APPENDIX B

SEDIMENTATION GLOSSARY OF TERMS

B-1. General. The following definitions are given to help achieve a uniform understanding of the methods recommended for sediment data acquisition. The definitions have been adapted from recommendations being prepared for the American Society for Testing and Materials.

Accelerated erosion. Erosion at a rate greater than normal, usually associated with activities of man which reduce plant cover and increase runoff. (See geologic erosion).

Aggradation. 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 from other areas. It is the opposite of degradation.

Aliquot. A fractional part representative of the whole.

Alluvial. Pertains to alluvium deposited by a stream or flowing water.

Alluvial channel. See alluvial stream.

Alluvial deposit. Clay, silt, sand, gravel, or other sediment deposited by the action of running or receding water.

Alluvial stream. A stream whose channel 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.

Alluvium. A general term for all detrital deposits resulting directly or indirectly from the sediment transported of (modern) streams, thus including the sediments laid down in river beds, flood plains, lakes, fans, and estuaries.

Antidunes. A series of general sinusoidal-shaped bed forms that commonly move upstream accompanied by in-phase waves on the water surface. Antidunes develop in a sand-bed stream where the Froude number is close to or greater than one.

Armoring. The formation of a resistant layer of relatively large particles resulting from removal of finer particles by erosion.

Bed load. Material moving on or near the stream bed by rolling, sliding, and sometimes making brief excursions into the flow a few diameters above the bed.

Bed load discharge. The quantity of bed load passing a cross section in a unit of time.

Bed load sampler. A device for sampling the bed load.

Bed material. The sediment mixture of which the bed is composed. In alluvial streams bed material particles are likely to be moved at any moment or during some future flow condition.

Bed material sampler. A device for sampling bed material.

Bottomset bed. Fine-grained material (usually silts and clays) slowly deposited on the bed of a quiescent body of water and which may in time be buried by foreset beds and topset beds.

Boulder. See Table B-1.

Channel. A natural or artificial waterway which periodically or continuously contains moving water.

Clay. See Table B-1.

Coagulation. The agglomeration of colloidal or finely divided suspended matter, generally caused by the addition of a chemical coagulant.

Cobbles. See Table B-1.

Cohesive sediments. Sediments whose resistance to initial movement or erosion is affected mostly by cohesive bonds between particles.

Colloids. Finely divided solids which do not settle in a liquid but which may be coagulated chemically or biochemically. See Table B-1.

Composite sample. A sample formed by combining two or more individual samples, or representative portions thereof.

Concentration of sediment. The dry weight of sediment per unit volume of water-sediment mixture, i.e. mg/l. (Note: In earlier writings concentration was calculated as the ratio of the dry weight of sediment in a water-sediment mixture to the total weight of the mixture divided by 1,000,000. It was expressed as parts per million, i.e. ppm. Either method gives the same result, within 1 percent, for concentrations up to 16,000 mg/l. A correction is needed for concentrations in excess of that value.

Degradation. The geologic process by which stream beds, flood plains, and the bottoms of other water bodies are lowered in elevation by the removal of material from the boundary. It is the opposite of aggradation.

Delta. A deposit of sediment formed where moving water (as from a stream at its mouth) is slowed by a body of standing water.

Density. The mass of a substance per unit volume. In the English system the units are pounds-seconds square/feet to the fourth power. In the metric system the units are kg/L. The Greek letter 'rho' is the common symbol.

Density current. A highly turbid mixture of water and very fine grained sediment which flows into and along the bottom of a reservoir because its density is relatively larger than that of the standing water in the reservoir.

Deposition. The mechanical or chemical processes through which sediments accumulate in a resting place.

Depth-integrated sample. A sample of the water-sediment mixture collected at a vertical in accordance with the technique of depth integration. The sample is used to determine the sediment discharge and the range of particle sizes in that discharge, i.e. the sediment load in that discharge.

