – [AGRONOMY] SOILS developed on a LATERITE[6].

lattice, *n* – [MINERALOGY] *1.* a STRUCTURE of crossed laths or bars with spaces between, used as a screen. *2.* a regular, periodic arrangement of ATOMS, IONS, MOLECULES in a CRYSTALLINE SOLID[4].

lava, *n* – [GEOLOGY] molten ROCK that comes to the Earth's surface through a VOLCANO or fissure[4]. *Also see magma.*

law, *n* -- that which is laid down, ordained or established. A body of rules of action or conduct prescribed by a controlling authority and having binding legal FORCE; that which must be obeyed and followed by citizens subject to sanction or LEGAL consequences; a solemn expression of the will of the supreme power of the State[19]. *Also see scientific law.*

Law of Corresponding States, *n* – [CHEMISTRY] LAW stating that, if any two ratios of pressure, temperature, or volume to their respective critical properties are equal, the third ratio must equal the other two.

Law of Cross-Cutting Relationships, *n* – [GEOLOGY] a geologic law stating that an intruded igneous rock is younger than the rocks through which it cuts[6].

Law of Mass Action, *n* – [CHEMISTRY] law stating that the rate at which a chemical reaction proceeds is directly proportional to the molecular concentrations of the reacting compounds[33].

Law of Original Continuity, *n* – [GEOLOGY] a general law of geology where a water-laid stratum, at the time it was formed, must continue laterally in all directions until it thins out as a result of non-

deposition or until it abuts against the edge of the original basin of deposition[4].

Law of Original Horizontality, *n* – [GEOLOGY] a general law of geology where water-laid sediments are deposited that are horizontal or nearly horizontal, and parallel or nearly parallel to the Earth's surface[4].

Law of Superposition, *n* – [GEOLOGY] a general law upon which all geologic chronology is based: In any sequence of sedimentary strata (or of extrusive igneous rocks) that has not been overturned, the youngest stratum is at the top and the oldest at the base; each bed is younger than the bed beneath, but older than the bed above it[4].

Law of Universal Gravitation, *n* – [PHYSICS] the statement that every mass particle in the universe attracts every other mass particle with a force directly proportional to the product of the two masses and inversely proportional to the square of the distance between them[4].

lawsuit, *n* – [LAW] a legal action started by a PLAINTIFF against a DEFENDANT based on a COMPLAINT that the defendant failed to perform a legal duty, resulting in harm to the plaintiff.

lawyer, *n* – [LAW] a person learned in the LAW; as an ATTORNEY, COUNSELOR or solicitor; a person licensed to practice law. Any person who prosecutes or defends causes in courts of record or other judicial tribunals or whose business it is to give legal advise or assistance in relation to any cause or matter whatever. *Also see attorney and counselor at law.*

layer, *n* – [GEOLOGY] a thickness of matter, especially one of several covering a SURFACE[4]. *Also see bed, seem and strata.*

layering, *n* – [GEOLOGY] *1*. a tabular succession of different components in IGNEOUS and METAMORPHIC rocks, or the formation of layers in a particular rocks, such as in PLUTONIC ROCKS as a results of crystal settling in MAGMA. *2*. stratification[4].

LC_{50}, *n* – [TOXICOLOGY] the concentration of toxicant in a given vehicle, usually air or water, that is lethal to 50% of the organisms tested in a specific time under specified test conditions.

LD_{50}, *n* – [TOXICOLOGY] the dose of toxicant that is lethal to 50% of the organisms tested in a specific time under specified test conditions. Usually expressed as weight of toxicant per unit body weight of the test organism.

leachate, *n* – [HYDROLOGY] WATER that contains a high concentration of DISSOLVED SOLIDS or CONTAMINANTS and is created by LIQUID, such as rainwater, seeping through a soil profile or a POLLUTION source area such as a LANDFILL[4].

leachate collection system, *n* – [HYDROLOGY] an arrangement of reservoirs and pipes underlying a waste-disposal site. The system is designed to accumulate and remove leachate, water that migrates through the waste[22].

leachfield, *n* – [WASTE DISPOSAL] a device constructed in conjunction with a SEPTIC TANK into which the septic-tank EFFLUENT drains into. It is often composed of SAND and GRAVEL. The effluent subsequently drains into the underlying SOIL and is naturally treated. *Also see cesspool, dry well, seepage pit and septic tank.*

leaching, *n* — [HYDROLOGY] *1*. the removal in SOLUTION of the more soluble materials by PERCOLATING or moving WATERS. *2*. the removal of soluble SOIL material and COLLOIDS by percolating water.

lead, *n* – [HYDROLOGY] an open WATERCOURSE, usually artificial, leading to or from a mill, mine, reservoir, etc.[16]

lead (Pb), *n* – [CHEMISTRY] a bluish-white metal of bright luster, very soft, highly malleable, ductile, and a poor conductor of electricity, very resistant to corrosion, a cumulative poison. Rarely occurs in native form, chiefly obtained from galena (PbS). Lead is used in storage batteries, cable covering, plumbing, ammunition, antiknock gasoline, radiation shielding, and to absorb vibration. Other lead compounds are used in paints, fine glass, and lenses. Environmental concern with lead poisoning has resulted in a U.S. national program to reduce the concentration of lead in gasoline.

lead-210 dating, *n* – [AGE DATING] determining the time frame when sediments were deposited based on the concentration of the isotope, ^{210}Pb. Because radon (^{222}Rn) is ubiquitous in the atmosphere, its atmospheric concentration is somewhat constant and it eventually decays to ^{210}Pb, the time frame when a sediment was deposited can be estimated through its ^{210}Pb concentration. Sediment samples can be collected by coring through saturated sediment beneath a water body. This analysis allows the calculation of sedimentation rates and possibly the onset of contamination events.

lead alkyl, *n* – [PETROLEUM CHEMISTRY] a LEAD COMPOUND containing a METHYL GROUP and formerly added to GASOLINE as an anti-knock component. Alkyl-lead compounds are MAN-MADE compounds in which a CARBON ATOM of one or more ALKANE molecules is bound to a lead atom. Tetraethyllead (TEL) ($Pb(C_2H_5)_4$)and tetramethyllead (TML) compounds are the most common alkyl-lead compounds. Alkyl-

lead compounds are used as a fuel additive to reduce "knock" in combustion engines. They were banned from use in automobile FUELS but are still in limited use today in the United States, in fuels such as aviation gas or racing gasolines.

DISCUSSION – In 1960, the oil companies began to offer a package of different lead additives, known as a reactive mixture. Prior to 1960, only tetraethyl lead was used as an additive. By the mid-1980s, this reactive mixture was phased out. Therefore, identification of these reactive mixture lead compounds in environmental samples can help to constrain release dates.

Also see leaded gasoline, organic lead content and unleaded gasoline.

leaded gasoline, *n* – [PETROLEUM CHEMISTRY] GASOLINE containing lead additives such as tetraethyl lead.

DISCUSSION – Leaded gasoline was introduced in the United States in 1923, in Canada in 1927 and in Europe in 1928. The use of organic lead in automotive gasoline was banned in the United States in 1996 (1992 in California). However, Japan banned leaded gasoline in 1980, whereas Brazil banned it in 1988 and Canada in 1990. The European Union banned leaded gasoline in 2000; however, Spain and Portugal were allowed to continue usage until 2001.

Also see unleaded gasoline.

leading edge, *n* – [HYDROGEOLOGY] the toe or front portion of a CONTAMINANT PLUME representing the oldest part of the DISCHARGE.

lead paint, *n* – [CHEMISTRY] paints which in the past contained lead-based additives.

lead scavenger, *n* – [PETROLEUM CHEMISTRY] an additive in GASOLINE used to remove lead deposits in the engine.

DISCUSSION – The two most common lead scavengers were ethylene dibromide (EDB) and ethylene dichloride (EDC)(also known as 1,2-dichloroethane). Other scavengers used in the 1920s included carbon tetrachloride and trichloroethylene. EDB was the only scavenger used in aviation gas.

Also see ethylene dibromide (EDB) and ethylene dichloride (EDC).

league, *n* – [PHYSICS] any of various linear units of distance, ranging from about 2.42 to 4.60 statute miles. 2. any of various units of land area equal to a square league, especially an old Spanish unit equal to 4,428 acres in Texas or 4,439 acres in California[4].

leak, *n* – [PHYSICS] *1*. a crack or hole that is usually cause by a mistake or common corrosion that admits or lets escape its contents. *2*. something that permits the admission or escape of something else usually with prejudicial effect[48].

leakance, *n* – [HYDROGEOLOGY] the rate of VERTICAL FLOW across a unit (horizontal) area of a CONFINING BED into (or out of) an AQUIFER under one unit of head difference across this layer. The ratio, K/b, in which K and b are the vertical HYDRAULIC CONDUCTIVITY and the thickness, respectively, of the confining bed[16].

leak detection system, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] a METHOD of detecting a LEAK in the space created by a method of SECONDARY CONTAINMENT[48].

leakage, *n* — [HYDROGEOLOGY] the FLOW of LIQUID from one HYDROGEOLOGIC unit to another.

DISCUSSION -- Leakage may be natural, as through semi-impervious confining layer, or man-made, as through an uncased well.

leaky aquifer, *n* — [HYDROGEOLOGY] AQUIFIERS, whether ARTESIAN or UNCONFINED, that lose or gain WATER through adjacent less PERMEABLE BEDS[16].

leaky confining bed, *n* – [HYDROGEOLOGY] a CONFINING BED that transmits water at sufficient rates to furnish some RECHARGE to a WELL pumping from an underlying AQUIFER[16].

least squares, *n* – [STATISTICS] a statistical method used to discover the best-fit regression line for two variables plotted on a GRAPH[45].

leat, *n* – [HYDROLOGY] an artificial CHANNEL constructed to transport water along the contour of a hillside to increase the CATCHMENT of a RESERVOIR or to provide water for an industrial undertaking[6].

Le Châtelier's Principle, *n* — [PHYSICS] a principle of dynamic equilibrium stating that a change in one or more factors that maintain EQUILIBRIUM conditions in a system will cause the system to shift in a direction that will work against or adjust to the change(s), with a resulting reestablishment of equilibrium conditions. For example, assume the concentrations of gaseous oxygen in the atmosphere and dissolved oxygen in a stream are in equilibrium at a certain temperature. As OXYGEN dissolves in water, HEAT is released. If an outside influence (such as sunlight) raises the water TEMPERATURE in the stream, this shifts the equilibrium back in the direction of lower dissolved oxygen and greater atmospheric oxygen, and oxygen escapes from the water. As a result, at higher water temperatures, equilibrium concentrations of dissolved oxygen are lower[6].

ledge, *n* – [GEOLOGY] *1*. term used by drillers for the BEDROCK SURFACE. *2*. a rocky shelf on a CLIFF, above or below sea level[6].

lee, *n* – [GEOGRAPHY] the side of a HILL, DUNE, or other prominent object that is sheltered or turned away from the wind[4].

leeward, *n* – [GEOGRAPHY] downwind side of an elevated area like a MOUNTAIN. *Also see windward*.

legal, *adj* – [LAW] *1*. of or based on the LAW. *2*. appointed or required by law. *3*. permitted by law; lawful[19].

legal geology--*See forensic geoscience*.

legend, *n* – [GEOGRAPHY] explanation of the symbols and patterns shown on a MAP or DIAGRAM[4].

legislation, *n* – [LAW] the exercise of the power and function of making rules (as LAWS) that have the force of authority by virtue of their promulgation by an official organ of a state or other organization[19].

legislature, *n* – [LAW] an organized body having the authority to make laws for a political unit[19].

length, *n* – [PHYSICS] a measured distance or DIMENSION[15].

lentic waters, *n* – [HYDROLOGY] PONDS or LAKES (standing water)[22].

lens, *n* – [GEOLOGY] a body of ORE or ROCK that is thick in the middle and thin at the edges, like a doubly convex lens[4].

lenticular, *adj* – [GEOLOGY] resembling in shape the cross section of a lens, especially of a double-CONVEX lens[4].

lepton, *n* – [PHYSICS] a family of elementary particles, alongside QUARKS and gauge BOSONS. Like quarks, leptons are FERMIONS (spin-1⁄2 particles) and are subject to the ELECTROMAGNETIC FORCE, the gravitational force, and weak interaction, but unlike quarks, leptons do not participate in the strong interaction. *Also bosons, fermions and quarks*.

lessivage, *n* – [AGRONOMY] the washing in suspension of fine CLAYS and silt down cracks or partings in a soil.

levee, *n* – [HYDROLOGY] *from French*, RIDGE of COARSE-grained DEPOSITS found alongside the STREAM CHANNELS and elevated above the FLOODPLAIN. Forms from the deposition of SEDIMENT during FLOODS[4]. *Also see dike and embankment.*

level, *n* – [PHYSICS] an imaginary LINE or PLANE joining points of equal height[15].

Lewis acid, *n* – [CHEMISTRY] an ELECTRON ACCEPTOR that acquires not just one, but two paired ELECTRONS to form a covalent bond with an electron donor molecule.

Lewis base, *n* – [CHEMISTRY] a SUBSTANCE, such as HYDROXIDE and AMMONIA IONS, that can donate an ELECTRON pair.

ley, *n* – [GEOGRAPHY] an area of cultivated GRASS or clover within arable rotation, remaining down for a few years (short ley) or up to 20 years (long ley) before the field is ploughed[45].

liability, *n* – [LAW] something for which one is obligated according to LAW or equity, especially, pecuniary obligation.

liability insurance, *n* – [INSURANCE] INSURANCE for what the policyholder is legally obligated to pay because of bodily injury or property damage caused to another person.

lichenometry, *n* – [BIOLOGY] a dating method that uses the growth rate of certain lichen species as an indicator of the age of the surface the lichen is growing on.

lick, *n* – [HYDROLOGY] a small watercourse or an ephemeral stream. It ranks hydrologically between a rill and a stream.

life, *n* – [BIOLOGY] the CONDITION which distinguishes active animals and plants from INORGANIC matter, including the capacity for growth, functional activity, and continual change preceding death.

lifetime average daily dose (LADD), *n* – [TOXICOLOGY] a measurement of dose that is usually used in carcinogen risk assessment; it is equal to the maximum daily dose that an individual is likely to receive on any day during the period of exposure multiplied by the fraction of the total lifetime that the individual is exposed to the substance.

lifts, *n* — [AGRONOMY] layers of loose SOIL. Used to specify how much loose soil should be laid down at a time before it must be compacted or wrapped in geotextile fabrics.

lift station, *n* – [HYDROLOGY] a pumping facility that raises municipal sewage to a higher elevation to allow further gravity transport. Such facilities are required in areas with flat topographic features[22].

ligand, *n* – [CHEMISTRY] *1*. a soluble MOLECULE or ION that can form COMPLEXES with a METAL. *2*. molecule, ion or ATOM that is capable of furnishing or donating one or more pairs of ELECTRONS to a transition-metal ion, thus forming a coordination compound.

light, *n* – [PHYSICS] 1. the sensation aroused by stimulation of the visual receptors. 2. an ELECTROMAGNETIC RADIATION in the WAVELENGTH range including infrared, visible, ultraviolet, and X-RAYS and traveling in a vacuum with a speed of about 186,281 miles (300,000 kilometers) per second; specifically **:** the part of this range that is visible to the human eye.

light industry, *n* – [INDUSTRIAL TECHNOLOGY] the manufacture of articles of relatively small bulk, using small amounts of raw materials, such as the making of tools and televisions, the processing of food, etc.[45].

light oil, *n* – [PETROLEUM CHEMISTRY] CRUDE OIL that has a high API GRAVITY or BAUMÉ GRAVITY[4].

light gas oils, *n* – [PETROLEUM CHEMISTRY] LIQUID PETROLEUM DISTILLATES heavier than NAPHTHA, with an approximate boiling range from 401 degrees Fahrenheit to 650 degrees Fahrenheit.

light hydrocarbons, *n* – [PETROLEUM CHEMISTRY] GASES that are VOLATILE LIQUIDS at standard temperature and pressure and range from methane to octane, including normal, iso-, and cyclic alkanes, and aromatic compounds[34].

light, non-aqueous phase liquid (LNAPL), *n* – [HYDROGEOLOGY] a NON-AQUEOUS PHASE LIQUID with a SPECIFIC GRAVITY less than 1.0. Because the specific gravity of water is 1.0, most LNAPLs float on top of the water table. Most common PETROLEUM HYDROCARBON FUELS and LUBRICATING OILS are LNAPLs[22]. *Also see DNAPL, entrapped LNAPL and NAPL.*

light water, *n* – [CHEMISTRY] term used to distinguish ordinary water from HEAVY WATER. A light water reactor is cooled by ordinary water. *Also see heavy water.*

lignin, *n* – [BIOLOGY] a CHEMICAL COMPOUND that is most commonly derived from wood and is an integral part of the cell walls of some cells, such as tracheids, xylary fibres and sclereids of plants[22].

lignite, *n* -- [GEOLOGY] a soft, brownish COAL that develops from PEAT through bacterial action, is rich in KEROGEN, and has a carbon content of 70%, which makes it a more efficient heating fuel than peat[4]. *Also see anthracite coal, bituminous coal, coal and peat.*

ligroin, *n* – [PETROLEUM CHEMISTRY] a GASOLINE fraction with a 120° – 135°C boiling range. It may also be known as MINERAL SPIRITS.

liman, *n* – [HYDROLOGY] a shallow, muddy LAGOON, bay or marshy LAKE, formed at the MOUTH of a RIVER behind the seaward deposits of a DELTA and protected by a barrier or a SPIT; an ESTUARY or broad fresh-water BAY of the sea[16].

lime, *n* – [CHEMISTRY] a white, CAUSTIC, ALKALINE SUBSTANCE (CaO) obtained by heating LIMESTONE and used for making MORTAR or as a FERTILIZER or bleach[4].

limestone, *n* – [GEOLOGY] SEDIMENTARY ROCK composed primarily of calcium carbonate. Some 10% to 15% of all sedimentary rocks are limestones. Limestone is usually organic, but it may also be inorganic[4]. *Also see karst and limestone.*

limited restricted use remedial action, *n* – [REMEDIATION TECHNOLOGY] any remedial action for soil that requires the continued use of institutional controls but does not require the use of an engineering control in order to meet the established health risk or environmental standards[18].

limiting factor, *n* – [CHEMISTRY] the dominant factor that restricts or prevents a PROCESS or REACTION to occur.

limits, *n* – [INSURANCE] maximum amount of INSURANCE that can be paid for a covered loss.

limnology, *n* – [HYDROLOGY] the study of the PHYSICAL, CHEMICAL, HYDROLOGICAL, and BIOLOGICAL aspects of fresh-water bodies[4].

lindane, *n* – [CHEMISTRY] an INSECTICIDE with many applications, including its use as a seed and soil treatment; foliage application on fruit and nut trees, vegetables and ornamentals; and timber and wood protection. It possesses more vapor activity than most of the organochlorine insecticides[7]. *Also see insecticide and pesticide.*

line, *n* – [MATHEMATICS] a straight or curved continuous extent of length without breadth[15].

linear, *adj* – [MATHEMATICS] arranged in a line or lines; pertaining to the line-like character of some object or objects[4].

linear alkyl sulfonate (ALS), *n* – [CHEMISTRY] a common surfactant, used in detergents. Biodegradable LAS replaced alkylbenzene sulfonate, another surfactant, when the latter, which is not readily biodegradable, caused foaming discharges from municipal sewage treatment plants[22].

linear element, *n* – [GEOLOGY] a fabric element having one DIMENSION that is much greater than the other two. Lineations are common linear elements[4].

line of section, *n* – [GEOLOGY] a line on a map, indicating the position of a profile section or CROSS SECTION[4].

line of seepage (seepage line) (phreatic line), *n* — [HYDROGEOLOGY] the upper free water surface of the zone of seepage[13].

lineament, *n* – [GEOLOGY] a linear TOPOGRAPHIC feature (as of the EARTH) that reveals a characteristic such as a FAULT, large FRACTURE system or some subsurface structure[4]. *Also see fracture trace.*

linear molecule, *n* – [CHEMISTRY] a MOLECULE in which the ATOMS are arranged so that the BOND angle between each is 180°.

lineation, *n* — [GEOLOGY] the PARALLEL orientation of structural features that are lines rather than planes; some examples are parallel ORIENTATION of the long dimensions of MINERALS; FRACTURE TRACES; long axes of PEBBLES; striae or slickensides; and cleavage-bedding PLANE intersections[4].

liner, *n* – [HYDROLOGY] *1*. a relatively IMPERMEABLE and usually ARTIFICIAL barrier designed to keep

LEACHATE inside a LANDFILL. Liner materials include plastic and dense CLAY[16]. *2*. an insert or sleeve for SEWER pipes to prevent LEAKAGE or INFILTRATION.

lining, *n* – [UNDERGROUND TANK TECHNOLOGY] a LAYER of non-corrodible material resistant to the HAZARDOUS SUBSTANCE stored and bonded firmly to the interior surface of the tank, pipe, line, fixture or other equipment[48].

linked-scan mode, *n* – [CHEMISTRY] a GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS) mode in which two or more quadrupole, electrostatic, and/or MAGNETIC FIELDS are scanned simultaneously, thus allowing detection of specific parent, daughter, or neutral loss relationships between IONS[34].

links, *n* – [HYDROLOGY] *1*. the winding course of a river. *2*. the ground along such a winding course[16]. 3. one of the 100 standard deviations of a surveyor's chain, measuring 7.92 inches in length[4].

linn, *n* – [HYDROLOGY] *1*. a pool of water. *2*. a torrent running over rocks; a waterfall, cataract, or cascade. *3*. a precipice or a steep ravine[16].

lipids, *n* – [CHEMISTRY] a broad term that includes all oil-soluble, water-insoluble substances such as fats, waxes, fatty acids, sterols, pigments and terpenoids.

lipophillic, *n* – [CHEMISTRY] a SUBSTANCE with a strong affinity for fats.

liquefaction, *n* — [HYDROGEOLOGY] the process of transforming any SOIL from a SOLID STATE to a LIQUID STATE, usually as a result of increased pore pressure and reduced shearing resistance[22].

liquefaction potential, *n* — [HYDROGEOLOGY] the capability of a soil to liquefy or develop cyclic mobility.

liquefaction (spontaneous liquefaction), *n* — [HYDROGEOLOGY] the sudden large decrease of the shearing resistance of a cohesionless soil. It is caused by a collapse of the structure by shock or other type of strain and is associated with a sudden but temporary increase of the prefluid pressure. It involves a temporary transformation of the material into a fluid mass.

liquefied natural gas (LNG), *n* – [PETROLEUM CHEMISTRY] a PETROLEUM GAS, principally METHANE, stored as a LIQUID under PRESSURE[4].

liquefied petroleum gas (LPG), *n* – [PETROLEUM CHEMISTRY] various PETROLEUM GASES, principally propane and BUTANE, stored as a LIQUID under PRESSURE[4].

liquid, *n* – [PHYSICS] a state of matter that has a high DENSITY and is incompressible compared to a GAS. LIQUIDS take the shape of their container but do not expand to fill the container as gases do. Liquids diffuse much more slowly than gases. Liquids have a viscosity between 0.2 centipoise and 3000 centipoise inclusive at one atmosphere (760.0 millimeters of mercury) pressure and temperatures between 32 and 120 degrees Fahrenheit (0 and 49 degrees centigrade)[4].

liquid chromatography, *n* – [CHEMISTRY] a form of chromatography employing a liquid as the moving phase and a solid or liquid on a solid support as the stationary phase. Examples in clued column chromatography, gel permeation chromatography and partition chromatography[34].

liquid level, *n* — [HYDROGEOLOGY] the level of LIQUID in a BOREHOLE or well at a particular TIME. The liquid level can be reported as an ELEVATION or as a depth below the top of the LAND SURFACE. If the liquid in GROUND WATER is known as water level.

liquid limit, *n* – [AGRONOMY] the BOUNDARY between the liquid and plastic state of a SOIL[20].

liquid phase, *n* — [HYDROGEOLOGY] CONTAMINANT residing as a LIQUID in VADOSE ZONE pore space, often referred to as FREE PRODUCT"

liquid sensor, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] a monitoring system which detects the liquid phase of a hazardous substance[48].

liquefied petroleum gas (LPG), *n* – [PETROLEUM CHEMISTRY] a flammable mixture of hydrocarbon gases used as a fuel in heating appliances and vehicles. They are composed primarily of propane's and/or butanes, and sometimes propylenes and butylenes. Ethanethiol, a MERCAPTAN, is often added to produce a characteristic odor. *Also known as autogas.*

liquour, *n* – [CHEMISTRY] any AQUEOUS SOLUTION of one or more CHEMICAL COMPOUNDS[22].

liter, *n* – [PHYSICS] a measure of VOLUME in the Metric System equal to 0.263 gallon. *Also written as litre. Also see gallon, pint and quart.*

lithia water, *n* – [CHEMISTRY] mineral water containing lithium salts. It can occur naturally in springs.

lithic tuff, *n* – [GEOLOGY] an INDURATED DEPOSIT of VOLCANIC ASH in which the fragments are composed of previously formed rocks, such as particles of SEDIMENTARY ROCK, pieces of earlier lavas in the same cone, or small bits of new lava that first solidify in the vent and are then blown out[4].

lithification, *n* – [GEOLOGY] PROCESS by which SEDIMENTS are CONSOLIDATED into SEDIMENTARY ROCK. *Also see diagenesis and lithification*[4].

lithify, *v* – [GEOLOGY] to change to stone or to petrify, especially to consolidate from a loose sediment to a solid rock[4].

lithology, *n* — [GEOLOGY] the description of ROCKS, especially SEDIMENTARY CLASTICS and especially in hand specimens and in OUTCROPS, on the basis of such characteristics as COLOR, STRUCTURES, MINERALOGY, and PARTICLE size[4].

lithosol, *n* – [AGRONOMY] an AZONAL group of SOILS characterized by shallow depth to BEDROCK and by recent and imperfect WEATHERING. It usually develops on steep slopes[4].

lithosphere, *n* – [GEOLOGY] the solid CRUST which envelops the inner BATHYSPHERE of the earth. It consists of the thin, loose layer known as soil and the mass of hard rock, several miles in thickness, upon which the soil lies. *Also see atmosphere, bathysphere and hydrosphere*.

lithostatic gradient, *n* – [GEOLOGY] the total PRESSURE GRADIENT with depth caused by ROCK grains and WATER. It averages about 24.4 kilopascals per meter (1.08 pounds per square inch per foot).

lithostatic pressure, *n* – [GEOLOGY] the force exerted on a ROCK buried deep within the EARTH by overlying rocks. Because lithostatic pressure is exerted equally from all sides of a rock, it compresses the rock into a smaller, denser form without altering the rock's shape[4].

lithostratigraphy, *n* – [GEOLOGY] a formal naming system that allows the description of rock successions in terms of recognizable defined units on a local scale. The units, which comprise supergroups, groups, formations, members and beds in decreasing order of size, are described on the basis of observable characteristics[4].

litigate, *n* – [LAW] to be a party in a LAW SUIT; to contest a point of law[19].

litter, *n* – [AGRONOMY] the accumulation of leaves, twigs, etc. above the soil, from which HUMUS is ultimately formed[6].

littoral water rights, *n* — [LAW] the equivalent of RIPARIAN WATER RIGHTS for a LAKE, RESERVOIR, or other non-flowing body of water. As with riparian water rights, littoral water rights allow persons who own land adjacent to a body of water to make reasonable use of those waters on lands within the watershed. Littoral users share the waters among themselves and the concept of priority use (*Prior Appropriation Doctrine*) is not applicable. Under drought conditions, the lake or waterfront users also share shortages. Littoral rights cannot be sold or transferred to use on other (nonriparian) lands.

littoral zone, *n* – [HYDROLOGY] *1*. that portion of a body of FRESH WATER extending from the shoreline lakeward to the limit of occupancy of rooted plants. *2*. a strip of land along the shoreline between the high and low water levels[4].

llano, *n* – [GEOGRAPHY] an extensive PLAIN, with or without VEGETATION[4].

LNAPL – *See light, non-aqueous phase liquid*.

LNAPL body, *n* – [HYDROGEOLOGY] the 3-dimensional form and distribution of LNAPL in the subsurface existing in any phase (for example, free, residual, mobile, entrapped).

LNAPL footprint, *n* – [HYDROGEOLOGY] the 2-dimensional form and distribution of LNAPL in the subsurface existing in any phase (for example, free, residual, mobile, entrapped).

load, *n* – [PHYSICS] a MASS or WEIGHT supported by something; the forces to which a structure is subjected due to superposed weight; broadly, the forces to which a given object is subjected.

loaded stream, *n* – [HYDROLOGY] a STREAM that has all the SEDIMENT that it can carry[16].

loam, *n* — [AGRONOMY] a mixture of SAND, SILT, or CLAY, or a combination of any of these, with ORGANIC MATTER[13].

> DISCUSSION—It is sometimes called topsoil in contrast to the subsoils that contain little or no organic matter.

local climate, *n* – [METEOROLOGY] the climate of a small area, which shows significant contrasts (in terms of temperature, rainfall, windspeed and direction, susceptibility to fog and frost, etc.) with adjacent areas[45].

loch, *n* – [GEOGRAPHY] a LAKE or an arm of the SEA[6]. *Also see lake.*

lock, *n* – [HYDROLOGY] a stretch of water in a CANAL, STREAM, or dock, enclosed by gates at each end, and used in raising or lowering boats as they pass from one water level to another[16].

lode, *n* – [GEOLOGY] a long, narrow VEIN of a MINERAL running through a ROCK[4].

lodgement till, *n* – [GEOLOGY] TILL formed at the base of the glacier, containing a wide PARTICLE size distribution: CLAY, SILT, SAND, GRAVEL, COBBLES, STONES and BOULDERS, an unsorted, HETEROGENEOUS mixture with angular-shaped ROCK FRAGMENTS and a firm and compact substratum (locally referred to as HARDPAN) and a relatively high CLAY percent (7 - 25%)[4]. *Also known as basal till or compact till. Also see ablation till.*

loess, *n* — [GEOLOGY] a uniform AEOLIAN DEPOSIT of *silty* material having an open structure and relatively

high cohesion due to CEMENTATION of CLAY or CALCAREOUS material at GRAIN contacts[13].

DISCUSSION—A characteristic of loess deposits is that they can stand with nearly vertical slopes.

Also known as löss.

log, *n* – [GEOLOGY] a continuous record as a function of depth, usually graphic and plotted to scale on a narrow paper strip, of observations made on the rocks and fluids of the geologic section exposed in a well bore[16].

logarithmic scale, *n* – [MATHEMATICS] a scale of measurement in which an increase or decrease of one unit represents a tenfold increase or decrease in the quantity measured[24].

logging, *n* – [GEOLOGY] the act or process of making or recording a log[4].

logic, *n* – [SCIENCE] *1*. the science of REASONING, PROOF, thinking or INFERENCE. *2*. a chain of reasoning; reasoned ARGUMENT[15]. *Also see deduction, induction and reason.*

lognormal distribution, *n* – [MATHEMATICS] a frequency distribution whose logarithm follows a normal distribution[4].

longitude, *n* – [GEOGRAPHY] a west-east measurement of position on the Earth. It is defined by the angle measured from a VERTICAL PLANE running through the polar AXIS and the PRIME MERIDIAN. A line connecting all places of the same longitude is termed a meridian. Longitude is measured in degrees, minutes, and seconds. Measurements of longitude range from prime meridian (0°) to 180° west and east from this point. *Also see latitude and prime meridian.*

longitudinal fault, *n* – [GEOLOGY] a FAULT having the same direction of STRIKE as the surrounding STRATA[4].

longshore bar, *n* – [GEOLOGY] a low SAND RIDGE, built chiefly by wave action, occurring at some distance from and generally parallel with the shoreline, being submerged at least by high tides, and typically separated from the beach by an intervening trough[4].

loop lake—*See oxbow lake.*

lopolith, *n* – [GEOLOGY] a saucer-shaped intrusive body of IGNEOUS ROCK. Lopoliths are typically MAFIC in COMPOSITION[4]. *Also see batholith and loccolith.*

losing stream, *n*—[HYDROLOGY] a STREAM or REACH of a stream in which water flows from the stream bed into the ground[16].

DISCUSSION — Synonymous with influent stream.

Also see gaining stream.

loss, *n* – [INSURANCE] a reduction in the quality or value of a property, or a legal liability.

löss—*See loess.*

loss of circulation, *n* — [DRILLING TECHNOLOGY] the loss of DRILLING FLUID into STRATA to the extent that circulation does not return to the surface[4].

lost stream, *n* – [HYDROLOGY] *1*. a dried-up STREAM in an arid region. *2*. a sinking stream in a KARST region[16].

lotic waters, *n* – [HYDROLOGY] flowing waters, as in streams and rivers[22]. *Also see lentic water.*

louderback, *n* – [GEOLOGY] a remnant of a LAVA flow appearing in a tilted FAULT BLOCK and bounded by a dip slope[4].

lough, *n* – [HYDROLOGY] a body of water, either an enclosed fresh-water lake or a long, narrow penetration of sea water extending inland from the ocean[6].

low-energy environment, *n* – [HYDROLOGY] an aqueous sedimentary environment characterized by low energy and by standing water or a general lack of wave or current action, thereby permitting very-fine-grained sediment to settle and accumulate[4].

low-enriched uranium, *n* – [CHEMISTRY] Any form of uranium having a ^{235}U isotope concentration greater than 0.71% but below 20%. Typical concentrations used in light reactors range from 3% to 5%. *Also see depleted uranium, highly-enriched uranium and uranium.*

lower explosive limit (LEL), *n* – [PHYSICS] minimum concentration of a combustible gas measured as a percentage of the total constituents present in the atmosphere that will combust when ignited[22].

low-flow sampling, *n* — [ENVIRONMENTAL INVESTIGATION] a ground-water sampling technique where the purge and sampling rates do not result in significant changes in formation seepage velocity.

lowland, *n* – [GEOGRAPHY] a general term for extensive PLAINS not far above sea level[4].

low-sulfur distillate fuel, *n* – [PETROLEUM CHEMISTRY] distillate fuel oil having a sulfur content greater than 15 milligrams per liter (mg/L) to 500 mg/L. It also includes product with a sulfur content equal to or less than 15 mg/L if the product is intended for pipeline shipment and the pipeline has a sulfur specification of less than 15 mg/L.

low-sulfur no. 2 diesel fuel, *n* – [PETROLEUM CHEMISTRY] No. 2 diesel fuel that has a sulfur content of no higher than 0.05 percent by weight (or 500 mg/L). It is used primarily in motor vehicle engines for on-highway use.

low-sulfur oil—*See sweet oil.*

low tide, *n* – [HYDROLOGY] the minimum height reached by each falling tide. The high-low and low-low tides are the higher and lower of the two low tides, respectively, of each tidal day[47].

lubricating oil, *n* – [PETROLEUM CHEMISTRY] a thick, fatty oil used to lubricate machinery. If petroleum based, it is often composed of long-chain hydrocarbons.

lubricity, *n* – [PHYSICS] the ability to reduce FRICTION between SOLID SURFACES in relative motion, so it is a measure of a material's effectiveness as a LUBRICANT.

lunette, *n* — [GEOLOGY] a broad, low-lying, typically crescent-shaped MOUND of SANDY or LOAMY MATTER that is formed by the WIND, especially along the windward side of a LAKE basin.

luster, *n* – [MINERALOGY] the appearance or quality of light reflected from the surface of a MINERAL.

lutite, *n* – [GEOLOGY] any sedimentary clastic rock with clay or silt grain size of less than 1/16 millimetre (mm) (0.06 mm or 0.00256 inches).

lynchet, *n* – [GEOGRAPHY] *1*. an artificial cultivation TERRACE cut into a hillside more or less parallel with the contours[6]. *2*. a bank of earth that builds up on the downslope of a field ploughed over a long period of time. The disturbed soil slips down the hillside to create a positive lynchet while the area reduced in level becomes a negative lynchet. *Also known to as strip lynchets*.

lyophillic, *adj* – [CHEMISTRY] a SUBSTANCE that will readily go into COLLOIDAL suspension in a LIQUID.

lyophobic, *adj* – [CHEMISTRY] a SUBSTANCE in a COLLOIDAL state that has a tendency to repel LIQUIDS.

lysimeter, *n* — [AGRONOMY] a device to measure the quantity or rate of water movement through a block of SOIL, usually undisturbed or in-situ; or to collect such percolated water for analyses.

Mm

maar, *n* — [GEOLOGY] a flat-bottomed, roughly circular VOLCANIC CRATER of explosive origin that is often filled with WATER[4].

macadam, *n* – [CONSTRUCTION TECHNOLOGY] crushed stone of regular sizes below 3 inches (7.6 centimeter) for road construction, commonly with tar or asphalt binder. The sizes below 1 inch (2.54 centimeter) are more specifically defined as chippings.

maceral, *n* – [GEOLOGY] MICROSCOPIC ORGANIC constituents found in COAL[54].

machair, *n* -- [GEOGRAPHY] a fertile low-lying GRASSY PLAIN found on some of the north-west coastlines of Ireland and Scotland. *Also known as machar.*

macro, *prefix* – [PHYSICS] on a large scale**.** *Also see micro.*

macropore, *n* — [HYDROGEOLOGY] interaggregate cavities that service as the principal avenues for the INFILTRATION and DRAINAGE of WATER and for aeration[16]. *Also see macroporosity*.

macroporosity, *n* — [HYDROGEOLOGY] large intergranular POROSITY with large pore throats, including soil cracks, moldic POROSITY, animal burrows and other significant VOID space.

macroscopic, *n* – [PHYSICS] a term referring to any physical phenomenon whose SCALE lies in the range of kilometers to hundreds of kilometers[4]. *Also see microscopic.*

made land, *n* – [GEOLOGY] any part of the land surface which has been accumulated by the actions of mankind[4]. A large portion of The Netherlands would be considered made land. *Also see polder*.

mafelsic, *adj* – [GEOLOGY] said of IGNEOUS ROCKS containing roughly equal amounts of FELSIC and MAFIC MINERALS, color index 40 to 70.

mafic, *adj* – [GEOLOGY] pertaining to or composed dominantly of the ferromagnesian ROCK-forming SILICATES; said of some IGNEOUS ROCKS and their CONSTITUENT MINERALS[4]. *Also felsic and ultramafic.*

magistrate, *n* – [LAW] *1*. an official entrusted with administration of the laws: as a **:** a principal official exercising governmental powers over a major political unit (as a nation). *2*. a local official exercising administrative and often judicial functions. *3*. a local judiciary official having limited original jurisdiction.

magma, *n* – [GEOLOGY] molten ROCK that forms naturally within the Earth. Magma may be either a LIQUID or a FLUID mixture of LIQUID, CRYSTALS, and dissolved GASES[6]. *Also see extrusive rock and lava.*

magmatic water, *n* – [GEOLOGY] water arising from subterranean MAGMA[6]. *Also known as juvenile water*.

magnesia, *n* — [CHEMISTRY] magnesium oxide (MgO)[4].

magnesium (Mg), *n* – [CHEMISTRY] a light, silvery-white, and fairly tough METAL. It does not occur uncombined, is found in large deposits in the form of magnesite, DOLOMITE, and other minerals. Readily ignites upon heating. Used in flashlight photography, flares, and pyrotechnics, including incendiary bombs. Its alloys are essential for airplane and missile construction.

magnet, *n* – [PHYSICS] *1*. any body that orients itself in a definite direction when suspended in any magnetic field. *2*. any shaped mass of ferromagnetic material that has been permanently magnetized[4].

magnetic declination, *n* – [GEOGRAPHY] the acute angle between the directions of the magnetic and geographic meridians[4].

magnetic field, *n* – [PHYSICS] a region of variable FORCE around magnets, MAGNETIC MATERIALS, or current-carrying conductors[4]. *Also see magnetism*.

magnetic north, *n* – [GEOGRAPHY] the direction indicated on the. end of a COMPASS needle. This direction should not be confused with GEOGRAPHIC NORTH[4]. As of 2006, the DECLINATION between MAGNETIC NORTH and GEOGRAPHIC NORTH is about 4°. *Also see geographic north.*

magnetism, *n* -- [PHYSICS] the PROPERTY, possessed by certain materials, to attract or repel similar materials. Magnetism is associated with moving ELECTRICITY. *Also see electricity and electromagnetic field.*

magnetometer, *n* – [PHYSICS] instrument which is used to measure MAGNETIC FIELD strength in units of GAMMA[4].

magnitude, *n* – [MATHEMATICS] a numerical *approximation* to the nearest power of ten[15].

main, *n* – [HYDROLOGY] a relatively large pipe in a distribution system for drinking water or in a collection system for municipal wastewater[22].

mainland, *n* – [GEOGRAPHY] a country or CONTINENT without its adjacent ISLANDS[7]. *Also see continent and subcontinent.*

mainstem, *n* — [HYDROLOGY] *1*. the major REACH of a RIVER or STREAM formed by the smaller TRIBUTARIES which flow into it. *2*. the principal watercourse of a river, excluding any tributaries[16].

malalathion, *n* – [CHEMISTRY] an organophosphate pesticide ($C_{10}H_{19}O_6PS_2$), slightly soluble in water, formerly used extensively in tobacco farming.

malenclave, *n* – [HYDROGEOLOGY] a body of contaminated or unusable GROUND WATER surrounded by uncontaminated water. Classification of malenclaves depends on whether their volume expands, diminishes or is constant with time[16].

malezal swamp, *n* – [HYDROLOGY] a SWAMP resulting from drainage of water over an extensive plain with a slight, almost imperceptible slope[7].

malpais, *n* – [GEOLOGY] *from Spanish,* a TERRAIN difficult to cross. It usually refers to rough lava surfaces or barren trap landscapes. Literally means "bad land"[6].

mammilated, *adj* – [GEOLOGY] smooth and rounded in appearance, this term can be used for LANDFORMS of different sizes from a ROCK to a LANDSCAPE. Usually refers to landscape altered by GLACIATION[6].

man, *n* – [BIOLOGY] the human race.

mandate, *n* – [LAW] a judicial command or precept issued by a COURT or magistrate, directing the proper officer to enforce a JUDGMENT, sentence or decree.

manganese (Mn), *n* – [CHEMISTRY] a gray-white, hard, brittle metallic ELEMENT. Manganese does not occur uncombined in nature, but its minerals are widely distributed. Pyrolusite (MnO_2) and rhodochrosite ($MnCO_3$) are the most common minerals. The discovery of large quantities of manganese nodules on the ocean floor, containing about 24% manganese, holds promise as a source of manganese. Used to form many important alloys, especially with steel, aluminum, and antimony; used in dry cells and glass, and in the preparation of oxygen, chlorine, and medicines[17].

manganese IV reduction, *n* – [TREATMENT TECHNOLOGY] an anaerobic, microbially-facilitated process of transforming Mn^{4+} to Mn^{3+}. This process facilitates the MINERALIZATION of many contaminants, ultimately to CO_2.

manifest, *n* – [ENVIRONMENTAL REGULATION] a one-page form used by haulers transporting WASTE that lists EPA identification numbers, type and quantity of waste, the generator it originated from, the transporter that shipped it, and the storage or disposal facility to which it is being shipped. It includes copies for all participants in the shipping process.

manifest system, *n* – [ENVIRONMENTAL REGULATION] tracking of HAZARDOUS WASTE from "cradle-to-grave" (generation through DISPOSAL) with accompanying documents known as MANIFESTS.

man-made – [INDUSTRIAL TECHNOLOGY] SYNTHETIC, made by man, not NATURAL. *Also see anthropogenic, human and man.*

Manning equation, *n* – [HYDROLOGY] an EQUATION used to compute the velocity of uniform FLOW in an open CHANNEL where,

$$V = 1.486/n\ R^{2/3}S^{1/2}$$

and V is the mean velocity of flow (in cfs units), R is the hydraulic radius in feet, S is the slope of the channel or sine of the slope angle, and n is the Manning roughness coefficient[16]. *Also see Chézy equation, Froude number and Reynolds number.*

Manning roughness coefficient, *n* – [HYDROLOGY] the resistance of the bed of a channel to the flow of water in it[16].

Mann-Whitney U-Test, *n* – [STATISTICS] a non-parametric statistical test designed to compare the magnitude of sample measurements of data, without having to make assumptions about the characteristics of the distribution of the populations concerned. It is used to determine whether a difference in the median of two independent samples is statistically significant[6].

manometer, *n* – [PHYSICS] a device used to measure fluid or vapore pressures that consists of a tube filled with a liquid; the liquid level is determined by the fluid pressure, and the height of the liquid may be read from a SCALE[16].

mantle, *n* – [GEOLOGY] the middle layer of the earth with a thickness of about 2,800 km[4].

mantlerock, *n* – [GEOLOGY] the layer of loose rock fragments, the surface part of which is called soil, that covers most of the Earth's land area and varies in thickness from place to place[63].

manto, *n* – [GEOLOGY] a flat-lying, bedded deposit; either a sedimentary bed or a replacement stratabound orebody[4].

manufactured gas—*See coal gas.*

manufactured gas plant (MGP), *n* – [COAL TECHNOLOGY] a plant where coal gas was produced. *Also see coal gas and coal tar.*

> DISCUSSION – Coal-gas production was a significant source of energy in the United States, Canada and Europe in the late 1800s and early 1900s. By the 1940s, most MGPs in the United States were shut down because of the introduction of natural gas.

manure, *n* – [AGRONOMY] animal dung used for fertilizing land.

map, *n* – [GEOGRAPHY] an abstraction of the real world that is used to depict, analyze, store, and

communicate spatially organized information about PHYSICAL and cultural PHENOMENA[4]. *Also see chart, map, map projection and Mercator projection.*

map projection, *n* – [GEOGRAPHY] a method by which the curved surface of the earth is represented on a flat, surface map, so that each point of the latter corresponds to one point only on the former[4].

mar, *n* – [GEOGRAPHY] **f**rom Portuguese or Spanish, the SEA.

marble, *n* – [GEOGRAPHY] a COARSE-GRAINED, nonfoliated METAMORPHIC ROCK derived from LIMESTONE or DOLOMITE[4]. *Also see calcite, dolomite and limestone.*

marina, *n* – [HYDROLOGY] a purpose-built harbor providing moorings for yachts and other leisure craft, together with shore-based facilities such as parking, chandlery and sometimes housing[45].

marginal sea, *n* – [GEOGRAPHY] a semi-enclosed sea adjacent to a continent, floored by submerged continental mass[4].

marine, *n* -- [HYDROLOGY] with reference to OCEAN ENVIRONMENTS and PROCESSES[15].

marine diesel fuel, *n* – [PETROLEUM CHEMISTRY] in the marine industry this term usually defines a heavy DISTILLATE FUEL that may contain small amounts of RESIDUAL FUEL. It is commonly called marine diesel fuel (MDF) or marine diesel oil (MDO)[38].

maritime, *adj* – [HYDROLOGY] near the SEA or COAST[15].

marker, *n* – [PETROLEUM CHEMISTRY] a means of distinguishing specific batches of GASOLINE without providing an obvious visual clue. A refiner may add a marker to its gasoline so it can be identified as it moves through the distribution system[4].

marker bed, *n* – [GEOLOGY] a STRATIGRAPHIC BED selected for use in preparing STRUCTURAL, paleogeologic, and other MAPS that emphasize the NATURE or ATTITUDE of a PLANE or a surface. It is generally selected for LITHOLOGIC CHARACTERISTICS, but BIOLOGIC FACTORS and UNCONFORMITIES may also control its selection[4].

market value, *n* – [COMMERCE] the price for which something would sell, especially the value of certain types of assets, such as stocks and bonds. It is based on what they would sell for under current market conditions. For example, common stock market value would be the price of the stock as of a specified date. *Also see actual cash value*.

marl, *n* — [GEOLOGY] CALCAREOUS CLAY, usually containing from 35 to 65 % CALCIUM CARBONATE ($CaCO_3$)[4]. *Also see carbonate.*

marsh, *n* — [HYDROLOGY] a WETLAND characterized by GRASSY SURFACE mats which are frequently interspersed with open WATER or by a closed canopy of grasses, SEDGES, or other herbacious plants[4]. *Also see bog, fen, swamp and wetland.*

marsh gas, *n* — [BIOLOGY] GAS produced during the DECOMPOSITION of organic material buried in WETLAND SOILS[4]. The primary gas produced is METHANE, CH_4.

mass, *n* – [PHYSICS] the amount of a material SUBSTANCE present in a body, regardless of GRAVITY[24]. *Also see weight*.

mass chromatogram, *n* – [CHEMISTRY] the intensity of a specific ion versus gas chromatographic retention time. Allows identification of carbon number and isomer distributions for selected compound types[34].

massif, *n* – [GEOGRAPHY] *from French,* a uniform area of higher land which stands out from the surrounding lowland[4].

massive structure, *n* -- [GEOLOGY] a HOMOGENOUS STRUCTURE without any oriented features[4].

mass movement, *n* – [GEOLOGY] unit downslope movement of a portion of the land surface, as in creep, lanslide, or slip[4]. *Also see mass wasting*.

mass number, *n* – [CHEMISTRY] the number of PROTONS plus NEUTRONS in the NUCLEUS of an ISOTOPE of an ELEMENT[34].

mass spectrometry, *n* -- [CHEMISTRY] in a typical approach, this TECHNIQUE for MEASURING and ANALYZING MOLECULES involves introducing enough ENERGY into a target molecule to cause its disintegration. The resulting fragments are then analyzed, based on their mass/charge RATIOS, to produce a "molecular fingerprint"[34]. *Also see atomic absorption spectroscopy and gas chromatography.*

mass spectrum, *n* – [CHEMISTRY] a plot of relative intensities of ions formed versus the mass-to-charge ratio (M/Z). Used primarily for identifying compounds[34].

mass transport, *n* – [HYDROGEOLOGY] *1*. the movement of water, especially its net transfer by wave action in the direction of wave travel. *2*. the carrying of material in a moving medium such as water, air, or ice[4].

mass unit weight — *See unit weight*.

mass wasting, *n* – [GEOLOGY] general term for the downslope movement of SOIL and ROCK material under the direct influence of GRAVITY. The DEBRIS removed is not carried within, on, or under another MEDIUM. *Also see creep and soil creep.*

master plan, *n* – [ENVIRONMENTAL REGULATION] a detailed plan drawing of some desired or intended future situation[45].

match point, *n* – [HYDROGEOLOGY] a common point in the superposition of a TYPE CURVE over measured DATA in AQUIFER TEST analyses.

material safety data sheet (MSDS), *n* — [TOXICOLOGY] written or printed material concerning a HAZARDOUS SUBSTANCE which is prepared by CHEMICAL manufacturers, importers, and employers for hazardous chemicals pursuant to OSHA's Hazard Communication Standard, 29 CFR 1910.1200[22].

material threat, *n* – [LAW] a physically observable or obvious threat which is reasonably likely to lead to a release that, in the opinion of the environmental professional, is threatening and might result in impact to public health or the environment. An example might include an aboveground storage tank that contains a hazardous substance and which shows evidence of damage. The damage would represent a material threat if it is deemed serious enough that it may cause or contribute to tank integrity failure with a release of contents to the environment.

mathematics, *n* – [SCIENCE] the study of topics such as quantity, structure, SPACE, and change. An other view, held by many mathematicians, is that mathematics is the body of KNOWLEDGE justified by DEDUCTIVE REASONING, starting from AXIOMS and definitions. Practical mathematics, in nearly every society, is used for such purposes as accounting, measuring land, or predicting astronomical events. Mathematical discovery or research often involves discovering and cataloging patterns, without regard for application. *Also see algebra, calculus, geometry and statistics.*

matric potential, *n* – [AGRONOMY] the ENERGY required to extract WATER from a SOIL against the CAPILLARY and ADSORPTIVE FORCES of the soil MATRIX[16].

matrix, *n* – [GEOLOGY] the NATURAL material (as SOIL or ROCK) in which something (as a fossil or CRYSTAL) is embedded[4].

matrix, *n* – [MATHEMATICS] a rectangular array of mathematical elements (as the coefficients of simultaneous linear equations) that can be combined to form sums and products with similar arrays having an appropriate number of rows and columns[24]. *Also see mathematics and statistics.*

matrix diffusion, *n* -- [HYDROGEOLOGY] the migration through chemical gradients from primary POROSITY to secondary porosity[33].

matrix effect, *n* – [CHEMISTRY] analytical uncertainty or difficulty in quantifying the target analyte as a result of the composition or concentration of non-target compounds in the sample.[2]

matrix spike, *n* – [CHEMISTRY] a LABORATORY QUALITY ASSURANCE SAMPLE comprised of the same MATRIX of the samples being analyzed. The sample is injected with a known CONCENTRATION of a specific ANALYTE.

matter, *n* – [PHYSICS] anything that has MASS. AIR, WATER, coffee, fire, human beings, and stars are matter. Light, X-RAYS, photons, gravitons, information, and love are not matter[15]. *Also see mass.*

mature soil, *n* – [AGRONOMY] a soil with well-developed soil HORIZONS created by natural soil-forming processes; a soil in equilibrium with its environment[6].

maximum capacity, *n* – [TREATMENT TECHNOLOGY] in waste-treatment plants, either the maximum rate at which waste water can be put through a plant hydraulically, or some lower rate established by management (such as the maximum rate at which waste water can be treated without seriously interrupting the treatment process)[63].

maximum contaminant level (MCL), *n* – [ENVIRONMENTAL REGULATION] the highest amount or CONCENTRATION of a CONTAMINANT permitted in drinking water by the SAFE DRINKING WATER ACT. MCLs are the concentrations of contaminants in drinking water for which adverse health effects are not expected to occur over a lifetime of EXPOSURE. Although they are health-based criteria, MCLs also effect the technological and economic feasibility of remediation of drinking-water sources to the MCL concentration[18].

maximum contaminant level goal (MCLG), *n* – [ENVIRONMENTAL REGULATION] a nonenforceable health goal for solutes in drinking water; set at a level to prevent known or anticipated adverse effects with an adequate margin of safety[33].

maximum daily dose (MDD), *n* – [TOXICOLOGY] during a period of exposure, the maximum dose an individual receive on any particular day.

maximum holding time, *n* – [CHEMISTRY] the longest period that ENVIRONMENTAL SAMPLES, such as WATER, SOIL or AIR, can be retained between the collection of the sample and the laboratory analysis.

meadow, *n* – [GEOGRAPHY] *1.* a piece of grassland, especially one used for hay. *2.* a piece of low, well-watered ground, especially near a river. *Also see field and pasture.*

mean, *n* – [STATISTICS] sum of a set of VALUES x_1, x_2, ..., x_n divided by their number, n. It is often denoted by a bar, such as $\bar{x}$ (the word "arithmetic" is frequently omitted; where a "mean" is mentioned, the

arithmetic mean is to be understood)[24]. *Also see average, median and mode.*

meander, *n* – [HYDROLOGY] one of a series of regular, freely-developing, sinuous curves, bends, loops, turns, or windings in the course of a STREAM[16].

meander belt , *n* – [HYDROLOGY] lots of MEANDERS in a RIVER'S course, one after the other[4]. *Also see meandering stream.*

meander core, *n* – [HYDROLOGY] the piece of LAND in the center of an incised MEANDER[4].

meandering valley, *n* – [HYDROLOGY] a winding VALLEY with a FLOODPLAIN made from ALLUVIUM[6].

meanderkarren, *n* – [HYDROLOGY] a MEANDER-like form of a KARREN[6]. *Also see karren.*

meander neck, *n* – [HYDROLOGY] the strip of land separating one side of a meander from another[4].

meander scar—*See ox-bow lake.*

meander scroll, *n* – [GEOLOGY] an arc-shaped feature on the LANDSCAPE where a RIVER or STREAM CHANNEL once occupied.

meandering stream, *n* – [HYDROLOGY] a STREAM that traverses relatively flat LAND in fairly evenly spaced loops and separated from each other by narrow strips of FLOODPLAIN[4]. *Also see braided stream and drainage pattern.*

meander terrace, *n* – [HYDROLOGY] a TERRACE on one BANK of a RIVER where the river undercuts the ALLUVIUM at the BLUFF.

mean sea level, *n* – [GEOGRAPHY] the AVERAGE level of the sea, as calculated from a large number of observations taken at equal intervals of time[4].

measure, *v* – [SCIENTIFIC METHOD] to ascertain the figure, extent, or amount of something[15].

measurement, *n* – [SCIENCE] a description of a property of a system by means of a set of specified rules, that maps the property onto a SCALE of specified values, by direct or "mathematical" comparison with specified reference(s)[62].

measurement bias, *n* – [STATISTICS] the consistent under- or overestimation of the true VALUES in a POPULATION.

measurement error, *n* – [STATISTICS] ERROR caused by the failure of the observed MEASUREMENT to be accurately recorded by the measuring device or person.

mechanical aeration, *n* – [TREATMENT TECHNOLOGY] the PHYSICAL TREATMENT PROCESS by which clean air is brought into contact with contaminated soil to transfer the volatile organic contaminants from the soil to the air stream. Subsequent treatment of the air stream is then conducted.

mechanical analysis, *n* – [AGRONOMY] the procedure for determining the particle-size distribution of a soil sample.

mechanical dispersion, *n* – [HYDROGEOLOGY] the process whereby SOLUTES are mechanically mixed during ADVECTIVE TRANSPORT caused by the velocity variations at the microscopic level. *Also known as hydraulic dispersion. Also see diffusion, dispersion and dispersivity.*

mechanical screen—*See bar screen*.

mechanical surging, *n* – [HYDROGEOLOGY] a type of well development in which water is forced to flow in and out of a well screen by forcing a plunger up and down through the casing. *Also see well development.*

mechanical weathering, *n* – [GEOLOGY] the process of WEATHERING by which frost action, salt-crystal growth, absorption of water, and other physical processes break down a rock to fragments, involving no chemical change[4].

mechanics, *n* – [MATHEMATICS] branch of applied MATHEMATICS dealing with MOTION. *Also see kinetics, mathematics, motion, physics and statics*.

media (*pl.*), medium (*s.*), *n* – [PHYSICS] any COMPONENT such as SOIL, AIR, SEDIMENT, STRUCTURES, GROUND WATER or SURFACE WATER[22].

medial, *adj* – [GEOLOGY] in the middle.

medial moraine, *n* – [GEOLOGY] DEPOSIT of material found down the center of a GLACIER. Created when two glaciers and their LATERAL MORAINES merge[4]. *Also see ablation till, ground moraine, lateral moraine, recessional moraine and terminal moraine.*

median, *n* – [STATISTICS] STATISTICAL MEASURE of central tendency in a set of DATA. The median is the VALUE halfway through a data set where the values have been ordered from lowest to highest. In an even data set, the median is the AVERAGE of the two halfway values. *Also see average, mean and mode.*

mediterranean, *n* – [GEOGRAPHY] surrounded nearly or completely by dry LAND. Used of large bodies of water, such as lakes or seas[4].

meer, *n* – [HYDROLOGY] *from Dutch,* a lake

meinzer, *n* – [HYDROGEOLOGY] a unit of HYDRAULIC GRADIENT (*i*) expressed in gallons per day per square foot. This unit is equal to the flow rate in gallons per day through a cross-section of one square foot under a unit hydraulic gradient at 60°F[16].

mélange, *n* – [GEOLOGY] *from French,* mixture of ROCK materials. Mappable body of DEFORMED rocks that may be several KILOMETERS in length and consists of highly SHEARED CLAYEY MATRIX, thoroughly mixed

with angular native and exotic blocks of diverse ORIGIN and GEOLOGIC AGE[4].

melanization, *n* – [AGRONOMY] the darkening of a light-colored soil by the mixing of additional organic matter.

melting point, *n* – [PHYSICS] the TEMPERATURE at which a solid changes into a LIQUID. A pure substance under standard temperature and pressure has a single, reproducible melting temperature(ice) is 0^{o}C or 32^{o}F, the melting point for solid water[22]. *Also see boiling point and freezing point.*

member, *n* – [GEOLOGY] a division of rock bodies in LITHOSTRATIGRAPHY. It is made up from a number of BEDS and is part of a FORMATION[6].

meniscus, *n* – [PHYSICS] the curved top of a column of LIQUID in a small tube[16].

mercaptan, *n* – [CHEMISTRY] any of a class of ORGANIC COMPOUNDS containing the group -SH BONDED to a CARBON ATOM. The VOLATILE low-molecular-weight mercaptans have disagreeable ODORS. Mercaptans are found in CRUDE OIL, and methyl mercaptan is produced as a DECAY product of animal and vegetable MATTER. They also are produced by certain plants and animals; such as allyl mercaptan is released when onions are cut, butanethiol (butyl mercaptan) derivatives are present in skunk secretion, and mercaptans are among the sulfur compounds causing the disagreeable odor of flatus[22]. *Also see thiol.*

Mercator projection, *n* – [GEOGRAPHY] MAP projection system that presents true COMPASS direction. Distortion is manifested in terms of area. Area distortion makes continents in the middle and high latitudes seem larger than they should be. Specifically designed for nautical navigation[4]. *Also see map.*

mercury, *n* – [CHEMISTRY] a HEAVY METAL that can accumulate in the ENVIRONMENT and is highly TOXIC if breathed or swallowed. Mercury is a highly toxic substance found in thermometers, measuring devices, pharmaceutical and agricultural chemicals, chemical manufacturing, and electrical equipment[17]. *Also see heavy metals*.

mere, *n* – [HYDROLOGY] a small LAKE, POND, ESTUARY, or arm of the SEA[6].

meridian, *n* – [GEOGRAPHY] a circular arc that meets at the poles and connects all places of the same LONGITUDE[4]. *Also see longitude and prime meridian.*

meristem, *n* – [DENDROLOGY] plant tissue composed of thin-walled cells that are capable of dividing. Meristematic tissue is found in all buds, toot tips, and growing regions including the various types of cambium[12].

Merox unit, *n* – [PETROLEUM TECHNOLOGY] a catalytic chemical process used in petroleum refineries and natural-gas-processing plants to remove mercaptans from LPG, propane, butanes, light naphthas, kerosene and jet fuel by converting them to liquid hydrocarbon disulfides. Merox is an acronym for mercaptan oxidation.

mesa, *n* – [GEOLOGY] *from Spanish,* a flat topped HILL that rises sharply above the surrounding LANDSCAPE. The top of this hill is usually capped by a rock FORMATION that is more RESISTANT to WEATHERING and EROSION[4]. *Also see guyot, plain and plateau.*

mesa-butte, *n* – [GEOLOGY] a BUTTE formed as a result of EROSION and reduction of a MESA[7].

mesa plain, *n* – [GEOLOGY] a flat-topped summit of a hilly MOUNTAIN[7].

meseta, *n* – [GEOLOGY] *1*. a small MESA. *2*. an extensive PLATEAU, often with an uneven or eroded surface, forming the central physical feature of a region[4].

mesh, *n* – [MATHEMATICS] *1*. one of the openings between the threads or cords of a net, one of the similar spaces in a network, often used to designate screen size as the number of openings per linear inch. *2*. a weblike PATTERN or construction[4].

mesomorphism, *n* – [GEOLOGY] a state of MATTER that is as intermediate between a CRYSTALLINE SOLID and a normal ISOTROPIC LIQUID.

meson, *n* – [PHYSICS] subatomic particles composed of one QUARK and one antiquark. They are part of the HADRON particle family—particles made of quarks.

mesotrophic, *n* – [HYDROLOGY] RESERVOIRS and LAKES which contain moderate quantities of NUTRIENTS and are moderately productive in terms of aquatic animal and plant life.

Mesozoic Era, *n* – [GEOLOGY] an era of geologic time, from the end of the Paleozoic to the beginning of the Cenozoic, or from about 225 to 65 million years ago; also, includes the Triassic, Jurassic and Cretaceous Periods[4].

metabolic by-product, *n* [BIOCHEMISTRY] a product of the reaction between an electron donor and an electron acceptor. Metabolic by-products include volatile fatty acids, daughter products of chlorinated aliphatic hydrocarbons, methane, and chloride[62].

metabolism, *n* – [BIOLOGY] the entire physical and chemical processes involved in the maintenance and reproduction of life in which nutrients are used to generate energy and in the process degrade to simpler

molecules (CATABOLISM), which by themselves may be used to form more complex molecules (anabolism)[62].

metabolite, *n* – [BIOLOGY] any substance produced by BIOLOGICAL PROCESSES[22].

metabolize, *v* – [BIOLOGY] the CHEMICAL PROCESS inside an *organism* to maintain life.

metagenesis, *n* – [PETROLEUM CHEMISTRY] stage of higher temperatures, such as 200° to 250°C where oil, condensate and gas are termally altered and the remaining organic material is converted to graphitic residues. Metagenesis is the beginning stages of metamorphism[34]. *Also see catagenesis and diagenesis*.

metal, *n* – [CHEMISTRY] a SUBSTANCE that conducts HEAT and ELECTRICITY, is shiny and reflects many colors of light, and can be hammered into sheets or drawn into wire. Metals lose ELECTRONS easily to form CATIONS. About 80% of the known ELEMENTS are metals[4].

metal alkyl, *n* – [CHEMISTRY] a combination of an ALKYL ORGANIC RADICAL with a metal atom or atoms.

metal deactivators, *n* – [PETROLEUM CHEMISTRY] CHELATING AGENTS, chemical compounds that capture specific metal ions, that are added to gasoline. The more-active metals, like copper and zinc, effectively catalyze the oxidation of GASOLINE. These metals are not used in most gasoline distribution and vehicle fuel systems. But when they are present, metal deactivators inhibit their catalytic activity.

metalimnion, *n* – [HYDROLOGY] the middle LAYER of a thermally STRATIFIED LAKE or RESERVOIR. In this layer there is a rapid decrease in TEMPERATURE with depth[4]. *Also called thermocline*.

metallic bond, *n* – [CHEMISTRY] a strong, electrostatic force existing between atoms in metallic crystals which binds the crystal together in a closely packed structure.

metallic element, *n* – [CHEMISTRY] an element distinguished by its luster, electrical conductivity, malleability, and ability to form positive ions[4].

metallography, *n* – [CHEMISTRY] the study of the PROPERTIES of METALS and ALLOYS as related to their PHYSICAL STRUCTURE, involving KNOWLEDGE of their CRYSTAL formation and structure, solid solution theory (phase rule), and microscopy at all levels.

metallurgy, *n* – [CHEMISTRY] the SCIENCE and TECHNOLOGY of METALS[4].

metamorphic facies, *n* – [GEOLOGY] a group of METAMORPHIC MINERAL assemblages that have reached CHEMICAL EQUILIBRIUM during metamorphism within a prescribed range of TEMPERATURE and PRESSURE[4].

metamorphic rock, *n* – [GEOLOGY] a ROCK that has undergone CHEMICAL or STRUCTURAL changes. HEAT, PRESSURE, or a CHEMICAL REACTION may cause such changes[4].

metamorphism, *n* – [GEOLOGY] the MINERALOGICAL, CHEMICAL, and structural adjustment of solid rocks to physical and chemical conditions imposed at depth below surface zones of weathering and cementation, which differs from the conditions under which the rocks formed[4].

metasomatic metamorphism, *n* – [GEOLOGY] form of METAMORPHISM that causes the chemical replacement of elements in rock minerals when gases and liquids permeate into bedrock[4].

meteoric water, *n* – [HYDROLOGY] WATER that occurs in or is derived from the ATMOSPHERE[4].

meteorology, *n* – [SCIENCE] the SCIENTIFIC STUDY of the ATMOSPHERE and its associated PHENOMENA[4].

meter, *n* – [PHYSICS] MEASURE of length in the Metric System equal to 100 centimeters, 1,000 millimeters, 0.001 kilometer or 3.28 feet. *Also written as metre. Also see feet, inch, mile and kilometer.*

methane, *n* – [CHEMISTRY] a colorless, nonpoisonous, FLAMMABLE GAS (CH_4) created by ANAEROBIC DECOMPOSITION of ORGANICS[4].

methanogenesis, *n* – [MICROBIOLOGY] the production of CH_4 and CO_2 by BIOLOGICAL PROCESSES that are carried out by methanogens[34].

methanogens, *n* – [MICROBIOLOGY] strictly ANAEROBIC archaebacteria, able to use only a very limited spectrum of SUBSTRATES (for example, molecular hydrogen, formate, methanol, methylamine, carbon monoxide or acetate) as electron donors for the reduction of carbon dioxide to methane[62].

methanol, *n* – [PETROLEUM CHEMISTRY] an ALCOHOL that can be used as an ALTERNATIVE FUEL or as a GASOLINE ADDITIVE. It is less VOLATILE than GASOLINE; when blended with gasoline it lowers the carbon monoxide emissions but increases HYDROCARBON emissions. Used as pure FUEL, its emissions are less OZONE-forming than those from gasoline. POISONOUS to humans and animals if ingested[22]. *Also see alternative fuels and ethanol.*

methemoglobinemia, *n* — [TOXICOLOGY] a blood disorder that impairs the ability of the blood supply to carry oxygen throughout the body. Also known as "blue baby syndrome", it is frequently caused by high concentrations of nitrate in drinking water supplies. It primarily affects infants less than 6 months of age. Most instances of the problem can be traced to babies drinking milk formula mixed in water with very high nitrate levels[22].

methine group, *n* – [CHEMISTRY] a RADICAL consisting of a single CARBON and a single HYDROGEN[17].

method, *n* – a special form of procedure especially in any branch of mental activity[15]. *Also see methodology and scientific method.*

method blank, *n* -- [CHEMISTRY] a BLANK SAMPLE maintained within the LABORATORY and analyzed periodically to determine if any CROSS-CONTAMINATION is occurring within their system. *See blank sample, field blank sample and trip blank sample.*

method detection limit (MDL), *n* – [CHEMISTRY] the minimum concentration of a SUBSTANCE that can be MEASURED and reported with a 99 percent confidence that the ANALYTE CONCENTRATION is greater than zero and is determined from the ANALYSIS of a SAMPLE in a given MATRIX containing the analyte[22].

methodology, *n* – [SCIENTIFIC METHOD] *1*. the SCIENCE of METHOD. *2*. a body of methods used in a particular branch of activity[15]. *Also see method and scientific method.*

methylcyclopentadienyl manganese tricarbonyl (MMT), *n* – [PETROLEUM CHEMISTRY] an ADDITIVE first commercialized in 1959 and used in GASOLINE alone or in combination with the LEAD ALKYLS. The Clean Air Act Amendments of 1977 banned the use of manganese antiknock additives in UNLEADED GASOLINE unless the EPA granted a waiver. MMT continued to be extensively used in unleaded gasoline in Canada at concentrations up to 0.068 g/gal. (18 mg/L). In 1996, after several waiver requests and court actions by the manufacturer, the courts ordered the EPA to grant a waiver for MMT. Its use is limited to a maximum of 0.031 g/gal. (8.2 mg/L). California regulations continue to ban the addition of manganese to gasoline.

methylene blue, *n* — [CHEMISTRY] a basic aniline dye, $C_{16}H_{18}N_3SCl{\bullet}3H_2O$, that forms a deep blue solution when dissolved in water. It is used as an antidote for CYANIDE poisoning and as a bacteriological stain.

methylene blue active substances (MBAS), *n* – [CHEMISTRY] any MATERIAL which forms a blue colored SALT with methylene blue, but generally interpreted as an indication of the presence of DETERGENTS in solution.

methylene chloride, *n* – [CHEMISTRY] a colorless, TOXIC LIQUID (CH_2Cl_2) heavier and less VISCOUS than WATER. Considered to be a DNAPL. Used to clean laboratory equipment and, consequently, often found as an ARTIFACT in ENVIRONMENTAL SAMPLES. *Also known as dichloromethane. Also see chlorinated solvent and DNAPL.*

methyl group, *n* – [CHEMISTRY] a univalent HYDROCARBON RADICAL (CH_3) present in many ORGANIC COMPOUNDS[17].

methylmercury, *n* — [CHEMISTRY] an ORGANIC COMPOUND that has known neurological toxicity effects that tend to biomagnify up the food chain in aquatic environments.. Biomagnification is a biological process wherein a contaminant's concentration increases at each level up the food chain, including humans. Thus, the availability of such contaminants, even in the seemingly insignificant parts per trillion range, often are ecologically important. Typically, methylmercury is formed by the action of certain bacteria on available supplies of inorganic mercury in stream-bottom sediments containing low concentrations of dissolved oxygen. However, the reverse process, or demethylation also is known to occur and this "detoxifying" of methylmercury is the subject of ongoing research[22].

methyl-*tert*-butyl ether, *n* – [PETROLEUM CHEMISTRY] an OXYGENATE ($C_5H_{12}O$) added to GASOLINE since late 1979[26]. MTBE CAN ALSO BE CONSIDERED AN OCTANE BOOSTER; ON ITS OWN, IT HAS AN OCTANE RATING OF 110. Because of its high aqueous solubility (~43,000 milligrams per liter) and its resistance to biological alteration, MTBE has become one of the most common contaminants in ground water in the United States.

metric system, *n* – [PHYSICS] a decimal system of units originally devised by a committee of the French Academy in 1791. It was based on the meter, the gram defined in terms of the mass of a cubic centimeter of water, and the second.

mica, *n* – [MINERALOGY] group of SILICATE MINERALS composed of varying amounts of ALUMINUM, POTASSIUM, MAGNESIUM, IRON and water. All micas form flat, plate-like crystals. Crystals cleave into smooth flakes. BIOTITE is dark, black or brown mica; MUSCOVITE is light-colored or clear mica[4].

micro, *prefix* – on a small SCALE[4]. *Also see macro.*

microanalysis, *n* – [CHEMISTRY] analysis of samples weighing between 0.1 and 10 milligrams.

microbe – *See microorganism.*

microbial activity, *n* – [BIOLOGY] CHEMICAL changes resulting from the METABOLISM of living MICROORGANISMS.

microbial gas, *n* – [BIOLOGY] GAS dominated by METHANE (typically >99%) produced by BACTERIA in shallow sediments. Microbial gas is generally depleted in ^{13}C compared to thermogenic gases[34].

microbiology, *n* – [BIOLOGY] a branch of BIOLOGY dealing especially with microscopic forms of life[22].

microchemistry, *n* – [CHEMISTRY] the study of chemical analysis of material on a small SCALE so that specialized instruments such as the microscope are needed; the material analyzed may be on the scale of 1 microgram.

microclimate, *n* – [METEOROLOGY] *1*. localized CLIMATE conditions within an URBAN area or neighborhood. *2*. the climate around a TREE or SHRUB or a stand of trees[6].

microcosm, *n* – [ECOLOGY] a diminutive, representative SYSTEM analogous to a larger system in composition, development or configuration[22].

microcrystalline, *n* – [GEOLOGY] a term used to describe materials that can be prepared in a form in which CRYSTALS are much smaller than in the natural product[4].

microenvironment, *n* – [ECOLOGY] the close physical and chemical surroundings of a MICROORGANISM[34].

microfauna, *n* – [BIOLOGY] microscopic animals such as protozoa and nematodes[7].

microflora, *n* – [BIOLOGY] the microscopic plants, such as fungi and bacteria of an organ or area[31].

microfractures, *n* – [GEOLOGY] MICROSCOPIC FRACTURES in ROCKS on the order of a millimeter or less in length.

micrometer, *n* – [DENDROLOGY] a device used for measuring tree-ring widths.

micron, *n* – [PHYSICS] a unit of length (μ) equivalent to one-millionth of a meter (10^{-6})[6].

microorganism, *n* – [BIOLOGY] an ORGANISM of microscopic or ultramicroscopic size, a MICROBE. *Also see bacteria and virus.*

microscope, *n* – an instrument with lenses that magnify objects or details too small to be seen with the naked eye[15].

microscopic, *adj* – [PHYSICS] said of an object or phenomenon or of its characteristics that cannot be observed without the aid of a microscope[4].

microsection, *n* – [DENDROLOGY] thin layer of wood, approximately 10 to 20 microns cut out from the surface of a wood sample with a microtome and prepared for microscopic examination in dendrochronological investigations.

midden, *n* – [GEOLOGY] a mound of organic DEBRIS or organic-rich SOIL created by an animal. In ARCHEOLOGY, a mound of human REFUSE.

middle distillates, *n* – [PETROLEUM CHEMISTRY] a general classification of refined PETROLEUM PRODUCTS that includes DISTILLATE FUEL OIL and KEROSENE.

migmatite, *n* – [GEOLOGY] a composite ROCK composed of IGNEOUS or igneous-appearing and/or METAMORPHIC materials that are generally distinguishable megascopically[4]. *Also see igneous rock, magma and metamorphic rock.*

mil, *n* – [PHYSICS] a unit of length equal to one thousandth of an inch[6]. *Also known as a thou*.

mildew, *n* – [BIOLOGY] *1*. a whitish growth on plants, organic matter, and other materials caused by a parasitic FUNGUS[2]. any fungus producing such growth[7].

mile, *n* – [PHYSICS] measure of length in the English System equal to 5,280 feet or 1.612 kilometer[6]. *Also see feet, inch, kilometer and meter*.

