REFERENCES

Abruna, F. and J. Vincente. 1955. Refinement of a quantitative method for determining the lime requirement of soils. J. of Agric., Univ. of Puerto Rico. Vol. 39, No. 1:41-45.

Alexander, M. 1965. Most-probable-number method for microbial populations. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:1467-1472. Am. Soc. of Agron., Madison, Wis.

Allen, O.N. 1949. Experiments in soil bacteriology. Burgess Publishing Co., Minneapolis, Minn.

Allison, L.E. 1965. Organic Carbon. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:1367-1378. Am. Soc. of Agron., Madison, Wis.

American Scoiety for Testing and Materials. 1958. Cited by Blake, G.R. 1965.

American Society for Testing and Materials. 1974. Standard method of test for density of soil in place by and sand-cone method (D1556-64). p. 208-211. In: Standards and tentatives relating to natural building stones; soil and rock; peat, mosses, and humus. Part 19. Am. Soc. Testing Mater., Philadelphia.

Anderson, D.M., and R. R. Binnie. 1961. Modal analysis of soils. SSSAP 25:499-503.

Baver, L.D. 1956. Soil physics. John Wiley and Sons, Inc., New York.

Blake, G.R. 1965. Particle density. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:371-373. Am. Soc. of Agron., Madison, Wis.

Bouyoucos, G.J. 1951. A recalibration of the hydrometer method for making mechanical analysis of soils. Agron. J. 43:434-437.

Bower, C.A. and L.V. Wilcox. 1965. Soluble salts. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:935. Am. Soc. of Agron., Madison, Wis.

Bremner, J.M. 1965. Total nitrogen. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:1149-1178. Am. Soc. of Agron., Madison, Wis.

Brewer, R. 1964. Fabric and mineral analysis of soils. John Wiley and Sons, Inc., New York.

Buol, S.W. and D.M. Fadness. 1961. New method of impregnating fragile material for thin sectioning. SSSAP 25:253.

Cady, J.C. 1965. Petrographic microscope techniques. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:604-631. Am. Soc. of Agron., Madison, Wis.

Carrucio, F.T. 1967. An evaluation of factors influencing acid mine drainage production from various strata of the Allegheny group and the ground water interactions in selected areas of western Pennsylvania. Ph.D. Thesis. The Pennsylvania State Univ., State College.

Cholodny, N.G. 1930. Cited by Frederick, L.R. 1965.

Clark, F.E. 1965. Agar-plate method for total microbial count. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:1460-1466. Am. Soc. of Agron., Madison, Wis.

Cochran, W.G. 1950. Cited by Alexander, M. 1965.

Coleman, N.T. and G.W. Thomas. 1967. The basic chemistry of acidity. In: R.W. Pearson and F. Adams (ed.) Soil acidity and liming. Agronomy 12:1-41. Am. Soc. of Agron., Madison, Wis.

Day, P.R. 1956. Report on the committee on physical analysis. 1954-55. SSSAP 20:167-169.

Dunn, L.E. 1943. Lime requirement determination of soils by means of titration curves. Soil Sci. 56:341-351.

Fred, E.B. and S.A. Waksman. 1928. Laboratory manual of general microbiology, McGraw-Hill Book Co., New York.

Frederick, L.R. 1965. Microbial populations by direct microscopy. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:1457-1459. Am. Soc. of Agron., Madison, Wis.

Gradwell, M.W. 1955. Cited by Blake, G.R. 1965.

Grube, W.E., Jr., R.M. Smith, R.N. Singh, and A.A. Sobek. 1973. Characterization of coal overburden materials and minesoils in advance of surface mining. p. 134-152. In: J.F. Boyer, Jr. (ed.) Research and applied technology symposium on mined-land reclamation. Natl. Coal Assoc., Washington, D.C.

Hill, R.D. 1970. Elkins mine drainage pollution control demonstration project. p. 284-303. In: Third symposium on coal mine drainage research. Bituminous Coal Res., Inc., Monroeville, Pa.

