Designation: D4410 – 16

# Terminology for Fluvial Sediment[1]

This standard is issued under the fixed designation D4410; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 These terms are to be used by persons involved in collecting, reporting, and interpreting information pertaining to sedimentation and hydrologic processes as they apply in the development, use, control, and conservation of water and land resources.

1.2 Some listed terms and definitions are from other ASTM standards and the source document is given in bold type at the end of the definition.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

## 2. Referenced Documents

2.1 *ASTM Standards:*[2]

D5614 Test Method for Open Channel Flow Measurement of Water with Broad-Crested Weirs

D5640 Guide for Selection of Weirs and Flumes for Open-Channel Flow Measurement of Water

D5674 Guide for Operation of a Gaging Station

D6855 Test Method for Determination of Turbidity Below 5 NTU in Static Mode

D6698 Test Method for On-Line Measurement of Turbidity Below 5 NTU in Water

D7937 Test Method for In-situ Determination of Turbidity Above 1 Turbidity Unit (TU) in Surface Water

## 3. Terminology

3.1 *Terms and Definitions:*

**accelerated erosion,** *n*—erosion at a rate greater than geologic or natural erosion.

DISCUSSION—Accelerated erosion is usually associated with anthropogenic activities and usually reduces plant cover and increases runoff.

**accretion,** *n*—a process of sediment accumulation.

**agglomeration or flocculation,** *n*—the coalescence of dispersed suspended matter into large flocs or particles which settle rapidly.

**aggradation,** *n*—the geologic process by which stream beds, flood plains, and the bottoms of other water bodies are raised in elevation by the deposition of material eroded and transported by water from other areas.

**alluvial channel,** *n*—see **alluvial stream**.

**alluvial deposit,** *n*—sediment deposited by the action of moving water.

**alluvial fans,** *n*—sediment deposited in the shape of a segment of a cone formed because of a sudden flattening of a stream gradient especially at debouchures of tributaries on main stream flood plains.

**alluvial stream,** *n*—a stream whose boundary is composed of appreciable quantities of the sediments transported by the flow and which generally changes its bed forms as the rate of flow changes.

**alluviation,** *n*—the process of accumulating sediment deposits at places where the flow is retarded.

**alluvium,** *n*—a general term for all fluvial deposits resulting directly or indirectly from the sediment transport of (modern) streams, thus including the sediments laid down in riverbeds, flood plains, lakes, fans, and estuaries.

**ambient light,** *n*—light or optical path or both that does not originate from the light source of a turbidimeter. **D7937**

**antidunes,** *n*—bed forms that occur at a velocity higher than that velocity which forms dunes and plane beds.

DISCUSSION—Antidunes commonly move upstream, and are accompanied by, and in phase with, waves on the water surface.

**armoring,** *n*—the formation of a resistant layer of relatively large particles by erosion of the finer particles.

**attenuation,** *n*—the amount of incident light that is scattered and absorbed before reaching a detector, which is geometrically centered at 180° relative to the centerline of the incident light beam. **D7937**

DISCUSSION—Attenuation is inversely proportional to transmitted signal.

[1] This terminology is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.07 on Sediments, Geomorphology, and Open-Channel Flow.

Current edition approved Jan. 1, 2016. Published February 2016. Originally approved in 1984. Last previous edition approved in 2010 as D4410 – 10. DOI: 10.1520/D4410-16.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

$$\text{Attenuated Turbidity} = \text{Absorbed Light} + \text{Scattered Light} \quad (1)$$

DISCUSSION—The application of attenuation in this test method is as a distinct means of measuring turbidity. When measured in the FAU or AU mode, the turbidity value is a combination of scattered (attenuated) light plus absorbed light. The scattered light is affected by particle size and is a positive response. The absorption due to color is a negative response. The sum of these two responses results in the turbidity value in the appropriate unit.

**automatic power control (APC),** *n*—the regulation of light power from a source such that illumination of the sample remains constant with time and temperature. D7937

**avulsion,** *n*—a sudden, natural change of a stream channel, so that the water flows elsewhere than in its previous course.

