TESTING FORUM

ASTM D-18 NEWS

Standards for Zeolites is Topic of ASTM November Organizational Meeting

Developing standards for characterizing and describing various hydrous silicates known as zeolites is the topic of an organizational meeting planned for 19-20 Nov. 1986 at ASTM headquarters in Philadelphia.

Zeolites are minerals that may be distinguished by the presence of water, which is easily released by the application of heat. They are relatively soft, possess low specific gravity, and decompose readily with acid treatment.

This activity is a result of a March planning meeting on zeolites, which brought together a number of people in the field including members of ASTM Committees D-18 on Soil and Rock and D-32 on Catalysts. Consultant Robert Clifton, formerly of the U.S. Department of Interior, Bureau of Mines-Division of Industrial Minerals, requested that ASTM investigate the possibility of a standards development project for natural and synthetic zeolites. Results of a questionnaire confirmed the need.

Attendees of the March planning meeting stated that no standards now exist on the properties of zeolites nor on how to characterize them or test those characteristics. There are also no standards defining zeolites or delineating how to compare one type to another. Among the areas identified at the meeting to be considered for standards development work are chemical tests, physical tests, characterization, evaluation, biological reactivity, catalytic properties, how to make Type A and B zeolites, and terminology.

Anyone interested in attending the November organizational meeting or wanting additional information should contact Wendy Dyer, Staff Manager, ASTM Developmental Operations, 1916 Race Street, Philadelphia, PA 19103, 215/299-5526.

Geotechnical Applications of Remote Sensing and Remote Data Transmission

An "International Symposium on Geotechnical Applications of Remote Sensing and Remote Data Transmission" was held 31 Jan. 1986 at Cocoa Beach, FL. The symposium was organized by ASTM Committee D-18 on Soil and Rock and the International Committee on Remote Sensing and Data Transmission (ICRSDT) of the International Association of Hydrological Sciences. Cochairmen for the symposium were Ivan Johnson of A. Ivan Johnson, Inc., Arvada, CO, and Bernt Pettersson of Brown and Root, Inc., Houston, TX. Johnson is President of ICRSDT and Pettersson is Chairman of ASTM Subcommittee D18.01 on Surface and Subsurface Reconnaissance.

The purpose of the symposium was to develop information that could be used to prepare guidelines for the use of remote sensing techniques and of satellite and meteor burst instrumentation for remote data transmission for a variety of projects involving geotechnical science and engineering. The program discussed advantages and disadvantages of a variety of remote sensing (RS) and remote data transmission (RDT) techniques, equipment, and programs related to soil mechanics, rock mechanics, geologic engineering, ground-water and flood hydrology, and other scientific input to geotechnical projects. Authors were from Australia, Canada, China, and England, as well as from the United States. A field trip to the John F. Kennedy Space Center, site of space shuttle flights to place satellites in orbit, was held on March 1 as a part of the symposium program.

The papers, which are being considered for publication in a proceedings volume, started the program by pointing out that applications of remotely sensed techniques are operational in many phases of hydrology. Landsat multispectral scanner data are widely used because the images are available for nearly all land areas of the world. Applications of RS techniques include documentation of floods, inventory, and monitoring of wet soils, interpretation of ground-water occurrence and salinity, and measurement of relative water turbidity in streams and estuaries. A comparison was made between side-looking airborne radar (SLAR) and synthetic-aperture radar (SAR) as presented in some case histories studying physical and vegetative characteristics of the study areas in Louisiana. Included among interpretive data obtained by conjunctive use of both systems was information relative to man's activities, improved delineation of drainage patterns, better definition of surface roughness in cleared areas, and swamp identification, all of which might be useful in the clearing and construction of dams, reservoirs, highway, or railroad right-of-way and other geotechnical projects. Some remote sensing techniques proved useful in delineating lineaments that appear to represent surface expressions of deeper basement rock discontinuities in South Dakota. These activities affect permeability and thickness of aquifers and confining beds. Thus, determination of lineaments by remote sensing techniques could be especially useful in locating potential ground-water supplies in arid areas previously considered essentially devoid of such supplies.

