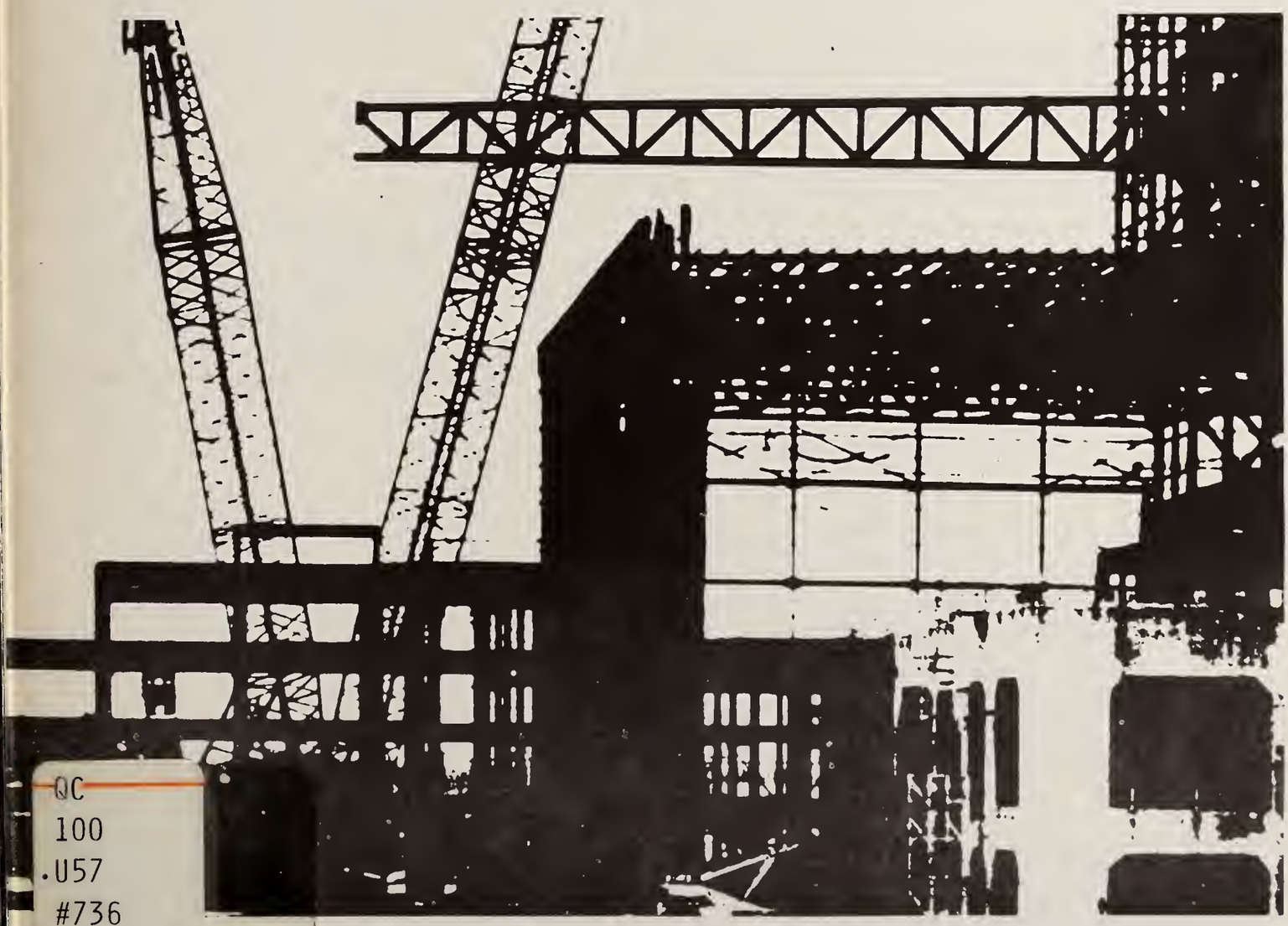
NBS Special Publication 736

Proceedings of the Conference on Accreditation of Construction Materials Testing Laboratories