DISCUSSION – The mile was originally the Roman measure of 1,000 paces (about 1,620 yards).

Also see nautical mile.

milliard—*See billion.*

millibar, *n* – [PHYSICS] a unit of pressure (mb) equivalent to 1,000 dynes per square centimeter[6].

milliequivalents per liter, *n* – [CHEMISTRY] an expression of the CONCENTRATION of a material dissolved in WATER, calculated by dividing the concentration, in milligrams per liter, by the equivalent weight of the dissolved material. For example, the equivalent weight of aluminum is 9.0. A water concentration of aluminum of 1.8 milligrams per liter equals an aluminum concentration of 0.2 milliequivalent per liter.

milliliter, *n* -- [PHYSICS] measure of VOLUME in the Metric System equal to 0.001 liter. *Also written as millilitre.*

million, *n* – [MATHEMATICS] a thousand thousand or 1 x 10^6.

mill pond, *n* – [HYDROLOGY] a relatively small impoundment, usuaaly behind a man-made dam, used to supply power to the mill[63].

mima mound, *n* – [GEOGRAPHY] a term used for low, flattened, circular to oval, domelike, natural mounds found in the northwestern United States, Idaho, Oregon, and Washington, that are composed of loose, unstratified, often gravelly sediment that is an overthickened A HORIZON. These mounds range in diameter from 3 to more than 50 m; in height 30 cm to greater than 2 m; and in density from several to greater than 50 mounds per hectare. Within the northwestern United States, they are typically part of what is commonly known as "hog-wallow landscape".

mine, *n* – [GEOLOGY] an EXCAVATION beneath the SURFACE of the GROUND from which MINERAL MATTER of VALUE is extracted. The word carries the sense of

laborers working beneath a cover of GROUND and thus excludes OIL, BRINE, and sulfur WELLS. Excavations for the extraction of ore or other economic minerals not requiring work beneath the surface are designated by a modifying word or phrase as: *1*. OPENCUT MINE -- an excavation for removing minerals that is open to the weather; *2*. STEAM SHOVEL MINE -- an opencut mine in which steam shovels or other power shovels are used for loading cars; *3*. STRIP MINE -- a stripping; an opencut mine in which the overburden is removed from a coalbed before the coal is taken out; *4*. PLACER MINE -- a deposit of sand, gravel, or talus from which some valuable mineral is extracted; and *5*. HYDRAULIC MINE -- a placer mine worked by means of a stream of water directed against a bank of sand, gravel, or talus; soft rock similarly worked. A quarry from which rock is extracted becomes a mine when it is carried under cover. Mines are commonly known by the mineral or metal extracted such as bauxite mines, copper mines, silver mines, coal mines, etc.[4]

mineral, *n* – [MINERALOGY] a NATURALLY occurring, usually inorganic, solid consisting of either a single ELEMENT or a COMPOUND, and having a definite CHEMICAL COMPOSITION and a systematic internal arrangement of ATOMS[4]. *Also see crystallography and mineralogy.*

mineral fuel, *n* – [PETROLEUM CHEMISTRY] a CARBONACEOUS FUEL mined or stripped from the earth, such as PETROLEUM, COAL, PEAT, SHALE OIL or TAR SANDS[7].

mineral horizon, *n* – [AGRONOMY] a SOIL HORIZON that contains less than 12% ORGANIC CARBON if the MINERAL fraction contains no CLAY, or less than 18% organic carbon if the mineral fraction contains 60% or more clay.

mineralization, *n* – [CHEMISTRY] the complete DEGRADATION of an ORGANIC CHEMICAL to CARBON DIOXIDE, WATER, and in some cases INORGANIC IONS.

mineralization, *n* – [GEOLOGY] the PROCESS of depositing MINERALS or NATURALLY occuring INORGANIC CHEMICALS. This may be a normal BIOLOGICAL process which takes place during the life of an ORGANISM such as the the formation of bone tissue or egg shells. Alternatively, it may a process which begins after death and burial within sediments by the total replacement of the ORGANIC material with various minerals known as fossilization. Frequently this involves either CALCITE or QUARTZ, but many other minerals such as PYRITE may be involved. Mineralization is also used to describe the hydrothermal deposition of economically important METALS in the formation of orebodies[4].

mineralogy, *n* – [GEOLOGY] the study of MINERALS: FORMATION, occurrence, use, properties, COMPOSITION, and classification[4].

mineral oil, *n* – [PETROLEUM CHEMISTRY] an OIL of mineral ORIGIN, REFINED from CRUDE OIL, possessing electrical insulating properties[18].

mineral spirits, *n* – [PETROLEUM CHEMISTRY] a REFINED PETROLEUM DISTILLATE (150^{o} – 200^{o} C) having a low AROMATIC HYDROCARBON content, with VOLATILITY, FLASH POINT, and other PROPERTIES making it suitable as a thinner and SOLVENT. Often in the C_9 – C_{12} carbon range. *Also known as petroleum spirits*.

mineral water, *n* – [HYDROLOGY] water containing minerals or other dissolved substances that alter its taste or give it a therapeutic value. It is generally obtained from a naturally-occurring mineral spring. Mineral water can be "sparkling" (with effervescence or "bubbles"), or "still" (without effervescence).

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

Miocene, *n* – [GEOLOGY] an EPOCH of the TERTIARY, occurring before the PLIOCENE and after the OLIGOCENE. It extended from about 23.5 million years BP to about 5.2 million years BP[6].

mire, *n* – [GEOGRAPHY] a BOG or MARSH. *Also see quagmire.*

misanthropic, *adj* [PHILOSOPHY] of or related to a hatred or contempt for humankind.

miscible displacement, *n* – [HYDROGEOLOGY] *1*. the mutual mixing and movement of two fluids that are soluble in each other. *2*. the displacement of a fluid saturating a porous medium by another fluid completely miscible with the first fluid[20].

miscibility, *n* – [CHEMISTRY] the ability of two or more SUBSTANCES or LIQUIDS to readily dissolve into one another, such as SOIL and WATER[4]. *Also see immiscibilty.*

misdemeanor – [LAW] a minor crime (as opposed to a felony). A crime - less serious than a felony - which is punishable by fine or imprisonment in a city or county jail rather than in a penitentiary. This term is used to express every offence inferior to felony, punishable by indictment, or by particular prescribed proceedings; in its usual acceptation, it is applied to all those crimes and offences for which the law has not provided a particular name; this word is generally used in contradistinction to felony; misdemeanors comprehending all indictable offences, which do not amount to felony, as perjury, battery, libels, conspiracies and public nuisances.

misfit stream, *n* – [HYDROLOGY] a STREAM which appears to be too small to have made the valley in which it is flowing[6].

misrepresentation, *n* -- the statement made by a party to a contract, that a thing relating to it is in fact in a particular way, when he knows it is not so[15].

missing ring, *n* – [DENDROLOGY] a TREE RING which in a sample CORE is absent due to the failure of CAMBIAL activity. Missing rings can be located by CROSS DATING[12]. *Also see false rings.*

Mississippian Period, *n* – [GEOLOGY] a period of the PALEOZOIC ERA (after the DEVONIAN and before the PENNSYLVANIAN), thought to have covered the span of time between 363 and 320 million years ago; also, the corresponding system of rocks. It is named after the Mississippi River valley, in which there are good exposures of rocks of this age. It is the approximate equivalent of the Lower Carboniferous of European usage[4].

mistake, *n* – [SCIENCE] a MEASUREMENT which is known to be incorrect due to carelessness, accidents, or the ineptitude of the experimenter. It's important to distinguish mistakes from ERRORS: mistakes can be avoided. Errors can be minimized but not entirely avoided, because they are part of the process of measurement. DATA that are mistaken should be discarded. Data that contain errors can be useful, if the sizes of the errors can be estimated. *Also see error.*

mistrial, *n* – [LAW] an invalid TRIAL, caused by fundamental error. When a mistrial is declared, the trial must start again from the selection of the JURY.

miticide, *n* – [CHEMISTRY] an agent for killing mites[7]. *Also known as acaricide.*

mitigation, *n* – [LOGIC] the act or PROCESS of making something milder, less intense or less severe.

mittelgebirge, *n* – [GEOLOGY] a relatively low mountain range.

mixed-base crude, *n* – [PETROLEUM CHEMISTRY] a crude oil in which both PARAFFINIC and NAPHTHENIC HYDROCARBONS are present in approximately equal proportions[4].

mixture, *n* – [CHEMISTRY] a system of two or more distinct SUBSTANCES.

moat, *n* – [HYDROLOGY] *1*. a GLACIAL CHANNEL in the form of a deep, wide TRENCH. *2*. an OXBOW LAKE[7].

mobile LNAPL, *n* – [HYDROGEOLOGY] free LNAPL that is moving laterally or vertically in the environment under prevailing hydraulic conditions. The result of the LNAPL movement is a net mass flux from one point to another. Not all free LNAPL is mobile, but all mobile LNAPL must be free LNAPL.

mobilization, *n* – [REMEDIATION TECHNOLOGY] the movement of equipment and personnel to the site, conducted during a continuous time frame to prepare for, collect, and evaluate site assessment data.

mode, *n* – [STATISTICS] one of several MEASURES of central tendency that statisticians use to indicate the point (or points) on the SCALE of measures where the POPULATION is centered. It is the score in the population that occurs most frequently. Note that the mode is not the FREQUENCY of the most numerous score. It is the VALUE of that score itself[45]. *Also see average, mean and median.*

model, *n* – [HYDROGEOLOGY] representation in any form of an object, process or system. In HYDROLOGY or HYDROGEOLOGY, a MODEL is in most cases a MATHEMATICAL representation of a basin, a WATER SYSTEM, a series of DATA, etc.[4] *Also see analytical modeling, finite-element model, finite-difference model and numerical modeling.*

model calibration, *n* -- [HYDROGEOLOGY] adjustment of the PARAMETERS of a computer MODEL, either on the basis of PHYSICAL considerations or by mathematical optimization, so that the agreement between the observed DATA and estimated output of the model is as good as possible.

model cell, *n* – [HYDROGEOLOGY] a 3-dimensional volume used in a numerical model to represent a discretized portion of a physical system. Numerical models calculate the flows in and out of each model cell balancing with the flows of the surrounding model cells. The numerical model calculates the potentiometric head or water level at the center of each model cell at the end of each model stress period.

model grid, *n* – [HYDROGEOLOGY] the discretized model domain. The model grid is the physical model area normally overlain by a rectangular grid which defines the model boundaries and model cells.

moder, *n* – [AGRONOMY] a type of HUMUS, intermediate in character between MULL and MOR. Decomposition is greater than in mor but has not proceeded as far as mull and although moder occurs as a distinct organic layer above the mineral soil, it is permeated by loose mineral particles, especially in its lower layer, due to activity of soil fauna[6].

modulus, *n* – [MATHEMATICS] a number or quantity that measures a FORCE or function.

mofette, *n* – [GEOLOGY] a FISSURE in the ground surface of a region of dwindling volcanic activity, from which CARBON DIOXIDE, water vapor and some other GASES are emitted[6].

mogote, *n* – [GEOLOGY] a residual mass of KARST LIMESTONE that rises precipitously from a flat VALLEY floor or plain as an example of tower karst[6].

Mohorovicic discontinuity, *n* – [GEOLOGY] the BOUNDARY between the CRUST and the upper MANTLE in inside the earth. *Also known as the Moho*.

Mohr Circle, *n* – [ENGINEERING] a graphical representation of the state of stress (normal and shear) on a particular plane inclined at an angle to the major principal stress.

Moh's Scale, *n* – [MINERALOGY] a standard of ten MINERALS by which the hardness of a mineral may be rated[53].

moiety, *n* – [CHEMISTRY] synonymous with the term "functional group". It is a part of a MOLECULE that may include functional groups as substructures. For example, an ESTER is divided into an ALCOHOL moiety and an acyl moiety, but has an ester functional group.

molality (m), *n* – [CHEMISTRY] CONCENTRATION measured as moles of SOLUTE per kilogram of solvent. For example, a 1 *m* NaCl solution contains 1 mole of NaCl per kilogram of water. Molalities are preferred over MOLARITIES in experiments that involve TEMPERATURE changes of solutions, such as calorimetry and FREEZING POINT depression experiments[16]. *Also see activity, concentration, fugacity, molarity and mole.*

molal solution, *n* – [CHEMISTRY] CONCENTRATION of a SOLUTION expressed in MOLES of solute divided by 1,000 grams of solvent.

molar gas constant (R), *n* – [PHYSICS] a fundamental physical CONSTANT equal to 8.3145 joules per mole per degrees Kelvin.

molarity (M), *n* – [CHEMISTRY] CONCENTRATION of a solution measured as the number of MOLES of solute per liter of solution. For example, a 6 *M* HCl solution contains 6 moles of HCl per liter of solution[16]. *Also see activity, concentration, fugacity, molality and mole.*

molasse, *n* – [GEOLOGY] a partly MARINE, partly CONTINENTAL or DELTAIC SEDIMENTARY FACIES consisting of a thick sequence of soft, ungraded fossiliferous CONGLOMERATES, SANDSTONES, SHALES and MARLS, characterized by primary sedimentary structures and sometimes by COAL and CARBONATE DEPOSITS[4]. *Also see flysch and mélange.*

mold, *n* – [BIOLOGY] *1*. a microscopic form of FUNGUS responsible for much food spoilage and, in caves, for conspicuous tufts quickly covering scats, dead insects and bats, and even wooden structures such as ladders. *2*. soft, crumbling, friable earth[7].

mole, *n* – [CHEMISTRY] unit for amount of SUBSTANCE, defined as the number of ATOMS in exactly 12 g of CARBON-12. One mole of a MOLECULAR compound contains AVOGADRO'S NUMBER molecules and has a MASS equal to the substance's molecular WEIGHT, in grams[22]. *Also see molality, molarity and mole fraction.*

molecular attraction, *n* – [PHYSICS] a force that pulls MOLECULES toward each other.

molecular diffusion, *n* – [CHEMISTRY] DISPERSION of a CHEMICAL caused by the KINETIC ACTIVITY of the IONIC or MOLECULAR constituents.

molecule, *n* – [CHEMISTRY] the smallest part of a COMPOUND or ELEMENT that exists independently and which possesses the CHEMICAL PROPERTIES of the element or compound.

molecular weight, *n* – [CHEMISTRY] the sum of the ATOMIC WEIGHTS of all of the ATOMS in a MOLECULE, expressed in grams per mole.

mole fraction, *n* – [CHEMISTRY] a measure of the amount of a component in a mixture. The mole fraction of component A is given by $X_A = n_A/N$, where n_A is the amount of substance A (for a given entity) and N is the total amount of the substance of the mixture (for the same entity)[4]. *Also see molality, molarity and mole.*

mollisol, *n* – [AGRONOMY] SOILS with a rich HUMUS content, developed under grassland[4].

monadnock, *n* – [GEOLOGY] an isolated PEAK standing above the level of a PENEPLAIN[4].

monitored natural attenuation (MNA), *n* – [REMEDIATION TECHNOLOGY] the use of naturally occurring, contaminant degrading and dispersing PROCESSES combined with environmental monitoring to remediate CONTAMINATED GROUND WATER. *Also see attenuation, enhanced natural attenuation and natural attenuation.*

monitoring well, *n* – [HYDROGEOLOGY] *1*. a WELL used to obtain water quality SAMPLES or MEASURE GROUND-WATER LEVELS[16]. *2*. a well drilled at a HAZARDOUS WASTE management facility or SUPERFUND site to collect ground-water samples for the purpose of PHYSICAL, CHEMICAL, or BIOLOGICAL ANALYSIS to determine the amounts, types, and distribution of CONTAMINANTS in the ground water beneath the SITE. *Also see temporary well.*

monoaromatic, *n* – [CHEMISTRY] AROMATIC HYDROCARBONS containing a single BENZENE ring[62].

> DISCUSSION – The "BTEX" compounds (benzene, toluene, ethylbenzene and *o,m,p*-xylenes) are all monoaromatic, whereas compounds such as anthracene, fluorene or phenanthrene are polyaromatic.

monocline, *n* – [GEOLOGY] a one-sided FOLD[4]. *Also see anticline and syncline.*

monocyclic aromatic hydrocarbons (MAH), *n* – [CHEMISTRY] the class of AROMATIC HYDROCARBONS which contain a single BENZENE ring.

monolith, *n* – [GEOLOGY] a geological feature such as a MOUNTAIN, consisting of a single massive stone or rock.

monomer, *n* – [CHEMISTRY] *1*. a CHEMICAL COMPOUND consisting of single compounds. *2*. a simple MOLECULE capable of combining with a number of like or unlike molecules to form a POLYMER[22].

monomictic, *n* – [HYDROLOGY] LAKES and RESERVOIRS which are relatively deep, do not freeze over during winter, and undergo a single STRATIFICATION and mixing cycle during the year (usually in the fall).

monovalent, *adj* – [CHEMISTRY] having a VALENCY of one.

montane, *adj* – [GEOLOGY] *1*. of a MOUNTAIN. 2. a FOREST ECOSYSTEM in mountainous areas of the tropics[22].

Monte Carlo Method, *n* — [STATISTICS] method that produces a STATISTICAL ESTIMATE of a quantity by taking many RANDOM SAMPLES from an assumed PROBABILITY distribution, such as a normal distribution. The method is typically used when experimentation is infeasible or when the actual input values are difficult or impossible to obtain[6].

montmorillonite, *n* — [MINERALOGY] a group of CLAY MINERALS characterized by a weakly bonded sheet-like internal molecular structure; consisting of extremely finely divided hydrous aluminum or magnesium silicates that swell on wetting, shrink on drying, and are subject to ion exchange[4]. *Also see clay.*

monzonite, *n* -- [GEOLOGY] GRANULAR PLUTONIC ROCK containing about equal amounts of orthoclase and plagioclase, and thus intermediate between syenite and diorite. QUARTZ is minor or absent. Either HORNBLENDE or diopside, or both, are present and biotite is a common constituent[4]. *Also see igneous rock and plutonic rock.*

moor, moorland, *n* – [GEOGRAPHY] *1*. an expanse of open rolling infertile LAND. *2*. a BOGGY area, especially, one that is PEATY and dominated by GRASSES and SEDGES[6].

moorpan, *n* – [AGRONOMY] an iron pan occurring in a peaty soil or forming at the bottom of a bog, containing compact redeposited iron and humus compounds[16]. *Also known as moorland pan. Also see claypan, duripan, fragipan, ironpan and pan.*

mor, *n* – [AGRONOMY] a surficial, FOREST SOIL HORIZON that consists of acid litter and HUMUS[6].

moraine, *n* – [GEOLOGY]*1*. a MOUND or RIDGE of unstratified GLACIAL DRIFT, chiefly TILL, deposited by direct action of glacier ice. *2*. solidified VOLCANIC DEBRIS carried on the surface of a LAVA flow[4].

moraine kame, *n* – [GEOLOGY] a KAME that forms one of a group having the characteristics of a TERMINAL MORAINE[4]. *Also see kame, ground moraine and terminal moraine.*

moral, *adj* – [PHILOSOPHY] *1*. of or relating to PRINCIPLES of right and wrong in behavior. *2*. expressing or teaching a conception of right behavior. *3*. conforming to a standard of right behavior *4*. sanctioned by or operative on one's conscience or ETHICAL judgment. *5*. capable of right and wrong action[15].

moral obligation, *n* – [LAW] a duty which one owes, and which he ought to perform, but which he is not legally bound to fulfill.

morass, *n* – [GEOGRAPHY] an area of waterlogged, marshy ground, thought by some to be a term derived from MOOR[6].

morphology, *n* — [BIOLOGY] the SCIENCE of the structure of ORGANISMS.

morphology, *n* – [GEOLOGY] the external structure form and arrangement of rocks in relation to the development of LANDFORMS. River morphology deals with the science of analyzing the structural make-up of rivers and streams. GEOMORPHOLOGY deals with the shape of the Earth's surface[4].

mortar, *n* – [ENGINEERING] a mixture of LIME and CEMENT, SAND and WATER, used in building to bond bricks or STONES. *Also see cement, grout and lime.*

morvan, *n* – [GEOLOGY] the intersection of two PENEPLAINS, as where an exhumed, tilted peneplain is cut across obliquely by a younger surface at a more nearly horizontal attitude[4].

mosaic, *n* – [REMOTE SENSING] an assemblage of AERIAL PHOTOGRAPHS or space images that have been matched to form a continuous representation of a part of the Earth's surface[4].

moss, *n* – [BIOLOGY] any plant of the class Bryatae, occurring in nearly all samp habitats except the ocean[7].

motion, *n* – [PHYSICS] an act, PROCESS or instance of changing place.

motion, *n* – [LAW] a request asking a JUDGE to issue a ruling or order on a legal matter.

motion for a new trial, *n* – [LAW] request in which a losing party asserts that a trial was unfair due to legal errors that prejudiced its case.

motion to dismiss, *n* – [LAW] in a civil case, a request to a judge by the efendant, asserting that even

if all the allegations are true, the plaintiff is not entitled to any legal relief and thus the case should be dismissed.

motor diesel – *See diesel fuel*.

motor fuel, *n* -- [PETROLEUM CHEMISTRY] any PETROLEUM PRODUCT that includes, but is not limited to, all grades of GASOLINE, DIESEL FUEL and KEROSENE used in the operation of any type of engine.

motor gasoline, *n* – [PETROLEUM CHEMISTRY] a complex mixture of relatively VOLATILE HYDROCARBONS with or without small quantities of additives, blended to form a fuel suitable for use in spark-ignition engines. Motor gasoline, as defined in ASTM Specification D4814 or Federal Specification VV-G-1690C, is characterized as having a boiling range of 122 to 158 degrees Fahrenheit at the 10 percent recovery point to 365 to 374 degrees Fahrenheit at the 90 percent recovery point. "Motor Gasoline" includes conventional gasoline; all types of oxygenated gasoline, including gasohol; and reformulated gasoline, but excludes aviation gasoline.

conventional gasoline. finished motor gasoline not included in the oxygenated or reformulated gasoline categories. This category excludes reformulated gasoline blendstock for oxygenate blending (RBOB) as well as other blendstock.

oxygenated fuels program reformulated gasoline. a reformulated gasoline which is intended for use in an oxygenated fuels program control area.

oxygenated gasoline (including gasohol). oxygenated gasoline includes all finished motor gasoline, other than reformulated gasoline, having oxygen content of 2.0 percent or higher by weight. Gasohol containing a minimum 5.7 percent ethanol by volume is included in oxygenated gasoline. Oxygenated gasoline was reported as a separate product from January 1993 until December 2003 inclusive.

reformulated gasoline. finished gasoline formulated for use in motor vehicles, the composition and properties of which meet the requirements of the reformulated gasoline regulations promulgated by the U.S. Environmental Protection Agency under Section 211(k) of the Clean Air Act. It includes gasoline produced to meet or exceed emissions performance and benzene content standards of federal-program reformulated gasoline even though the gasoline may not meet all of the composition requirements (such as oxygen content) of federal-program reformulated gasoline.

reformulated (blended with alcohol). reformulated gasoline blended with an alcohol component (such as fuel ethanol) at a terminal or refinery to raise the oxygen content.

reformulated (blended with ether). reformulated gasoline blended with an ether component (such as methyl tertiary butyl ether) at a terminal or refinery to raise the oxygen content.

reformulated (non-oxygenated). reformulated gasoline without added ether or alcohol components.

Outside of the US, gasoline may be known as benzine or petrol.

motor gasoline blending components, *n* – [PETROLEUM CHEMISTRY] NAPHTHAS (such as STRAIGHT-RUN GASOLINE, ALKYLATE, REFORMATE, BENZENE, TOLUENE, XYLENE) used for blending or compounding into finished MOTOR GASOLINE. These components include reformulated gasoline blendstock for OXYGENATE blending (RBOB) but exclude oxygenates (ALCOHOLS, ETHERS), BUTANE, and pentanes.

motor octane number (MON), *n* – [PETROLEUM CHEMISTRY] a measure of the antiknock quality of gasoline under relatively severe conditions as can occur under full throttle. *Also see research octane number (RON)*.

motor oil, *n* – [PETROLEUM CHEMISTRY] a LUBRICATING OIL used in engines. Can be PETROLEUM-based or a non-petroleum.

mottling, *n* – [AGRONOMY] irregular spots or blotches of different COLORS or shades that vary in number and size. Mottling generally indicates poor aeration and impeded DRAINAGE[20]. *Also see gleyed soil.*

motu, *n* – [GEOGRAPHY] one of a series of closely-spaced coral ISLETS separated by narrow CHANNELS; the group of islets forms a ring-shaped ATOLL[7]. *Also see atoll and key*.

moulin, *n* – [GEOLOGY] *from French*, a shaft by which supraglacial meltwater enters a GLACIER to become ENGLACIAL or SUBGLACIAL.

moulin kame, *n* – [GEOLOGY] a DEPOSIT formed where a glacial STREAM falls into the GLACIER or to its bed, then loses gradient and velocity and drops its load in a pile. The ice-contact margins of the KAME are often slumped and mixed with TILL.

mound, *n* – [GEOGRAPHY] *1*. a low, rounded natural HILL, generally of earth; a KNOLL. *2*. a small, man-made hill, composed either of DEBRIS accumulated during successive occupations of the site or of earth heaped up to mark a burial site[4].

mounding, *n* – [HYDROGEOLOGY] PHENOMENON normally caused by excess ground-water RECHARGE from a man-made structure into permeable geologic material. Associated ground-water flow will be away from the structure in a radial fashion.

mountain, *n* – [GEOLOGY] NATURAL upward projections of the Earth's surface that are higher and steeper than hills. Mountains are at least 330 meters (or 1,000 feet) higher than the surrounding topography[4]. *Also see crest, hill, hillock, knoll, mountain range, peak and ridge*.

mountain glacier–*See alpine glacier.*

mountain range, *n* – [GEOLOGY] a line of MOUNTAINS connected by high ground[4]. *Also see mountain.*

mountain wood, *n* – [MINERALOGY] a compact, fibrous, gray to brown type of ASBESTOS which has an appearance similar to dry wood[7]. *Also known as rock wood. Also see asbestos.*

mousse, *n* – [PETROLEUM CHEMISTRY] a water-oil EMULSION formed when higher-density CRUDE OIL is spilled into SURFACE WATERS[22].

mouth, *n* – [GEOGRAPHY] where a RIVER empties into the SEA, OCEAN or LAKE[7]. *Also see delta.*

moutonnée (also moutonnéed), *adj* — [GEOLOGY] *from French*, rounded by glacial action into a shape resembling a sheep's back. Used of a rock formation.

moving average, *n* – [STATISTICS] as a simple mathematical process, the moving average process is merely a moving, fixed-interval average of a time series of data used to smooth fluctuations and distortions in the data and provide a more meaningful representation of underlying trends and cycles. As applied to econometric model development, a moving average process is one whereby future data values are expressed as a linear combination of past errors.

muck, *n* – [GEOLOGY] EARTH made from decaying plant materials[4]. *Also see bog and fen*.

mud, *n* — [GEOLOGY] a mixture of SOIL and WATER in a FLUID or weakly SOLID STATE[4].

mud cake, *n* – [HYDROGEOLOGY] the sheath of MUD SOLIDS that forms on the wall of the hole when LIQUID from mud filters into the FORMATION. *Also called filter cake or wall cake.*

mudflat, *n* — [GEOLOGY] low-lying muddy LAND that is covered at high TIDE and exposed at low tide; A level tract lying at little depth below the surface of water or alternately covered and left bare by the tide[4]. *Also see alkali flat and playa.*

mud flow, *n* – [GEOLOGY] FLOW of WATER so heavily charged with EARTH and DEBRIS that the flowing mass is thick or VISCOUS[4]. *Also see mass wasting and mudslide.*

mud-rotary drilling rig, *n* – [DRILLING TECHNOLOGY] a DRILLING method in which a hole is drilled by a rotating BIT to which a downward force is applied. The bit is fastened to and rotated by the drill stem, which also provides a passageway through which the DRILLING FLUID, such as a BENTONITE slurry, is circulated. Additional joints of drill pipe are added as drilling progresses. *Also see bentonite and drilling fluid.*

mudslide, *n* – [GEOLOGY] a slow-moving MUDFLOW in which movement is mainly by sliding upon a discrete BOUNDARY shear surface[7]. *Also see mass wasting and mudflow.*

mudstone, *n* – [GEOLOGY] a DETRITAL SEDIMENTARY ROCK composed of CLAY-sized PARTICLES[4]. *Also see argillite, claystone and shale.*

mulch, *n* – [AGRONOMY] a loose layer of organic or inorganic materials that forms naturally or is spread artificially on the ground surface to protect the soil and the plant roots from the effect of raindrops, evaporation and freezing[6].

mull, *n* – [AGRONOMY] a FOREST SOIL consisting of MINERAL matter and AMORPHOUS HUMUS[6]. *Also see headland*.

multi-cased well, *n* — [HYDROGEOLOGY] a WELL constructed by using successively smaller diameter casings with depth.

multi-component, *n* — [PETROLEUM CHEMISTRY] refers to PETROLEUM PRODUCTS or other mixtures composed of many different individual CHEMICALS at varying MOLAR FRACTIONS, such as in most petroleum-based FUELS, SOLVENTS, PETROCHEMICALS, and other products.

multi-level sampler, *n* – [ENVIRONMENTAL INVESTIGATION] a device built as or within a MONITORING WELL where GROUND-WATER SAMPLES can be collected from distinct depth intervals.

multi-phase flow, *n* – [HYDROGEOLOGY] simultaneous FLOW of two or more PHASES such as GROUND WATER and GASOLINE. *Also known as dense, non-aqueous phase liquid (DNAPL), light, non-aqueous phase liquid (LNAPL) and polyphase flow.*

multiple-screened wells, *n* — [ENVIRONMENTAL INVESTIGATION] two or more MONITORING WELLS situated in the same BOREHOLE. These devices can be either individual casing strings and SCREEN set at a specific

depth, a well with screens in more than one zone, or can consist of devices with screens with tubing or other collecting devices attached that can collect a *discrete sample*. *Also see multi-level sampler.*

multiple working hypothesis, *n* – [LOGIC] a method of "mental procedure" applicable to geologic studies, in which several rational and tenable explanations of a phenomenon are developed, coordinated, and evaluated simultaneously in an impartial manner[4].

multispectral scanner (MSS), *n* – [REMOTE SENSING] a remote sensing term referring to a scanning radiometer that simultaneously acquires images in various wavebands at the same time. A multispectral scanner can be carried aboard an aircraft or a satellite[6].

multivariate analysis, *n* – [STATISTICS] statistical analysis where more than one variable is considered[6]. *Also see statistics.*

municipal sewage, *n* – [WASTE DISPOSAL] WASTES (mostly liquid) originating from a community; may be composed of domestic WASTEWATERS and/or industrial DISCHARGES[22].

municipal sludge, *n* – [WASTE DISPOSAL] semi-liquid RESIDUE remaining from the treatment of municipal water and WASTEWATER.

municipal solid waste, *n* – [WASTE DISPOSAL] common *garbage* or *trash* generated by industries, businesses, institutions, and homes[16]. *Also see landfill.*

Munsell notation, *n* – [GEOLOGY] a designation of *color* by degrees of three simple variables; hue, *value*, and chroma, for soil and rock. For example, a notation of 10YR 6/4 has a hue of 10YR (yellow-red), value of 6, and chroma of 4[54].

mushroom stones, *n* – [GEOLOGY] limestone boulders undercut through erosion by water. These take the form of solitary sentinels of limestone which sbear the unmistakable marks of long-term erosion by lapping waves at the edge of lakes, which since vanished or retreated. These stone sentinels are often shaped like mushrooms.

muskeg, *n* — [GEOGRAPHY] level, practically treeless areas supporting dense growth consisting primarily of GRASSES. The surface of the SOIL is covered with a layer of partially decayed grass and grass roots which is usually wet and soft when not frozen[4]. *Also see prairie*.

mutagenic, *adj* -- [TOXICOLOGY] a PROPERTY of an agent that causes a permanent genetic change in a cell other than that which occurs during normal growth. Mutagenicity is the capacity of a CHEMICAL or *physical agent* to cause such permanent changes. *Also carcinogenic and teratogenic.*

mycology, *n* – [BIOLOGY] the study of fungi, ncluding their genetic and biochemical properties, their taxonomy and their use to humans as a source for tinder, medicinals (such as penicillin), food (such as beer, wine, cheese, edible mushrooms) and entheogens, as well as their dangers, such as poisoning or infection.

mycoremediation, *n* – [TREATMENT TECHNOLOGY] the removal of contaminants from soil, sediment or water through the use of FUNGI.

mylonite, *n* — [GEOLOGY] a microscopic BRECCIA with flow structure formed in FAULT ZONES. Caused by deformation as a result of shearing[4]. RADON is known to accumulate in mylonitic zones. *Also see fault, fissure, joint and radon*.

m/z – [CHEMISTRY] the mass/charge ratio of an ion in mass spectrometry measured in units of Daltons per charge, with positive or negative values denoting cations or anions, respectively. *Also see mass spectrometry.*

Nn

nadir, *n* — [HYDROLOGY] refers to a low or the lowest point, as the lowest point of a LAKE or other body of water attained of a certain period of time (period of record)[4].

naked karst, *n* – [GEOLOGY] KARST that is developed in a region without soil cover, so that its TOPOGRAPHIC features are well exposed[16].

***n*-alkane**, *n* – [PETROLEUM CHEMISTRY] straight-chain ALKANES in the range of C_9 to C_{20}. *Also known as n-paraffins*.

naphtha, *n* – [PETROLEUM CHEMISTRY] a DISTILLATION cut of petroleum showing VOLATILITY between GASOLINE and KEROSENE (~C_7 to C_{10}). Used as a manufacturing SOLVENT, a DRY-CLEANING FLUID and a GASOLINE blending stock[34]. *Also known as straight-run gasoline. Also see gas oil and heavy oil.*

naphthalene, *n* – [PETROLEUM CHEMISTRY] an AROMATIC HYDROCARBON ($C_{10}H_8$) with an ODOR of moth balls, obtained from the REFINING of CRUDE OIL and is a significant COMPONENT of many PETROLEUM PRODUCTS such as DIESEL FUEL[7].

naphthenes, *n* – [PETROLEUM CHEMISTRY] HYDROCARBONS (cycloalkanes) with the general formula C_nH_{2n}, in which the CARBON ATOMS are arranged to form a ring[34]. *Also known as cycloalkanes. Also see aromatics, isoparaffins, olefins, paraffins and PIANO.*

NAPL – [HYDROGEOLOGY] acronym for Non-Aqueous Phase Liquid. A LIQUID that is not MISCIBLE in WATER and can exist in the EARTH as a SEPARATE PHASE. *Also see corrected NAPL thickness, DNAPL and LNAPL.*

nappe, *n* – [GEOLOGY] *1.* a sheetlike, allochthonous ROCK unit, which has moved on a predominantly HORIZONTAL surface. The mechanism may be THRUST FAULTING, recumbent FOLDING, or both[4]. *2.* the French word for AQUIFER.

nari, *n* – [GEOLOGY] a variety of caliche that forms by surface or near-surface alteration of permeable calcareous rocks (dissolution and redeposition of calcium carbonate) and that occurs in the drier regions[16].

narrative standards, *n* – [ENVIRONMENTAL REGULATION] water quality standards that use descriptions to define acceptable levels of quality[22].

narrow, *n* – [GEOLOGY] a constricted section of a mountain pass, VALLEY or CAVE, or a gap or narrow passage between mountains[7].

narrows, *n* – [GEOGRAPHY] narrow part of a STRAIT or RIVER[7]. *Also see channel or strait.*

nation, *n* – [GEOGRAPHY] a community of people of mainly common descent, history, language, etc. forming a unified government or inhabiting a territory.

National Contingency Plan (NCP), *n* — [ENVIRONMENTAL REGULATION] in the United States, the National Oil and Hazardous substances Pollution Contingency Plan found at 40 CFR § 300, which is the EPA's regulations for how hazardous substances are to be cleaned up pursuant to CERCLA[22].

National Geodetic Vertical Datum of 1929 (NGVD of 1929), *n* – [GEOGRAPHY] a fixed reference adopted as a standard GEODETIC DATUM for ground-surface elevations determined by leveling. It was formerly called "*Sea Level Datum of 1929*" or "MEAN SEA LEVEL." Although the datum was derived from the mean sea level at 26 tide stations, it does not necessarily represent local mean sea level at any particular place. *Also see NOAA web site*: http://www.ngs.noaa.gov/faq.shtml#WhatVD29VD88. There is also a *"North American Vertical Datum of 1988"*[46]

National Pollutant Discharge Elimination System (NPDES), *n* – [ENVIRONMENTAL REGULATION] a provision of the CLEAN WATER ACT which prohibits discharge of POLLUTANTS into WATERS of the United States unless a special permit is issued by EPA, a state, or, where delegated, a tribal government on an Indian reservation[22].

National Priorities List (NPL), *n* — [ENVIRONMENTAL REGULATION] in the United States, a list compiled by the EPA pursuant to CERCLA 42 USC § 9605(a)(8)(B) of properties with the highest priority for cleanup pursuant to EPA's Hazard Ranking System. See 40 CFR Part 300[22]. *Also see Superfund.*

National Response Center (NRC), *n* -- [ENVIRONMENTAL REGULATION] staffed by the U.S. Coast Guard, a communications center that receives reports of discharges or releases of hazardous substances into the environment. The U.S. Coast Guard, in turn, relays information about such releases to the appropriate Federal agency[22].

native element, *n* – [CHEMISTRY] any of 20 ELEMENTS, such as copper, gold and silver, which occur naturally uncombined in a nongaseous state; there are three groups: metals, semimetals and nonmetals[4].

native material, *n* — [GEOLOGY] in place GEOLOGIC (or SOIL) materials encountered at a SITE.

native water, *n* – [HYDROLOGY] *1.* connate water. 2. formation water[16].

natric horizon, *n* – [AGRONOMY] a subsurface HORIZON that has more than 15% of its CATION EXCHANGE CAPACITY saturated with SODIUM.

natural, *adj* – [ENVIRONMENTAL SCIENCE] *1*. growing without human care, not cultivated[15]. *2*. existing in or produced by nature, not artificial. *Also see ambient.*

natural attenuation, *n* – [HYDROGEOLOGY] the observed reduction in CONTAMINANT CONCENTRATIONS as contaminants migrate from the source[22]. The reduction in concentration in GROUND WATER is caused primarily by:

- DILUTION;
- DISPERSION;
- SORPTION;
- VOLATILIZATION;
- BIOTIC and ABIOTIC TRANSFORMATIONS (BIOLOGICAL and CHEMICAL DEGRADATION).

Also see attenuation and monitored natural attenuation.

natural background soil level, *n* – [AGRONOMY] the CHEMICAL CONCENTRATION of a SUBSTANCE which is found in SOIL and which is not attributable to human activity[18].

natural coke, *n* – [GEOLOGY] COAL that has been naturally carbonized by contact with or proximity to an IGNEOUS intrusion, or by natural COMBUSTION[4]. *Also see coal.*

natural drainage system, *n* – [HYDROLOGY] a STREAM network in which the main stream and its TRIBUTARIES follow natural channels unmodified in their geometry and position by man[16].

natural gas, *n* – [PETROLEUM CHEMISTRY] HYDROCARBONS that exist as a GAS or VAPOR at ordinary PRESSURES and TEMPERATURES. A mixture of METHANE (CH_4) and other gases, often found trapped over PETROLEUM deposits under the earth. Common impurities include NITROGEN, CARBON DIOXIDE and hydrogen sulfide. It can be found alone or associated with oil[4]. *Also known as associated gas.*

natural-gas liquids, *n* – [PETROLEUM CHEMISTRY] HYDROCARBONS that occur naturally in gaseous form or in solution with OIL in the RESERVOIR, and that are recoverable as liquids by condensation or absorption[4].

natural gasoline, *n* – [PETROLEUM CHEMISTRY] the LIQUID PARAFFIN HYDROCARBON in NATURAL GAS and recovered by COMPRESSION, DISTILLATION AND ABSORPTION[4]. *Also see gasoline.*

natural ground-water remediation, *n* – [REMEDIATION TECHNOLOGY] any form of GROUND-WATER REMEDIATION in which only DEGRADATION, RETARDATION, and DISPERSION mechanisms are used to achieve applicable remediation standards. For active ground water remediations, this definition shall also apply to portions of PLUMES that are not captured by the active ground-water remediation, but are expected to be naturally remediated after separation from the source plume[18]. *Also see attenuation, enhanced natural attenuation, monitored natural attenutation and natural attenuation.*

naturalism, *n* – [PHILOSOPHY] belief that all objects, events, and and VALUES can be wholly explained in terms of factual and/or causal claims about the world, without reference to supernatural powers or authority.

natural load, *n* – [HYDROLOGY] the quantity of SEDIMENT carried by a stable STREAM[7].

natural logarithm, *n* – [MATHEMATICS] the value of the exponent that the base, e, must have to equal a given number[22]. It is calculated as $e^x = y$, where x is the logarithm. For example, the natural logarithm of 5 is the power (x) to which e (approximately equal to 2.718282) must be raised to equal 5, or ex = 5, which is equivalent to approximately 1.60944. Also written as ln 5 = 1.60944. *Also see logarithm.*

natural pollution, *n* – [ENVIRONMENTAL SCIENCE] soil, mineral, or bacterial impurities picked up by water from the Earth's surface, apart from any human activity[63].

natural quality, *n* – [ENVIRONMENTAL INVESTIGATION] the CONCENTRATION or level of CONSTITUENTS which occurs in GROUND WATER of a HYDROLOGIC UNIT without the influence of human activity, other than the effects of regional PRECIPITATION of AIR POLLUTANTS (for example, acid precipitation). The natural quality for SOCs is established as zero (0.0) except where the SOCs are the result of air transport from outside the JURISDICTION, enter the jurisdiction from ground water transport of pollutants having their origins outside, or are created entirely by natural processes. Where natural quality for other constituents is not ascertainable from generally acceptable scientific studies, the lowest concentrations known to exist within the same or a similar hydrologic unit and setting (that is, depth) within the classification area shall be used to represent the natural quality, provided, however, that for pH, corrosivity and hardness, the most representative concentration shall be used.

natural resources, *n* – [ENVIRONMENTAL SCIENCE] all LAND, BIOTA, fish, shellfish, and other wildlife, AIR, WATERS and other such RESOURCES[18].

natural selection, *n* – [BIOLOGY] ENVIRONMENT'S influence on the reproductive success of individuals in a population. It results in the exclusion of

maladapted genetic traits found within individuals in a population[22].

natural water, *n* – [HYDROLOGY] any bottled water obtained from a GROUND-WATER source, including SPRING water, WELL water, ARTESIAN water, or mineral water. Water not obtained from a municipal water supply[22].

nature, *n* – [ENVIRONMENTAL SCIENCE] *1*. the external world in its entirety[15]. *2*. humankind's original or NATURAL condition.

nature reserve, *n* – [ENVIRONMENTAL REGULATION] an area of land, usually enclosed and of restricted access, set aside for the protection of plants, animals, or the landscape.

nautical mile, *n* – [GEOGRAPHY] any of various units of distance, used for sea and air navigation, based on the length of a minute of arc of a great circle of the Earth and differing because the Earth is not a perfect sphere: *1*. a British unit that equals 6,080 feet or 1,853.2 meters, also called Admiralty mile. *2*. a U.S. unit, no longer in official use, that equals 6080.20 feet or 1,853.248 meters. *3*. an international unit that equals 6,076.1033 feet or 1,852 meters, used officially in the United States since July 1954. *Also see mile.*

Navier-Stokes equations, *n* – [HYDROLOGY] equations of motion for a viscous fluid[16].

navigable waters, *n* – [HYDROLOGY] traditionally, waters sufficiently deep and wide for navigation by all, or specified vessels; such waters in the United States come under federal jurisdiction and are protected by certain provisions of the Clean Water Act.

***n*-C_{17}/pristine ratio**, *n* – [AGE DATING] the ratio of *n*-C_{17} (heptadecane) versus the ISOPRENOID, PRISTINE[30]. *Also see Christensen & Larsen Method.*

neap tide, *n* – [HYDROLOGY] TIDE that occurs every 14 to 15 days and coincides with the first and last quarter of the moon. This tide has a small TIDAL RANGE because the GRAVITATIONAL forces of the moon and sun are PERPENDICULAR to each other[4]. *Also see spring tide*.

nearshore, *n* – [HYDROLOGY] an indefinite zone which extends from the shoreline seaward to a point beyond the breaker zone[7].

neat cement, *n* – [ENGINEERING] a SLURRY composed of any CEMENT and WATER.

Nebraska Glacial Stage, *n* – [GEOLOGY] the first known, significant period of advance of the North American ICE SHEET during the PLEISTOCENE EPOCH between about 1.75 million years BP and about 2 million years BP, occurring before the AFTONIAN INTERGLACIAL STAGE.

neck, *n* – [GEOGRAPHY] *1*. a narrow strip of land connecting two larger areas, such as an ISTHMUS. *2*. a meander neck. *3*. a volcanic neck[4].

needle, *n* – [DENDROLOGY] a long, slender leaf normally found associated with coniferous trees such as pines[12].

negative landform, *n* – [GEOLOGY] a relatively depressed or low-lying topographic form, such as a valley, basin or plain[7].

negligence, *n* – [LAW] the failure to use reasonable care. The doing of something which a reasonably prudent person would not do, or the failure to do something which a reasonably prudent person would do under like circumstances. A departure from what an ordinary reasonable member of the community would do in the same community. *Also see gross negligence.*

nehrung, *n* – [GEOLOGY] *from German*, a lengthy coastal stand spit created by longshore drift[6].

nematicide, *n* – [CHEMISTRY] all SUBSTANCES or MIXTURES of substances used to control or destroy NEMATODES[7].

nematodes, *n* – [BIOLOGY] roundworms, sometimes called threadworms or eelworms, important in the breakdown of SOIL microflora into HUMUS.

Neogene, *n* – [GEOLOGY] the later of the two stratigraphic divisions of the CENOZOIC and generally accepted as including the MIOCENE, PLIOCENE and PLEISTOCENE EPOCHS extending from about 23.3 million years BP to about 1.64 million years BP[6].

neokerogen, *n* – [PETROLEUM CHEMISTRY] ORGANIC DEBRIS deposited among MARINE SEDIMENTS and modified by BACTERIAL action in such a way as to form the source material of PETROLEUM, or, under certain conditions, to form the kerogen of oil shales. *Also see kerogen and oil shale.*

neon, *n* – [CHEMISTRY] a colorless, GASEOUS ELEMENT considered to be a NOBLE GAS. Analysis of neon is needed when performing ground-water dating with the TRITIUM-HELIUM METHOD.

nephelometry, *n* – [CHEMISTRY] a technique used to measure TURBIDITY of a SOLUTION. The LIGHT reflected at right angles when passing through a solution is recorded as a measurement of the dispersed PARTICLES in the solution.

neptunism, *n* – [GEOLOGY] the theory, advocated in the 18th century, that the rocks of the Earth's crust all consist of material deposited sequentially from, or crystallized out of, water[4].

neritic zone, *n* – [HYDROLOGY] that part of the SEA floor extending from the low TIDE line to a depth of 200 m[4].

Nernst Equation, *n* – [CHEMISTRY] an equation relating the solubility product of a reaction to the oxidation-reduction potential where,

$$Eh = E^0 + (RT/nF)\ln K_{sp}$$

and E^0 is the standard electrical potential in volts (V), R is the gas constant of 0.00199 kcal/(mol.K), T is the temperature in kelvins, *n* is the number of electrons, F is the Faraday constant of 23.1 kcal/V and K_{sp} is the solubility product.

ness, *n* – [GEOGRAPHY] a PROMONTORY or HEADLAND[6].

net opinion, *n* – [LAW] an expert opinion not based on facts and data.

net peak flow, *n* – [HYDROLOGY] the total flow at a peak, minus the corresponding base flow.

network, *n* – [MATHEMATICS] a system of lines (arcs, edges, links) which join together a set of points (NODE)[6].

Neumann condition, *n* – [HYDROGEOLOGY] the BOUNDARY condition for a ground-water flow model where a flux across the boundary of the flow region is known[16].

neuston, *n* – [MICROBIOLOGY] the community of minute organisms living in the surface film of water[63].

neutral estuary, *n* – [HYDROLOGY] an ESTUARY in which neither fresh-water inflow nor evaporation dominates[7].

neutralization, *n* – [CHEMISTRY] decreasing the ACIDITY or ALKALINITY of a SUBSTANCE by adding alkaline or acidic materials, respectively[22].

neutrino, *n* – [PHYSICS] an elementary particle that usually travels close to the SPEED OF LIGHT, is electrically neutral, and is able to pass through ordinary matter almost undisturbed. This makes neutrinos extremely difficult to detect. Neutrinos have a very small, but non-zero mass.

neutron, *n* – [CHEMISTRY] an electrically neutral subatomic PARTICLE of MATTER existing within the NUCLEUS of an ATOM[22]. *Also see electron and proton.*

neutron log, *n* – [GEOPHYSICS] a BOREHOLE, GEOPHYSICAL LOG obtained by lowering a RADIOACTIVE ELEMENT, which is a source of NEUTRONS, and a neutron detector into the WELL. The neutron log measures the amount of WATER present; hence, the POROSITY of the FORMATION[4].

neutron number, *n* – [CHEMISTRY] the number of NEUTRONS in the NUCLEUS of an ATOM.

névé—*See snow field.*

newly discovered evidence, *n* – [LAW] that evidence which, after diligent search for it, was not discovered until after the trial of a cause. *Also see circumstantial evidence and direct evidence.*

Newark Supergroup, *n* – [GEOLOGY] CONTINENTAL STRATA of Lower Jurassic or Upper Triassic age in the Eastern United States, consisting essentially of red SANDSTONE, SHALE, ARKOSE, and CONGLOMERATE, some 14,000 to 18,000 ft (4.3 to 5.5 km) thick. The series includes black shales with fish remains, thin COAL seams in Virginia and North Carolina, and basaltic flows and sills.

newton, *n* – [PHYSICS] the SI unit of force equaling a mass of one kilogram accelerated at one meter per second per second[22].

Newtonian fluid, *n* – [PHYSICS] a FLUID whose VISCOSITY does not depend on GRADIENTS in FLOW speed. Gases and low-MOLECULAR WEIGHT liquids are usually Newtonian fluids[16]. *Also see non-Newtonian fluid.*

Newton's first law of motion, *n* – [PHYSICS] a body at rest or in uniform MOTION in a straight line will remain at rest or in the same uniform motion unless acted upon by an external FORCE; also called the law of inertia.

Newton's law of universal gravitation, *n* – [PHYSICS] the FORCE of attraction between any two PARTICLES of MATTER in the UNIVERSE is directly PROPORTIONAL to the product of their MASSES and inversely proportional to the square of the distance between their centers of mass.

Newton's second law of motion, *n* – [PHYSICS] the acceleration of a body is directly proportional to the net force exerted on the body, is inversely proportional to the MASS of the body, and has the same direction as the net force; also called the law of acceleration where,

$$F = ma$$

and F is force, m is the mass and a is the acceleration.

Newton's third law of motion, *n* – [PHYSICS] if one body exerts a force on a second body, then the second body exerts a force equal in magnitude and opposite in direction on the first body; also called the law of interaction.

new trial, *n* – [LAW] a completed TRIAL that has been set aside and tried again from scratch as opposed to a mistrial which is terminated prior to its conclusion and then tried again. A reexamination of an issue in fact before a court and jury, which had been tried at least once before the same COURT and a JURY. *Also see trial.*

nickel (Ni), *n* – [CHEMISTRY] a silvery white, hard, malleable, ductile, somewhat ferromagnetic ELEMENT. It takes on a high polish and is a fair conductor of heat and electricity. Used for making stainless steel and other corrosion-resistant metals and is chiefly valuable for the alloys it forms. Also used extensively in coinage, in desalination plants for converting sea water into fresh water, and in making nickel steel for armor plate and burglar-proof vaults.

nip, *n* – [HYDROLOGY] a small, low break in the slope on a BEACH, produced at the high-water mark by wavelets[4].

nitrate (NO_3), *n* – [CHEMISTRY] a CONTAMINANT often found in GROUND WATER and commonly originating from SEPTIC SYSTEM DISCHARGES, AGRICULTURAL WASTES and overapplication of FERTILIZERS[22]. In the United States, the drinking-water standard is usually 10 mg/l. *Also see ammonia and nitrite.*

nitrate reduction, *n* – [TREATMENT TECHNOLOGY] an anaerobic, microbially-facilitated process of transforming NITRATE ultimately into molecular nitrogen (N_2). This process facilitates the MINERALIZATION of many contaminants, ultimately to CO_2.

nitride, *n* – [CHEMISTRY] a compound of NITROGEN and a METAL.

nitrite, *n* – [CHEMISTRY] an ORGANIC or INORGANIC COMPOUND containg the RADICAL NO_2^{-}[22]. *Also see nitrate.*

nitrification, *n* – [CHEMISTRY] a CHEMICAL PROCESS in which NITROGEN, mostly in the form of AMMONIA, in plant and animal WASTES and dead remains is oxidized at first to nitrites and then NITRATES[22]. *Also see denitrification.*

nitrobacteria, *n* – [BIOLOGY] BACTERIA that OXIDIZE NITRITE to NITRATE. *Also see nitrate, nitrification, nitrite, nitrogen and nitrogen cycle.*

nitrogen (N), *n* – [CHEMISTRY] ELEMENT number 7, a colorless, odorless, tasteless GAS that makes up about 80% of the earth's ATMOSPHERE. *Also see ammonia, ammonification, ammonium, denitrification and nitrate.*

nitrogen cycle, *n* – [CHEMISTRY] one of the major cycles of CHEMICAL ELEMENTS in the ENVIRONMENT. NITRATES in the SOIL are taken up by plant ROOTS and may then be pass along food chains into animals. Decomposing BACTERIA convert nitrogen-containing compounds, especially AMMONIA, in plant and animal wastes and dead remains back into nitrates, which are leased into the soil and can be taken up again by plants[22]. *Also see ammonification, denitrification and nitrification.*

nitrogen fixation, *n* – [CHEMISTRY] the conversion of ELEMENTAL NITROGEN in the atmosphere (N_2) to a reduced form (such as AMMONIA and amino groups of AMINO ACIDS) that can be used as a nitrogen source by organisms[7]. The process is important since all organisms require a source of nitrogen for nutrition, and N_2 cannot be used by the great majority of the biota to satisfy that need. Biological nitrogen fixation is carried out by a variety of organisms; however, those responsible for most of the fixation are certain species of bluegreen algae, the soil bacterium Azotobacter, and the symbiotic association of plants of the legume variety and the bacterium Rhizobium.

nitrogen, total Kjeldahl, *n* — [CHEMISTRY] the sum of the NITROGEN contained in the free AMMONIA and other nitrogen compounds which are converted to ammonium sulfate under specified digestion conditions. *Also see nitrogen and nitrogen cycle.*

nitrogenous wastes, *n* – [BIOLOGY] wastes of animal or plant origin that contain a significant concentration of nitrogen[63].

nitroglycerin, *n* – [CHEMISTRY] pale yellow, flammable, explosive, thick liquid, soluble in alcohol, soluble in ether in all proportions, slightly soluble in water with a melting point of 13.1°C and an explosion point of 256°C ($CH_2NO_3CHNO_3CH_2NO_3$). Used as an explosive, in the production of dynamite and other explosives, as an explosive plasticizer in solid rocket propellants, and as a possible liquid rocket propellant.

nival, *adj* – [BIOLOGY] characterized by or living in or under snow[4].

nivation, *n* – [GEOLOGY] EROSION as a result of the action of SNOW.

noble gas, *n* – [CHEMISTRY] a rare inert gas: helium, neon, argon, krypton, xenon, and radon.

node, *n* – [HYDROGEOLOGY] in a numerical model, a location in the discretized model domain where a dependent variable (HYDRAULIC HEAD) is computed.

node, *n* – [GEOLOGY] the point on a fault at which the apparent displacement changes[4].

nodular, *adj* – [GEOLOGY] composed of nodules[4].

nodule, *n* – [GEOLOGY] irregular, knobby-surfaced mineral body that differs in composition from rock in which formed. Silica in form of chert or flint is common component of nodules. They are commonly found in limestone and dolomite[4].

no further action (NFA) letter, *n* – [ENVIRONMENTAL REGULATION] a written determination by the regulatory agency that based upon an evaluation of the historical use of the site, or of an area of concern

or areas of concern at that site, as applicable, and any other investigation or action the regulatory agency deems necessary, there are no discharged contaminants present at the site, at the area of concern or areas of concern, or at any other site to which a discharge originating at the site has migrated, or that any discharged contaminants present at the site or that have migrated from the site have been remediated in accordance with applicable remediation regulations[18].

noise, *n* – [STATISTICS] BACKGROUND variation in a DATA set that cannot be attributed to a detectable pattern, quality or variation and is normally assumed to be random through time.

nomenclature, *n* -- [LOGIC] a SYSTEM for naming things. For example, "organic nomenclature" is the system used to name ORGANIC COMPOUNDS[4].

nonangular unconformity—*See disconformity.*

non-aqueous phase liquid--*See NAPL.*

non-associated gas, *n* – [PETROLEUM CHEMISTRY] NATURAL GAS in gas accumulations[34].

noncommunity water system, *n* – [HYDROLOGY] a drinking water supply and distribution system that serves at least 15 connections or 25 or more people but not on a year-round basis[22].

nonconformity, *n* – [GEOLOGY] SEDIMENTARY STRATA overlying IGNEOUS or METAMORPHIC rocks (in an erosional - not intrusive- contact)[4]. *Also see angular unconformity, disconformity, nonconformity, paraconformity and unconformity.*

nonconsumptive use, *n* – [HYDROLOGY] water use in which only a small portion is lost to the atmosphere by EVAPOTRANSPIRATION or by being combined with a manufactured product. Nonconsumptive use returns to the stream or ground approximately the same amount of water as is diverted or used[63].

noncontact cooling water, *n* – [INDUSTRIAL TECHNOLOGY] under Clean Water Act regulations, cooling water that does not have direct contact with raw materials, products, by-products or waste[22].

non-darcian flow, *n* – [HYDROGEOLOGY] flow of water under conditions in which the volumetric rate of flow is not directly proportional to the HYDRAULIC GRADIENT. It occurs when flow is either non-LAMINAR or is in transition between non-laminar and laminar flow[16]. *Also see Darcy's Law, laminar flow and turbulent flow.*

non-equilibrium type curve, *n* – [HYDROGEOLOGY] a plot on logarithmic paper of the well function *W(u)* as a function of *u*. Type curves of this type are used to analyze aquifer pumping-test data. *Also see type curve.*

non-flowing artesian well, *n* – [HYDROGEOLOGY] an ARTESIAN WELL whose HEAD is not sufficient to lift the water above the land surface[4]. *Also see artesian well.*

non-hydrocarbon gases, *n* – [CHEMISTRY] mainly CARBON DIOXIDE (CO_2), NITROGEN (N_2) and hydrogen sulfide (H_2S), but also including helium (He), argon (Ar), and hydrogen (H_2)[34].

non-ionizing radiation, *n* – [CHEMISTRY] radiation without enough energy to remove tightly bound electrons from their orbits around atoms. Examples include microwaves and visible light[64]. *Also see ionizing radiation.*

nonmetal, *n* – [CHEMISTRY] a naturally-occurring substance that does not have metallic properties such as high luster, conductivity, opaqueness and ductility[4]. *Also see metal.*

non-Newtonian fluid, *n* – [PHYSICS] a FLUID whose VISCOSITY changes when the GRADIENT in FLOW speed changes. COLLOIDAL SUSPENSIONS and polymer solutions like ketchup and starch/water paste are non-Newtonian fluids. *See Newtonian fluid.*

non-plastic, *n* – [AGRONOMY] a soil morphology term that qualitatively describes soil plasticity. It denotes a soil that can be rolled into a wire between the hands.

non-point source, *n* – [HYDROGEOLOGY] diffuse POLLUTION SOURCES (such as without a single point of ORIGIN or not introduced into a receiving STREAM from a specific outlet). The pollutants are generally carried off the LAND by *storm water*. Common non-point sources are *agriculture*, *forestry*, *urban*, *mining*, construction, dams, *channels*, land disposal, *saltwater intrusion*, and city streets[22]. *Also see point source.*

non-polar, *n* –[CHEMISTRY] pertaining to an ELEMENT or COMPOUND which has no permanent electric DIPOLE MOMENT[34].

non-potable, *adj* – [HYDROLOGY] water that is unsafe or unpalatable to drink because it contains POLLUTANTS, CONTAMINANTS, MINERALS, or infective agents[22].

non-sample contacting equipment, *n* — [ENVIRONMENTAL INVESTIGATION] related equipment associated with the sampling effort, but that does not directly contact the sample (for example, augers, drilling rods, excavations machinery).

non-targeted compound, *n* – [CHEMISTRY] a compound detected in a sample using a specific analytical method that is not a targeted compound, a surrogate compound, a system monitoring compound or an internal standard compound. *Also see targeted compound.*

non-transient, non-community water system, *n* -- [HYDROLOGY] a water system which supplies water to 25 or more of the same people at least six months per year in places other than their residences. Some examples are schools, factories, office buildings, and hospitals which have their own water systems. *Also see transient non-community water system.*

non-wetting fluid – *Also known as non-wetting agent, also see wetting fluid.*

normal distribution, *n* – [STATISTICS] the symmetrical (bell-shaped) DISTRIBUTION of DATA characterized by the MEAN and VARIANCE of the data[4]. *Also known as normal curve*.

normal fault, *n* – [GEOLOGY] a DIP-SLIP FAULT marked by a generally steep DIP along which the hanging wall has moved downward relative to the footwall[4]. *Also see dip-slip fault, reverse fault, scissor fault, strike-slip fault, thrust fault, transform fault and wrench fault.*

normality, *n* – [CHEMISTRY] the measure of the number of gram-equivalent weights of a compound per liter of solution. *Also see activity, concentration and fugacity.*

normal phase chromatography, *n* – [CHEMISTRY] CHROMATOGRAPHY using a polar stationary phase and a non-polar mobile phase, such as adsorption on silica gel using hexane as a mobile phase[34].

nose—*See ness.*

notch, *n* – [GEOGRAPHY] a narrow defile between mountains or through a ridge[4].

notice of appeal—*See appeal, notice of.*

Notice of violation (NOV), *n* – [ENVIRONMENTAL REGULATION] an official communication from a regulatory agency's enforcement department that a facility has violated a regulation or exceeded the discharge limits or other provisions of the operating permit[22].

nubbin, *n* – [GEOLOGY] *1.* a small rounded or elongated lump of earth thought to be created by needle ice action at the ground surface in periglacial climates. *2.* a small GRANITE dome, created by subsurface WEATHERING of JOINTS in the outer rock "shells", with its unweathered core revealed by subsequent DENUDATION[6].

nuclear chemistry, *n* – [CHEMISTRY] the study of the TRANSFORMATIONS within the NUCLEUS of an ATOM.

nuclear force, *n* – [PHYSICS] the FORCE between two or more NUCLEONS. It is responsible for binding of PROTONS and NEUTRONS into atomic nuclei.

nuclear powerplant, *n* – [PHYSICS] any device, machine, or assembly thereof that converts nuclear energy into some form of useful power, such as mechanical or electric power. In a nuclear electric powerplant, heat produced by a reactor is used to make steam, and the steam drives a turbine generator in the conventional way[7].

nucleon, *n* – [CHEMISTRY] a constituent of the ATOMIC NUCLEUS such as a PROTON or a NEUTRON[22].

nucleophile, *n* – [CHEMISTRY] a CHEMICAL REAGENT that reacts by forming COVALENT BONDS with electronegative ATOMS and COMPOUNDS[62].

nucleus (s.), nuclei (pl.), *n* – [CHEMISTRY] the central part of an ATOM, containing most of the atom's mass and having a positive charge due to the presence of PROTONS[22]. *Also see atom, electron, neutron and proton.*

nuclear log—*See neutron log.*

nucleon, *n* – [CHEMISTRY] a collective name for the NEUTRON and the PROTON. These are the two constituents of the atomic nucleus.

nuclide, *n* — [CHEMISTRY] an atomic species characterized by the constitution of its NUCLEUS, specifically by the number of PROTONS and NEUTRONS[4].

nuée ardente, *n* – [GEOLOGY] *from French meaning hot cloud,* applied to highly heated mass of gas-charged LAVA ejected from VENT or pocket at VOLCANO summit more or less horizontally onto an outer slope, down which it moves swiftly, however slight the incline, because of its extreme mobility[4]. *Also see volcanic ash and volcanic dust.*

null hypothesis, *n* – [LOGIC] any HYPOTHESIS set up primarily to see whether it can be rejected[22]. *Also see alternative hypothesis and hypothesis.*

number, *n* – [MATHEMATICS] an ARITHMETICAL VALUE representing a particular quantity[15].

numerical dating, *n* – [DENDROLOGY] the fixing of a geological structure or hydrogeological event in time, as by counting tree rings.

numerical methods, *n* – [HYDROGEOLOGY] in subsurface fluid flow modeling, a set of procedures used to solve the GROUND-WATER FLOW equations in which the applicable partial DIFFERENTIAL EQUATIONS are replaced by a set of algebraic equations written in terms of discrete values of state variables (such as HYDRAULIC HEAD) at discrete points in space and time. The most commonly used numerical methods in ground-water models are the FINITE-DIFFERENCE METHOD, the FINITE-ELEMENT METHOD, the BOUNDARY element method and the analytic element method. *Also see analytical modeling, finite-difference method, finite-element method and numerical modeling.*

numerical modeling, *n* – [HYDROGEOLOGY] in subsurface fluid flow modeling, a mathematical

model that uses NUMERICAL METHODS to solve the governing equations of the applicable problem[16].

nunatak, *n* – [GEOLOGY] an isolated HILL or PEAK that projects through the surface of a GLACIER[4].

nutrient, *n* – [BIOLOGY] any SUBSTANCE assimilated by living things that promotes growth. The term is generally applied to NITROGEN and PHOSPHORUS in WASTEWATER, but is also applied to other essential and trace elements[7].

nutrient cycle, *n* – [BIOLOGY] the cyclic conversions of NUTRIENTS from one form to another within the biological communities[22].

nutrient loading, *n* – [HYDROLOGY] input of NUTRIENTS to a waterbody from all natural and cultural sources.