**bag sampler,** *n*—a sampler that utilizes a collapsible bag as the sample collection container.

**base flow,** *n*—stream flow that is sustained by ground water and other delayed sources.

**bed-load,** *n*—material moving on or near the stream bed by rolling, sliding, and skipping.

**bed-load discharge,** *n*—the quantity of bed-load passing a cross section of a stream in a unit of time.

**bed-load sampler,** *n*—a device for sampling the bed-load.

**bed material,** *n*—the sediment mixture of which the stream bed is composed.

**bed-material discharge,** *n*—that part of the total sediment discharge composed of grain sizes occurring in appreciable quantities in the bed material.

**bed-material load,** *n*—that part of the total load which is composed of particle sizes present in appreciable quantities in the shifting portions of the stream bed.

**broadband, white-light source,** *n*—a visible-light source that has a full bandwidth at half of the source's maximum intensity (FWHM) located at wavelengths greater than 200 nm. D7937

DISCUSSION—Tungsten-filament lamps (TFLs) and white LEDs are examples of broadband sources.

**bottomset bed,** *n*—fine-grained material (usually silts and clays) slowly deposited on the bed of a quiescent body of water which may in time be buried by foreset beds and topset beds.

**boulder size (fluvial sediment),** *n*—larger than 256 mm in diameter.

**braided river,** *n*—a wide- and shallow-river where the flow passes through a number of small interlaced channels separated by bars or shoals.

**calibration turbidity standard,** *n*—a turbidity standard that is traceable and equivalent to the reference turbidity standard to within defined accuracy; commercially prepared 4000 NTU Formazin, stabilized formazin, and styrenedivinylbenzene (SDVB) are calibration turbidity standards. D7937

DISCUSSION—These standards may be used to calibrate the instrument. All meters should read equivalent values for formazin standards. SDVB-standard readings are instrument specific and should not be used on meters that do not have defined values specified for that instrument. Calibration standards that exceed 10 000 turbidity units are commercially available.

**calibration-verification standards,** *n*—defined standards used to verify the instrument performance in the measurement range of interest. D7937

DISCUSSION—Calibration-verification standards may not be used to adjust instrument calibration, but only to check that the instrument measurements are in the expected range. Examples of calibration-verification standards are opto-mechanical light-scatter devices, gel-like standards, or any other type of stable liquid standard. Calibration-verification standards may be instrument-design specific.

**channel,** *n*—a natural or artificial waterway that periodically or continuously contains moving water.

**channel-fill deposits,** *n*—deposits of sediment within a channel, partly or completely filling the channel.

DISCUSSION—Such materials accumulate where the transporting capacity has been insufficient to remove it as rapidly as it has been delivered.

**classic gully,** *n*—a channel that is formed by gully erosion and is not interrupted by mechanical tillage operations to fill the resulting void.

DISCUSSION—Gully depth can exceed 30 m. (see **gully erosion**.)

**clay size (fluvial sediment),** *n*—0.00024 to 0.004 mm in diameter.

**coagulation,** *n*—the agglomeration of colloidal or finely divided suspended matter caused by the addition to the liquid of an appropriate chemical coagulant, by biological processes, or by other means (see also **agglomeration**).

**cobble size (fluvial sediment),** *n*—64 to 256 mm in diameter.

**cohesive sediments,** *n*—that material whose resistance to initial movement or erosion depends upon the strength of the bond between particles.

**colloids (fluvial sediment),** *n*—smaller than 0.00024 mm in diameter.

**colluvial deposits,** *n*—that material accumulated along valley margins by mass movements from the adjacent hillsides.

**color,** *n*—the hue (red, yellow, blue, etc.) of a water sample produced by the combination of: the selective absorption of visible light, the spectral reflectivity, and the degree of darkness or blackness of suspended matter. D7937

DISCUSSION—The combination above is defined by the Munsell color-classification scheme.[3]

**composite sample,** *n*—a sample formed by combining two or more individual samples or representative portions of the samples.

**concentration (volume),** *n*—the ratio of the volume of dry sediment to the volume of the water-sediment mixture.

[3] Munsell Color Classification System, available from: http:// www.munsell.com.

**concentration of sediment (by mass),** *n*—the ratio of the mass of dry sediment in a water-sediment mixture to the mass of the mixture.