Other discussion demonstrated the usefulness of a variety of remote sensing data for site selection, geotechnical sampling, lithological mapping, subsurface investigations, and site monitoring during and after construction. Case histories for Canadian geotechnical projects, such as pipelines, waste disposal sites, mine roof stability, and sand-gravel deposit exploration showed the use of color infrared aerial photography, imagery from the Landsat Thematic Mapper (TM) and SEASAT/SAR, and thermal imagery. Color infrared airphotos (CIR) were used to map vegetation and land losses that would result from submergence once a reservoir developed behind a dam under construction in China. A land-cover land classification system using three primary level and 25 secondary level categories was developed, and an orthophotomap was then produced by use of the CIR-determined land classes. The root-mean-square accuracy claimed by the author was only 3% between statistical acreage of cultivated land obtained from the CIR estimating method and from the conventional method of investigation on site by surveyors. In England, aerial photography, thermal infrared linescanning, and multispectral scanning (MSS) techniques were compared for location of potential land subsidence and collapse features in soluble carbonate rocks, and the results were checked by drilling and surface geophysics. Subsidence and collapse features pose serious geotechnical problems to various construction projects and also to public safety, and remote sensing is shown to be useful in detecting areas of past or potential collapse. Another paper presents use of NOAA-AVHRR, Landsat MSS, and imagery from shuttle radar imaging systems in Australia to determine the distribution, structure, and form of surficial deposits related to development of large open-cut coal mines. Important parameters, such as density and orientation of regional fracture systems; thermal conductivity of the land surface; distribution, movement, and discharge of ground water; and the roughness and moisture content of the surface, were interpreted with the use of the listed RS data. In a study by Arizona authors image spatial statistics was used to improve the resolution of low resolution digital images through an estimation process known as co-kriging or co-estimation. The authors conclude that co-kriging provides an accurate and flexible estimation technique and that it appears to be a promising technique for future automate image interpretation and feature extraction algorithms. Wisconsin studies dwelt on optical diffraction analysis (ODA), image subtraction (IS), and joint-transform correlation (JTC) techniques and indicate usefulness for determining areas of flooding, headward growth of gullies, crack propagation, meander migration and shore erosion, for example. It is shown that a simple and easily obtained byproduct of ODA is the Fourier optical transform, which is obtained in the course of doing JTC and IS work, and transform analysis also can be a useful byproduct of JTC and IS. Final discussions under remote sensing described new U.S. government programs that might be useful for geological applications. New programs include the U.S. Geological Survey's National High Altitude Photography Program (NHAP) and Side-Looking Airborne Radar (SLAR), and NASA's Shuttle Imaging Radar (SIR) Program. It is shown that such data can provide an inexpensive regional analysis that will serve as a basis for the planning and execution of detailed site-specific studies. The Geosat Committee's 1979-1984, $10 million, joint GEOSAT-NASA Test Program was developed to assess, in known geological areas, the value of existing and potential satellite remote sensing methods for oil/gas and mining exploration, and engineering geology and environmental applications. One result of the study was the recognition that a number of techniques used in an interactive manner with each other and with field checking and computer processing techniques were needed to obtain optimum interpretation. The study also resulted in recommendations that shortwave IR TM spectral bands, higher spatial resolution (10 to 20 m), and Synthetic Aperture Radar in present and planned systems, when combined with the Landsat/MSS system, will substantially improve these systems as a whole for more efficient geologic mapping and improved exploration success worldwide.

Papers on the subject of remote data transmission led off with an over view of recent developments. Most major North American hydrologic agencies, such as the U.S. Geological Survey and Environment Canada, have come to rely on satellite communication from data platforms to operationally collect the data in real time to central data processing and dissemination facilities. It was noted also that the U.S. Soil Conservation Service has a network of about 500 sites in remote areas for snow measurements, utilizing a communications technique known as meteorburst. This system relies on ionized trails in the atmosphere left by micrometeors as they plunge into the atmosphere to reflect radio messages between a data transmission station and a data interrogation site. It is shown that some of the same successfully used hydrologic data collection equipment and data transmission systems could be quite useful for other data programs related to geotechnical projects. A second paper shows there are many applications already developed even though it has been only within the last five years that geotechnical monitoring has entered into the age of automatic and remote data telemetry. The author states that monitoring data can now be automatically gathered on site and transmitted to a remote central location easily, efficiently, and economically for any size project. Systems can use such conventional geotechnical instruments as pneumatic and vibrating-wire piezometers, thermisters, and liquid level sensors. Telephone and radio (UHF and VHF) communication systems were compared with satellite transmission, and the advantages and disadvantages of each were explained. In some cases, multiple types of transmission systems are considered applicable. Some case histories showing actual use of geotechnical instrument automation and remote data transmission were presented. A final paper describes the U.S. Corps of Engineers' remote data collection system, which utilizes the Geostationary Environmental Operational Satellite (GOES). Piezometer levels, water temperature, and conductivity transmitted to a central location will provide the necessary information concerning underseepage quantity and quality at Red Rock Dam in Iowa.