Oo

oasis, *n* – [HYDROLOGY] a fertile spot in the DESERT where WATER is found6. *Also see desert and wadi*.

oath, *n* – [LAW] a declaration made according to law, before a competent tribunal or officer, to tell the truth; or it is the act of one who, when lawfully required to tell the truth, takes God to witness that what he says is true. It is a religious act by which the party invokes God not only to witness the truth and sincerity of his promise but also to avenge his imposture or violated faith, or in other words to punish his perjury if he shall be guilty of it. It is proper to distinguish two things in oaths. Courtrooms commonly keep several types of holy books, such as the Old Testament, the New Testament or the Koran for witnessing the oath. Some states allow an attestation, or an oath without any spiritual involvement, prior to giving testimony for those not religiously inclined. *Also see attest.*

objective, *adj* – [LOGIC] not influenced by personal feelings or opinions. *Also see bias and subjective.*

oblate, *adj* – [PHYSICS] the flattening of opposing parts of a SPHERE, such as the EARTH[6].

oblique, *n* – [REMOTE SENSING] an AERIAL PHOTOGRAPH taken with the camera AXIS intentionally inclined. It combines a ground view with a pattern obtained from a height[4]. *Also see aerial photograph and remote sensing.*

oblique fault, *n* – [GEOLOGY] a FAULT with its STRIKE at an oblique angle to the strike of the BED it cuts through, which can include NORMAL, REVERSE and THRUST FAULTS[6]. *Also known as a diagonal-slip fault or and oblique-slip fault.*

obsequent river, *n* -- [HYDROLOGY] a RIVER or STREAM flowing in a direction opposite to that of the DIP of the underlying STRATA[6].

obsequent valley, *n* – [HYDROLOGY] a VALLEY carved by an OBSEQUENT STREAM[6].

observation, *n* – [SCIENCE] *1*. the act or instance of noticing. *2*. perception, the faculty of taking notice. An integral part of the scientific method.

observation well, *n* — [HYDROGEOLOGY] typically, a small diameter well used to measure changes in HYDRAULIC HEAD, usually in response to a nearby pumping well. *Also see monitoring well, sentinel well and temporary well.*

obvious, *n* – [LOGIC] that which is plain or evident; a condition or fact that could not be ignored or overlooked by a reasonable observer.

occupants, *n* – [LAW] those tenants, subtenants, or other persons or entities using a property or a portion of the property. *Also see owner.*

ocean, *n* – [HYDROLOGY] a body of SALINE WATER found occupying all or part of the Earth's ocean BASINS. There are five recognized oceans: the Atlantic, the Southern Ocean, the Pacific Ocean, the Indian Ocean, and the Arctic Ocean. *Also see sea.*

oceanography, *n* – [HYDROLOGY] the SCIENTIFIC study of PHENOMENA found in the world's OCEANS. *Also see hydrography, hydrology and meteorology.*

occluded vapor phase, *n* — [HYDROGEOLOGY] condition of CONTAMINANT residence in which volatilized contaminants occur in porosity that is ineffective to free and open gaseous flow and exchange, such porosity generally being microporosity; frequently termed dead-end pore space.

ocher, *n* – [GEOLOGY] an earthy, powdery, red, yellow or brown iron oxide that is used as a pigment[4]. *Also spelled ochre.*

octane, *n* – [PETROLEUM CHEMISTRY] FLAMMABLE LIQUID COMPOUNDS (C_8H_{18}) found in PETROLEUM and NATURAL GAS. There are 18 different octanes: they have different structural formulas but share the molecular formula C_8H_{18}. Octane is used as a fuel and as a raw material for building more complex organic molecules. It is the eighth member of the ALKANE series.

octane number, *n* – [PETROLEUM CHEMISTRY] a number indicating the relative antiknock characteristics of a GASOLINE.

octane rating, *n* – [PETROLEUM CHEMISTRY] the octane rating is the most important characteristic of GASOLINE and other fuels used in spark-ignition internal combustion engines. The octane rating is measured relative to a mixture of 2,2,4-trimethylpentane (an isomer of OCTANE) and *n*-heptane. An 87-octane gasoline has the same knock resistance as a mixture of 87% ISO-OCTANE and 13% *n*-heptane. A complementary standard for DIESEL FUEL is the CETANE NUMBER. A low octane rating means that the fuel has a high tendency to autoignite, which is undesirable. *Also see cetane number.*

octanol-water partitioning coefficient (K_{ow}), *n* – [CHEMISTRY] a coefficient representing the ratio of solubility of a compound in octanol to its solubility in water. As K_{ow} increases the water solubility of the chemical decreases. The greater the value of K_{ow}, the more the chemical will be adsorbed to soil. K_{ow} values are often used in fate and transport

calculations. *Also see organic carbon partitioning coefficient and partitioning coefficient.*

odor, *n* – [CHEMISTRY] a PROPERTY of a SUBSTANCE that has an effect on the nasal sense of smell. *Also see olfaction and olfactory.*

odor threshold, *n* – [CHEMISTRY] the minimum CONCENTRATION of a SUBSTANCE at which a majority of test subjects can detect and identify the characteristic ODOR of the substance.

off-gas treatment system, *n* – [TREATMENT TECHNOLOGY] operation used to treat (such as condense, collect or destroy) CONTAMINANTS in the purge GAS from a THERMAL desorber.

officer, *n* – [LAW] a person holding a position of authority or trust.

official, *adj* – [LAW] *1*. of or relating to an office or its tenure or duties. *2*. properly authorized. *3*. employed in a public capacity. *4*. characteristic of bureaucracies.

offlap, *n* – [GEOLOGY] the disposition of bedded SEDIMENTS deposited in a regressing sea, in which the youngest sediments occur farthest from the shoreline marking the limit of the former transgression. Thus, the oldest beds extend further than the youngest, in direct contrast to the depositional pattern in an OVERLAP[6]. *Also see overlap and overstep.*

offset, *n* – [GEOLOGY] the horizontal component of displacement on a FAULT, measured perpendicular to the disrupted horizon[4]. *Also known as normal horizontal separation.*

offshore bar, *n* – [GEOLOGY] a BEACH, essentially parallel to a SHORELINE, formed some distance from the shoreline.

offshore terrace, *n* – [GEOLOGY] a SAND deposit that is built out into deep water by the combined action of waves and currents.

ohm, *n* – [PHYSICS] the RESISTANCE through which a difference in one volt will produce a current of one ampere.

Ohm's Law, *n* – [PHYSICS] a LAW that states that the current, or flow rate, of ELECTRICITY is proportional to the electric potential GRADIENT.

oil, *n* – [PETROLEUM CHEMISTRY] *1*. HYDROCARBON-based LIQUID commonly found in the pores of SEDIMENTARY ROCKS of MARINE origin. *2*. any of various thick, viscous, usually flammable liquids insoluble in WATER, but soluble in ORGANIC SOLVENTS. *Also see crude oil, hydrocarbon, NAPL and petroleum.*

oil and grease, *n* – [PETROLEUM CHEMISTRY] HYDROCARBONS, FATTY ACIDS, WAXES, OILS and other materials which are extracted by SOLVENTS from an acidified sample and are not volatilized during the test.

oil field, *n* – [GEOLOGY] two or more OIL POOLS on a single geologic feature or otherwise closely related[4].

oil pool, *n* – [GEOLOGY] an accumulation of PETROLEUM in the PORES of a SEDIMENTARY ROCK. It is not a pool in the normal sense of the word[6].

oil sand, *n* – [GEOLOGY] a SANDSTONE or porous CARBONATE ROCK that is naturally impregnated with HYDROCARBONS. *Also see oil shale*.

oil shale, *n* – [GEOLOGY] a FINE-grained, CARBONACEOUS SEDIMENTARY ROCK from which *oil* can be extracted. The rock contains KEROGEN which decomposes to yield oil when heated. *Also see oil sand.*

oil terminal, *n* – [PETROLEUM TECHNOLOGY] facilities used for storing OIL and NATURAL GAS as well as loading and unloading facilities.

oil trap, *n* – [GEOLOGY] any barrier to the upward movement of oil or gas, allowing either or both to accumulate. A trap includes a RESERVOIR ROCK and an impermeable ROOF ROCK. The contact between the two is normally CONCAVE downward[4].

oil-water separator, *n* – [TREATMENT TECHNOLOGY] a device used as part of a water treatment system which separates the oil from the water. The oil-water separator precedes any type of active water treatment system. *Also see API oil-water separator.*

oleanane index, *n* – [FINGERPRINTING] the ratio of oleanane (a C_{30} triterpane marker of angiosperms) to 17α-hopane (a bacterial marker). Oleanane occurs mainly in the Late-Cretaceous Period or younger rocks, but its absence cannot be used to prove the age of the petroleum (as in the time frame when the petroleum formed in the reservoir). The index can be used to fingerprint spilled petroleum products[34].

olefins, *n* – [PETROLEUM CHEMISTRY] a family of unsaturated HYDROCARBONS with one carbon-carbon DOUBLE BOND and the general formula C_nH_{2n}. *Also see aromatics, isoparaffins, napthenes, paraffins and PIANO.*

oleophillic, *adj* – [PETROLEUM CHEMISTRY] having an affinity for attracting, absorbing or adsorbing oil.

olfaction, *n* – [CHEMISTRY] the sense of smell or the process of detecting smells[24].

olfactory, *adj* – [CHEMISTRY] referring to the sense of smell[24].

Oligocene, *n* – [GEOLOGY] the epoch of the TERTIARY following the EOCENE and preceding the MIOCENE. It extended from about 35.4 million years BP to about 23.3 million years BP.

oligomict, *n* – [GEOLOGY] a DETRITAL SEDIMENTARY ROCK comprising fragments of a single type of material, as distinct from a POLYMICT[6]. *Also see polymict.*

oligotrophic, *adj* – [HYDROLOGY] characteristic of deep clear LAKES with few NUTRIENTS, little ORGANIC matter and a high DISSOLVED-OXYGEN CONCENTRATION.

olistostrome, *n* – [GEOLOGY] a SEDIMENTARY DEPOSIT consisting of a chaotic mass of intimately mixed HETEROGENEOUS materials (such as blocks and muds) that accumulated as a semi-fluid body by submarine GRAVITY sliding or slumping of UNCONSOLIDATED SEDIMENTS[4].

ombrotrophic, *n* – [HYDROLOGY] fed only by PRECIPITATION, not by WATER draining from the surrounding LANDSCAPE.

one-hundred year flood, *n* – [HYDROLOGY] the highest discharge that may be expected to occur along a river every 100 years. Accordingly, it has a 1% chance of occurring each year. *Also see floodplain, floodway and floodway fringe.*

ontology, *n* -- the study of the nature of being, of what exists or what can be known.

oöid, *n* – [GEOLOGY] small (< 2 millimetre in diameter), spheroidal, coated, sedimentary grains, normally composed of calcium carbonate, but sometimes made of iron- or phosphate-based minerals. Oöids commonly form on the sea floor, usually in shallow tropical seas.

oölite, *n* – [GEOLOGY] a form of LIMESTONE made from small, round particles[4]. *Also see limestone.*

oölith, *n* – [GEOLOGY] a spherical ROCK PARTICLE formed by the gradual accretion of material around an inorganic (such as a sand grain) or organic (such as a piece of a shell) nucleus, possibly by the means of the action of ALGAE. Diameters are normally in the range of 0.25 to 2 mm[6].

ooze, *n* – [GEOLOGY] a fine textured SEDIMENT in ocean basins at depths of greater than 2,000 m[6].

opaque, *adj* -- [PHYSICS] totally absorbent of rays of a specified WAVELENGTH. For example, wood is opaque to visible light, but slightly transparent to infrared rays and completely transparent to *x*-rays.

open-channel flow, *n* – [HYDROLOGY] the characteristic movement of water in a RIVER CHANNEL, influenced by the following physical properties: MASS, DENSITY, WEIGHT, SPECIFIC WEIGHT, VISCOSITY, SHEAR, TEMPERATURE, all of which affect the channel geometry and help to explain sediment transport6. *Also see Froude Number, laminar flow, Reynolds Number and turbulent flow*.

open dump, *n* – [WASTE DISPOSAL] an uncovered SITE used for DISPOSAL of WASTE without ENVIRONMENTAL controls. *Also see dump and landfill.*

open fold, *n* – [GEOLOGY] a FOLD the interlimb angle of which exceeds 70°. The limbs diverge at a large angle[6].

openhole, *n* – [HYDROGEOLOGY] *1*. a section of well borehole without casing. *2*. a borehole free of an obstructing object or material[4].

open packing, *n* – [HYDROGEOLOGY] the manner of arrangement of uniform solid spheres packed as loosely as possible so that porosity is at its maximum[4]. *Also see packing.*

open-pit mining, *n* – [MINING] the process of removing MINERAL DEPOSITS that are found close enough to the surface so that the construction of tunnels (underground mining) is not necessary. The SOIL and STRATA that cover the deposit are removed to gain access to the mineral deposit. *Also known as open-cast mining. Also see strip mining.*

open system, *n* – [BIOLOGY] a SYSTEM in which ENERGY and MATTER are exchanged between the system and the ENVIRONMENT, such as a living ORGANISM[6].

open traverse, *n* – [GEOGRAPHY] a traverse which does not close onto a survey point of known coordinates and orientation or onto itself. *Also see closed traverse*.

operator, *n* – [MATHEMATICS] a mathematical symbol indicating that a specified operation should be carried. For example, the operator $\sqrt{}$ in $\sqrt{x}$ indicates that the square root of x is to be taken, while the operator d/dx in dy/dx indicates that y should be differentiated with respect to x, etc.[24].

operator, *n* -- means any person, including users, tenants, or occupants, having and exercising direct actual control of the operations of an industrial establishment. A holder of a mortgage or other security interest in the industrial establishment is not an operator of the industrial establishment unless or until it loses its exemption or obtains title to the industrial establishment by deed of foreclosure, by other deed, or by court order or other process. *Also see generator.*

ophiolite, *n* – [GEOLOGY] an old lowland fragment of a OCEANIC CRUST, moved across the ocean floor by sea-floor spreading, and finally lifted above sea level.

ophitic, *adj* – [GEOLOGY] referring to the TEXTURE of an IGNEOUS ROCK in which lath-shaped plagioclase crystals are included in pyroxene crystals, typically augite[4].

opinion, *n* – [LAW] *1*. a BELIEF or ASSESSMENT based on grounds short of PROOF. *2*. a view held as probable.

opinion, *n* – [LAW] *1*. a JUDGE'S written explanation of the DECISION of the COURT. Because a case may be heard by three or more judges in the court of appeals, the opinion in appellate decisions can take several forms. If all the judges completely agree on the result, one judge will write the opinion for all. If all the judges do not agree, the formal decision will be based upon the view of the majority, and one member of the majority will write the opinion. The judges who did not agree with the majority may write separately in dissenting or concurring opinions to present their views. A dissenting opinion disagrees with the majority opinion because of the reasoning and/or the principles of law the majority used to decide the case. A concurring opinion agrees with the decision of the majority opinion, but offers further comment or clarification or even an entirely different reason for reaching the same result. Only the majority opinion can serve as binding precedent in future cases. 2. a BELIEF or an ASSESSMENT provided by a qualified expert in a certain field or study. *Also see expert witness, net opinion and precedent.*

optical mineralogy – *See crystallography.*

optics, *n* – [PHYSICS] the study of LIGHT and the phenomena associated with its generation, transmission and detection[24].

oral argument, *n* – [LAW] an opportunity for LAWYERS to summarize their position before the court and also to answer the JUDGES' questions.

orbital, *n* – [CHEMISTRY] a region in which an electron may be found in an ATOM or MOLECULE[24].

orchard, *n* – [GEOGRAPHY] a piece of enclosed LAND with fruit TREES.

> DISCUSSION – Orchards can be sources of ground-water contamination as a result of the over-application of pesticides.

Also see forest, grove and woods.

order, *n* – [CHEMISTRY] in the expression for the rate of a chemical reaction, the sum of the powers of the concentrations is the overall order of the reaction. For example, in a reaction:

$$A + B \rightarrow C$$

The rate equation may have the form

$$R = k[A][B]^2$$

The reaction would be described as first order for A and second order for B. The overall order is three[24].

order, *n* – [LAW] an authoritative command issued by a ruling COURT or magistrate.

order of magnitude, *n* – [MATHEMATICS] a factor of ten.

order of reaction, *n* – [CHEMISTRY] a chemical rate process occurring in systems for which CONCENTRATION changes (and hence the rate of reaction) are not themselves measurable, provided it is possible to measure a chemical FLUX[62].

ordinance, *n* – [LAW] a LAW, a STATUTE, a DECREE. *Also see law, regulation and statute.*

ordinate, *n* – [MATHEMATICS] the *y*-coordinate of a point, or the distance of that point from the *x*-AXIS. *Also see abscissa, Cartesian coordinate system and coordinate.*

Ordovician Period, *n* – [GEOLOGY] a period in the PALEOZOIC ERA immediately after the CAMBRIAN and before the SILURIAN PERIODS including the time interval from about 510 to 570 million years BP.

ore, *n* – [GEOLOGY] a MINERAL DEPOSIT that can be MINED for a profit.

organic, *adj* – [BIOLOGY] referring to or derived from living *organisms*.

organic, *adj* – [CHEMISTRY] any COMPOUND containing CARBON. *Also see inorganic.*

organic acid, *n* – [CHEMISTRY] a CHEMICAL COMPOUND with one or more CARBOXYL RADICALS (COOH) in its structure.

organic carbon (OC), *n* – [CHEMISTRY] a measure of ORGANIC MATTER present in AQUEOUS SOLUTION, suspension, or bottom SEDIMENT. May be reported as dissolved organic carbon (DOC), particulate organic carbon (POC), or total organic carbon (TOC)[47].

organic carbon content, *n* – [CHEMISTRY] the CONCENTRATION of ORGANIC matter in a SOIL or SEDIMENT.

> DISCUSSION – This value is often used in fate and transport calculations to estimate the amount of attenuation (adsorption to soil materials).

organic carbon partitioning coefficient (K_{oc}), *n* – [CHEMISTRY] the measure of the tendency for organic chemicals to be adsorbed to soil and sediment, expressed as the milligrams of chemical adsorbed per kilogram of organic carbon divided by the milligrams of chemical dissolved per liter of solution. *Also see octanol-water partitioning coefficient and partitioning coefficient.*

organic chemical, *n* – [CHEMISTRY] chemical compounds of carbon, excluding carbon monoxide, carbon dioxide, carbolic acid, metallic carbides, metallic carbonates, and ammonium carbonate. *Also see volatile organic chemical.*

organic chemistry, *n* – [CHEMISTRY] the study of COMPOUNDS that contain CARBON chemically bound to HYDROGEN, including synthesis, identification, modeling, and reactions of those compounds. *Also see biochemistry.*

organic clay, *n* — [AGRONOMY] a CLAY with a high ORGANIC content.

organic horizon, *n* – [AGRONOMY] a SOIL HORIZON that contains more than 30% ORGANIC MATTER if the mineral fraction is more than 50% clay, or more than 20% organic matter if the mineral fraction has no clay. *Also see soil horizon*.

organic lead content, *n* – [PETROLEUM CHEMISTRY] a LABORATORY, ANALYTICAL PARAMETER for quantifying the content of ORGANIC LEAD within a SAMPLE. The quantification of the organic lead content in a GASOLINE sample can help estimate the age of manufacture. *Also see lead alkyls and tetraethyl lead.*

organic matter, *n* – [BIOLOGY] plant and animal residue in the soil in various stages of DECOMPOSITION.

organic rock, *n* – [GEOLOGY] a SEDIMENTARY ROCK consisting primarily of the remains of ORGANISMS (plants or animals)[4].

organic salt, *n* – [CHEMISTRY] the reaction product of an organic acid and an inorganic base.

organic silt, *n* — [AGRONOMY] a SILT with a high ORGANIC content.

organic soil, *n* — [AGRONOMY] SOIL with a high ORGANIC content.

DISCUSSION — In general, organic soils are very compressible and have poor load-sustaining properties.

organic terrain — *See peatland.*

organic vapor analyzer (OVA) – *See flame-ionization detector (FID).*

organism, *n* – [BIOLOGY] any form of animal or plant life.

organochlorine compounds, *n* – [CHEMISTRY] any chemicals that contain carbon and chlorine. Organochlorine compounds that are important in investigations of water, sediment, and biological quality include certain PESTICIDES and industrial compounds.

organophosphate, *n* – [CHEMISTRY] PESTICIDES that contain phosphorus; short-lived, but some can be TOXIC when first applied.

organophyllic, *n* – [CHEMISTRY] a SUBSTANCE that easily combines with ORGANIC COMPOUNDS.

orientation, *n* – [MATHEMATICS] a relative position within space.

origin, *n* – [MATHEMATICS] *1*. a beginning or starting point, a derivation, a source. *2*. a fixed point from where COORDINATES are measured.

original horizontality--*See law of original horizontality.*

orocline, *n* – [GEOLOGY] any structural mountain chain or orogenic belt, the line of which has been sharply displaced by subsequent horizontal movement to create a marked change in trend[6].

orographic rainfall, *n* – [METEOROLOGY] rainfall that occurs when an airstream is forced to rise over a MOUNTAIN RANGE. The air becomes cool, the liquid condenses and precipitation occurs.

orphan site, *n* – [ENVIRONMENTAL REGULATION] a site with no identified responsible parties, or a site where the parties responsible for the contamination are unable or unwilling to conduct an investigation and cleanup.

ortho- [GEOLOGY] a prefix used in PETROLOGY that, when used with the name of a METAMORPHIC ROCK, indicates that it was derived from an IGNEOUS ROCK such as orthogneiss, orthoamphibolite. It may also indicate the primary origin of a CRYSTALLINE SEDIMENTARY ROCK, such as ORTHOQUARTZITE as distinguished from metaquartzite[4].

orthophoto map, *n* – [GEOGRAPHY] a type of photomap which eliminates the distortion of perspective by transforming the central projection of air photographs to an orthogonal type of projection[6]. *Also see aerial photograph and remote sensing.*

orthoquartzite, *n* – [GEOLOGY] a CLASTIC, SEDIMENTARY ROCK in which more than 95% of the grains are of QUARTZ firmly cemented by silica[6]. *Sometimes known as quartzarenite. Also see metaquartzite, quartzite and sandstone*.

oscillation, *n* – [PHYSICS] a motion that repeats itself in equal intervals of time. *Also see fluctuation.*

osmosis, *n* **–** [CHEMISTRY] passage of a SOLVENT from a dilute SOLUTION to a more concentrated one through a semi-permeable membrane, such as one which is PERMEABLE only to the solvent[24].

ounce, *n* – [PHYSICS] measure of weight in the English System equal to 0.0625 pounds. *Also see gram, kilogram and pound.*

outcrop, *n* — [GEOLOGY] the exposure of the BEDROCK at the surface of the ground. *Also see bedrock and country rock.*

outer core, *n* – [GEOLOGY] the portion inside the Earth that surrounds the inner core and is molten. *Also see crust, inner crust, lithosphere and mantle.*

outermost ring, *n* – [DENDROLOGY] the most recently formed tree ring still visible on a wood sample. *Also see pith.*

outfall, *n* – [HYDROLOGY] the place where EFFLUENT is discharged into receiving waters.

outfall sewer, *n* – [TREATMENT TECHNOLOGY] a SEWER that carries wastewater to a point of final discharge.

outlet, *n* – [HYDROLOGY] the point that a LAKE or POND discharges into a STREAM that drains it.

outlet cave, *n* - [HYDROGEOLOGY] a hollow cavity in a cliff or hillside marking the point at which an underground KARST watercourse re-emerges[6].

outlet glacier, *n* – [GEOLOGY] a lobe of GLACIER ice issuing from a PLATEAU ice-cap and flowing down a peripheral VALLEY[6].

outlier, *n* – [GEOLOGY] a mass of younger rocks surrounded by geologically older rocks. *Also see inlier*

outwash, *n* – [GEOLOGY] meltwater-deposited SEDIMENT, dominantly SAND and GRAVEL, showing increasing ROUNDING and SORTING into LAYERS with increasing distance from the ice margin. Often silt-rich, which can be reworked by WIND to form LOESS.

outwash plain, *n* – [GEOLOGY] a plain of glaciofluvial deposits of stratified drift from meltwater-fed, braided, and overloaded streams beyond a glacier's morainal deposits. *Also known as a sandur. Also see stratified drift.*

outwash terrace, *n* – [GEOLOGY] an OUTWASH deposit that has been incised by GLACIAL MELTWATER to form a terrace. Such terraces are often pitted with KETTLE holes and show evidence of BRAIDED STREAM networks[6].

overbank deposits, *n* – [GEOLOGY] SEDIMENTS (usually CLAY, SILT, and fine-grained SAND) deposited on FLOOD PLAIN by RIVER overflowing banks. *Also see crevasse splay.*

overbreak, *n* — [GEOLOGY] the quantity of ROCK that is excavated or breaks out beyond the perimeter specified as the finished excavated tunnel outline.

overburden, *n* — [GEOLOGY] the loose SOIL, SAND, SILT, or CLAY that overlies BEDROCK. In some usages it refers to all material overlying the point of interest (tunnel crown), that is, the total cover of soil and rock overlying an underground excavation.

overdraft, *n* – [HYDROGEOLOGY] the PUMPING of WATER from a ground-water basin or AQUIFER in excess of the supply flowing into the basin; results in a depletion or "mining" of the GROUND WATER in the basin. *Also see ground-water mining*.

overdrilling, *n* — [DRILLING TECHNOLOGY] the process of DRILLING out a WELL CASING and any material placed in the ANNULAR SPACE.

overfill, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] exceeding the capacity of the tank. Overfilling is a common cause of releases from underground or aboveground storage tanks.

overfill prevention, -- [UNDERGROUND STORAGE TANK TECHNOLOGY] the use of a mechanical or electrical device designed to restrict or stop the transfer of HAZARDOUS SUBSTANCES from a delivery vehicle to a TANK or alert the operator that the tank is nearly full[48].

overfold—*See overturned fold*.

overflow channel, *n* – [HYDROLOGY] a CHANNEL, often streamless, cut in solid rock or in drift, having been carved out by the overflow of an ice-dammed lake[6].

overland flow, *n* – [HYDROLOGY] the surface movement of water derived from PRECIPITATION which is not intercepted by VEGETATION and which runs as a shallow unchanelled sheet across the soil or ground surface[6]. *Also see evapotranspiration, precipitation and runoff.*

overlap, *n* – [GEOLOGY] a particular relationship of rock strata at an UNCONFORMITY, where the beds above the unconformity were deposited by a transgressing sea. Thus, each successively younger bed extends further on to the older underlying rock series than does its predecessor[6]. *Also see offlap and overstep*.

overstep, *n* – [GEOLOGY] the disposition of rock strata at an unconformity when the younger series deposited during a transgression rest upon progressively older strata of the underlying rock series[6]. *Also see offlap and overlap.*

overthrust, *n* – [GEOLOGY] a low-angle THRUST FAULT produced by crustal shearing during intense folding, especially during NAPPE formation[6].

overturned fold, *n* – [GEOLOGY] a FOLD in which the beds in one limb have been rotated more than 90° so that they are now inverted or overturned[6]. *Also known as an overfold. Also see klippe and nappe.*

owner, *n* – the person or entity that possesses a certain property. *Also see occupant.*

oxbow lake, *n* – [HYDROLOGY] a crescent-shaped body of standing WATER formed from a single loop that was cut off from a MEANDERING STREAM, typically by a FLOOD that allowed the STREAM to flow through its FLOODPLAIN and bypass the loop. *Also see meandering stream.*

oxic, *n* – [CHEMISTRY] containing oxygen. *Also see anoxic*.

oxic horizon, *n* – [AGRONOMY] subsurface soil that contains at least 15% clay and is 12 inches or more in thickness.

oxidation, *n* – [CHEMISTRY] *1*. the chemical addition of oxygen to break down pollutants or organic waste; such as destruction of chemicals such as cyanides, phenols, and organic sulfur compounds in sewage by bacterial and chemical means. *2*. chemical reaction in which electrons are transferred from an ion or atom, thus increasing its net charge or valence. *Also see reduction.*

oxidation inhibitors, *n* – [PETROLEUM CHEMISTRY] also called antioxidants, aromatic amines and hindered phenols are added to gasoline. They prevent gasoline components from reacting with oxygen in the air to form peroxides or gums. They are needed in virtually all gasolines, but especially those with a high olefins content. Peroxides can degrade antiknock quality, cause fuel pump wear, and attack plastic or elastomeric fuel system parts, soluble gums can lead to engine deposits, and insoluble gums can plug fuel filters. Inhibiting oxidation is particularly important for fuels used in modern fuel-injected vehicles, as their fuel recirculation design may subject the fuel to more temperature and oxygen-exposure stress.

oxidation number, *n* – [CHEMISTRY] the numerical CHARGE on the IONS of an ELEMENT.

oxidation-reduction potential, *n* – [CHEMISTRY] *1*. the electric potential required to transfer ELECTRONS from one COMPOUND or ELEMENT (the oxidant) to another compound (the reductant); used as a qualitative measure of the state of oxidation in water treatment systems. *2*. the electromotive force developed by a noble metal electrode immersed in the water, referred to the standard hydrogen electrode. *Also see Eh.*

oxidation-reduction reaction, *n* – [CHEMISTRY] a complete CHEMICAL REACTION where an ELECTRON DONOR is oxidized and an ELECTRON ACCEPTOR is reduced. *Also see electron acceptor, electron donor, oxidation and reduction.*

oxidation state, *n* – [CHEMISTRY] the number of ELECTRONS to be added (or subtracted) from an ATOM in a combined state to convert it to elemental form; the degree to which an element is oxidized.

oxidizing, *adj* – [CHEMISTRY] an ENVIRONMENT that has a high concentration of ELECTRON ACCEPTORS and a high electrical potential. *Also see reducing*.

oxidizing agent, *n* – [CHEMISTRY] a substance that can add electrons. *Also see reducing agent.*

oxidizing acid, *n* – [CHEMISTRY] an ACID, such as HNO_3^-, which tends to lose ELECTRONS in a REACTION.

Oxisol, *n* – [AGRONOMY] one of the soil orders with a loamy or clayey texture, a very low base exchange capacity and is characterized by an extreme degree of WEATHERING of its MINERALS to form free oxides and kaolin. Oxisols occur over vast areas of the humid tropics[6].

oxygen, *n* – [CHEMISTRY] element 8, atomic weight 15.9994, a colorless, odorless gas that makes up about 1/5 of the earth's atmosphere and (in combined form) 8/9ths of earth's oceans and almost half of the earth's crust. The name is derived from the French *oxygène*, which means "acid generating".

oxygen-18 ($^{18}0$), *n* – [ISOTOPES] a rare, stable isotope of oxygen, which has eight protons and ten neutrons for a total atomic weight of about 18. It is heavier than the more abundant form, oxygen-16 (^{16}O). The ratio of ^{18}O to ^{16}O (known as $\delta^{18}O$) can be used to determine the potential sources of ground water and interpret ground-water flow paths. *Also see isotope and stable isotope.*

oxygenate, *n* – [PETROLEUM CHEMISTRY] an organic compound containing oxygen added to gasoline to help reduce tailpipe emissions. Types of oxygenates include METHYL-TERT-BUTYL ETHER (MTBE) and TERT-BUTYL ALCOHOL (TBA). *Also see diisopropyl ether (DIPE), ethyl-tert-butyl ether (ETBE), methyl-tert-butyl ether (MTBE), tert-amyl ethyl amine (TAME) and tert-butyl alcohol (TBA).*

oxygenated fuels, *n* – [PETROLEUM CHEMISTRY] GASOLINE which has been blended with ALCOHOLS or ETHERS that contain oxygen in order to reduce carbon monoxide and other emissions. *Also see ETBE, MTBE, TAME and TBA.*

oxygenated solvent, *n* – [CHEMISTRY] an ORGANIC SOLVENT containing OXYGEN as part of the molecular structure. ALCOHOLS and KETONES are oxygenated compounds often used as paint solvents.

oxygen demand, *n* – [BIOLOGY] the quantity of oxygen utilized in the biochemical oxidation of organic matter in a specified time, at a specified temperature, and under specified conditions.

oxygen release compound (ORC), *n* – [REMEDIATION TECHNOLOGY] a proprietary formulation of phosphate-intercalated magnesium peroxide that time releases oxygen when hydrated. ORC is added to impacted ground water and soil to supply oxygen to accelerate the rate of naturally occurring aerobic contaminant biodegradation in groundwater and saturated soils. *Also see hydrogen release compound (HRC).*

ozonation, *n* – [TREATMENT TECHNOLOGY] a chemical treatment process where the oxidation of the compound is achieved with ozone as the oxidizing agent. *Also see treatment.*

ozone (O_3), *n* – [METEOROLOGY] found in two layers of the atmosphere, the stratosphere and the troposphere. In the stratosphere (the atmospheric layer 7 to 10 miles or more above the earth's surface) ozone is a natural form of oxygen that provides a protective layer shielding the earth from ultraviolet radiation. In the troposphere (the layer extending up 7 to 10 miles from the earth's surface), ozone is a chemical oxidant and major component of photochemical smog. It can

seriously impair the respiratory system and is one of the most wide- spread of all the criteria pollutants for which the Clean Air Act required EPA to set standards. Ozone in the troposphere is produced through complex chemical reactions of nitrogen oxides, which are among the primary pollutants emitted by combustion sources; hydrocarbons, released into the atmosphere through the combustion, handling and processing of petroleum products; and sunlight.

ozone depletion, *n* – [METEOROLOGY] destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (CHLOROFLUOROCARBONS or halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules.

ozone hole, *n* – [METEOROLOGY] a thinning break in the stratospheric ozone layer. Designation of amount of such depletion as an "ozone hole" is made when the detected amount of depletion exceeds fifty percent. Seasonal ozone holes have been observed over both the Antarctic and Arctic regions, part of Canada, and the extreme northeastern United States.

ozone layer, *n* – [METEOROLOGY] the protective layer in the ATMOSPHERE, about 15 miles above the ground, that absorbs some of the sun's ULTRAVIOLET RAYS, thereby reducing the amount of potentially harmful RADIATION that reaches the earth's surface.

ozonide, *n* – [CHEMISTRY] a group of compounds formed by REACTION of OZONE with ALKALI METAL HYDROXIDES and formally containing IRON[24].

Pp

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paar, *n* – [GEOLOGY] a depression produced by the moving apart of crustal blocks rather than by subsidence within a crustal block[54].

packer, *n* — [HYDROGEOLOGY] a transient or dedicated device placed in a WELL that isolates or seals a portion of the well, well ANNULUS, or BOREHOLE at a specific level. *Also see packer test.*

packer test, *n* – [HYDROGEOLOGY] a PUMPING TEST where the pump is placed between PACKERS in the pumping test so that the influence is limited to a certain depth interval. *Also see packer.*

packing, *n* – [HYDROGEOLOGY] the spacing or density pattern of the MINERAL GRAINS in a ROCK. *Also see open packing.*

packsand, *n* – [GEOLOGY] a very FINE-grained SANDSTONE that is so loosely consolidated by a little calcareous cement as to be readily cut by a spade.

packstone, *n* – [GEOLOGY] a sedimentary rock that contains lime mud, but is grain supported.

paha, *n* – [GEOLOGY] a low, elongated, rounded glacial ridge or hill consisting mainly of drift, rock or windblown sand, silt or clay but is capped with a thick cover of LOESS[54].

pahoehoe, *n* – [GEOLOGY] solidified LAVA that is characterized by a smooth, billowy or ropy surface and having a skin of glass a fraction on an inch to several inches thick. *Also see aa, lava and volcano.*

paired terraces, *n* – [HYDROLOGY] STREAM TERRACES that face each other at the same elevation from opposite sides of a stream VALLEY and represent remnants of the same FLOODPLAIN or valley floor[4].

palaeoecology, *n* – [GEOLOGY] the study of paleoenvironments based on the FOSSIL assemblage within a rock formation. *Also see paleontology*.

palaeomagnetism, *n* – [GEOLOGY] MAGNETIC MINERALS in rocks align themselves with the magnetic field which was operating at the time of their formation. This magnetism can be measured and previous changes in the earth's magnetic field can be ascertained.

paleo- -- [GEOLOGY] a prefix meaning old or ancient. *Also spelled palaeo-.*

Paleocene, *n* – [GEOLOGY] first EPOCH of the TERTIARY, preceding the EOCENE extending from about 65 million years BP (the end of the CRETACEOUS) to about 57 million years BP[6].

paleochannel, *n* – [GEOLOGY] a remnant of a STREAM CHANNEL cut into older rock and filled by the sediments of younger, overlying rocks[54].

paleocollapse, *n* – [GEOLOGY] a rock structure resembling the KARST LANDFORM, but is formed essentially by the dissolution of underlying SEDIMENTARY rock. *Also known as paleo-karst collapse.*

Paleogene, *n* – [GEOLOGY] the lower part of the TERTIARY, comprising the PALEOCENE, EOCENE and OLIGOCENE EPOCHS, extending from about 65 million years BP to about 23.3 million years BP[6].

paleontology, *n* – [GEOLOGY] the study of ancient life based on FOSSIL remains of plants and animals. *Also see paleoecology.*

Paleozoic Era, *n* – [GEOLOGY] the geologic era between 570 and 245 million years ago starting with the CAMBRIAN PERIOD and ending with the PERMIAN PERIOD. The Paleozoic was characterized by the extensive development of shells by marine life forms and the first fish, amphibians, reptiles and land plants appeared during this era.

palimpsest, *adj* – [GEOLOGY] referring to a kind of drainage in which a modern, anomalous drainage pattern is superimposed upon an older one, clearly indicating different topographic and possibly structural conditions at the time of development[54].

palisade, *n* – [GEOLOGY] a picturesque, extended rock cliff, rising precipitously from the margin of a stream or lake, especially one consisting of IGNEOUS ROCK with columnar structure. The term is usually used in a plural form[4].

pallid zone, *n* – [AGRONOMY] a whitish-colored horizon of decomposed KAOLINITE CLAY and QUARTZ SAND occurring above deeply weathered bedrock in the tropics[6].

palsa, *n* – [GEOLOGY] a mound of PEAT that develops as the result of the formation of a number ice lenses beneath the ground surface. Typical size is 1 to 7 meters high, 10 to 30 meters wide, and 15 to 150 meters long. Found in the high latitudes. *Also see pingo.*

paludal, *adj* – [HYDROLOGY] pertaining to a MARSH[4].

palustrine, *adj* – [HYDROLOGY] pertaining to material growing or deposited in a MARSH, WETLANDS or other PALUDAL ENVIRONMENT; wet or marsh habitats[4].

palynology, *n* – [BIOLOGY] the study of POLLEN, living and fossil.

pan, *n* -- [GEOLOGY] a large, shallow, flat-floored depression found in arid and semi-arid regions

pan, *n* – [AGRONOMY] a compact, dense layer in a soil that impedes the movement of water and the growth of roots. *Also see clayplan, hardpan and fragipan.*

pandemic, *adj* – [ECOLOGY] occurring over a wide geographic area and affecting an exceptionally high proportion of the population.

panel, *n* – [LAW] *1*. in APPELLATE cases, a group of JUDGES (usually three) assigned to decide the case. *2*. in the JURY selection process, the group of potential jurors.

panfan—*See pediplain.*

panhole, *n* – [GEOLOGY] a depressed, erosional feature found on flat or gently sloping rock. Panholes are the result of long-term weathering and are generally seen on bedrock or very large blocks of rock. *Also known as gnamma (Australia), opferkessel (German), armchair hollows, weathering pans (or pits), solution pans (or pits), kamenitza (German), kamenica (German) and tinajita (Spanish).*

panplain, *n* – [GEOLOGY] a very broad PLAIN formed by the coalescence of several adjacent FLOOD PLAINS, each resulting from long-continued lateral EROSION by MEANDERING STREAMS; it represents the end of a erosion cycle[4]. *Also spelled panplane.*

paper shale, *n* – [GEOLOGY] a SHALE that easily separates on weathering into very thin, tough, uniform and somewhat flexible LAYERS or LAMINAE suggesting sheets of paper[54]. *Also see fissility and shale.*

parabola, *n* – [MATHEMATICS] a mathematical curve ($y = x^2$) which passes through the origin of the GRAPH and increases steadily in gradient away from the AXIS on both sides, with the value on the *y*-axis increasing as the square of the value of the *x*-axis.

paraclinal, *adj* – [HYDROLOGY] referring to a stream or valley that is oriented in a direction parallel to the fold axes of the region[54].

paraconformity, *n* – [GEOLOGY] a planar SURFACE between two parallel units of sedimentary rock, representing a period of non-deposition, but no erosion. *Also see angular unconformity, disconformity, nonconformity and unconformity.*

paradigm, *n* – [LOGIC] a representative example or PATTERN, especially one underlying a THEORY or viewpoint.

paraffin-based crude, *n* – [PETROLEUM CHEMISTRY] CRUDE OIL that will yield large quantities of PARAFFINS in the DISTILLATION PROCESS[4].

paraffin coal, *n* – [PETROLEUM CHEMISTRY] a type of light-colored BITUMINOUS COAL from which OIL and PARAFFIN are produced[54].

paraffin dirt, *n* – [GEOLOGY] a CLAY SOIL appearing rubbery or curdy and occurring in the upper several inches of a soil profile near gas seeps, probably formed by BIODEGRADATION of NATURAL GAS[54].

paraffins, *n* – [PETROLEUM CHEMISTRY] *1*. a waxy substance that is a mixture of ALKANES with chains containing 18 to 36 carbon atoms. *2*. a family of saturated ALIPHATIC HYDROCARBONS (also known as "*n*-alkanes") with the general formula C_nH_{2n+2}. *Also see isoparaffins, aromatics, naphthenes, olefins and PIANO.*

paralic, *adj* – [HYDROLOGY] referring to a LITTORAL ENVIRONMENT where shallow waters predominate, such as a lagoonal environment[6].

parallax, *n* – [REMOTE SENSING] the apparent difference in the position or direction of an object when viewed from different positions. This is a PHENOMENON that often crops up when viewing AERIAL PHOTOGRAPHS. *Also see aerial photograph and remote sensing.*

parallel, *n* – [GEOGRAPHY] a line parallel to the EQUATOR and connecting all places of the same LATITUDE. *Also see equator, latitude and longitude.*

parallel, *adj* – [MATHEMATICS] extending in the same direction, everwhere equidistant and not meeting[17]. *Also see perpendicular*.

parallel drainage, *n* – [HYDROLOGY] a pattern in which streams and their tributaries are regularly spaced and flow parallel or subparallel to one another over a considerable area. It is indicative of a region having uniform slope and homogeneous lithology and rock structure[4].

parameter, *n* – [MATHEMATICS] a variable, measurable PROPERTY whose value is a determinant of the characteristics of a system; for example, TEMPERATURE, PRESSURE, and DENSITY are parameters of the ATMOSPHERE. *Also see variable.*

parametric hydrology, *n* – [HYDROLOGY] the branch of hydrology dealing with development and analysis of relationships among physical parameters involved in hydrologic events and the use of these relationships to generate, or synthesize, hydrologic events[54].

parametric statistics, *n* – [STATISTICS] statistical tests which make certain assumptions about the nature of the full POPULATION from which a SAMPLE is taken; usually the assumption of the normal distribution. *Also see statistics.*

páramo, *n* – [GEOGRAPHY] *from Spanish*, a Neotropical ecosystem. It is located in the high elevations, between the upper forest line (about 3000 meter altitude) and the permanent snow line (about 5000 meters). The ecosystem consists of accidented, mostly glacier formed valleys and plains with a large variety of lakes, peat bogs and wet grasslands intermingled with shrublands and forest patches.

paraquat, *n* – [CHEMISTRY] a yellow, water-soluble solid ($CH_3(C_5H_4N)_2CH_3(2CH_3SO_4)$) which is used as a HERBICIDE.

parasite, *n* – [BIOLOGY] an ORGANISM that lives in or on another organism of a different SPECIES from which it derives NUTRIENTS and shelter[7].

parent isotope, *n* – [ISOTOPES] a RADIOACTIVE ISOTOPE that changes into a different isotope when its NUCLEUS decays. *Also see daughter product and radioactivity.*

parent compound, *n* – [CHEMISTRY] a chemical compound which is the basis for one or more derivatives; for example, ethane is the parent compound for ethyl alcohol and ethyl acetate.

parent material, *n* — [AGRONOMY] material from which a SOIL has been derived.

parent name, *n* – [CHEMISTRY] that portion of the name of a chemical compound from which the name of a derivative comes.

parent rock, *n* – [GEOLOGY] *1*. the rock mass from which parent material is derived. *2*. a source rock[54].

parish, *n* – [GEOGRAPHY] originally an ecclesiastical unit comprising a village and a church with a clergyman. Today it represents a unit of local government which does not necessarily share the ecclesiastical parish boundaries.

park, *n* – [GEOGRAPHY] a large, GRASSY area surrounded by woodland or interrupted by scattered clumps of trees and shrubby vegetation[4].

parshall, *n* – [HYDROLOGY] a device for measuring the flow in conduits by observing the difference in pressure on opposite sides of a partial obstruction[63].

Part B permit, *n* – [ENVIRONMENTAL REGULATION] the second, narrative section submitted by generators in the RCRA permitting process; it covers detailed procedures followed at a facility to protect human health and the environment.

partial pressure, *n* – [CHEMISTRY] the total PRESSURE of a mixture of GASES or VAPORS is equal to the sum of each pressure of its COMPONENTS, known as the partial pressure.

partial remedy, *n* — [ENVIRONMENTAL REGULATION] an interim or incomplete solution intended to be consistent with the expected permanent remedy for treatment, control, elimination, or management of risk associated with the release of a contaminant to the environment.

particle-size analysis — *See grain-size analysis and mechanical analysis.*

particle tracking, *n* – [HYDROGEOLOGY] a mathematical approach used to trace the movement of imaginary particles in a flow field. This technique is commonly used in contaminant transport modeling.

parting, *n* – [GEOLOGY] *1*. the breaking of a MINERAL along planes of weakness that are not true CLEAVAGE. *2*. a very thin SEDIMENTARY LAYER forming a surface of separation between thicker strata of different LITHOLOGY. *3*. a plane or surface along which a rock readily separates[4].

partitioning, *n* — [CHEMISTRY] the act of movement of CONTAMINANTS from one soil residence phase to another.

particle, *n* – [PHYSICS] a minute portion of MATTER.

partitioning coefficient (K_d), *n* – [CHEMISTRY] in the EQUILIBRIUM distribution of a SOLUTE between two LIQUID PHASES, it is the constant ratio of the solute's CONCENTRATION in the upper phase to its concentration in the lower phase.

parts per billion (ppb), *n* – [CHEMISTRY] a common unit of measure of concentration. Preferred terms are micrograms per kilogram (µg/kg) for solid phases or micrograms per liter (µg/l) for aqueous phases or molar concentrations such as milliequivalents per liter.

> DISCUSSION – It is noted that in some countries, such as the United Kingdom, a billion is equal to a million million ($1x10^{12}$), while in the United States, a billion is a thousand million ($1x10^9$). This difference can lead to confusion. It is further assumed that the temperature (T) and pressure (P) of both components are the same. However, this assumption may not always be true. The "ppb" value, known as a mixing ratio (x), is in the form of:
>
> $$x = cRT/P$$
>
> where c is the concentration in µg/l, x is the mixing ratio in ppb and R is the gas constant.

parts per million (ppm), *n* – [CHEMISTRY] a common unit of measure of concentration. Preferred terms are milligrams per kilogram (mg/kg) for solid phases or milligrams per liter (mg/L) for aqueous phases or molar concentrations such as milliequivalents per liter.

party, *n* – [LAW] a person or group taking one side of a question, dispute, or contest.

parsimony, *n* – [SCIENTIFIC METHOD] the PRINCIPLE that the simplest scientific explanation is best[7].

pascal (Pa), *n* – [PHYSICS] a unit of STRESS equal to a force of one NEWTON per square meter[6].

pass, *n* – [GEOGRAPHY] *1*. a natural passageway through high, difficult TERRAIN, as between two PEAKS. *2*. a CHANNEL through which a DISTRIBUTARY on a DELTA flows to the sea. *3*. a navigable channel connecting a body of water with the sea[4].

passage, *n* – [GEOGRAPHY] narrow pathway. *Also see channel, narrows and strait.*

passive glacier, *n* – [GEOLOGY] a GLACIER with little alimentation or ablation.

passive remediation, *n* – [REMEDIATION TECHNOLOGY] NATURAL DEGRADATION of chemicals through physical, chemical and biological processes.

passive sampling, *n* — [ENVIRONMENTAL INVESTIGATION] *1*. the collection of ground-water quality data so as to induce no hydraulic stress on the aquifer. *2*. a sampling procedure where no active stress is placed on the medium.

pasture, *n* – [GEOGRAPHY] land covered with GRASS etc. suitable for grazing animals, especially cattle and sheep. *Also see field and meadow.*

paternoster lakes, *n* -- [GEOLOGY] a linear series of mountain valley lakes that are formed from glacial erosion. They form behind GLACIAL MORAINES or in glacially carved out rock basins. The name of this feature is related to the series of lakes looking like a string of beads.

pathline, *n* – [HYDROGEOLOGY] a general term which refers to a flow path. It describes the route that a discrete particle of water follows through a region of flow during a steady or transient event.

pathogen, *n* – [BIOLOGY] MICROSCOPIC parasite ORGANISM that causes disease in a host. Disease causes the host to be less fit and may eventually cause premature death. *Also see bacteria, microorganism and virus.*

pathway, *n* – [TOXICOLOGY] the physical course a CHEMICAL or POLLUTANT takes from its source to the exposed ORGANISM.

patina, *n* – [GEOLOGY] a colored film or thin layer produced on the surface of a rock by WEATHERING[4].

pattern, *n* -- a discernible coherent system based on the intended interrelationship of component parts.

patterned fen, *n* – [HYDROLOGY] a PEATLAND with a distinctive net-like pattern of low peat RIDGES topped by shrubs or trees and elongate pools and low spots occupied by SEDGES. *Also see flark.*

pay zone, *n* – [GEOLOGY] the vertical interval(s) of the stratigraphic section in an oil or gas field that will yield oil or gas in economic quantities[4].

p*e*, *n* – [CHEMISTRY] the electron activity, a measure of the chemical activity of a solute in terms of the number of electrons. It is related to oxidation-reduction potential (Eh) by the expression

$$pe = (F/2.303RT)Eh.$$

where F is the Faraday constant of 23.1 kcal/V, R is the gas constant of 0.00199 kcal/(mol·K), T is temperature (kelvins) and Eh is in volts (V)[33].

peak, *n* – [GEOGRAPHY] a pointed top of a MOUNTAIN. *Also see crest, hill, mountain and ridge.*

peak flow, *n* – [HYDROLOGY] an instantaneous local maximum value in the continuous time series of streamflows or stages, preceded by a period of increasing values and followed by a period of decreasing values. Several peak values ordinarily occur in a year. The maximum peak value in a year is called the annual peak; peaks lower than the annual peak are called secondary peaks. Occasionally, the annual peak may not be the maximum value for the year; in such cases, the maximum value occurs at midnight at the beginning or end of the year, on the recession from or rise toward a higher peak in the adjoining year. If values are recorded at a discrete series of times, the peak recorded value may be taken as an approximation of the true peak, which may occur between the recording instants. If the values are recorded with finite precision, a sequence of equal recorded values may occur at the peak; in this case, the first value is taken as the peak[47]. *Also known as peak stage*.

peat, *n* — [GEOLOGY] a naturally-occurring, highly ORGANIC SUBSTANCE derived primarily from plant materials.

> DISCUSSION—Peat is distinguished from other organic soil materials by its lower ash content (less than 25% ash by dry weight) and from other phytogenic material of higher rank (that is, lignite coal) by its lower calorific value on a water saturated basis.

Also see anthracite coal, bituminous coal, coal and lignite.

peatland, *n* — [GEOLOGY] areas having PEAT-forming VEGETATION on which peak has accumulated or is accumulating. *Also see bog, fen, flark and swamp.*

peat moss, *n* – [ECOLOGY] moss, especially sphagnum moss, from which peat has been produced[7].

pebble, *n* – [GEOLOGY] a rounded piece of ROCK that is larger than GRAVEL. *Also see boulder, cobble and gravel.*

Peclet Number, *n* – [HYDROLOGY] a relationship between the advective and diffusive components of solute transport expressed as the ratio of the product of the average interstitial velocity, times the characteristic length, divided by the coefficient of molecular diffusion; small values indicate diffusion dominance, large values indicate advection dominance. The value for the Peclet number (P_e) is:

$$P_e = LV/D_d$$

where L is the characteristic length of the pores, V is the average velocity of the water and D_d is the coefficient of molecular diffusion. *Also see diffusion and dispersion.*

ped, *n* – [AGRONOMY] an aggregate of SILT, SAND and CLAY of characteristic shape in the SOIL.

pedalfer, *n* – [AGRONOMY] any soil high in aluminium and iron, and from which the bases such as calcium and magnesium carbonates have been leached.

pedestal, *n* – [GEOLOGY] a pillar made of weak rock capped with a more resistant rock.

pediment, *n* – [GEOLOGY] a broad, gently sloping rock surface at the base of a steeper slope, often covered with ALLUVIUM, formed primarily by EROSION.

pediplain, *n* – [GEOLOGY] a flat or low-angled plain at the foot of mountain scarps.

pedocal, *n* – [AGRONOMY] any soil high in calcium carbonate and magnesium carbonate because leaching is slight.

pedogenesis, *n* – [AGRONOMY] the process of soil formation.

pedology, *n* – [AGRONOMY] the scientific study of soils.

pedon, *n* – [AGRONOMY] a small sample of a soil sufficiently large to show all the characteristics of all its horizons.

Pee Dee Belemnite (PDB), *n* – [ISOTOPES] a belemnite from the Cretaceous Pee Dee formation of South Carolina. Used as the accepted zero point standard for expression of carbon and oxygen isotope abundances (such as -10 per mil ^{13}C vs. PBD).

pegmatite, *n* – [GEOLOGY] a very-coarse-grained IGNEOUS ROCK formed during the later stages of the cooling of the MAGMA. Because of association with hydrothermal fluids, pegmatites often contain high concentrations of various metals and radioactive elements. Pegmatites are often associated with elevated radon concentrations. *Also see igneous rock, intrusive rock and magma.*

pelagic, *adj* — [HYDROLOGY] *1*. of or performed on the open *sea*. *2*. belonging to the upper layers of the open sea. *Also see marine, ocean and sea*.

Pelean eruption, *n* – [GEOLOGY] a violent form of VOLCANIC eruption which is accompanied by an explosion of gas, ash and PYROCLASTS in the form of an incandescent cloud, which travels at great speed down the flanks of the volcano.

pelite, *n* -- [GEOLOGY] a FINE-GRAINED SEDIMENTARY ROCK consisting mostly of CLAY and/or SILT. MUDSTONE, SHALE, SILTSTONE, and CLAYSTONE are all pelitic.

pellicular water, *n* – [HYDROGEOLOGY] WATER adhering as FILMS to the surface of GRAINS of water-bearing material after gravitational-dependent water has been drained. It occurs as wedge-shaped bodies at the junctures of soil grains in the unsaturated zone. *Also known as adhesive water. Also see field capacity, residual saturation and specific retention.*

peloid, *n* – [GEOLOGY] fecal pellets that are produced by organisms that consume calcium carbonate mud and then often are lithified. They are formed from organism excretions of undigested calcium carbonate mud. Peloids tend to be oval in shape and uniform in size.

pendular water, *n* – [HYDROGEOLOGY] water that clings to the surfaces of mineral particles in the zone of aeration (vadose zone)[33].

peneplain, peneplane, *n* — [GEOLOGY] a nearly flat land surface representing an advanced stage of erosion.

penetration, *n* — [DRILLING TECHNOLOGY] depth of hole cut in rock by a drill bit.

peninsula, *n* – [GEOGRAPHY] LANDMASS bounded on three sides by water. *Also see island, isthmus and causeway*.

Pennsylvanian Period, *n* -- [GEOLOGY] a period of the PALEOZOIC ERA (after the MISSISSIPPIAN and before the PERMIAN), thought to have covered the span of time between 320 million years and 290 million years ago; also, the corresponding system of rocks. It is named after the state of Pennsylvania in which rocks of this age are widespread and yield much coal. It is the approximate equivalent of the Upper Carboniferous of European usage.

pentachlorophenol (PCP), *n* – [CHEMISTRY] a chemical compound containing carbon, chlorine, oxygen, and hydrogen, is a contaminant used in feed stock material and chemical manufacturing.

pentane, *n* – [PETROLEUM CHEMISTRY] any of three PARAFFIN HYDROCARBONS, with the formula C_5H_{12}, found in petroleum and NATURAL GAS[4]. A constituent of refined petroleum products such as GASOLINE.

percability—*See permeability.*

percent recovery, *n* – [CHEMISTRY] the percentage of a spiked analyte that is recovered. For spiked recoveries, the relationship is expressed as:

$$\frac{\text{(average of spike analysis results – sample concentration)}}{\text{spike amount}}$$

The ratio is then multiplied by 100.

percentile, *n* – [STATISTICS] a value below which a certain percentage of observations fall; for example,

the 30th percentile is the value below which 30% of the observations fall.

percent saturation (degree of saturation), *n,* — [HYDROGEOLOGY] the ratio, expressed as a percentage, of: (*1*) the VOLUME of WATER in a given SOIL or ROCK mass, to (*2*) the total volume of intergranular space (VOIDS).

perched ground water, *n* — [HYDROGEOLOGY] UNCONFINED GROUND WATER separated from an underlying body of ground water by an UNSATURATED ZONE.

perched water table, *n* — [HYDROGEOLOGY] 1. a WATER TABLE usually of limited area maintained above the normal FREE WATER ELEVATION by the presence of an intervening relatively impervious confining stratum. *2*. GROUND WATER separated from an underlying body of ground water by UNSATURATED SOIL or ROCK. Usually located at a higher ELEVATION than the water table.

perchlorate, *n* – [CHEMISTRY] SALTS of the chloric acid ClO_4 used in rocket fuels, but also found in some fertilizers, especially fertilizers originating from Chile. A CONTAMINANT found in many drinking-water supplies.

percolate, *v* – [HYDROGEOLOGY] to INFILTRATE through SOIL or other MEDIUM with the medium acting as a FILTER. *Also see infiltrate.*

percolation, *n* — [HYDROGEOLOGY] *1*. the movement of WATER through the VADOSE ZONE, in contrast to INFILTRATION at the LAND SURFACE and RECHARGE across a WATER TABLE. *2*. the movement of gravitational water through SOIL. *Also see infiltration and seepage*.

percolines, *n* – [HYDROGEOLOGY] an underground network of water seepage zones.

percussion drilling rig, *n* – [DRILLING TECHNOLOGY] a method of DRILLING with use of a heavy bit that is alternately raised and lowered, breaking and crushing the material which it strikes. *Also known as cable tool drilling.*

perennial, *adj* -- active throughout the year.

perfluorocarboxylates, *n* – [CHEMISTRY] a class of CHEMICAL COMPOUNDS with the general FORMULA $F(CF_2)_nCO_2$ where $n \geq 2$. Use to create stable foams, in METAL plating and cleaning, coating formulations, fire-fighting foams, varnishes, lubricants, GASOLINE and OILS.

perfluorooctanoic acid (PFOA), *n* – [CHEMISTRY] a SYNTHETIC (man-made) CHEMICAL that does not occur naturally in the ENVIRONMENT. PFOA is sometimes called "C8." Companies use PFOA to make fluoropolymers, substances with special properties that have thousands of important manufacturing and industrial applications. Consumer products made with fluoropolymers include non-stick cookware and breathable, all-weather clothing.

pergelation, *n* – [GEOLOGY] the formation of permanently frozen ground in the present or in the past[4].

pergelisol—*See permafrost.*

pericline, *n* – [GEOLOGY] a domed STRUCTURE of SEDIMENTARY ROCKS.

peridotite, *n* – [GEOLOGY] a dense, coarse-grained igneous rock, consisting predominantly of the minerals: olivine and pyroxene. Peridotite is ultramafic, therefore, it contains less than 45% silica. The rock contains significant amounts of magnesium, reflecting the elevated content of Mg-rich olivine, with appreciable iron. Peridotite originates from the Earth's mantle, either as solid blocks and fragments, or as crystals derived from magmas that formed in the mantle.

perigean tide—*See spring tide.*

periglacial, *adj* – [GEOLOGY] *1*. on the fringe of or near to, an ICE SHEET or GLACIER. *2*. any area which has or has had, a very cold CLIMATE.

periglacial landforms, *n* – [GEOLOGY] refers to a feature created largely through the actions of PERIGLACIAL PROCESSES.

period, *n* – [GEOLOGY] a geologic time unit longer than an EPOCH and shorter than an ERA, during which the rocks of a corresponding system were formed. It is a fundamental unit of the geologic time scale[4].

periodic-record station, *n* – [HYDROLOGY] a site where STAGE, DISCHARGE, SEDIMENT, CHEMICAL, PHYSICAL, or other hydrologic measurements are made one or more times during a year, but at a frequency insufficient to develop a daily record[46].

periodic table, *n* – [CHEMISTRY] a table of ELEMENTS arranged in order of increasing PROTON number to show the similarities of CHEMICAL ELEMENTS with related electronic configuration.

periphyton, *n* – [BIOLOGY] organisms (including both plants and animals) that commonly grow on submerged surfaces such as stones, wood, aquatic plants, or other objects, forming more or less continuous slimy or woolly felted coatings on these objects[63].

peristaltic pump, *n* – [PUMPING TECHNOLOGY] a low-volume suction pump in which the compression of a flexible tube by a rotor results in the development of suction.

perjury, *n* – [LAW] when a person, having taken an OATH before a competent tribunal, officer, or person, in any case in which a LAW of the U.S. authorizes an

oath to be administered, that he will testify, declare, depose, or certify truly, or that any written TESTIMONY, declaration, DEPOSITION, or certificate by him subscribed, is true, willfully and contrary to such oath states or subscribes any material matter which he does not believe to be true; or in any declaration, certificate, verification, or statement under penalty of perjury, willfully subscribes as true any material matter which he does not believe to be true.

permafrost *, n* — [HYDROLOGY] subsoil which remains below the FREEZING POINT throughout the year, as in polar regions. *Also known as pergelisol or permanently frozen ground*.

permeable reactive barrier (PRB), *n* – [REMEDIATION TECHNOLOGY] *in-situ* technology for the remediation of CHLORINATED HYDROCARBON-, HEAVY METAL- or RADIONUCLIDE-impacted GROUND WATER. Ground water is hydraulically forced to migrate through an area filled with a TREATMENT material (see ZERO-VALENT IRON). The ground water exited the PRB is then free of contamination. *Also see zero-valent iron (ZVI).*

permeability*, n* — [HYDROGEOLOGY] the capacity of a ROCK, SEDIMENT or SOIL to conduct LIQUID or GAS. It is measured as the proportionality constant, *k*, between flow velocity, *v*, and HYDRAULIC GRADIENT, *I*; where $v = kAI$[14]. *Also see coefficient of permeability, hydraulic conductivity and intrinsic permeability* .

permeability, intrinsic, *n* — [HYDROGEOLOGY] [L^2] a measure of the ease with which a POROUS MEDIUM can transmit a fluid under a potential gradient where,

$$k = K\mu/\rho g$$

and k is the intrinsic permeability, K is the saturated HYDRAULIC CONDUCTIVITY, μ is the DYNAMIC VISCOSITY, ρ is the fluid density and g is the GRAVITATIONAL CONSTANT[16].

> DISCUSSION—Intrinsic permeability is a property of the medium alone and is independent of the nature of the fluid and of the force field causing movement.

Also see absolute permeability, hydraulic conductivity, permeability and relative permeability.

permeability trap, *n* – [GEOLOGY] a trap for oil or gas formed by the lateral variation of PERMEABILITY within a RESERVOIR bed[4].

permeameter, *n* – [HYDROGEOLOGY] a laboratory device used to measure the INTRINSIC PERMEABILITY and HYDRAULIC CONDUCTIVITY of a soil or rock sample[33].