Hedrick, H.G., and H.A. Wilson. 1956. The rate of carbon dioxide production in a stripmine spoil. Proc. of the West Virginia Acad. of Sci. Vol. 28:11-15.

Hutchinson, C.S. 1974. Laboratory handbook of petrographic techniques. John Wiley and Sons, Inc., New York.

Jackson, M.L. 1958. Soil chemical analysis. Prentice Hall, Englewood Cliffs, N.J.

Kerr, P.F. 1959. Optical mineralogy. McGraw-Hill Book Co., New York.

Kilmer, V.J. and L. T. Alexander. 1949. Methods for making mechanical analyses of soils. Soil Sci. 68:15-24.

Kilmer, V.J. and J.F. Mullins. 1954. Improved stirring and pipetting apparatus for mechanical analyses of soils. Soil Sci. 77:437-441.

Lockhead, A.G. 1940. Cited by Clark, F.E. 1965.

Marshall, C.E. 1949. The colloid chemistry of the silicate minerals. Agron. 1:152-165.

Mehlich, A. 1953. Cited by Nelson et al. 1953.

Miller, W.L., C.L. Godfrey, W.C. McCully, and G.W. Thomas. 1976. Formation of soil acidity in carbonaceous soil materials exposed by highway excavations in east Texas. Soil Sci. 121:162-169.

Nelson, W.L., A. Mehlich, and E. Winters. 1953. The development, evaluation, and use of soil tests for phosphorus availability. In: W.H. Pierre and A.G. Norman (ed.) Soil and fertilizer phosphorus. Agron. 4:153-188.

Olsen, S.R., C.V. Cole, F.F. Watanabe, and L.A. Dean. 1954. Estimation of available phosphorus in soils by extraction with sodium bicarbonate. U.S.D.A. Circular 939.

Olsen, S.R. and L.A. Dean 1965. Phosphorus. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:1035-1049. Am. Soc. of Agron., Madison, Wis.

Peech, M. 1965. Hydrogen-ion activity. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:914-920. Am. Soc. of Agron., Madison, Wis.

Rich, C.I. 1961. Calcium determination for cation-exchange capacity measurements. Soil Sci. 9:226-231.

Richards, L.A. 1965. Physical condition of water in soil. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:128-137. Am. Soc. of Agron., Madison, Wis.

Rossi, G., S. Riccardo, G. Gesue, M. Stanganelli, and T.K. Wang. 1936. Cited by Frederick, L.R. 1965.

Shoemaker, H.E., E.O. McLean, and P.F. Pratt. 1962. Buffer methods for determination of lime requirement of soils with appreciable amount of exchangeable aluminum. SSSAP 25:274-277.

Smith, R.M., W.E. Grube, Jr., T. Arkle, Jr., A. Sobek. 1974. Mine spoil potentials for soil and water quality. EPA-670/2-74-070. U.S. Environmental Protection Agency, Cincinnati, Ohio.

Smith, R.M., A.A. Sobek, T. Arkle, Jr., J.C. Sencindiver, and J.R. Freeman. 1976. Extensive overburden potentials for soil and water quality. EPA-600/2-76-184. U.S. Environmental Protection Agency, Cincinnati, Ohio.

Sobek, A.A., R.M. Smith, and T. Arkle, Jr. 1977. Planning and classifying highly disturbed soils. International Hill Land Symposium, Morgantown, W.Va. (In Press).

Sobek, A.A., R.M. Smith, W.A. Schuller, and J.R. Freeman. 1976. Overburden properties that influence minesoils. p. 153-159. In: J.F. Boyer, Jr. (ed.) Fourth symposium on surface mining and reclamation. Natl. Coal Assoc., Washington, D.C.

Soil Survey Staff. 1970. Family textural placement of soils with a fabric dominated by fragments of soft rock. Unpublished Memorandum. Soil Survey Laboratory, Lincoln, Neb.

Sorensen, S.P.L. 1909. Cited by Peech, M. 1965.