Papers selected for publication will be available early 1987 as ASTM Special Technical Publication, *Geotechnical Applications of Remote Sensing and Remote Data Transmission*. More details concerning availability of the volume may be obtained from Ms. Theresa Smoot, Publications and Marketing Division, ASTM, 1916 Race Street, Philadelphia, PA 19103, 215/299-5400.

Ground-Water Contamination Field Methods

Fifty percent of the U.S. drinking water comes from ground water, 75% of the nation's cities obtain all or part of their supplies from ground water, and the rural areas are 95% dependent upon ground water. Therefore, it is imperative that every possible precaution be taken to protect the purity of the ground water.

Because of the increasing interest in prevention of ground-water contamination and the need for nationally recognized methods for investigation of contamination, a Symposium on Field Methods for Ground-Water Contamination Studies and Their Standardization was held 2-7 Feb. 1986 in Cocoa Beach, FL. The symposium was sponsored and organized by ASTM Committee D-18 on Soil and Rock and Committee D-19 on Water. Symposium Chairman was Gene Collins of the National Institute for Petroleum and Energy Research, Bartlesville, OK, and Vice-chairman was Ivan Johnson, A. Ivan Johnson, Inc. Consulting, Arvada, CO.

The purpose of the symposium was to develop information that can be used to prepare guidelines for ground-water contamination studies and also be used to develop field methods that can eventually become ASTM standard methods or recommended practices. Fifty-one papers were presented on methods related to well-drilling; construction, monitoring, and development of monitoring wells; ground-water sampling and sampling in unsaturated soils; soil permeability; non-point source investigations; and a variety of actual case histories.

A session was dedicated to U.S. Federal government efforts to improve field methods for ground-water contaminations studies. The session was sponsored by the Ground-Water Subcommittee of the Interagency Advisory Committee on Water Data. Speakers from Federal agencies, such as the Environmental Protection Agency, Agricultural Research Service, Geological Survey, and Nuclear Regulatory Commission, held panel discussions on the following topics: (1) Standardization of ground-water monitoring techniques—is it desirable? (2) Quality assurance/quality control of ground-water monitoring—can it be accomplished? and (3) Ground-water monitoring research—does it help?

During another special session, representatives from ASTM Committees D-18 on Soil and Rock, D-19 on Water, and D-34 on Waste Disposal discussed the philosophical approach and standards development progress and plans of their respective committees. This session also had discussion about activities of an ASTM Ground Water Coordinating Subcommittee. A third special session presented a panel discussion on quality assurance through education and certification. Opinions and programs were discussed by representatives from the Association of Engineering Geologists, American Institute of Professional Geologists, National Water Well Association, American Institute of Hydrology, and the Interagency Advisory Committee on Water Data.

A field trip to the NASA Kennedy Space Center took place in mid-week to tour the center and to witness a demonstration concerning construction of ground-water monitoring wells on the center and observe logging and interpretation of borehole geophysical logging of a well. The symposium was preceded on 28–30 Jan. with the semi-annual meetings of the 30 standards-writing subcommittees of ASTM Committee D-18 on Soil and Rock. On 31 Jan. an International Symposium on Geotechnical Applications of Remote Sensing and Remote Data Transmission was sponsored by ASTM Committee D-18 and the International Committee on Remote Sensing and Data Transmission of the International Association of Hydrological Sciences.