Permian Period, *n* – [GEOLOGY] a GEOLOGIC TIME PERIOD occurring, immediately after the PENNSYLVANIAN and before the TRIASSIC Periods, about 245 to 290 million years BP. Named after the Perm region of Russia.

permissible exposure limits (PEL), *n* – [TOXICOLOGY] a concentration established by OSHA which represents the acceptable concentration of airborne chemicals in the workplace. PELs differ from threshold limit values (TLV) in that they represent enforceable workplace concentrations, specific to each chemical, to which workers may be exposed for 8 hours a day, 5 days a week, for a period of 47 years, without adverse effects.

permit, *n* – [ENVIRONMENTAL REGULATION] an authorization, license, or equivalent control document issued by EPA, an approved state agency or other regulating authority to implement the requirements of an environmental regulation; such as a permit to operate a wastewater treatment plant or to operate a facility that may generate harmful emissions.

permutation, *n* – [MATHEMATICS] an ordered arrangement or grouping of a set of numbers. The number of permutations of *r* objects selected from a set of *n* distinct objects is:

$$_nP_r = n!/(n - r)!$$

Also see combination.

peroxides, *n* – [CHEMISTRY] a group of INORGANIC compounds that contain the O_2^{2-} ion. They are notionally derived from hydrogen peroxide, H_2O_2, but these ions do not exist in AQUEOUS SOLUTION due to extremely rapid HYDROLYSIS to OH^-. *Also see Fenton's Reagent.*

perpendicular, *adj* – [MATHEMATICS] standing at right angles to the plane of the horizon **:** exactly upright. *Also see parallel.*

perennial stream, *n* — [HYDROLOGY] a STREAM that flows from source to MOUTH throughout the year. *Also see stream*.

persistence, *n* – [CHEMISTRY] the longevity of a CHEMICAL in the integrated BACKGROUND ENVIRONMENT as estimated from its chemical and physicochemical properties within a defined model of the environment.

pesticide, *n* – [CHEMISTRY] substances or mixture there of intended for preventing, destroying, repelling, or mitigating any pest. Also, any substance or mixture intended for use as a plant regulator, defoliant, or desiccant. *Also see herbicide and insecticide.*

petrification, *n* – [GEOLOGY] the turning of ORGANIC remains into stone as the original tissue is replaced by MINERALS.

petrochemical, *n* – [PETROLEUM CHEMISTRY] an intermediate CHEMICAL derived from HYDROCARBON liquids, NATURAL GAS or PETROLEUM.

petrochemistry, *n* – [GEOLOGY] the study of the CHEMICAL COMPOSITION of ROCKS; it is an aspect of GEOCHEMISTRY, and is not equivalent to PETROLEUM CHEMISTRY[4].

petrogenic, *adj* -- [CHEMISTRY] derived from ROCKS. *Also see pyrogenic.*

petrographic province, *n* – [GEOLOGY] a region of IGNEOUS ROCKS with enough in common to differentiate them from the rocks of another region.

petrography, *n* – [GEOLOGY] a general term for the SCIENCE dealing with the description and systematical classification of ROCKS, based on observations in the field, on hand SPECIMENS, and on thin sections. Petrography is thus wider in its scope than LITHOLOGY, but more restricted than PETROLOGY, which implies interpretation as well as description. *Also see crystallography and petrology.*

petrol, *n* – [PETROLEUM CHEMISTRY] in the UK (and some other countries) petrol has the same meaning as GASOLINE does in the United States. *Also known as benzine.*

petroleum, *n* – [PETROLEUM CHEMISTRY] a MIXTURE of ORGANIC COMPOUNDS composed predominantly of HYDROGEN and CARBON and found in a GASEOUS, LIQUID or SOLID state in the Earth. *Also see fuel and hydrocarbons.*

petroleum chemistry, *n* – [CHEMISTRY] the study of the CHEMICAL COMPOSITION of NATURAL and MAN-MADE PETROLEUM products.

petroleum coke, *n* – [PETROLEUM CHEMISTRY] a CARBONACEOUS solid material made by the destructive heating of high-molecular-weight petroleum-refining RESIDUES[7]. *Also known as petcoke or pet coke.*

petroleum dyes, *n* – [PETROLEUM CHEMISTRY] colored dyes added to PETROLEUM PRODUCTS such as GASOLINE or HEATING OIL to distinguish manufacturers or for taxing purposes. For example, the State of New Jersey requires that a red dye be added to heating oil, which is not taxed, to distinguish it from motor diesel, which is taxed.

petroleum engineering, *n* – [PETROLEUM TECHNOLOGY] the application of almost all types of engineering to the drilling for and production of oil, gas and liquefiable hydrocarbons[7].

petroleum exclusion, *n* — [ENVIRONMENTAL REGULATION] in the United States, the exclusion from CERCLA liability provided in 42 USC § 9601(14), as interpreted by the courts and EPA: "The term (hazardous substance) does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (*A*) through (*F*) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas)."

petroleum geology, *n* – [GEOLOGY] the branch of ECONOMIC GEOLOGY that relates to the origin, migration and accumulation of OIL and GAS, and to the discovery of commercial deposits. Its practice involves the application of GEOCHEMISTRY, GEOPHYSICS, PALEONTOLOGY, STRUCTURAL GEOLOGY and STRATIGRAPHY to the problems of finding HYDROCARBONS[4].

petroleum products, *n* — [ENVIRONMENTAL REGULATION] in the United States, those substances included within the meaning of the petroleum exclusion to CERCLA 42 USC § 9601(14) as interpreted by the courts and EPA, that is: petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (*A*) through (*F*) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas)."

petroleum tar, *n* – [PETROLEUM CHEMISTRY] a viscous, black or dark-brown product of petroleum refining; yields a substantial quantity of solid residue when partly evaporated or fractionally distilled[7].

petroliferous, *adj* – [PETROLEUM CHEMISTRY] containing petroleum.

petrology, *n* – [GEOLOGY] a general term for the study, by all available methods, of the natural history of ROCKS, including their origins, present conditions, alterations, and decay. Petrology comprises PETROGRAPHY on the one hand, and petrogenesis on the other, and properly considered, its subject matter includes ore deposits and MINERAL deposits in general, as well as rocks in the more limited sense in which that term is generally understood. *Also see petrography*.

pH, *n* — [CHEMISTRY] the negative LOGARITHM of the HYDROGEN-ION activity in an AQUEOUS SOLUTION, or, the logarithm of the reciprocal of the hydrogen-ion activity. *Also see acid and base.*

phacolith, *n* – [GEOLOGY] an elongated dome of INTRUSIVE IGNEOUS ROCK usually located beneath the crest of an ANTICLINE or the trough of a SYNCLINE.

phase, *n* – [PHYSICS] a condition of matter, whether AQUEOUS, VAPOR or SOLID.

phase I environmental site assessment (ESA), *n* — [ENVIRONMENTAL INVESTIGATION] an INVESTIGATION to identify, to the extent feasible, recognized environmental conditions in connection to a property. Phase I assessments normally do not include any environmental sampling.

phase II environmental site assessment (ESA), *n* – [ENVIRONMENTAL INVESTIGATION] an INVESTIGATION conducted to evaluate the recognized environmental conditions identified in a Phase I ESA. Typically, the purpose of a Phase II ESA is to: develop sufficient information from which an environmental professional can render a professional opinion on whether or not hazardous substances have been releases at a particular property, thereby satisfying the innocent purchaser defense under CERCLA. In addition, the Phase II ESA may be developed to provide sufficient information to meet the business objectives of the client and assist in making a business decision.

phenol, *n* – [CHEMISTRY] carbolic acid, an acidic compound that is a powerful caustic poison.

phenols, *n* – [CHEMISTRY] ORGANIC COMPOUNDS that are byproducts of PETROLEUM REFINING, tanning, and textile, dye, and resin manufacturing. Low concentrations cause taste and odor problems in water; higher concentrations can kill aquatic life and humans. *Also see acid extractable compounds.*

phenomena (pl.), phenomenon (s.), *n* – a FACT or occurrence that appears or is perceived, especially one of which the cause is in question.

phenomenal environment, *n* – [ECOLOGY] human activity together with its effects on the natural environment.

phenyl, *n* – [CHEMISTRY] functional group (C_6H_5) consisting of a benzene ring from which a hydrogen has been removed[7].

philosophy, *n* – [LOGIC] *1*. a discipline comprising as its core LOGIC, aesthetics, ETHICS, metaphysics, and epistemology. *2*. pursuit of wisdom**:** a search for a general understanding of values and reality by chiefly speculative rather than observational means. *3*. an analysis of the grounds of and concepts expressing fundamental beliefs.

phloem, *n* – [DENDROLOGY] food conducting tissue in vascular plants. *Also see cambium and xylem.*

phosphorous (P), *n* – [CHEMISTRY] a nonmetallic ELEMENT of the nitrogen group. Never found free in nature, but is widely distributed in combination with MINERALS. An important source is phosphate rock, which contains the mineral apatite.

photic zone, *n* – [HYDROLOGY] the upper zone of a body of water in which sufficient light is available for PHOTOSYNTHESIS[63]. *Also see profundal zone.*

photochemical smog, *n* – [METEOROLOGY] a form of smog that occurs in large cities and can be dangerous to health.

photochemistry, *n* – [CHEMISTRY] a subdivision of CHEMISTRY devoted to the chemical changes induced by various WAVELENGTHS of RADIATION, often brought about through the agency of MOLECULAR fragments known as free RADICALS.

photodegradation, *n* – [CHEMISTRY] the PHENOMENON whereby ULTRAVIOLET RADIATION attacks a CHEMICAL BOND or link in a polymer or chemical structure.

photogeology, *n* – [REMOTE SENSING] the interpretation of AERIAL PHOTOGRAPHS for geological purposes.

photogrammetry, *n* – [REMOTE SENSING] the SCIENCE of using AERIAL PHOTOGRAPHS and other REMOTE SENSING imagery to obtain measurements of NATURAL and human-made features on the Earth. *Also see aerial photograph.*

photoionization detector (PID), *n* **–** [CHEMISTRY] an air monitoring instrument that utilizes the principle of photoionization for the detection and measurement of organic and inorganic vapors. *Also see flame-ionization detector.*

photolineament, *n* – [GEOLOGY] any line or linear feature detectable on an aerial photograph that may be structurally controlled such as stream beds, or trees. The term is normally applied to underlying geologic structures such as beds, fracture zones, faults, mineral bands or zones, unconformities or formational contacts. The intersection of lineaments is often zones of increased water supply.

photolysis, *n* – [CHEMISTRY] DECOMPOSITION or CLEAVAGE of a CHEMICAL COMPOUND induced by RADIATION of a certain wavelength.

photon,*n* – [PHYSICS] an elementary particle, the quantum of the electromagnetic interaction and the basic unit of light and all other forms of ELECTROMAGNETIC RADIATION. It is also the force carrier for the electromagnetic force.

photosynthesis, *n* – [BIOLOGY] the process by which plants convert solar RADIATION into CHEMICAL ENERGY.

photovoltaic cells, *n* – [PHYSICS] these contain semi-conductor crystals of silicon (or gallium arsenide) which, when exposed to the sun, generate electricity, which can be stored in batteries.

phreatic cycle, *n* – [HYDROGEOLOGY] the time period during which the WATER TABLE rises anf falls. It may be daily, annual or other cycle[4].

phreatic line, *n* — [HYDROGEOLOGY] the trace of the phreatic surface in any selected plane of reference.
phreatic line — *See line of seepage*.
phreatic surface — *See free water elevation.*
phreatic water — *See free water*.
phreatophyte, *n* – [BIOLOGY] plants that send their roots into or below the CAPILLARY ZONE to use GROUND WATER.
phthalates, *n* – [CHEMISTRY] an ESTER of phthalic acid made by reacting phthalic anhydride with an ALCOHOL in the presence of sulfuric acid. They are high boiling point liquids used as plasticizers. Phthalates are often found as artifacts in environmental samples. *Also see plasticizer*.
phyllite, *n* – [GEOLOGY] CLAYEY METAMORPHIC ROCK with rock cleavage intermediate between SLATE and SCHIST. Commonly formed by the regional METAMORPHISM of SHALE or TUFF. MICAS characteristically impart a pronounced sheen to rock cleavage surfaces. *Also see argillite, schist and shale.*
physical, *adj* – [PHYSICS] *1*. of MATTER and material. *2*. of, or according to, the laws of NATURE. *3*. belonging to PHYSICS or physical science.
physical chemistry, *n* – [CHEMISTRY] the portion of SCIENCE that deals with laws or generalizations related to CHEMICAL PHENOMENON.
physical weathering, *n* – [GEOLOGY] breaking down of parent ROCK into bits and pieces by exposure to TEMPERATURE and changes and the physical action of moving ICE and WATER, growing roots, and human activities such as farming and construction.
physics, *n* – the branch of SCIENCE dealing with MATTER and ENERGY.
physiographic province, *n* – [GEOLOGY] a region in which all parts are similar in geologic structure and climate and which had a unified geomorphic history; its relief features differ significantly from those of adjacent areas[4].
physiography, *n* – [GEOLOGY] the SCIENCE of the origin and evolution of LAND FORMS[4].
phytane, *n* – [PETROLEUM CHEMISTRY] an ISOPRENOID found in CRUDE OIL and many refined PETROLEUM PRODUCTS. Because of its relative resistance to DEGRADATION, it is often used in FINGERPRINTING studies.
phytoextraction, *n* – [TREATMENT TECHNOLOGY] the use of plants or algae to remove contaminants from soil, sediments or water. The contaminants are uptaken by the plants and becomes part of the biomass.
phytogeomorphology, *n* – [GEOLOGY/BIOLOGY] the study of LANDFORMS and its resulting VEGETATION[6].
phytopathology, *n* [BIOLOGY] the study of PLANT diseases.
phytoplankton, *n* – [BIOLOGY] the plant part of the plankton. They usually are MICROSCOPIC, and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment and commonly are known as algae[47]**.** *Also see plankton.*
phytoremediation, *n* – [REMEDIATION TECHNOLOGY] the uptake and potential TRANSFORMATION of CONTAMINANTS in SOIL and GROUND WATER by plants. A wide variety of plants will uptake contaminants present in soil water and ground water. The contaminants may be METABOLIZED by the tree or TRANSPIRED to the ATMOSPHERE.
phytostabilization, *n* – [TREATMENT TECHNOLOGY] long-term stabilization, control or immobilization of pollutant s through the use of plants or algae.
phytostimulation, *n* – [TREATMENT TECHNOLOGY] the enhancement or stimulation of microbes in soil, sediment or water through the introduction of plants and subsequent increase in contaminant degradation and removal. *Also known as rhizodegradation.*
phytotransformation, *n* – [TREATMENT TECHNOLOGY] the transformation or degradation of contaminants in soil, sediment or water through contact with and metabolism by plants or microbes associated with plants.
Pi, or π, *n* – [MATHEMATICS] the RATIO of the CIRCUMFERENCE of a CIRCLE to its DIAMETER. The value of π is about 3.1415926 or about 22/7.
PIANO – [CHEMISTRY] acronym for PARAFFINS, ISOPARAFFINS, AROMATICS, NAPHTHENES and OLEFINS, the predominant constituents of petroleum products.
pickle liquor, *n* – [INDUSTRIAL TECHNOLOGY] a dilute acid solution used in pickling.
pickling, *n* – [INDUSTRIAL TECHNOLOGY] removal of scale from steel and IRON by immersion in hot hydrochloric or sulfuric acid.
picocurie – [PHYSICS] one trillionth (10^{-12}) of a CURIE. *Also see curie.*
picoline, *n* – [PETROLEUM CHEMISTRY] three different methylpyridine isomers, all with the chemical formula C_6H_7N and a molar mass of 93.13 g mol^{-1}.

picrite, *n* – [GEOLOGY] a type of high-magnesium BASALT very rich in the mineral OLIVINE. It is dark and contains yellow-green olivine phenocrysts (20 to 50%) and black to dark-brown PYROXENE, mostly augite.

pie-chart—*See pie-graph.*

piedmont, *n* – [GEOLOGY] *from French,* lying or formed at the base of a MOUNTAIN or MOUNTAIN RANGE, such as a piedmont terrace or a piedmont pediment. An area, plain, slope, GLACIER, or other feature at the base of a mountain such as a foothill or a BAJADA. In the United States, the piedmont is a PLATEAU extending from New Jersey to Alabama and lying east of the Appalachian Mountains. Meaning in French is "foot of the mountain".

pie graph, *n* – [Statistics] an alternative name for a wheelgraph or divided-circle graph, in which a circle is divided into sectors, or slices of a pie, each proportional to the value it represents[6]. *Also known as a pie-chart. Also see histogram.*

pier, *n* – category applied to column-like concrete foundations, similar to piles. The pier is generally considered the type of deep foundation that is constructed by placing concrete in a deep excavation large enough to permit manual inspection. A pier is also used frequently to indicate heavy masonry column units that are used for basement-level and substructural support.

piezometer, *n* — [HYDROGEOLOGY] a device used to measure HEAD at a point in the subsurface.

piezometric line (equipotential line), *n* — [HYDROGEOLOGY] line along which water will rise to the same elevation in piezometric tubes.

piezometric surface, *n* — [HYDROGEOLOGY] *1*. the SURFACE at which WATER will stand in a series of PIEZOMETERS. *2*. an imaginary surface that everywhere coincides with the static level of the water in the AQUIFER.

pig, *n* – [PETROLEUM TECHNOLOGY] a pipeline inspection gauge used to perform various operations on a pipeline without stopping the flow of the product in the pipeline. These operations include but are not limited to cleaning and inspection of the pipeline. Pigs can also be used to separate different products in a multiproduct pipeline.

pigment, *n* – [CHEMISTRY] a CHEMICAL SUBSTANCE that imparts COLOR to an object by reflecting or transmitting only certain LIGHT rays and absorbing all others. For example, a substance that absorbs all but green rays appears green. An object that contains no pigment, on the other hand, appears white because it reflects all light rays and absorbs none. *Also see color.*

pike, *n* – [Geology] a MOUNTAIN or HILL with a peaked summit[54].

pile, *n* – [GEOLOGY] the relatively long, slender, column-like type of foundation that obtains supporting capacity from the SOIL or ROCK some distance below the ground surface.

pillow lava, *n* – [GEOLOGY] LAVA extruded under WATER and forming a series of rounded masses.

pilot test, *n* – [REMEDIATION TECHNOLOGY] testing a technology, such as a cleanup technology, under actual site conditions to identify potential problems prior to full-scale implementation.

pinch out, *n* – [GEOLOGY] the thinning out and disappearance over a distance of a geologic formation, for example an oil bearing sandstone between layers of impermeable rock.

pingo, *n* – [GEOLOGY] a large conical mound that contains an ice core. This feature can be up to 60 to 70 meters in height. Forms in regions of PERMAFROST.

pinnacle, *n* – [GEOLOGY] a tall, slender pillar of rock; also a lofty peak[4].

pinnate drainage, *n* – [HYDROLOGY] a feather-like drainage pattern containing a large number of closely spaced TRIBUTARIES[6].

pint, *n* – [PHYSICS] measure of VOLUME in the English System equal to 0.125 gallon and 0.5 quart. *Also see gallon, liter and quart.*

pipe, *n* – [GEOLOGY] *1*. a VOLCANIC CHANNEL filled with solidified MAGMA. *2*. A natural, subsurface channel (near-horizontal) through which water passes.

pipeline, *n* – [PETROLEUM TECHNOLOGY] a long, usually underground PIPE used for conveyance, often for OIL or other PETROLEUM PRODUCTS. Pipelines are best suited for transporting large volumes of FUEL. Batch shipments (tenders) of a product commonly exceed 400,000 gallons (10,000 barrels).

Piper Diagram, *n* – [CHEMISTRY] plot of the major ions as percentages of MILLI-EQUIVALENTS in two base triangles. The total CATIONS and the total ANIONS are set equal to 100% and the DATA points in the two triangles are projected onto an adjacent grid. This plot reveals useful PROPERTIES and relationships for large SAMPLE groups. The main purpose of the Piper DIAGRAM is to show clustering of data points to indicate sampled WATER types that have similar COMPOSITIONS. *Also see Stiff Diagram.*

piping, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] any hollow cylinder or tubular conveyance which contains a petroleum product, hazardous substance, or other liquid or gas or

routinely contains a hazardous substance, is in contact with the ground and is constructed of nonearthen materials including any fill pipe, valves, elbows, joints, flanges and flexible connections. Piping does not include vent lines, vapor recovery lines or fittings located on top of the tank[48].

piping, *n* — [AGRONOMY] the progressive removal of soil particles from a mass by percolating water, leading to the development of channels.

piping, *n* – [HYDROLOGY] erosive action of water passing through or under a dam, which may result in leakage or failure[54].

piping sump, *n* -- [UNDERGROUND STORAGE TANK TECHNOLOGY] a LIQUID tight container designed to contain LEAKS from tank top fittings, pumps and associated equipment[48].

pisolite, *n* – [GEOLOGY] a round STONE, larger than an OÖLITE and with a diameter of 2 to 10 mm.

piston sampler, *n* – [ENVIRONMENTAL INVESTIGATION] sealed soil sampling tool that uses an internal piston to seal the tool while it is pushed or driven to the target zone. Once the sampling zone has been reached, the internal piston is unlocked, and the tool is driven to fill the sample barrel. The tool is removed from the ground to retrieve the sample.

pit, *n* — [MINING] *1*. a hole, shaft, or cavity in the ground. *2*. an EXCAVATION in the SURFACE of the earth from which ORE is obtained as in large open pit MINING or as an excavation made for test purposes, that is, a testpit. *Also see excavation.*

pitch, *n* – [GEOLOGY] *1*. the angle between the horizontal and any linear feature, such as an ore shoot or lineation, measured in the plane containing the linear feature. *2*. the angle between the horizontal and an axial line passing through the highest or lowest points of a given stratum in an anticline or syncline. *3*. loosely, the grade, rise, or incline of a seam or bed.

pitch, *n* – [PETROLEUM CHEMISTRY] a resin, a viscous substance produced by plants or formed from PETROLEUM. *Also see asphalt, asphaltenes and coal tar.*

pitchblende, *n* – [MINERALOGY] a black, lustrous oxide of URANIUM (uraninite); the chief ORE of uranium, occurring in sulfide-bearing VEINS[6].

pitch-run gravel, *n* – [GEOLOGY] a natural deposit of a mixture of gravel, sand and foreign materials[54].

pith, *n* – [DENDROLOGY] the center or inside of a twig, branch, or stem. The kind of WOOD in the pith is often different than the kind of wood around the outside. In some species, the pith can have some strange properties. It might be a different color, or be really soft, or even have chambers.

pith date, *n* – [DENDROLOGY] the date of the center ring on a WOOD sample. As the sample may come from any part of the TREE, the pith date may be considerably later than the actual germination date[12].

pitometer—*See pitot tube.*

pitot tube, *n* – [HYDROLOGY] an instrument used to measure the PRESSURE and VELOCITY of flowing water (or moving air)[6]. *Also known as a pitometer.*

pitted outwash, *n* – [GEOLOGY] an expression referring to the TERRAIN created by the burial of a stagnant ICE-SHEET by GLACIOFLUVIAL deposits, in which a large number of KETTLE holes have been formed. A SANDUR with considerable KETTLE-hole development is termed a *kettled sanfur* or *pitted sanfur*[6].

pitting, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] CORROSION of METAL, for example in an UNDERGROUND TANK, where the destruction of the metal does not complete a hole. Pitting could be considered to be a precursor to a hole in the metal. *Also see corrosion.*

pixel, *n* – [REMOTE SENSING] an element of a picture - the basic unit from which an image may be built up for satellite imaging or remote sensing.

pivotal fault, *n* – [GEOLOGY] a FAULT which has allowed one block to rotate around a point on the fault plane. Thus, as the original NORMAL FAULT is traced towards its rotational point, its amount of THROW decreases. Beyond the rotational point, at which there is no displacement, the fault becomes a REVERSE FAULT for the remainder of its length. *Also known as a hinge fault or scissor fault. Also see normal fault and reverse fault.*

placer deposit, *n* – [GEOLOGY] a MINERAL occurring as an ALLUVIAL DEPOSIT in the SAND and GRAVEL of alluvial fans and valley floors. Placer deposits are often a source for GOLD.

plagioclase, *n* – [MINERALOGY] a series of silicate minerals within the feldspar family. The series ranges from the albite to anorthite endmembers (with respective compositions $NaAlSi_3O_8$ to $CaAl_2Si_2O_8$), where sodium and calcium substitute for each other in the mineral's crystal structure.

plain, *n* – [GEOGRAPHY] a level tract of especially treeless country. *Also see guyot, mesa and plateau.*

plaintiff, *n* – [LAW] a person who brings an action; the party who complains or sues in a *civil action* and is so named on the record. A person who seeks remedial relief for an injury to rights; it designates a complainant. *Also see defendant.*

Planck's Law, *n* – [Physics] a law of RADIATION which describes the spectral relationships between

the temperature and the radiate properties of a black body, any object that is a perfect emitter and a perfect absorber of radiation, where

$$W\lambda = c_1\lambda^{-5}/(e^{c_2/T} - 1)$$

T is temperature (^{o}K) of the black body; Wλ is the energy emitted in unit time for an area of interest within a unit range of wavelengths centered on λ; c_1 and c_2 are universal constants and *e* is the base of natural logarithm (2.718)[6].

plane, *n* – [MATHEMATICS] the intersection of three POINTS. *Also see geometry.*

plane-table, *n* – [GEOGRAPHY] a surveying instrument used for drawing maps of small areas. It consists of a small drawing board fixed on a tripod which itself is set up over one end of a measured baseline. Through the use of an ALIDADE placed onto the drawing board, fixed points can be measured and then placed onto a sheet of paper attached to the drawing board[6]. *Also see alidade and theodolite.*

planèze, *n* – [GEOLOGY] *from French,* a triangular or wedge-shaped LANDFORM which results from the dissection of a VOLCANIC CONE by DENUDATION[6].

planimeter, *n* – [GEOGRAPHY] an instrument used in measuring distances on a MAP. The most common type is a wheeled device which is linked to a recording dial[6].

planimetric map, *n* – [GEOGRAPHY] a MAP in which no contours are shown and there is no other indications of vertical relief, merely the horizontal relationships of surface features[6].

plankton, *n* – [BIOLOGY] the floating or weakly swimming plant and animal life of a body of water, consisting mostly of minute forms but including some larger forms (such as jellyfish) with weak powers of locomotion[63].

plasma, *n* — [PHYSICS] an electrically neutral, highly ionized GAS composed of IONS, ELECTRONS, neutral particles. It is a PHASE of matter distinct from solids, liquids, and normal gases.

plastic flow (plastic deformation), *n* — [PHYSICS] the DEFORMATION of a plastic material beyond the point of recovery, accompanied by continuing deformation with no further increase in STRESS.

plasticity, *n* — [GEOLOGY] the property of a SOIL or ROCK which allows it to be deformed beyond the point of recovery without cracking or appreciable volume change.

plasticity index (PI), *n* – [AGRONOMY] the range in water content between the LIQUID LIMIT and the PLASTIC LIMIT of a soil. *Also see liquid limit and plastic limit.*

plasticizer, *n* – [CHEMISTRY] *1*. substance incorporated into a PLASTIC or elastomer for the purpose of improving the material's flexibility and ability to be processed. *2*. non-volatile organic liquid of medium VISCOSITY which is added to rubber and plastic mixtures to act as an internal lubricant and softener. *Also see phthalate.*

plastic limit (PL), *n* – [AGRONOMY] the lower limit of the plastic state of a soil. It is that water content at which the soil begins to crumble when rolled into thin threads.

plastics, *n* – [CHEMISTRY] a collective name for different materials with different characteristics consisting of long carbon chains. Plastic is made almost exclusively of fossil carbon from oil or natural gas which is mixed with different chemicals. Plastic can be divided up in different ways. One division is thermoplastics, which can be transformed when they are heated, and hardened plastics, which cannot be transformed when they are heated but are instead hardened. The environmental impact of plastic is included at every stage from the extraction of oil and gas to the production of plastic and subsequent waste handling. There are few extensive studies of the environmental impact of plastic and it is difficult to state categorically which plastic is better than others. It is, however, possible to say with some certainty that chlorine-based plastics (like PVC below) are worse than other thermoplastics from an environmental angle. This is largely due to the fact that the chlorine in the plastic can combine with organic compounds which often have a very negative effect on the environment.

plastic soil, *n* – [AGRONOMY] a SOIL that will deform without shearing (typically SILTS and CLAYS). Plasticity characteristics are measured using a set of parameters known as ATTERBERG LIMITS.

plate, *n* – [GEOLOGY] a rigid segment of the EARTH'S CRUST which can 'float' across the heavier, semi-molten ROCK below.

plate tectonics, *n* – [GEOLOGY] the concept that both continents and ocean basis are only the emergent parts of large pieces or plates of the earth's surface. It is generally agreed that the global surface can be divided into at least twenty discrete plates (seven major and many minor) with each plate moving in a different direction from that of its neighbor. It is this motion that creates the variety of features of the earth as well as leads to instability along the plate edges. The motion of the plates is believed to be caused by tremendous heat and pressure built up beneath the relatively thin veneer of the overlying plates. The

motion of the plates is characterized by spreading centers whereby molten rock is forced to the surface to form new crustal rocks, and collision zones where plates meet and the older, heavier plate is forced beneath the newer, lighter plate to be turned into a molten state once again deep beneath the earth's surface. This subduction process builds up the mountains along the collision line and results in considerable seismic activity. The seven major plates are named for the continents or oceans and include Pacific, Eurasian, African, Australian, North American, South American, and Antarctic.

plateau, *n* – [GEOGRAPHY] an area of fairly level high ground. *Also see guyot, mesa and plain.*

plateau basalt, *n* – [GEOLOGY] very fluid LAVA which wells up in a FISSURE eruption and covers a large area, often more than 100 kilometers across[6].

plateau gravel, *n* – [GEOLOGY] a deposit of sandy gravel capping ridges, hills and plateaux[6].

platform, *n* – [GEOLOGY] a relatively flat, low-angle surface cut in solid or in DRIFT by MARINE EROSION. It is not produced by subaerial agencies[6].

playa, *n* – [HYDROLOGY] *from Spanish,* LAKE bed found in arid or desert regions in the lowest part of an enclosed VALLEY whose DRAINAGE is CENTRIPETAL or inward. The lake is usually dry, except after heavy rainstorms, when it may be covered by a thin sheet of water which quickly disappears through evaporation and/or infiltration.

playa lake, *n* – [HYDROLOGY] a temporary LAKE formed in a PLAYA. A shallow, intermittent lake in an arid region, occupying a playa in the wet season but drying up in the summer; an ephemeral lake that upon evaporation leaves or forms a playa. *Also see playa.*

Playfair's Law, *n* – [GEOLOGY] a generalization about the relation of stream systems to their valleys, enunciated by John Playfair in 1802: "Every river appears to consist of a main trunk, fed from a variety of branches, each running in a valley proportioned to its size, and all of them together forming a system of valleys communicating with one another, and having such a nice adjustment of their declivities that none of them join the principal valley either on too high or too low a level; a circumstance which would be infinitely improbable if each of these valleys were not the work of the stream which flows in it"[4].

pleadings, *n* – [LAW] written statements filed with the court which describe a party's legal or factual assertions about the case.

Pleistocene Epoch, *n* – [GEOLOGY] the epoch that extended from about 1.8 million years ago to 10,000 years ago on the GEOLOGIC TIME SCALE; when the most recent glaciations occurred.

plinth, *n* – [GEOLOGY] the lower, outer section of a sand DUNE.

plinthite, *n* – [AGRONOMY] a hard capping or crust at the surface of an unconsolidated soil.

Pliocene, *n* – [GEOLOGY] the last EPOCH of the NEOGENE, occurring after the MIOCENE and before the PLEISTOCENE extending from about 5.2 million years BP and lasted for about 3.5 million years[6].

plot, *v* – [GEOGRAPHY] to place survey data on a map; to draw to scale[4].

plottable error, *n* – [GEOGRAPHY] an expression referring to the smallest distance on the ground that can be depicted on a map, according to the scale. This is caused by the minimum thickness of about 0.25 mm attainable when drawing lines on a map[6].

ploughing block, *n* – [GEOLOGY] a BOULDER that moves downslope by frost creep and/or SOLIFLUCTION in a PERIGLACIAL environment[6].

plucking, *n* – a process of GLACIAL EROSION which involves the penetration of ice or rock wedges into subglacial niches, crevices and joints in the bedrock, as the glacier moves. It plucks off pieces of jointed rock and incorporates them into the ice[54].

plug, *n* – [GEOLOGY] a mass of solid LAVA in the neck of a VOLCANO.

plug flow, *n* – [HYDROGEOLOGY] the flow of ground water with piston-like displacement without any mixing.

plume, *n* – [HYDROGEOLOGY] a relatively concentrated mass of emitted CHEMICAL CONTAMINANTS spreading in the ENVIRONMENT. In SURFACE WATER, the EFFLUENT added to a receiving stream near a point source. For example, when a heated-water discharge is added to a stream, the heated water does not mix immediately with the stream water. The mass of hot water remains detectable for some distance downstream. In ground water, the LEACHATE leaking down-gradient from a site of buried waste material.

plume, *adj* [GEOLOGY] an upwelling of molten rock through the asthenosphere to the lower lithosphere.

plume stability, *n* — [HYDROGEOLOGY] a lack of significant geographic movement in any phase (for example, LNAPL, dissolved-phase, vapor-phase). The significance of the movement is measured at a scale practical for containment or other exposure pathway management actions specific to stopping plume movement. Different phases can have different stability conditions. For example, the LNAPL footprint may be geographically stable, but

dissolved-phase flux emanating from that body may not be stable.

plunge, *n* – [GEOLOGY] acute angle that the AXIS of folded rock mass makes with horizontal plane.

plunge pool, *n* – [HYDROLOGY] a pool at the base of a waterfall, often undercutting the sheer rock face.

plutology, *n* – [GEOLOGY] study of the interior of the earth.

pluton, *n* – [GEOLOGY] an INTRUSIVE ROCK, as distinguished from the preexisting COUNTRY ROCK that surrounds it. *Also see igneous rock, intrusive rock and extrusive rock.*

plutonic rock, *n* – [GEOLOGY] an INTRUSIVE ROCK formed inside the Earth. *Also known as intrusive.*

plutonium (Pu), *n* – [CHEMISTRY] a manmade RADIOACTIVE ACTINIDE ELEMENT. It is not a normal part of rocks. Much soil, air, and water has been contaminated by release of Pu from nuclear weapons testing and other activities. Three important isotopes of Pu are Pu-239, Pu-240, and Pu-241[2].

pluvial, *adj* – [METEOROLOGY] of having to do with RAIN; rainy.

pluvial lake, *n* – [HYDROLOGY] a LAKE formed during a PLUVIAL period.

pluvial terrace, *n* – [GEOLOGY] a TERRACE of depositional or erosional derivation, now left abandoned at elevations above current levels of certain lakes, following a change in climatic and hence hydrological conditions[6].

pluvofluvial, *adj* – [HYDROLOGY] referring to the combined action of rainwater and STREAMS[54].

pneumatic action, *n* – [GEOLOGY] acting by means of, WIND or trapped AIR.

pneumatic fracturing, *n* – [HYDROGEOLOGY] to artificially increase the PERMEABILITY of ROCK or SEDIMENT by the propagation of FRACTURES through the introduction of a pressurized LIQUID.

pneumatolysis, *n* – [GEOLOGY] the process of CHEMICAL change in a ROCK brought about by the action of GASES from the interior of the EARTH.

pocket beach, *n* – [GEOLOGY] an accumulation of coastal beach sediment at the head of a bay. *Also see bayhead beach.*

pocket valley, *n* – [GEOLOGY] a flat, steep-sided valley enclosing a KARST STREAM below its RESURGENCE. It extends headward into a limestone massif and is usually terminated by a cliff. It is the opposite of a BLIND VALLEY[6].

pocosin, *n* — [HYDROLOGY] an upland SWAMP of shallow water.

podzolization, *n* – [AGRONOMY] CHEMICAL migration of ALUMINUM, IRON and/or organic matter from a SOIL HORIZON.

point, *n* – [GEOGRAPHY] a projecting usually tapering piece of land or a sharp prominence. *Also see cape, point and promontory.*

point, *n* – [MATHEMATICS] that which has position but not magnitude; the intersection of two LINES. *Also see line and plane.*

point bar, *n* – [GEOLOGY] stream bar deposit that is normally located on the inside of a channel bend.

point distribution, *n* – [STATISTICS] a statistical method of summarizing the locational characteristics of data on a map, whereby each item is allocated to a discrete point on the map[6].

point of compliance, *n* – [ENVIRONMENTAL REGULATION] a location(s) selected between the source area(s) and potential point(s) of exposure where concentrations of constituents of concern must be at or below the determined ground water target levels.

point-of-entry treatment (POET) device, *n* — [TREATMENT TECHNOLOGY] a TREATMENT device applied to the drinking water entering a house or building to reduce the contaminants in the water distributed throughout the house or building.

point of exposure, *n* – [TOXICOLOGY] the point(s) at which an individual or population may come in contact with a chemical(s) of concern originating from a particular site.

point source, *n* – [ENVIRONMENTAL POLLUTION] a stationary location or fixed facility from which pollutants are discharged; any single identifiable source of POLLUTION; such as a pipe, ditch, ship, ore pit, factory smokestack. *Also see non-point source.*

poised stream, *n* – [HYDROLOGY] a stream that is neither eroding nor depositing sediment[4].

poision, *n* – [TOXICOLOGY] a SUBSTANCE that through its CHEMICAL action usually kills, injures, or impairs an ORGANISM. *Also see toxin.*

Poisson distribution, *n* – [STATISTICS] a type of statistical data distribution used to describe the case in which the probability of an event occurring (p) is very small compared with the probability that it will not occur (q). Wheras in a NORMAL DISTRIBUTION $p = q = ½$, in the Poisson distribution p is very much smaller than q.[6]

Poisson's Ratio, *n* – [PHYSICS] an elastic constant (does not exceed 0.5) which is the ratio of the lateral unit STRAIN to the longitudinal unit strain in a body that has been stressed longitudinally within its elastic limit.

polar, *adj* – [GEOGRAPHY] of or relating to a geographical pole or the region around it.

polar, *adj* – [CHEMISTRY] exhibiting polarity; especially, having a DIPOLE or characterized by MOLECULES having dipoles. *Also see dipole.*

polar compound, *n* – [CHEMISTRY] a MOLECULE which has, or can acquire, electrical charges which enable it to conduct ELECTRICITY.

polar desert, *n* – [GEOGRAPHY] an area with an annual PRECIPITATION rate of less than 250 millimeters and a mean TEMPERATURE during the warmest month of less than 10° C.

polarity, *n* – [PHYSICS] the magnetic positive (north) or negative (south) character of a magnetic pole4.

polarization, *n* – [PHYSICS] the state of an ELECTROMAGNETIC WAVE in which the electric and magnetic field vibrates in a straight line in the plane perpendicular to the direction of wave propagation.

polder, *n* – [HYDROLOGY] *from Dutch,* a mostly low-lying area artificially protected from surrounding WATER and within which the WATER TABLE can be controlled.

policy, *n* – [LAW] a course or principle of action adopted or proposed by a government, party, business or individual.

policy, *n* – [INSURANCE] a written CONTRACT for insurance between an insurance company and policyholder stating details of coverage.

policyholder, *n* – [INSURANCE] a person or entity that has a contract with an insurance company for insurance coverage and is entitled to make claims under the conditions of the policy.

polishing, *n* — [TREATMENT TECHNOLOGY] the removal of low CONCENTRATIONS of dissolved, recalcitrant organic compounds from either water intended for human consumption or wastewater that has been subjected to PRIMARY and SECONDARY WASTEWATER TREATMENT. The passage of water through a charcoal filtering device is a frequently employed polishing technique.

polje, *n* – [GEOLOGY] *from Serbo-Croatian,* large, isolated depression, generally several kilometres long, covered with fairly flat ALLUVIUM and with steep walls. Occurs mainly in KARST areas.

pollen, *n* – [BIOLOGY] the fertilizing element of flowering plants; background air pollutant.

> DISCUSSION – Pollen has been used in criminal forensic investigations to trace the origin of soils, for example, soils left behind on shoes used during a shooting.

pollution, *n* – [ENVIRONMENTAL REGULATION] CONTAMINATION of the ENVIRONMENT by a variety of sources including, but not limited to, HAZARDOUS SUBSTANCES, organic wastes and toxic chemicals. Pollution is legally controlled and its cleanup enforced by various LAWS and regulatory agencies, including common nuisance laws.

pollution indicator organism, *n* – [BIOLOGY] a plant or animal form, such as the rat-tailed maggot or blue-green algae, that thrives in polluted water[63].

pollution insurance, *n* – [INSURANCE] policies that cover property loss and liability arising from pollution-related damages, for sites that have been inspected and found uncontaminated. It is usually written on a claims-made basis so policies pay only claims presented during the term of the policy or within a specified time frame after the policy expires.

poly- --prefix meaning many.

polybrominated diphenyl ethers (PBDEs), *n* – [CHEMISTRY] MAN-MADE CHEMICALS used as flame retardants in plastics, textiles and electronics. They are highly persistent in the ENVIRONMENT and have been detected in many places within the food chain.

polychlorinated biphenyls (PCBs), *n* – [CHEMISTRY] polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor. PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

polychlorinated dibenzo-*p*-dioxins with/and/or polychlorinated dibenzofurans (PCDD/Fs) – *See dioxins*

polycyclic aromatic hydrocarbons (PAHs), *n* – [CHEMISTRY] polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot. Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs

are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides. *Also see base/neutral extractable compounds, petrogenic and pyrogenic.*

polychlorinated naphthalenes (PCNs), *n* — [CHEMISTRY] industrial chemicals that are mixtures of chlorinated naphthalene compounds. They have properties and applications similar to POLYCHLORINATED BIPHENYLS (PCBS) and have been identified in commercial PCB preparations.

polygenetic, *adj – 1.* resulting from more than one process of formation or derived from more than one source, or originating or developing at various places and times. *2.* consisting of more than one material, or having a HETEROGENEOUS COMPOSITION[54]. *Also known as polygenic.*

polymer, *n* – [CHEMISTRY] a COMPOUND made up of a large, long-chain or branching matrix composed of many repeated, simple units (monomers) linked together by polymerization.

polynomial, *n* – [MATHEMATICS] an expression of finite length constructed from variables (also known as indeterminates) and constants, using only the operations of addition, subtraction, multiplication, and non-negative, whole-number exponents. For example, $x^2 - 5x + 12$ is a polynomial, but $x^2 - 3/x + 7x^{3/2}$ is not.

polynuclear aromatic hydrocarbons (PNA), *n* – [CHEMISTRY] a group of highly reactive organic compounds, such as naphthalene and biphenyls, that are a common component of CREOSOTES, which can be CARCINOGENIC.

polyterpanes, *n* – [FINGERPRINTING] a class of saturated BIOMARKERS constructed of more than eight ISOPRENE subunits ($\sim C_{40}+$)[34].

polyvinyl chloride (PVC), *n* – [CHEMISTRY] a tough, environmentally indestructible plastic that releases hydrochloric acid when burned.

pond, *n* – [HYDROLOGY] small storage RESERVOIR or body of WATER. *Also see kettle and lake.*

pondage, *n* – [HYDROLOGY] the amount of water stored behind a dam of relatively small storage capacity used to control the flow of a river[63].

ponor, *n* – [HYDROLOGY] *from Serbo-Croatian,* a deep SWALLOW HOLE with a POLJE. *Also see aven*.

pontic, *adj* – [GEOLOGY] relating to SEDIMENTS or FACIES deposited in comparatively deep and motionless water, such as an association of black SHALES and dark LIMESTONES deposited in a stagnant basin[54].

pool, *n* – [HYDROLOGY] a location in an active STREAM CHANNEL, usually located on the outside bends of MEANDERS, where the water is deepest and has reduced current velocities.

poorly graded, *adj* – [GEOLOGY] pertaining to a soil, sediment or rock in which a continuous distribution from coarsest to finest of particles is lacking[4].

poorly sorted, *adj* – [GEOLOGY] pertaining to soil, sediment or rock that consists of particles of many sizes mixed together in an unsystematic manner so that no one size class predominates[4].

population, *n* – [STATISTICS] the entire collection of items that is the focus of concern.

pore, *n* — [HYDROGEOLOGY] synonymous with INTERSTICE or INTERSTITIAL.

pore pressure, *n* — [HYDROGEOLOGY] PRESSURE exerted by FLUID in the VOID space of SOIL or ROCK; the INTERSTITIAL (pore) movement of WATER that may take place through a DAM, its foundation, or its abutments.

pore space, *n* — [HYDROGEOLOGY] that portion of ROCK or SOIL not occupied by solid MINERAL MATTER and which may be occupied by GROUND WATER.

pore volume, *n* – [HYDROGEOLOGY] the volume of water required to replace or flush out water in a unit volume of saturated porous media.

pore water, *n* — [HYDROGEOLOGY] WATER contained in the voids of the SOIL or ROCK.

porosimeter, *n* – [HYDROGEOLOGY] an instrument used to determine the porosity of a rock sample by comparing the bulk volume of the sample to the aggregate volume of the pore spaces within it[4].

porphyritic, *adj* – [GEOLOGY] an IGNEOUS ROCK TEXTURE characterized by larger crystals (phenocrysts) in a matrix of distinctly finer crystals (groundmass).

porosity, *n* – [HYDROGEOLOGY] [L^3L^{-3}] the ratio, usually expressed as a percentage, of: (*1*) the volume of VOIDS of a given SOIL or ROCK mass, to (*2*) the total volume of the soil or rock mass. Porosity is normally expressed as,

$$n = (V_v/V)x100\%$$

where n is the porosity, V_v is the volume of void space and V is the total volume of material (solid and void space). Representative porosity values for soils and geologic materials are:

glacial till	10-20%
sand and gravel	20-35%
gravel	25-50%
coarse-grained sand	30-40%
medium-grained sand	25-35%
fine-grained sand	45-52%
silt	35-50%

clay 33-60%

Also see effective porosity.

porous media displacement pressure, *n* – [HYDROGEOLOGY] the threshold CAPILLARY PRESSURE required for a non-wetting fluid to enter a wetting-fluid saturated porous medium. Lower permeability media such as silts and clays exhibit higher displacement pressures than more permeable media such as coarse sands and gravels. Usually expressed in Pascals (Pa).

portal, *n* – [MINING] the surface entrance to an underground mine.

portland cement, *n* – [TECHNOLOGY] a cement produced by fine grinding a carefully proportioned mixture of limestone and shale (or equivalent raw materials); heating the mixture to incipient fusion in a rotary kiln; and fine grinding the resulting clinker[4].

positron, *n* – [CHEMISTRY] a particle equal in mass, but opposite in charge, to the electron; a positive electron[64].

post-excavation soil sample, *n* – [ENVIRONMENTAL INVESTIGATION] SOIL SAMPLES collected during or after the excavating of contaminated soil to document that all of the impacted soil has been removed or characterize the condition of the remaining impacted soil.

postulate, *n* – [LOGIC] a proposition assumed to be true without any appeal to evidentiary support, especially when it is then used to derive further statements in a formal system or general theory.

potable, *adj* – [HYDROLOGY] WATER that is safe for drinking and cooking.

potable well – *Also known as domestic well and private well.*

potamology, *n* – [HYDROLOGY] that branch of HYDROLOGY dealing with surface STREAMS and their regime. It includes FLUVIAL DYNAMICS and all the PHENOMENA related to EROSION of and SEDIMENTATION on the stream bed.

potamon zone, *n* — [HYDROLOGY] STREAM reach at lower elevations characterized by reduced flow, higher TEMPERATURE, and lower DISSOLVED OXYGEN concentrations.

potash, *n* – [CHEMISTRY] potassium carbonate (K_2CO_3).

potassium (K), *n* – [CHEMISTRY] a highly reactive metallic ELEMENT of the alkali group; it is soft, light, and silvery. Occurs abundantly in nature; obtained from the following MINERALS: sylvite, carnallite, langbeinite, and polyhalite. The greatest demand is for use in FERTILIZERS.

potassium-argon dating, *n* – [AGE DATING] dating of ARCHEOLOGICAL, GEOLOGICAL or ORGANIC SPECIMENS by measuring the amount of ARGON accumulated in the MATRIX ROCK through decay of radioactive POTASSIUM[54].

potential, *n* – [PHYSICS] any of several different scalar quantities, each of which involves energy as a function of position or of condition, such as the fluid potential of GROUND WATER[4].

potential energy, *n* – [PHYSICS] ENERGY that is the result of the position of an object, a potential GRADIENT. The change in potential per unit distance. *Also see Bernoulli's Equation and kinetic energy.*

potential evapotranspiration, *n* – [HYDROLOGY] generally, the amount of MOISTURE which, if available, would be removed from a given land area by EVAPOTRANSPIRATION, expressed in units of water depth[54].

potential responsible party (PRP), *n* – [ENVIRONMENTAL INVESTIGATION] any individual or company--including owners, operators, transporters or generators--potentially responsible for, or contributing to a SPILL or other CONTAMINATION.

potentiometric map, *n* – [HYDROGEOLOGY] a CONTOUR MAP showing the ELEVATION of the POTENTIOMETRIC SURFACE[4].

potentiometric surface, *n* — [HYDROGEOLOGY] an imaginary SURFACE representing the static HEAD of GROUND WATER. The WATER TABLE is a particular potentiometric surface.

> DISCUSSION — Where the head varies with depth in the aquifer, a potentiometric surface is meaningful only if it describes the static head along a particular specified surface or stratus in that aquifer. More than one potentiometric surface is required to describe the distribution of head in this case.

pot hole, *n* – [GEOLOGY] *1.* a more or less circular hole in the rocky bed of a STREAM, carved by the scouring and grinding effect of PEBBLES rotated in an eddy in a stretch of RAPIDS[6]. *2.* a steep-sided shaft in LIMESTONE TERRAIN down which a surface stream disappears[6]. *Also see abîme, gouffre and swallow hole.*

potrero, *n* – [GEOLOGY] an elongate, ISLAND-like BEACH RIDGE, surrounded by mudflats and separated from the COAST by a LAGOON and BARRIER ISLAND, made up of a series of accretionary DUNE ridges[54].

pound, *n* – [PHYSICS] measure of WEIGHT in the English System equal to 16 ounces, 0.0005 TON and 0.373 KILOGRAM. *Also see gram, kilogram, ounce and ton.*

pour point, *n* – [PETROLEUM CHEMISTRY] the lowest TEMPERATURE at which an OIL will appear to flow under ambient PRESSURE over a period of five seconds. The pour point of CRUDE OILS generally varies from -60 °C to 30 °C. Lighter oils with low VISCOSITIES generally have lower pour points[51].

power, *n* – [PHYSICS] the TIME RATE of doing WORK.

power of attorney, *n* – [LAW] an instrument by which one person authorizes another to act for him in a manner which is as legally binding upon the person giving such authority as if he personally were to do the acts. It does not have to be made in favor of a licensed attorney. Most standard powers of attorney are automatically revoked should you become incompetent; A document under which a grantor gives an agent powers to act on behalf of the grantor.

practical quantitation level (PQL), *n* – [CHEMISTRY] the lowest quantitation level of a given ANALYTE that can be reliably achieved among LABORATORIES within the specified limits of PRECISION and ACCURACY of a given analytical METHOD during routine laboratory operating conditions.

practice, *n* – the work or business of a doctor, lawyer, or other professional.

prairie, *n* – [GEOGRAPHY] a tract of level to hilly land whose VEGETATION is dominated GRASSES and FORBS with scarce shrubs and which is treeless. The natural plant community consists of various mixtures of tall, mid, and short growing native species, also known as true prairie, mixed prairie, and shortgrass prairie, respectively.

prairie lake, *n* – [GEOGRAPHY] a shallow lake that empties naturally during dry periods allowing a variety of land plants to flourish in the rich nutrients on the lake bottom. The lakes eventually fill up with water returning to their previous state.

precedent, *n* – [LAW] previous case etc. taken as a guide for subsequent cases or as a justification. *Also see case law.*

precept, *n* – [LOGIC] a command or PRINCIPLE intended especially as a general rule of action.

precious metal, *n* – [CHEMISTRY] gold, silver or any of the minerals of the platinum group[4].

precious stone, *n* – [GEOLOGY] a relatively rare, durable gemstone of unusual beauty, such as diamond, ruby, emerald or sapphire[4].

precipice, *n* – [GEOLOGY] a very steeply-inclined, vertical or overhanging wall or surface of rock[54].

precipitation, *n* – [CHEMISTRY] the conversion of a dissolved SUBSTANCE into insoluble form by CHEMICAL or PHYSICAL means.

precipitation, *n* – [METEOROLOGY] *1*. LIQUID or SOLID products of the CONDENSATION of WATER VAPOR falling from clouds or deposited from AIR on the GROUND. *2*. amount of precipitation on a unit of horizontal surface per unit time. *Also see areal precipitation.*

precision, *n* — the degree of agreement of repeated measurements of the same parameter expressed quantitatively as the standard deviation computed from the results of a series of controlled determinations.

> DISCUSSION — Measures frequently used to express *precision* are standard deviation, relative standard deviation, variance, repeatability, reproducibility, confidence interval, and range. In addition to specifying the measure and the *precision*, it is important that the number of repeated measurements upon which the estimated *precision* is based also be given.

Also see accuracy.

prediction, *n – 1*. the act of declaring or indicating in advance. *2*. a statistical term for an estimate of future or past conditions or data extrapolated beyond the period of calibration or beyond the rane of the data set.

preliminary assessment (PA), *n* — [ENVIRONMENTAL INVESTIGATION] a review of existing information and an off-site reconnaissance, if appropriate, to determine whether a RELEASE may require additional INVESTIGATION or action. A preliminary assessment may include an on-site reconnaissance, if appropriate. See ASTM Guidance for Transaction Screen Questionnaire (Practice E 1528).

premise, *n* – [LAW] a previous statement from which another is inferred.

preponderance of evidence, *n* – [LAW] the level of PROOF required to prevail in most civil cases. The JUDGE or JURY must be persuaded that the facts are more probably one way (the PLAINTIFF'S way) than another (the DEFENDANT'S).

preservation, *n* — [ENVIRONMENTAL REGULATION] the natural resources POLICY that stresses the aesthetic aspects of FORESTS, RIVERS, WETLANDS, and other areas and tends to favor leaving such areas in an undisturbed state. *Also see conservation*.

presque isle, *n* – [GEOGRAPHY] *from French meaning "almost an island"* a PROMONTORY or PENINSULA extending into a lake, nearly or almost forming an ISLAND; its head or end section is connected with the shore by a sag or low gap only slightly above water level or by a strip of lake bottom exposed as a land surface by a drop in lake level[54].

pressure, *n,* — [PHYSICS] the load divided by the area over which it acts.

pressure head, *n* — [HYDROGEOLOGY] the HEAD of WATER at a point in a porous system; negative for unsaturated systems, positive for saturated systems. Quantitatively, it is the water PRESSURE divided by the specific WEIGHT of water. *Also see elevation head and static head.*

pressure gradient, *n* – [PHYSICS] the rate of variation of pressure in a given direction at a fixed time[4].

pressure pan, *n* – [AGRONOMY] a subsurface soil HORIZON with a higher DENSITY and a lower POROSITY than the horizons directly above and below it. It results from the pressure of agricultural machinery during tillage operations and has to be artificially broken to avoid GLEYING. It is sometimes referred to as an *induced pan*[6].

pressure ridge, *n* – [HYDROLOGY] a formation of ice found on large frozen lakes or the sea during the winter. a pressure ridge is a long crack in the ice that occurs because of repeated heating and cooling on the water surface.

pressure transducer, *n* – [HYDROGEOLOGY] an electronic device placed within an OBSERVATION WELL to collect continuous water-level DATA. *Also see water-level recorder.*

pretrial conference, *n* – [LAW] a meeting of the JUDGE and LAWYERS to discuss which matters should be presented to the JURY, to review EVIDENCE and WITNESSES, to set a timetable, and to discuss the settlement of the case.

prima facie case, *n* – [LAW] Latin for "at first view." Evidence that is sufficient to raise a presumption of fact or to establish the fact in question unless rebutted. A prima-facie case is a lawsuit that alleges facts adequate to prove the underlying conduct supporting the cause of action and thereby prevail.

primarümpf, *n* – [GEOGRAPHY] *from German,* an upwarped, progressively expanding landscape or plain, with a rise so slow that degradation keeps pace with uplift[4].

primary permeability, *n* — [HYDROGEOLOGY] internal PERMEABILITY of intact ROCK; intergranular permeability (not permeability due to fracturing).

primary pollutant, *n* – [METEOROLOGY] a POLLUTANT that enters the air directly from a source[54].

primary porosity, *n* — [HYDROGEOLOGY] the POROSITY that developed during the final stages of sedimentation or that was present within SEDIMENTARY PARTICLES at the time of DEPOSITION.

primary substrate, *n* – [BIOLOGY] the ELECTRON DONOR and ELECTRON ACCEPTOR that are essential to ensure the growth of MICROORGANISMS. These COMPOUNDS can be viewed as analogous to the food and OXYGEN that are required for human growth.

primary wastewater treatment, *n* – [TREATMENT TECHNOLOGY] the first major (and sometimes only) treatment in a wastewater treatment plant. It screens out some sticks, rags and other solids, and floats and settles out others in settling basins. At best, primary treatment removes about 35 percent of the organic waste. A primary wastewater treatment plant may consist of the following units: BAR SCREENS or mechanical screens, GRIT-REMOVAL CHAMBERS, flowmeters, COMMINUTORS or BARMINUTORS, CLARIFIERS or sedimentation tanks, DIGESTERS or sludge digestion tanks, SLUDGE DRYING BEDS and chlorinators or CHLORINE CONTACT CHAMBERS[63]. *Also see secondary wastewater treatment and tertiary wastewater treatment.*

prime, *v* – [PUMPING TECHNOLOGY] to put into working order by filling or charging with something, such as to "prime" a PUMP with water. Many pumps will not work properly unless they are first filled with water.

prime meridian, *n* – [GEOGRAPHY] the location from which meridians of LONGITUDE are measured. Has the measure of 0° of longitude. The prime meridian was selected by international agreement to run through Greenwich, England. *Also see Equator, International Date Line, latitude and longitude.*

principal, *n* – [LAW] a person for whom another acts as an AGENT. *Also see agent, attorney, counselor and lawyer.*

principal component analysis (PCA), *n* – [MATHEMATICS] a MATHEMATICAL procedure that transforms a number of (possibly) correlated variables into a (smaller) number of uncorrelated variables called principal components. The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible.

principle, *n* – [LOGIC] a comprehensive and fundamental LAW, doctrine, or assumption. *Also see law and scientific law*.

Principle of Cross-Cutting Relationships, *n* – [GEOLOGY] GEOLOGICAL PRINCIPLE stating that the thing being cut is older than the thing doing the cutting.

Principle of Original Horizontality, *n* – [GEOLOGY] GEOLOGICAL PRINCIPLE stating that SEDIMENTARY LAYERS are initially DEPOSITED in HORIZONTAL BEDS.

Principle of Superposition, *n* – [GEOLOGY] GEOLOGICAL PRINCIPLE stating that in any undeformed sequence of SEDIMENTARY ROCKS, each BED is younger than the one below it and older than the one above it.

This is the basis of relative AGES of all strata and their contained fossils.

Principle of Uniformitarianism, *n* – [GEOLOGY] GEOLOGICAL PRINCIPLE stating that PROCESSES going on presently were pretty much the same in the past and, accordingly, the present is the key to the past.

prior appropriation doctrine, *n* – [LAW] the system for allocating water to private individuals used in most Western states. The doctrine of Prior Appropriation was in common use throughout the arid West as early settlers and miners began to develop the land. The prior appropriation doctrine is based on the concept of "First in Time, First in Right." The first person to take a quantity of water and put it to beneficial use has a higher priority of right than a subsequent user. The rights can be lost through nonuse; they can also be sold or transferred apart from the land. Contrasts with riparian water rights.

priority pollutants plus 40 (PP+40), *n* – [ENVIRONMENTAL REGULATION] the priority pollutant list of 126 compounds and elements developed by the EPA pursuant to Section 307(a)(1) of the Clean Water Act and 40 NON-TARGETED ORGANIC COMPOUNDS detected by GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GC/MS) analysis. For the purposes of this chapter, a PP+40 scan means the analysis of a sample for all priority pollutants except asbestos and 2,3,7,8-TETRACHLORO-DIBENZO-P-DIOXIN, (DDT) and up to 15 non-targeted VOLATILE ORGANIC COMPOUNDS and up to 25 non-targeted SEMI-VOLATILE ORGANIC COMPOUNDS as analyzed using GC/MS analytical methods. Non-targeted compound criteria shall be used pursuant to the version of the EPA "Contract Laboratory Program Statement of Work for Organic Analysis, Multi-media, Multi-concentration" in effect as of the date which the laboratory is performing the analysis.

pristane, *n* – [PETROLELEUM CHEMISTRY] (2,6,10,14-tetramethylpentadecane), a naturally-occurring ISOPRENOID ALKANE that is probably derived from the phytyl moiety of chlorophyll, from thermal DEGRADATION of tocopherols, and/or from the catagenic DECOMPOSITION of methyltrimethyltridecylchromans. It is found in CRUDE OIL and some refined products, such as motor diesel or no. 2 heating oils. Because of its relative resistance to degradation, it can be used in fingerprinting and age-dating studies. *Also see Christensen & Larsen method, isoprenoid and phytane.*

pristine, *n* – [ECOLOGY] *1*. belonging to the earliest period or state. *2*. not spoiled, corrupted, or POLLUTED. *3*. fresh and clean as or as if new.

private well, *n* – *See domestic well and potable well.*

protactinium-ionium age method, *n* – [AGE DATING] a method of calculating the ages of deep-sea SEDIMENTS formed during the last 150,000 years from measurements of the ratio of protactinium-231 to ionium (thorium-230), based on gradual change of this ratio over time because of the differences in their half-lives[54].

probabilistic analysis, *n* – [STATISTICS] quantitative procedures used to evaluate the variability or uncertainty, or both, surrounding a distribution when the result depends on a number of factors, each of which has its own variability and uncertainty.

probability, *n* – [STATISTICS] basic statistical concept either expressing in some way a "degree of belief" or taken as a limiting relative frequency of occurrence in an infinite series. *Also see chance and statistics.*

probability distribution, *n* – [STATISTICS] a distribution of values of a variable indicating the odds (PROBABILITY) of encountering each of the values[6].

probable error, *n* – [STATISTICS] a statistical term referring to the range in a normal random distribution of data (NORMAL DISTRIBUTION), for a large number of observations within which half of the observations fall[6].

probe, *n* – [ENVIRONMENTAL INVESTIGATION] any instrument that is placed into the environment to measures it's characteristics.

procedure, *n* – a particular way of accomplishing something or of acting. *Also see process and protocol.*

process, *n* – *1*. a NATURAL PHENOMENON marked by gradual changes that lead toward a particular RESULT. *2*. a natural continuing activity or function. *3*. a series of actions or operations conducing to an end. *4*. a continuous operation or TREATMENT especially in manufacture.

prodelta, *n* – [GEOLOGY] the part of a delta that is below the effective depth of wave action, lying beyond the delta front and sloping gently to the floor of the basin into which the delta is advancing[4].

producer gas, *n* – [PETROLEUM CHEMISTRY] a GAS rich in carbon monoxide, HYDROGEN and NITROGEN (heating value of about 150 BTU per cubic foot) made by reacting COAL or COKE with steam and air.

product-moment coefficient of correlation, *n* – [STATISTICS] the most powerful test of correlation of variables in which the correlation coefficient (*r*) is:

$$r = \frac{1/n\Sigma(a - a')(b - b')}{\sigma a \cdot \sigma b}$$

where this refers to the sum (Σ) of the product of the total variations from *a'* and *b'*, divided by the number of pairs (*n*), known as the covariance. The latter is reduced to *r* when it is divided by the product of the two standard deviations (σ).

proglacial, *adj* – [GEOLOGY] immediately in front of or just beyond the outer limits of a glacier or ice sheet[4].

profundal zone, *n* – [HYDROLOGY] the deep region of a water body that lies below the light-controlled limit of plant growth[63]. *Also see photic zone*.

proglacial channel, *n* – [GEOLOGY] a type of meltwater channel which is formed across the slope that declines ahead of an ice front. It usually forms at right angles to the ice margin but can also occur parallel to the ice front[6].

proglacial deposit, *n* – [GEOLOGY] *1*. any SEDIMENT which is laid down in a water body having been carried by meltwater STREAMS beyond the limits of the GLACIER or ICE SHEET. 2. deposits of GLACIOFLUVIAL origin that are laid down in front of an ice margin such as a SANDFUR[6].

proglacial lake, *n* – [GEOLOGY] a body of water that accumulates in a basin as a result of damming by ice-sheets as they advance into an ice-free area[6].

proglacial outwash, *n* – [GEOLOGY] STRATIFIED OUTWASH DEPOSITED in front of or just beyond the outer limits of a GLACIER. *Also see outwash and stratified drift.*

projection, *n* – [GEOGRAPHY] a DIAGRAM or representation of three-dimesional space relations produced by passing lines from various points to their intersection with a plane[4].

prokaryote, *n* – [BIOLOGY] a group of organisms that lack a cell nucleus (= karyon), or any other membrane-bound organelles. They differ from the EUKARYOTES, which have a cell nucleus.

promontory, *n* – [GEOGRAPHY] a point of high land jutting out into the *sea*. *See cape or point.*

promulgation, *n* – [LAW] the act of putting a LAW into action or force.

proof of service, *n* – [LAW] a COURT paper filed by a process server as evidence that he or she served the witness or party to the lawsuit with the court papers he or she was instructed to serve.

propane, *n* – [PETROLEUM CHEMISTRY] an inflammable gaseous HYDROCARBON with the formula C_3H_8 of the methane series. It occurs naturally in crude petroleum and natural gas. It is also produced by cracking and is used primarily as a fuel and in the making of chemicals[4].

property, *n* – [LAW] *1*. something owned or possessed; a piece of real estate. *2*. the exclusive right to possess, enjoy, and dispose of a thing. *3*. something to which a person or business has a legal title.

property, *n* – [PHYSICS] a characteristic that distinguishes one SUBSTANCE from another.

property condition assessment (PCA), *n* – [ENVIRONMENTAL INVESTIGATION] the process by which a person or entity observes a property, interviews sources, and reviews available documentation for the purpose of developing an opinion and preparing a PCR of a commercial real estate's current physical condition. At the option of the user, a PCA may include a higher level of inquiry and due diligence than the baseline scope described within this guide or, at the user's option, it may include a lower level of inquiry or due diligence than the baseline scope described in this guide. Such deviations from this guide's scope should be disclosed in the PCR's executive summary.

proportional, *adj* – [MATHEMATICS] corresponding in size, degree, or intensity; having the same or a constant ratio.

prospective purchaser, *n* – [ENVIRONMENTAL INVESTIGATION] any person contemplating acquiring contaminated property who: 1. is not in any way responsible under any statute, federal or state, or common law for any hazardous substances, hazardous wastes, or other pollutants discharged at a contaminated site, and *2*. is not a corporate successor to, or capitalized by, any person who is in any way responsible under any statute, federal or state, or common law for any hazardous substances, hazardous wastes, or other pollutants discharged at a contaminated site. *Also see innocent purchaser defense*.

prospective purchaser agreement (PPA), *n* – [LAW] legally-binding agreements between a regulating authority and prospective purchasers of contaminated property. The purpose of a PPA is to facilitate cleanup and productive reuse of contaminated property. Often, existing contamination is an obstacle to property use and/or transfer. These PPAs provide certainty to purchasers as to the extent of their liability for existing contamination and facilitate the cleanup and reuse of contaminated property.

protein, *n* – [BIOLOGY] organic compounds made of AMINO ACIDS arranged in a linear chain and folded

into a globular form. Proteins are essential parts of ORGANISMS and participate in virtually every process within cells. Many proteins are ENZYMES that catalyze biochemical reactions and are vital to METABOLISM.

protium, *n* – [CHEMISTRY] the most common ISOTOPE of the ELEMENT HYDROGEN; that has one PROTON and no NEUTRONS. *Also see deuterium and tritium.*

protocol, *n* – [ENVIRONMENTAL INVESTIGATION] a detailed plan of a SCIENTIFIC or medical experiment, TREATMENT, or PROCEDURE. *Also see process and procedure*.

proton, *n* – [CHEMISTRY] elementary PARTICLE that is STABLE, bears a positive CHARGE equal in MAGNITUDE to that of the ELECTRON and has a MASS of 1.67×10^{-27} kilogram which is 1,836 times that of an electron[17]. *Also see electron, neutron and nucleus.*

provenance, *n* – [GEOLOGY] for SEDIMENT, the source area or source BEDROCK or source sediment[4].

proximal, *adj* – [GEOLOGY] referring to a SEDIMENTARY DEPOSIT composed of coarse-grained CLASTICS and formed near the source[54].

pruning, *n* – [DENDROLOGY] the cutting away from a tree of its superfluous growth, so as to improve its development[12].

pseudo- -- a prefix meaning false or spurious.

public, *n* – [LAW] of, relating to, or affecting all the people or the whole area of a nation or state; of or relating to a government; of, relating to, or being in the service of the community or nation.

public comment period, *n* – [LAW] a time period for the public to review and submit comment on various documents and actions. A comment period for federal documents or actions cannot be less than 30 days and upon timely request to the lead agency, the comment period can be extended by a minimum of 30 additional days.

publicly-owned treatment works (POTW), *n* – [HYDROLOGY] facilities for the treatment of domestic SEWAGE that are owned and operated by a public body, usually a municipal government, a state, or Indian tribe.

public water system (PWS), *n* – [HYDROLOGY] any water system which provides water to at least 25 people for at least 60 days annually. There are more than 170,000 PWSs providing water from wells, rivers and other sources to about 250 million Americans. The others drink water from private wells. There are differing standards for PWSs of different sizes and types.

pulse, *n* – [PHYSICS] a single disturbance propagated as a WAVE but not exhibiting a CYCLIC PATTERN[6].

pump, *n* – [PUMPING TECHNOLOGY] a device that raises, transfers, or compresses *fluids* or that *attenuates gases* especially by *suction* or *pressure* or both.

pump-and-treat system, *n* – [REMEDIATION TECHNOLOGY] a REMEDIAL TECHNOLOGY which generally consists of pumping GROUND WATER and directing the pumped water through a treatment device. The treated effluent is either injected back into the ground, discharged into a sewer system or a surface-water body.

pumping test, *n* — [HYDROGEOLOGY] a FIELD PROCEDURE used to determine the in situ HYDRAULIC characteristics, such as TRANSMISSIVITY and STORATIVITY of a water-bearing, GEOLOGIC FORMATION. *Also see slug test.*

pure, *adj* – [CHEMISTRY] *1.* unmixed with any other matter. *2*. free from dust, dirt, or taint.

purge and trap (device), *n* – [CHEMISTRY] analytical technique (device) used to isolate volatile (purgeable) organics by stripping the compounds from water or soil with a stream of inert gas, trapping the compounds on an adsorbent such as a porous polymer trap, and thermally desorbing the trapped compounds into the gas chromatographic column.

push moraine, *n* – [GEOLOGY] LANDFORMS produced by the bulldozing effect of an ICE-SHEET advancing across the glacial DRIFT from an earlier GLACIATION[6]. *Also see recessional moraine and terminal moraine.*

putrefaction, *n* — [BIOLOGY] the biological DECOMPOSITION of organic matter by BACTERIA, FUNGI, and oxidation, resulting in the formation of foul-smelling products, typically of SWAMPS, BOGS, and other areas of persistent moisture; a rotting. A biological process most closely associated with ANAEROBIC conditions.

pygas, *n* – [PETROLEUM CHEMISTRY] pyrolysis GASOLINE. Pygas is a NAPHTHA-range product with a high AROMATICS content used either for GASOLINE BLENDING or as a FEEDSTOCK for a benzene/toluene/xylene (BTX) extraction unit. Pyrolysis gasoline is produced in an ethylene plant that processes NAPHTHA, butane or gasoil.

pyridine, *n* – [PETROLEUM CHEMISTRY] a HETEROCYCLIC organic compound with the chemical formula C_5H_5N. It is structurally related to BENZENE, with one CH group replaced by a NITROGEN ATOM. Normally derived from COAL TAR.

pyrite, *n* – [MINERALOGY] MINERAL with the formula FeS_2. The presence of pyrite in SEDIMENTARY ROCKS is often the cause of ACID DRAINAGE associated with MINES. *Also see acid mine drainage.*

pyroclastic, *n* -- [GEOLOGY] being or pertaining to ROCK fragments formed in a VOLCANIC eruption. *Also see extrusive rock, lava, tuff and volcano.*

pyroclastic flow, *n* – [GEOLOGY] flows of fast-moving currents of hot gas and rock (collectively known as TEPHRA), which travel from erupting volcanoes at speeds generally as much as 700 kilometres per hour (450 miles per hour). Gases within these flows can reach temperatures of about 1,000 °C (1,830 °F). These flows normally hug the ground, travel downhill, and/or spread laterally under gravity. Speeds depend on the gas-rock density, the volcanic output rate, and the gradient of the slope.

pyrogenic, *adj* – [CHEMISTRY] COMPOUNDS derived from the COMBUSTION of HYDROCARBONS, such as POLYCYCLIC AROMATIC HYDROCARBONS (PAHs). *Also see petrogenic.*

pyrolysis, *n* – [BIOLOGY] THERMAL DECOMPOSITION of ORGANIC MATERIAL in an OXYGEN deficient ENVIRONMENT.

pyroxene, *n* – [MINERALOGY] a type of rock-forming silicate mineral found in many igneous and metamorphic rocks. They consist of single chains of silica tetrahedra and crystallize in the monoclinic and orthorhombic systems. Pyroxenes have the general formula $XY(Si,Al)_2O_6$ (where X is Ca, Na, Fe^{2+} and Mg and more rarely Zn, Mn and Li, whereas Y is smaller ions including Cr, Al, Fe^{3+}, Mg, Mn, Sc, Ti, V and even Fe^{2+}).

Pythagorean Theorem, *n* – [MATHEMATICS] states that in a right-angled triangle, the area of the square of the hypoteneuse (*h*)(the longest side) is equal to the sum of the areas of the squares drawn on the other two sides (*a* and b) where,

$$h^2 = a^2 + b^2$$

Qq

qaid, *n* – [GEOLOGY] a DESERT DUNE massif in which the summits rise high above the general level of the dunes to form irregularly shaped conical hills, their steep sides being dimpled with hollows and TERRACES[6]. *Also see barchan, desert and dune.*

qanat, *n* – [HYDROGEOLOGY] *from Farsi,* subsurface gallery for water supply starting from below the WATER TABLE and sloping downwards to the ground surface with a gradient flatter than both the water table and the ground surface.

> DISCUSSION -- Qanats are commonly found in fairly arid climates, such as Iran.

quadrangle, *n* – [GEOGRAPHY] the term used for topographic maps issued by the U. S. Geological Survey. The maps come in 7.5-minute and 15-minute versions, referring to the length of latitude for each map. *Also see USGS 7.5 Minute Topographic Map.*

quadrant, *n* – [MATHEMATICS] a quarter of a circle, such as an arc of 90^{o}.

quadrat, *n* – [ECOLOGY] a rectangular plot of land used for ecological or population studies.

quadratic, *n* – [MATHEMATICS] involving terms of the second degree at most.

quadratic equation, *n* – [MATHEMATICS] a polynomial equation of second degree, that is, an equation containing as its highest power the square of a variable, such as x^2. The general formula of such an equation is:

$$ax^2 + bx + c = 0$$

Some quadratic equations can be solved by factorization, or values of x can be found by using the formula for the general solution:

$$x = [-b \pm \sqrt{(b^2-4ac)}]/2a$$

quadrennial, *adj* [LOGIC] *1*. consisting of or lasting for four years. *2*. occurring or being done every four years.

quadrillion, *n* – [MATHEMATICS] a thousand trillion or 1×10^{15}.

quagmire—*See quaking bog.*

quaking bog, *n* – [HYDROLOGY] a PEAT BOG that is either floating or is growing over water-saturated ground, so that it shakes or trembles when walked on. QUAGMIRE is sometimes used as a synonym. *Also see bog, fen, peat, swamp and wetland.*

qualitative, *adj* — [LOGIC] pertaining to a descriptive MEASUREMENT, such as *(1)* TASTE or *(2)* presence/absence of a CHARACTERISTIC or COMPONENT. *Also see quantitative.*

quality, *n* – [LOGIC] a distinctive attribute or faculty; CHARACTERISTIC trait. *Also see characteristic and trait.*

quality assurance (QA), *n* — [ENVIRONMENTAL INVESTIGATION] an integrated system of management activities involving planning, QUALITY CONTROL, quality assessment, reporting, and quality improvement to ensure that a PROCESS or service (for example, ENVIRONMENTAL SAMPLING DATA) meets defined standards of quality with a stated level of CONFIDENCE.

quality assurance project plan (QAPP), *n* – [ENVIRONMENTAL INVESTIGATION] a document which presents in specific terms the policies, organization, objectives, functional activities and specific quality assurance/quality control activities designed to achieve the data quality goals or objectives of a specific project or operation.

quality control (QC), *n* — [ENVIRONMENTAL INVESTIGATION] the overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users. The aim is to provide quality that is satisfactory, adequate, dependable, and economical. Normally regarding sampling procedure or laboratory analytical procedures.