Sowers, G.F. 1965. Consistency. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:391-399. Am. Soc. of Agron., Madison, Wis.

Stevenson, I.L., and J.W. Rouatt. 1953. Cited by Clark, F.E. 1965.

Temple, K.L. and W.A. Koehler. 1954. Drainage from bituminous coal mines. West Virginia Univ. Eng. Stn. Res. Bull. 25.

Tyner, E.H. 1940. The use of sodium metaphosphate for the dispersion of soils for mechanical analysis. SSSAP 4:106-113.

U.S. Department of Agriculture, SCS, Soil Survey Staff. 1951. Soil survey manual. Agriculture Handbook No. 18. U.S. Government Printing Office, Washington, D.C.

U.S. Department of Agriculture, SCS, Soil Survey Staff. 1972. Soil survey laboratory methods and procedures for collecting soil samples. Soil Survey Investigations Report No. 1. U.S. Government Printing Office, Washington, D.C.

U.S. Department of Agriculture, SCS, Soil Survey Staff. 1975. Soil taxonomy: a basic system of soil classification for making and interpreting soil surveys. Agriculture Handbook No. 436. U.S. Government Printing Office, Washington, D.C.

U.S. Salinity Laboratory Staff. 1954. Quality of irrigation water. p. 72-75. In: L.A. Richards (ed.) Diagnosis and improvement of saline and alkali soils. Agriculture Handbook No. 60. USDA. U.S. Government printing Office, Washington, D.C.

Vomocil, J.A. 1965. Porosity. In: C.A. Black (ed.) Methods of soil analysis. Agronomy 9:300. Am. Soc. of Agron., Madison, Wis.

Waksman, S.A. and E.B. Fred. 1922. Cited by Clark, F.E. 1965.

Walkley, A. 1947. A critical examination of a rapid method for determining organic carbon in soils - effect of variation in digestion conditions and of inorganic soil constituents. Soil Sci. 63:251-263.

West Virginia University. 1971. Mine spoil potentials for water quality and controlled erosion. 14010 EJE 12/71. U.S. Environmental Protection Agency, Washington, D.C.

Wilson, A.A. and H.G. Hedrick. 1957a. Some qualitative observations of the microflora in a strip mine spoil. Proc. of the West Virginia Acad. of Sci. 29, 30:35-38.

Wilson, H.A. and H.G. Hedrick. 1975b. Carbon dioxide evolution from some strip mine spoils. Applied Microbiology Vol. 5, No. 1:17-21.

Winchell, A.N. 1937. Elements of optical mineralogy. Part 1. Principles and methods. Part II. Descriptions of minerals. John Wiley and Sons, Inc., New York.

Winkler, L.W. 1913. Cited by Bremner, J.M. 1965.

Woodruff, C.M. 1948. Testing soils for lime requirements by means of a buffered solution and the glass electrode. Soil Sci. 66:53-66.

PUBLICATIONS

Arnold, G.E. 1977. A petrographic study of sandstone weathering. M.S. Thesis. West Virginia Univ., Morgantown. (In Process).

Freeman, J.R. 1976. Overburden analysis. P. 29-56. In: F.W. Glover, Jr. (ed.) Annual interagency evaluation of surface mine reclamation in West Virginia. West Virginia DNR, Charleston.

Cole, C.P. 1976. Overburden and minesoil properties in relation to original soil profiles, with special attention to subsoil structure. M.S. Thesis. West Virginia Univ., Morgantown.

Delp, C. 1975. Soil morphological characteristics, genetics, and classification of West Virginia coal mine refuse. M.S. Thesis. West Virginia Univ., Morgantown.

Perry, E.F. 1976. Better reclamation at reduced cost using overburden analysis. Green Lands Quarterly. Vol. 6, No. 4:34-37.

Sencindiver, J.C. 1977. Classification and genesis of minesoils. Ph.D. Thesis. West Virginia Univ., Morgantown.

Smith, R.M. 1976. Minesoil properties and classification studied. Green Lands Quarterly. Vol. 6, No. 1:11.