**critical flow,** *n*—open channel flow in which the energy, expressed in terms of depth plus velocity head, is a minimum for a given flow rate and channel. D5614

DISCUSSION—The Froude number is unity at critical flow.

**debris,** *n*—as applied to geologic debris flows, a mixture of loose, poorly-sorted rock fragments or soil material, or both, potentially ranging from clay to boulder-size particles that may include fragmental organic matter and other exotic detritus.

**degradation,** *n*—the geologic process by which stream beds, flood plains, the bottoms of other water bodies, and other land surfaces are lowered in elevation by the removal of material by fluids.

**delivery rate,** *n*—use **sediment delivery ratio** or sediment yield, whichever is meant.

**delta,** *n*—a sediment deposit formed where moving water is slowed by a slower moving body of water.

**density,** *n*—the mass of a substance per unit volume, ρ in kg/L or kg/m$^3$.

DISCUSSION—Use $\rho_s$ for density of solid particles, $\rho_w$ for water, $\rho_d$ for dry sediment with voids, $\rho_{sat}$ for saturated sediment, $\rho_{wet}$ for wet sediment, and $\rho_b$ for submerged sediment (buoyant weight).

**density current,** *n*—the movement of one fluid under, through, or over another fluid of differing density.

**deposition,** *n*—the chemical, mechanical, or biological processes through which sediments accumulate in a resting place.

**depth-integrated sample,** *n*—a discharge-weighted (velocity-weighted) sample of water-sediment mixture collected at one or more verticals in accordance with the technique of depth integration; the discharge of any property of the sample expressible as a concentration can be obtained as the product of the concentration and the water discharge represented by the sample.

**depth-integrating sediment sampler,** *n*—a device that collects a representative water-sediment mixture at all points along the sampling vertical.

**depth integration,** *n*—a method of sampling at every point throughout a given depth (the sampled depth) whereby the water-sediment mixture is collected isokinetically so that the contribution from each point is proportional to the stream velocity at the point.

DISCUSSION—This process yields a sample with properties that are discharge weighted over the sampled depth. Ordinarily, depth integration is performed by traversing either a depth- or point-integrating sampler vertically at an acceptably slow and constant rate; however, depth integration can also be accomplished with vertical slot samplers.

**detector,** *n*—a solid-state device that converts light into electrical current or voltage. D7937

**detector angle,** *n*—the angle between the axis of the detector acceptance cone and the axis of the source light or NIR beam. D7937

DISCUSSION—The detector angle equals 180° – θ. (θ is the scattering angle.)

**diameter, sedimentation,** *n*—the diameter of a hypothetical sphere of the same specific gravity and the same settling velocity as the given particle in the same fluid.

**direct-measuring bed-load sampler,** *n*—a device which physically collects and holds bed load.

**discharge (water),** *n*—the volume of water flowing through a cross-section in a unit of time, including sediment or other solids that may be dissolved in or mixed with the water; usually cubic feet per second (f$^3$/s), or cubic metres per second (m$^3$/s). D5674

**dispersed system,** *n*—in laboratory analysis of grain sizes, an initial condition whereby the particles begin to settle from a stirred mixture; when stirring stops, each particle settles independently of other particles.

**dissolved load,** *n*—the part of the stream load that is carried as dissolved solids.

**dissolved solids,** *n*—the mass of constituents in a filtered water sample.

DISCUSSION—For operational purposes, the filter pore is usually 0.00045 mm.

**drainage basin,** *n*—see **watershed**.

**dunes (stream),** *n*—bed forms of coarse sediment, generally transverse to the direction of flow, with a triangular profile having a gentle upstream slope.

DISCUSSION—Dunes advance downstream by the movement of sediment along the upstream slope and by the deposition of sediment on the steep downstream slope. Dunes move downstream at low velocities compared to the stream flow velocity.

**ephemeral gully,** *n*—a channel that is formed by gully erosion on cropland and that is routinely but temporarily obscured by mechanical operations such as tilling.

**equal-discharge-increment (EDI) method,** *n*—a procedure for obtaining the discharge weighted suspended-sediment concentration of flow at a cross section whereby depth integration is performed at the centers of three or more equal flow segments of the cross section.