> DISCUSSION – It is the quality assurance (QA) and quality control (QC) of a forensic investigation that often comes under scrutiny during litigation. If the laboratory data can be deemed inadmissible because of QA and QC issues, litigation and even trials can often be settled or simply ended.

quantification, *n* — [MATHEMATICS] the process of performing a quantitative determination.

quantitation limit, *n* — [CHEMISTRY] the lowest result that would be considered quantitative, normally regarding the analytical results from a LABORATORY. *Also see detection limit.*

quantitative, *adj* – [MATHEMATICS] concerned with quantity, measured or measurable by quantity. *Also see qualitative.*

quantitative analysis, n – [CHEMISTRY] chemical analysis designed to determine the amounts or proportions of the components of a substance.

quantum, *n* – [PHYSICS] the tiniest amount of physical ENERGY that can exist independently, especially a finite amount of ELECTROMAGNETIC RADIATION. Plural form is "quanta".

quantum chemodynamics, *n* – [PHYSICS] a theory of fundamental particles based on the assumption that quarks are distinguished by differences in color and are held together (as in HADRONS) by an exchange of GLUONS.

quantum electrodynamics, *n* – [PHYSICS] quantum mechanics applied to electrical interactions (as between nuclear particles).

quantum (wave) mechanics, *n* – [PHYSICS] a branch of PHYSICS that describes the WAVE properties of subatomic particles mathematically. It is a branch of physics providing a mathematical description of much of the dual particle-like and wave-like behavior and interactions of energy and matter. It departs from classical mechanics primarily at the atomic and subatomic scales, the so-called quantum realm. *Also known as quantum theory.*

quantum number, *n* – [PHYSICS] the basic unit of ELECTROMAGNETIC ENERGY. This characterizes the WAVE properties of ELECTRONS, as distinct from their particulate properties. This determines the principal energy level of an ELECTRON.

quantum theory—*See quantum mechanics.*

quarantine, *n* – [TOXICOLOGY] a state of enforced isolation.

quark, *n* – [PHYSICS] an elementary particle and a fundamental constituent of matter. Quarks combine to form composite particles called hadrons, the most stable of which are PROTONS and NEUTRONS, the components of atomic nuclei. *Also antiquark, baryon, hadron and meson.*

quarry, *n* — [MINING] an excavation in the surface of the earth from which stone is obtained for crushed rock or building stone[4].

quart, *n* – [PHYSICS] measure of VOLUME in the English System equal to 2 pints and 0.25 gallon. *Also see gallon, liter and pint.*

quartz, *n* – [MINERALOGY] a highly-RESISTANT MINERAL with a formula of SiO_2[4]. Quartz is a common mineral in IGNEOUS ROCKS, such as GRANITES, and SEDIMENTARY ROCKS, such as SANDSTONE. *Also see chert and silica.*

quartzite, *n* – [GEOLOGY] a METAMORPHIC ROCK consisting predominantly of QUARTZ (SiO_2). A highly resistant rock normally found capping the top of mountains, especially in the Appalachian region of the USA.

> DISCUSSION – The very-resistant Tuscarora Quartzite caps many of the mountains found in Pennsylvania's Valley and Ridge Physiographic Province, whereas much less resistant limestone is found in the valleys. It is this juxtaposition of resistant and less-resistant geologic formations that allows these mountains to be formed.

Also see arkose, chert, geomorphology, greywacke, quartz, sandstone and silica.

quash, *v* – [LAW] to overthrow or annul. To nullify, void or declare invalid as in 'quash a subpeona.'

quasi-, *adj* [PREFIX] meaning approximately or as it were, or resembling to some degree.

quatern, *n* – [MATHEMATICS] a quarter of a hundred.

Quaternary Period, *n* – [GEOLOGY] GEOLOGIC PERIOD that occurred roughly 1.6 million years ago to today. During much of this period continental GLACIERS in the Northern Hemisphere covered large regions of land surface in the high and mid-latitudes. Homo sapiens appear about 200,000 years BP (before present) and become the first species to alter the Earth's environment on a large-scale[4].

> DISCUSSION – Much of the northern USA and pretty much all of Canada are covered by Quaternary-age glacial drift. It is from within this drift that large quantities of potable water are obtained, for both privste and public supplies. Furthermore, many of the forensic investigations, dealing with problems such as gasoline or oil spills, take place in these Quaternary-age sediments.

quay, *n* – [GEOGRAPHY] *from French,* a structure on the shore of a harbour where ships may dock to load and unload cargo or passengers. *Also known as a wharf.*

quebrada, *n* – [GEOLOGY] *from Spanish*, a term used in the southwestern USA for a deep RAVINE or GORGE, especially one that is usually dry, but is filled by a torrent during a rain event[4]. *Spanish word for "broken".*

quick clay, *n* – [AGRONOMY] water-saturated clay which cannot stop heavy objects from sinking into its surface.

quicksand, *n* – [HYDROGEOLOGY] saturated SANDY DEPOSITS such as sand, sandy LOAM, etc. which under certain conditions are BUOYANT and are able to FLOW. Normally, there is an upward, HYDRAULIC GRADIENT causing the sand to become buoyant.

> DISCUSSION – According to the peer-reviewed scientific journal *Ground Water,* there has never been a reported death arising from falling into quicksand. This myth is obviously "Hollywood"-derived.

quid pro quo, *n* – [LAW] something given or received for something else.

quinidine, *n* – [CHEMISTRY] an alkaloid ($C_{20}H_{24}N_2O_2$) that is stereoisometric with QUININE and is used in the form of its sulfate as a medicine.

quinine, *n* – [CHEMISTRY] a bitter crystalline alkaloid $C_{20}H_{24}N_2O_2$ from cinchona bark used in medicine.

quinoline, *n* – [CHEMISTRY] also known as 1-azanaphthalene, 1-benzazine, or benzo[*b*]pyridine, is a heterocyclic aromatic organic compound. It has the formula C_9H_7N and is a colourless hygroscopic liquid with a strong odour. As it ages, if exposed to light, the liquid tends to become yellow and later brown. It is only slightly soluble in water but dissolves readily in many organic solvents. Quinoline is an intermediate in metallurgical processes and in dye, polymer, and agrochemical production. It is also a preservative, disinfectant, and solvent.

quinone, *n* – [CHEMISTRY] either of two isomeric cyclic crystalline compounds ($C_6H_4O_2$) that are derivatives of benzene.

quote, *n* – [LOGIC] *1*. to speak or write a passage from an other usually acknowledgment. *2*. To state the price or prepare a bid.

quotient, *n* – [MATHEMATICS] the result of a division.

Rr

rad, *n* – [PHYSICS] a unit of absorbed dose of ionizing radiation equal to the energy of 100 ergs per gram of irradiated material.

radial dike, *n* – [GEOLOGY] a DIKE of IGNEOUS ROCK which radiates from a VOLCANIC VENT, following fracture lines due to the stress imposed by crustal swelling prior to an eruption[6].

radial fault, *n* – [GEOLOGY] one of a group of FAULTS that radiate from a central point[4].

radian, *n* – [MATHEMATICS] a unit of angular measurement such that there are 2 π radians in a complete circle. One radian = 180/π degrees. One radian is approximately 57.3°.

radiant energy, *n* – [PHYSICS] the ENERGY originally transferred from the Sun. It may subsequently be reradiated[6].

radiant heat, *n* – [PHYSICS] heat transmitted by radiation as contrasted with that transmitted by conduction or convection.

radiation, *n* – [PHYSICS] the emission of atomic particles or rays from the NUCLEUS of an ATOM[4]. *Also see radioactivity.*

radical, *n* – [CHEMISTRY] an ELEMENT or ATOM or group of these normally forming part of a COMPOUND and remaining unaltered during the compound's ordinary chemical changes.

radical sign, *n* – [MATHEMATICS] the sign: √, placed before an expressionto denote the square root is to be extracted. To denote a cube root, the sign $\sqrt[3]{}$ would be used.

radicand, *n* – [MATHEMATICS] the QUANTITY under the RADICAL SIGN.

radioactive daughter, *n* — [ISOTOPES] the direct RADIOACTIVE DECAY product of a RADIONUCLIDE.

radioactive decay, *n* – [PHYSICS] the gradual breakdown of an ELEMENT by the emission of charged particles from the NUCLEI of its ATOMS, leading to the eventual formation of STABLE ISOTOPES. By measuring the rates of radioactive decay in certain materials, it is possible to estimate their age. *Also see age dating, carbon-14 dating, half-life and radiometric age.*

radioactive decay series, *n* – [ISOTOPES] the series of RADIONUCLIDES successively formed by the radioactive decay of a long-lived parent radionuclide ending with the formation of a STABLE ISOTOPE of a product element. *Also see disintegration*.

radioactivity, *n* — [CHEMISTRY] spontaneous NUCLEAR DISINTEGRATION with emission of corpuscular or ELECTROMAGNETIC RADIATION, or both during RADIOACTIVE DECAY[4].

radioactivity half-life, *n* — [ISOTOPES] the unvarying characteristic period of TIME in which one half of the RADIOACTIVE ATOMS of a given RADIONUCLIDE will decay.

radiocarbon, *n* – [ISOTOPES] the RADIOACTIVE ISOTOPE of CARBON with a mass of 14 (6 protons, 6 electrons and 8 neutrons).

radiocarbon dating–*See carbon-14 (^{14}C) dating.*

radiogenic isotope, *n* – [ISOTOPES] an ISOTOPE that was produced by RADIOACTIVE DECAY, but which by itself may or may not be radioactive[4]. *Also see radioisotope.*

radioisotopes, *n* — [ISOTOPES] RADIONUCLIDES having the same ATOMIC NUMBER. *Also see radionuclide.*

radiolarian, *n* – [GEOLOGY] the skeleton of an ORGANISM formed of SILICA.

radiolarite, *n* – [GEOLOGY[a ROCK composed of RADIOLARIANS.

radiometric, *adj* – [CHEMISTRY] using radiation for detection.

radiometric age, *n* – [AGE DATING] the AGE given to a substance based on rates of radioactive decay.

radionuclide, *n* -- [ISOTOPES] a specific ISOTOPE of an ELEMENT that is radioactive (will undergo a form of radioactive decay, either alpha, beta or gamma). Individual radionuclides are distinguished by their ATOMIC WEIGHT and ATOMIC NUMBER.

radium (Ra), *n* – [CHEMISTRY] a RADIOACTIVE METALLIC ELEMENT with ATOMIC NUMBER 88. As found in nature, the most common ISOTOPE has a mass number of 226. It occurs in minute quantities associated with uranium in PITCHBLENDE, camotite, and other minerals.

radius, *n* – [MATHEMATICS] a straight line from the center to the CIRCUMFERENCE of a CIRCLE or a SPHERE. *Also see circumference and diameter.*

radius of influence of a well, *n* — [HYDROGEOLOGY] distance from the center of the WELL to the closest point at which the PIEZOMETRIC SURFACE is not lowered when pumping has produced the maximum steady rate of flow.

> DISCUSSION – Radius of influence does not necessarily mean that water within this zone will reach the pumping well. This area is known as the capture zone.

radon (Rn), *n* – [CHEMISTRY] a naturally-occurring RADIOACTIVE GAS that is odorless and tasteless. It is formed from the radioactive decay of URANIUM. Uranium is found in small amounts in most igneous rocks and soil derived from igneous rock. The uranium slowly breaks down or radioactively decays

to other products such as RADIUM, which then breaks down to radon.

> DISCUSSION -- Radon also undergoes radioactive decay. It divides into two parts: one part is called radiation, and the other part is called a daughter product. The DAUGHTER PRODUCT, like radon, is not stable, and it also divides into radiation and another daughter. The dividing of daughters continues until a stable, non-radioactive daughter is formed. During the decay process, alpha, beta, and gamma radiation are released. Alpha particles can travel only a short distance and cannot travel through skin. Beta particles can penetrate skin, but they cannot go all the way through the body. Gamma radiation can penetrate all the way through the body. Radon can be ingested through inhalation and consumption of water containing dissolved radon.

rain, *n* – [METEOROLOGY] PRECIPITATION of LIQUID WATER, either in the form of drops of more than 0.5 mm diameter, or of smaller, widely scattered drops.

rain gauge—*See hyetometer.*

rain shadow, *n* – [METEOROLOGY] an area that has a relatively light average rainfall because of its situation on the lee side of a range of mountains or hills where it is sheltered from the prevailing rain-bearing winds. On the windward side, the rainfall is heavy, owing to the forced ascent of moisture-laden air; as the air descends on the lee side, it is warmed and dried, reducing the rainfall[63].

rainwash, *n* – [HYDROLOGY] a thin sheet of water flowing evenly downslope, quickly concentrated by converging slopes into the shortest and steepest routes downward. This is the first step in the formation of a stream[63].

raised beach, *n* – [GEOLOGY] an emergent coastal LANDFORM. Raised beaches and marine terraces are beaches or wave-cut platforms raised above the shore line by a relative fall in the sea level.

raised bog, *n* – [HYDROLOGY] a variety of BOG, corresponding approximately to a MOORLAND, but is much thinner and occurs in wetter, cloudier climatic zones. *Also see bog, fen, marsh, moorland, swamp and wetland.*

random, *adj* – [STATISTICS] *1.* made, done, etc. without method or conscious choice. *2.* with equal chances for each item.

random error, *n* — [STATISTICS] *1.* the chance variation encountered in all measurement work, characterized by the random occurrence of deviations from the mean value. *2.* an error that affects each member of a set of data (measurements) in a different manner.

randomness, *n* – [STATISTICS] a state in which there is an equal chance of any number of events occurring or any variable being chosen[6].

random sample, *n* – [STATISTICS] a set of items that have been drawn from a POPULATION in such a way that each time an item was selected, every item in the population had an equal opportunity to appear in the sample. In practical terms, it is not so easy to draw a random sample. First, the only factor operating when a given item is selected, must be chance.

random sampling error, *n* – [STATISTICS] variation in an estimated quantity caused by the random selection of units for measurement.

random-walk model, -- [MATHEMATICS] a type of simulation that represents the RANDOMNESS in the spatial progression of a physical process. The simulation is based on square paper with each square being referred in sequence to a table of random numbers and each compass direction also being allotted a number. Thus, the direction of flow from square to square can be generated entirely at random, or it can be biased by allotting more random numbers to one direction than to the others[6].

range, *n* – [STATISTICS] one of several INDICES of variability that statisticians use to characterize the dispersion among the measures in a given POPULATION. The range is the distance between the highest and lowest score. Numerically, the range equals the highest score minus the lowest score.

ranking, *n* – [STATISTICS] the METHOD by which any DATA are arranged in order according to a given CRITERION or set of criteria to produce an ordinal scale[6].

Raoult's Law, *n* – [CHEMISTRY] a law used to estimate the EFFECTIVE SOLUBILITY of individual components from within a mixture. It was developed by François-Marie Raoult in 1882. Once the components in a solution have reached EQUILIBRIUM, the total vapor pressure p of the solution is:

$$p = p^*_A x_A + p^*_B x_B + \ldots..$$

and the individual vapor pressure for each component is

$$p_i = p^*_i x_i$$

where,

p_i is the partial pressure of the component i in mixture;

p^*_i is the vapor pressure of the pure component *i,* and

x_i is the mole fraction of the component *i* in solution (in mixture).

Consequently, as the number of components in a solution increases, the individual vapor pressures decrease, since the mole fraction of each component decreases with each additional component.

rapid sampling tools, *n* – [ENVIRONMENTAL INVESTIGATION] equipment and techniques that allow personnel to collect samples from different media, in a relatively short time period, for on-site chemical analysis and hydrogeologic evaluation within the same mobilization.

rapids, *n* – [HYDROLOGY] areas of fast flowing water in a RIVER CHANNEL.

rare earths, *n* – [CHEMISTRY] an expression given to those metallic oxides with ATOMIC NUMBERS between 57 and 71. They are chemically similar and therefore difficult to separate[6]. The rare earth elements (REEs) include: lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb), lutetium (Lu) and yttrium (Y).

> DISCUSSION - The uses of REEs range from mundane (lighter flints, glass polishing) to high-technology (phosphors, lasers, magnets, batteries, magnetic refrigeration) to futuristic (high-temperature superconductivity, safe storage and transport of hydrogen for a post-hydrocarbon economy). As of 2010, most REE sources are in China.

rate, *n* – [MATHEMATICS] a fixed RATIO between two things. *Also see ratio.*

rate-controlling step, *n* [CHEMISTRY] the elementary reaction having the largest control factor exerts the strongest influence on the rate. A step having a control factor much larger than any other step is said to be rate-controlling[62]. *Also known as rate-limiting step or rate-determining step.*

ratio, *n* – [MATHEMATICS] measure of the relative size of two quantities or of two measurements (in similar units) expressed as a proportion.

rational, *n* – [LOGIC] *1*. of, or based on reasoning or reason. *2*. sane, sensible, moderate, not foolish, absurd or extreme.

rational number, *n* -- [MATHEMATICS] a NUMBER that is the ratio of two INTEGERS. All other real numbers are said to be irrational.

ravine, *n* – [GEOGRAPHY] a deep, narrow GORGE or CLEFT[6].

raw material, *n* – [INDUSTRIAL TECHNOLOGY] that from which the process of manufacture makes products.

raw water, *n* – [HYDROLOGY] untreated GROUND WATER or SURFACE WATER.

ray, *n* – [DENDROLOGY] a ribbon-like aggregate of storage and conducting cells extending radially in the XYLEM and PHLOEM[12].

Rayleigh Equation, *n* – [ISOTOPES] an equation relating a reactant concentration (C) and isotope ratio (R) to their initial values (C_1 and R_1) where,

$$(R/R_1) = (C/C_1)^{1/\alpha - 1}$$

and α is the enrichment factor. These calculations are often used to assess the magnitude of biodegradation in ground water.

> DISCUSSION – Compound specific stable isotope analyses, in particular of carbon and hydrogen, are often used to assess natural attenuation projects. These data can also be used to differentiate contaminant plumes in ground water. The Rayleigh Equation can help to assess the enrichment of the heavier isotopes, which should occur if attenuation is happening.

R_b method, *n* – [AGE DATING] the used of dissolved BTEX CONCENTRATIONS in GROUND WATER to estimate the AGE of the release where,

$$R_b = (B+T)/(E+X)$$

Near the source and immediately after the release, R_b is between 1.5 and 6. This value range normally represents a release of 5 years or less. R_b values of less than 0.5 normally represent a release of 10 years or greater.

> DISCUSSION – One should approach this method with great care because the BTEX concentrations in the original spilled gasoline can be highly variable. Furthermore, weathering of the BTEX can also be quite variable within different portions of the plume.

RCRA—*See Resource Conservation and Recovery Act.*

RCRA generators, *n* — [ENVIRONMENTAL REGULATION] those persons or entities that generate HAZARDOUS WASTES, as defined and regulated by RCRA.

RCRA generators list, *n* — [ENVIRONMENTAL REGULATION] list kept by EPA of those persons or entities that generate HAZARDOUS WASTES, as defined and regulated by RCRA.

RCRA TSD facilities, *n* — [ENVIRONMENTAL REGULATION] those facilities on which TREATMENT, STORAGE, or DISPOSAL, or a combination thereof, of HAZARDOUS WASTES takes place, as defined and regulated by RCRA.

reach, *n* – [HYDROLOGY] an expanse of a STREAM CHANNEL.

reaction, *n* – [CHEMISTRY] PROCESS by which one or more SUBSTANCES may be transformed into one or more new substances. ENERGY is released or is absorbed, but no loss in total MOLECULAR WEIGHT occurs. When, for example, water is decomposed, its MOLECULES, each of which consists of one ATOM of oxygen and two of hydrogen, are broken down; the hydrogen atoms then combine in pairs to form hydrogen molecules and the oxygen atoms to form oxygen molecules. In a chemical reaction, substances lose their characteristic properties. Water, for example, a liquid which neither burns nor supports COMBUSTION, is decomposed to yield flammable hydrogen and combustion-supporting oxygen. In some reactions heat is given off (exothermic reactions), and in others heat is absorbed (endothermic reactions).

reaction wood, *n* – [DENDROLOGY] anaomolous XYLEM usually consisting of higher density cells. In HARDWOODS, it appears to most often on the tension side of the STEM or branches (TENSION WOOD), while in SOFTWOODS, most often on the compression side (COMPRESSION WOOD)[12].

reactivity, *n* – [CHEMISTRY] refers to those HAZARDOUS WASTES that are normally unstable and readily undergo violent CHEMICAL change but do not explode.

reality, *n* – [SCIENTIFIC METHOD] what is actually existing and occurring or underlies appearances.

real number, *n* – [MATHEMATICS] all rational numbers (integers, or whole numbers and fractions) and irrational numbers (those not expressible as fractions). *Also see irrational numbers.*

reason, reasoning, *n* – [LOGIC] *1*. the intellectual faculty by which conclusions are drawn from premises. *2*. the intellectual ability to apprehend the truth cognitively, either immediately in intuition, or by means of a process of inference. *Also see deduction, induction and logic.*

reasonable doubt, *n* – [LAW] the level of certainty a juror or judge must have to find a defendant guilty of a crime. A real doubt, based upon reason and common sense after careful and impartial consideration of all the evidence, or lack of evidence, in a case. Proof beyond a reasonable doubt, therefore, is proof of such a convincing character that you would be willing to rely and act upon it without hesitation in the most important of your own affairs. However, it does not mean an absolute certainty.

rebutting evidence, *n* – [LAW] that which is given by a party in the cause to explain, repel, counteract or disprove facts given in evidence on the other side. The term rebutting evidence is more particularly applied to that evidence given by the plaintiff, to explain or repel the evidence given by the defendant. It is a general rule that anything may be given as rebutting evidence which is a direct reply to that produced on the other side and the proof of circumstances may be offered to rebut the most positive testimony. But there are several rules which exclude all rebutting evidence. A party cannot impeach the validity of a promissory note which he has made or endorsed; nor impeach his own witness, though he may disprove, by other witnesses, matters to which he has testified, nor can be rebut or contradict what a witness has sworn to, which is immaterial to the issue. *Also see circumstantial evidence and direct evidence.*

recalcitrant, *adj* – [CHEMISTRY] synonymous with unreactive, nondegradable; refractory.

receiving waters, *n* – [HYDROLOGY] the bodies of water that receive effluent waste water from treatment plants.

receptor, *n* – [ECOLOGY] any human or other ecological component which is or may be affected by a contaminant from a contaminated site.

receptor evaluation, *n* – [ENVIRONMENTAL INVESTIGATION] an evaluation of surface water bodies and wells, basements, utility conduits and other structures that may be impacted from a vapor hazard or as a result of ground-water contamination.

recession, *n* -- [HYDROLOGY] the decline in RIVER flow after a storm event has passed. The 'recession limb' can be seen on a flood hydrograph.

recessional moraine, *n* – [GEOLOGY] MORAINE that is created during a pause in the retreat of a GLACIER. *Also known as a stadial moraine. Also see ground moraine, lateral moraine and recessional moraine.*

recharge, *n* – [HYDROGEOLOGY] *1*. process by which WATER is added from outside to the ZONE OF SATURATION of an AQUIFER, either directly into a FORMATION, or indirectly by way of another formation. *2*. vertical volumetric flux of water across the water table.

recharge area, *n* -- [HYDROGEOLOGY] an area in which there is a downward COMPONENT of HYDRAULIC HEAD in an AQUIFER.

reciprocal, *n* – [MATHEMATICS] the reciprocal of the number x is the number $1/x$.

recirculating cooling system, *n* – [INDUSTRIAL TECHNOLOGY] in a manufacturing or processing plant, a system that reduces the temperature of used water in a cooling tower by evaporating a small percent of the recirculating stream; although the evaporated water is permanently removed from the supply,

overall water withdrawal is reduced to a small percent of what it would otherwise be[63].

reclaimed land, *n* – [GEOGRAPHY] an artificially created area of new land which is created by humans draining waterlogged estuarine muds near the coast. This provides cheap, large areas of flat land which can be used by agriculture or industry. Industries, such as petrochemicals and iron and steel works like this location for the import of raw materials from other countries.

reclamation, *n* — [REMEDIATION TECHNOLOGY] *1*. the process of land treatment that minimizes water degradation, air pollution, damage to aquatic or wildlife habitat, flooding, erosion, and other adverse effects from surface mining operations including adverse surface effects incidental to underground mines, so that mine lands are reclaimed to a usable condition which is readily adaptable for alternate land uses and creates no danger to public health or safety. The process may extend to affected land surrounding mining lands, and may require backfilling, grading, resoiling, revegetation, soil compaction, stabilization, and other measures. *2*. may also apply to other land uses and land types, for example, the reclaiming of waste, desert, marshy or submerged land for cultivation, preservation, reuse, etc.

recognized environmental condition, *n* – [ENVIRONMENTAL INVESTIGATION] the presence or likely presence of any hazardous substances or petroleum products on property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

record, *n* – [ENVIRONMENTAL INVESTIGATION] *1*. a piece of EVIDENCE or information constituting an official account of something that has occurred or been said. *2*. a DOCUMENT preserving above. *3*. an official report of the proceedings and JUDGMENT in a COURT of JUSTICE.

Record of Decision (ROD), *n* – [ENVIRONMENTAL REGULATION] a public document that explains which cleanup alternative(s) will be used at National Priorities List sites where, under CERCLA, Trust Funds pay for the cleanup.

records search, *n* – [ENVIRONMENTAL INVESTIGATION] a detailed search and review of available information and records in the possession of and made available by regulatory agencies or other involved Federal agencies, including, but not limited to, installation restoration program studies and analyses, surveys for radioactive materials, asbestos, radon, lead-based paint, electrical devices (that is, transformers) containing polychlorinated biphenyl (PCB), RCRA facility assessments and investigations to determine which, if any, hazardous substances or petroleum products may be present on the property. For the purposes of adjacent facilities, a records search includes the review of all reasonably obtainable Federal, state, and local government records for each adjacent facility where there has been a release or likely release of any hazardous substance or any petroleum product, and which is likely to cause or contribute to a release or threatened release of any hazardous substance or any petroleum product on the real property.

recoverability, *n* — [HYDROGEOLOGY] a general term for the degree to which NAPL (LNAPL or DNAPL) can be removed from the subsurface stated as a ratio of the estimated volume in the formation, the residual volume, or the free volume. The recoverability is a function of the type of technology to be used.

recovery well, *n* – [HYDROGEOLOGY] WELL used for the PUMPING of impacted GROUND WATER from within a CONTAMINANT PLUME as part of a REMEDIATION SYSTEM. *Also pump-and-treat system.*

recumbent fold, *n* – [GEOLOGY] an overturned FOLD in which the axial plane is virtually horizontal[6].

redox conditions, *n* – [CHEMISTRY] a REACTION that involves transfer of ELECTRONS from one SUBSTANCE to another. Redox reactions always involve a change in oxidation number for at least two ELEMENTS in the reactants. *Also see oxidation-reduction (redox) potential.*

redoximorphic features, *n* – [AGRONOMY] colors in the SOIL that indicate water is seasonally present at the level the features are found. One example is known as MOTTLES.

reducing, *adj* – [CHEMISTRY] an ENVIRONMENT that is depleted in ELECTRON ACCEPTORS and has a low ELECTRICAL POTENTIAL. *Also see oxidizing*.

reduction, *n* – [CHEMISTRY] CHEMICAL REACTION in which ELECTRONS are transferred to an ATOM or ION, thus decreasing its CHARGE or VALENCE.

reductive dechlorination, *n* – [REMEDIATION TECHNOLOGY] the removal of CHLORINE ATOMS from an ORGANIC COMPOUND and their replacement with HYDROGEN atoms (same as reductive dehalogenation).

reductive dehalogenation, *n* – [REMEDIATION TECHNOLOGY] a variation on BIODEGRADATION in which microbially catalyzed reactions cause the replacement of a halogen atom (such as chlorine) on an organic compound with a hydrogen atom. The reactions result in the net addition of two electrons to the organic compound. If the compound is chlorinated, the term REDUCTIVE DECHLORINATION may be used.

> DISCUSSION – An example of this process is the reductive dechlorination of tetrachloroethylene (C_2Cl_4) to trichloroethylene (C_2Cl_3H) and then to either *cis*-1,2-dichloroethylene or *trans*-1,2-dichloroethylene ($C_2Cl_2H_2$). This process occurs only under reducing conditions. The dechlorination can continue to vinyl chloride (C_2ClH_3) and ethene (C_2H_4), but then only under oxidizing conditions.

Also see oxidizing and reducing.

reef, *n* – [GEOLOGY] a ridge of rocks found in the tidal zone along a coastline. One common type of reef is the coral reef. *Also see atoll and lagoon.*

reference sample, *n* — [CHEMISTRY] a MATRIX whose ANALYTES of interest are of known or accepted CONCENTRATION or property. *Also known as reference standard.*

refined products, *n* – [PETROLEUM CHEMISTRY] materials, such as GASOLINE, FUEL OIL, KEROSENE or other chemicals, which have been refined from other natural products, such as CRUDE OIL.

refinery, *n* – [PETROLEUM TECHNOLOGY] a building, equipment or plant for refining or processing materials such as CRUDE OIL into GASOLINE and other petroleum products.

reflection, *n* – [PHYSICS] the return of a wave incident upon a surface to its original medium[4]. *Also see refraction.*

reforestation, *n* – [GEOGRAPHY] the planting of trees on land where a forest had previously stood, but had been destroyed. *Also see afforestation*.

reformate, *n* – [PETROLEUM CHEMISTRY] a high-AROMATICS / high-OCTANE product made in a reformer and used to blend AVIATION GASOLINE or motor gasoline. *Also see catalytic reforming and reforming.*

reforming, *n* – [PETROLEUM TECHNOLOGY] a REFINING process where the feed molecules are reformed (or "changed around"), converting straight-chain paraffins (*n*-alkanes) and naphthenes (*cyclo*-alkanes) into aromatics (predominantly toluene). For example, reforming cyclizes normal heptane (*n*-C_7) (RON = 0) and then abstracts hydrogen to produce toluene (RON = 120). The hydrogen by-product is almost as important as the octane number upgrade. Hydrogen is an essential ingredient for processes like HYDROCRACKING and hydrofining. Refineries often have a hydrogen deficit, which has to be made up by making hydrogen from NATURAL GAS (METHANE) or other hydrogen-rich feeds. *Also see catalytic reforming and reformate.*

reformulated gasoline (RFG), *n* -- [PETROLEUM CHEMISTRY] GASOLINE blended to burn cleaner and reduce smog-forming and TOXIC POLLUTANTS in the air. The Clean Air Act requires that RFG be used in cities with the worst smog POLLUTION to reduce harmful emissions of OZONE. The Act also specified that RFG contain OXYGEN - 2 percent by weight. MTBE (METHYL-TERT-BUTYL ETHER) and ETHANOL are the two most commonly used substances that add oxygen to gasoline. Oil companies decide which substance to use to meet the law's requirements.

reformulated gasoline attainment area, *n* – [PETROLEUM CHEMISTRY] certain areas where the US federal government requires that RFG be used. These areas are commonly locations where smog has been a problem and includes most urban zones.

refraction, *n* – [PHYSICS] the deflection of a ray of light or of an energy wave due to its passage from one medium to another of differing density, which changes its characteristics[4]. *Also see reflection*.

refractory, *n* – [GEOLOGY] a material resistant to heat[4].

refractory pollutant, *n* – [TREATMENT TECHNOLOGY] a pollutant that resists treatment.

refusal, *n* — [DRILLING TECHNOLOGY] depth at which drilling is no longer possible, usually caused by very-fine- or very-coarse-grained or dense and hard materials.

refuse, *n* – [WASTE DISPOSAL] the worthless or useless part of something. *Also see garbage, rubbish, solid waste and trash.*

regelation, *n* – [HYDROLOGY] a two-fold process involving the melting of ice under excess pressure and the refreezing of the derived meltwater upon release of that pressure[4].

regime, *n* – [HYDROLOGY] the characteristic movements of a STREAM as it attempts to remain adjusted to its CHANNEL. A stream is said to be in regime if its channel has achieved a stable form as a result of the stream's flow characteristics[6]. *Also known as regimen.*

regime, *n* – [PHYSICS] *1*. the total economy of a natural system[6]. *2*. a recurring pattern, as in the seasonal pattern of CLIMATES or the yearly fluctuations in the volume of a RIVER or a GLACIER.

region, *n* – [GEOGRAPHY] any area of the EARTH'S SURFACE with either natural or human-made characteristics which mark it off as being different from the areas around it.

regional metamorphism, *n* – [GEOLOGY] large scale metamorphic modification of existing rock through the heat and pressure of plutons created at tectonic zones of subduction.

regolith, *n* – [GEOLOGY] loose layer of rocky material overlying BEDROCK. *Also see regosol soil.*

regosol soil, *n* – [AGRONOMY] any young underdeveloped soil that lacks identifying soil horizons. *Also see regolith.*

regression, *n* – [GEOLOGY] retreat of the sea from land areas; or any change that converts off-shore, deep-water conditions to near-shore, shallow-water conditions, or that moves the BOUNDARY of between marine and non-marine deposition[4]. *Also see transgression.*

regression analysis, *n* -- [STATISTICS] STATISTICAL method developed to investigate the interdependence or relationship between two or more measurable variates. The most common form of regression analysis is linear regression. *Also see correlation coefficient.*

regression line, *n* – [STATISTICS] a 'best fit' line through a series of points on a graph showing the form of the relationship between two sets of data.

regulation, *n* – [LAW] a RULE or ORDER prescribed for management or GOVERNMENT; a regulating principle; a PRECEPT.

regulatory, *adj* – [LAW] *1*. to govern or direct according to rule *2*. to bring under the control of law or constituted authority. *3*. to make regulations for or concerning the industries of a country.

regulatory agency, *n* – [ENVIRONMENTAL REGULATION] any federal, state or local officer responsible for overseeing and enforcing environmental programs such as underground-tank removals, site characterization, waste management and minimization, and corrective actions. An example in the USA would be the Environmental Protection Agency (EPA).

rejuvenation, *n* -- [HYDROLOGY] a fall in sea level or a rise of the land which enables a river to revive erosion.

relative age, *n* – [GEOLOGY] refers to the dating of rocks or other materials merely in comparative rather than absolute terms, such as an ABSOLUTE AGE[4].

relative date, *n* – [AGE DATING] a date which can be ordered in time but for which no absolute age can be determined. *Also known as a floating chronology*.

relative density, *n* – [PETROLEUM TECHNOLOGY] a unit of measure for petroleum products also known as SPECIFIC GRAVITY. It is the ratio of the density of material at a selected temperature to the density of a reference material at a selected temperature. For the relative density of petroleum crudes and products in the United States, the reference material is water, and both temperatures are 60°F.

$$RD\ (60/60°F) = \rho_{sample(60F)}/\rho_{water(60F)}$$

Also see API gravity.

relative humidity, *n* – [METEOROLOGY] the ratio of the amount of water vapor present in the portion of the atmosphere under consideration to the quantity that would be there if the air were saturated at the given temperature.

relative permeability, *n* – [HYDROGEOLOGY] in a system containing more than one fluid, the facility with which each fluid moves in response to its own field of fluid potential is lessened because each fluid competes for the limited number of available flow paths[14]. *Also see absolute permeability, effective permeability, hydraulic conductivity, intrinsic permeability and permeability.*

release, *n* — [ENVIRONMENTAL INVESTIGATION] *1*. any spilling, leaking, pumping, emitting, emptying, discharging, injecting, escaping, leaching, dumping, and disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any hazardous chemical, extremely hazardous substance, or CERCLA hazardous substance. *Also known as a discharge or a leak.*

relevancy, *n* – [LAW] whether or not EVIDENCE is logically related to matters under dispute.

relic, *n* -- [GEOLOGY] a LANDFORM that has survived decay or disintegration (such as an erosion remnant) or that has been left behind after the disappearance of the greater part of its substance (such as a remnant island).

relict, *adj* — [GEOLOGY] *1*. said of a topographic feature that remains after other parts have disappeared[4]. *2*. being a remnant of something that no longer exists.

relief, *n* – [GEOLOGY] the range of topographic elevation within a specific area[4]. *Also see altitude and elevation.*

relief, *n* – [LAW] that assistance which a court of chancery will lend to a party to annul a contract tinctured with fraud, or where there has been a mistake or accident; courts of equity grant relief to all parties in cases where they have rights, and modify and fashion that relief according to circumstances.

relief map, *n* – [GEOGRAPHY] a map that depicts the surface configuration or relief of an area by any method such as CONTOUR lines or HACHURES, hill shading, or layer tinting[4].

remedial actions, *n* — [REMEDIATION TECHNOLOGY] those actions consistent with a permanent remedy taken instead of, or in addition to, removal action in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to the present or future public health or welfare or the environment.

remedial action selection, *n* – [REMEDIATION TECHNOLOGY] the process of selecting the most appropriate remedy for a site or area of concern that will ensure protection of the public health, and safety and the environment, based upon careful consideration of a variety of factors, including, without limitation, future site use, surrounding land uses, remediation goals and objectives, cost, implementability, reliability and effectiveness.

remedial action workplan (RAW), *n* – [REMEDIATION TECHNOLOGY] a plan for the REMEDIAL ACTION to be undertaken at a contaminated site.

remedial investigation (RI), *n* – [ENVIRONMENTAL INVESTIGATION] an in-depth study designed to gather data needed to determine the nature and extent of contamination at a Superfund site, establish site cleanup criteria, identify preliminary alternatives for remedial action, and support technical and cost analyses of alternatives. The remedial investigation is usually done with the Feasibility Study (FS). Together they are usually referred to as the "RI/FS".

remedial phase, *n* – [REMEDIATION TECHNOLOGY] a distinct component of the remediation process. Such components may include preliminary assessment, site investigation, remedial investigation, remedial alternative analysis, and remedial action.

remediation, *n* -- cleanup or other methods used to remove or contain a toxic spill or hazardous materials.

remediation standards, *n* – [ENVIRONMENTAL REGULATION] the combination of numeric standards or criteria that establish a level or concentration, and narrative standards, to which contaminants must be treated, removed or otherwise cleaned for soil, ground water or surface water, to meet the health risk or environmental standards.

remote sensing, *n* -- the collection and interpretation of information about an object without physical contact with the object; such as satellite imaging, aerial photography, and open path measurements[4].

removal, *n* — [REMEDIATION TECHNOLOGY] the cleanup or removal of released HAZARDOUS SUBSTANCES from the environment; such actions as may be necessary to take in the event of the threat of release of hazardous substances into the environment; such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release.

rendzina, *n* – [AGRONOMY] a SOIL rich in HUMUS and CALCIUM CARBONATE, developed on LIMESTONE.

repose—*See angle of repose.*

reportable quantity (RQ), *n* – [ENVIRONMENTAL REGULATION] the quantity of HAZARDOUS SUBSTANCES that, when released into the environment, can cause substantial endangerment to human health or the environment. Under CERCLA, the Federal government must be notified when quantities equaling or exceeding RQs are released.

representative fraction, *n* – [GEOGRAPHY] the expression of MAP SCALE as a mathematical ratio. *Also see scale*.

representative sample, *n* — [ENVIRONMENTAL INVESTIGATION] *1*. a sample collected such that it reflects one or more characteristics of interest of the lot or population from which it was collected. *2*. a sample collected in such a manner that it has characteristics equivalent to the material being sampled. *3*. a sample collected in such a manner that it reflects one or more characteristics of interest (as defined by the project objectives) of a population from which it is collected.

> DISCUSSION — A representative sample can be a single sample, a collection of samples, or one or more composite samples. A single sample can be representative only when the population is highly homogeneous.

representative sampling, *n* — [ENVIRONMENTAL INVESTIGATION] the process of obtaining a

representative sample or a representative set of samples.

representative set of samples, *n* — [ENVIRONMENTAL INVESTIGATION] a set of samples that collectively reflect one or more characteristics of interest of a population from which they were collected. *See representative sample*.

reproducibility, *n* – [SCIENTIFIC METHOD] of or pertaining to the ability to repeat scientific experiments or processes and obtain the same results.

requirement, *n* – [LAW] a commandment, an instruction or an order. *Also see law, regulation and statute.*

research, *n* – [SCIENTIFIC METHOD] *1*. studious inquiry or examination, *2*. INVESTIGATION or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws *3*. the collecting of information about a particular subject. *Also see assessment, evaluation, experiment and investigation.*

research octane number (RON), *n* – [PETROLEUM CHEMISTRY] a measure of the antiknock quality of a gasoline when vehicles are operated under mild conditions such as low speeds and low loads. *Also see motor octane number (MON) and (R+M)/2,*

resequent river, *n* – [HYDROLOGY] a RIVER flowing according to a consequent DRAINAGE PATTERN but at a lower level than the original SLOPE.

reserves, *n* – [INSURANCE] an INSURANCE carrier's best estimate of what it will have to pay for a particular CLAIM or series of claims.

reservoir, *n* – [HYDROLOGY] *from French,* any natural or holding area used to store, regulate, or control ARTIFICIAL WATER.

reservoir rock, *n* – [GEOLOGY] a permeable ROCK containing OIL or GAS. *Also see cap rock and petroleum geology.*

residence time, *n* – [HYDROGEOLOGY] period during which WATER or a SUBSTANCE remains in a component part of the HYDROLOGICAL CYCLE.

residual, *n* – [CHEMISTRY] amount of a POLLUTANT remaining in the ENVIRONMENT after a natural or technological process has taken place; such as the sludge remaining after initial wastewater treatment, or particulates remaining in air after it passes through a scrubbing or other process.

residual bottoms, *n* – [PETROLEUM TECHNOLOGY} the fraction remaining after DISTILLATION of a CRUDE OIL.

residual drawdown, *n* — [HYDROGEOLOGY] the difference between the projected pre-pumping water-level trend and the water level in a well or PIEZOMETER after PUMPING or INJECTION has stopped.

residual fuel oil, *n* – [PETROLEUM CHEMISTRY] a term for FUEL OIL mainly comprising of the residues remaining after refining CRUDE OIL.

residual product, *n* – [HYDROGEOLOGY] a SEPARATE PHASE material present in CONCENTRATIONS below a CONTAMINANT'S RESIDUAL SATURATION point, retained in SOIL or GEOLOGIC MATRIX PORE spaces or FRACTURES by CAPILLARY FORCES. This definition applies to solids, liquids, and semi-solids. *Also see residual saturation.*

residual saturation, *n* – [AGRONOMY] saturation level below which fluid drainage will not occur. *Also see entrapped LNAPL, field capacity and specific retention*.

> DISCUSSION – After the introduction of petroleum products, chlorinated solvents or other non-aqueous contaminants into a soil, there is a minimum amount that will no longer drain and will be held indefinitely by the soil. In sandy soils, this residual saturation can be around 30%, whereas in finer-grained soils the value can be even greater. This residual saturation can become a continued source of ground-water contamination and the costs for its removal can be significant.

residual soil, *n* — [AGRONOMY] soil derived in place by WEATHERING of the underlying material.

residue, *n* – [HYDROLOGY] the dry solids remaining after the evaporation of a sample of WATER or SLUDGE.

residuum, *n* — [GEOLOGY] SOIL material formed from ROCK WEATHERING in place.

residuum, *n* – [PETROLEUM CHEMISTRY] RESIDUE from CRUDE OIL after distilling off all but the heaviest components, with a boiling range greater than 1,000 degrees Fahrenheit.

resin, *n* – [BIOLOGY] solids or semi-solids of plant origin used principally in lacquers, varnishes, inks, adhesives, synthetic plastics, and pharmaceuticals.

resistance, *n* – [PHYSICS] in general, the power or capacity of an object or a material to withstand the force imposed upon it[6].

resistant, *adj* – [GEOLOGY] the quality of withstanding the effect of EROSION and WEATHERING processes. *Also see weathering and erosion.*

resistivity log, *n* – [GEOPHYSICS] a GEOPHYSICAL LOG that measures the RESISTIVITY of the FLUIDS contained in the ROCK FORMATIONS. Resistivity is related to the POROSITY of the rock and fluids in the rock. Porous rocks such as sandstones usually have higher resistivity, on the contrary, Low porosity rocks such as shales usually have lower resistivity. If the porous

sandstone is filled with salty water, the resistivity is low. If the fluid is fresh water, resistivity is medium high.

resource, *n* – [BIOLOGY] anything obtained from the *environment* to meet the needs of a species.

Resource Conservation and Recovery Act (RCRA), *n* – [ENVIRONMENTAL REGULATION] as amended (42 U.S.C. 6901 et seq.) federal legislation requiring that HAZARDOUS WASTES be tracked from "cradle" (generation) to "grave" (disposal).

respiration, *n* – [BIOLOGY] the process of exchanging OXYGEN and CARBON DIOXIDE between an ORGANISM and its external environment.

response, *n* – [PHYSICS] an action or feeling which answers to a stimulus.

response action, *n* – [REMEDIATION TECHNOLOGY] a short-term removal action or a long-term remedial response, authorized under CERCLA that is taken at a site to address releases of hazardous substances.

responsibility, *n* – [LAW] accountability for the actions one performs and the consequences they bring about, for which a moral agent could be justly punished or rewarded. Moral responsibility is commonly held to require the agent's freedom to have done otherwise.

responsible party, *n* – [LAW] the person or entity in any way responsible for a contaminated site, or for the contaminants at a site including, for the purposes of this chapter, each owner or operator, and any other person obligated by law to clean up and remove contaminants at a site.

restoration, *n* — [REMEDIATION TECHNOLOGY] the act or process of bringing something back to a previous condition or position. For example, the establishment of natural land contours and vegetative cover following extensive degradation of the environment caused by activities such as SURFACE MINING. Under this condition, the term is used interchangeably with RECLAMATION.

restricted-use remedial action, *n* – [REMEDIATION TECHNOLOGY] any REMEDIAL ACTION for SOIL that requires the continued use of engineering and INSTITUTIONAL CONTROLS in order to meet the established health risk or environmental standards.

restricted-use standard, *n* – [ENVIRONMENTAL REGULATION] a numeric SOIL REMEDIATION STANDARD which, when achieved, restores the contaminated soil to a condition suitable for only certain specified uses.

result, *n* — [SCIENTIFIC METHOD] the outcome of a MEASUREMENT.

resurgence, *n* – [HYDROGEOLOGY] the appearance or reappearance on the surface of an underground stream after flowing through permeable strata, and now reaching underlying impermeable rocks.

retardation, *n* -- [HYDROGEOLOGY] a general term for the many processes that act to remove solutes from GROUND WATER; for many solutes, the solute front will travel more slowly than the rate of the advecting ground water.

> DISCUSSION – Because of processes such as biodegradation, adsorption, volatilization and others, contaminants within ground water almost always migrate at a rate slower than the ground water itself. The only exemption to this rule is some anions, such as chloride, in a process known as "anion exclusion". Because both the chloride and most clays exhibit a negative charge, they are repelled and the chloride can migrate faster than the water, which is not repelled.

Also see adorption and attenuation.

retardation factor, *n* – [HYDROGEOLOGY] a MEASURE of the amount of ATTENUATION (or reduction in migration rate) of a particular CONTAMINANT within a plume of contaminated GROUND WATER where,

$$R_d = 1 + \rho_b k_d / \theta$$

and R_d is the retardation factor, ρ_b is the BULK DENSITY of the soil, θ is the POROSITY and k_d is the PARTITIONING COEFFICIENT which is defined as $f_{oc}K_{oc}$, where f_{oc} is the fraction of organic carbon in the soil and K_{oc} is the ORGANIC CARBON/WATER PARTITIONING COEFFICIENT. The contaminant-migration rate (V_c) is the ground-water flow rate (V_{gw}) divided by the R_d. The value for R_d is always greater than 1.0.

> DISCUSSION – The calculation of the retardation factor is an important part of any fate-and-transport study, especially one that attempts to back calculate release time frames (or "age date" a spill). Parameters such as the fraction of organic carbon and the porosity can be quite variable and site-specific data are not always available. Therefore, assumptions are made and the selection of the values can be disputed.

Also see fate and transport, fraction of organic carbon and porosity.

retention time, *n* — [CHEMISTRY] with regard to laboratory chromatographic techniques, the time that elapses from the introduction of the sample until the component peak maximum is reached.

retrial—*See new trial.*

return flow, *n* – [HYDROLOGY] *1*. WATER which has seeped through the soil as INTERFLOW but which backs up the hillslope when it has reached a saturated layer. *2*. that part of IRRIGATION WATER that is not consumed

by EVAPOTRANSPIRATION and returns to its source or runs off into another body of water[63].

reverse fault, *n* – [GEOLOGY] a DIP-SLIP FAULT marked by a HANGING WALL that has moved upward relative to the FOOTWALL. Reverse faults are often caused by the convergence of lithospheric plates. *Also see normal fault, strike-slip fault, thrust fault and transform fault.*

reverse osmosis, *n* – [CHEMISTRY] a process in which, if pressure is put on the concentrated side of a liquid system in which liquids with different concentrations of mineral salts are separated by a semi-permeable membrane, molecules of pure water pass out of the concentrated solution to the weak or fresh-water side[63].

revert, *n* – [DRILLING TECHNOLOGY] a DRILLING MUD composed of food-grade material. *Also see bentonite clay and drilling mud.*

Reynolds Number (R_e), *n* – [HYDROLOGY] a dimensionless number used as an index of fluid flow characteristics in a pipe, duct, or around an obstacle. The expression for fluid flow in a pipe or duct is equal to:

$$R_e = (Vd\tilde{n})/\mu$$

where V is the fluid velocity, d is the pipe or duct diameter, $\tilde{n}$ is the fluid density; and μ is the fluid dynamic viscosity. For fluid flow around a particle it takes the form:

$$R_e = (d_p v_r \tilde{n})/\mu$$

where d_p is the particle diameter, v_r is the velocity of the particle relative to the fluid, $\tilde{n}$ is the fluid density; and μ is the fluid viscosity. For fluid flow in a pipe or duct, a Reynolds number below about 2,100 is considered to be streamline, smooth, or LAMINAR FLOW; above 4,000, the flow is TURBULENT; 2,100–4,000 is a transition zone. For the flow of fluid around a particle, a Reynolds number less than 1.0 is considered laminar flow and as the value increases above 1.0 turbulence increases. The difference between the conditions for laminar flow around particles and in pipes is explained by the impact of inertial forces as the fluid flows around a particle compared to the straight flow in a pipe or duct. *Also see Froude Number.*

rheology, *n* — [PHYSICS] the study of the DEFORMATION and FLOW of MATTER.

rhithron zone, *n* — [HYDROLOGY] a STREAM REACH at higher elevations, characterized by rapid FLOW, low TEMPERATURE, and high DISSOLVED OXYGEN contents. *Also see potamon zone.*

rhizosphere, *n* – [AGRONOMY] SOIL and MICROBES adjacent to and influencing plant roots.

R horizon, *n* – [AGRONOMY] SOIL HORIZON found beneath the C horizon. Consists of consolidated rock showing little sign of WEATHERING or PEDOGENESIS.

rhyolite, *n* – [GEOLOGY] an IGNEOUS, VOLCANIC (extrusive) rock, of FELSIC (silica-rich) composition. It may have any texture from glassy to aphanitic to porphyritic. Minerals include usually QUARTZ, alkali feldspar and plagioclase. Biotite and hornblende are common accessory minerals. The volcanic equivalent of granite. *Also see granite, igneous and plutonic.*

ria, *n* – [GEOGRAPHY] a LANDFORM, often referred to as a drowned river valley. Rias are almost always estuaries. Rias form where sea levels rise relative to the land either as a result of eustatic sea level change (where the global sea levels rise), or isostatic sea level change (where the local land sinks). When this happens valleys which were previously at sea level become submerged. The result is often a very large estuary at the mouth of a relatively insignificant river (or else sediments would quickly fill the ria).

ribbon lake, *n* – [GEOLOGY] an elongated LAKE occupying the floor of a glaciated VALLEY or TROUGH.

> DISCUSSION – The Finger Lakes of upstate New York are a prime example of this type of lake.

Also see finger lake.

ribonucleic acid (RNA), *n* – [BIOLOGY] form of nucleic acid. Ribonucleic acid is used by most organisms to read the genetic information found in DNA and to produce specific organic molecules used in the development and functioning of cells. *Also see deoxyribonucleic acid (DNA).*

ridge, *n* – [GEOLOGY] *1*. a range of HILLS or MOUNTAINS. *2*. an elongate elevation on an OCEAN bottom *3*. an elongate CREST or a linear series of crests. *Also see crest, hill, mountain and peak***.**

ridge and valley, *n* – [GEOLOGY] an almost parallel series of RIDGES and intervening VALLEYS, where the valleys have been carved out of less RESISTANT ROCK.

> DISCUSSION – The ridge and valley province of the eastern USA (part of the Appalachian Mountains) consists of interbedded resistant quartzites and sandstones with less-resistant limestones. In between, shales may also exist. The resistant sandstones cap the mountain tops because they are less susceptible to erosion, whereas the less-resistant limestones are found in the valleys. This sequence of lithologies and resulting geomorphic features extend from New York State in the north to Alabama in the south.

riegel, *n* – [GEOLOGY] an OUTCROP of ROCK, forming a bar across a GLACIAL TROUGH.

riffle, *n* – [HYDROLOGY] a rocky or gravelly section of a RIVER BED causing ruffled flow.

rift valley, *n* – [GEOLOGY] a surface DEPRESSION due to the formation of GRABEN block faulting.

rig, *n* – [DRILLING TECHNOLOGY] the derrick or mast, drawworks, and attendant surface equipment of a drilling or workover unit. *Also known as drilling rig.*

right angle, *n* – [MATHEMATICS] an angle formed by two perpendicular lines; a 90^{o} angle.

right triangle, *n* – [MATHEMATICS] a triangle that contains a right angle.

rill, *n* – [HYDROLOGY] a small CHANNEL eroded into the soil by surface RUNOFF; can be easily smoothed out or obliterated by normal tillage.

ring width, *n* – [DENDROLOGY] width of a TREE RING, measured along a radius[12].

ring-width index, *n* – [DENDROLOGY] the transformed value of a RING WIDTH after dividing by a standardizing, smoothing function to perform a standardization[12].

rinse blank—*See field blank*.

riparian, *adj* – [HYDROLOGY] pertaining to the BANKS of a RIVER, STREAM, waterway, or other, typically, flowing body of water as well as to plant and animal communities along such bodies of water. This term is also commonly used for other bodies of water, such as ponds, lakes, etc., although LITTORAL is the more precise term for such stationary bodies of water. Also refers to the legal doctrine (RIPARIAN DOCTRINE and Riparian Water Rights) that says a property owner along the banks of a surface water body has the primary right to withdraw water for reasonable use.

riparian doctrine, *n* – [LAW] the system for allocating water used in England and the eastern United States, in which owners of lands along the banks of a stream or water body have the right to reasonable use of the waters and a correlative right protecting against unreasonable use by others that substantially diminishes the quantity or quality of water. The right is appurtenant to the land and does not depend on prior use. Under this doctrine, ownership of land along a stream or river (such as riparian lands) is an absolute prerequisite to a right to use water from that body of water and each such landowner has an equal right to withdraw "reasonable" amounts of water (whether or not he is presently using it or not) so long as downstream landowners are not unreasonably damaged. *Also known as riparian right.*

ripple, *n* – [HYDROLOGY] a small RIDGE, a few centimetres high, formed on a BEACH or on a sandy RIVER BED by the motion of WATER CURRENTS.

rip-rap, *n* – [HYDROLOGY] rough stone of various sizes placed compactly or irregularly to prevent erosion[66].

riser, *n* — [HYDROGEOLOGY] the PIPE extending from the WELL SCREEN to or above the ground surface.

riser, *n* – [GEOLOGY] the steep portion of a TERRACE; the flat portion is named the tread, as in stair-steps.

risk, *n* — [INSURANCE] *1*. the PROBABILITY or likelihood that an adverse effect will occur. *2*. the probability or an expected LOSS associated with an adverse effect.

> DISCUSSION — Risk is frequently used to describe the adverse effect on health or on economics. Health-based risk is the probability of induced diseases in persons exposed to physical, chemical, biological, or radiological insults over time. This risk probability depends on the concentration or level of the insult, which is expressed by a mathematical model describing the dose and risk relationship. Risk is also associated with economics when decision makers have to select one action from a set of available actions. Each action has a corresponding cost. The risk or expected loss is the cost multiplied by the probability of the outcome of a particular action. Decision makers should adopt a strategy to select actions that minimize the expected loss.

risk-based criteria, *n* — [ENVIRONMENTAL REGULATION] cleanup levels intended to meet a predetermined level of acceptable risk to human health or the environment.

risk assessment, *n* – [ENVIRONMENTAL INVESTIGATION] an evaluation of the potential adverse impact of a given event(such as the release or threat of release of a HAZARDOUS SUBSTANCE) upon the well-being of a person or a population. It is a process by which information or experience concerning the cause and effect under a set of circumstances (such as exposure) is integrated with the extent of those circumstances to quantify or otherwise describe risk.

river, *n* – [HYDROLOGY] large STREAM which serves as the natural DRAINAGE CHANNEL for a DRAINAGE BASIN. *Also see brook, creek, run and stream***.**

riverain, *n* – [HYDROLOGY] about a RIVER, its BANKS and/or its VALLEY.

river-basin concept, *n* – [HYDROLOGY] the notion that each river system, from its headwaters to its mouth, is a single unit and should be treated as such. This concept recognizes the interrelationship of resource elements in a single basin, and assumes that multiple-purpose development can take this interrelationship

into account. It extends the principle of ecological balance to the whole of the area and its occupants[63].

river capture, *n* – [HYDROLOGY] where the headwaters of one RIVER system capture those of another river system.

river cliff, *n* – [GEOLOGY] formed on the outside of the bend of a MEANDER where the CURRENT is at its fastest. The current erodes (undercuts) the river BANK and this collapses, leaving a vertical slope. *Also known as undercut slope.*

river profile, *n* – [HYDROLOGY] a section or curve showing the slope of a river from its source to its mouth[63].

river terrace, *n* – [HYDROLOGY] an elevated LANDFORM feature running along a VALLEY side, roughly PARALLEL with the valley walls.

rivulet, *n* – [HYDROLOGY] a small STREAM or BROOK

(R+M)/2, *n* – [PETROLEUM CHEMISTRY] RESEARCH OCTANE NUMBER (RON) plus MOTOR OCTANE NUMBER (MON) halved. A gasoline octane designation commonly used in the US since the 1970s. *Also see motor octane number (MON) and research octane number (RON).*

road oil, *n* – [PETROLEUM CHEMISTRY] any heavy PETROLEUM OIL, including RESIDUAL ASPHALTIC oil used as a dust palliative and surface treatment on roads and highways. It is generally produced in six grades from 0, the most liquid, to 5, the most VISCOUS.

road salt, *n* – [CHEMISTRY] SALTS such as NaCl or $CaCl_2$ applied to roadways to help melt SNOW or ICE. The salt may pose a threat to the underlying GROUND-WATER QUALITY if it is applied at too great of a quantity.

> DISCUSSION – The application of salt to roads helps to melt ice because the melting point of saltwater is less, or about -4°C or 27°F. More recently, $CaCl_2$ has been used as road salt, instead of NaCl, because it has less of an adverse impact on ground-water supplies.

roche moutonnée, *n* – [GEOLOGY] *from French,* a feature of GLACIAL EROSION that resembles an asymmetrical rock mound. It is smooth and gently sloping on the side of ice advance. The lee-side of this feature is steep and jagged.

rock, *n* — [GEOLOGY] *1*. NATURAL SOLID MINERAL MATTER occurring in large MASSES or fragments. *2*. any naturally formed aggregate of mineral matter occurring in large masses or fragments.

rock creep, *n* – [GEOLOGY] the slow, downslope movement of rock fragments, caused by GRAVITY.

rock flour, *n* – [GEOLOGY] SILT and CLAY-sized PARTICLES of DEBRIS formed because of grinding due to ABRASION within and at the base of a GLACIER.

> DISCUSSION – The input of rock flour to rivers and streams near or downstream of glaciers often gives the water a milky appearance.

rock mass, *n* — [GEOLOGY] ROCK as it occurs *in situ*, including its STRUCTURAL DISCONTINUITIES.

rock mechanics, *n* — [GEOLOGY] the application of the KNOWLEDGE of the mechanical behavior of ROCK to engineering problems dealing with rock. Rock mechanics overlaps with STRUCTURAL GEOLOGY, GEOPHYSICS, and SOIL MECHANICS.

rock wood—*See mountain wood.*

rodenticide, *n* -- [CHEMISTRY] a CHEMICAL or agent used to destroy rats or other rodent pests, or to prevent them from damaging food, crops, etc.

roller bit, *n* – [DRILLING TECHNOLOGY] a rotary drilling bit which works by pulverizing the rock with its toothed wheels.

root system, *n* – [BIOLOGY] that organ of a plant body that typically lies below the surface of the SOIL.

rotation, *n* – [PHYSICS] spinning of a spherical object around an AXIS.

roughness, *n* – [HYDROLOGY] an unevenness of surfaces giving rise to high flow resistances.

rounding, *n* – [MATHEMATICS] the process of approximating a number to a nearby one.

roundness, *n* – [GEOLOGY] defined as a the average RADIUS of curvature of corners of a GRAIN to that of the largest inscribing circle. Most geologists compare the roundness of the grains in a rock or sediment as angular, subangular, subrounded, rounded and well-rounded.

round-off error, *n* – [STATISTICS] the ERROR accumulated during a calculation due to rounding intermediate results.

rubber, *n* – [PETROLEUM CHEMISTRY] an ELASTOMER (an ELASTIC HYDROCARBON POLYMER) that was originally derived from LATEX, a milky colloid found in the sap of some plants. Synthetic rubber is now produced from PETROLEUM.

rubbish, *n* – [WASTE DISPOSAL] SOLID WASTE, excluding food waste and ASHES, from homes, institutions, and workplaces. *Also see garbage, refuse, solid waste and trash.*

rubification, *n* – [AGRONOMY] the change of soil color to yellow or red, which occurs in warm climates where intense weathering liberates iron.

rudaceous, *adj* – [GEOLOGY] coarse-grained SEDIMENTARY ROCK, either consolidated as in CONGLOMERATE or unconsolidated as in TILL.

rudite, *n* – [GEOLOGY] any sedimentary clastic rock with grain sizes exceeding 2 millimetre (0.08 inch) such as conglomerates and breccias.

rudstone, *n* – [GEOLOGY] a coarse-grained LIMESTONE

supported by grains larger than 2 millimetres.

rule, *n* -- [LAW] an established standard, guide or regulation; prescribed guide for conduct or action, regulation or principle.

rules of evidence, *n* – [LAW] rules for accepting or rejecting EVIDENCE.

run, *n* – [HYDROLOGY] a natural STREAM of water normally smaller than and often TRIBUTARY to a RIVER. The same as a CREEK. A*lso see brook, creek, river and stream.*

runlet—*See runnel.*

runnel, *n* — [HYDROLOGY] 1. a RIVULET; a BROOK. 2. a narrow CHANNEL or course, as for WATER.

runoff, *n* – [HYDROLOGY] the overland movement of WATER.

rural property, *n* – [GEOGRAPHY] property that includes non-commercial real estate, undeveloped real property, real property used for agricultural purposes, or commercial real estate used only for the transportation of people or products (including, but not limited to, natural resource development, for example, mining, oil and gas, etc.)

Ss

sabkha, *n* – [GEOLOGY] a supratidal ENVIRONMENT of SEDIMENTATION, formed under arid to semiarid conditions on restricted COASTAL PLAINS just above normal high-tide level. It is gradational between the LAND SURFACE and the intertidal environment. Sabkhas are characterized by evaporite-salt, tidal-flood, and eolian deposits, and are found on many modern coastlines.

DISCUSSION – Sabkhas are environments where the mineral dolomite ($CaMg(CO_3)_2$) can form.

Also see dolomite and evaporite.

sacrificial anode, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] an easily corroded material deliberately installed in a pipe or intake to give it up (sacrifice it) to corrosion while the rest of the water supply facility remains relatively corrosion-free. Can be part of a cathodic protection system for an UNDERGROUND STORAGE TANK.

saddle, *n* – [GEOLOGY] *1*. a low point or COL on a ridge connecting two summits. *2*. a structural feature associated with a sag in the crest of an ANTICLINE[7].

safe, *n* – [TOXICOLOGY] condition of exposure under which there is a practical certainty that no harm will result to exposed individuals.

Safe Drinking Water Act, *n* – [ENVIRONMENTAL REGULATION] an amendment to the Public Health Service Act which established primary and secondary quality standards for drinking water. The SDWA was passed in 1976 to protect public health by establishing uniform drinking water standards for the nation. In 1986 SDWA Amendments were passed that mandated the U.S. Environmental Protection Agency (EPA) to establish standards for 83 drinking water contaminants by 1992 and identify an additional 25 contaminants for regulation every 3 years thereafter.

safe yield, *n* – [HYDROGEOLOGY] the amount of naturally-occurring GROUND WATER that can be economically and legally withdrawn from an AQUIFER on a sustained basis without impairing the native ground-water quality or creating an undesirable effect such as environmental damage. It cannot exceed the increase in recharge or leakage from adjacent STRATA plus the reduction in discharge, which is due to the decline in head caused by pumping.

DISCUSSION – It was historically believed that the safe yield of an aquifer or even a region is equal to the recharge. However, it has been found that safe yield is much less than the recharge.

sag pond, *n* – [GEOLOGY] a water body, forming as water collects in the lowest parts of a depression located between two strands of an active strike-slip fault. The relative motion of the two fault strands results in a stretching of the land between them, causing it to sink.

salcrete, *n* – [GEOLOGY] a surface crust, mainly of sodium chloride, which cements a sand surface on a beach by the evaporation of seaspray[7]. *Also see calcrete and silcrete.*

salic horizon, *n* – [AGRONOMY] a subsurface soil that is at least 15 centimeters thick and salt enriched (2% to 3%).

salient, *n* – [GEOGRAPHY] a projecting spur or headland which protrudes from a line of hills or a coastline[7].

salina, *n* – [GEOLOGY] *from Portuguese and Spanish,* a place where CRYSTALLINE SALT DEPOSITS are formed or found, such as a salt flat or pan, a salada, or a salt lick, especially, a salt-encrusted PLAYA or a wet playa. *Also known as a salt flat. Also see playa and salt.*

saline *adj* – [CHEMISTRY] impregnated or containing SALT or salts.

salinity, *n* — [CHEMISTRY] the CONCENTRATION OF DISSOLVED MATTER found in WATER after bromide and iodide have been replaced by an equivalent quantity of CHLORIDE, all carbonate converted to oxide, and all ORGANIC MATTER destroyed.

DISCUSSION -- The average salinity of the oceans is about 35 parts per thousand or about 3.5%. Salinity values can differ in areas where there is a large inflow of fresh water, areas of heavy precipitation, such as the tropics, or areas of heavy ice formations. The different water classifications, based on its salinity, are:

Fresh = <1,000 mg/l
Slightly saline = 1,000 mg/l - 3,000 mg/l
Moderately saline = 3,000 mg/l - 10,000 mg/l
Highly saline = 10,000 mg/l - 35,000 mg/l

salt, *n* – [CHEMISTRY] *1*. the MINERAL sodium chloride. *2*. COMPOUNDS that are produced as the result of a METAL ATOM replacing a HYDROGEN atom in an ACID.

salt flat--*Also see salina.*

salt pan, *n* – [HYDROLOGY] a very shallow, enclosed basin of salty water, usually fed from the sea.

salt water—*See sea water.*

salt-water intrusion, *n* – [HYDROGEOLOGY] the invasion of FRESH SURFACE or GROUND WATER by SALT WATER. If it comes from the OCEAN it may be called SEA WATER INTRUSION.

saltation, *n* – [GEOLOGY] movement of soil and mineral particles by intermittent leaps from the ground when the particles are being moved by water or wind.

saltpanne, *n* -- [HYDROLOGY] salty low flat area. Salts left behind after tidewater evaporates. Also spelled Salt Pans (which are also pans used for making salt by evaporating seawater).

sample, *n* — [ENVIRONMENTAL INVESTIGATION] *1*. a portion of material taken from a larger quantity for the purpose of estimating properties or composition of the larger quantity. *2*. one or more items or portions collected from a lot or population. *3*. a portion of material which is collected for testing or for record purposes.

DISCUSSION — Sample is a term with numerous meanings. The project team member collecting physical samples (for example, from a landfill, drum or waste pipe) or analyzing samples considers a sample to be that unit of the population collected and placed in a container. In statistics, a sample is considered to be a subset of the population and this subset may consist of one or more physical samples. To minimize confusion, the term "physical sample" is a reference to the sample held in a sample container or that portion of the population that is subjected to measurement.

sample contacting equipment, *n* — [ENVIRONMENTAL INVESTIGATION] equipment that comes in direct contact with the SAMPLE or portion of sample that will undergo CHEMICAL ANALYSES or PHYSICAL testing (for example, ground water well bailer, split-spoon sampler, soil gas sampling probe).

sampling, *v* — [ENVIRONMENTAL INVESTIGATION] obtaining a representative portion of the material concerned.

sampling design, *n* — [ENVIRONMENTAL INVESTIGATION] *1*. the sampling schemes specifying the point(s) for sample collection; *2.* the sampling schemes and associated components for implementation of a sampling event.

DISCUSSION — Both of the above definitions are commonly used within the environmental community. Therefore, both are used within this document.

sampling error, *n* — [STATISTICS] the systematic and random deviations of the sample value from that of the population. The systematic error is the SAMPLING BIAS. The random error is the SAMPLING VARIANCE.

DISCUSSION — Before the physical samples are taken, potential sampling variance comes from the inherent population heterogeneity (sometimes called the "fundamental error," see HETEROGENEITY). In the physical sampling stage, additional contributors to sampling variance include random errors in collecting the samples. After the samples are collected, another contributor is the random error in the measurement process. In each of these stages, systematic errors can occur as well, but they are the sources of bias, not sampling variance.

sampling interval, *n* – [ENVIRONMENTAL INVESTIGATION] the depth and location of soil or sediment samples.

sampling process, *n* — [ENVIRONMENTAL INVESTIGATION] the method and procedure of collecting PHYSICAL SAMPLES from a defined POPULATION.

sand, *n* — [GEOLOGY] particles of rock that will pass the No. 4 (4.75-mm) sieve and be retained on the No. 200 (75-µm) U.S. standard sieve.

sand bank, *n* – [GEOMORPHOLOGY] a LANDFORM consisting of a sand bar within water, which creates a shallow area posing a hazard to watercraft. Some sandbanks exist above the water line at low tide and may serve as natural habitats for a variety of wading birds.

sandspit—*See spit.*

sandstone, *n* – [GEOLOGY] a CLASTIC ROCK composed of particles that range in diameter from 1/16 millimeter to 2 millimeters in diameter. Sandstones make up about 25% of all SEDIMENTARY ROCKS. *Also see arkose, greywacke and quartzite.*

sandur/sandar, *n* – [GEOLOGY] a sheet, or gently sloping fan of outwash sands and gravel. *Also see outwash plain*.