Smith, R.M. 1976. Long range benefits of surface mining. Green Lands Quarterly. Vol. 6, No. 1:35.

Smith, R.M. 1976. Pre-planning to future land use. P. 57-63. In: F.W. Glover, Jr. (ed.) Annual interagency evaluation of surface mine reclamation in West Virginia. West Virginia DNR, Charleston.

Smith, R.M. and A.A. Sobek. 1977. Physical and chemical properties of overburdens, spoils, wastes, and new soils. In: P. Sutton (ed.) Reclamation of drastically disturbed lands. Am. Soc. of Agron., Madison, Wis. (In Process).

Sobek, A.A. 1975. Overburden properties and minesoil characteristics. P. 17-20. In: F.W. Glover, Jr. (ed.) Annual interagency evaluation of surface mine reclamation in West Virginia. West Virginia DNR, Charleston.

Sobek, A.A. 1977. The role of pedologic principles in advance planning of coal mining. Ph.D, Thesis. West Virginia Univ., Morgantown. (In Process).

Sobek, A.A., R.M. Smith, and T. Arkle, Jr. 1977. Planning and classifying highly disturbed soils. International Hill Land Symposium, Morgantown, W.Va. (In Press).

Sobek, A.A., R.M. Smith, W.A. Schuller and J.R. Freeman. 1976. Overburden properties that influecne minesoils. P. 153-159. In: J.F. Boyer, Jr. (ed.) Fourth symposium on surface mining and reclamation. Natl. Coal Assoc., Washington, D.C.

GLOSSARY

Acidic - Having a pH of less than 7.0

Actinomycetes - Any of numerous generally filamentous and often pathogenic microorganisms of the family Actinomycetaceae, resembling both bacteria and fungi.

Aerobic - Oxygen-requiring organism.

Agar - Dried polysaccharide extract of red algae used as a solidifying agent in microbiological media.

Agricultural Limestone - A soil amendment consisting principally of calcium carbonate but including magnesium carbonate and perhaps other materials used to furnish calcium and magnesium as essential elements for the growth of plants and to neutralize soil acidity. It is made by crushing or pulverizing limestone.

Argillians - See 3.3.3.2.

Alkaline - Having a pH greater than 7.0.

Amorphous - Having no crystal structure.

Anistrophic (optical mineralogy) - Any crystal in which the optical properties (indexes) very with respect to directions of the crystal axes. Term includes all crystal systems except isometric and amorphous.

Anthropic - Said of an epipedon that is similar to a mollic epipedon but in which the content of P_2O_5 is greater than 250 ppm.

Argillaceous - Containing an appreciable amount of clay-size particles.

Autoclave - An apparatus using steam under pressure for sterilization.

Bacteria - Any of numerous unicellular microorganisms occurring in a wide variety of forms, existing as either a free-living organism or parasite, and having a wide range of biochemical, often pathogenic, properties.

Bedding Planes - Planes that mark the breaks between different rock types or changes in color or texture within a rock type.

Biotite - A mineral of the mica group. (See 3.3.2.2 for optical properties).

Birefringence - See 3.3.2.2.

Blossom - The decomposed (weathered) outcrop of a coal seam on the land surface.

Bone Coal - Coal in which the content of earthy material is too high to be commercially valuable; the percent of ash ranges upward from about 25 percent; bone is dull rather than bright, is both heavier and harder than commercial coal, and is classified for this manual as the rock type carbolith.

Canada balsam - a viscous, yellowish, transparent resin obtained from the balsam fir and used as a mounting cement for microscopic specimens.

Carbolith - See 2.1.2.

Carbonate - A group of minerals which all contain the anion $(CO_3)^{-2}$.

Chalcopyrite - A sulfide of copper and iron, $CuFeS_2$.

Chert - See 2.1.2.

Chlorite - A group of clay minerals as defined by method 3.3.4.

Clay film - See clay skin.

Clay-size particles - Particles having an equivalent diameter of less than 2 microns (0.002 mm).