DISCUSSION—If approximately equal volumes of water-sediment mixture are collected from each flow segment, the samples may be composited for analysis. If unequal volumes are collected, samples from each flow segment must be analyzed separately and the results combined mathematically.

**equal-width-increment (EWI) method,** *n*—a procedure of obtaining the discharge weighted suspended-sediment concentration of flow at a cross section by performing depth integration at a series of verticals equally spaced across the cross section and using the same vertical transit rate at all sampling verticals.

**fall velocity,** *n*—the settling rate of a particle in a given medium.

**filtrate,** *n*—the fluid that has passed through a filter.

**filtration,** *n*—the process of passing a liquid through a porous medium for the removal of suspended matter.

**fine-material load,** *n*—that part of the total sediment load that is composed of particles of a finer size than the particles present in appreciable quantities in the bed material; normally, the fine-material load consists of material finer than 0.062 mm.

**flocculant,** *n*—an agent that produces flocs or aggregates from small suspended particles.

**flocculating agent,** *n*—a coagulating substance such as alum, ferrous sulfate, or lime which, when added to water, forms a precipitate that expedites the settling of suspended matter.

**flocs or floccules,** *n*—masses of solids formed in a liquid by addition of coagulants (flocculants), or through biochemical processes, or by agglomeration of individual particles.

**fluvial sediment,** *n*—particles derived from rocks, biological materials, or chemical precipitants, that are transported by, suspended in, or deposited by flowing water.

**foreset bed,** *n*—the advancing and relatively steep frontal slope of a delta, that progressively covers the bottomset bed and in turn is covered by the topset bed.

DISCUSSION—Foreset beds represent the greater part of the volume of a delta.

**Froude number,** *n*—dimensionless number expressing the ratio of inertial to gravity forces in free-surface flow. It is equal to the average velocity divided by the square root of the product of the average depth and the acceleration due to gravity. **D5640**

**gauge height,** *n*—the height of a water surface above an established or arbitrary datum at a particular gauging station; also termed stage. **D5674**

**gauging station,** *n*—a particular site on a stream, canal, lake, or reservoir at which systematic observations of hydrologic data are obtained. **D5674**

**geologic or natural erosion,** *n*—the erosion process on or in a given land form undisturbed by activities of man and his agents.

**graded sediment,** *n*—in geology, a sediment consisting chiefly of grains of the same size range.

DISCUSSION—In engineering, a sediment having a uniform or equable distribution of particles from coarse to fine.

**graded stream,** *n*—a stream in which a steady state has been reached such that over a period of time the discharge and sediment load entering the system are balanced by the discharge and sediment load leaving the system.

**grading,** *n*—the degree of mixing of size classes in sedimentary material.

**gravel size (fluvial sediment),** *n*—2.0 to 64 mm in diameter.

**gross erosion,** *n*—the total of all sheet, gully, and channel erosion in a watershed.

**hydraulic jump,** *n*—an abrupt transition from supercritical flow to subcritical or tranquil flow, accompanied by considerable turbulence or gravity waves, or both. **D5614**

**instantaneous sampler,** *n*—a suspended-sediment sampler that takes a representative specimen of the water-sediment mixture in a stream at a desired depth and moment of time.

**isokinetic sampling,** *n*—sample done in such a way that the water-sediment mixture moves with no change in velocity as it leaves the ambient flow and enters the sampler intake.

**lag deposits,** *n*—the larger and heavier particles that are sorted out and left behind in stream channels.

**lateral accretion deposits,** *n*—see **point bar**.

**maximum transit rate,** *n*—the maximum speed at which the sampler can be lowered and raised in the sampling vertical and still have the sample collected isokinetically.

**measured sediment load,** *n*—that part of the total sediment discharge that can be measured with available suspended-sediment samplers; does not include bed-load discharge and suspended sediment discharge very near the bed.

**mechanical analysis,** *n*—a determination of the particle-size distribution of a sample by mechanical separation.

**median diameter,** *n*—the grain diameter such that half of the sediment by mass is composed of particles of larger size and half by mass is composed of particles of smaller size; commonly denoted by the symbol "$D_{50}$".