Depth integrating, suspended-sediment sampler. An instrument designed to be lowered to within a few inches of the stream bed while collecting a water-sediment mixture isokinetically into a bottle. Sampling starts automatically as the instrument enters the water and continues until the orifice breaks the water surface on the return trip from the bed. Hence, a sampler suitable for performing depth integration.

Depth-integration. A method of sampling the water-sediment mixture in a flowing stream whereby the sampling instrument is lowered down to the bottom and returned to the surface in a continuous motion and at the proper rate to collect a discharge-weighted sample of the mixture. Ordinarily, depth integration is performed by traversing the water column with a depth-integrating sampler. However, when the water is so deep or the current is so swift that a single bottle cannot contain the entire sample, depth-integration is acconplished by partitioning the water column into layers, vertically, and lowering a point-integrating sampler through each layer separately. The valve on the point sampler allows the inflow orifice to be opened only for the layer being sampled. Depth integration has also been accomplished using a vertical-slot sampler.

Diameter, standard fall. See standard fall diameter.

Diameter, standard sediment. See standard sedimentation diameter.

Discharge-weighted concentration. The dry mass (weight) of sediment in a unit volume of stream discharge, or the ratio of the mass discharge (dry) of sediment to the mass discharge of water-sediment mixture.

Disperse. To de-flocculate or disaggregate compound particles, such as clays and fine silts, into individual component particles (ultimate particles).

Dispersed system. A condition in particle-size analyses whereby particles begin to settle from an initial uniform dispersion, such that particles of equivalent fall diameters settle at the same rate.

Dissolved load. The part of the stream load that is carried in solution, such as chemical ions yielded by weathering and erosion of the land mass.

Dissolved solids. The mass of dissolved constituents in water determined by evaporating a sample to dryness, heating to 103-105 C for two hours, desiccating, and weighing.

Drainage basin. The area tributary to or draining into a lake, stream, or measuring site. (See watershed.)

Dunes. Bed forms with triangular profile that advance downstream due to net deposition of particles on the steep downstream slope. Dunes move downstream at velocities that are small relative to the stream flow velocity.

Equal-discharge-increment (EDI) method. A procedure for obtaining the discharge-weighted suspended-sediment concentration at a cross section by (1) collecting a depth-integrated sample at the center of equal-flow sub-sections across the cross section while (2) using vertical transit rates that provide the same volume of sample at each sampling vertical.

Equal transit rate. Obsolete, replaced by the term "equal-width increment."

Equal-width increment (EWI) method. A procedure for obtaining the discharge-weighted suspended-sediment concentration of flow at a cross section by: (1) performing depth integration at a series of verticals equally spaced across the cross section, and by (2) using the same vertical transit rate at all sampling verticals.

Erosion. The wearing away of the land surface by detachment and movement of soil and rock fragments through the action of moving water and other geological agents.

Fall velocity. The falling or settling rate of a particle in a given medium.

Filtrate. The fluid that has passed through a filter.

Filtration. The process of passing a liquid through a filter to remove suspended matter that usually cannot be removed by settling. The filter may consist of granular material such as sand, magnetite, or diatomaceous earth; finely woven cloth, unglazed porcelain, or specially prepared paper.

Fine material. Particles of a size finer than the particles present in appreciable quantities in the bed material; normally silt and clay particles (particles finer than 0.062 mm).

Fine-material load. That part of the total sediment load that is composed of particles smaller than the particles present in appreciable quantities in the stream bed. Normally, that is of sediment particles smaller than 0.062 mm.

Flocculent. An agent that produces flocs or aggregates from small suspended particles.

Flocculation agent. A coagulating substance which, when added to water, forms a flocculent precipitate that will entrain suspended matter and expedite settling; for example, alum, ferrous sulfate, or lime.

Fluvial. (1) Pertaining to streams. (2) Growing or living in streams or ponds. (3) Produced by river action, as a fluvial plain.