Symposium papers selected for publication will be available in 1987 as ASTM Special Technical Publication, *Ground-Water Contamination Field Methods*. More details concerning availability of the volume may be obtained from Ms. Theresa Smoot, Publications and Marketing Division, ASTM, 1916 Race Street, Philadelphia, PA 19103, 215/299-5400.

D-18 Selected for Up-Front Editing Pilot Program

ASTM Committee D-18 along with two other ASTM technical committees has been selected to participate in an up-front editing program designed to decrease the number of editorial negatives received during the balloting process. The program is described in the following paragraphs. An evaluation of the programs' effectiveness will be made in approximately 18 months.

Prebinfluence Editorial Pilot Program—Document Processing

1. A new standard or a revision to an existing standard when approved for Subcommittee Letter Ballot should be sent promptly to the Staff Manager and indicate the reviewer for the document. The document will be edited by an ASTM editor and new draft standards will be keystroked into the Word Processing System.
2. The edited and proofread document will be sent for review to the task group or subcommittee chairman or other designated reviewer.
3. The reviewer should indicate approval and/or send any comments or revisions to the document to the editor. The reviewer can call the editor indicating approval to expedite the process. The document will be automatically sent to Subcommittee Letter Ballot three weeks after being sent to the reviewer unless the item is being coordinated with other ballot items.
4. The Subcommittee Ballot will be issued from ASTM Headquarters, which will require a five-week processing period, which includes the required 30-day ballot period.

Note: Technical or editorial changes to a document resulting from the balloting process should be made legibly directly on the latest draft and sent to the staff manager who will have a clean copy of the document prepared. The document will then be processed appropriately within the ballot system.

Subcommittee Spotlight

This Section is provided for information requests, announcement of new activities, new sections, task groups or other items of interest. Items may be submitted to Carl Tockstein, D-18 News Editor, 3200 Walnoaks Rd., Knoxville TN, 37921.

Officer Changes

D18.09 Dynamic Properties of Soils
Ronald Ebelhar, Chairman
D18.95 Information Retrieval and Data Automation
Allen W. Marr, Chairman

New Subcommittee Formed

New Subcommittee D18.19 on Frozen Soil and Rock was formed at the Louisville, KY, meeting of Committee D-18.

The subcommittee scope states that this subcommittee shall be responsible for the development and revision of standards for frozen soil, frozen rock, and ice. This will include definitions, sampling, classification, and laboratory testing and in-situ and field load evaluations.

The Subcommittee Chairman is Prof. C. W. (Bill) Lovell, School of Civil Engineering, Purdue University, West Lafayette, IN 47907, (317) 494-5034.

If you are interested in joining this subcommittee, please contact Prof. Lovell. It is anticipated that the subcommittee activity will attract additional members with expertise in building on frozen soil/rock, to Committee D-18.

Future Meetings

18-21 Jan. 1987

Tampa, FL
Symposium on In Situ Vane Shear Application in a Marine Environment

21-26 June 1987

Cincinnati, OH
Symposium on Rock Classification

24-28 Jan. 1988

Albuquerque, NM
D-18 on Soil and Rock

26-30 June 1988

Baltimore, MD
D-18 on Soil and Rock

ASTM Committee D-35 Test Method Summary

ASTM Subcommittee D35.03 on Hydraulic Properties of Geotextiles and Related Products is developing a new standard test method for measuring the hydraulic transmissivity of geotextiles and various related products. The proposed test method describes the procedure for determining the constant head hydraulic transmissivity, the flow within the manufactured plan of the specimen.

A geosynthetic's capacity for in-plane flow is of importance in many geotechnical and environmental engineering applications, including drainage behind retaining walls, beneath impermeable liners, and as an integral part of leachate collection systems.

Hydraulic transmissivity is defined as the volumetric flow rate of water per unit width of the specimen per unit gradient in the direction parallel to the plane of the specimen. The value of the hydraulic transmissivity is dependent on the hydraulic gradient, the normal compressive stress and the boundary conditions modeled in the lab. The contract surfaces for the test specimen are selected by the user to most closely model conditions in a particular field application. The contact surfaces can range from geomembranes or other rigid surfaces (with no intrusion into the specimen pore or channel spaces) to soil, which may intrude into open spaces in the specimen, thereby reducing the specimen flow capacity.