Clay skin (clay film) - A thin coating of well-oriented clay particles on the surface of a soil aggregate, particle, or pore.

Collapsing minerals - A group of clay minerals whose internal structure collapses upon heating due to the removal of interlayer waters.

Colony - A microscopically visible growth of microorganisms on a solid culture medium.

Concretion - A hard, compact, rounded, normally subspherical mass or aggregate of mineral matter generally formed by orderly and localized precipitation from an aqueous solution in the pores of a sedimentary rock and usually of a composition widely different from that of a surrounding rock and rather sharply separated from it. Concretions have concentric layering about a central core.

Confidence limits - Either the upper or lower value between which an actual measurement or parameter will fall with a stated probability.

Crystal - A homogeneous, solid body of a chemical element, compound, or isomorphous mixture having a regularly repeating atomic arrangement that may be outwardly expressed by planar faces.

Culture - A population of microorganisms grown in a medium.

Cutans - See 3.3.3.2.

Density - The weight of a substance per unit volume of water which it will displace. Bulk density is expressed in grams per cubic centimeter.

Dolomite - Same as limestone except has substitution of magnesium for some of the calcium, $CaMg(CO_3)_2$. Differs from limestone since cold dilute HCl will not, or only slightly, cause effervesence except when applied to powdered sample.

Drift - See 1.1.2.

Earth worm casts - See 3.3.3.2.

Earthy material - See 2.1.2.

Epipedon - A diagnostic surface layer of soil.

Epsomite - See 2.1.7.

Extinction - The more or less complete darkness obtained in a birefringent mineral at two positions during a complete rotation as seen with crossed nicols using a petrographic microscope.

Fe-Al sulfates - See 2.1.7.

Ferrans - See 3.3.3.2.

Fizz - The process of a material (whether rock or soil) bubbling when cold dilute hydrochloric acid is applied.

Flint - See 2.1.2.

Fossils - Any remains, trace, or imprint of a plant or animal that has been preserved, by natural processes, in the earth's crust since some past geologic time.

Fungi - Any of numerous plants including the yeasts, molds, smuts, and mushrooms.

Glacial drift - See 2.1.2.

Gypsum - See 2.1.7.

Hardness - The resistance of a mineral to scratching (See 2.1.4 for more detail).

Hematite - An iron oxide (Fe_2O_3) mineral (See 3.3.2.2 for optical properties).

Hexagonal - One of the six crystal systems characterized by minerals having six crystal faces resulting from three equal length horizontal axes at right angles to a differing length central vertical axis.

Highwall - The exposed face of excavated overburden and coal in a surface mine or the face or bank of the uphill side of a contour strip mine excavation.

Horizon - See soil horizon.

Hydrated Lime - A material made from burnt lime which consists primarily of calcium hydroxide.

Illite - A group of clay minerals as defined by method 3.3.4.

Immersion - To cover completely with a liquid.

Incubate (incubation) - Holding cultures of microorganisms under conditions, especially temperature, favorable to their growth.

Incubation period - The time period during which microorganisms innoculated into a medium are allowed to grow.

Inoculum - The material containing microorganisms and used for the artificial introduction of microorganisms into a culture medium.

Intercalate - See 2.1.2.

Interference colors - See 3.3.2.2.

Isometric - One of the six crystal systems characterized by three axes that are mutually perpendicular and of equal lengths.

Isotrophic - See 3.3.2.2.

Kaolin - A group of clay minerals as defined by method 3.3.4.

Kaolinite - A clay mineral of the kaolin group as defined by method 3.3.4.

Jasper - See 2.1.2

Limestone - See 2.1.2.

Loess - See 2.1.2.

Luster - The reflection of light from the surface of a mineral.

Macroscopic - Visible without the aid of a microscope.

Mangans - See 3.3.3.2.

Marcasite - Like pyrite, an iron disulfide, FeS_2; however, differs in crystal form.

Medium - A substance used to provide nutrients for the growth and multiplication of microorganisms.