Fluvial sediment. Particles derived from rocks or biological materials which are transported by, suspended in, or deposited by streams.

Foreset bed. Included layers of sandy material deposited upon or along an advancing and relatively steep frontal slope. A foreset bed progressively covers a bottomset bed, and in turn is covered by a topset bed.

Froude number. A dimensionless number expressing the ratio between influence of inertia and gravity in a fluid.

Gaging station. A selected cross section of a stream channel where one or more variables are measured continuously or periodically to index discharge and other parameters.

Geologic erosion. The erosion process on a given land form that is not associated with the activities of man.

Gradation curve. See particle-size distribution.

Grading. Degree of mixing of size classes in sedimentary material: Well graded implies a more or less uniform distribution from coarse to fine; poorly graded implies uniformity in size of lack of continuous distribution.

Grain size. See particle size.

Gravel. See Table B-1.

Gross erosion. The total of all sheet, gully, and channel erosion in a drainable basin, usually expressed in units of weight.

Instantaneous sampler. A suspended-sediment sampler that instantaneously traps a sample of the water-sediment mixture in a stream at a desired depth.

Isokinetic sampling. To collect a water-sediment mixture at the velocity of the approaching flow; that is, the velocity of the mixture experiences no acceleration or deceleration as it leaves the ambient flow and enters the sampler intake.

Load. See sediment load.

Measured sediment discharge. The quantity of sediment passing a stream cross section in a unit of time as computed with data measured by sampling. (i.e. Sampling with suspended sediment samplers provides the measured sediment discharge of suspended sediment. There will be an unmeasured sediment discharge which must be added to that value to obtain the total sediment

discharge for the cross section.)

Median diameter. The sediment particle diameter for which one half of the weight of the material is composed of particles larger than the median diameter, and the other half is composed of particles smaller than the median diameter.

Nephelometer. An instrument that measures the amount of light scattered in a suspension.

Native water. Water from a water body that has been unaffected by sampling, handling, and preservation.

Noncohesive sediments. Sediments consisting of discrete particles. For given erosive forces, the movement of such particles depends only on the properties of shape, size, and density, and on the position of the particle with respect to surrounding particles.

Optical opacity. An expression for the amount of light absorbed and scattered by a suspension reported as: (1) extinction coefficient, (2) percent of incident light scattered at 90 degrees, and/or (3) percent of incident light transmitted at 180 degrees over a standard distance.

Particle size. 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. See Table B-1.

Particle-size classification. See sediment grade scale.

Particle-size distribution. The frequency distribution of the relative amounts of particles in a sample that are within specified size ranges, or a cumulative frequency distribution of the relative amounts of particles coarser or finer than specified sizes. Relative amounts are usually expressed as percentages by weight.

Particle-size, intermediate axis. The size of a rock or sediment particle determined by direct measurement of the axis normal to a plane representing the longest and shortest axes.

Plane bed. A sedimentary bed without elevations or depressions larger than the maximum size of the bed material.

Point-integrating sediment sampler. An instrument capable of collecting a water-sediment mixture isokinetically for a specified period of time by opening and closing while under water. An instrument suitable for performing point integration.

Point-integrated sample (point sample). A sample of water-sediment mixture collected at a relatively fixed point in accordance with the technique of point integration. 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.

Point integration. A method of sampling at a relatively fixed point whereby the water-sediment mixture is withdrawn isokinetically for a specified period of time.

Pollution. The condition caused by the presence of substances of such character and in such quantities that the quality of the environment is impaired. (See water pollution.)

Pumping sampler. A sampler with which the water-sediment mixture is withdrawn through a pipe or hose, the intake of which is placed at the desired sampling point.

Reservoir. An impounded body of water or controlled lake where water is collected and stored.

Residue. Material that remains after gases, liquids,or solids have been removed.

Rill erosion. Land erosion forming small, well-defined incisions in the land surface less than 30 centimetres in depth.

