TESTING FORUM

Committee D-18 News

ASTM Workshop on Development of Rock Mechanics Standards for Property Testing

An ASTM sponsored workshop on the current status of and needs for development of property standards in rock mechanics was held on 25 June 1984, in conjunction with the 25th Annual Rock Mechanics Symposium at Northwestern University, Evanston, IL. This was an informal session attended by about 50 people.

To insure substantial participation at the workshop, 24 invitations were sent to prospective contributors, both in the United States and abroad. The invitations to contribute indicated that publishable papers were not being sought, but that written communications would be welcome if oral presentations were not feasible. Government, industry, and academe were represented among those invited and those who spoke.

Thirteen people made presentations at the workshop, four communicated in writing, and about another six made comments or asked questions. Thus, almost half of those present were heard.

The remarks that follow do not purport to be a complete world picture of the status of and needs for development of rock mechanics standards, or in fact of all that was presented at the workshop. Rather, we present here some of the highlights and general impressions of what was discussed.

The Commission on Testing Methods of the International Society for Rock Mechanics (ISRM) has prepared and published a collection of testing methods and continues its work in publishing suggested methods. The ISRM methods apply to both laboratory and field work, and are widely used as standards both in the United States and abroad.

The International Standards Organization (ISO) in Geneva has a Geotechnical Subcommittee (TC-182) in Delft which in turn has a subcommittee (SC-1) on Classification and Presentation of Symbols with its secretariat located in Sweden. SC-1 works with ISRM, International Society for Soil Mechanics and Foundation Engineering (ISSMFE), and International Association of Engineering Geology (IAEG).

The American Society for Testing and Materials (ASTM) has published rock mechanics standards through the efforts of Subcommittee D18.12 on Rock Mechanics and other constituent committees such as C-18 on Natural Building Stones. Other units of ASTM concerned with types of property measurements not restricted to rock or soil, for example E-37 on Thermal Measurements has produced standards applicable to a variety of materials including rocks.

The Standards Association of Australia has included within its *CE-9, Methods of Testing Soil for Engineering Purposes*, standards DR 81227-81239 on rock. Included are standards on moisture content, density, porosity, swelling, static durability, the point load test, and uniaxial tests. The Association has no immediate plans to produce additional standards in rock mechanics.

A recent poll of practitioners in Australia revealed a wide range of views on development of standards. Some responded that test techniques used in rock mechanics are not suitable for standards, per se. Others proposed development of additional specific standards, while still others advocated following ISRM "as far as possible."

In the Federal Republic of Germany, the Bundesanstalt für Geowissenschaften und Rohstoffe has published a German glossary on terminology in engineering geology and rock mechanics, *Grundbegriffe der Felsmechanik und der Ingenieurgeologie*, published by Glückauf-Verlag, Essen. Standards have been published for a variety of tests such as point load, uniaxial and triaxial strength, and in-situ shear.

The British Standards Association reports that it is not producing any standards in rock mechanics; however one should not conclude from this that there is no interest or activity by the British in standards development in rock mechanics. For example, at the University of Newcastle-on-Tyne, there is interest in standards for rock machinability.

Soiltest, Inc. reports that ISRM standards are followed in Argentina.

Within U.S. government agencies, activities in standards development vary widely. In the Bureau of Mines, about a third of the 240 active research projects are in or oriented toward rock mechanics; the USBM has been involved in such enterprises as classification of coal-mine roof-rock, the measurement of large deformations in underground test-chambers, acoustical determination of in situ properties, calibration of borehole instruments, and classification of support systems. The U.S. Geological Survey has been working on development of verification of instrumentation in many types of activities. The U.S. Bureau of Reclamation has been assembling a rock-testing handbook, leaning heavily on ASTM; step-by-step procedures are being documented and in-situ testing is included. The U.S. Army Corps of Engineers has also been assembling a rock-testing handbook for field and laboratory work, also using some ASTM standards.

The Tennessee Valley Authority (TVA) is a user of the standards of ASTM and ISRM; personnel are concerned with how the standards are used and to what they are applicable. The Nuclear Regulatory Commission (NRC) is also a user of standards but has contracted with ASTM to develop rock mechanics standards on an accelerated basis in connection with storage and isolation of nuclear wastes. The NCR is also very much concerned with basic questions, such as, how many measurements are needed to determine a property with sufficient precision? The Department of Agriculture is another user of standards, relying on ASTM for test procedures for rock mechanics, soil mechanics, and concrete.

Among the national laboratories, Sandia personnel have been doing developmental work in heated block tests, in situ, involving concurrent measurement of mechanical, thermal, and fluid-flow properties. Los Alamos personnel have been concerned primarily with laboratory testing, using ISRM standards as their starting reference; their tests are principally not of the engineering type. Battelle Pacific Northwest Laboratories are working in support of the national nuclear waste isolation program, and this requires rock mechanics standards to meet quality assurance specifications. Lawrence Berkeley Laboratories require instrumentation that will work reliably over long periods of time, implying the need for appropriate standards of reliability. Lawrence Livermore Laboratories work in

both statics and dynamics of rock behavior, and use ASTM standards where appropriate.

In the private sector, manufacturers of test equipment, such as MTS and Soiltest, develop equipment and the procedures for using the equipment in response to real and anticipated markets for their products. Commercially produced test equipment commonly reflects established practices, such as those promulgated by ASTM.

In the discussion that followed the presentation of the foregoing informal reports, a variety of concerns was expressed. Are we facing the prospect of a proliferation of tests for the same properties? For example, do ASTM and ISRM talk to each other? (They do, through interlocking memberships in working committees.) Is it realistic to require as many as ten tests for each property determination, as required in some standards? (In many cases it is unrealistic because it is not feasible or not possible to get ten presumably identical specimens.)

Some fundamental differences among producers of standards were pointed out. For example, ISRM publishers suggested methods without the type of prepublication, hierarchial screening used by ASTM. ISRM then gets its major feedback after publication. The ASTM prepublication voting process gives individual attention to each negative vote at each of at least three levels of balloting, and also to comments not tied to negative votes. Each method has its advantages. Interestingly, ISRM and ASTM standards on the same subject are usually very similar in terms of procedure, if not in terms of language.

There appears to be consensus among diverse sectors of the rock mechanics community that property standards are needed and that more standards will be needed as rock mechanics is applied to newly developing activities. The types of standards developed vary considerably with the needs of the user and with the application, as is to be expected. Communication among organizations and agencies developing and applying standards should be encouraged. During and following the workshop, several participants expressed the wish that another workshop be held in several years.

Acknowledgments

The cooperation of Professor Charles H. Dowding, Program Chairman of the 25th U.S. Rock Mechanics Symposium, is deeply appreciated. Professor Dowding provided a place on the program for the workshop and excellent facilities in which to conduct discussions.

Each person who spoke at the workshop deserves warm thanks for his contribution.

Dr. John A. Franklin of Franklin Geotechnical, Ltd., Canada, presented a lucid, up-to-date account of ISRM's activities in standards development. This representation on behalf of the international society was extremely helpful, and merits the gratitude of all who attended.

Howard J. Pincus
Chairman of D18.12

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.

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