James H. Pielert and Curtis B. Spring, Editors



The National Bureau of Standards[1] was established by an act of Congress on March 3, 1901. The Bureau's overall goal is to strengthen and advance the nation's science and technology and facilitate their effective application for public benefit. To this end, the Bureau conducts research to assure international competitiveness and leadership of U.S. industry, science and technology. NBS work involves development and transfer of measurements, standards and related science and technology, in support of continually improving U.S. productivity, product quality and reliability, innovation and underlying science and engineering. The Bureau's technical work is performed by the National Measurement Laboratory, the National Engineering Laboratory, the Institute for Computer Sciences and Technology, and the Institute for Materials Science and Engineering.

The National Measurement Laboratory

Provides the national system of physical and chemical measurement; coordinates the system with measurement systems of other nations and furnishes essential services leading to accurate and uniform physical and chemical measurement throughout the Nation's scientific community, industry, and commerce; provides advisory and research services to other Government agencies; conducts physical and chemical research; develops, produces, and distributes Standard Reference Materials; provides calibration services; and manages the National Standard Reference Data System. The Laboratory consists of the following centers:

- Basic Standards[2]
- Radiation Research
- Chemical Physics
- Analytical Chemistry

The National Engineering Laboratory

Provides technology and technical services to the public and private sectors to address national needs and to solve national problems; conducts research in engineering and applied science in support of these efforts; builds and maintains competence in the necessary disciplines required to carry out this research and technical service; develops engineering data and measurement capabilities; provides engineering measurement traceability services; develops test methods and proposes engineering standards and code changes; develops and proposes new engineering practices; and develops and improves mechanisms to transfer results of its research to the ultimate user. The Laboratory consists of the following centers:

- Applied Mathematics
- Electronics and Electrical Engineering[2]
- Manufacturing Engineering
- Building Technology
- Fire Research
- Chemical Engineering[3]

The Institute for Computer Sciences and Technology

Conducts research and provides scientific and technical services to aid Federal agencies in the selection, acquisition, application, and use of computer technology to improve effectiveness and economy in Government operations in accordance with Public Law 89-306 (40 U.S.C. 759), relevant Executive Orders, and other directives; carries out this mission by managing the Federal Information Processing Standards Program, developing Federal ADP standards guidelines, and managing Federal participation in ADP voluntary standardization activities; provides scientific and technological advisory services and assistance to Federal agencies; and provides the technical foundation for computer-related policies of the Federal Government. The Institute consists of the following divisions:

- Information Systems Engineering
- Systems and Software Technology
- Computer Security
- System and Network Architecture
- Advanced Systems

The Institute for Materials Science and Engineering

Conducts research and provides measurements, data, standards, reference materials, quantitative understanding and other technical information fundamental to the processing, structure, properties and performance of materials; addresses the scientific basis for new advanced materials technologies; plans research around cross-cutting scientific themes such as nondestructive evaluation and phase diagram development; oversees Bureau-wide technical programs in nuclear reactor radiation research and nondestructive evaluation; and broadly disseminates generic technical information resulting from its programs. The Institute consists of the following Divisions:

- Ceramics
- Fracture and Deformation[3]
- Polymers
- Metallurgy
- Reactor Radiation

[1]Headquarters and Laboratories at Gaithersburg, MD, unless otherwise noted; mailing address Gaithersburg, MD 20899.
[2]Some divisions within the center are located at Boulder, CO 80303.
[3]Located at Boulder, CO, with some elements at Gaithersburg, MD

NBS Special Publication 736

Proceedings of the Conference on Accreditation of Construction Materials Testing Laboratories

Held at NBS on May 14–15, 1986

Sponsored by:
American Society for Testing and Materials
American Association of State Highway and Transportation Officials
American Concrete Institute
American Council of Independent Laboratories
Florida Concrete and Products Association