Ripple. Small triangular-shaped bed forms that are similar to dunes but have much smaller heights and lengths of 0.3 m or less. They develop when the Froude number is less than approximately 0.3.

Runoff. Flow that is discharged from the area by stream channels-- sometimes subdivided into surface runoff, ground-water runoff, and seepage.

Sampled zone. That part of a vertical transect presumed to be wholly represented by sediment samples.

Sampling vertical. 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. See Table B-1.

Scale of particle sizes. The scale recommended is essentially that prepared by Lane (1947), for the Subcommittee on Sediment Terminology, American Geophysical Union (AGU). See Table B-1.

Scour. The enlargement of a flow section by the removal of boundary material through the action of the fluid in motion.

Sediment. (1) Particles derived from rocks or biological materials that have been transported by a fluid. (2) Solid material (sludges) suspended in or settled from water.

* Sedimentation. A broad term that embodies the processes of erosion, entrainment, transportation, deposition, and the compaction of sediment.

Sedimentary delivery ratio. The ratio of sediment yield to gross erosion.

Sediment discharge. The mass or volume of sediment (usually mass) passing a stream cross section in a unit of time. The term may be qualified, for example; as suspended-sediment discharge, bed load discharge, or total-sediment discharge.

Sediment grade scale. The grouping of sediment particles into size classes based on particle diameters uses the American Geophysical Union size classification scale of 1947. See Table B-1.

Sediment load. A general term that refers to material in suspension and/or in transport. It is not synonymous with either discharge or concentration. (See total sediment load.)

Sedimentology. The scientific study of sediment, sedimentary rocks, and the processes by which they are formed--more specifically for this report, it is a study of detachment, transport, and deposition of sediment particles in streams and other water bodies.

Sediment particles. Fragments of mineral or organic material in either a singular or aggregate state.

Sediment production. An unacceptable term. Use erosion. (See sediment yield.)

Sediment sample. A quantity of water-sediment mixture or deposited sediment that is collected to characterize some property or properties of the sampled medium.

Sediment transport (rate). See sediment discharge.

Sediment yield. The total sediment outflow from a drainage basin in a specific period of time. It includes bed load as well as suspended load, and usually is expressed in terms of mass, or volume per unit of time.

Settling. The downward movement of suspended-sediment particles.

Sheet erosion. The more or less uniform removal of soil from an area by raindrop splash and overland flow without the development of water channels. Included with sheet erosion, however, are the numerous conspicuous small rills that are caused by minor concentrations of runoff.

Sieve diameter. The smallest standard sieve opening size through which a given particle of sediment will pass.

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Silt. See Table B-1. Siltation. An unacceptable term. Use sediment deposition, sediment discharge, or sediment yield as appropriate.

Soil. Unconsolidated mineral and organic surface material that has been sufficiently modified and acted upon by physical, chemical, and biological agents so that it will support plant growth.

Spatial concentration. The dry mass of sediment in a unit volume of water-sediment mixture in place.

Specific gravity. Ratio of the mass of any volume of a substance to the mass of an equal volume of water at 4 degrees C.

Specific weight of sediment deposits. The dry weight of sediment particles within a unit volume of the deposit expressed as pounds per cubic foot.

Specific weight of sediment particles. The dry weight of sedimentary material per cubic foot of volume assuming no voids.

Split sample. 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. Sometimes simply fall diameter. The diameter of a sphere that has a specific gravity of 2.65 and has the same standard fall velocity as the given particle.

Stream bank erosion. The removal of bank material by the force of flowing water and the caving of stream banks.

Stream discharge. The quantity of flow passing a stream cross section in a unit of time. (The discharge contains water, dissolved solids, organic sediment and inorganic sediment.)

Supernate or supernatant. The liquid (i.e.; water) above the surface of settled sediment.

Suspended load. That part of the sediment load which is suspended sediment. (See sediment load.)