Mica - See 2.1.6.

Microcline - A mineral of the alkali feldspar group. (See 3.3.2.2 for optical properties).

Microbe (Microbial) - Microscopic organism belonging to either the plant or animal kingdom.

Microorganism - Form of life of microscopic dimensions.

Microscopic - Visible only with the aid of a microscope.

Mineral - A naturally formed chemical element or compound having a definite chemical composition and usually a characteristic crystal form.

Mollic - Pertaining to a dark, thick epipedon having at least 0.58% organic carbon, a base saturation of at least 50% when measured at pH 7, and less than 250 ppm P_2O_5 soluble in citric acid.

Monoclinic - One of the six crystal systems. Minerals in this system will have three unequal axes, two of which are obliquely inclined to each other and the third is perpendicular to the plane formed by them.

Montmorillonite - A group of expanding-lattice clay minerals as defined by method 3.3.4.

Mudrock - See 2.1.2.

Mudstone - See 2.1.2.

Munsell Color System - A color designation system that specifies the relative degrees of the three simple variables of color: hue, value, and, chroma. The Hue of a color indicates its relation to red, yellow, green, blue, or purple; the Value indicates its lightness (ranges from absolute black at 0 to absolute white at 10); The Chroma indicates its strength (or departure from neutral of the same lightness). For example: 10YR 6/4 has a color of Hue 10YR, Value 6, and Chroma 4 (for additional information see 2.1.3).

Muscovite - A mineral of the mica group (see 3.3.2.2 for properties).

Nodule - A hard, compact, rounded mass or aggregate of mineral matter. Unlike concretions, nodules do not have concentric layering.

Opaque - Said of materials that are impervious to light.

Organism - A living biological specimen.

Orthoclase - A mineral of the alkali feldspar group. (See 3.3.2.2 for properties).

Orthorhombic - One of the six crystal systems, characterized by three axes

that are mutually perpendicular and of unequal length.

Outwash - See 2.1.2.

pH - A numberical measure of the acidity or alkalinity. The neutral point is pH 7.0. All pH values below 7.0 are acid and all above 7.0 are alkaline (for more information see 3.2.2).

Plate counting - The counting of microorganisms on a microscope slide.

Pocket - A small, discontinuous occurrence or patch of mineralized material, rock, soil, or void within a rock, stratum, or soil.

Polysaccharide - A carbohydrate formed by the combination of many molecules of monosaccharides (e.g. starch, cellulose, glycogen).

Pores - See 3.3.3.2.

Pyrite - An iron disulfide (FeS_2) mineral. (See 2.1.6 for detection and 3.3.2.2 for optical properties).

Quartz - Crystalline silica (SiO_2). (See 3.3.2.2 for optical properties).

Rock - Any consolidated or coherent naturally formed mass of mineral matter.

Rock chips - (a) Field - Fragments of rock expelled by a compressed air rotary blast hole drill.
(b) Laboratory - Fragments taken from a rock used for analysis.

Rock Texture - A general physical appearance or character of a rock and the mutual relations among the component particles or crystals; e.g. the size, shape, and arrangement of the constituent elements of a sedimentary rock.

Root channels - See 3.3.3.2.

Sand-size particles - A particle having an equivalent diameter in the range of 0.05 to 2.0 mm.

Sandstone - See 2.1.2.

Shale - See 2.1.2.

Silt-size particles - A particle having an equivalent diameter in the range of 0.002 to 0.05 mm.

Siltstone - A fine-grained consolidated clastic rock composed predominantly of particles of silt grade or size. Individual grains are not visible without magnification. Crushed wet fragments feel smooth rather than gritty or sticky. Would fall into the mudrock or mudstone category depending on hardness.

Skeletal grains - See 3.3.3.2.

Soil - The natural bodies on the earth's surface, in places modified or even made by man of earthy materials containing living matter and supporting or capable of supporting plants out-of-doors.

Soil horizon - A layer within the soil profile that has characteristics that separate it from the rest of the profile. (For additional information on the soil horizons used in the manual, see 2.1.2).