Edited by James H. Pielert and Curtis B. Spring

Construction Materials Reference Laboratories
Building Materials Division
National Engineering Laboratory
National Bureau of Standards
Gaithersburg, MD 20899

November 1987

U.S. Department of Commerce
C. William Verity, Secretary

National Bureau of Standards
Ernest Ambler, Director

Library of Congress
Catalog Card Number: 87–619889
National Bureau of Standards
Special Publication 736
Natl. Bur. Stand. (U.S.)
Spec. Publ. 736
86 pages (Nov. 1987)
CODEN: XNBSAV

U.S. Government Printing Office
Washington: 1987

For sale by the Superintendent
of Documents,
U.S. Government Printing Office,
Washington, DC 20402

PREFACE

A two-day Conference hosted by NBS was held in Gaithersburg, Maryland on May 14-15, 1986 to test the hypothesis that "There is a need for a coordinated methodology for accrediting construction materials testing laboratories." Construction materials include primary materials such as: cement, concrete, aggregates, rock and soil, asphalts, metals, wood and masonry. The Conference was structured to consider: (1) the status of existing laboratory evaluation and accreditation programs; (2) current trends in the accreditation process; and (3) the need for and nature of a coordinated accreditation system. The Conference included the presentation of invited papers and four workshop sessions. Conference participants concluded that there is a need for a coordinated national system for the accreditation of construction materials testing laboratories and its development should be initiated. It was recommended that a working group with representation from appropriate organizations should be formed to define the goals, scope, format, and procedures in coordinating laboratory accreditation efforts.

CONFERENCE ORGANIZING COMMITTEE

Walter E. Capper
E. L. Conwell & Company

Emery Farkas
W. R. Grace Company

Richard D. Gaynor
National Sand and Gravel Association/
National Ready Mixed Concrete Association

Richard E. Hay
Federal Highway Administration

Walter E. Kunze
Portland Cement Association

Joseph F. Lamond
U. S. Army Corp of Engineers

James H. Pielert
National Bureau of Standards

Louis U. Spellman
Blue Circle/Atlantic Cement

Garland W. Steele
West Virginia Department of Highways

CONTENTS

1. INTRODUCTION

A Conference on Accreditation of Construction Materials Testing Laboratories was hosted by the National Bureau of Standards (NBS) in Gaithersburg, Maryland on May 14-15, 1986. An Executive Summary of the conference has been prepared.[1]

The Conference was sponsored by the:

American Society for Testing and Materials
American Association of State Highway and Transportation Officials
American Concrete Institute
American Council of Independent Laboratories
Florida Concrete and Products Association.

The Cement and Concrete Reference Laboratory (CCRL) is an NBS Research Associate Program sponsored by ASTM Committees C-1 on Cement and C-9 on Concrete and Concrete Aggregates. CCRL is organizationally located in the NBS Center for Building Technology, which manages its day-to-day operations. Policy oversight is provided to CCRL by a Joint ASTM C1/C9 Subcommittee on the CCRL. This Joint Subcommittee is studying the possibility of accrediting laboratories and in September 1985 made a recommendation to the ASTM Board of Directors that:

1. CCRL programs be extended to include laboratory accreditation within the framework of ASTM, and

2. if ASTM allows the Joint Subcommittee and CCRL to proceed with laboratory accreditation, ASTM should work with NBS to revise the policy established at the formation of CCRL in 1929 which specified that CCRL would not certify laboratories.

While this recommendation was being considered by ASTM, the Joint Subcommittee initiated plans for this National Conference to address the overall question of accreditation of construction materials testing laboratories.

The Conference Organizing Committee established the purpose and organization of the Conference, selected speakers and workshop chairmen, and prepared guidelines for workshop chairmen. NBS hosted the Conference as a service to the construction community and does not necessarily endorse the conclusions of the workshops or the Conference as a whole.