**movable bed,** *n*—a stream bed made up of materials readily transportable by the stream flow.

**mudflow,** *n*—a mass of water-sediment mixture which, because of its high viscosity, moves more slowly than water.

**narrow-band source,** *n*—a light source with a full bandwidth (at half of the source's maximum intensity) (FWHM) located at wavelengths less than 5 nm. **D7937**

**native water,** *n*—water from a sampled medium; this water has been unaffected by sampling, handling, and preservation.

**natural levee,** *n*—raised berms or crests above the flood-plain surface adjacent to the channel usually containing coarser materials deposited by flood flows.

**naturally dispersed sample,** *n*—a sample having sediment that will not settle in about 4 h due to the character of fineness of particles or due to the nature of the dissolved constituents, or both.

**nephelometer,** *n*—an instrument that measures the amount of light scattered in a suspension.

**nominal diameter,** *n*—the diameter of a sphere that has the same volume as the sediment particle.

DISCUSSION—Sometimes called *equivalent spherical diameter*.

**noncohesive sediments—**discrete particles, the movement of which for given erosive forces depends only upon the properties of shape, size, and density and upon the relative position of the particle with respect to surrounding particles.

**operating spectrum,** *n*—the wavelength-by-wavelength products of source intensity, filter transmittance, and detector sensitivity. D7937

DISCUSSION—The operating spectrum determines the relative contributions of wavelengths in the light-to-current conversions made by a turbidimeter.

**optical opacity,** *n*—an expression for the amount of light absorbed and scattered by a suspension reported as: extinction coefficient, or percent of incident light scattered in 90°, or percent of incident light transmitted at 180° over a standard distance, or all three.

**overland flow,** *n*—rainfall runoff from a surface containing concentrated flow no larger than rill flow.

**oxbow lake,** *n*—a lake formed when a meander bend is cut off and its ends filled in, thus isolating the lake from the main channel of the stream.

**particle sieve diameter,** *n*—a measure of the size of a sediment particle; the smallest standard sieve opening through which the particle will pass. For an elongated particle, it is a measure of its intermediate axis.

DISCUSSION—For an elongated particle, it is a measure of its intermediate axis.

**particle size,** *n*—a linear dimension, usually designated as *diameter*, used to characterize the size of a particle; the dimension may be determined by any of several different techniques, including sedimentation, sieving, micrometric measurement, or direct measurement.

**particle-size distribution,** *n*—the relative amount of a sediment sample of a range in specific sizes in terms of percentages by mass finer than a given size, D, often shown on a semilog plot.

**particle-size, intermediate axis,** *n*—the size of a sediment particle determined by direct measurement of the axis normal to a plane representing the longest and shortest axes.

**parts per million,** *n*—mass unit of any substance in a million mass-units of the water-substance mixture.

**plane bed,** *n*—a sedimentary stream bed without elevations or depressions larger than the maximum size of the bed material.

**point bar,** *n*—one or a series of low ridges, usually of coarse sediment, deposited on the inner (convex) side of a river bend.

**point-integrated sample,** *n*—a sample of water-sediment mixture collected at a relatively fixed point in accordance with the technique of point integration.

DISCUSSION—A point-integrated sample is discharge weighted. However, because the sample is obtained from a single point, the concentration of any component of the mixture that is transported exactly at stream velocity can be considered as either a spatial or a discharge-weighted concentration. Samples collected with instruments that instantaneously capture a quantity of water-sediment mixture are not true point-integrated samples. (See **point sample**.)

**point-integrating sediment sampler,** *n*—an instrument capable of collecting a water-sediment mixture isokinetically for a specified period of time by opening and closing under water; an instrument suitable for performing point integration.

**point integration,** *n*—a method of sampling at a relatively fixed point whereby the water-sediment mixture is withdrawn isokinetically for a specified period of time.

**point sample,** *n*—sample of water-sediment mixture taken at a single point, either with an instantaneous or a point-integrating sampler.

**pollution,** *n*—the condition caused by the presence of substances of such character and in such quantities that the quality of the environment is impaired.