Soil profile - A vertical section of the soil from the surface through all its horizons.

Soil texture - The relative proportion of the various soil separates (e.g. sand, clay, and silt) in a soil. (see 2.1.8 for additional information).

Spore - A resistant body formed by certain microorganisms; a resistant resting cell; a primitive unicellular reproductive body.

Sterilize (Sterilization) - The killing of all forms of life.

Stokes' Law - A formula that expresses the rates of settling of spherical particles in a fluid: $V = Cr^2$, where V is velocity (in cm/sec), r is the particles radius (in cm), and C is a constant relating relative densities of fluid and particle, acceleration due to gravity, and viscosity of the fluid.

Tension - The suction or negative pressure of soil water.

Tetragonal - One of the six crystal systems, in which the crystals are related to three mutually perpendicular axes, the vertical axis of which is of unequal length relative to the two horizontal axes.

Thin section - See 3.3.3.1.

Translucent - Said of a mineral that transmits light, but is not transparent.

Transparent - Said of a mineral that is capable of transmitting light, and through which an object can be seen.

Triclinic - One of the six crystal systems, characterized by three unequal axes that intersect obliquely.

Texture - See rock texture or soil texture.

Till - See 2.1.2.

Umbric - Pertaining to an epipedon that is similar to a mollic epipedon except for having a base saturation of less than 50%, measured at a pH of 7.

Undersoil - The material (rock or unconsolidated) that directly underlies a coal.

Vermiculite - A group of clay minerals as defined by method 3.3.4.

Viable - Living

Viscosity - The property of a substance to offer internal resistance to flow.

Water holding capacity - The smallest value to which the water content of a soil can be reduced by gravity drainage.

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. EPA-600/2-78-054	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE FIELD AND LABORATORY METHODS APPLICABLE TO OVERBURDENS AND MINESOILS		5. REPORT DATE March 1978 issuing date 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Andrew A. Sobek, William A. Schuller, John R. Freeman, and Richard M. Smith		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS College of Agriculture and Forestry, West Virginia University, Morgantown, West Virginia 26506		10. PROGRAM ELEMENT NO. EHB - 526 11. CONTRACT/GRANT NO. R 803508-01-0
12. SPONSORING AGENCY NAME AND ADDRESS Industrial Environmental Research Laboratory - Cin., OH, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268		13. TYPE OF REPORT AND PERIOD COVERED Final 1/75-12/76 14. SPONSORING AGENCY CODE EPA/600/12

15. SUPPLEMENTARY NOTES

16. ABSTRACT

With the growing demand for environmental assessment of a mining site, it becomes apparent that a manual of field and laboratory procedures to study the overburden and the resulting minesoil is necessary.

Incorporated within this manual are step-by-step procedures on field identification of common rocks and minerals; field sampling techniques; processing of rock and soil samples; and chemical, mineralogical, microbiological, and physical analyses of the samples. The methods can be used by mining companies, consultant firms, and State and Federal agencies to insure mining efficiency, post-mining land and water quality, and long range land use.

Inherent to these methods is the definition of terms. Many common terms are used inconsistently even within small groups; and when multiple disciplines are involved, communication demands that many terms must be defined for that particular purpose. Thus, the definition of essential rock, soil, chemical, mineralogical, microbiological, and physical terms constitute an important part of this project.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
*Coal Mines, *Surface Mining, *Overburden, *Chemical Properties *Weathering	*Potential Toxicity, *Minesoils, *Neutralization Potentials, *Available Nutrients, *Physical Properties, *Acid-Base Account, *Preplanning, *Analytical Properties, *Mineralogical Properties, *Microbiological Properties	43F 48A 91A

18. DISTRIBUTION STATEMENT Release to Public	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES 216
	20. SECURITY CLASS (This page) Unclassified	22. PRICE

EPA Form 2220-1 (9-73)

☆ U. S. GOVERNMENT PRINTING OFFICE: 1978-759-829