Sangamon Interglacial Stage, *n* – [GEOLOGY] an interglacial time period, between advances of the North American ice sheet, from about 380,000 years BP to about 180,000 BP

sanitary sewer, *n* – [WASTE DISPOSAL] a system of underground PIPES that carry off only domestic or industrial waste, not storm water, normally to a treatment facility.

sap, *n* – [DENDROLOGY] the fluid part of a plant, a watery solution that circulates through a plant's vascular system[12].

sapping, *n* – [GEOLOGY] the breaking down and undermining of part of a hillslope such that small slips occur.

saprolite, *n* – [GEOLOGY] soft, normally CLAY-rich, thoroughly DECOMPOSED ROCK formed in place by CHEMICAL WEATHERING of IGNEOUS and/or METAMORPHIC rock. In some instances, these saprolites can act as a ground-water-bearing formations or even aquifers if they are of sufficient thickness.

sapwood, *n* – [DENDROLOGY] the outer layers of XYLEM which, in the growing tree, contain living cells with stored food reserves[12].

sapwood-hardwood boundary (SHB), *n* – [DENDROLOGY] the interface between the SAPWOOD, or

the wood which transports water and nutrients from the roots and through the tree to the leaves, and the heartwood, usually of a darker color which develops in the center of the trunk and larger branches.

saturate, *v* – [HYDROLOGY] to fill with moisture or liquid, to soak thoroughly.

saturates, *n* – [PETROLEUM CHEMISTRY] ALKANES. HYDROCARBON compounds that do not contain double or triple BONDS.

> DISCUSSION – Many of the fossil fuels are plentiful in saturates or "saturated" hydrocarbons. The most common hydrocarbons in diesel fuel and heating oils are the saturates.

Also known aliphatics. Also see cyclo-alkanes, n-alkanes and iso-alkanes.

savanna, **savannah**, *n* – [GEOGRAPHY] a TROPICAL or sub-tropical plant community characterized by TREES and shrubs scattered among a cover of GRASSES, herbs and FORBS. The climate of a savanna is tropical with a dry season occurring in the low sun period of the year. *Also known as campo and llano.*

scabland, *n* — [GEOGRAPHY] an elevated area of barren, rocky land with little or no soil cover, often crossed by dry stream channels.

scale, *n* – [GEOGRAPHY] a visual device placed onto maps or cross section that allows the reader to understand proportions. Scales are normally given as "bar scales" where the reader can make measurements; however, sometimes a verbal scale is used, such "one inch equals 500 feet". Verbal scales can be troublesome if the map has been enlarged or condensed.

scale, *n* – [PHYSICS] a specific relative or proportional size or extent of a phenomena as measured through space and/or time.

scarification, *n* – [GEOLOGY] decreasing the smoothness of the land surface[66].

scarp, *n* – [GEOGRAPHY] a steep slope.

scarpfoot spring, *n* – [HYDROGEOLOGY] a SPRING at the foot of a SCARP, often where permeable rocks are underlain by impermeable rocks.

scarp slope, *n* – [GEOGRAPHY] a steep slope - the steeper ridge of an escarpment. The other side is gentler and called a dip slope.

scavenger, *n* – [PETROLEUM CHEMISTRY] halogenated compounds present in a leaded gasoline to prevent lead compounds such as lead oxides or lead sulfates from building up in a combustion chamber.

> DISCUSSION -- Common scavengers formerly used in gasoline include ethylene dichloride (EDC) and ethylene dibromide (EDB). During the 1920s, carbon tetrachloride and trichloroethylene were also used. The quantity of EDB and/or EDC in a organic-lead package is based on its organo-lead content and expressed as "theory units". One theory unit (T) is defined as the theoretical amount of bromine or chlorine required to convert all lead in the gasoline to the corresponding lead halide and prevent build up in the engine's combustion chamber.

schist, *n* – [GEOLOGY] a coarse-grained, strongly FOLIATED METAMORPHIC rock that develops from phyllite and splits easily into flat, parallel slabs.

> DISCUSSION – Much of the island of Manhattan in New York City is underlain by a schist, known as the "Manhattan Schist".

schistosity, *n* – [GEOLOGY] the variety of FOLIATION that occurs in the coarser-grained METAMORPHIC ROCKS and is generally the result of the parallel arrangement of platy and ellipsoidal MINERAL GRAINS within the rock substance.

schlatt, *n* – [GEOGRAPHY] a HEATHLAND pond, an undrained body of water usually shallow, that is fed by surface water and is largely unaffected by GROUND WATER.

Schmidt Method, *n* -- [AGE DATING] a method used to estimate the age of gasoline releases. Because of the requirement to reformulate gasoline, known as "RFG," the concentration of toluene in regular and mid-grade gasoline since the 1970s has increased, while the composition of paraffins, in particular, the *n*-C_8 alkane (*n*-octane) has decreased. To determine if regular or mid-grade gasoline is present, the octane index (OI) must be calculated where OI = (*iso*-octane + toluene)/(*n*-C_7 + *n*-C_8). Accordingly, the ratio of these two compounds can be used to estimate the age of gasoline.

science, *n* – [LOGIC] *1*. a department of systemized KNOWLEDGE as an object of study. *2*. a method of acquiring knowledge. To do science, one must follow a specific universal METHODOLOGY. The central theme in this methodology is the testing of HYPOTHESES and the ability to make PREDICTIONS. The overall goal of science is to better understand nature and our Universe. *3*. knowledge or a system of knowledge concerned with the physical universe and its phenomena.

scientific law, *n* – [LOGIC] *1*. a natural phenomenon that has been proven to occur invariably whenever certain conditions are met. *2*. a formal statement describing such a phenomenon and the conditions under which it occurs. *Also see knowledge.*

scientific method, *n* – [LOGIC] techniques that involve gathering all available data on a subject, forming a hypothesis to explain the data, conducting experiments to test the HYPOTHESIS, and modifying or

confirming the hypothesis as necessary to account for the experimental results.

> DISCUSSION – The use of a method to solve or approach scientific problems was probably first advocated by the French mathematician and philosopher Réné Descartes in his 1637 book *Discourse on Method and Meditations on First Philosophy*.

scientist, *n* – [LOGIC] a person learned in SCIENCE and especially natural science, scientific investigator.

scissor fault—*See pivot fault.*

scoria, *n* – [GEOLOGY] LAVA or TEPHRA fragments containing numerous cavities produced by expanding gases during cooling.

scour, *v* – [HYDROLOGY] to abrade or wear; used to describe the wearing away of TERRACES, CHANNELS or STREAM BEDS.

scree, *n* – [GEOLOGY] an accumulation of WEATHERED ROCK FRAGMENTS at the base of a steep rock slope or cliff.

screen–*See well screen.*

scroll, *n* – [HYDROLOGY] a low, narrow ridge running parallel with a MEANDER and formed in times of FLOOD.

scrub, *n* – [DENDROLOGY] low or stunted trees and shrubs, found in such adverse conditions as exposed hillsides, semi-deserts and areas of poor soil.

scrub swamp—*See shrub swamp*

sea, *n* – [HYDROLOGY] *1*. a body of SALINE WATER found on the Earth's continental surface. *2*. a portion of an ocean that is in close proximity to a continent. *Also see ocean.*

sea level, *n* – [GEOGRAPHY] in the United States, the National Geodetic Vertical Datum of 1929 – a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

seam, *n* – [GEOLOGY] *1*. a thin layer or STRATUM (as of rock) between distinctive layers. *2*. a bed of valuable mineral and especially coal irrespective of thickness *Also see bed, layer and strata.*

sea water, *n* – [HYDROLOGY] water originating in or from the sea.

sea-water intrusion-- *See salt-water intrusion.*

secondary containment or diversion system, *n* – [ENVIRONMENTAL REGULATION] any structures, devices or combinations thereof supplementary to the ordinary containers employed in the normal course of storage, transfer, processing or use, designed and operated to prevent leaks of hazardous substances from becoming discharges.

secondary drinking water standards, *n* – [ENVIRONMENTAL REGULATION] non-enforceable federal guidelines regarding cosmetic effects (such as tooth or skin discoloration) or aesthetic effects (such as taste, odor, or color) of drinking water.

secondary filter pack, *n* — [HYDROGEOLOGY] a clean, uniformly graded sand that is placed in the ANNULUS between the primary filter pack and the over-lying seal, or between the seal and overlying grout backfill, or both, to prevent movement of seal or grout, of both, into the primary filter pack.

secondary clarifier, *n* – [TREATMENT TECHNOLOGY] in a waste-treatment plant, a basin or tank that receives liquid from a trickling filter or an activated sludge tank; here settleable solids are removed by sedimentation[63].

secondary porosity, *n* – [HYDROGEOLOGY] the porosity that has been caused by fractures or the weathering of a rock or sediment after it was formed. For example, the caves and solution cavities found in karst formations are considered secondary porosity. *Also see effective porosity and porosity.*

secondary soil, *n* – [AGRONOMY] a soil transported from its place of formation.

secondary wastewater treatment, *n* – [TREATMENT TECHNOLOGY] wastewater treatment using biological methods (bacterial action) in addition to primary treatment by screening, sedimentation and flotation. In secondary treatment, bacteria are used to destroy organic wastes as the water trickles over coarse-grained sand. This process removes up to 90 percent of the dissolved pollutants, but leaves many other pollutants untouched[63]. *Also see primary wastewater treatment and tertiary wastewater treatment.*

second law of thermodynamics, *n* – [PHYSICS] the second law states that every spontaneous process causes a net increase in the entropy of the universe. Heat can never pass spontaneously from a body at a lower temperature to a body at a higher temperature. *Also see the first, third and zeroth laws of thermodynamics.*

secretion, *n* – [BIOLOGY] a secondary structure formed of material deposited from solution within a cavity in a rock, such as a vein or a geode[4].

sedentary, *adj* – [PHYSICS] fixed, not moving.

sedentary soil, *n* – [AGRONOMY] a soil formed from the parent rock which it still overlies.

sedge, *n* – [BIOLOGY] any of a family of usually tufted monocotyledonous MARSH PLANTS differing from the related GRASSES in having achenes and stems[15].

sediment, *n* -- [GEOLOGY] an assemblage of individual mineral grains that were deposited by some geologic agent such as water, wind, ice or gravity. From the Latin word *sedimentum*, meaning "settling". *Also see sedimentology and stratigraphy.*

sedimentary basin, *n* – [GEOLOGY] TERRAIN consisting of SEDIMENTARY ROCK deposited over the course of many *eras*.

sedimentary rock, *n* – [GEOLOGY] a ROCK made from the consolidation of solid fragments, as of other rocks or organic remains, or by precipitation of minerals from solution. *Also see sediment, sedimentology and stratigraphy.*

sedimentation, *n* – [TREATMENT TECHNOLOGY] an early stage in the purification of raw polluted water whereby suspended particles in the water are allowed to settle[63].

sedimentation tank—*See clarifier.*

sediment dating, *n* – [AGE DATING] the act or process of estimating the time frame when sediment was deposited. Laboratory analysis for isotopes such as ^{210}Pb, ^{137}Cs and ^{90}Sr can be used to estimate these time frames. *Also see lead-210 dating*.

sedimentology, *n* – [GEOLOGY] the scientific study of SEDIMENTARY ROCKS and of the processes by which they were formed; the description, classification, origin, and interpretation of sediments. *Also see sediment, Stoke's Law and stratigraphy.*

seep, *n* — [GEOLOGY] a small area where water or petroleum oozes from the soil or rock.

seepage, *n* — [HYDROGEOLOGY] *1*. the INFILTRATION or PERCOLATION of water through rock or soil to or from the surface. *2*. the slow movement of gravitational water through the SOIL or ROCK.

seepage force, *n* — [HYDROGEOLOGY] *1*. the frictional drag of water flowing through VOIDS or INTERSTICES in rock, causing an increase in the intergranular pressure, that is, the hydraulic force per unit volume of rock or soil which results from the flow of water and which acts in the direction of flow. *2*. the force transmitted to the soil or rock grains by SEEPAGE.

seepage pit, *n* – [WASTE DISPOSAL] an underground reservoir normally for industrial, liquid waste without treatment. *also see cesspool, dry well, leachfield and septic tank.*

seepage velocity, *n*, — [HYDROGEOLOGY] the RATE of DISCHARGE of seepage water through a porous medium per unit area of void space perpendicular to the direction of flow. *Also see Darcy's Law.*

seiche, *n* – [HYDROLOGY] a short-term oscillation in the surface of a lake or land-locked sea which may be caused by a persistent strong wind or a change in atmospheric pressure[63].

selecting ion monitoring (SIM), *n* – [CHEMISTRY] mass spectrometric monitoring of a specific mass/charge (M/Z) ratio. The SIM mode offers better sensitivity than can be obtained using the full scan mode[51]. The SIM mode can be used to detect many of the biomarkers present in petroleum for fingerprinting purposes.

semi-volatile organic compounds, *n* – [CHEMISTRY] compounds amenable to analysis by extraction of the sample with an organic solvent. *Also referred to as base/neutral extractable compounds (B/Ns).*

senescent lake, *n* – [HYDROLOGY] a LAKE nearing extinction, especially through the accumulation of the remains of aquatic vegetation[63].

senior judge, *n* – [LAW] a federal judge who, after attaining the requisite age and length of judicial experience, takes senior status, thus creating a vacancy among a court's active judges. A senior judge retains the judicial office and may cut back his or her workload by as much as 75 percent, but many opt to keep a larger caseload.

sensitivity analysis, *n* – [MATHEMATICS] a procedure based on systematic variation of model input values *1.* to identify those model input elements that cause the most significant variations in model output; and *2.* to quantitatively evaluate the impact of uncertainty in model input on the degree of calibration and on the model's predictive capability.

sentinel well, *n* – [HYDROGEOLOGY] a MONITORING WELL placed DOWNGRADIENT of a contaminated SITE as a safeguard to an on-coming PLUME. *Also see monitoring well, observation well and piezometer*.

separate phase, *n* – [PHYSICS] a distinct phase as opposed to an aqueous phase, where the distinct phase is differentiated by density, viscosity, surface tension and chemical composition. *Also known as free product or NAPL.*

separation processes, *n* – [PETROLEUM TECHNOLOGY] process used in petroleum refining to separate the feed stock into two or more components based on some physical property, usually boiling point. These processes do not otherwise change the feedstock. The most common separation process in the refinery is DISTILLATION.

separate sewer, *n* – [TREATMENT TECHNOLOGY] a SEWER that carries waste water but excludes storm and surface waters[63].

septage, *n* — [WASTE DISPOSAL] SEPTIC TANK SLUDGE that is a combination of raw primary sludge and an anaerobically produced raw sludge.

septentrional, *adj* – [GEOGRAPHY] meaning "of the north".

septic tank, *n* – [WASTE DISPOSAL] an UNDERGROUND STORAGE TANK for wastes from homes not connected to a sewer line. Waste goes directly from the home to the tank. *Also see cesspool, dry well, leachfield, seepage pit and septic system.*

septic system, *n* – [WASTE DISPOSAL] an on-site system designed to treat and dispose of domestic sewage. A typical septic system consists of tank that receives waste from a residence or business and a system of tile lines or a pit for disposal of the liquid effluent (sludge) that remains after decomposition of the solids by bacteria in the tank and must be pumped out periodically. *Also see cesspool, dry well, leachfield, seepage pit and septic tank.*

sequestration, *n* – [CHEMISTRY] the inhibition or prevention of normal ion behaviour by combination with added materials, especially the prevention of metallic ion precipitation from solution by formation of a coordination compound with a phosphate.

sesquioxide, *n* – [CHEMISTRY] CHEMICAL COMPOUNDS which are common in many SOILS resulting from the WEATHERING process. They are oxides containing three atoms of oxygen with two atoms (or RADICALS) of some other substance; thus, alumina, Al_2O_3 is a sesquioxide.

sesquiterpanes, *n* – [FINGERPRINTING] a class of saturated biomarkers constructed of three isoprene units $(\sim C_{15})$[34].

sesterterpanes, *n* – [FINGERPRINTING] a class of saturated biomarkers constructed of five isoprene units $(\sim C_{25})$[34].

settleable solids, *n* – [TREATMENT TECHNOLOGY] bits of debris and fine matter heavy enough to settle out.

settlement, *n* – [LAW] parties to a LAWSUIT resolve their difference without having a TRIAL. Settlements often involve the payment of compensation by one party in satisfaction of the other party's claims.

settlement agreement, *n* – [LAW] in a CIVIL LAWSUIT, the document that spells out the terms of an out-of-court compromise.

settling tank, *n* – [TREATMENT TECHNOLOGY] a tank (basin) in which SETTLEABLE SOLIDS are removed by gravity[63].

sewage, *n* – [WASTE DISPOSAL] the WASTE and WASTEWATER produced by residential and commercial sources and discharged into SEWERS. *Also see sewer and sewerage.*

sewage lagoon, *n* – [TREATMENT TECHNOLOGY] a shallow pond, three to five feet deep, where natural biological processes purify wastewater to a degree comparable to that accomplished through SECONDARY WASTEWATER TREATMENT[63].

sewage sludge, *n* – [WASTE DISPOSAL] the dried or semi-liquid residue of a sewage treatment process.

sewage treatment plant, *n* – [WASTE DISPOSAL] a facility designed to receive the WASTEWATER from domestic sources and to remove materials that damage water quality and threaten public health and safety when discharged into receiving streams or bodies of water. The substances removed are classified into four basic areas: *1*. greases and fats; *2*. solids from human waste and other sources; *3*. dissolved pollutants from human waste and decomposition products; and *4*. dangerous microorganisms. Most facilities employ a combination of mechanical removal steps and bacterial decomposition to achieve the desired results. Chlorine is often added to discharges from the plants to reduce the danger of spreading disease by the release of pathogenic bacteria.

sewage works, *n* – [TREATMENT TECHNOLOGY] wastewater installations, including both the sewer systems and wastewater treatment plant[63].

sewer, *n* – [HYDROLOGY] a CHANNEL or CONDUIT that carries WASTEWATER and STORM-WATER RUNOFF from the source to a treatment plant or receiving stream. "Sanitary" sewers carry household, industrial and/or commercial wastes, whereas "storm" sewers carry runoff from rain or snow that collect in CATCH BASINS. A "combined" sewer handles both. *Also see collecting sewer, combined sewer, intercepting sewer, outfall sewer, separate sewer, sewage, sewerage and trunk sewer.*

sewerage, *n* – [HYDROLOGY] the entire system of sewage collection, treatment, and disposal. *Also see sewage and sewer system.*

sextant, *n* – [GEOGRAPHY] an instrument for measuring angular distances used especially in navigation to observe altitudes of celestial bodies (as in ascertaining latitude and longitude). *Also see compass.*

shale, *n* – [GEOLOGY] a SEDIMENTARY ROCK composed of detrital SEDIMENT particles less than 0.004 millimeter in diameter and characterized by a FISSILE nature. Shales tend to be red, brown, black, or gray, and usually originate in relatively still waters. *Also see argillite, clay and claystone.*

shatter belt, *n* – [GEOLOGY] a zone of fragmented ROCK caused by movement along a FAULT.

shearing, *n* – [PHYSICS] a type of internal motion, or DEFORMATION, in which thin layers of MOLECULES glide over one another.

shear zone, *n* – [GEOLOGY] a tabular zone of rock that has been crushed and brecciated by many parallel fractures due to shear strain. Such an area is often mineralized by ore-forming solutions.

sheen, *n* – [PHYSICS] *1*. a gloss or luster on a SURFACE. *2*. the impact of DISSOLVED PETROLEUM in WATER producing a change of the reflective properties of a water surface.

DISCUSSION – A petroleum sheen should not be confused with an iron sheen. A petroleum sheen produces a rainbow-like color and twists around when it moves. A iron sheen breaks into pieces when it is touched.

Also see film, free product and NAPL.

sheet flow, *n* — [HYDROLOGY] an OVERLAND FLOW or downslope movement of WATER taking the form of a thin, continuous film over relatively smooth SOIL or ROCK surfaces and not concentrated into CHANNELS larger than RILLS.

sheet piling, *n* – [CONSTRUCTION] a pile with a generally flat cross section, made to interlock with adjoining sections to form a thin diaphragm wall or bulkhead; used to resist the lateral force of retained earth or water when part of temporary and permanent structures.

shelby tube, *n* – [ENVIRONMENTAL INVESTIGATION] a hollow, metal device used to insert into BOREHOLES for the collection of SOIL SAMPLES to be analyzed for geotechnical parameters. *Also see split spoon.*

shelves, *n* – [HYDROLOGY] streambank features extending nearly horizontally from the FLOOD PLAIN to the lower limit of persistent woody vegetation[47].

shield, *n* – [GEOLOGY] the very old, rigid core of relatively stable ROCKS within a CONTINENT. *Also see craton.*

shingle beach, *n* – [GEOLOGY] BEACH composed of well-rounded COBBLES[6]. *Also see beach.*

shoal, *n* – [HYDROLOGY] a shallow place in a body of WATER. *Also see bank or levee.*

shore, *n* – [GEOGRAPHY] *1.* the land area bordering a relatively large water body like a LAKE or OCEAN. 2. a bank of coastal sediment that rises almost to the surface of the sea, thereby creating a navigation hazard[6].

short-lived daughters, *n* – [CHEMISTRY] radioactive isotope progeny of radioactive isotopes that have half-lives on the order of a few hours or less[64]. *Also see half life.*

shott, *n* – [HYDROLOGY] *from Arabic,* a shallow and sometimes SALINE LAKE or watercourse which may dry out at certain seasons[6]. *Also known as chott and schott.*

shrinking plume, *n* – [HYDROGEOLOGY] configuration where the SOLUTE PLUME margin is receding back toward the source area over TIME and the CONCENTRATIONS at points within the plume are decreasing over time. In this instance, the quantity of contaminants being emitted by the source than the quantity being removed by attenuation processes. *Also known as a contracting plume. Also see natural attenuation.*

shrub, *n* – [BIOLOGY/DENDROLOGY] a plant, distinguished from a tree by its multiple stems and lower height, usually less than 5–6 meters (15–20 feet) tall. Generally synonymous with a "bush".

shrub swamp, *n* – [GEOGRAPHY] a type of freshwater wetland ecosystem occurring in areas too wet to become hardwood SWAMPS ("true" or forested swamps), or too dry or too shallow to become MARSHES. They are often considered transitional between wet MEADOWS or FENS and conifer or hardwood swamps.

shutter ridge, *n* – [GEOLOGY] a ridge which has moved along a FAULT, blocking and/or diverting drainage. A shutter ridge often creates a VALLEY along the length of the fault.

sial, *n* – [GEOLOGY] the CONTINENTAL CRUST dominated by MINERALS rich in SILICA and ALUMINIUM (hence 'SIAL' from SIlica and ALuminum). *Also see sima.*

sidegradient, *adj* – [HYDROGEOLOGY] PERPENDICULAR to the SLOPE. Normally used when describing locations in relation to the GROUND-WATER FLOW DIRECTION. *Also see downgradient, ground-water flow direction and upgradient.*

sierra, *n* – [GEOLOGY] *from Spanish,* a range of mountains especially with a serrated or irregular outline. *Also see mountain range.*

sieve analysis, *n* — [GEOLOGY] determination of the proportions of PARTICLES lying within certain size ranges in a GRANULAR MATERIAL by separation on sieves of different size openings.

signal, *n* – [PHYSICS] in general, an event or phenomenon that conveys information from one place to another[6].

signature, *n* -- [FINGERPRINTING] something (as a tune, style, or logo) that serves to identify an object, a characteristic mark.

significant, *adj* — [STATISTICS] a term applied to differences, correlations, cause-and-effect relationships, etc., to indicate that they are probably not due to chance alone. Significant ordinarily indicates a probability of not less than 95 percent, while highly significant indicates a probability of not less than 99 percent.

silcrete, *n* – [GEOLOGY] a very tough SANDSTONE that has been silicified, perhaps when it formed part of a DURICRUST[6].

silica, *n* – [GEOLOGY] the chemically resistant dioxide of silicon, SiO_2; occurs naturally as five crystalline polymorphs: trigonal and hexagonal quartz, orthorhombic and hexagonal tridymite, tetragonal and isometric cristobalite, monoclinic coesite, and tetragonal stishovite. Also occurs as cryptocrystalline chalcedony, hydrated opal, the glass lechatelierite, skeletal material in diatoms and other living

organisms, and fossil skeletal material in diatomite and other siliceous accumulations. Also occurs with other chemical elements in silicate minerals.

silicon (Si), *n* – [CHEMISTRY] a non-metallic ELEMENT that is the second most abundant on Earth, being exceeded only by OXYGEN. Silicon is not found free in nature, but occurs as the oxide and silicate (for example, SILICA). Sand, QUARTZ, rock crystal, amethyst, agate, flint, jasper, and opal are some of the forms in which the oxide appears.

sill, *n* – [GEOLOGY] a concordant PLUTON that is substantially wider than it is thick. Sills normally form within a few kilometers of the Earth's surface. *Also see dike*.

silt (inorganic silt) (rock flour), *n* — [GEOLOGY] material passing the No. 200 (75 μm) U.S. standard sieve that is nonplastic or very slightly plastic and that exhibits little or no strength when air-dried.

siltation, *n* – the accumulation of fine-grained sediments in a body of water, which generally leads to it becoming choked up[6].

silt size, *n* — [GEOLOGY] that portion of the *soil finer* than 0.02 mm and *coarser* than 0.002 mm (0.05 mm and 0.005 mm in some cases).

siltstone, *n* – [GEOLOGY] FINE-GRAINED SEDIMENTARY ROCK composed of lithified SILT PARTICLES.

Silurian Period, *n* – [GEOLOGY] a period of the PALEOZOIC, thought to have covered the span of time between 510 and 439 million years ago; also, the corresponding system of rocks. The Silurian follows the ORDOVICIAN and precedes the DEVONIAN; in the older literature, it was sometimes considered to include the Ordovician. It is named after the Silures, a Celtic tribe.

sima, *n* – [GEOLOGY] the lower part of the continental crust and the oceanic crust, dominated by SILICA and MAGNESIUM (hence SIMA from SIlica and MAgnesium). *Also see sial.*

single-cased well, *n* — [HYDROGEOLOGY] a MONITORING WELL constructed with a RISER but without an exterior CASING. *Also see monitoring well.*

sinkhole, *n* – [GEOLOGY] a circular, often funnel-shaped DEPRESSION in the GROUND that forms when soluble rocks dissolve. *Also see calcite, dolomite, karst and limestone.*

sinter, *n* – [GEOLOGY] a deposit of MINERAL, notably of SILICA and sulfates, precipitated in layered deposits from the gases released in an area of VOLCANIC activity.

sinuosity, *n* — [HYDROLOGY] *1*. the nature of a MEANDERING and winding STREAM SYSTEM. *2*. the ratio of the THALWEG length (such as the line connecting the deepest points along a stream) to valley length, for a specific reach of a river or stream system. This is, in essence, a ratio of the stream's actual "running" length to its down-gradient length.

site, *n* -- the place, scene, or point of something.

site conceptual model, *n* – [HYDROGEOLOGY] the integrated representation of the physical and environmental context, the complete and potentially complete exposure pathways and the potential fate and transport of chemical(s) of concern at a site. The site conceptual model should include both the current understanding of the site and the understanding of the potential future conditions and uses for the site. It provides a method to conduct the exposure pathway evaluation, inventory the exposure pathways evaluated, and determine the status of the exposure pathways as incomplete, potentially complete or complete.

site inspection (SI), *n* — [ENVIRONMENTAL INVESTIGATION] an on-site INVESTIGATION to determine whether a release or potential release exists and the nature of the associated threats. The purpose is to augment the data collected in the preliminary assessment and to generate, if necessary, sampling and other field data to determine whether further action or investigation is appropriate.

site investigation, *n* – [ENVIRONMENTAL INVESTIGATION] the collection and evaluation of DATA adequate to determine whether or not discharged CONTAMINANTS exist at a SITE or have migrated or are migrating from the site at levels in excess of the applicable remediation standards. A site investigation shall be developed based upon the information collected pursuant to the PRELIMINARY ASSESSMENT. *Also see preliminary assessment and phase 1 environmental site assessment.*

site remediation, *n* — [REMEDIATION TECHNOLOGY] those actions taken in the event of a RELEASE or threatened release of a HAZARDOUS SUBSTANCE in to the ENVIRONMENT, to prevent or minimize the impact of the release, or to mitigate a substantial hazard to present or future environmental conditions. This early action may or may not lead to ultimate restoration of the site.

site specific, *adj* – [ENVIRONMENTAL INVESTIGATION] activities, information and data unique to a particular site.

SI units, *n* – [PHYSICS] system of coherent metic units proposed for international acceptance in 1960. SI stands for *Système International d'Unités*.

skerry, *n* – [GEOGRAPHY] *from Gaelic,* a small ISLAND.

skewed result, *n* – [STATISTICS] a frequency distribution in which the number of findings is not balanced around the mean figure.

skin effect, *n* – [HYDROGEOLOGY] the effect of the zone of reduced PERMEABILITY immediately around the BOREHOLE on transient flow phenomena in pumping tests.

sky island, *n* – [GEOGRAPHY] an environment where mountains in ranges are isolated by valleys in which other ecosystems exist. The mountain ecosystems are isolated from each other and, therefore, species develop in parallel.

slag, *n* – [WASTE DISPOSAL] vitreous REFUSE left over after ORE has been smelted.

slam bar, *n* -- [ENVIRONMENTAL INVESTIGATION] a hand-held weight used to pound direct push rods into the ground. Originally designed for steel fence posts.

slate, *n* – [GEOLOGY] a fine-grained, FOLIATED METAMORPHIC ROCK that develops from SHALE and tends to break into thin, flat sheets.

sleet, *n* – [METEOROLOGY] type of PRECIPITATION, transparent or translucent bits of frozen water with a diameter less than 5 millimeters. To form, these pellets require an environment where raindrops develop in an atmosphere with a temperature above freezing and then fall into a lower layer of air with temperatures below freezing. In the lower layer of cold air the raindrops freeze into small ice pellets. Normally, to provide temperatures above freezing in the atmosphere above a colder atmospheric layer, an upper air temperature inversion, is required. *Also see hail, rain and snow.*

slick, *n* – [PETROLEUM CHEMISTRY] if an oil tanker runs aground or sinks, an environmental disaster known as an "oil slick" will probably occur. An oil slick is a layer of oil floating on water.

> DISCUSSION – An oil slick can be devastating to marine life and very costly to clean up. Estimates suggest 2 million barrels of petroleum are lost every year in this way.

slickensides, *n* — [GEOLOGY] a smooth striated polished surface produced on rock by movement along a fault.

slope, *n* – [GEOGRAPHY] the inclination of the LAND SURFACE from the HORIZONTAL. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

slot canyon, *n* – [GEOGRAPHY] a narrow canyon, eroded by the rushing of water through the rock. A slot canyon will be significantly deeper than it is wide.

slough, *n* – [GEOLOGY] *1*. soil or rock that has fallen down a borehole and can be mistaken native material within a certain depth interval. *2*. a place of deep mud or mire; a wet or marshy place as a swamp or marshland creek. Also a side channel or inlet as from a river; ordinarily found on or at the edge of the flood plain or a river; a *Bayou*[4].

sludge, *n* — [HYDROLOGY] *1*. any mixture of SOLIDS that settles out of SOLUTION. Sludges contain LIQUIDS that are not apparent as free LIQUIDS. *2*. a WATER charged SEDIMENTARY DEPOSIT.

> DISCUSSION — The water-formed sedimentary deposit may include all suspended solids carried by the water and trace elements that were in solution in the water. Sludge usually does not cohere sufficiently to retain its physical shape when mechanical means are used to remove it from the surface on which it deposits, but it may be baked in place and be adherent.

sludge, *n* – [TREATMENT TECHNOLOGY] the solid matter removed from wastewater; a concentration of solids thick enough to give its fluid carrier a paste-like consistency. Sludge includes both organic matter, which can be burned, and other matter which cannot[63]. *Also see activated sludge*.

sludge-digestion tank—*See digester.*

sludge-drying bed, *n* – [TREATMENT TECHNOLOGY] a bed on which humus-like residue from the DIGESTER is dried; after being dried, the SLUDGE may be burned or dumped[63].

slug, *n* — [HYDROGEOLOGY] a VOLUME of WATER or solid object used to induce a sudden change of HEAD in a WELL.

slug test, *n* – [HYDROGEOLOGY] a type of hydraulic test whereby a "slug" or volume of water is introduced or removed from a well and the resulting rise of fall of the water level is recorded. Based on a series of equations, the hydraulic conductivity of the nearby surrounding formation can then be estimated. *Also see pumping test and step-drawdown test.*

sluice, *n* — [HYDROLOGY] *1a*. an artificial CHANNEL for conducting water, with a valve or gate to regulate the flow; *1b*. a valve or gate used in such a channel; a floodgate or sluice gate. *2*. a body of water impounded behind a floodgate. *3*. a sluiceway.

slump, *n* – [GEOLOGY] a form of LANDSLIDE in which a single, large block of bedrock moves downward with backward rotation upon an upwardly concave FRACTURE surface.

slurry, *n* – [CHEMISTRY] a watery mixture of insoluble matter resulting from some pollution control techniques.

slurry wall, *n* – [REMEDIATION TECHNOLOGY] a vertical barrier constructed by excavating a vertical slot under a BENTONITE slurry and backfilling it with materials of

low PERMEABILITY for the purpose of the containment of the lateral flow of water and other fluids.

small-quantity generator, *n* – [ENVIRONMENTAL REGULATION] persons or enterprises that produce 220 to 2,200 pounds per month of HAZARDOUS WASTE; they are required to keep more records than conditionally exempt generators. The largest category of hazardous waste generators, SQGs, include automotive shops, dry cleaners, photographic developers, and many other small businesses. *Also see large-quantity generator.*

smear zone, *n* – [HYDROGEOLOGY] SOILS between the top and bottom of the WATER TABLE that becomes saturated by the GROUND WATER part of the year due to water table fluctuations. This area may become contaminated if contamination is floating on the top of the groundwater or if soil contamination extends into the smear zone.

smelter, *n* -- [INDUSTRIAL TECHNOLOGY] a facility that melts or fuses ore, often with an accompanying chemical change, to separate its metal content. Emissions cause pollution. "Smelting" is the process involved.

smog, *n* – [METEOROLOGY] a FOG containing impurities, mainly nitrogen oxides and VOLATILE ORGANIC COMPOUNDS from domestic fires, industrial furnaces, certain power stations and internal combustion engines.

snow, *n* – [METEOROLOGY] type of PRECIPITATION that forms in air with TEMPERATURES below freezing. Snow forms when water vapor deposits directly as a solid on a deposition nuclei, by passing the liquid state. A snowflake forms first as a very tiny crystal developing on a six-sided hexagonal deposition nuclei. The ice crystal then grows fastest at the six points as these area are more directly exposed to the atmosphere's water vapor. Snow is most common in winter just north of the center of mid-latitude cyclones. As the warm moist air travels around the center of lowest pressure, it overrides colder air located north of the low and is cooled to its saturation temperature, producing rainfall and snow. Snow generally occurs with east winds, since the winds at locations north of a mid-latitude cyclone are from the east. *Also see fog, hail, rain and sleet.*

snow field, *n* – [GEOGRAPHY] a permanent accumulation of snow and ice, normally found above the snow line. The term is often applied to mountainous and glacial terrains. In glaciology, the term refers to locations on top of a glacier where there is a permanent snow cover. *Also known as a névé.*

soda ash, *n* – [CHEMISTRY] commercial term for sodium carbonate, Na_2CO_3.

sodium (Na), *n* – [CHEMISTRY] a soft, bright, silvery METALLIC ELEMENT, one of the ALKALI METALS. It is a very reactive element and is never found free in nature. The most common compound is sodium chloride. Sodium compounds are important to the paper, glass, soap, textile, petroleum, chemical, and metal industries.

sods, *n* – [GEOGRAPHY] a mountain-top MEADOW or BOG, in an area that is forested (a term often used in the Allegheny Mountains of eastern West Virginia).

softwood, *n* – [DENDROLOGY] a conventional term for both timber and TREES belonging to the botanical group GYMNOSPERMS and, in practice, almost restricted to CONIFERS.

soil (earth), *n* — [GEOLOGY] sediments or other unconsolidated accumulations of solid particles produced by the physical and chemical disintegration of rocks, and which may or may not contain organic matter.

soil-cleanup criteria (*pl.*), criterion (*s.*), *n* [ENVIRONMENTAL REGULATION] -- contaminant concentrations in soil that must be met to obtain case closure from a regulatory agency. *Also known as cleanup standards.*

soil creep, *n* – [AGRONOMY] the slow downward progression of rock and soil down a low grade slope. *Also known as mass wasting.*

soil depletion, *n* – [AGRONOMY] decrease in soil quality over time. Causes include loss of NUTRIENTS caused by overfarming, EROSION by wind, and chemical imbalances caused by acid rain.

soil-forming factors, *n* — [AGRONOMY] factors, such as PARENT MATERIAL, CLIMATE, VEGETATION, TOPOGRAPHY, ORGANISMS, and TIME involved in the transformation of an original geologic deposit into a soil profile.

soil gas, *n* — [AGRONOMY] *1*. vadose zone atmosphere. *2*. gaseous elements and compounds in the small spaces between particles of the earth and soil. Such gases can be moved or driven out under pressure and samples collected.

soil horizon — *See horizon*.

soil map, *n* – [AGRONOMY] a map designed to show the distribution of soil types or other soil mapping units in relation to other prominent physical and cultural features on the earth's surface. The Soil Conservation Service (SCS), a division of the U. S. Department of Agriculture, produces soil maps for most counties within the USA.

soil mechanics, *n* — [AGRONOMY] the application of the LAWS and PRINCIPLES of MECHANICS and HYDRAULICS to engineering problems dealing with soil as an engineering material.

soil physics, *n* — [AGRONOMY] the organized body of KNOWLEDGE concerned with the physical characteristics of soil and with the methods employed in their determinations.

soil profile (profile), *n* — [AGRONOMY] vertical section of a soil, showing the nature and sequence of the various layers, as developed by deposition or weathering, or both.

soil stabilization, *n* – [AGRONOMY] treatment of soil to improve its properties; includes the mixing of additives and other means of alterations such as COMPACTION or DRAINAGE.

soil-vapor extraction, *n* – [REMEDIATION TECHNOLOGY] a technology where a vacuum is applied to a well or multiple wells with screened intervals open to the soil which contains contaminants.

soil washing, *n* – [REMEDIATION TECHNOLOGY] a technology that uses water or other liquids to remove contaminants from soils. The process works by either dissolving or suspending contaminants in the wash solution. It is often used in conjunction with other physical separation techniques such as pump-and-treat.

soil-water pressure, *n* — [AGRONOMY] the PRESSURE on the water in a soil-water system, as measured by a PIEZOMETER for a water saturated soil, or by a TENSIOMETER for an unsaturated soil.

Solar System, *n* – [ASTRONOMY] the SUN and those celestial objects bound to it by GRAVITY.

sole-source aquifer, *n* – [HYDROGEOLOGY] an AQUIFER that supplies 50-percent or more of the drinking water of an area.

solidification and stabilization, *n* – [TREATMENT TECHNOLOGY] a technology used to prevent the migration of hazardous substances from a site. Generally, contaminated soils are excavated and mixed with concrete or other agents to form solid blocks that are then usually buried at the site. Alternatively, a slurry of binding agents can be injected directly into the ground, where the material fills all available spaces and hardens into a solid mass.

solid phase, *n* – [PHYSICS] a relatively dense, rigid state of MATTER, with a definite VOLUME and shape. MOLECULES in solids are often packed close together in regularly repeating PATTERNS, and vibrate around fixed positions. *Also known as solid state.*

solid waste, *n* – [WASTE DISPOSAL] non-liquid, non-soluble materials ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substances. Solid wastes also include sewage sludge, agricultural refuse, demolition wastes, and mining residues. Technically, solid waste also refers to liquids and gases in containers. *Also see garbage,refuse, rubbish and trash.*

solid waste disposal site, *n* — [WASTE DISPOSAL] a place, location, tract of land, area, or premises used for the disposal of solid wastes as defined by state solid waste regulations. The term is synonymous with the term LANDFILL and is also known as a garbage dump, trash dump, or similar term.

solonchak, *n* – [AGRONOMY] an intrazonal SALINE SOIL found in hot, arid climates.

solonetz, *n* – [AGRONOMY] an intrazonal, formerly SALINE, SOIL.

solstice, *n* – [GEOGRAPHY] the time (21 June or 22 December) at which the overhead sun is furthest from the EQUATOR and appears to stand still before returning towards the equator.

solubility, *n* – [CHEMISTRY] the amount of MASS of a COMPOUND that will dissolve in a unit VOLUME of SOLUTION. Aqueous Solubility is the maximum concentration of a chemical that will dissolve in pure water at a reference TEMPERATURE. The solubility of a certain chemical can also be dependent of the pressure and the presence of other chemicals in the solution.

solubility product (K_{sp}), *n* – [CHEMISTRY] the EQUILIBRIUM CONSTANT that describes a SOLUTION of a slightly soluble SALT in WATER[33].

solum, *n* – [AGRONOMY] part of the SOIL that is capable of supporting LIFE.

solute phase, *n* — [CHEMISTRY] a condition of CONTAMINANT residence in which contaminants are dissolved in ground water in either the saturated or the vadose zone.

solute transport, *n* -- [HYDROGEOLOGY] the movement of dissolved CONSTITUENTS in GROUND WATER.

solute transport model, *n* – [HYDROGEOLOGY] application of a model to represent the movement of chemical species dissolved in GROUND WATER.

solution, *n* – [CHEMISTRY] *1*. an act or the PROCESS by which a SOLID, LIQUID, or GASEOUS SUBSTANCE is HOMOGENEOUSLY mixed with a liquid or sometimes a gas or solid. *2*. a homogeneous mixture formed by this process, especially, a single-phase liquid system. *3*. the condition of being dissolved.

solution channel, *n* – [HYDROGEOLOGY] openings in rock masses formed by moving water carrying away soluble materials.

solvent, *n* — [CHEMISTRY] a CHEMICAL COMPOUND that is capable of dissolving another SUBSTANCE and, potentially, a HAZARDOUS substance, used in a number of manufacturing/industrial processes including but

not limited to the manufacture of paints and coatings for industrial and household purposes, equipment clean-up, and surface degreasing in metal fabricating industries.

solvent extraction, *n* – [INDUSTRIAL TECHNOLOGY] an innovative treatment technology that uses a solvent to separate or remove hazardous organic contaminants from oily-type wastes, soils, sludges, and sediments. The technology does not destroy contaminants, but concentrates them so they can be recycled or destroyed more easily by another technology. Solvent extraction has been shown to be effective in treating sediments, sludges, and soils that contain primarily organic contaminants, such as PCBs, VOCs, halogenated organic compounds, and petroleum wastes. Such contaminants typically are generated from metal degreasing, printed circuit board cleaning, gasoline, and wood preserving processes. Solvent extraction is a transportable technology that can be brought to the site.

solvent mileage, *n* – [DRY CLEANING TECHNOLOGY] the WEIGHT of clothes cleaned per gallon of DRY-CLEANING FLUID used in pounds per gallon.

solvolysis, *n* [CHEMISTRY] generally, a REACTION with a solvent, involving the rupture of one or more BONDS in the reacting SOLUTE. More specifically, the term is used for substitution, elimination, or fragmentation reactions in which a solvent species is the nucleophile (HYDROLYSIS, if the solvent is water or alcoholysis if the solvent is alcohol)[62].

sonic log, *n* – [GEOPHYSICS] measure the acoustic velocity of a rock formation. Sonic log provides a formation's internal transit time. The speed of sound in rock is related to lithology, rock texture, notably porosity. Sonic logs are very useful in integrating seismic data with well log data. As we learned in the last week, the vertical scale of seismic sections is in "two way travel time". Sonic log can be used to change the time scale into depth scale. *Also see electric log, gamma log, gamma-gamma log, induction log, neutron log, resistivity log, sonic log and spontaneous potential log.*

sorbate, *n* — [CHEMISTRY] chemical species sorbed by a SORBENT.

sorbed phase, *n* — [CHEMISTRY] a condition of contaminant residence in which contaminants are adsorbed into the surface of soil particles or absorbed by soil organic matter.

sorbent, *n* — [CHEMISTRY] a substance that sorbs the solute from solution (for example, soil, sediment, till, etc.).

sorption, *n* — [CHEMISTRY] depletion of an amount of SOLUTE initially present in solution by a sorbent. *Also see adsorption.*

sorting, *n* – [GEOLOGY] *1*. the process by which a given transport medium separates out certain particles, as on the basis of size, shape, or density.

sound, *n* – [GEOGRAPHY] *1*. a long broad inlet of the OCEAN generally PARALLEL to the COAST. *2*. a long passage of WATER connecting two larger bodies (as a SEA with the ocean) or separating a mainland and an ISLAND. *Also see bay and gulf.*

source, *n* — [HYDROGEOLOGY] the location at which CONTAMINATION has entered the NATURAL ENVIRONMENT.

source reduction, *n* – [REMEDIATION TECHNOLOGY] any activity that eliminates or decreases wastes by avoiding their creation, typically by materials substitution, process design, or product redesign.

source water, *n* – [HYDROLOGY] the supply source of water (for example, private wells, public water supply) to a discharger, where the source water becomes part of a discharge.

sour crude, *n* – [PETROLEUM CHEMISTRY] high-sulfur-containing CRUDE OIL. *Also see sweet crude.*

> DISCUSSION – Sour crude, which is less economically advantageous than sweet crude, can be found in places such as the Venezuela and Mexico.

sour gas, *n* – [PETROLEUM CHEMISTY] any gas or natural gas that contains hydrogen sulfide in significant amounts. *Also see acid gas.*

space, *n* – [PHYSICS] *1*. a distance, area, or volume. *2*. an infinite three-dimensional area in which objects have relative coordinates to each other. *3*. the region beyond the outer limits of the Earth's atmosphere.

sphagnum, *n* – [BIOLOGY] a grayish moss growing in dense layers in BOGS, that eventually forms PEAT.

speciation, *n* – [BIOLOGY] the evolutionary formation of a new biological SPECIES, usually the division of a single, existing species into two or more genetically distinct ones.

speciation, *n* – [CHEMISTRY] the distribution of a chemical SPECIES amongst defined chemical species in a system,

species, *n* – [BIOLOGY] *1*. a reproductively isolated aggregate of interbreeding ORGANISMS having common ATTRIBUTES and usually designated by a common name. *2*. an organism belonging to belonging to such a category.

> DISCUSSION – The biological categories can be remembered with the following phrase: "Keep Peeling Onions For Good Smells Instantly", describing: Kingdom, Phylum, Order, Family, Genus, Species and Individual.

species, *n* – [CHEMISTRY] ATOMS, MOLECULES or molecular fragments, which are entities being subjected to chemical processes or to a measurement.

specific activity, *n* – [CHEMISTRY] the number of radioactive decays that take place per unit mass. In general, this means that a low specific-activity material releases a relatively small amount of radiation[64].

specific capacity, *n* — [HYDROGEOLOGY] [L^2T^{-1}] the RATE of DISCHARGE from a WELL divided by the DRAWDOWN of the water level within the well at a specific TIME since PUMPING started.

specific conductance, *n* – [CHEMISTRY] a measure of the capacity of a water to conduct an electrical current, expressed in microsiemens per centimeter at 25° C.

specific discharge, *n* — [HYDROGEOLOGY] [LT^{-1}] the rate of flow of water through a porous medium per unit area measured at a right angle to the direction of flow.

specific gravity, *n* – [PHYSICS] there are several types of specific gravities:

- ***specific gravity of solids*** — ratio of: (*1*) the weight in air of a given volume of solids at a stated temperature to (*2*) the weight in air of an equal volume of distilled water at a stated temperature.
- ***apparent specific gravity*** — ratio of: (*1*) the weight in air of a given volume of the impermeable portion of a permeable material (that is, the solid matter including its impermeable pores or voids) at a stated temperature to (*2*) the weight in air of an equal volume of distilled water at a stated temperature.
- ***bulk specific gravity (specific mass gravity)*** — ratio of: (*1*) the weight in air of a given volume of a permeable material (including both permeable and impermeable voids normal to the material) at a stated temperature to (*2*) the weight in air of an equal volume of distilled water at a stated temperature.

specific heat capacity, *n* – [PHYSICS] the heat capacity of a substance per unit mass.

specific retention, *n* – [HYDROGEOLOGY] the ratio of the VOLUME of water a rock can retain (in spite of gravity) to the total volume of rock. *Also see field capacity, residual saturation and water capacity.*

specific storage, *n* — [HYDROGEOLOGY] the volume of water released from or taken into storage per unit volume of the porous medium per unit change in head.

specific surface, *n* — [HYDROGEOLOGY] the surface area per unit of volume of soil particles.

specific yield, *n* — [HYDROGEOLOGY] the ratio of the volume of water that the saturated rock or soil will yield by gravity to the volume of the rock or soil. In the field, specific yield is generally determined by tests of unconfined aquifers and represents the change that occurs in the volume of water in storage per unit area of unconfined aquifer as the result of a unit change in head. Such a change in storage is produced by the draining or filling of pore space and is, therefore, mainly dependent on particle size, rate of change of the water table, and time of drainage.

specimen, *n* — [ENVIRONMENTAL INVESTIGATION] pieces or quantity taken or prepared from a sample for testing. *Also see sample.*

spectra (*pl.*), spectrum (*s.*), *n* – [PHYSICS] *1.* a sequence of colors produced by passing light through a prism or diffraction grating. *2.* a range of wavelengths of electromagnetic radiation. *3.* a plot that shows how some intensity-related property of a beam of radiation or particles depends on another property that is related to dispersal of the beam by a prism, a magnet, or some other device. For example, a plot of light absorbance versus wavelength is an absorption spectrum; a plot of ion abundance versus mass is a mass spectrum.

speed of light, *n* – [PHYSICS] VELOCITY of LIGHT in a VACUUM. This velocity is APPROXIMATELY 3 x 10^8 meters per second. It takes light from the sun 8 minutes and 20 seconds to reach the Earth.

speleothem, *n* – [GEOLOGY] a mineral deposit of calcium carbonate that precipitates from SOLUTION in a CAVE.

spent fuel, *n* – [CHEMISTRY] fuel assemblies taken out of a nuclear reactor after a period of useful energy production[64]. *Also referred to as irradiated fuel or used fuel.*

sphericity, *n* – [GEOLOGY] the degree to which the grain approaches a sphere.

spill bucket, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] a device installed at the FILL PIPE and at the DISPENSER to contain the drips and spills of fuel that can occur when the delivery hose is uncoupled from the fill pipe after delivery.

spit, *n* – [GEOLOGY] a narrow, fingerlike ridge of SAND that extends from land into open water. *Also known as a sandspit.*

split spoon, *n* – [ENVIRONMENTAL INVESTIGATION] a hollow, metal tube which is inserted into boreholes to collect SOIL SAMPLES. The device splits in two so that the sample can be retrieved. *Also see Shelby tube.*

spoils, *n* – [MINING] waste materials removed from a mining facility that is not considered a useful product[66]. *Also known as spoil material.*

spoliation, *n* – [LAW] destruction of a thing or evidence by the act of a stranger; as, the erasure or alteration of a writing by the act of a stranger, is called spoliation. This has not the effect to destroy its character or legal effect.

spontaneous potential log, *n* – [GEOPHYSICS] one of the oldest logging techniques. It employs very simple equipment to produce a log whose interpretation may be quite complex, particularly in freshwater aquifers. This complexity has led to misuse and misinterpretation of spontaneous potential (SP) logs for groundwater applications. The spontaneous potential log (incorrectly called self potential) is a record of potentials or voltages that develop at the contacts between shale or clay beds and a sand aquifer, where they are penetrated by a drill hole. *Also see electric log, gamma log, gamma-gamma log, induction log, neutron log, resistivity log and sonic log.*

spring, *n* – [HYDROGEOLOGY] GROUND WATER seeping out of the earth where the water table intersects the ground surface.

spring, artesian, *n* – [HYDROGEOLOGY] water flowing under ARTESIAN PRESSURE with the POTENTIOMETRIC SURFACE above the land surface.

spring, barrier, *n* – [HYDROGEOLOGY] a subsurface barrier forcing water to rise to ground surface and discharge as a spring.

spring overturn, *n* – [HYDROLOGY] a physical phenomenon that may take place in a body of water during the early spring. The sequence of events leading to spring overturn include: *1*. melting of ice cover; *2*. warming of surface water; *3*. density changes in surface waters producing convection currents; *4*. circulation of the total water volume by wind action, and *5*. vertical temperature homogenization. The overturn mixes the water mass and results in a lake that is physically and chemically more uniform.

spring tide, *n* – [HYDROLOGY] TIDE with large amplitude at the times of full moon and new moon. *Also see neap tide*.

spur, *n* – [GEOLOGY] a subsidiary SUMMIT of a MOUNTAIN.

square number, *n* – [MATHEMATICS] a number of the form n^2; a number multiplied by itself.

square root, *n* – [MATHEMATICS] the number *x* is said to be a square root of *y* if $x^2 = y$. *Also see radical and radicand.*

stability, *n* – [PHYSICS] the quality or act of being firmly fixed or established, not easily adjusted, destroyed or altered.

stabilization, *n* – [TREATMENT TECHNOLOGY] a process for treating a WASTE to minimize an undesirable attribute of that waste; the treating of solids from wet scrubbing or other air POLLUTION control processes; FLY ASH is often used as a reagent or filler.

stable, *adj* -- [CHEMISTRY] expresses a thermodynamic property, which is quantitatively measured by relative molar standard Gibbs energies. A chemical species A is more stable than its isomer B if $\Delta rGo > 0$ for the (real or hypothetical) reaction A → B, under standard conditions[62].

stable isotope, *n* – [ISOTOPES] an ISOTOPE that does not emit RADIATION such as ^{13}C or ^{18}O. *Also see radioisotope.*

stable carbon isotope ratio, *n* -- [ISOTOPES] relative amount of ^{13}C versus ^{12}C in organic matter. This ratio can be used to fingerprint different types of contaminant releases, for example, gasoline discharges. A bulk value can be obtained for a product, such as gasoline, or a compound-specific value can be determined for specific constituents in the product.

stable plume, *n* – [HYDROGEOLOGY] configuration where the SOLUTE PLUME margin is stationary over time and concentrations at points within the plume are relatively uniform over time or may decrease over time.

stablization pond—*See sewage lagoon.*

stage, *n* – [HYDROLOGY] the elevation of the WATER surface in a STREAM CHANNEL.

stagnation point, *n* – [HYDROGEOLOGY] the foremost point on a streamline dividing an area of pumping depression from a zone of influence in a tilted AQUIFER being pumped by a well.

staining, *n* – [PHYSICS] discoloration by the action of LIQUID sinking in or some foreign matter. Staining often occurs when a petroleum product enters a soil.

stand, *n* – [DENDROLOGY] a group of growing PLANTS.

standard deviation (σ), *n* – [STATISTICS] a STATISTICAL measure of the spread of the DATA where,

$$\sigma = \sqrt{[\Sigma(x_i - x)^2/n]}$$

n is the number of items in the data set, x is the mean value and x_i is the value of each item.

standard error, *n* – [STATISTICS] the potential difference between the MEAN value calculated from a sample of a DATA set, and the mean value of the total POPULATION of the data set.

standard of proof, *n* – [LAW] the amount of evidence which a plaintiff (or prosecuting attorney, in a criminal case) must present in a trial in order to win is called the standard of proof. Different cases require different standards of proof depending on what is at stake. The common standards are:

> ***beyond a reasonable doubt (criminal cases)-*** **-**for a criminal defendant to be convicted of a crime, the prosecutor must prove her case to the point that the jurors have no reasonable doubts in their minds that the defendant did whatever he is charged with having done. ***clear and convincing evidence (civil cases involving the potential loss of important interests)*** **--** for a party to prove a case under this standard, he or she must show something more than it is more likely than not, but not as much as beyond a reasonable doubt. No legal scholar has ever been able to define clear and convincing evidence more precisely than that.
>
> ***preponderance of the evidence (most civil cases)*****--**preponderance of the evidence generally means that a party will win if he or she can show that it is more likely than not that her contention is true.

standard sea level pressure, *n* -- [METEOROLOGY] average height of the MERCURY column in a mercurial barometer: 76 centimeters, 29.92 inches or 1,013.2 millibars.

star, *n* – [ASTRONOMY] a massive, luminous ball of PLASMA held together by GRAVITY. The SUN is a star.

state, *n* – [LAW] *1*. a self-sufficient body of persons united together in one community for the defence of their rights, and to do right and justice to foreigners. In this sense, the state means the whole people united into one body politic; and the state, and the people of the state, are equivalent expressions. *2*. an organized, political community under one GOVERNMENT, a commonwealth, a nation.

state, *n – 1*. a condition or stage in the physical being of something.

statement, *n* – [LAW] an expression in WORDS; a declaration.

state-of-the-art technology, *n* – [TECHNOLOGY] up-to-date TECHNOLOGY reflected in equipment or procedures that, when applied at a major facility, will result in a significant reduction in the probability of a contaminant discharges. For example, the concept of state-of-the-art technology would represent an advancement in reduction of leaks or discharges and could be demonstrated at a similar facility to be reliable in commercial operation or in a pilot operation on a scale large enough to be translated into commercial operation. The technology shall be in the public domain at reasonable cost commensurate with the reduction in probability of leaks or discharges achieved, or otherwise available at reasonable cost commensurate with the reduction in probability of leaks or discharges achieved.

static pressure, *n* – [HYDROGEOLOGY] [$ML^{-1}T^{-2}$] the pressure exerted by a fluid. It is the mean normal compressive stress on the surface of a small sphere around a given point[65].

static water level, *n* — [HYDROGEOLOGY] the ELEVATION of the top of a column of WATER in a MONITORING WELL or PIEZOMETER that is not influenced by PUMPING or conditions related to well installation, HYDROLOGIC TESTING, or nearby pumpage.

static, *adj* – [PHYSICS] of FORCE acting by WEIGHT without MOTION, as opposed to DYNAMIC. *Also see dynamic.*

statics, *n* – [PHYSICS] SCIENCE of bodies at rest or of forces in EQUILIBRIUM.

statistics, *n* – [MATHEMATICS] branch of MATHEMATICS dealing with the collection, ANALYSIS, interpretation, and presentation of masses of numerical DATA.

> DISCUSSION – Winston Churchill once said that "there are three types of lies: lies, damned lies and statistics".

Also see algebra, calculus, geometry, geostatistics and mathematics.

statute, *n* – [LAW] a formal written enactment of a legislative body, whether federal, state, city or county; an act of the legislature declaring, commanding or prohibiting something.

statute of limitations, *n* – [LAW] LAWS setting deadlines for filing lawsuits within a certain time after events occur that are the source of a claim. These deadlines vary depending on the state, the type of issue and the circumstances of the case. A lawsuit filed after the deadline will be thrown out of court.

steady state, *adj* – [PHYSICS] a type of EQUILIBRIUM where the average condition of the system remains unchanged over time.

steady-state flow, *n* – [HYDROGEOLOGY] a characteristic of a GROUND WATER or VADOSE ZONE flow system where the magnitude and direction of specific discharge at any point in space are constant in time. *Also known as steady flow. Also see uniform flow and unsteady-state flow.*

steady state model, *n* – [HYDROGEOLOGY] a numerical model in which model stresses do not vary over time. A steady state model is run until the modeled basin is

in equilibrium and no more changes in potentiometric head are calculated.

steam, *n* – [PHYSICS] a vapor arising from a heated substance; the invisible vapor into which water is converted when heated to the boiling point; the mist formed by the condensation on cooling of water vapor.

steam cracker, *n* – [PETROLEUM CHEMISTRY] a PETROCHEMICAL plant, often associated with a refinery, that produces OLEFINS, particularly ethylene, and, in some cases, AROMATICS. *Also see catalytic cracking.*

stem, *n* – [BIOLOGY] in a plant, the aboveground conducting portion, with a specific anatomic structure.

step-drawdown test, *n* — [HYDROGEOLOGY] a test in which a control well is pumped at constant rates in "steps" of increasing discharge. Each step is approximately equal in duration, although the last step may be prolonged. A step-drawdown test is often conducted immediately before a long-term pumping test to determine the sustainable yield of the aquifer and consequently choose a pumping rate for the test. *Also see pumping test and slug test.*

step faults, *n* – [GEOLOGY] a series of PARALLEL FAULTS each having movement in the same direction but with an increasing THROW from the top to bottom.

steppe, *n* – [GEOGRAPHY] Russian term for mid-LATITUDE grasslands.

steranes, *n* – [FINGERPRINTING] BIOMARKERS found in CRUDE OIL derived from the sterols of cell membranes of eukaryotes, mainly algae and higher plants. Composed of saturated biomarkers constructed of six isoprene units ($\sim C_{30}$)[34]. These biomarkers are often used to fingerprint spilled crude oils and heavier refined petroleum products.

stereochemistry, *n* – [CHEMISTRY] the three-dimensional relationship of atoms within a molecule[34].

stereoisomers, *n* – [CHEMISTRY] COMPOUNDS that have the same MOLECULAR FORMULA and the same linkage between ATOMS but different spatial arrangements of the atoms, typically around an asymmetric carbon atom. Stereoisomers include ENANTIOMERS (mirror-image structures) and diasteromers (epimers), which differ at certain asymmetric centers but are identical at others[34]. *Also see enantiomers*.

stereoscope, *n* – [REMOTE SENSING] a type of binocular used to create a three-dimensional image from two photographs, usually AERIAL PHOTOGRAPHS, taken at different angles but of the same area.

sterile, *adj* — [BIOLOGY] free from any viable ORGANISM, either active or dormant.

Stiff Diagram, *n* – [CHEMISTRY] a visual METHOD to compare the relative proportions of IONS in water. Ion CONCENTRATIONS in milligrams per liter (mg/l) are converted to millequivalents per liter (meq/l). CATIONS (positively charged ions) are plotted on the left side of the DIAGRAM, with ANIONS (negatively charged ions) plotted on the right. The length of the diagram vertices are proportional to ionic content. Different ion combinations can be plotted in Stiff diagrams depending on AQUEOUS GEOCHEMISTRY, and on what the author wants to demonstrate.

stigma, *n* – [INSURANCE] the residual loss in value above and beyond the actual cost to cure or control the environmental condition of concern if such extraordinary loss is evident in the marketplace. Stigma generally is a result of uncertainty as to the cost, effectiveness or permanency of the methodology of cure/control, or uncertainty concerning the environmental regulatory agencies' endorsement of such methodology or results. Stigma is a time-dependent phenomena and as such may be only temporary in effect.

still gas, *n* -- [PETROLEUM CHEMISTRY] any form or mixture of gases produced in refineries by DISTILLATION, CRACKING, REFORMING, and other processes. Principal constituents are METHANE, ETHANE, ethylene, normal butane, butylene, PROPANE, propylene, etc. Used as a refinery fuel and as a PETROCHEMICAL FEEDSTOCK.

stochastic, *adj* – [STATISTICS] governed by the laws of PROBABILITY. *Also see probability and statistics.*

stochastic hydrology, *n* – [HYDROLOGY] HYDROLOGICAL PROCESSES and PHENOMENA which are described and analysed by the METHODS of PROBABILITY THEORY.

stochastic model, *n* – [STATISTICS] a MODEL which shows probability changes through time.

stock, *n* – [GEOLOGY] a small PLUTON, with a surface exposure area of less than 40 square miles (or about 100 square kilometers).

Stoddard solvent, *n* – [PETROLEUM CHEMISTRY] a colorless, flammable liquid that smells and tastes like kerosene. It will turn into a vapor at temperatures of 150° to 200 °C. It is a petroleum mixture that is also known as dry cleaning safety solvent, petroleum solvent, and varnoline; its registered trade names are Texsolve S® and Varsol 1®. It is a chemical mixture that is similar to white spirits. Stoddard solvent is used as a paint thinner; in some types of photocopier toners, printing inks, and adhesives; as a dry cleaning solvent; and as a general cleaner and degreaser.

stoichiometry, *n* – [CHEMISTRY] *1.* ratios of ATOMS in a COMPOUND. *2.* ratios of MOLES of compounds in a reaction. *3.* a branch of CHEMISTRY that quantitatively relates amounts of ELEMENTS and compounds involved

in CHEMICAL REACTIONS, based on the law of conservation of mass and the law of definite proportions.

Stoke's Law, *n* – [HYDROLOGY] a FORMULA expressing the rates of settling of spherical particles in a fluid. Gives the rate of fall of a small sphere in a viscous fluid. When a small sphere falls under the action of gravity through a viscous medium, it ultimately acquires a constant velocity, V, where,

$$V = 2g\alpha^2 (d_1 - d_2)/9\varepsilon$$

and g is gravitational acceleration, a is the radius of the sphere, d_1 and d_2 are the densities of the sphere and of the medium, respectively, and ε is the coefficient of viscosity. V will be in centimeters per second if g is in centimeters per second per second; *a* will be in centimeters; d_1 and d_2 will be in grams per cubic centimeter; and ε will be in dynes second per square. *Also see sedimentology.*

stone, *n* — [GEOLOGY] crushed or naturally angular particles of ROCK.

storage coefficient, *n* — [HYDROGEOLOGY] the volume of water an AQUIFER releases from or takes into storage per unit surface area of the aquifer per unit change in head. For a confined aquifer, the storage coefficient is equal to the product of the specific storage and aquifer thickness. For an unconfined aquifer, the storage coefficient is approximately equal to the specific yield.

storativity — *See storage coefficient*

storm sewer, *n* – [HYDROLOGY] a system of pipes (separate from SANITARY SEWERS) that carries water runoff from buildings and land surfaces.

storm water, *n* – [HYDROLOGY] water from precipitation that flows across the ground and pavement when it rains or when snow and ice melt. The water seeps into the ground or can drain into storm sewers. These are drains along street corners or at low points on the sides of streets. Collectively, the draining water is called storm water runoff and is a concern in commercial and industrial sites as well as residential neighborhood because of the pollutants it carries. When it rains, oil, antifreeze, detergents, pesticides and other pollutants get washed from driveways, backyards, parking lots, and streets into storm drains and then directly to surface-water bodies. *Also see runoff and storm sewer.*

stoss and lee topography, *n* – [GEOLOGY] a glaciated LANDSCAPE where the LANDFORMS facing up-glacier show erosion while their lee sides show a degree of protection from GLACIAL EROSION.

straight-run gasoline, *n* – [PETROLEUM CHEMISTRY] GASOLINE produced by the primary DISTILLATION of CRUDE OIL. It contains no cracked, polymerized, alkylated, reformed, or visbroken stock.