Suspended sediment. Sediment that is carried in suspension by the turbulent components of the fluid or by Brownian movement.

Suspended-sediment concentration. See concentration of sediment.

Suspended-sediment discharge. The quantity of suspended sediment passing a cross section in a unit of time.

Suspended-sediment sample. See sediment sample.

Suspended-sediment sampler. Device to sample flow and its suspended-sediment load.

Thalweg. The line connecting the lowest or deepest points along a stream bed, valley or reservoir, whether under water or not.

Topset bed. A layer of sediments deposited on the top surface of an advancing delta which is continuous with the land ward alluvial plain.

Total-sediment discharge. The total quantity of sediment passing a section in a unit of time.

Total-sediment load (total load). All of the sediment in transport; that part moving as suspended load plus that moving as bed load.

TOTAL LOAD

MODE OF TRANSPORT	AVAILABILITY IN STREAMBED	METHOD OF QUANTIFYING
SUSPENDED + BED LOAD	WASH LOAD + BED MATERIAL LOAD	MEASURED LOAD + UNMEASURED LOAD
TOTAL LOAD	TOTAL LOAD	TOTAL LOAD

Transect. A sample line or sub-area chosen as the basis for studying one or more characteristics of the water discharge mixture. (Note: Some documents use transect interchangably with cross section, but that is not consistent with other areas of hydraulics and, therefore, is discouraged.)

Transmissometer. An instrument that measures the energy of a light ray that has passed through a suspension.

Transportation (sediment). The complex processes of moving sediment particles from place to place. The principal transporting agents are flowing water and wind.

Turbidity. Only a general definition is possible because of the wide variety of methods in use. This term has been used as an expression of the optical properties of a sample which causes light rays to be scattered and absorbed rather than transmitted through the sample. (See optical opacity.)

Turbidity current. See density current.

Turbulence. In general terms, the irregular motion of a flowing fluid.

Unmeasured sediment discharge. The difference between total sediment discharge and measured suspended-sediment discharge. (See total load.)

Unsampled depth. The unsampled part of the sampling vertical; usually within 8 - 15 centimetres of the stream bed depending on the kind of sampler used.

Unsampled zone. The bottom part of a vertical transect that cannot be reached by sediment samplers. (See sampled zone.)

Volume weight. Use density.

Wash load. See fine-material load.

Water discharge. See stream discharge.

Watershed. All lands enclosed by a continuous hydrologic-surface drainage divide and lying upslope from a specified point on a stream. (See drainage basin.)

Water pollution. The addition of harmful or objectionable material to water in sufficient quantities to adversely affect its usefulness.

Table B-1. Scale for Size Classification of Sediment Particles

CLASS NAME	MILLIMETERS	MICROMETERS	PHI VALUE
Boulders	>256	--	<-8
Cobbles	256 - 64	--	-8 to -6
Gravel	64 - 2	--	-6 to -1
Very coarse sand	2.0 - 1.0	2000 - 1000	-1 to 0
Coarse sand	1.0 - 0.50	1000 - 500	0 to +1
Medium sand	0.50 - 0.25	500 - 250	+1 to +2
Fine sand	0.25 - 0.125	250 - 125	+2 to +3
Very fine sand	0.125 - 0.062	125 - 62	+3 to +4
Coarse silt	0.062 - 0.031	62 - 31	+4 to+5
Medium silt	0.031 - 0.016	31 - 16	+5 to +6
Fine silt	0.016 - 0.008	16 - 8	+6 to +7
Very fine silt	0.008 - 0.004	8 - 4	+7 to +8
Coarse clay	0.004 - 0.0020	4 - 2	+8 to +9
Medium clay	0.0020 - 0.0010	2 - 1	+9 to +10
Fine clay	0.0010 - 0.0005	1 - 0.5	+10 to +11
Very fine clay	0.0005 - 0.00024	0.5 - 0.24	+11 to +12
Colloids	<0.00024	<0.24	>+12