**pumping sampler,** *n*—a device that draws the water-sediment mixture through a pipe or hose, the intake of which is placed at the desired sampling point in a stream.

**rating curve, sediment,** *n*—a graph of the relationship between stream discharge and sediment discharge at a stream cross section.

DISCUSSION—The graph is sometimes called a *sediment transport curve*.

**ratio turbidity measurement,** *n*—a standard that is synthesized reproducibly from traceable raw materials by a skilled analyst. D7937

**reference turbidity standard,** *n*—light or optical path or both that does not originate from the light source of a turbidimeter. D7937

DISCUSSION—All other standards are traced back to this standard. The reference standard for turbidity is formazin.

**regimen of a stream,** *n*—characteristics of a stream with respect to flow duration, form of and changes in channel, capacity to transport sediment, and amount of material supplied for transportation.

**reservoir,** *n*—a man-made impounded body of water or controlled lake where water is collected and stored.

**Reynolds number,** *n*—a dimensionless number expressing the ratio of inertia forces to viscous forces in a moving fluid.

DISCUSSION—The number is given by VLr/m where "V", is the fluid's velocity, "L" is a characteristic length or distance such as pipe diameter, "r" is the fluid's mass density, and "m" is the fluid's dynamic viscosity.

**ripple,** *n*—small, triangular-shaped bed forms that are similar to dunes but smaller.

**roundness,** *n*—the ratio of the average radius of curvature of the individual edges of a particle to the radius of the maximum circle that can be inscribed within the particle.

**runoff,** *n*—that part of precipitation appearing in surface streams.

**sample volume,** *n*—the water-sample volume wherein light from a turbidimeter source interacts with suspended particles and is subsequently detected. D7937

**sampled zone,** *n*—that part of a transect presumed to be wholly represented by sediment samples.

**sampling vertical,** *n*—an approximately vertical path from the water surface to the bottom along which one or more samples are collected to define various properties of the flow, such as sediment concentration.

**sand size (fluvial sediment),** *n*—0.062 to 2 mm in diameter.

**scale of particle sizes,** *n*—scale based on AGU (American Geophysical Union) scale.

**scattering (also referred to as scatter),** *n*—light interaction that alters the direction of light transport through a sample without changing the wavelength. D7937

DISCUSSION—The light interaction can be with suspended particles, water molecules, and variations in the sample's refractive index.

**scattering angle (θ),** *n*—the angle between a source light or NIR beam, and the scattered beam. D7937

**forward-scattered radiation,** *n*—the scattered incident light that is detected at an angle between 0-degrees and less than 90-degrees, relative to the direction of the projected incident-light beam. D7937

DISCUSSION—Most designs will have an angle between 0-degrees and 45-degrees.

**scour,** *n*—the enlargement of a flow section by the removal of the boundary material by the motion of a fluid.

**sediment,** *n*—see **fluvial sediment**.

**sediment delivery,** *n*—see **sediment yield**.

**sediment delivery ratio,** *n*—the ratio of sediment yield to gross erosion expressed in percent.

**sediment discharge,** *n*—the mass or volume of sediment passing a stream cross section in a unit of time.

DISCUSSION—The term may be qualified as suspended-sediment discharge, bedload discharge or total-sediment discharge.

**sediment load,** *n*—a general term that refers to material in suspension or in transport, or both; it is not synonymous with either discharge or concentration.

DISCUSSION—See **bed-load** and **suspended-sediment load**.

**sediment sample,** *n*—a quantity of water-sediment mixture or deposited sediment that is collected to represent some property or properties of the sampled medium.

**sedimentation—**(*a*) consists of five fundamental processes: (*1*) weathering, (*2*) erosion, (*3*) transportation, (*4*) deposition, and (*5*) diagenesis, or consolidation into rock; (*b*) deposition of particles, especially in engineering.

**sedimentology,** *n*—the scientific study of sediment, sedimentary rocks, and the processes by which they were formed.

**sediment particle,** *n*—fragment of mineral or organic material in either a singular or aggregate state.

**sediment transport rate,** *n*—see **sediment discharge**.

**settling,** *n*—the process of depositing, by gravity, matter suspended in water.

**silt size (fluvial sediment),** *n*—0.004 to 0.062 mm in diameter.

**siltation,** *n*—see **deposition**.

**sloughs,** *n*—a stagnant or sluggish channel of water in a flood plain.

**sorting,** *n*—the process by which sedimentary particles are selectively separated from associated but dissimilar particles by flowing water.