> DISCUSSION -- Prior to the 1960s, a large proportion of the gasoline sold in the USA was straight-run. Today, straight-run gasoline is no longer available because it cannot meet the octane-rating requirements of modern vehicles.

straight-run refinery products, *n* – [PETROLEUM CHEMISTRY] distillation cuts from crude oil feedstock that include gasoline (C_5 – C_{10}), kerosene (C_{11}-C_{13}), diesel (C_{14}-C_{18}), heavy gas oil (C_{19}-C_{25}), lubricating (C_{26}-C_{40}) and residuum (>C_{40}). The carbon number ranges are approximate and differ depending on specific distillation columns[34].

strain, *n* – [PHYSICS] general term for the DEFORMATION of a solid by bending or volume change when stress is applied. *Also see stress.*

strait, *n* – [GEOGRAPHY] a comparatively narrow passageway connecting two large bodies of water. *Also see channel and narrows.*

strand, *n* – [GEOLOGY] *from German*, *1.* a BEACH; *2.* an unconsolidated geological formation consisting of loose rock particles along the shoreline of a body of water.

strandline, *n* – [GEOLOGY] a relict feature where there used to be a BEACH when large glacial lake(s) occupied the lowlands during glaciations. These lines are now visible as wave-cut terraces where the former beach waves eroded and deposited a steep terrace riser and a flat terrace tread.

strand plain, *n* – [GEOLOGY] a broad belt of sand located along a shoreline with a surface exhibiting parallel or semi-parallel sand RIDGES separated by shallow swales. A strandplain differs from a BARRIER ISLAND because it lacks LAGOONS and tidal marsh that separate a barrier island from the shoreline (to which the strandplain is directly attached). The tidal channels and inlets, which cut through barrier islands, are absent in a strand plain.

strang , *n* – [GEOLOGY] a low PEAT RIDGE.

strata (*pl.*), stratum (*s.*), *n* – [GEOLOGY] the LAYERS or beds found in SEDIMENTARY ROCK. *Also see bed, layer and seem.*

strath, *n* – [GEOGRAPHY] a broad VALLEY. A Scottish term.

stratified drift, *n* – [GEOLOGY] SEDIMENTS deposited by glacial meltwater that are sorted and layered; a major subdivision of glacial drift that includes river, lake, and marine deposits.

stratified sampling, *n* – [ENVIRONMENTAL INVESTIGATION] samples are selected according to some known background characteristic in the

statistical population.

stratigraphic column, *n* – [GEOLOGY] a chronologic succession of sedimentary rocks (consolidated or unconsolidated) from older below to younger above, essentially without interruption; such as a sequence of bedded rocks of interregional scope, bounded by unconformities.

stratigraphy, *n* – [GEOLOGY] the study of the formation, composition, and sequence of sediments, whether consolidated or not.

streak, *n* – [MINERALOGY] the color of a MINERAL in its powder form and is obtained by rubbing the mineral across a plate of unglazed porcelain.

stream, *n* – [HYDROLOGY] a body of water found on the Earth's surface and confined to a narrow topographic depression, down which it flows and transports rock particles, sediment, and dissolved particles. Rivers, creeks, brooks, and runs are all streams. *Also see brook, creek, river and run***.**

***annular stream* –** streams forming a pattern of of incomplete concentric circles.

consequent stream – stream that takes its course down the slope of an initial LANDFORM, such as a newly emerged coastal plain or volcano.

graded stream – stream with its gradient adjusted to achieve a balanced state in which the average bed load transport rate is matched to the average bed load input rate.

radial stream – streams flowing radially outward from a central peak or highland such as a sedimentary dome or volcano.

subsequent stream – stream that develops its course by stream erosion along a band or belt of less resistant rock.

stream capture, *n* – [HYDROLOGY] a process of EROSION where one stream erodes headward, diverting some of another stream's drainage into its own channel. *Also called stream piracy.*

stream depletion, *n* – [HYDROLOGY] a decrease in river gains or an increase in river losses resulting from a change in the WATER TABLE.

stream gage, *n* – [HYDROLOGY] a station established to measure FLOW in a RIVER or STREAM.

stream order, *n* – [HYDROLOGY] the numbering of STREAMS in a network.

stream piracy—*See stream capture.*

streamside management zone (SMZ), *n* – [ENVIRONMENTAL REGULATION] an area of varying width adjacent to a watercourse in which special management precautions are necessary to protect natural resources.

stress, *n* – [PHYSICS] *1*. pressure or tension exerted on a material object. *2*. a demand on physical or mental energy. *Also see strain.*

stressors, *n* – [ECOLOGY] PHYSICAL, CHEMICAL, or BIOLOGICAL entities that can induce adverse effects on ecosystems or human health.

striation, *n* – [GEOLOGY] a long scratch on a ROCK surface often caused by GLACIAL SCOUR.

strict liability, *n* – [ENVIRONMENTAL REGULATION] a concept under CERCLA that empowers the Federal government to hold PRPs liable without proving that the PRPs were at fault and without regard to a PRP's motive. PRPs can be found liable even if the problems caused by the release of a hazardous substance were unforeseeable, the PRPs acted in good faith, and state-of-the-art hazardous waste management practices were used at the time the materials were disposed of. *Also see potential responsible party.*

strike, *n* — [GEOLOGY] the direction or AZIMUTH of a horizontal line in the plane of an inclined STRATUM, JOINT, FAULT, cleavage plane, or other planar feature within a rock mass. The strike is at a right angle to the DIP of the bed. *Also see dip.*

strike fault, *n* – [GEOLOGY] a FAULT with a strike parallel to the strike of the strata involved. *Also see strike-slip fault.*

strike-slip fault, *n* – [GEOLOGY] a FAULT in which two sections of rock have moved horizontally in opposite directions, parallel to the line of the FRACTURE that divided them. Strike-slip faults are caused by shearing stress. *Also see normal fault, reverse fault,strike fault, thrust fault and transform fault.*

strike valley, *n* – [GEOLOGY] a VALLEY aligned with the STRIKE of the rocks in which it lies.

string bog, *n* – [HYDROLOGY] a marshy area containing ridges of PEAT in a PERIGLACIAL area. *Also see bog, fen, marsh and swamp.*

strip mining, *n* – [MINING] the process of removing mineral deposits that are found close enough to the surface so that the construction of tunnels (underground mining) is not necessary. The soil and strata that cover the deposit are removed to gain access to the mineral deposit. The primary environmental concerns related to this technique are the disposition of spoils removed to gain access to the deposit and the scoring of the landscape that remains following the complete removal of the mineral deposit. Water pollution is also a concern because runoff from the mining area is frequently rich in sediments and minerals.

structural fill, *n* — [CONSTRUCTION] man-made deposits of solid materials. Examples include backfills, landfills, embankments, earth dams, linings and blankets, foundations, canals, road base, footings, and trenches.

structural geology, *n* – [GEOLOGY] the branch of geology that deals with the form, arrangement, and internal structure of the rocks, and esp. with the description, representation, and analysis of structures, chiefly on a moderate to small scale. The subject is similar to tectonics, but the latter is generally used for the broader regional or historical phases.

structural isomers, *n* – [CHEMISTRY] MOLECULES that have the same molecular formula but different linkages between atoms, such as *n*-butane and isobutene. STEREOISOMERS are a special form of structural isomers[34].

structure, *n* — [GEOLOGY] one of the larger features of a rock mass, like BEDDING, FOLIATION, JOINTING, CLEAVAGE, or brecciation; also the sum total of such features as contrasted with TEXTURE. Also, in a broader sense, it refers to the structural features of an area such as ANTICLINES or SYNCLINES. *Also see structural geology.*

structure, *n* — [AGRONOMY] the arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are; PLATY (laminated), PRISMATIC (vertical AXIS of aggregates longer than horizontal), COLUMNAR (prisms with rounded tops), BLOCKY (angular or subangular), and GRANULAR. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Student's T-Test, *n* – [STATISTICS] a statistical test of the NULL HYPOTHESIS that the means of two normally distributed POPULATIONS are equal. All such tests are usually referred to as Student's *t*-tests, though strictly speaking that name should only be used if the variances of the two populations are also assumed to be equal; the form of the test used when this assumption is dropped is sometimes called Welch's t-test. *Also see statistics.*

subaerial, *adj* – [GEOLOGY] occurring on LAND at the EARTH's surface, as opposed to under water or underground.

subarctic, *adj* – [GEOGRAPHY] referring to a region in the Northern Hemisphere immediately south of the true Arctic and covering much of Alaska, Canada, the north of Scandinavia, Siberia, and northern Mongolia. Generally, subarctic regions fall between 50°N and 70°N latitude, depending on local climates.

subbase, *n* — [CONSTRUCTION] a layer used in a pavement system between the subgrade and base coarse, or between the subgrade and portland cement concrete pavement.

subcontinent, *n* – [GEOGRAPHY] a large landmass smaller than a CONTINENT, especially, a major subdivision of a continent such as the Indian subcontinent.

subdrain, *n* – [HYDROLOGY] a pervious backfilled trench containing a pipe or stone for the purpose of intercepting ground water or seepage[66].

subgrade, *n* — [CONSTRUCTION] the soil prepared and compacted to support a structure or a pavement system.

subgrade surface, *n* — [CONSTRUCTION] the SURFACE of the EARTH or ROCK prepared to support a structure or a pavement system.

subjective, *adj* – [LOGIC] depending on personal TASTE or reviews, not objective. *Also see bias and objective.*

sublimation, *n* – [PHYSICS] *1*. the TRANSFORMATION of a SOLID to the GASEOUS PHASE without passing through the normally intermediate LIQUID phase. An example would be evaporation of snow. *2*. the change of a solid to a VAPOR (or the reverse) without the appearance of a liquid state, as in the changing of SNOW directly into water vapor without MELTING.

submerged coastline, *n* – [GEOLOGY] stretches along a coastline that were inundated by the ocean because of a relative rise in sea levels as a result of either ISOSTASY or EUSTASY.

submersible pump – *See centrifugal pump.*

subpoena, *n* – [LAW] an order directed to an individual commanding him or her to appear in court on a certain day to testify or produce documents in a pending LAWSUIT.

subpoena duces tecum, *n* – [LAW] a command to a witness to produce documents.

subrogation, *n* – [INSURANCE] the legal process by which an insurance company, after paying a loss, seeks to recover the amount of the loss from another party who is legally liable for it.

subsidence, *n* – [GEOLOGY] the lowering of the EARTH'S SURFACE, caused by such factors as COMPACTION, a decrease in GROUND WATER, or the PUMPING of OIL.

sub-slab ventilation system, *n* – [REMEDIATION TECHNOLOGY] an engineering control used to capture vapors emanating from subsurface contamination before those vapors enter a building. Perforated pipes are installed beneath a building foundation (or "slab") to capture and funnel harmful vapors that arise from

volatile contaminants beneath a building. In a passive system, the vapors simply follow the pipes to the outside air. In an active system, a fan or blower is attached to the pipes to speed the removal of the vapors.

subsoil, *n* — [AGRONOMY] *1*. soil below a subgrade of fill. *2*. that part of a soil profile occurring below the "A" horizon.

substance, *n* – [CHEMISTRY] *1*. PHYSICAL MATERIAL from which something is made or which has discrete existence. *2*. matter of particular or definite CHEMICAL constitution.

substrate, *n* – [AGRONOMY] the layer of material beneath the surface soil.

substrate, *n* – [BIOLOGY] *1*. the SUBSTANCES used for food by MICROORGANISMS in LIQUID SUSPENSION, as in wastewater treatment. *2*. the physical surface upon which an ORGANISM lives; *3*. the surface, natural or artificial, upon which an organism grows or to which it is attached. *4*. a compound that microorganisms can use in the CHEMICAL REACTIONS catalyzed by their enzymes.

subsurface barrier wall, *n* – [REMEDIATION TECHNOLOGY] an engineering control used to block the flow of contaminated GROUND WATER. Generally, solid metal sheets are driven into the ground to block the groundwater. Alternatively, a liquid substance can be injected into the ground, where it fills all available spaces and hardens into an impermeable barrier.

subterranean, *adj* – [GEOLOGY] existing, occurring or done beneath the EARTH'S surface. *Also known as underground or subsurface.*

subterranean estuary, *n* – [HYDROLOGY] the location where terrestrially-derived, fresh ground water and sea water interact in coastal aquifers[60].

suction, *n* – [PHYSICS] the act or process of drawing in a certain direction by placing a VACUUM or partial vacuum.

suffosion, *n* – [HYDROLOGY] undermining through removal of sediment by mechanical and corrosional action of underground water.

sulfate reducer, *n* – [BIOLOGY] a MICROORGANISM that exists in ANAEROBIC ENVIRONMENTS and reduces sulfate to hydrogen sulfide.

sulfate reduction, *n* – [TREATMENT TECHNOLOGY] an anaerobic, microbially-facilitated process of transforming sulfate (SO_4^{2-}) to sulfide (S^-). This process facilitates the MINERALIZATION of many contaminants, ultimately to CO_2.

sulfur (S), *n* – [CHEMISTRY] ELEMENT number 32, pale-yellow, non-metallic element which burns with a blue flame and a suffocating odor. Spelled "*sulphur"* in the UK.

> DISCUSSION – Sulfur is present in many fossil fuels in both organic and inorganic forms. The organic forms are normally thiophenes or mercaptans (thiols), whereas sulfur can also be found in elemental or sulfide forms. Sulfur in road fuels, such as diesel or gasoline, is now limited in the USA. Therefore, these concentrations may be used to estimate the ages of spilled fuels.

Also see low-sulfur distillate fuel oil, low-sulfur no. 2 diesel fuel, high-sulfur distillate fuel oil, high-sulfur no. 2 diesel fuel and ultra-low-sulfur distillate fuel oil.

sulfur hexafluoride (SF_6), *n* – [AGE DATING] an industrial CHEMICAL that is present in the atmosphere generally at low concentrations, but is highly resistant to degradation and can a useful TRACER for tropospheric, stratospheric, oceanic, and ground-water studies. Also known as an "anthropogenic tracer". In particular, it can be used to estimate the age of GROUND-WATER RECHARGE. A very powerful greenhouse gas used primarily in electrical transmission and distribution systems and as a dielectric in electronics. *Also see chlorofluorocarbons (CFCs), krypton-85 and tritium.*

sulfur bacteria, *n* – [MICROBIOLOGY] bacteria that oxidize sulfur compounds, precipitating sulfur or producing noxious sulfur gases such as hydrogen sulfide.

sumidero , *n* – [GEOLOGY] *from Spanish, 1*. a swallow hole. *2*. in Latin America, any closed depression caused by solution.

summary judgment, *n* – [LAW] a DECISION made on the basis of STATEMENTS and EVIDENCE presented for the record without a TRIAL. It is used when there is no dispute as to the facts of the case, and one party is entitled to judgment as a matter of law.

summit, *n* – [GEOGRAPHY] the flattish top of an erosional fan remnant, hill, mountain, etc. The term is used for both a LANDFORM element and a slope component.

summons, *n* – [LAW] a legal document that notifies a party that a lawsuit has been initiated and states when and where the party must appear to answer the charges. A notice to the defendant requiring him to serve an answer to the complaint.

sump, *n* — [HYDROLOGY] a PIT, CISTERN, CESSPOOL, or similar receptacle where liquids drain, collect, or are stored.

Sun, *n* – [ASTRONOMY] the STAR at the center of the SOLAR SYSTEM. It has a diameter of about 1,392,000

kilometers (865,000 miles), about 109 times that of Earth, and its mass (about 2×10^{30} kilograms, 330,000 times that of Earth) accounts for about 99.86% of the total mass of the Solar System. About three quarters of the Sun's mass consists of HYDROGEN, while the rest is mostly HELIUM.

superconductivity, *n* – [PHYSICS] an electrical RESISTANCE of exactly zero which occurs in certain materials below a characteristic TEMPERATURE.

superfluid, *n* – [PHYSICS] a phase of MATTER in which VISCOSITY of a FLUID vanishes, while HEAT CAPACITY becomes infinite. These unusual effects are observed when liquids, typically of helium-4 or helium-3, overcome friction in surface interaction at a stage (known as the "lambda point", which is TEMPERATURE and PRESSURE, for helium-4) at which the liquid's viscosity becomes zero

Superfund, *n* – [ENVIRONMENTAL REGULATION] the program operated under the legislative authority of CERCLA and SARA that funds and carries out EPA solid waste emergency and long-term removal and remedial activities. These activities include establishing the National Priorities List, investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions. *Also see CERCLA and SARA.*

superimposed stream, *n* — [HYDROLOGY] a STREAM whose present course was established on young rocks burying an old surface. With uplift, this course was maintained as the stream cut down through the young rocks to and into the old surface.

superimposed valley, *n* – [GEOLOGY] a VALLEY established on the land surface with a pattern that is independent of the underlying rock structure.

supernatant, *n* – [WASTE DISPOSAL] the clear fluid that is removed or drains from the top of SEPTIC TANKS or PONDS used to allow solids to settle from suspension. *Also see cesspool, seepage pit and septic tank.*

supersaturate, *v* — [CHEMISTRY] *1*. to cause or allow (a chemical solution) to be more highly concentrated than is normally possible under given conditions of TEMPERATURE and PRESSURE. *2*. to cause (a VAPOR) to exceed the normal saturation vapor pressure at a given temperature. *Also see saturate.*

suppressed trees, *n* – [DENDROLOGY] older, slow growing smaller trees in the FOREST UNDERSTORY whose growth are slowed by the larger trees around them.

Supreme Court, *n* – [LAW] the highest JUDICIAL COURT in a NATION.

surface, *n* – [PHYSICS] the exterior or upper BOUNDARY of an object or body. *Also see interface.*

surface impoundment, *n* – [WASTE DISPOSAL] TREATMENT, storage, or disposal of LIQUID HAZARDOUS WASTES in artificial PONDS. *Also see impoundment and pond.*

surface mining, *n* – [MINING] the process of removing mineral deposits that are found close enough to the surface so that the construction of tunnels (underground mining) is not necessary. The soil and strata that cover the deposit are removed to gain access to the mineral deposit. The primary environmental concerns related to this technique are the disposition of spoils removed to gain access to the deposit and the scoring of the landscape that remains following the complete removal of the mineral deposit.

surface tension, *n* — [PHYSICS] a PROPERTY arising from the MOLECULAR forces of the SURFACE FILM of all liquids tend to alter the contained VOLUME of which LIQUID into a form of minimum superficial area, expressed as work in newtons per millimeter.

> DISCUSSION – It is because of the significant surface tension of many chlorinated solvents that makes them quite difficult to remove from soils. The surface tension allows these chemical to attach to the soil grains very strongly.

Also see interfacial tension.

surface water, *n* – [HYDROLOGY] *1*. an open body of WATER such as a STREAM, LAKE, or RESERVOIR. *2*. water that remains on the EARTH's surface; all waters whose surface is naturally exposed to the ATMOSPHERE, for example, RIVERS, LAKES, RESERVOIRS, PONDS, STREAMS, IMPOUNDMENTS, SEAS, ESTUARIES, etc., and all SPRINGS, WELLS, or other collectors directly influenced by surface water. *3*. a source of drinking water that originates in rivers, lakes and run-off from melting snow. It is either drawn directly from a river or captured behind DAMS and stored in reservoirs. (rivers, lakes, reservoirs, ponds, streams, impoundments, seas, estuaries, etc.)

surfactant, *n* – [CHEMISTRY] a detergent COMPOUND that promotes lathering. A surfactant can be used in remedial efforts to help remove CONTAMINANTS from within SOILS.

surrogate, *n* — [CHEMISTRY] a SUBSTANCE with PROPERTIES that mimic the performance of the ANALYTE of interest in the MEASUREMENT SYSTEM, but which is not normally found in the SAMPLE of concern and is added for QUALITY CONTROL purposes.

surrogate recovery, *n* – [CHEMISTRY] SURROGATES are often added to BLANKS, SAMPLES, MATRIX SPIKES, matrix spike duplicates, and STANDARDS to evaluate the performance of the ANALYTICAL SYSTEM. The amount

detected in comparison to the amount introduced is the percent recovery.

suspension, *n* – [CHEMISTRY] the act of sustaining solid particles or a body in a fluid medium somewhere between top and bottom.

sustainability, *n* – [ECOLOGY] management practices that do not take more from an ecosystem than it can provide. Theoretically, sustainable management practices can continue in perpetuity, since they do not lead to exhaustion of natural resources.

sustained yield, *n* – [HYDROGEOLOGY] the rate at which water can be withdrawn from an AQUIFER without depleting the supply.

swale, *n* – [GEOGRAPHY] *1*. a slight DEPRESSION, sometimes swampy, in the midst of generally level land. *2*. a shallow depression in an undulating GROUND MORAINE due to uneven glacial deposition. 3. a long, narrow, generally shallow, troughlike depression between two beach ridges, and aligned roughly parallel to the coastline. *4*. a piece of MEADOW, often a slight depression or VALLEY, as in a PLAIN or MOOR, marshy and rank with vegetation. Swales usually carry flows only during or immediately after rainfall or snowmelt events. Swales vary in size from small conveyances providing drainage along roadways and behind or between buildings to larger waterways.

swallow hole, *n* – [HYDROLOGY] the point at which a surface stream disappears in LIMESTONE TERRAIN prior to commencing its journey underground[6]. *Also known as a water sink. Also see abîme, gouffre and pothole.*

swamp, *n* — [HYDROLOGY] a FORESTED or shrub covered WETLAND where standing or gently flowing water persists for long periods on the surface. *Also see bog, fen, marsh and wetland*.

swash, *n* – [HYDROLOGY] *1*. a narrow CHANNEL through which TIDES flow. *2*. a BAR over which waves wash freely.

swathe, *n* – [REMOTE SENSING] a strip of the earth's surface scanned by an orbiting sensor.

sweet crude, *n* – [PETROLEUM CHEMISTRY] low-SULFUR-containing CRUDE OIL. *Also see sour crude.*

> DISCUSSION – Sweet crude, which is more economically advantageous than sour crude, can be found in places such as the Middle East and parts of Brazil.

sweetener, *n* -- [HYDROGEOLOGY] an ARTIFICIAL form of sugar.

> DISCUSSION – Because many sweeteners are resistant to degradation and are not significantly metabolized, they can be found in wastewater and subsequently in ground water.

sweetening processes, *n* – [PETROLEUM TECHNOLOGY] the removal of a particular class of SULFUR-containing compounds called MERCAPTANS during PETROLEUM REFINING. Mercaptans are undesirable because they are corrosive and also because of their offensive odor. Several processes have been developed to remove mercaptans by converting them to disulfides. These disulfides are not corrosive and their odors are not as strong as the mercaptans they replace.

syenite, *n* – [GEOLOGY] a group of PLUTONIC ROCKS containing alkali feldspar (usually orthoclase, microcline, or perthite), a small amount of plagioclase (less than in "monzonite"), one or more mafic minerals (especiallby hornblende), and quartz, if present, only as an accessory; also, any rock in that group; the intrusive equivalent of "trachyte." With an increase in the quartz content, syenite grades into "granite". *Also see granite, igneous rock and plutonic rock.*

symbol, *n* – [SCIENTIFIC METHOD] *1*. a thing conventionally regarded as typifying, representing or recalling something, especially an idea or quality. *2*. a mark or character taken as the conventional sign of some object, idea, function or process.

symmetrical fold, *n* – [GEOLOGY] where both limbs of a FOLD dip away from the AXIS at the same angle.

synclinal valley, *n* – [GEOLOGY] a VALLEY formed by a down FOLD of the underlying rocks.

syncline, *n* – [GEOLOGY] a CONCAVE FOLD, the central part of which contains the youngest section of *rock*. *Also see anticline*.

synecology, *n* – [ECOLOGY] the study of many ORGANISMS and their surrounding ENVIRONMENT. *Also see autecology.*

synergism, *n* – [CHEMISTRY] an interaction of two or more CHEMICALS that results in an effect greater than the sum of their separate EFFECTS.

synergistic pollution, *n* – [ENVIRONMENTAL SCIENCE] the combined effect of two or more toxic substances acting together that is more adverse than their sum would be if each were acting separately or independently[63].

synoptic studies, *n* – [ENVIRONMENTAL INVESTIGATION] short-term INVESTIGATIONS of specific water-quality conditions during selected seasonal or HYDROLOGIC periods to provide improved spatial resolution for critical water-quality conditions. For the period and conditions sampled, they assess the spatial distribution of selected water-quality conditions in relation to causative factors, such as land use and contaminant sources.

syntax, *n* – [GRAMMAR] the way in which linguistic elements (as words) are put together to form constituents (as phrases or clauses).

synthesis, *n* -- [SCIENTIFIC METHOD] the PROCESS or RESULT of building up separate elements, especially ideas into a connected whole., especially into a THEORY or SYSTEM.

synthetic, *adj* – [CHEMISTRY] of, relating to, or produced by CHEMICAL or BIOCHEMICAL SYNTHESIS, especially, produced ARTIFICIALLY. *Also see man-made and natural.*

synthetic fuels, *n* – [PETROLEUM CHEMISTRY] COMBUSTIBLE FLUIDS made from COAL or other HYDROCARBON-containing SUBSTANCES[34]. *Also see methanol.*

synthetic organic chemicals (SOCs), *n* – [CHEMISTRY] man-made (ANTHROPOGENIC) ORGANIC CHEMICALS. Some SOCs are VOLATILE; others tend to stay dissolved in WATER instead of evaporating.

syrt, *n* – [GEOLOGY] a denudational upland or elevated flatland; a kind of dissected PLATEAU.

system, *n* – [SCIENTIFIC METHOD] a set of interrelated COMPONENTS working together towards some kind of PROCESS.

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tableland, *n* – [GEOLOGY] a PLATEAU with steep drops surrounding a flat top.

tablemount—*See guyot.*

taconite, *n* – [GEOLOGY] unleached iron formation of the Lake Superior District of northern Minnesota (USA). Taconite consists of chert with hematite, magnetite, siderite, and hydrous-iron silicates. The ore averages about 25% iron, but natural leaching turns it into ore with 50% to 60% iron.

taiga, *n* – [GEOGRAPHY] *from Russian,* FOREST zone south of the TUNDRA in the northern hemisphere where dense forests of conifers (mostly spruce and hemlock), birches and poplars occupy glaciated regions punctuated with cold LAKES, STREAMS, BOGS and MARSHES. *Also see tundra*.

tailing pond, *n* – [WASTE DISPOSAL] enclosures or basins for the disposal of mine tailings; they serve as settling basins and prevent or reduce the contamination of streams and other water bodies by such waste[63].

tailings, *n* – [MINING] RESIDUE of raw material or WASTE separated out during the PROCESSING or beneficiation of crops or MINERAL ORES. Term also applies to DEPLETED URANIUM from enrichment.

tails—*See tailings*.

tails assay, *n* – [CHEMISTRY] the concentration of the ^{235}U isotope remaining in TAILS material, most applicable to DEPLETED URANIUM from enrichment[64].

talik, *n* – [HYDROLOGY] *from Russian,* permanently unfrozen ground in regions of permafrost; applies to a layer which lies above the permafrost but below the active layer, that is, when the permafrost table is deeper than the depth reached by winter freezing from the surface. *Also known as tabetisol.*

talus, *n* — [GEOLOGY] ROCK fragments mixed with SOIL at the foot of a natural SLOPE from which they have been separated. *Also see colluvium.*

tank, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] a stationary device designed to contain an accumulation of HAZARDOUS SUBSTANCES, HAZARDOUS WASTES, or POLLUTANTS which is constructed of non-earthen materials (for example, CONCRETE, STEEL, plastic) that provide structural support. *Also see aboveground tank and underground tank.*

taproot, *n* – [DENDROLOGY] a main root that grows straight down. Taproots can go very deep if there is a lack of soil moisture near the surface and bedrock or dense soil are not present[12].

tar, *n* – [PETROLEUM CHEMISTRY] RESIDUE obtained by destructive DISTILLATION of carbon-rich materials such as COAL, WOOD or PETROLEUM. May also form as a result of severe WEATHERING of petroleum products in the ENVIRONMENT. *Also see coal tar*.

tar balls, *n* – [PETROLEUM CHEMISTRY] non-VOLATILE HYDROCARBON clumps remaining in WATER after the volatile fractions have evaporated from CRUDE OIL that has been discharged or spilled into the MARINE ENVIRONMENT. When washed ashore, these RESIDUES, which range in size from marbles to beach balls, spoil beaches and marine HABITAT.

targeted compound, *n* – [CHEMISTRY] a HAZARDOUS SUBSTANCE, HAZARDOUS WASTE, or POLLUTANT for which a specific ANALYTICAL METHOD is designed to detect that potential CONTAMINANT both qualitatively and quantitatively. *Also see non-targeted compound.*

target monitoring zone, *n* — [HYDROGEOLOGY] the GROUND-WATER FLOW path from a particular area or facility in which MONITORING WELLS will be SCREENED. The target monitoring zone should be a STRATUS (STRATA) in which there is a reasonable expectation that a vertically placed well will intercept migrating CONTAMINANTS.

tarn, *n* – [GEOLOGY] a small MOUNTAIN LAKE that occurs inside a CIRQUE basin of a former glacier.

tar well, *n* -- [COAL GAS TECHNOLOGY] any subsurface TANK or vessel used to accumulate or store TAR. It is common to find these structures, partially or totally full of tar, during investigations of manufactured gas plants. It is through these wells that waste coal tar was often disposed of.

taste, *n* – [CHEMISTRY] the sensation characteristic of a soluble substance caused in the mouth and throat by contact with that substance. *Also see odor.*

tear faults, *n* – [GEOLOGY] a FAULT characterised by lateral movement, transverse to the STRIKE of the rocks.

tea table, *n* – [GEOLOGY] a rock formation that is a remnant of newer STRATA that eroded away. A tea table is a type of rock column comprising discrete layers, usually SEDIMENTARY ROCK, with the top layers being wider than the base because of greater resistance to EROSION.

technique, *n – 1*. a manner of performance in relation to mechanical of formal details. *2*. skill or ability in some field. *3*. A means of achieving one's purpose especially skillfully. *Also see method and methodology.*

technology, *n* – the study or the use of the mechanical arts and applied SCIENCES.

tectonics, *n* – [GEOLOGY] THEORY suggesting that the Earth's SURFACE is composed of a number of OCEANIC

and CONTINENTAL plates. Driven by convection currents in the mantle, these plates have the ability to slowly move across the Earth's plastic asthenosphere. This theory is very important to GEOLOGY and GEOMORPHOLOGY because it helps to explain the occurrence and formation of MOUNTAINS, FOLDS, FAULTS, VOLCANOES, earthquakes, ocean trenches and the mid-oceanic ridges.

Teflon, *n* – [ENVIRONMENTAL INVESTIGATION] a trademarked material made of synthetic fluorine-containing resins used especially for molding articles, coatings to prevent sticking and ENVIRONMENTAL SAMPLING equipment. It is the preferred material for sampling equipment because it is inert and consequently much less susceptible to causing cross-contamination.

temperate, *adj* – [GEOGRAPHY] referring to latitudes of the globe that lie between the tropics and the polar circles. The changes in these regions between summer and winter are generally relatively moderate, rather than extreme hot or cold. But in continental areas, such as Asia and central North America the variations between summer and winter can be extreme. In regions traditionally considered tropical, localities at high altitudes (such as parts of the Andes) may have a temperate climate.

temperature, *n* – [PHYSICS] an intensive property associated with the hotness or coldness of an object. It determines the direction of spontaneous heat flow (always from hot to cold).

temporal, *n* – [PHYSICS] of or relating to TIME as opposed to eternity.

temporary well, *n* – [HYDROGEOLOGY] a WELL installed for a short period of time, usually less than 48 hours, and used solely for the collection of a ground-water sample. After the sample collection, the well is removed. *Also see monitoring well.*

tensiometer, *n* — [AGRONOMY] a device for measuring soil-water MATRIC POTENTIAL (or tension or suction) of WATER in SOIL in-situ; a porous, permeable ceramic cup connected through a water filled tube to a PRESSURE measuring device. *Also see matric potential.*

tension, *n* – [GEOLOGY] a stretching force in the EARTH'S surface which may cause FAULTING or JOINTING.

tension wood, *n* – [DENDROLOGY] REACTION WOOD which in HARDWOODS occurs on the upper side of the leaning stems and lateral branches[12].

tentatively identified compound (TIC), *n* -- [CHEMISTRY] a non-targeted compound detected in a sample using a GC/MS ANALYTICAL METHOD which has been tentatively identified using a mass spectral library search. An estimated CONCENTRATION of the TIC is also determined.

tephra, *n* – [GEOLOGY] collective term for all size grades of solid igneous rock blown under gas pressure from a volcanic vent.

teratogenic, *adj* – [TOXICOLOGY] characteristic of a substance capable of causing birth defects. *Also see carcinogenic and mutagenic.*

terminal electron acceptor, *n* – [CHEMISTRY] a compound or molecule that accepts an electron (is reduced) during metabolism (oxidation) of a carbon source. Under aerobic conditions, molecular oxygen is the terminal electron acceptor. Under anaerobic conditions, a variety of terminal electron acceptors may be used. In order of decreasing redox potential, they include: nitrate, manganese, ferric iron, sulfate and carbon dioxide.

terminal lake, *n* — [HYDROLOGY] a LAKE without an outlet.

terminal moraine, *n* – [GEOLOGY] MORAINE that marks the maximum advance of a GLACIER.

> DISCUSSION -- A glacier often acts like a bulldozer, pushing forward soil and rock in its path. A terminal moraine is the remnants of the last push of this glacial bulldozer. A terminal moraine is often characterized by a heterogeneous mixture of different grain sizes and compositions, often making hydrogeological investigations at these locations quite difficult.

Also see ground moraine, lateral moraine and recessional moraine.

terpanes, *n* – [FINGERPRINTING] BIOMARKERS found in CRUDE OIL. These biomarkers can be used to FINGERPRINT CRUDE OILS and heavier refined petroleum products. A broad class of complex branched, cyclic alkane biomarkers including hopanes and tricyclic compounds. They are commonly monitored using *m/z* 191 mass chromatograms[34]. *Also see biomarkers, hopane and steranes.*

terpanoids, *n* – [FINGERPRINTING] a broad class of complex branched, cyclic biomarkers composed of isoprene subunits, including mono- (two isoprene units), sesqui- (three), di- (four), sester- (five), tri- (six), tetra- (eight) and higher terpenoids[34]. These biomarkers may be used to fingerprint spilled petroleum products.

terrace, *n* – [GEOLOGY] an elevated surface above the existing level of a FLOODPLAIN or SHORE that is created by STREAM or OCEAN wave erosion. *Also see kame terrace.*

terracette, *n* – [GEOMORPHOLOGY] a type of LANDFORM, a ridge on a hillside formed when saturated soil

particles expand, then contract as they dry, causing them to move slowly downhill. It is a small, irregular step-like formation on steep hillslopes, especially on those used for pasture which are formed by soil creep or erosion of surface soils exacerbated by the trampling of livestock such as sheep or cattle. *Also known as catstep, sheep or cattle track.*

terrain, *n* – [GEOGRAPHY] *1*. a GEOGRAPHICAL area. *2*. a piece of LAND, GROUND. *3*. the PHYSICAL features of a tract of LAND. *Also see ground, land and terrane*.

terrane, *n* – [GEOLOGY] the area or SURFACE over which a particular ROCK or group of rocks is prevalent. *Also see terrain.*

terrestrial, *adj* – [GEOLOGY] of or relating to the EARTH or its inhabitants. *Also see terrain, terrane and terrigenous.*

terrigenous, *adj* – [GEOLOGY] land derived especially designated a marine deposit consisting of material eroded from the land.

territory, *n* – [GEOGRAPHY] *1*. the extent of the land under the jurisdiction of a ruler, nation, city, etc. *2*. an organized division of a country, especially one that has not yet been admitted to the full rights of a state. *3*. a large tract of land.

***tert*-amyl methyl ether (TAME)**, *n* – [PETROLEUM CHEMISTRY] an OXYGENATE-type additive found in GASOLINE in the United States since the early 1990s ($(CH_3)_2(C_2H_5)COCH_3$).

> DISCUSSION – TAME was first developed by Exxon in 1987, but did not see widespread usage in the USA until later in the 1990s.

Also see MTBE, *oxygenate and TBA*.

***tert*-butyl alcohol (TBA)**, *n* – [PETROLEUM CHEMISTRY] an OXYGENATE-type additive ($(CH_3)_3COH$) found in GASOLINE in the United States since 1969. In the 1990s, it was, for the most part, replaced by MTBE.

> DISCUSSION – TBA is a biodegradation byproduct of MTBE. Therefore, they are often found together.

Also see methyl-tert-butyl ether (MTBE) and oxygenate.

Tertiary Period, *n* – [GEOLOGY] GEOLOGIC PERIOD that occurred roughly 1.6 to 65 million years ago. During this period, mammals become a dominant species on the planet.

tertiary wastewater treatment, *n* – [TREATMENT TECHNOLOGY] selected biological, physical, and chemical separation processes to remove organic and inorganic substances that resist conventional treatment practices; the additional treatment of effluent beyond that of primary and secondary treatment methods to obtain a very high quality of effluent. The complete wastewater treatment process typically involves a three-phase process: *1*. first, in the primary wastewater treatment process, which incorporates physical aspects, untreated water is passed through a series of screens to remove solid wastes; *2*. second, in the secondary wastewater treatment process, typically involving biological and chemical processes, screened wastewater is then passed a series of holding and aeration tanks and ponds; and *3*. third, the tertiary wastewater treatment process consists of flocculation basins, clarifiers, filters, and chlorine basins or ozone or ultraviolet radiation processes.

test, *n* – [SCIENTIFIC METHOD] a means of examining, a standard for comparison or trial.

testify, *v* – [LAW] to give EVIDENCE according to law; the examination of a WITNESS who declares his KNOWLEDGE of facts.

testimony, *n* – [LAW] the statement made by a WITNESS under OATH or AFFIRMATION.

test pit, *n* — [ENVIRONMENTAL INVESTIGATION] a shallow excavation made to characterize the subsurface.

tetrachloroethylene (PCE), *n* – [CHEMISTRY] a manufactured chemical that is widely used for DRY CLEANING of fabrics and for metal-DEGREASING. It is also used to make other CHEMICALS and included in some consumer products (in particular, spot removers). Other names for tetrachloroethylene include perchloroethylene, PCE and tetrachloroethene. It is a nonflammable liquid at room temperature. It EVAPORATES easily into the air and has a sharp, sweet ODOR. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm)(or milligrams per liter) or more, although some can smell it at even lower concentrations. With time and the appropriate environmental conditions, PCE will transform into trichloroethylene, followed by *cis*-1,2-dichloroethylene, then 1,1-dichloroethylene, vinyl chloride, ethene and finally carbon dioxide and water. *Also see chlorinated solvent and DNAPL.*

tetraethyl lead (TEL)–*See lead alkyls*.

texture, *adj* — [GEOLOGY] *1*. geometrical aspects consisting of size, SHAPE, arrangement, and crystallinity of the COMPONENT PARTICLES and of the related CHARACTERISTICS of VOIDS. *2*. the arrangement in space of the components of a rock body and of the boundaries between these components.

thalweg, *n* – [HYDROLOGY] *from Dutch*, line following the deepest part of a streambed or CHANNEL or of a VALLEY.

Theis Equation, *n* – [HYDROGEOLOGY] an equation for determining AQUIFER characteristics such as TRANSMISSIVITY (T) and STORATIVITY, originally obtained through comparison with the conduction of heat through solid materials. The equation is based on the rate of DRAWDOWN in a PUMPING WELL and nearby OBSERVATION WELLS (at known distances) where,

$$s = \frac{Q}{4\pi T} W(u)$$

and

$$u = \frac{r^2 S}{4Tt}$$

and s is the drawdown (L), r is the distance from the pumping well (L), T is transmissivity (LT^{-1}), S is storativity (L^3/L^3), Q is the pumping rate (L^3T^{-1}), t is time and w(u) is the well function obtained from tables and type curves and used to obtain u. Developed by the U. S. Geological Survey's C. V. Theis in the 1930s. *Also see distance-drawdown equation, Theis Equation and time-drawdown equation.*

theodolite, *n* – [GEOGRAPHY] a precision surveying instrument that is used for measuring angular distances in both vertical and horizontal planes. *Also see transit.*

theorem, *n* – [MATHEMATICS] mathematical proposition that can be deduced by LOGIC from a set of AXIOMS.

theoretical, *n* – [SCIENTIFIC METHOD] *1*. concerned with KNOWLEDGE, but not with its practical application. *2*. based on theory rather than experience. *Also see conceptual and theory.*

theory, *n* – [SCIENTIFIC METHOD] a comprehensive explanation of a given set of data that has been repeatedly confirmed by observation and experimentation and has gained general acceptance within the scientific community but has not yet been decisively proven. Also see *hypothesis* and *scientific law*.

thermal , *adj* – [PHYSICS] having to do with HEAT.

thermal conductivity, *n* – [PHYSICS] the time rate of transfer of HEAT by conduction, through unit thickness, across unit area for unit difference of temperature.

thermal cracking, *n* – [PETROLEUM TECHNOLOGY] the CONVERSION OF high-molecular weight HYDROCARBON fractions of PETROLEUM CRUDE OILS to more valuable GASOLINE, olefinic gases and other products lighter-weight hydrocarbons) through an increase in temperature. The TEMPERATURES are normally in the range of 700 - 750 °F (370 - 400 °C).

> DISCUSSION – In the earlier parts of the 20th Century, thermal cracking was the only type of cracking technology available. In the 1940s, catalytic cracking became available and is now used at just about every refinery in North America. The first catalytic cracking unit was installed at Standard Oil of New Jersey's (now ExxonMobil's) refinery in Baytown, Texas.

Also see catalytic cracking.

thermal desorption, *n* – [TREATMENT TECHNOLOGY] a technology that uses HEAT to remove HAZARDOUS SUBSTANCES from SOIL and SEDIMENTS. The contaminated material is generally excavated and placed into a chamber where it is heated. The contaminants evaporate and are usually captured in air filters. The remaining soil can then be returned to the site.

thermal expansion, *n* – [GEOLOGY] a type of physical WEATHERING where rocks and minerals are altered through daily temperature changes.

thermal pollution, *n* – [HYDROLOGY] the contamination of cold water by adding warm water.

thermal weathering, *n* – [GEOLOGY] the WEATHERING of rocks, achieved by exposure to the sun, such as exfoliation.

thermocline, *n* – [HYDROLOGY] the middle LAYER of a thermally STRATIFIED LAKE or RESERVOIR. In this layer, there is a rapid decrease in TEMPERATURES in a lake or reservoir.

thermodynamics, *n* – [PHYSICS] the study of energy transfers and transformations. *Also see the first, second, third and zeroth law of thermodynamics.*

thermolysis, *n* – [PHYSICS] the dissociation or decomposition of a MOLECULE by HEAT.

thickness, *n* — [GEOLOGY] the perpendicular distance between bounding surfaces such as bedding or foliation planes of a rock. Often represented by the symbol "b".

Thiem Equation, *n* – [HYDROGEOLOGY] an equation to calculate AQUIFER characteristics based on the PUMPING of one WELL and the measurement of water levels from OBSERVATION WELLS where,

$$Q = 2\pi KD(s_1 - s_2)/\ln(r_2/r_1)$$

and, *Q* is the well discharge rate (m^3/d), T or *KD* is the TRANSMISSIVITY of aquifer (m^2/d), r_1, r_2 are the respective distances of the observation wells from the pumping well (m) and s_1, s_2 are the respective STEADY-STATE drawdowns in the observation wells

(m). The assumptions of the Thiem Method are: the aquifer is confined; the aquifer has an infinite areal extent; the aquifer is HOMOGENEOUS, ISOTROPIC and of uniform THICKNESS over the area influenced by the test; Prior to pumping, the PIEZOMETRIC surface is HORIZONTAL over the area that will be influenced by the test; The aquifer is pumped at a constant discharge rate. *Also see distance-drawdown equation, DuPuit-Forcheimer Equation, the Theis Equation and the time-drawdown equation.*

thinner, *n* – [CHEMISTRY] a general term for low-VISCOSITY LIQUIDS, such as NAPHTHA, BENZENE and TURPENTINE, which can be added to OIL-based paints to adjust their viscosity. *Also see turpentine*.

thiol, *n* – [PETROLEUM CHEMISTRY] an organo-sulfur compound that contains a SULFUR-HYDROGEN BOND (S-H). *Also known as mercaptans.*

third law of thermodynamics, *n* – [PHYSICS] the ENTROPY of a perfect CRYSTAL is zero at absolute zero. *Also see the first, second and zeroth law of thermodynamics.*

third parties, *n* – [LAW] all persons who are not parties to the contract, agreement or instrument of writing, by which their interest in the thing conveyed is sought to be affected.

third party coverage, *n* – [INSURANCE] liability coverage purchased by the policyholder as a protection against possible lawsuits filed by a third party. The insured and the insurer are the first and second parties to the insurance contract. *Also see first party coverage.*

thorofare, *n* – [GEOGRAPHY] a way or place for passage, such as a NARROWS or STRAITS. *Also known as thoro or thoroughfare.*

thou—*See mil.*

threat, *n* – [LAW] *1*. an expression of intention to inflict evil, injury, or damage. *2*. an indication of something impending.

threshold entry pressure, *n* – [HYDROLOGY] the capillary pressure that must be overcome for an immiscible fluid to enter a water-saturated medium.

threshold limit value (TLV), *n* – [TOXICOLOGY] an estimate of the average safe airborne concentration of a substance. The TLV represents conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect.

throughfall, *n* – [HYDROGEOLOGY] the movement downslope of WATER through the SOIL.

throw, *n* – [GEOLOGY] the vertical displacement of STRATUM along a FAULT plane; the distance that a fault has moved.

thrust, *n* – [GEOLOGY] a movement causing the formation of a REVERSE FAULT of a very low angle.

thrust fault, *n* – [GEOLOGY] a REVERSE FAULT marked by a DIP of 45º or less. *Also see normal fault, reverse fault, strike-slip fault and transform fault.*

thufur, *n* – [GEOLOGY] a low MOUND which forms part of a polygonal pattern in PERIGLACIAL areas.

tidal flat, *n* – [HYDROLOGY] *1*. an extensive flat tract of land alternatively covered and uncovered by the tide, and comprising mostly unconsolidated mud and sand. *2*. saltwater wetlands that are characterized by mud and/or sand. Tidal flats often occur at the seaward edges of salt marshes. They're covered with seawater during high tide and become exposed during low tide. Algae are the dominant plants in tidal flats.

tidal gut, *n* – [HYDROLOGY] a STREAM-like feature formed by receding TIDES.

tidal marsh, *n* – [HYDROLOGY] low, flat marshlands traversed by CHANNELS and TIDAL hollows, subject to tidal inundation; normally, the only VEGETATION present is salt-tolerant bushes and GRASSES. *Also see marsh.*

tidal pool, *n* – [HYDROLOGY] a pool of SALT WATER left (as in a rock basin) by an ebbing tide. *Also known as tide pool.*

tide, *n* – [HYDROLOGY] *1*. the cycle of alternate rising and falling of the surface of an OCEAN or large LAKE, caused by the gravitational pull of the Sun and especially Moon in interaction with the EARTH'S rotation. Tides occur on a regular basis, twice every day on most of the Earth. *2*. a single rise or fall within this cycle. *Also see high tide, low tide, neap tide and spring tide.*

till, *n* — [GEOLOGY] material deposited by glaciation, usually composed of a wide range of particle sizes, which has not been subjected to the sorting action of water[4].

> DISCUSSION – The often-used term "glacial till" is redundant.

See ablation till, ground moraine and lodgment till.

tillite, *n* – [GEOLOGY] lithified form of TILL.

till plain, *n* – [GEOMORPHOLOGY] an extensive flat plain of till that forms when a sheet of ice becomes detached from the main body of the glacier and melts in place depositing its sediments. A till plain with irregular topography is often called ground moraine.

tilt block, *n* – [GEOLOGY] a block of CRUST delimited by two FAULTS at an ANGLE to the rocks around.

time, *n* – [PHYSICS] measurable period in which cause and effect occurs and SYSTEMS function. *Also see age.*

time-drawdown equation, *n* – [HYDROGEOLOGY] an EQUATION used to determine CHARACTERISTICS such as

TRANSMISSIVITY (T) and STORATIVITY based on the rate of DRAWDOWN in a pumping WELL and nearby observation wells where,

$$s = \frac{Q}{4\pi T} \ln\left(\frac{2.25Tt}{r^2S}\right)$$

and where Q is the pumping rate (L^3T^{-1}), r is the distance from the pumping well (L), s is the drawdown (L), T is the transmissivity (L^2T^{-1}) and S is storativity (L^3L^{-3}). *Also see distance-drawdown equation, Theis Equation and Thiem Equation*

time-weighted average, *n* – [STATISTICS] in hydrogeological investigations, computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water resulting from the mixing of flow proportionally to the duration of the concentration[47].

title search, *n* – [ENVIRONMENTAL INVESTIGATION] review of the land records to determine the present and past ownerships and descriptions of a particular property.

toe-slope, *n* – [GEOLOGY] the slightly sloping area below a foot-slope, and above a flat. *Also see foot-slope.*

toluene, *n* – [CHEMISTRY] a colorless LIQUID, C_7H_8, derived from the refining of CRUDE OIL and used as a SOLVENT, a raw material for producing TNT and is a component of many FUELS such as GASOLINE or DIESEL FUEL. An aromatic composed of a benzene ring and an attached methyl group. *Also known as methylbenzene.*

tombolo, *n* – [GEOLOGY] COASTAL feature that forms when a belt of SAND and/or GRAVEL is deposited between an ISLAND and the MAINLAND. This feature is above SEA-LEVEL for most of the TIME.

ton, *n* – [PHYSICS] measure of WEIGHT in the English System equal to 2,000 POUNDS. *Also see ounce and pound.*

top of borehole, *n* — [HYDROGEOLOGY] the SURFACE of the GROUND surrounding the BOREHOLE.

topographic divide—*See drainage divide.*

topography, *n* – [GEOLOGY] the set of PHYSICAL features, such as MOUNTAINS, VALLEYS, and the shapes of LANDFORMS, that characterizes a given LANDSCAPE.

topple, *n* – [GEOLOGY] a form of mass movement from a ROCK face where top-heavy rocks with vertical or forward-leaning BEDDING PLANES are separated from the BEDROCK and fall.

topsoil, *n* — [AGRONOMY] the SURFACE SOIL, usually containing a significant quantity of ORGANIC MATTER.

toreva block, *n* – [GEOLOGY] a LANDSLIDE which occurs when a stronger material, such as SANDSTONE or LIMESTONE, overlies a weaker material, such as SHALE, and an eroding agent undercuts the weaker lower layer.

torr, *n* – [PHYSICS] a unit of measurement of a state of VACUUM. A torr is equal to $1/760^{th}$ of a standard atmosphere or about 1 millimeter of mercury. *Also see atmosphere.*

tort, *n* – [LAW] a private or civil wrong or injury, including action of bad faith, breach of contract, for which the court will provide a remedy in the form of an action for damages.

tortuosity, *n* – [HYDROGEOLOGY] the actual length of a GROUND-WATER FLOW path, which is SINUOUS in form, divided by the straight-line distance between the ends of the flow path. Similar to the term SINUOSITY, but refers to ground water instead of surface water.

total coliform bacteria, *n* – [MICROBIOLOGY] a particular group of BACTERIA that are used as indicators of possible SEWAGE POLLUTION. This group includes coliforms that inhabit the intestine of warmblooded animals and those that inhabit soils. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria that ferment lactose with gas formation within 48 hours at 35°C. In the laboratory, these bacteria are defined as all the organisms that produce colonies with a golden-green metallic sheen within 24 hours when incubated at 35°C plus or minus 1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 milliliters of sample[47]. *Also see fecal coliform bacteria.*

total dissolved solids (TDS), *n* – [CHEMISTRY] the quantity of solid (non-aqueous) dissolved in water.

total five alkylated PAH homologues, *n* – [PETROLEUM CHEMISTRY] the sum of the 5 target PAHs (naphthalene, phenanthrene, dibenzothiophene, fluorene, chrysene) and their alkylated ($C_1$to C_4) homologues, as determined by GCMS. These 5 target alkylated PAH HOMOLOGOUS SERIES are oil-characteristic aromatic compounds[51].

total petroleum hydrocarbons (TPH), *n* – [PETROLEUM CHEMISTRY] a term used to describe a large family of several hundred CHEMICAL COMPOUNDS that originally come from CRUDE OIL. Crude oil is used to make PETROLEUM products, which can contaminate

the ENVIRONMENT. Because there are so many different chemicals in crude oil and in other petroleum products, it is often not practical to measure each one separately. However, it is useful to measure the total amount of TPH at a site. TPH is a mixture of chemicals, but they are all made mainly from HYDROGEN and CARBON, called HYDROCARBONS. Scientists divide TPH into groups of petroleum hydrocarbons that act alike in soil or water. These groups are called petroleum hydrocarbon fractions. Each fraction contains many individual chemicals. Some chemicals that may be found in TPH or are a fraction of it are HEXANE, JET FUELS, MINERAL OILS, BENZENE, TOLUENE, XYLENES, NAPHTHALENE, and fluorene, as well as other petroleum products and GASOLINE components. However, it is likely that samples of TPH will contain only some, or a mixture, of these chemicals. The volatile fraction of the TPH is often lost in the analytical process and not quantified. *Also see diesel-range organics (DRO) and gasoline-range organics (GRO).*

total recoverable petroleum hydrocarbons (TRPH), *n* – [CHEMISTRY] a method of measuring the quantity of total petroleum hydrocarbons in soil and water through infrared spectrophotometry. The method specifies that the extract be passed through silica gel to remove the non-petroleum fraction of the hydrocarbons

total soil-water potential, *n* — [AGRONOMY] the sum of the ENERGY-related components of a SOIL-WATER SYSTEM; for example, the sum of the gravitational, matrix and osmotic potentials. *Also see matric potential*.

total suspended solids (TSS), *n* – [CHEMISTRY] a LABORATORY ANALYTICAL PARAMETER which provide information on a wide variety of material, such as silt, decaying plant and animal matter, industrial wastes, and sewage suspended in the water sample. High concentrations of suspended solids can cause many problems for stream health and aquatic life.

towhead, *n* – [GEOGRAPHY] a small ISLET or SANDBAR within a river (most often the Mississippi River) having a grouping or thicket of trees.

town gas—*See coal gas*.

toxic, *n* – [TOXICOLOGY] of, relating to, or caused by a POISON or TOXIN. *Also see poison and toxin*.

toxicity, *n* – [TOXICOLOGY] the degree to which a substance or mixture of substances can harm humans or animals. The following types are:

> *Acute toxicity* involves harmful effects in an organism through a single or short-term exposure;
>
> *Chronic toxicity* is the ability of a substance or mixture of substances to cause harmful effects over an extended period, usually upon repeated or continuous exposure sometimes lasting for the entire life of the exposed organism, and
>
> *Subchronic toxicity* is the ability of the substance to cause effects for more than one year but less than the lifetime of the exposed organism.

toxicity characteristic leaching procedure (TCLP), *n* – [CHEMISTRY] an extraction test used to determine whether a WASTE STREAM meets the applicable technology-based treatment standards for land disposal.

toxicology, *n* – [SCIENCE] a SCIENCE that deals with POISONS and their effect and with the problems involved (as clinical, industrial and legal)[17].

toxin, *n* – [TOXICOLOGY] POISONOUS SUBSTANCE that is a specific product of the metabolic activities of a living organism and is usually very unstable, notably toxic when introduced into the tissues, and typically capable of inducing antibody formation. *Also see poison.*

Toxic Substances Control Act (TSCA), *n* – [ENVIRONMENTAL REGULATION] enacted in 1976 to test, regulate, and screen all chemicals produced or imported into the U.S. TSCA requires that any chemical that reaches the consumer marketplace be tested for possible toxic effects prior to commercial manufacture. Any existing chemical that poses health and environmental hazards is tracked and reported under TSCA.

tracer, *n* – [HYDROGEOLOGY] easily detectable material which may be added in small quantities to flowing SURFACE WATER or GROUND WATER to depict the path lines or to serve in the measurement of characteristics of flow, such as velocity, transit times, age, dilution, etc.

trachyte, *n* – [GEOLOGY] an IGNEOUS, VOLCANIC rock with aphanitic to porphyritic texture. Minerals include ALKALI FELDSPAR; relatively minor PLAGIOCLASE and QUARTZ or a FELDSPATHOID such as nepheline may also be present. BIOTITE, CLINOPYROXENE and OLIVINE are common accessory minerals.

tract, *n* — [GEOGRAPHY] an expanse of LAND or WATER.

trait, *n* – [LOGIC] a CHARACTERISTIC, attribute or QUALITY of some object. *Also see characteristic and quality*.

transcript, *n* – [LAW] a written, word-for-word record of what was said, either in a proceeding such

as a trial or during some other conversation, as in a transcript of a hearing or oral deposition.

transcurrent fault--*See strike-slip fault.*

transect, *n* – [ENVIRONMENTAL INVESTIGATION] a SAMPLE area usually in the form of a long continuous strip.

transformation, *n* – [CHEMISTRY] an act, process, or instance of changing or being changed in composition or structure.

transform fault, *n* – [GEOLOGY] a particular type of fault found only in mid-ocean ridges. *Also see normal fault, reverse fault, strike-slip fault and thrust fault.*

transgression, *n* – [GEOLOGY] the spread of the sea over land areas; also, any change that brings off-shore, deep-water environments to areas formerly occupied by near-sore, shallow-water conditions, or that shifts the BOUNDARY between marine and non-marine deposition[4]. *Also see regression*.

transient conditions, *n* – [HYDROGEOLOGY] a condition in which system inputs and outputs are not in EQUILIBRIUM so that there is a net change in the SYSTEM with TIME.

transient flow, *n* – [HYDROGEOLOGY] a condition that occurs when, at any location in a GROUND WATER or VADOSE ZONE flow system, the magnitude and/or direction of the specific discharge changes with time.

transient, non-community water system, *n* – [HYDROLOGY] a water system which provides water in a place such as a gas station or campground where people do not remain for long periods of time. These systems do not have to test or treat their water for contaminants which pose long-term health risks because fewer than 25 people drink the water over a long period. They still must test their water for microbes and several chemicals. *Also see non-transient non-community water system.*

transit, *n* – [GEOGRAPHY] a THEODOLITE in which the telescope can be reversed (turned end for end) in its supports without being lifted from them, by rotating it 180 degrees or more about its horizontal transverse AXIS. *Also see theodolite.*

transition area, *n* – [HYDROLOGY] an area of land adjacent to a FRESHWATER WETLAND which minimizes adverse impacts on the wetland or serves as an integral component of the wetlands ecosystem.

translocation, *n* – [AGRONOMY] the movement of SOIL SUBSTANCES in solution or suspension from one place to another.

translocation, *n* [DENDROLOGY] the movement of elements or chemical compounds within SAP between TREE RINGS[12]. *Also see dendrochronology and dendroecology*.

transmission oil, *n* – [PETROLEUM CHEMISTRY] normally a PETROLEUM-based oil of high molecular weight used to lubricate transmission systems within automotive engines. *Also known as transmission fluid. Also see hydraulic oil and motor oil.*

transmission pipeline, *n* – [PETROLEUM TECHNOLOGY] new and existing pipe and any equipment, facility, rights-of-way, or building used or intended for use in the transportation of a hazardous substance by a pipeline and having a throughput capacity of 140 gallons per minute (530 liters per minute) or greater. This term does not include the transportation of a hazardous substance through onshore production or flow lines, refining, or manufacturing facilities, or storage terminals or in-plant piping systems associated with those facilities. Any pipe used or intended to be used in the transportation of a hazardous substance which is not a transmission pipeline will be considered an in-facility pipe.

transmissivity, *n* — [HYDROGEOLOGY] *1*. the VOLUME of WATER at the existing KINEMATIC VISCOSITY that will move in a unit TIME under a unit HYDRAULIC GRADIENT through a unit width of the AQUIFER. *2*. the rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of the aquifer under a unit hydraulic gradient. *3*. transmissivity is the product of the HYDRAULIC CONDUCTIVITY (K) times the thickness of the aquifer (b).

> DISCUSSION—The transmissivity is equal to an integration of the hydraulic conductivities across the saturated part of the aquifer perpendicular to the flow paths.

transmutation, *n* – [CHEMISTRY] the changing of atoms of one element to another by bombardment with nuclear particles, such as, ^{238}U into plutonium or thorium into ^{233}U by neutron bombardment[64].

transpiration, *n* – [HYDROLOGY] the PROCESS by which WATER VAPOR is lost to the ATMOSPHERE from living plants. The term can also be applied to the quantity of water thus dissipated. *Also see evapotranspiration.*

transported soil, *n* — [GEOLOGY] SOIL transported from the place of its origin by WIND, WATER, or ICE.

transuranic elements, *n* – [CHEMISTRY] ELEMENTS with ATOMIC NUMBERS higher than that of URANIUM[92].

transverse coast, *n* – [GEOGRAPHY] a COAST with the lie of the land at right angles to the coastal direction.

transverse dispersion, *n* – [HYDROGEOLOGY] dispersion in the horizontal direction perpendicular to the ground-water flow direction. Its magnitude is reflected in the dispersion coefficient (D_y), which is the product of the dispersivity (α_y) and the ground-

water migration rate (V). *Also see dispersion and dispersivity.*

transverse dune, *n* – [GEOLOGY] a DUNE at right angles to the prevailing winds.

transverse ridge, *n* – [GEOLOGY] a ridge at the sea floor, running at right angles to a mid-oceanic ridge and often flanking a deep TROUGH.

trash, *n* – [WASTE DISPOSAL] material considered worthless or offensive that is thrown away. Generally defined as dry waste material, but in common usage it is a synonym for GARBAGE, RUBBISH, or REFUSE. *Also see garbage, refuse, rubbish and solid waste.*

travel time, *n* – [HYDROGEOLOGY] time elapsing between the passage of a water parcel or packet between a given point and another point downstream, such as a flood wave, down an open channel.

> DISCUSSION – The calculation of travel time in ground water is often used as an age-dating tool. A form of Darcy's Law is used to estimate the ground-water migration rate. This value is then divided by the retardation factor to obtain the contaminant migration rate. The age of the release can then be back calculated based on the length of the plume.

traverse, *n* – [GEOGRAPHY] a base line from which land-surveying observations are made.

travertine, *n* – [GEOLOGY] hard CALCAREOUS mineral deposited by flowing WATER, that is the same as the calcareous variety of SINTER and comparable to the softer TUFA. The term is normally used only for deposits formed outside caves, where plants and algae cause the precipitation by extracting carbon dioxide from the water and give travertine its porous structure. Travertine forms most commonly on waterfalls that build up like gour dams. *Also see tufa.*

treating, *n* – [CHEMISTRY] converting a CONTAMINANT or unwanted substance into an easily removable or non-objectionable form[52].

treatment, *n* – [CHEMISTRY] any METHOD, TECHNIQUE, or PROCESS designed to remove solids and/or pollutants from solid waste, waste-streams, effluents, and air emissions.

treatment works, *n* – [TREATMENT TECHNOLOGY] any device or systems, whether public or private, used in the storage, TREATMENT, recycling, or reclamation of municipal or industrial waste of a liquid nature including intercepting sewers, outfall sewers, sewage collection systems, cooling towers and ponds, pumping, power and other equipment and their appurtenances; extensions, improvements, remodeling, additions, and alterations thereof; elements essential to provide a reliable recycled supply such as standby treatment units and clear well facilities; and any other works including sites for the treatment process or for ultimate disposal of residues resulting from such treatment. Treatment works includes any other method or system for preventing, abating, reducing, storing, treating, separating, or disposing of pollutants, including storm water runoff, or industrial waste in combined or separate storm water and sanitary sewer systems.

treble damages, *n* – [LAW] essentially, "triple damages". Refers to the maximum amount of fines a regulatory agency may level against a party for not following some type of order or directive. For example, if a party fails to conduct a cleanup costing $1 million, the party may be fined as much as $4 million. ($1 million for the cleanup, and up to $3 million in treble damages).

tree, *n* – [DENDROLOGY] a large woody plant that has a trunk which supports branches and LEAVES[12].

tree ring, *n* – [DENDROLOGY] a layer of wood cells produced by a tree or shrub in one year, usually consisting of thin-walled cells formed early in the growing season (called EARLYWOOD) and thicker-walled cells produced later in the growing season (called LATEWOOD). The beginning of earlywood formation and the end of the latewood formation form one annual ring, which usually extends around the entire circumference of the tree[12]. *Also see dendrochronology and dendroecology.*

tremie, *n* — [DRILLING TECHNOLOGY] material placed under water through a tremie pipe in such a manner that it rests on the bottom without mixing with the water.

tremie method, *n* — [DRILLING TECHNOLOGY] the method whereby materials are emplaced in the bottom of a BOREHOLE with a small diameter pipe.

trench, *n* — [GEOLOGY] 1. usually a long, narrow, near vertical sided cut in rock or soil such as is made for utility lines, but can be naturally formed. *2.* A long, narrow, near vertical sided cut in the rock of the sea floor, normally caused by the tectonic subduction of the oceanic plate beneath the continental plate. These trenches can be several thousands of meters deep. *Also see ditch, gulch and gully.*

trend, *n* – [STATISTICS] long-term smooth movement in a time series.

trial, *n* – [LAW] a judicial examination and determination of issues between parties to action, whether they be issues of law or fact, before a court that has jurisdiction. *Also see court, trial court and tribunal.*

trial court, *n* – [LAW] the COURT in which a lawsuit is filed, and where all litigation up to and including the trial is held. *Also see court and tribunal.*

triangulation, *n* – [GEOGRAPHY] a method of surveying using a base line and two sight lines to make a triangle.

Triassic Period, *n* – [GEOLOGY] GEOLOGIC PERIOD that occurred roughly 208 to 245 million years ago. During this period, the first dinosaurs appeared. *Also see Cenozoic Era*.

tribunal, *n* –[LAW] *1.* a court of justice. *2.* a board appointed to adjudicate in some manner, especially one appointed by the government to investigate a matter of public concern. *Also see court.*

tributary, *n* – [HYDROLOGY] a STREAM that supplies water to a larger stream. *Also see delta and distributary.*

1,1,1-trichloroethane (1,1,1-TCA), *n* – [CHEMISTRY] a CHLORINATED SOLVENT heavier and less viscous than water often used as a DEGREASER in industrial operations. *Also see chlorinated solvent, DNAPL and hydrolysis.*

trichloroethylene (TCE), *n* – [CHEMISTRY] a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a SOLVENT to remove GREASE from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers. TCE is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical. With time and the appropriate environmental conditions, TCE will transform into *cis*-1,2-dichloroethylene, then 1,1-dichloroethylene, vinyl chloride, ethane and finally carbon dioxide and water. *Also see chlorinated solvent, DNAPL, olefin, tetrachloroethylene and unsaturated hydrocarbon.*

trickling-filter process, *n* – [TREATMENT TECHNOLOGY] a process in which the liquid from a primary clarifier is distributed on a bed of stones. As the waste water trickes through to drains underneath, it comes in contact with slime on the stones, by which organic material in the water is oxidized and impurities reduced[63].

tricresyl phosphate (TCP)($C_{21}H_{21}O_4P$), *n* – [PETROLEUM CHEMISTRY] an additive in GASOLINE known as a combustion chamber deposit modifier used from about 1953 to about 1974 and first introduced by the Shell Oil Company. Cresyl diphenyl phosphate (CDP) was also used for the same purpose. *Also see additive.*

trigonometry, *n* – [MATHEMATICS] the branch of mathematics dealing with the relations of sides and angles of triangles and with relevant functions of any angles. *Also see algebra, arithmetic, calculus, geometry and mathematics*.

trihalomethanes (THMs), *n* – [CHEMISTRY] one of a family of ORGANIC COMPOUNDS named as derivative of METHANE. THMs are generally by-products of chlorination of drinking water that contains organic material and consist of compounds such as chloroform or bromoform. Significant amounts of drinking-water supplies contain THMs at concentrations above their respective DRINKING-WATER STANDARDS.

2,4,6-trinitrotoluene (TNT), *n* – [CHEMISTRY] a yellow, odorless solid that does not occur naturally in the environment. It is commonly known as TNT and is an explosive used in military shells, bombs, and grenades, in industrial uses, and in underwater blasting. 2,4,6-Trinitrotoluene production in the United States occurs solely at military arsenals.

trip blank, *n* – [ENVIRONMENTAL INVESTIGATION] a BLANK SAMPLE prepared and provide by the LABORATORY and is kept with the sampling crew at all times. Laboratory ANALYSIS of this sample is performed to determine if any outside CONTAMINATION occurred during the sampling event. *Also see field blank and method blank.*

triterpanes, *n* – [PETROLEUM CHEMISTRY] a class of cyclic saturated BIOMARKERS constructed from six isoprene subunits. Cyclic terpane compounds containing two, four, and six isoprene subunits are called monoterpane (C_{10}), diterpane (C_{20}) and triterpane (C_{30}), respectively. Because of their resistance to degradation, these biomarkers can be used to fingerprint spilled petroleum products.

tritium (^{3}H), *n* – [ISOTOPES] an ISOTOPE of HYDROGEN with a MASS NUMBER of 3; the nucleus contains two NEUTRONS and one PROTON and undergoes BETA DECAY to ^{3}He. *Also see tritium method and tritium-helium method.*

tritium method, *n* – [AGE DATING] the use of atmospheric contaminants, such as TRITIUM (^{3}H), CHLOROFLUOROCARBONS (CFCs), SULFUR HEXAFLUORIDE and KRYPTON-85 (^{85}Kr), to estimate the GROUND-WATER AGE and consequently constrain the age of any associated, dissolved contaminants. *Also see age-dating, chlorofluorocarbons, ground-water age, krypton-85, sulfur hexafluoride, tritium and tritium-helium method.*

tritium-helium method, *n* – [AGE DATING] analysis of both TRITIUM and HELIUM to estimate the age of

GROUND-WATER RECHARGE. Because the explosion of thermonuclear devices has decreased more recently, the concentration of tritium in the atmosphere has declined significantly. Therefore, to obtain the age estimates, analysis of helium, the daughter product of tritium disintegration, must also be estimated. *Also see tritium and tritium method.*

trivalent chromium, *n* – [CHEMISTRY] chromium (Cr^{+3}) with a VALENCE of +3. *Also see hexavalent chromium.*

tropical, *adj* – [GEOGRAPHY] of, being, or characteristic of a region or CLIMATE that is frost-free with TEMPERATURES high enough to support year-round plant growth given sufficient moisture. The "tropics" is considered to be between latitudes 23.5° north and 23.5° south. *Also see Tropic of Cancer and Tropic of Capricorn.*

Tropic of Cancer, *n* – [GEOGRAPHY] LATITUDE of 23.5° north. Northern limit of the sun's declination. This line also demarcates the northern limit of the area known as the Tropics. *Also see Tropic of Capricorn and tropics.*

Tropic of Capricorn, *n* – [GEOGRAPHY] LATITUDE of 23.5° south. Southern limit of the sun's declination. This line also demarcates the southern limit of the area known as the Tropics. *Also see Tropic of Cancer and tropics.*

Tropics, *n* – [GEOGRAPHY] the area on the EARTH between the LATITUDES of 23.5°S and 23.5°N or the TROPIC OF CAPRICORN and the TROPIC OF CANCER, respectively.

trough, *n* – [HYDROLOGY] *1*. a long, narrow, open receptacle, especially for holding WATER. *2*. a CHANNEL for conveying LIQUIDS. *Also see channel, ditch and trench.*

trough, *n* – [OCEANOGRAPHY] linear structural depression that extends laterally over a distance within sea floor. *Also see trench.*

trueness, *n* – [STATISTICS] the closeness of an AVERAGE measurement to a "true" value, while ACCURACY is the closeness of a single measurement to the true value. *Also see accuracy, error, mistake and precision.*

truncated spur , *n* – [GEOLOGY] a steep wall on the side of a river valley between two TRIBUTARY VALLEYS where an interlocking spur has been eroded away.

trunk sewer, *n* – [TREATMENT TECHNOLOGY] a SEWER that transports water from COLLECTING SEWERS to the treatment plant. A trunk sewer does not ordinarily service individual properties, but rather receives tributary branches and serves a larger territory[63].

trunk stream, *n* – [HYDROLOGY] a large STREAM into which TRIBUTARIES carry water and sediment. *Also see distributary and tributary.*

truth, *n* – [LOGIC] *1*. the state of being the case. *2*. the body of real things, events, and FACTS. *3*. a judgment, proposition, or idea that is true or accepted as true. *4*. the body of true statements and propositions. *5*. the property (as of a statement) of being in accord with fact or reality.

TS-1 fuel, *n* – [PETROLEUM CHEMISTRY] light KEROSENE-type JET FUEL used in the former Soviet Union and presently in Russia and parts of eastern Europe. *Also see jet fuel.*

TSD facility, *n* – [ENVIRONMENTAL REGULATION] treatment, storage, or disposal facility (as per RCRA).

tufa, *n* — [GEOLOGY] the CALCAREOUS and SILICEOUS ROCK DEPOSITS of SPRINGS, LAKES, or GROUND WATER. Typically consist of CALCIUM CARBONATE ($CaCO_3$) deposits created by PRECIPITATION from SUPERSATURATED waters entering a cold lake from thermal springs. *Also see travertine.*

tuff, *n* – [GEOLOGY] a compacted DEPOSIT that is 50 percent or more volcanic ASH and dust. *Also see welded tuff.*

tuff ring, *n* – [GEOLOGY] a low profile apron of TEPHRA surrounding a wide crater (called a MAAR crater) that is generally lower than the surrounding topography.

tuff cone, *n* – [GEOLOGY] a steep-sloped, cone-shaped, wide CRATER formed of highly altered, thickly bedded TEPHRA. they are considered to be a taller variant of a TUFF RING.

tundra, *n* – [ECOLOGY] a type of treeless ecosystem dominated by lichens, mosses, GRASSES, and woody plants. Tundra is found at high LATITUDES (arctic tundra) and high ALTITUDES (alpine tundra). Arctic tundra is underlain by PERMAFROST and is usually water saturated. *Also see taiga.*

tundra soil, *n* – [AGRONOMY] a dark rich SOIL with a thick, PEAT layer of poorly decomposed VEGETATION, usually underlain by a frozen layer of soil.

tunnel, *n* – [GEOGRAPHY] an underground passage, a passage for a highway or railroad through a HILL or under a RIVER.

turbidite, *n* – [GEOLOGY] a type of rock whose origin is deposits of turbidity current, which are formed from underwater AVALANCHES. These avalanches are responsible for distributing vast amounts of CLASTIC SEDIMENT into the deep ocean.

DISCUSSION – Much of the Ordovician-age Martinsburg Formation is composed of turbidites. This formation can be found in New Jersey,

Pennsylvania, West Virginia, Maryland and Virginia. The shales (and slates) of the Martinsburg were deposited in a large forearc basin resulting in a flysch deposit. This basin was the result of a deepening sea due to the closing of the Iapetus Ocean. Turbidites are common in the Martinsburg due to underwater landslides stirring up sediments and rushing down a slope.

turbidity, *n* — [CHEMISTRY] reduction of transparency of a SAMPLE due to the presence of particulate matter.

turbulent flow, *n* — [HYDROLOGY] that type of FLOW in which any WATER PARTICLE may move in any direction with respect to any other particle, and in which the HEAD loss is approximately proportional to the second power of the velocity. *Also see laminar flow and Reynolds Number.*

turpentine, *n* – [CHEMISTRY] an essential OIL ($C_{10}H_{16}$) derived from the distillation of rosin, which comes from pine TREES. *Turpentine substitute* is a PETROLEUM fraction of similar BOILING POINT.

tussock, *n* – [BIOLOGY] a thick clump of GRASS, or grass-like plant.

type curve, *n* – [HYDROGEOLOGY] a graph used in the analysis of PUMPING-TEST DATA which can be matched to field data to calculate the AQUIFER parameters. *Also see pumping test.*

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ubac, *n* – [GEOGRAPHY] the shaded side of a VALLEY which receiving less sunlight. In the northern hemisphere, it would be the north-facing side of the valley, whereas in the southern hemisphere, it would be the south-facing side.

ultrabasic, *adj* – [GEOLOGY] an IGNEOUS rock of less than 45% silica and more than 55% basic oxides. *Also see felsic, igneous, mafic, plutonic and ultramafic.*

ultra-low-sulfur distillate fuel oil, *n* – [PETROLEUM CHEMISTRY] distillate fuel oil having a sulfur content of less than 15 milligrams per liter (mg/L).