Procedure

A sketch of the testing device is shown in Fig. 1. The specimen is trimmed to the exact width of the base plate and placed in the device along with the substratum and superstratum selected by the user. The hydraulic gradient and normal compressive stress are selected by the user for specific application. For index testing several gradients ranging from 0.1 to 1.0 are recommended. A minimum of three different normal stresses bracketing anticipated end uses are suggested.

Hydraulic transmissivity is a function of the specimen thickness. For index testing, the flow rate through the specimen is measured after a seating period of 15 min. For performance testing, longer seating periods, as selected by the user, are recommended.

The results are expressed as a plot of hydraulic transmissivity versus either hydraulic gradient or compressive normal stress. When reporting results, the contact surfaces, seating period and other special conditions must accompany the data.

This procedure is currently being balloted at the Main Committee level. A round-robin testing program is underway with eleven laboratories participating. Contact: John Bove, Soil and Material Engineers, Inc., 225 Corporate Court, Fairfield, OH 45014 (513/874-4111); or Robert Morgan, ASTM (215/299-5505) for further information.

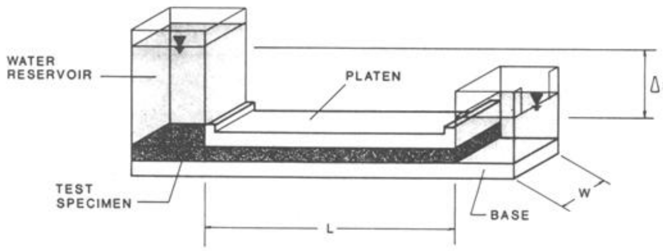

FIG. 1—*Sketch of a constant head hydraulic transmissivity testing device.*

SI Conversion Factors for Geotechnical Engineering

During the past several years, Subcommittee D18.93, through the initiative of Marshall Silver, has developed a table of factors for converting U.S. customary and metric units into SI units. The objective is to assist authors in converting their results into SI units and to promote uniformity in the use of SI units in geotechnical engineering. Additional information on the SI system can be obtained from ASTM Metric Practice Guide (E 380) and "SI Units in Geotechnical Engineering," by R. D. Holtz in the *Geotechnical Testing Journal*, Vol. 3, No. 2, June 1980, pp. 73–79. Comments from the profession are invited as letters either to the editor for publication in the journal or to Subcommittee D18.93 for its consideration.

Ernest T. Selig
Technical Editor

To Convert From	To	Multiply By
	Length	
inches (in.)	millimetres (mm)	25.4
inches (in.)	metres (m)	0.0254
feet (ft)	metres (m)	0.305
miles (miles)	kilometres (km)	1.61
yards (yd)	metres (m)	0.914
	Area	
square inches (in.^{2})	square centimetres (cm^2)	6.45
square feet (ft^2)	square metres (m^2)	0.0929
square yards (yd^2)	square metres (m^2)	0.836
acres (acre)	square metres (m^2)	4047
square miles (miles^2)	square kilometres (km^2)	2.59
	Volume	
cubic inches (in.^{3})	cubic centimetres (cm^3)	16.4
cubic feet (ft^3)	cubic metres (m^3)	0.0283
cubic yards (yd^2)	cubic metres (m^3)	0.765
	Mass	
pounds (lb)	kilograms (kg)	0.454
tons (ton)	kilograms (kg)	907
	Force	
one pound force (lbf)	newtons (N)	4.45
one kilogram force (kgf)	newtons (N)	9.81
	Pressure or Stress	
pounds per square foot (psf)	kilonewtons per square metre (kN/m^2) or kilopascals (kPa)	0.0479
pounds per square inch (psi)	kilonewtons per square metre (kN/m^2) or kilopascals (kPa)	6.89
kilogram force per square centimetre (kgf/cm^2)	kilonewtons per square metre (kN/m^2) or kilopascals (kPa)	98.1
	Liquid Measure	
gallon (gal)	cubic metres (m^3)	0.0038
acre-feet (acre-ft)	cubic metres (m^3)	1233
	Quantity of Flow	
gallons per minute (gal/min)	cubic metres per minute (m^3/min)	0.0038
cubic feet per minute (ft^3/min)	cubic metres per minute (m^3/min)	0.0283
	Mass Density	
pounds per cubic feet (pcf)	megagrams per cubic metre (Mg/m^3)	0.0160
kilonewtons per cubic metre (kN/m^3)	megagrams per cubic metre (Mg/m^3)	0.102