**specific gravity,** *n*—ratio of the mass of any volume of a substance to the mass of an equal volume of water at 4°C.

**specific weight (of sediment deposits),** *n*—the dry weight of sediment solids per unit volume of deposit in place.

DISCUSSION—Synonymous with **volume-weight**.

**sphericity—**the ratio of the surface area of a hypothetical sphere of the same volume as the particle to the actual surface area of the particle.

DISCUSSION—A more convenient expression is the ratio of the diameter of a circle with an area equal to that of the projection of a grain when it rests on its larger face to the diameter of the smallest circle circumscribing this projection. Shape factor.

**splay,** *n*—deposits of flood debris, usually of sand, scattered on the flood plain.

**split sample,** *n*—a single sample separated into two or more individual parts in a manner that each part is representative of the original sample.

**standard-fall diameter,** *n*—the diameter of a sphere with a specific gravity of 2.65 and the same standard-fall velocity as the particle.

**standard-fall velocity,** *n*—the rate of fall that a particle would finally attain if falling alone in quiescent distilled water of infinite extent and a temperature of 24°C.

**standard-sedimentation diameter,** *n*—the diameter of a sphere with the same specific gravity and fall velocity as the given particle.

**stray light,** *n*—all light reaching the detector(s) other than light that is scattered by the sample. D7937

DISCUSSION—Stray light could be ambient-light leakage, internal reflections, and divergent light in optical systems. For this test method, stray light is likely to be negligible. The instrument design is intended to reduce or eliminate stray light.

**stream discharge,** *n*—the quantity of flow passing through a cross section in a unit of time.

**streambank erosion,** *n*—the removal of bank material by flowing water.

**subcritical flow,** *n*—open channel flow that is deeper and at lower velocity than critical flow for the same flow rate; sometimes called tranquil flow. D5614

DISCUSSION—A Froude number less than one exists.

**supercritical flow,** *n*—open channel flow that is shallower and at higher velocity than critical flow for the same flow rate. D5614

DISCUSSION—A Froude number greater than one exists.

**supernate or supernatant,** *n*—the liquid above the surface of settled sediment.

**suspended sediment,** *n*—sediment that is carried in suspension by the turbulent components of the fluid or by Brownian movement.

**suspended-sediment concentration,** *n*—see **concentration of sediment (by mass)**.

**suspended-sediment discharge,** *n*—the quantity of suspended-sediment passing through a stream cross section per unit of time.

**suspended-sediment load,** *n*—that part of the sediment load which is suspended sediment.

**suspended-sediment sampler,** *n*—a device that collects a representative portion of the water with its suspended-sediment load.

**terminal velocity,** *n*—the limiting velocity reached by a particle falling under the action of gravity in a still liquid at a specified temperature.

**texture,** *n*—the geometric aspects of the component particles of a sediment deposit or rock including size, shape, and arrangement.

**thalweg,** *n*—the line connecting the lowest or deepest point along a stream bed, valley, or reservoir, whether underwater or not.

**topset bed,** *n*—a layer of sediment deposited on the top surface of an advancing delta that is continuous with the landward alluvial plain.

**total-sediment discharge,** *n*—the total quantity of sediment passing a section per unit of time.

**total-sediment load (total load),** *n*—all of the sediment in transport; that part moving as suspended load plus that moving as bedload.

**traction,** *n*—transport of debris by running water in which the particles are swept along close to the bed of the stream by rolling, sliding, or saltation.

**tranquil flow,** *n*—see **subcritical flow**.

**transit rate,** *n*—the speed at which the suspended-sediment sampler is lowered and raised in the sampling vertical.

**transit-rate ratio,** *n*—the ratio computed by dividing the transit rate by the mean stream velocity in the vertical being sampled.