> DISCUSSION -- As of 1993, the US federal government mandated that on-road diesel fuel, a type of distillate fuel oil, have a maximum sulfur content of 0.05% (or 500 mg/L). However, off-road fuels, such as heating oils, are exempt from this mandate.

ultramafic, *adj* – [GEOLOGY] an IGNEOUS ROCK composed chiefly of MAFIC MINERALS, such as monomineralic rocks composed of hypersthene, augite, or olivine. *Also see felsic, igneous, mafic, plutonic and ultrabasic.*

ultraviolet, *n* – [PHYSICS] ELECTROMAGNETIC RADIATION of a WAVELENGTH between the shortest visible violet and low-energy X-RAYS. *Also see electromagnetic radiation and infrared radiation.*

uncertainty, *n* — [STATISTICS] (of measurement) PARAMETER, associated with the result of a MEASUREMENT that characterizes the dispersion of VALUES that could reasonably be attributed to the measurand. *Also see accuracy, error, error range and precision.*

unconsolidated, *adj* – [GEOLOGY] not lithified into ROCK, loosely arranged. *Also see consolidated and diagenesis.*

undercut slope—*See river cliff.*

underfit stream—*See misfit stream.*

underflow, *n* – [HYDROLOGY] downstream flow of water through the permeable deposits underlying a stream. *Also see baseflow and interflow.*

underground storage tank (UST), *n* — any tank, constructed of any material, including the underground PIPING connected to the tank that is or has been used to store HAZARDOUS SUBSTANCES or PETROLEUM PRODUCTS and the VOLUME of which is 10% or more beneath the SURFACE of the GROUND. *Also see aboveground tank.*

understorey, *n* – [DENDROLOGY] area beneath the CANOPY of a FOREST. TREES growing in this area tend to grow slower because of the reduced sunlight. *Also see canopy, dendroecology, dendrology and forest.*

undisturbed sample, *n* — [ENVIRONMENTAL INVESTIGATION] a SOIL SAMPLE that has been obtained by METHODS in which every precaution has been taken to minimize disturbance to the sample. *Also see sample.*

unified soil classification system, *n* – [AGRONOMY] a SOIL classification system based on GRAIN size. The group symbols and divisions are:

Symbol	*Secondary Divisions*
GW	well-graded gravel sand gravels and mixtures with little or no fines
GP	poorly-graded gravels or gravel-sand mixtures with little or no fines
GM	silty gravels, gravel-sand-clay mixtures, plastic fines
GC	clayey gravels, gravel-sand-clay mixtures with plastic fines.
SW	well-graded sands and gravelly sands with little or no fines.
SP	poorly-graded sands or gravelly sands with little or no fines
SM	silty sands and sand-silt mixtures with non-plastic fines
SC	clayey sands and sand-clay mixtures with plastic fines
ML	inorganic silts and very-fine-grained sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
CL	inorganic clays or low to medium plasticity, gravelly clays, sandy clays, silty clays, clean clays
OL	organic silts and organic silty clays of low plasticity
MH	inorganic silts, micaceous or diatomaceous fine sandy or silty soils, clastic silts
CH	inorganic clays of high plasticity
OH	organic clays of medium to high plasticity, organic silts
Pt	peat and other highly organic soils.

uniform flow, *n* – [HYDROGEOLOGY] a property is known to be uniform if, at a given instant, it is the same at every point. Uniform flow occurs if at every point, the specific discharge has the same magnitude and direction[65]. *Also see steady-state flow and unsteady-state flow.*

uniformly graded, *n* — [GEOLOGY] a quantitative definition of the PARTICLE size distribution of a SOIL, SEDIMENT or ROCK which consists of a majority of particles being of the same approximate DIAMETER. A granular material is considered uniformly graded when the uniformity coefficient is less than about five (see Test Method D 2487). Comparable to the geologic term well sorted.

unit weight, *n*, — [PHYSICS] WEIGHT per unit VOLUME (with this, and all subsequent unit-weight definitions, the use of the term weight means FORCE).

- ***dry unit weight (unit dry weight)***, g_d, g_e (FL^{-3}) — the weight of soil or rock solids per unit of total volume of soil or rock mass.
- ***effective unit weight***, g_e (FL^{-3})—that unit weight of a soil or rock which, when multiplied by the height of the overlying column of soil or rock, yields the effective pressure due to the weight of the overburden.
- ***maximum unit weight***, g_{max} (FL^{-3})—the dry unit weight defined by the peak of a compaction curve.
- ***saturated unit weight***, g_G, g_{sat} (FL^{-3})—the wet unit weight of a soil mass when saturated.
- ***submerged unit weight (buoyant unit weight)***, g_m, g_8, g_{sub} (FL^{-3})—the weight of the solids in air minus the weight of water displaced by the solids per unit of volume of soil or rock mass; the saturated unit weight minus the unit weight of water.
- ***unit weight of water***, g_w (FL^{-3})—the weight per unit volume of water; nominally equal to 62.4 lb/ft^3 or 1 g/cm^3.
- ***wet unit weight (mass unit weight)***, g_m, g_{wet} (FL^{-3})—the weight (solids plus water) per unit of total volume of soil or rock mass, irrespective of the degree of saturation.
- ***zero air voids unit weight***, g_z, g_s (FL^{-3})—the weight of solids per unit volume of a saturated soil or rock mass.

universe, *n* – [PHILOSOPHY] the whole body of things and phenomena observed or postulated.

unknown compound, *n* – [CHEMISTRY] a NON-TARGETED COMPOUND which cannot be tentatively identified. Based on the analytical method used, the estimated CONCENTRATION of the unknown compound may or may not be determined. *Also see non-targeted compound and tentatively identified compounds.*

unleaded gasoline, *n* – [PETROLEUM CHEMISTRY] gasoline not containing any lead additives, such as TETRAETHYL LEAD or other LEAD ALKYLS. Today, most service stations in the USA offer three grades of unleaded gasoline: regular, mid-grade and premium.

> DISCUSSION – In the early-1970s, the US federal government began mandating reductions in the organic-lead content of on-road gasolines. By the late 1980s, leaded gasoline was no longer available. It was completely discontinued in California in 1992 and in 1996 in the rest of the USA. Lead additives are still available as of 2010 in aviation and racing gasoline in the USA (also Canada and Australia). There are numerous countries throughout the world where alkyl leads continue to be added to gasoline.
>
> Between the 1930s and the 1960s, unleaded gasoline was not popular, but it still could be found. In the 1930s, it was called "regular", but after a regular-grade leaded gasoline was introduced in 1933, unleaded was often known as "3rd Grade". In the 1960s, Standard Oil of Indiana (Amoco) offered a premium-grade unleaded gasoline known as "White Gas".

Also see additive, gasoline, lead alkyls, leaded gasoline and reformulated gasoline.

unresolved complex mixture (UCM), *n* – [PETROLEUM CHEMISTRY] after significant BIODEGRADATION and other WEATHERING processes, the trace left on a GAS CHROMATOGRAM leaves numerous compounds that cannot be identified. This mixture of peaks on the GC often has the shape of a hump. Unresolved complex mixtures (UCMs) of HYDROCARBONS are an almost universal feature of environmental samples contaminated with weathered RESIDUES of PETROLEUM. Gas-chromatographically-resolved hydrocarbons are removed or depleted by bacterial action during weathering processes, leaving a mixture of both nonaromatic and aromatic compounds. The UCM appear as the "envelope" or hump area between the solvent baseline and the curve defining the base of resolvable peaks[51]. *Also see chromatogram and gas chromatography.*

> DISCUSSION – The relative size of the UCM is often used as a measure of environmental weathering. A larger UCM suggests a greater degree of weathering.

unrestricted-use remedial action, *n* – [ENVIRONMENTAL REGULATION] any REMEDIAL ACTION for soil that does not require the continued use of either engineering or institutional controls to meet the established health risk or environmental standards. *Also see restricted use remedial action.*

unrestricted-use standard, *n* – [ENVIRONMENTAL REGULATION] a numeric soil remediation standard that, when achieved, restores the contaminated soil to a condition or quality suitable for any use. The unrestricted use standard is the lowest of any numeric

standard, without limitation, any residential soil remediation standard, any non-residential soil remediation standard and any applicable impact-to-groundwater soil standard. *Also see restricted-use standard.*

unsaturated hydrocarbon, *n* – [PETROLEUM CHEMISTRY] a HYDROCARBON in which at least two CARBON ATOMS are joined by more than one covalent bond while all the remaining bonds are occupied by HYDROGEN; a hydrocarbon with one or more double or triple bonds.

> DISCUSSION -- An olefin, such as butene or trichloroethylene, is an example of an unsaturated hydrocarbon.

Also see aliphatic.

unsaturated zone—*See vadose zone.*

unsteady-state flow, *n* – [HYDROGEOLOGY] unsteady flow occurs when at any point the magnitude or direction of the specific discharge changes with time[65]. *Also see steady-state flow and uniform flow.*

upconing, *n* – [HYDROGEOLOGY] PROCESS by which a denser LIQUID, such as COAL TAR, CHLORINATED SOLVENT or SALINE WATER underlying FRESHWATER in an AQUIFER rises upward into the freshwater zone as a result of pumping water from the freshwater zone.

> DISCUSSION – Upconing is a common event with wells located close to the coastline. A saltwater-freshwater interface exists landward with depth. The pumping can cause that interface to upcone and possibly contaminate the well with saltwater.

Also known as uprising and upwelling.

upgradient, *adj* – [HYDROLOGY] *1*. PARALLEL to the SLOPE and upward. *2*. at a higher elevation. Also known as UPSTREAM when dealing with flowing water bodies. *Also see downgradient and sidegradient.*

upgrading processes, *n* – [PETROLEUM REFINING] processes in petroleum refining to improve the quality of a material by using chemical reactions to remove any compounds present in trace amounts that give the material the undesired quality. Otherwise, the bulk properties of the FEEDSTOCK are not changed. The most commonly used upgrading processes are SWEETENING, HYDROTREATING, and CLAY TREATMENT.

upper explosive limit, *n* – [ENVIRONMENTAL INVESTIGATION] the minimum concentration (volume percent in air) of a flammable gas or vapor required for ignition or explosion to occur in the presence of an ignition source. *Also see lower explosive limit.*

uprising—*See upconing.*

upstream – *See upgradient*

uranium (U), *n* -- [CHEMISTRY] RADIOACTIVE ELEMENT with the ATOMIC NUMBER 92 and, as found in natural ores, an ATOMIC WEIGHT of approximately 238. The two principal natural ISOTOPES are uranium-235 (0.71 percent of natural uranium), which is fissile, and uranium-238 (99.3 percent of natural uranium), which is fissionable by fast neutrons and is fertile. Natural uranium also includes a minute amount of uranium-234. *Also see depleted uranium, highly-enriched uranium, low-enriched uranium, radioactivity, radioisotopes, radium and radon.*

urban hydrology , *n* – [HYDROLOGY] the study of how URBANIZATION changes the HYDROLOGY of DRAINAGE BASINS. Tarmac, CONCRETE and drains increase RUNOFF and may increase the FLOOD risk in urban areas.

urbanization , *n* – [GEOGRAPHY] the quality or state of being of or the PROCESS of becoming more characteristic of a city. *Also see development.*

U.S. attorney, *n* – [LAW] a LAWYER appointed by the President in each judicial district to prosecute and defend cases for the federal government. The U.S. Attorney employs a staff of Assistant U.S. Attorneys who appear as the GOVERNMENT'S attorneys in individual cases.

USGS 7.5 Minute Topographic Map — [GEOGRAPHY] the map (if any) available from or produced by the United States Geological Survey, entitled "USGS 7.5 Minute Topographic Map" and showing LANDFORMS, TOPOGRAPHY, etc. (such ground-surface-elevation contours). In some instances, the same quandrangle showing the underlying GEOLOGIC FORMATIONS is available. *Also see quadrangle.*

uphold, *v* – [LAW] for the appellate court to agree with the lower court decision and allow its decision to stand.

uvala, *n* – [GEOLOGY] a depression formed when two or more DOLINES coalesce.

upwelling—*See upconing.*

Vv

vactor, *n* – [ENVIRONMENTAL REMEDIATION] a truck which can remove soil and other heavier materials through a hose equipped with a vacuum system. *Also see vacuum truck.*

vacuum, *n* — [PHYSICS] a degree of rarefaction below ATMOSPHERIC PRESSURE: negative pressure.

vacuum distillation, *n* – [PETROLEUM TECHNOLOGY] a unit within a PETROLEUM REFINERY that further distills residual bottoms after ATMOSPHERIC DISTILLATION.

vacuum truck, *n* – [ENVIRONMENTAL REMEDIATION] a truck which can removed WATER or SLUDGES through a hose equipped with a vacuum system. *Also see vactor.*

vadose DNAPL zone, *n* – [HYDROGEOLOGY] DNAPL present above the water table in either the residual or free-phase state and generally the cause of contaminated soil gas, residual water and ground water[67].

vadose zone, *n* — [AGRONOMY] the HYDROGEOLOGICAL region extending from the SOIL SURFACE to the top of the principle WATER TABLE; commonly referred to as the "unsaturated zone" or "zone of aeration". These alternative names are inadequate as they do not take into account locally saturated regions above the principle water table (for example, perched water zones). *Also see zone of aeration.*

vale, *n* – [GEOGRAPHY] a VALLEY, often coursed by a STREAM; a DALE.

valence, *n* – [CHEMISTRY] the combining POWER of an ATOM or RADICAL, equal to the number of HYDROGEN atoms that the atom could combine with or displace in a CHEMICAL COMPOUND (hydrogen has a valency of 1). *Also see charge.*

valleuse, *n* – [HYDROLOGY] a depression in the land surface of a PLATEAU which permits access to the sea.

valley, *n* – [GEOGRAPHY] a linear depression in the LANDSCAPE that slopes down to a STREAM, LAKE or the OCEAN. Formed by water and/or ice EROSION. *Also see canyon and gorge.*

valley train, *n* – [GEOLOGY] a PLAIN within a VALLEY, sloping down and away from the site of a glacier snout. It is composed of GRAVELS, SANDS, PEBBLES and BOULDERS.

vallon de gélivation, *n* – [GEOLOGY] *from French,* a small VALLEY formed by the widening of BEDROCK JOINTS by ice action rather than by normal FLUVIAL PROCESSES.

value, *n* – [MATHEMATICS] *1*. a numerical QUANTITY that is assigned or is determined by calculation or MEASUREMENT. *2*. the monetary worth of something; marketable price. *Also see number and quantity.*

van der Waals forces, *n* – [CHEMISTRY] extremely weak forces of interaction between unexcited ATOMS or MOLECULES of gases which accounts for why gases do not behave strictly in accordance with theory (their behavior varies slightly from that required by the ideal or perfect gas laws).

van't Hoff Equation, *n* – [CHEMISTRY] an equation relating the equilibrium constant of a certain reaction at a certain temperature with the corresponding enthalpy value where,

$$\text{Log}K_{T2} = \text{log}K_{T1} + \Delta H^0_r/2.303R\ (T_1^{-1} - T_2^{-1})$$

and K is the equilibrium constant, T is the temperature (kelvins) at 1 and 2, ΔH is the change in enthalpy is kJ/mol or kcal/mol, R is the gas constant of 0.00199 kcal/(mol·K).

vapor, *n* – [CHEMISTRY] *1*. the state of a substance that exists below its critical temperature and that may be liquefied by application of sufficient pressure. *2*. the gaseous state of a substance that is liquid or solid under ordinary conditions.

vapor degreasing, *n* – [INDUSTRIAL TECHNOLOGY] the use of chlorinated or fluorinated SOLVENTS to remove soils, greases or waxes from a surface.

vapor density, *n* – [PHYSICS] the RATIO of the MASS of VAPOR per unit VOLUME. An equation for estimating vapor density is derived from a varied form of the ideal gas law where,

$$PV = MRK/FW$$

and P is the PRESSURE (in atmospheres), V is the volume (in liters), M is the mass (grams), R is the IDEAL GAS CONSTANT of 8.20575×10^{-2} atmospheres liters per mole per degrees Kelvin, K is the TEMPERATURE in degrees Kelvin and FW is the formula weight.

vapor extraction, *n* – [REMEDIATION TECHNOLOGY] a SOIL REMEDIATION PROCESS in which a VACUUM is applied to subsurface media to volatilize and remove CONTAMINANTS. The introduction of hot air may also be used to enhance the volatilization process.

vapor phase, *n* – [PHYSICS] the GAS given off by SUBSTANCES that are SOLIDS or LIQUIDS at ordinary ATMOSPHERIC PRESSURE and TEMPERATURES. *Also see gaseous phase.*

vapor pressure, *n* – [PHYSICS] a MEASURE of a SUBSTANCE's propensity to EVAPORATE, vapor pressure

is the FORCE per unit area exerted by vapor in an EQUILIBRIUM state with surroundings at a given pressure. It increases exponentially with an increase in TEMPERATURE. A relative measure of CHEMICAL VOLATILITY, vapor pressure is used to calculate WATER PARTITION COEFFICIENTS and volatilization rate constants. *Also see evaporation, Henry's Law Constant and volatility.*

variable, *n* – [MATHEMATICS] quantity which may take any one of a specified set of values a variable in the mathematical sense. *Also see number, parameter and value.*

variance, *n* – [STATISTICS] for a set of values the sum of the squares of the deviations from the mean divided by the number of values. *Also see average, mean, standard deviation and statistics.*

varve, *n* – [GEOLOGY] a pair of SEDIMENT BEDS deposited by a lake on its floor, typically consisting of a thick, coarse, light-colored bed deposited in the summer and a thin, fine-grained, dark-colored bed deposited in the winter. Varves are most often found in LAKES that freeze in the winter. The number and nature of varves on the bottom of a lake provide information about the lake's age and geologic events that affected the lake's development. *Also see lake and strata.*

vasques, *n* – [GEOLOGY] wide, shallow pools with flat bottoms forming a network of tiered terraced steps on LIMESTONE coastal platforms.

vector, *n* – [MATHEMATICS] something, such as VELOCITY, that has both MAGNITUDE and direction.

vegetation, *n* – [BIOLOGY] plant life or total plant cover.

velocity, *n* — [PHYSICS] TIME RATE of linear MOTION in a given direction. Can be expressed in units such as centimeters per second or feet per day. *Also see acceleration and motion.*

velocity head, *n* – [HYDROGEOLOGY] the height the KINETIC ENERGY of the LIQUID is capable of lifting the liquid. *Also see elevation head, pressure head and static head.*

vent, *n* – [GEOLOGY] the opening of the CRUST through which volcanic material flows. VOLCANOES have one, other igneous features may have several. *Also see volcanic neck.*

vent—*Also see vent pipe.*

ventifact, *n* – [GEOLOGY] a stone shaped by the wind, especially in polar or arid areas. *Also see dreikanter*.

vent pipe, *n* – [UNDERGROUND STORAGE TANK TECHNOLOGY] an open pipe connected to a storage tank system that allows the free passage of *air* in and out to allow filling and emptying of the vessel. *Also see underground tank.*

venturi tube, *n* – [PHYSICS] a closed conduit or pipe used to measure the rate of fluid flow.

vertical, *n* – [PHYSICS] at right angles to a HORIZONTAL plane, perpendicular. *Also see horizontal.*

vertical hydraulic gradient, *n* — [HYDROGEOLOGY] the change in total HYDRAULIC HEAD of WATER per unit vertical distance between measuring points (in the *z* direction). *Also see hydraulic gradient*.

vial, *n* – [ENVIRONMENTAL INVESTIGATION] a small closed or closable vessel especially for liquids.

violation, *n* – [LAW] the act or process of disregarding or failing to comply with an oath, treaty, LAW, etc.

virology, *n* – [BIOLOGY] the scientific study of VIRUSES. *Also see microbe, microbiology, microorganism*

virus, *n* – [BIOLOGY] *1*. a fragment of DNA or RNA that depends on the infection of host cells for their reproduction. They are not cells. Viruses are thought to parts of the genetic code found in either eukaryote or prokaryote cells that have the ability to exist on their own. At times, viruses are METABOLICALLY inert and technically non-living. *2*. an infectious agent having a simple acellular organization with a protein coat and a single type of nucleic acid, lacking independent metabolism, and reproducing only within living host cells. *Also see bacteria, microbe, microbiology, microorganism and virology.*

visbreaker, *n* – {PETROLEUM TECHNOLOGY] a processing unit within a petroleum refinery with the purpose of reducing the quantity of residual oil produced in the distillation of crude oil and to increase the yield of more valuable middle distillates (heating oil and diesel). A visbreaker thermally cracks large hydrocarbon molecules by heating in a furnace to reduce its viscosity and to produce small quantities of light hydrocarbons (LPG and gasoline). The process name of "visbreaker" refers to the fact that the process reduces or breaks the viscosity of the residual oil. The process is non-catalytic.

viscosity, *n* – [PHYSICS] property of a FLUID describing its RESISTANCE to flow in units of Newton-seconds per meter squared or pascal-seconds. *Also known as dynamic viscosity.*

viscosity coefficient, *n* – [PHYSICS] a numerical factor that measures the internal resistance of a fluid to flow; it equals the shearing force in dynes per square centimeter transmitted from one fluid plane to another that is one centimeter away, and generated by the difference in fluid velocities of 1 centimeter per

second in the two planes. The greater the resistance to flow, the larger the coefficient[16]. *Also see viscosity.*

viscous flow — *See laminar flow.*

viscous stress, *n* – [PHYSICS] the resistive force of water. It is proportional to the speed of the CURRENT, but acts opposite to its direction of flow[16].

visible radiation, *n* – [PHYSICS] WAVELENGTHS of the ELECTROMAGNETIC SPECTRUM between 10^{-4} and 10^{-5} cm. *Also see infrared and ultraviolet radiation.*

vitrification, *n* – [TREATMENT TECHNOLOGY] an *in-situ* thermal treatment process which converts SOIL into a CHEMICALLY INERT and stable glass and CRYSTALLINE MATRIX. Organic constituents in the soil are destroyed by PYROLYSIS. *Also see lithification*.

vlei, *n* – [HYDROLOGY] *from Dutch,* a shallow LAKE or marshy area, especially one developed in the poorly drained valley of an intermittent stream[16]. *Also spelled vley or vly.*

void, *n* — [HYDROGEOLOGY] SPACE in a SOIL or ROCK MASS not occupied by SOLID MINERAL MATTER. This space may be occupied by AIR, WATER, or other GASEOUS or LIQUID material. *Also see porosity and effective porosity.*

void ratio, *n,* — [HYDROGEOLOGY] the ratio of: (*1*) the volume of void space, to (*2*) the volume of solid particles in a given soil mass. *Also see porosity and effective porosity.*

volatile, *n* – [CHEMISTRY] any SUBSTANCE that EVAPORATES readily. *Also see gas, Henry's Law Constant and vapor.*

volatilization, *n* – [CHEMISTRY] the EVAPORATION or changing of a substance from LIQUID to VAPOR. *Also see evaporation.*

volatile organic compounds (VOCs), *n* – [CHEMISTRY] ORGANIC COMPOUNDS amenable to analysis by the purge and trap technique. For the purposes of this chapter, analysis of volatile organics means the analysis of a sample for either those PRIORITY POLLUTANTS listed as amenable for analysis using EPA method 624 or those target compounds identified as volatiles in the version of the EPA "Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration" in effect as of the date on which the laboratory is performing the analysis. *Also see semi-volatile compounds.*

volcanic ash, *n* – [GEOLOGY] fine fragements of ROCK and LAVA which have been thrown out of a VOLCANO during an eruption. *Also see nuée ardente.*

volcanic dust, *n* – [GEOLOGY] very fine particles of of dust emitted during a volcanic eruption.

volcanic eruption, *n* – [GEOLOGY] there are four types: Hawaiian (non-explosive - lava spills out from a fissure); Pelean (violent eruption when pressure build up behind a blocked vent. Eventually the pressure blows the vent away); Bolian (small-scale and frequent eruptions) and Vulcanian (as Pelean, but the lava is less viscous).

volcanic neck, *n* – [GEOLOGY] the passage from the MAGMA chamber to the CRATER of a VOLCANO which become blocked by cooled LAVA. This then forms a resistant plug. If the surrounding rocks are eroded, the neck will be left behind. *Also see lava, magma and volcano.*

volcanic plume, *n* – [GEOLOGY] describes two events: *1.* the upwelling of MAGMA at a hotspot, and *2*. a cloud of steam, dust and other material ejected from a volcano during an eruption. *Also see nuée ardente.*

volcanic rock–*See extrusive rock.*

volcano, *n* – [GEOLOGY] *1.* the SOLID structure created when LAVA, GASES, and hot PARTICLES escape to the Earth's SURFACE through vents. Volcanoes are usually conical. A volcano is active when it is erupting or has erupted recently. Volcanoes that have not erupted recently but are considered likely to erupt in the future are said to be "dormant." A volcano that has not erupted for a long time and is not expected to erupt in the future is "extinct." 2. any eruption of material, such as mud, that resembles a magmatic volcano[4]. Word derived from the Roman deity of fire, Vulcan. *Also see active volcano, dormant volcano and lava.*

volume, *n* – [PHYSICS] *1.* the amount of SPACE an object takes up. *2.* the amount of space a container can hold. The SI unit of volume is the cubic meter (m^3); the LITER is a popular unit of volume in CHEMISTRY.

Voluntary Cleanup Program (VCP), *n* -- [ENVIRONMENTAL REGULATION] a formal means established by many states to facilitate assessment, cleanup, and redevelopment of Brownfields sites. VCPs typically address the identification and cleanup of potentially contaminated sites that are not on the NPL. Under VCPs, owners or developers of a site are encouraged to approach the state voluntarily to work out a process by which the site can be readied for development. Many state VCPs provide technical assistance, liability assurances, and funding support for such efforts. *Also see enforcement and National Priorities List.*

vorticity, *n* – [PHYSICS] the measure of the rotation in a fluid or gas. *Also see centrifugal and centripetal.*

vug, vugh, *n* – [GEOLOGY] a small, unfilled *cavity,* normally in VOLCANIC rock, and normally caused by an AIR pocket in the original LAVA. *Also see extrusive rock and lava.*

vulcanism, *n* – [GEOLOGY] the action and formation of VOLCANOES.

vulnerability assessment, *n* – [ENVIRONMENTAL INVESTIGATION] an evaluation of drinking water source quality and its vulnerability to contamination by pathogens and toxic chemicals.

Ww

wacke, *n* – [GEOLOGY] a dirty SANDSTONE that consists of a mixed variety of ANGULAR and unsorted or POORLY SORTED MINERAL and rock fragments, and of an abundant MATRIX of CLAY and fine SILT; specifically an impure sandstone containing more than 10% ARGILLACEOUS matrix. The term is used for a major category of sandstone, as distinguished from ARENITE. *Also see arkose and greywacke.*

wackestone, *n* – [GEOLOGY] a SEDIMENTARY ROCK with more than 10% grains, supported by a lime mud.

wash, *n* – [GEOLOGY] ALLUVIUM that has been collected, carried and deposited by the action of WATER.

washboarding, *n* – [HYDROLOGY] the process where unpaved roads develop a series of regular bumps with short spacing on their surface.

washboard moraine, *n* – [GEOLOGY] RIDGES of MORAINE material, a few metres high lying transverse to the direction of the former ice flow. *Also see moraine, ground moraine, recessional moraine and terminal moraine.*

waste, *n* – [WASTE DISPOSAL] a material that is unwanted at its present location; that is no longer useful for its original purpose; that has been disposed, or any combination thereof.

wastage, *n* – [GEOLOGY] the PROCESS by which GLACIERS lose substance; these processes include EROSION, CORROSION, calving, EVAPORATION and melting and ABLATION.

wasteland, *n* – [GEOGRAPHY] LAND that is not capable of producing materials or services of value.

waste oil, *n* – [PETROLEUM CHEMISTRY] normally a PETROLEUM based or SYNTHETIC OIL which, through use, storage or handling has become unsuitable for its original purpose due to the presence of IMPURITIES or loss of original PROPERTIES. However, waste oils may be mixtures of many petroleum-based and non-petroleum products. Most service stations and automotive repair facilities maintain UNDERGROUND STORAGE TANKS for waste oil and they are filled, mostly, with waste motor oil, although there can also be waste gasoline and waste LUBRICATING OILS and TRANSMISSION FLUIDS. *Also see crankcase oil, hydraulic fluid, lubricating oil, motor oil and transmission fluid.*

waste stream, *n* -- [WASTE DISPOSAL] the total amount and composition of WASTE materials emitted from an industrial facility. *Also see waste and wastewater.*

wastewater, *n* — [WASTE DISPOSAL] WATER that *1.* is or has been used in an industrial or manufacturing process. *2.* conveys or has conveyed SEWAGE, or *3.* is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. Wastewater does not include water originating on or passing through or adjacent to a site, such as storm-water flows, that has not been used in industrial or manufacturing processes, has not been combined with sewage, or is not directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. *Also see waste and wastestream.*

water, *n* – [HYDROLOGY] a colorless, tasteless LIQUID, with the formula H_2O and some very peculiar properties that stem from the bent H-O-H structure of its MOLECULES. Exists in three forms: a crystalline solid (ICE) at or below 0^oC (32^oF), a colorless liquid from 0^oC to 100^oC (32^oF to 212^oF) or as a VAPOR (STEAM) at or above 100^oC (or 212^oF). *Also see ice and steam*.

water break, *n* – [HYDROLOGY] a place in a STREAM where the surface of water is broken by bottom irregularities[16].

water capacity, *n* – [AGRONOMY] the maximum amount of WATER that a ROCK or SOIL can hold[16]. *Also see field capacity, residual saturation and specific retention.*

water content, *n,* — [HYDROGEOLOGY] the RATIO of the MASS of WATER contained in the PORE spaces of SOIL or ROCK material, to the solid mass of PARTICLES in that material, expressed as a percentage. It is expressed as:

$$w = W_w/W_s \text{ or } M_w/M_s$$

where, w is the water content (%), W_w is the weight of water, W_s is the weight of the solids, M_w is the mass of water and M_s is the mass of the solids.

watercourse, *n* – [HYDROLOGY] a NATURAL CHANNEL through which water runs[16].

water creep, *n* – [HYDROLOGY] the movement of water under or around a structure, such as a dam, buit on a semi-permeable foundation[16].

water demand, *n* – [HYDROLOGY] a schedule of the water requirements for a particular purpose, as for irrigation, power, municipal supply, plant transpiration and storage[16].

waterfall, *n* – [HYDROLOGY] a perpendicular or steep descent of the water of a STREAM, as where it crosses an outcrop of RESISTANT ROCK overhanging softer rock

that has been eroded, or flows over the edge of a plateau or cliffed COAST[16].

water-fit, *n* – [HYDROLOGY] the MOUTH of a RIVER[16].

water gap, *n* – [GEOLOGY] a deep pass in a MOUNTAIN RIDGE, through which a STREAM flows, especially a narrow GORGE or RAVINE cut through RESISTANT ROCKS by an ANTECEDENT STREAM[16].

water gas, *n* – [PETROLEUM CHEMISTRY] a GAS rich in HYDROGEN, carbon monoxide, and METHANE made by pyrolyzing in the hot gas product from a blue gas generator. *Also known as blue gas or carbureted water gas.*

waterhole, *n* – [HYDROLOGY] a depression where water collects.

water-holding capacity, *n* — [HYDROGEOLOGY] the smallest value to which the water content of a SOIL or ROCK can be reduced by GRAVITY DRAINAGE[16]. *Also see field capacity, residual saturation and specific retention.*

waterhole, *n* – [GEOLOGY] a natural hole, HOLLOW or small DEPRESSION that contains water, especially in ARID or semi-arid regions[16]. *Also see oasis and wadi.*

water level, *n* – [HYDROLOGY] *1*. water-surface elevation or STAGE. *2*. the free surface of a body of water. *3*. the elevation of the free surface of a body of water above or below a DATUM. *4*. the surface of water standing in a WELL, usually indicative of the position of the WATER TABLE or other POTENTIOMETRIC SURFACE[16].

water-level fluctuation, *n* – [HYDROGEOLOGY] *1*. movement of the free-water surface of a body of water. *2*. change in the elevation of the free-water surface of a body of water above or below a DATUM[16].

water-level recorder, *n* – [HYDROLOGY] a mechanical device used to collect continuous WATER-LEVEL DATA from an OBSERVATION WELL. *Also see pressure transducer.*

waterline, *n* – [HYDROLOGY] *1*. the migrating line of contact between land and sea; the SHORELINE. *2*. the actual line of contact, at a given time, between the standing water of a lake or sea and the bordering land. *3*. the limit of backrush where waves are present on a beach[16].

waterlogging, *n* – [AGRONOMY] the accumulation of excessive moisture in the soil within the zone or depth desirable for favorable root development of plants[16].

water loss, *n* – [HYDROLOGY] in any water system, that portion of water that leaves the system without being subjected to the intended use[16].

water mass, *n* – [HYDROLOGY] a mixture of two or more water types[16].

water mass balance, *n* – [HYDROGEOLOGY] an inventory of the different sources and sinks of water in a hydrogeologic system. In a well-posed model, the sources and sinks should balance. *Also known as a water budget.*

water of compaction, *n* – [HYDROGEOLOGY] rejuvenated water originating from the destruction of INTERSTICES by COMPACTION of SEDIMENTS[16].

water of dehydration, *n* – [HYDROLOGY] water that has been set free from its chemically combined state[16].

water of hydration, *n* – [HYDROLOGY] WATER that is chemically combined in a CRYSTALLINE SUBSTANCE to form a hydrate, but that may be driven off by HEAT[16].

water of imbibition, *n* – [HYDROGEOLOGY] the amount of WATER a ROCK can contain at locations above the WATER TABLE[16].

water of retention, *n* – [HYDROGEOLOGY] that part of the INTERSTITIAL WATER in a SEDIMENTARY ROCK that remains in the INTERSTICES under CAPILLARY PRESSURES and under conditions of unhindered flow; usually called CONNATE WATER[16]. *Also see field capacity, residual saturation, specific retention and water-holding capacity.*

water of saturation, *n* – [HYDROGEOLOGY] water that can be absorbed by water-bearing material without dilation of that material[16]. *Also see ground water and zone of saturation.*

water of supersaturation, *n* – [HYDROGEOLOGY] water in excess of that required for SATURATION; water in sedimentary materials that are inflated or dilated, such as plastic clay or flowing mud whose particles are not in contact and are separated by water[16]. *Also see compressibility.*

water pocket, *n* – [HYDROGEOLOGY] a small, bowl-shaped DEPRESSION on a BEDROCK SURFACE, where water may gather[16]. *Also see bathtub effect.*

water quality, *n* – [HYDROLOGY] the PHYSICAL, CHEMICAL and BIOLOGICAL CHARACTERISTICS of water with respect to its suitability for a particular purpose[16].

water-quality criteria, *n* – [ENVIRONMENTAL REGULATION] designated levels or CONCENTRATIONS of certain CONSTITUENTS or CHARACTERISTICS that, when not exceeded, will not prohibit or significantly impair a designated use of WATER. *Also see drinking water standard.*

water resources, *n* – [HYDROLOGY] a general term referring to the occurrence, replenishment, movement, discharge, quantity, quality and availability of water[16].

water right, *n* – [LAW] the legal right to use a specific

quantity of water, on a specific time schedule, at a specific place, and for a specific purpose[16].

watershed, *n* -- [HYDROLOGY] the DRAINAGE area of a STREAM. *Also see catchment and drainage basin.*

water sink – *See swallow hole.*

watersmeet, *n* – [HYDROLOGY] a meeting place of two STREAMS[16].

water supply, *n* – [HYDROLOGY] a source or volume of water available for use; also a system of reservoirs, wells, conduits and treatment facilities required to make the water available and usable[16].

water table, *n* — [HYDROGEOLOGY] the SURFACE of a GROUND-WATER body at which the WATER PRESSURE equals ATMOSPHERIC PRESSURE. Earth material below the water table is SATURATED with water[16]. *Also see capillary fringe, free-water elevation, phreatic surface, piezometric surface and potentiometric surface.*

> DISCUSSION – The water table is the location where water will occur in a well; however, it is not where the soil, sediment or rock is first water saturated. This location can occur in the capillary fringe. The water table is where the water pressure equals or exceed the atmospheric pressure. Water in the capillary fringe can be under saturated conditions, but it does not flow into a well because its pressure is less than atmospheric. The width of the capillary fringe tends to be greater in finer-grained materials compared to the coarser grained.

water-table aquifer—*See preferred term: unconfined aquifer.*

water year, *n* – [HYDROLOGY] in federal agency reports dealing with SURFACE-WATER supply, the 12-month period of October 1 through September 30[1].

water yield, *n* – [HYDROLOGY] the RUNOFF from a DRAINAGE BASIN; PRECIPITATION minus EVAPOTRANSPIRATION[1].

wave, *n* – [CHEMISTRY] a similar variation of an ELECTROMAGNETIC FIELD in the propagation of RADIATION through a MEDIUM or VACUUM. *Also see amplitude, frequency and wavelength.*

wave, *n* – [PHYSICS] a disturbance of the PARTICLES of a FLUID MEDIUM to form ridges and troughs for the propagation or direction of motion, heat, sound, etc.

wavelength, *n* – [PHYSICS] the distance between successive CRESTS of a WAVE, especially points in a sound wave or electromagnetic wave. *Also see amplitude and frequency.*

wax, *n* – [PETROLEUM CHEMISTRY] a thermoplastic solid of high MOLECULAR WEIGHT which may be HYDROCARBON-derived from DISTILLATION of an ALIPHATIC PETROLEUM (paraffin wax) or an ESTER of unsaturated FATTY ACIDS and alcohols which are end products of plant and animal METABOLISM. *Also see paraffin.*

weather, *n* – [METEOROLOGY] the state of the ATMOSPHERE at a specific TIME and place. *Also see climate.*

weathering, *n* — [GEOLOGY] the process of DISINTEGRATION and DECOMPOSITION as a consequence of exposure to the ATMOSPHERE, to CHEMICAL action, and to the action of frost, WATER, and HEAT. The ALTERATION of ORGANIC COMPOUNDS through EVAPORATION, DISSOLUTION and BIODEGRADATION. *Also see biodegradation, dissolution, erosion, evaporation and resistant.*

weeping rock, *n* – [HYDROGEOLOGY] a porous rock from which water oozes.

weight, *n* – [PHYSICS] the FORCE by which a body is attracted to the Earth. It is the MASS multiplied by the GRAVITATIONAL CONSTANT. *Also see energy, force, mass and work.*

weighted average, *n* – [STATISTICS] for a series of recorded observations, the sum of the products of the FREQUENCY of certain values and the value of the observation, divided by the total number of observations. For example, for one measurement of 5 grams, three measurements of 7 grams, and two measurements of 2 grams, the weighted average is (1(5) + 3(7) + 2(2))/6 = 5 grams. *Also see statistics*.

weir, *n* – [HYDROLOGY] *1*. a wall or plate placed in an open CHANNEL to MEASURE the FLOW of WATER. *2*. a wall or obstruction used to control flow from settling tanks and clarifiers to ensure a uniform flow RATE and avoid short-circuiting.

welded tuff, *n* – [GEOLOGY] a VOLCANIC IGNEOUS ROCK that forms when still-warm TEPHRA accumulates at the Earth's surface. Because the particles are still warm and soft, they can weld together under the weight of overlying deposits, forming a hard rock.

> DISCUSSION -- The permeabilities or hydraulic conductivities of welded tuffs are often extremely low. Therefore, this type of lithology has been proposed for the storage of nuclear wastes.

well, *n* – [HYDROGEOLOGY] a bored, drilled, or driven shaft, or a dug hole whose depth is greater than the largest surface DIMENSION and whose purpose is to reach underground WATER supplies or OIL, or to store or bury FLUIDS below GROUND.

well completion diagram, *n* — [HYDROGEOLOGY] a RECORD that illustrates the details of a WELL installation, in particular, the depth interval of the screen, the sand pack and grout. It may also provide a description of the geologic materials encountered during drilling.

well development, *n* – [HYDROGEOLOGY] the removal of FINE-GRAINED SEDIMENT from a *well* to improve its YIELD. The well development process is usually conducted immediately after the installation and completion of the well. *Also see mechanical surging.*

well field, *n* – [HYDROGEOLOGY] area containing one or more WELLS that produce usable amounts of WATER, GAS or OIL.

well graded, *adj* – [GEOLOGY] refers to SOIL material consisting of COARSE-grained PARTICLES that are well distributed over a wide range in size or DIAMETER. Such soil normally can be easily increased in DENSITY and bearing properties by COMPACTION. Contrasts with poorly graded soil.

well head, *n* -- [HYDROGEOLOGY] the area immediately surrounding the top of a WELL, or the top of the well casing.

wellhead protection area (WPA), *n* -- [HYDROGEOLOGY] a protected SURFACE and subsurface zone surrounding a WELL or well field supplying a public water system to keep CONTAMINANTS from reaching the well WATER. *Also see capture zone*.

well point, *n* – [HYDROGEOLOGY] a hollow vertical tube, rod, or pipe terminating in a perforated pointed shoe and fitted with a fine-mesh SCREEN.

well purging, *n* – [ENVIRONMENTAL INVESTIGATION] the PROCESS in which the standing WATER in a WELL column is evacuated prior to SAMPLING to insure that the GROUND WATER is REPRESENTATIVE of ongoing conditions.

well screen, *n* — [HYDROGEOLOGY] a FILTERING device used to retain the primary or natural filter pack; usually a cylindrical pipe with openings of a uniform width, orientation, and spacing.

Wenzel's Law, *n* – [CHEMISTRY] applies to the DISSOLUTION of a SOLID in a LIQUID. The RATE of dissolution is proportional to the surface area of the solid exposed to the action of the SOLVENT. *Also see solubility.*

wetland, *n* — [HYDROLOGY] LAND which has the WATER TABLE at, near, or above the land SURFACE, or which is saturated for long enough periods to promote HYDROPHYLIC VEGETATION and various kinds of BIOLOGICAL activity which are adapted to the wet ENVIRONMENT. *Also see bog, fen, marsh and swamp.*

wettability, *n* – [PHYSICS] the relative DEGREE to which a FLUID will spread into or coat a SOLID SURFACE in the presence of other IMMISCIBLE FLUIDS.

wetting, *n* – [PHYSICS] the ability of LIQUIDS to form BOUNDARY surfaces with SOLID states. The wetting is determined by measuring the contact angle or WETTING ANGLE, which the liquids forms in contact with the solids. The wetting tendency of a liquid is larger, the smaller the contact angle (Q) or the SURFACE TENSION is. *Also see surface tension, wettability and wetting angle.*

wetting agent—*See wetting fluid.*

wetting angle, *n* – [PHYSICS] the contact angle which a liquid forms in contact with a solid.

wetting fluid, *n* — [PHYSICS] a substance capable of lowering the SURFACE TENSION of LIQUIDS, facilitating the wetting of SOLID SURFACES, and facilitating the penetration of liquids into the capillaries. *Also known as wetting agent. Also see non-wetting fluid.*

wetting front, *n* – [AGRONOMY] movement of a FLUID through the SOIL to the point that the moisture gradient is so steep that there appears to be a BOUNDARY between the moisture content above and below this boundary.

wharf---*See quay.*

white gas, *n* – [PETROLEUM CHEMISTRY] a generic name for camp stove and lantern fuel, usually naphtha. The term may also refer to a premium-grade unleaded grade of gasoline offered during the 1960s and 1970s by the American Oil Company (also known as the Standard Oil Company of Indiana or "Amoco").

white spirits, *n* – [PETROLEUM CHEMISTRY] a HYDROCARBON derived from the light DISTILLATE fractions during the CRUDE-OIL REFINING process. It is composed of C_6 to C_{11} COMPOUNDS with the majority in the C_9 to C_{11} range. Composed, in general, of NORMAL-PARAFFINS (50%), CYCLO-PARAFFINS (40%) and AROMATICS (10%). Normally used as an industrial solvent. *Also see mineral spirits and Stoddard solvent.*

whole number, *n* – [MATHEMATICS] an INTEGER.

wich, *n* – [GEOGRAPHY] *from Celtic for salt spring,* often used in England as the termination of names of places where SALT is or has been found such as Droitwich, Nantwich or Greenwich.

wide-cut fuel, *n* – [PETROLEUM CHEMISTRY] a HYDROCARBON mixture spanning the GASOLINE and KEROSENE boiling ranges (C_5 to C_{15}) originally used in military jet engines. *Also see JP-4 jet fuel.*

wilderness, *n* – [ECOLOGY] undeveloped LAND and associated WATER resources retaining their primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its NATURAL condition.

wildlife refuge, *n* – [ECOLOGY] an area designated for the protection of wild animals, within which hunting and fishing are either prohibited or strictly controlled.

wilting point, *n* – [AGRONOMY] when SOIL MOISTURE is exhausted and a plant has to supply its water from own cells to transpire.

wind, *n* – [METEOROLOGY] the HORIZONTAL or VERTICAL movement of AIR.

window, *n* – [GEOLOGY] an eroded area of a THRUST sheet that displays the rocks beneath it.

windward, *n* – [METEOROLOGY] upwind side or side directly influenced to the direction that the wind blows from. *Also see leeward.*

wipe, *n* — [ENVIRONMENTAL INVESTIGATION] sorbent material (such as cotton gauze) that is rubbed on a SURFACE to collect a SAMPLE for CHEMICAL ANALYSIS.

Wisconsin Glacial Stage, *n* – [GEOLOGY] the most recent glacial stage beginning about 180,000 years ago and lasting to about 25,000 years ago. *Also see Sangamon Interglacial Stage.*

witness, *n* – [LAW] a person whose declaration under OATH or AFFIRMATION is received as EVIDENCE for any purpose, whether such declaration be made on ORAL EXAMINATION or by DEPOSITION or AFFIDAVIT. *Also see expert or expert witness.*

witness credibility, *n* – [LAW] worthiness of BELIEF. To entitle a WITNESS to credibility, he or she must be competent. OBJECTIVITY and the elimination of BIAS is also an important factor to take into consideration when assessing the credibility of a witness.

wood, *n* – [DENDROLOGY] the hard fibrous SUBSTANCE consisting basically of XYLEM that makes up the greater part of the stems, branches, and ROOTS of TREES or shrubs beneath the BARK and is found to a limited extent in herbaceous plants.

woods, *n* -- [GEOGRAPHY] a dense growth of TREES usually greater in extent than a GROVE and smaller than a FOREST. *Also see forest, grove and orchard.*

word, *n* – [LANGUAGE] *1.* a speech sound or series of speech sounds that symbolizes and communicates a meaning without being divisible into smaller units capable of independent use. *2.* the entire set of linguistic forms produced by combining a single base with various inflectional elements without change in the part of speech elements.

work, *n* – [PHYSICS] the ENERGY required to move an object against an opposing FORCE. Work is usually expressed as a force times a displacement. Dropping a stone from a window involves no work, because there is no force opposing the motion (unless you consider air friction). Pushing against a stone wall involves no work, unless the stone wall actually moves. *Also see energy, force, mass and matter.*

work plan, *n* — [ENVIRONMENTAL INVESTIGATION] *1.* a plan, specific to a particular site, for conducting activities specified in the plan. *2.* plans that are specific to sampling at a particular site; examples are Health and Safety Plans and Sampling and Analysis Plans.

work-product privilege, *n* – [LAW] "The work product of an ATTORNEY is not DISCOVERABLE unless the COURT determines that denial of discovery will unfairly prejudice the party seeking discovery in preparing that party's claim or defense or will result in an injustice." California Code of Civil Procedure section 2018, subdivision (b). Subdivision (c) provides: "Any writing that reflects an attorney's impressions, conclusions, OPINIONS, or legal research or theories shall not be discoverable under any circumstances." Most US states have a similar doctrine, whether by STATUTE or otherwise.

world, *n* – [GEOLOGY] the EARTH with its inhabitants and all things upon it. *Also see earth*.

wrench fault, *n* – [GEOLOGY] a STRIKE-SLIP FAULT with a fault plane making it vertical. *Also see dip-slip fault, normal fault, strike-slip fault and thrust fault.*

Xx

xenobiotic, *n* [BIOLOGY] a CHEMICAL which is found within an ORGANISM which is not normally produced or expected to be present in that organism. It can also cover substances present in much higher concentrations than are usual. Specifically, drugs such as antibiotics are xenobiotics in humans because the human neither produces them itself nor are they part of a normal diet.

xenolith, *n* – [GEOLOGY] an inclusion within an IGNEOUS ROCK mass, usually derived from the immediate surrounding COUNTRY ROCK. *Also see igneous rock and magma.*

xeriscape, *n* – [HYDROLOGY] creative landscaping for water and energy efficiency and lower maintenance. The seven xeriscape principles are: good planning and design; practical lawn areas; efficient irrigation; soil improvement; use of mulches; low water demand plants; good maintenance.

xerophytes, *n* – [BIOLOGY] plants that grow in or on extremely dry soils or soil materials.

xerosere, *n* – [BIOLOGY] a plant succession occurring in areas where there are very dry conditions.

xerosphere, *n* – [BIOLOGY] an area where VEGETATION has adapted to living in dry conditions (DROUGHT resistant), such as cacti.

x-ray, *n* – [PHYSICS] a very high ENERGY form of ELECTROMAGNETIC RADIATION (though not as high energy as GAMMA RAYS). X-rays typically have wavelengths from a few picometers up to 20 nanometers. X-rays easily penetrate soft tissue, which makes them useful in medical imaging and in radiation therapy.

x-ray diffraction, *n* – [MINERALOGY] a method of ANALYSIS commonly used to study MINERALS in which *x-rays* are reflected off the surface of a CRYSTAL. As the crystalline material is rotated within the path of the radiation, information concerning the structure of the crystal may be obtained.

x-ray fluorescence, *n* – [CHEMISTRY] the emission of X-RAYS from excited ATOMS produced by the impact of high-energy electrons, other particles, or a primary beam of x-rays. The wavelengths of the fluorescent x-rays can be measured by a x-ray spectrometer as a means of chemical analysis known as EDXRF. This analytical method can be used in dendroecological studies to determine the composition of tree rings. *Also see dendrochronology and dendroecology.*

xylem, *n* – [DENDROLOGY] conducting tissue in vascular plants through which water and mineral nutrients are transported. *Also see dendrochronology, dendroecology and tree.*

xylenes, *n* – [CHEMISTRY] three compounds with the formula C_8H_{10}, each having two METHYL GROUPS substituted on the BENZENE ring (also known as *o,m,p*-xylenes for the *ortho*-, *meta*- and *para*-isomers). The ortho- meta- and para-isomers are based on the position of the two methyl groups on the benzene ring. It is derived from the refining of CRUDE OIL. It is used as a SOLVENT and can be a COMPONENT of many FOSSIL FUELS such as GASOLINE or DIESEL FUEL. *Also known as dimethylbenzene. Also see aromatics and gasoline.*

Yy

yardangs, *n* – [GEOLOGY] extensive rocky RIDGES separated from each other by grooves or TROUGHS. Found typically in DESERT or semi-desert areas, aligned to the direction of the wind[6].

Yarmouth Interglacial Stage, *n* – [GEOLOGY] time period of retreat of the North American ice sheet between 550,000 years BP and about 900,000 years BP occurring before the ILLINOIS GLACIAL STAGE and after the KANSAS GLACIAL STAGE.

yazoo , *n* – [HYDROLOGY] a TRIBUTARY STREAM that runs parallel to the main stream for some distance because it cannot breach RIVER LEVEES[6].

year, *n* – [GEOGRAPHY] the measure of time for the EARTH to complete one revolution in its orbit around the SUN.

yedoma, *n* – [GEOGRAPHY] an organic-rich (about 2% carbon by mass) Pleistocene-age loess permafrost with ice content of 50–90% by volume

yellow boy, *n* – [HYDROLOGY] iron oxide FLOCCULANT (clumps of SOLIDS in WASTE or WATER), usually observed as orange-yellow deposits in surface STREAMS with excess iron content. Often associated with ACID-MINE DRAINAGE.

yield, *n* – [HYDROGEOLOGY] the quantity of WATER (expressed as a RATE of flow or total quantity per year) that can be collected for a given use from surface- or GROUND-WATER sources[33]. *Also see specific yield and safe yield.*

Young's Modulus, *n* – [PHYSICS] a measure of the stiffness of an isotropic elastic material.

Zz

zastruga, *n* – [GEOGRAPHY] sharp irregular grooves or ridges formed on a snow surface by wind erosion and deposition, and found in polar and temperate snow regions. They differ from sand dunes in that the ridges are parallel to the prevailing winds.

zee, *n* – [HYDROLOGY] *from Dutch,* a LAKE.

zenith, *n* – [GEOLOGY] *1*. the point on the celestial sphere that is vertically above the observer[6]. *2*. The highest point.

zeolite, *n* – [MINERALOGY] a group of hydrated, aluminum complex SILICATE MINERALS, either NATURAL or SYNTHETIC, with CATION-EXCHANGE properties.

> DISCUSSION – Zeolites are a catalyst used in oil refining, for example, in catalytic-cracking processes.

zero, *n* – [MATHEMATICS] *1*. no quantity or NUMBER. *2*. a point on a scale from which positive and negative are reckoned.

zeroth law of thermodynamics, *n* – [PHYSICS] if two bodies are each in THERMAL EQUILIBRIUM with a third body, then all three bodies are in thermal equilibrium with each other. *Also see the first, second and third laws of thermodynamics.*

zero-valent iron (ZVI), *n* -- [REMEDIATION TECHNOLOGY] an iron filing with a zero VALENCY used as a TREATMENT material in remediation systems such as permeable reactive barriers (PRBs). ZVI can also be injected through BOREHOLES as a treatment method (as a nanoparticle), commonly on cases with CHLORINATED HYDROCARBON CONTAMINATION.

zeugen, *n* – [GEOLOGY] *from German,* tabular masses of RESISTANT ROCK found in DESERT and other ARID areas. They stand out from the ground, where the softer rock around them has been eroded away more quickly[6].

zibar, *n* – [GEOLOGY] a type of low sand DUNE in the corridors between higher dunes. It is suggested that it has a higher percentage of coarser grains than other dunes[6].

zonal soil, *n* – [AGRONOMY] SOIL which shows that it has endured the maximum effects of CLIMATE and VEGETATION on it. These soils are often called 'mature'[6]. *Also see immature soil.*

zone, *n* – [PHYSICS] an area having particular features, PROPERTIES, purpose or use.

zone of aeration, *n* – [HYDROLOGY] hydrologic zone above the WATER TABLE and CAPILLARY FRINGE where water saturation is less than 100% and pressure is below atmospheric. *Also known as the vadose zone and the unsaturated zone*

zone of saturation, *n* — [HYDROLOGY] a hydrologic zone in which all the INTERSTICES between PARTICLES of geologic material or all of the JOINTS, FRACTURES, or SOLUTION CHANNELS in a CONSOLIDATED ROCK unit are filled with WATER under PRESSURE greater than that of the ATMOSPHERE.

zooplankton, *n* – [BIOLOGY] the animal part of the plankton. Zooplankton are capable of extensive movements within the water column and often are large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers[47].

zweikanter, *n* – [GEOLOGY] *from German*, a VENTIFACT with two facets, meaning two (*zwei*) edges (*Kanter*)[6]. *Also see dreikanter*.

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Acronyms in Environmental Forensics

AA	=	atomic absorption spectroscopy
ABS	=	alkylbenzene sulfonate
ACL	=	alternate contaminant level
ACM	=	asbestos-containing material
ACO	=	administrative consent order
ACR	=	acute/chronic ratio
ACS	=	American Chemical Society
ADR	=	alternative dispute resolution
AEC	=	Atomic Energy Commission
AEHS	=	Association of Environmental Health and Sciences
AFB	=	Air Force Base
AFCEE	=	Air Force Center for Environmental Excellence
AFFF	=	aqueous fire-fighting foam
AGU	=	American Geophysical Union
AGWSE	=	Association of Ground Water Scientists and Engineers
AIChE	=	American Institute of Chemical Engineers
AIH	=	American Institute of Hydrology
ALAS	=	anthropogenic lead archaeostratigraphy
AMSL	=	above mean sea level
ANSI	=	American National Standards Institute
AO	=	administrative order
AOC	=	area of concern
AEC	=	area of environmental concern
AOP	=	advanced oxidation process
API	=	active pharmaceutical ingredients
API	=	American Petroleum Institute
ARAR	=	applicable or relevant and appropriate requirements
ASME	=	American Society of Mechanical Engineers
AST	=	aboveground storage tank
ASTM	=	American Society for Testing & Materials
AWWA	=	American Water Works Association
BAT	=	best available technology
BDAT	=	best demonstrated achievable technology
bgs	=	below ground surface
BLM	=	Bureau of Land Management
BMDL	=	below minimum detection level
BMP	=	best management practices
BMSL	=	below mean sea level
B/N	=	base/neutral extractable compound
BOD	=	biological oxygen demand
BOM	=	Bureau of Mines
BP	=	before present
BTEX	=	benzene, toluene, ethylbenzenes and xylenes
BTU	=	British thermal unit
CAA	=	Clean Air Act
CAAA	=	Clean Air Act Amendment
CAH	=	chlorinated aliphatic hydrocarbon
CAS	=	Chemical Abstracts Service
CCSRA	=	compound class specific radiocarbon analysis
CEC	=	cation exchange capacity
CERCLA	=	Comprehensive Environmental Response Compensation and Liability Act
CERCLIS	=	Comprehensive Environmental Response Compensation and Liability Information System
CFC	=	chlorofluorocarbon
CFPP	=	coal-fired power plant
Cfm	=	cubic feet per minute
cfs	=	cubic feet per second
CFR	=	Code of Federal Regulations
CGI	=	combustible gas indicator
CGL	=	comprehensive general liability
CHC	=	chlorinated hydrocarbon
CIIT	=	Chemical Industry Institute of Toxicology
CITT	=	conservative interwell tracer test
CLP	=	Contract Laboratory Program (Superfund)
CMB	=	chemical mass balance
CMS	=	corrective measure study
COC	=	contaminant of concern
COD	=	chemical oxygen demand
COE	=	US Army Corps of Engineers
CPEO	=	Center for Public Environmental Oversight
CPG	=	certified professional geologist
CPT	=	cone penetrometer technology
CSA	=	conventional site assessment
CSM	=	conceptual site model
CSSIA	=	compound-specific stable isotope analysis
CT	=	carbon tetrachloride
CWA	=	Clean Water Act
CV	=	cirriculum vitae
CVOC	=	chlorinated volatile organic compound
DBP	=	disinfection byproduct
DDT	=	dichlorodiphenyltrichloroethane
DEDML	=	diethyldimethyl lead
DEL	=	diethyl lead
DGGE	=	denaturing gradient gel electrophoresis
DIC	=	dissolved inorganic carbon
DIPE	=	diisopropyl ether
DME	=	dimethyl ether
DNA	=	deoxyribonucleic acid
DNAPL	=	dense non-aqueous phase liquid
DO	=	dissolved oxygen
DOC	=	dissolved organic carbon
DoD	=	Department of Defense
DOT	=	United States Department of Transportation
DQO	=	data quality objectives
DP	=	direct push
DPE	=	dialkyl phthalate ester
DRO	=	diesel range organics
DST	=	daylight savings time
EC	=	electrical conductivity
ECD	=	electron capture detector
ECRA	=	Environmental Cleanup and Recovery Act
EDB	=	ethylene dibromide
EDC	=	ethylene dichloride
EDD	=	electronic disk deliverable
EDID	=	earliest demonstrable inception date
EDTA	=	ethylenediaminetetraacetic acid
EDXRF	=	energy-dispersive x-ray fluorescence
EFR	=	enhanced fluid recovery
EIS	=	environmental impact statement
ELI	=	Environmental Law Institute
EPA	=	United States Environmental Protection Agency
EPCRA	=	Emergency Planning and Community Right to Know Act
ERNS	=	EPA Emergency Response Notification System

ESA	=	environmental site assessment
ESA	=	expedited site assessment
ETBE	=	ethyl-*tert* butyl ether
FDA	=	Food and Drug Administration
FCC	=	fluidized-bed catalytic cracking
FEM	=	finite element method
FEMA	=	Federal Emergency Management Agency
FID	=	flame ionization detector
FOC	=	fraction of organic carbon
FOIA	=	Freedom of Information Act
FR	=	Federal Register
FRE	=	Federal Rules of Evidence
FS	=	feasibility study
FTCA	=	fluorotelomer carboxylic acid
FTOH	=	fluorotelomer alcohol
GAC	=	granular activated carbon
GAO	=	Government Accountability Office
GC	=	gas chromatography
GCIRMS	=	gas chromatography – isotope ratio – mass spectrometry
GCMS	=	gas chromatography – mass spectrometry
GIN	=	general information notice
GIS	=	geographic information system
GMT	=	Greenwich Mean Time
GRO	=	gasoline range organics
gpm	=	gallons per minute
GSA	=	Geological Society of America
GTBA	=	gasoline-grade TBA
GUI	=	graphical user interface
GWQS	=	ground-water quality standard
HASP	=	health and safety plan
HDPE	=	high density polyethylene
HEI	=	Health Effects Institute
HPAH	=	heterocyclic polynuclear aromatic hydrocarbons
HPLC	=	high-performance liquid chromatography
HRC	=	hydrogen release compound
HRGC	=	high-resolution gas chromatography
HRMS	=	high resolution mass spectrometry
HSRG	=	heavy straight-run gasoline
HSWA	=	Hazardous and Solid Waste Amendments
IAEA	=	International Atomic Energy Agency
IAH	=	International Association of Hydrogeologists
ICP	=	inductively coupled plasma spectroscopy
IPT	=	integral pumping test
IR	=	infrared
IRIS	=	integrated risk information system
ISCO	=	in situ chemical oxidation
ISEF	=	International Society of Environmental Forensics
ISO	=	isooctane
ISRA	=	Industrial Site Recovery Act
ITRC	=	Interstate Technology & Regulatory Council
IUPAC	=	International Union of Pure and Applied Chemistry
LADD	=	lifetime average daily dose
LDR	=	land disposal restriction
LEL	=	lower explosive limit
LNG	=	liquefied natural gas
LPG	=	liquefied petroleum gas
LPID	=	latest possible inception date
LUST	=	leaking underground storage tank
LNAPL	=	light non-aqueous phase liquid
LSRG	=	light straight-run gasoline
MA	=	methyl acetate
MAH	=	monocyclic aromatic hydrocarbons
MBAS	=	methylene blue active substance
MBR	=	mountain block recharge
MC	=	methylene chloride
MCH	=	methylcyclohexane
MCL	=	maximum contaminant level
MCLG	=	maximum contaminant level goal
MDF	=	marine diesel fuel
MDL	=	method detection limit
MDO	=	marine diesel oil
MEK	=	methyl ethyl ketone
MGP	=	manufactured gas plant
MIBK	=	methyl isobutyl ketone
MIP	=	membrane interface probe
MMT	=	methylcyclopentadienyl manganese tricarbonyl
MNA	=	monitored natural attenuation
MOA	=	memorandum of agreement
MOC	=	method of characteristics
MON	=	motor octane number
MPE	=	multiphase extraction
MS	=	mass spectrometry
MSDS	=	material safety data sheet
MTBE	=	methyl-*tert*-butyl ether
MTEL	=	methyltriethyl lead
MTZ	=	mass transfer zone
MW	=	molecular weight
NA	=	not analyzed
NA	=	not available
NGL	=	natural gas liquids
NS	=	not sampled
NAICS	=	North American Industry Classification System
NAPL	=	non-aqueous phase liquid
NASA	=	National Aeronautics and Space Administration
NCDC	=	National Climatic Data Center
NCP	=	National Contingency Plan
NEPA	=	National Environmental Policy Act
NFA	=	no further action
NFESC	=	Naval Facilities Engineering Service Center
NFPA	=	National Fire Protection Association
NGWA	=	National Ground Water Association
NIOSH	=	National Institute of Occupational Safety and Health
NJPDES	=	New Jersey Pollutant Discharge Elimination System
NOAA	=	National Oceanographic and Atmospheric Administration
NOD	=	natural oxidant demand
NPDES	=	National Pollutant Discharge Elimination System
NPDWR	=	National Primary Drinking Water Regulations
NPL	=	National Priority List
NRC	=	National Response Center
NRDC	=	Natural Resources Defense Council
NSDWR	=	National Secondary Drinking Water Regulations
NTIS	=	National Technical Information Service
NWIS	=	National Water Information System
NWWA	=	National Water Well Association
O&M	=	operation and maintenance
ORC	=	oxygen release compound

ORP = oxidation-reduction potential
OSHA = U.S. Occupational Safety and Health Administration
OSWER = Office of Solid Waste and Emergency Response
OTA = Office of Technology Assessment
OVA = organic vapor analyzer
PA = preliminary assessment
PAH = polyclic aromatic hydrocarbon
PA/SI = preliminary assessment/site investigation
PBB = polybrominated biphenyl
PBDE = polybrominated diphenyl ether
PCA = principal component analysis
PCB = polychlorinated biphenyls
PCDD = polychlorinated dibenzodioxin
PCDF = polychlorinated dibenzofuran
PCE = tetrachloroethylene
PCP = pentachlorophenol
PDB = passive diffusion bag
PDE = partial differential equation
PDMS = polydimethlysiloxane
PE = professional engineer
PEC = predicted environmental concentration
PEL = permissible exposure limit
PF = plug flow
PFCA = perfluorocarboxylates
PFOA = perfluorooctanoic acid
PFOSA = perfluorooctanesulfonamide
PFS = polyfluoroalkyl substance
PFSA = perfluoroalkyl sulfonate
PIANO = paraffins, isoparafffins, aromatics, napthenes and olefins
PID = photoionization detector
PM = physical mixture
PNEC = predicted no-effect concentration
POE = point of entry
POET = point of entry treatment
POTW = publicly owned treatment works
PP+40 = priority pollutants plus 40 peaks
ppb = parts per billion
PPE = personal protective equipment
ppm = parts per million
ppt = parts per thousand
PQL = practical quantitation limit
PRB = permeable reactive barrier
PRP = potential responsible party
PSI = pounds per square inch
PT = purge and trap
PVC = polyvinyl chloride
PWS = public water system
QA = quality assurance
QAPP = quality assurance project plan
QC = quality control
RA = risk assessment
RAT = remedial action technology
RAW = remedial action workplan
RBOB = reformulated blendstock oxygenate
RCRA = Resource Conservation and Recovery Act
RD = relative density
REC = recognized environmental condition
RFG = reformulated gasoline
RFP = request for proposal
RG = registered geologist
RI = remedial investigation
RI/FS = remedial investigation/feasibility study
RIR = remedial investigation report
RIW = remedial investigation workplan
RM = reactive mixture
RNA = ribonucleic acid
ROD = record of decision
RON = research octane number
RP = responsible party
RQ = reportable quantity
RVP = Reid vapor pressure
SARA = Superfund Amendments and Reauthorization Act
SCC = soil cleanup criterion
SCS = Soil Conservation Service
SDWA = Federal Safe Drinking Water Act
SEM = scanning electron microscope
SI = site investigation
SIC = standard industrial classification
SIM = select ion mode
SMZ = streamside management zone
SOC = synthetic organic chemicals
SOQ = statement of qualifications
SMOW = standard mean ocean water
SOP = standard operating procedure
SP = spontaneous potential
SPME = solid phase microextraction
SRG = straight-run gasoline
STP = sewage treatment plant
SVE = soil-vapor extraction
SWMA = Solid Waste Management Act
TAA = *tert*-amyl alcohol
TAL = target analyte list
TAEE = *tert*-amyl ethyl ether
TAME = *tert*-amyl methyl ether
TBA = *tert*-butyl alcohol
TBF = *tert*-butyl formate
TCA = 1,1,1-trichloroethane
TCC = triclocarban
TCDD = 2,3,7,8-tetrachlorodibenzo-*p*-dioxin
TCE = trichloroethylene
TCL = target compound list
TCLP = toxic characteristic leaching procedure
TCP = tricresyl phosphate
TCPA = Toxic Catastrophe Prevention Act
TDS = total dissolved solids
TEAP = terminal electron accepting process
TEL = tetraethyl lead
THM = trihalomethane
TIC = tentatively identified compound
TKN = total Kjehdahl nitrogen
TLV = threshold limit value
TMEL = trimethylethyl lead
TML = tetramethyl lead
TMP = trimethylpentane
TNT = 2,4,6-trinitrotoluene
TOC = total organic carbon
TOX = total organic halogens
TPH = total petroleum hydrocarbons
TPHC = total petroleum hydrocarbons
TREL = triethyl lead
TRPH = total recoverable petroleum hydrocarbons
TSCA = Toxic Substances Control Act
TSD = treatment, storage and disposal
TSP = trisodium phosphate
TSS = total suspended solids
TWA = time-weighted average

UBC	=	uniform building code
UCM	=	unresolved complex mixture
UFC	=	uniform fire code
UIC	=	underground injection control
UL	=	Underwriters Laboratories
USC	=	United States Code
USCS	=	unified soil classification system
USDA	=	United States Department of Agriculture
USFS	=	United States Forest Service
USGS	=	United States Geological Survey
UST	=	underground storage tank
UV	=	ultraviolet
UXO	=	unexploded ordinance
VC	=	vinyl chloride
VCP	=	voluntary cleanup program
VOC	=	volatile organic compound
VSMOW	=	Vienna standard mean ocean water
WHO	=	World Health Organization
WHPA	=	wellhead protection area
WWTP	=	waste-water treatment plant
XRF	=	x-ray fluorescence spectrometry
ZVI	=	zero valent iron

The Term “Forensic” in other Languages:

Albanian: mjekoligjor, mjekoligjore
Bulgarian: съдебен, юридически, адвокатски
Chinese: 形 法院的;关于法庭的
Croatian: forenzičan
Czech: forenzní, soudní
Danish: juridisk, advokatorisk
Dutch/Flemish: forensische geneeskunde
French: forensics, forensie, récherche legale
Gaelic: taighde fóiréinseach
German: forensisch
Greek: Ιατροδικαστικές
Hungarian: törvényszéki
Icelandic: réttar-
Italian: forense
Korean: 법정의, 법정에 관한
Latvian: tiesas
Norwegian: juridisk, lovlig, retts-, rettslig
Polish: sądowy
Portuguese: forense
Romanian: judiciar, legal
Russian: судебный
Serbian: pravnički, sudski, sudbeni
Spanish: forense, judicial
Swedish: juridisk
Turkish: mahkemeye ait
Ukrainian: судов*и*й
Welsh: fforensig