Temperature

$$°F = 1.8 \text{ Temp } °C + 32$$

$$°C = (\text{Temp } °F - 32)/1.8$$

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ASTM Committee D-18 on Soil and Rock

Scope

The promotion of knowledge; stimulation of research; the development of specifications and methods for sampling and testing; and the development of nomenclature, definitions, and practices relating to the properties and behavior of soil, rock, and the fluids contained therein. Excluded are the uses of rock for building stone and for constituent materials in portland cement and bituminous paving and structures coming under the jurisdiction of other committees. Included are the properties and behavior of: (1) soil-like materials such as peats and related organic materials, (2) geotextiles, and (3) fluids occupying the pore spaces, fissures, and other voids in soil and rock insofar as such fluids may influence the properties, behavior, and uses of the soil and rock materials.

Officers

Chairman: W. G. Shockley, 326 Lake Hill Dr., Vicksburg, MS 39180.

First Vice-Chairman: R. E. Gray, GAI Consultants, 570 Beatty Rd., Monroevill, PA 15146.

Vice-Chairman: Robert C. Deen, University of Kentucky, Kentucky Transportation Research Program, Transportation Research Bldg., Lexington, KY 40506.

Vice-Chairman: P. M. Jarrett, Royal Military College, Department of Engineering, Kingston, Ontario, Canada K7L 2W3.

Vice-Chairman: H. J. Pincus, University of Wisconsin—Milwaukee, Department of Geological Sciences, Sabin Hall, Milwaukee, WI 53201.

Vice-Chairman: R. S. Ladd, Woodward-Clyde Consultants, 1425 Broad St., Clifton, NJ 07012.

Secretary: R. J. Stephenson, U.S. Army Corps of Engineers, South Atlantic Division Lab., 611 S. Cobb Dr., Marietta, GA 30060.

Membership Secretary: H. F. Hanson, Los Angles City, Department of Water and Power, P.O. Box 111, (510 E. Second St.), Los Angeles, CA 90051.

Subcommittees and Their Chairmen

TECHNICAL

D18.01 Surface and Subsurface Reconnaissance
C. B. Petterson

D 18.02 Sampling and Related Field Testing for Soil Investigations
R. E. Brown

D18.03 Texture, Plasticity, and Density Characteristics of Soils
R. C. Horz

D18.04 Hydrologic Properties of Soil and Rock
R. S. Ladd

D18.05 Structural Properties of Soils
R. T. Donaghe

D18.06 Physico-Chemical Properties of Soils and Rocks
G. R. Olhoeft

D18.07 Identification and Classification of Soils
C. H. McElroy

D18.08 Special and Construction Control Tests
J. R. Talbot

D18.09 Dynamic Properties of Soils
M. L. Silver

D18.10 Bearing Tests of Soils in Place
G. Y. Baladi

D18.11 Deep Foundations
E. T. Mosley

D18.12 Rock Mechanics
William Austin

D18.13 Marine Geotechnics
R. C. Chaney

D18.14 Geotechnics of Waste Management
D. E. Clark

D18.15 Stabilization by Additives
M. C. Anday

D18.16 Chemical Grouting
R. H. Karol

D18.17 Rock for Erosion Control
C. Merrick

D18.18 Peats and Organic Soils
P. M. Jarrett

D18.20 Impermeable Barriers
A. I. Johnson

ADMINISTRATIVE

D18.91 Editorial
G. N. Durham

D18.92 Papers
V. P. Drnevich

D18.93 Nomenclature for Soil and Rock Mechanics
A. I. Johnson

D18.94 Education and Training
N. O. Schmidt

D18.95 Information Retrieval and Data Automation
Carl D. Tockstein

D18.96 Research Steering and Standards Development
Adrian Pelzner

D18.97 Special Awards
R. G. Packard

D18.98 Hogentogler Award
R. E. Gray

D18.99 Quality Control
J. R. Forbes