**transmittance,** *n*—the ratio of light power transmitted through a sample to the light power incident upon the sample. **D7937**

**trap efficiency,** *n*—the percent of the incoming sediment load that is deposited.

**transportation,** *n*—the complex process of moving sediment particles by water.

DISCUSSION—The principal factors affecting transportation are turbulence; ratio of settling velocity to water velocity; shape, size, density, and quantity of particles; and saltation.

**turbidimeter,** *n*—an instrument that measures light scatter using a nephelometric detector. **D6855, D6698**

DISCUSSION—An instrument that measures light scatter using a nephelometric detector.

**turbidimeter design,** *n*—an arrangement of optical (lenses, windows, filters, apertures, etc.) and optoelectronic (light sources and detectors, etc.) components, mechanical components, and electrical circuits for determining the turbidity of water. **D7937**

**turbidity,** *n*—an expression of a sample's optical properties that cause light rays to be scattered and absorbed rather than transmitted in straight lines through the sample. **D7937**

DISCUSSION—Turbidity of water is caused by the presence of suspended and dissolved matter such as clay, silt, finely divided organic matter, plankton, other microscopic organisms, organic acids, and dyes.

**turbidity current,** *n*—see **density current**.

**turbulence,** *n*—the irregular motion of a flowing fluid.

**unit bed-load discharge,** *n*—bed-load discharge per unit width of river bed.

DISCUSSION—Units are reported in mass of discharge per unit time per unit width, such as tons per day per foot.

**unmeasured-sediment discharge,** *n*—the difference between the total sediment discharge and the measured suspended-sediment discharge.

**unsampled depth,** *n*—the unsampled part of the sampling vertical; usually within 0.8 to 0.15 m of the stream bed, depending on the kind of suspended-sediment sampler used.

**unsampled zone,** *n*—the unsampled part of the sampling vertical, usually assumed to be 90 to 150 mm above the stream bed, depending on the kind of sampler used.

**valley trenching,** *n*—gully erosion occurring in flood plains.

**velocity head,** *n*—the square of the average velocity divided by twice the acceleration due to gravity. **D5614**

**vertical,** *n*—an approximately vertical path from water surface to stream bed along which one or more samples are taken to define sediment concentration or distribution.

DISCUSSION—May also be referred to as *sampling vertical*.

**vertical accretion deposits,** *n*—flood-plain deposits formed by deposition of suspended sediment from overbank flood waters.

**volume-weight,** *n*—see **specific weight**.

**wash load,** *n*—the portion of the stream sediment load composed of particles, usually finer than 0.062 mm in diameter which are found only in relatively small quantities in the bed.

**water pollution,** *n*—the harmful or objectionable material introduced into water in sufficient quantities to adversely affect its usefulness.

**water discharge,** *n*—the quantity of water passing a stream cross section per unit of time.

**watershed,** *n*—all lands enclosed by a continuous hydrologic-surface drainage divide and lying upslope from a specified point on a stream.

3.2 *Symbols (from Test Method D7937):*

$A$ = amperes
$b$ = scattering coefficient
$\theta$ = scattering angle
$W$ = watts

3.3 *Acronyms:*

**APC,** *n*—automatic power control

**AU,** *n*—attenuation unit

**BU,** *n*—backscatter unit

**FAU,** *n*—formazin attenuation unit

**FBU,** *n*—formazin backscatter unit

**FNMU,** *n*—nephelometric turbidity multi-beam unit

**FNRU,** *n*—formazin nephelometric ratio unit

**FNU,** *n*—formazin nephelometric unit

**FSU,** *n*—forward scatter unit

**FSRU,** *n*—forward scatter ratio unit

**FWHM,** *n*—full bandwidth at half of the source's maximum intensity

**IRED,** *n*—infrared-emitting diode

**LED,** *n*—light-emitting diode

**NIR,** *adj*—near infrared

**NTRU,** *n*—nephelometric

**NTU,** *n*—nephelometric turbidity unit

**SDVB,** *n*—styrenedivinylbenzene

**SSC,** *n*—suspended sediment concentration

**TFL,** *n*—tungsten-filament lamp

**TU,** *n*—turbidity unit

## 4. Keywords

4.1 erosion; fluvial sediment; sediment; sedimentation; turbidity