2. PURPOSE AND ORGANIZATION OF CONFERENCE

The Conference was organized to test the hypothesis that:

"There is a need for a coordinated methodology for accrediting construction materials testing laboratories."

---

[1] James H. Pielert, Executive Summary - Conference on Accreditation of Construction Materials Testing Laboratories, May 14-15, 1986, National Bureau of Standards Interim Report 86-3397, June 1986.

Construction materials were defined for the purposes of this conference to include primary materials such as: cement, concrete, aggregates, rock and soil, asphalts, metals, wood and masonry.

The Conference was structured to consider:

1. the status of existing laboratory evaluation and accreditation programs for the primary construction materials;
2. current trends in the accreditation process; and
3. the need for and nature of a coordinated national accreditation system.

Appendix A shows the program for the Conference. The first day included the presentation of invited papers and the convening of four workshop sessions. The presented papers are in Section 3. Each workshop was asked to address the Conference hypothesis. The workshops continued meeting on the morning of the second day to prepare reports with findings and proposed actions for presentation to all Conference participants in the afternoon. The workshop reports are given in Section 4 below. Appendix B lists the names and addresses of Conference registrants and workshop assignments. Appendix C lists the issues provided to the workshop chairmen as possible topics for discussion with the understanding that the workshops could change the list.

The following organizations are referenced in these proceedings:

AALA	American Association for Laboratory Accreditation
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
AIA	American Institute of Architects
AMRL	AASHTO Materials Reference Laboratory
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BOCA	Building Officials and Code Administrators International
CABO	Council of American Building Officials
CCRL	Cement and Concrete Reference Laboratory
DoD	U.S. Department of Defense
ELF/FCPA	Engineering Laboratories Forum/Florida Concrete and Products Association
FHWA	Federal Highway Administration
GSA	U.S. General Services Administration
HUD	U.S. Department of Housing and Urban Development
ICBO	International Conference of Building Officials
ILAC	International Laboratory Accreditation Conference
NBS	National Bureau of Standards
NCSBCS	National Conference of States on Building Codes and Standards
NIBS	National Institute of Building Sciences
NVLAP	National Voluntary Laboratory Accreditation Program
PCI	Prestressed Concrete Institute
SBCC	Southern Building Code Congress International
WACEL	Washington Area Council of Engineering Laboratories

3.0 CONFERENCE PAPERS

Welcome to NBS

Ernest Ambler, Director
National Bureau of Standards

Welcome to the Conference on Accreditation of Construction Materials Testing Laboratories Hosted by the National Bureau of Standards and sponsored by ASTM, the American Association of State Highway and Transportation Officials, the American Concrete Institute, the American Council of Independent Laboratories, and the Florida Concrete and Products Association. The subject of laboratory accreditation is timely because of the national concern for improved quality in construction. This is evidenced by the consideration of the subject by ASTM which will be discussed at this conference and by the great attention to improvements of quality being given by building designers, regulators, constructors and owners. It is recognized that the performance of laboratory testing is an important component in assuring quality construction. This conference is structured to test the assertion that "there is a need for a coordinated methodology for accrediting construction materials testing laboratories." It will include discussion of current construction materials laboratory evaluation and accreditation programs, and current trends and needs related to the accreditation process.

NBS has a long history of providing support to the construction industry. The Center for Building Technology is the National Building Research Laboratory that develops technologies to predict, measure, and test the performance of building materials, components, systems, and practices. It works cooperatively with other organizations, public and private, to improve building practices. The Construction Materials Reference Laboratories, CCRL and AMRL, located in the Center are excellent examples of cooperation between the Federal and private sectors. CCRL and AMRL are Research Associate Programs involved with the evaluation of construction materials testing laboratories. The CCRL was established in 1929 and is sponsored by the American Society for Testing and Materials; AMRL started in 1965 and is sponsored by the American Association of State Highway and Transportation Officials. CCRL and AMRL have two primary functions which lead to an improvement in the quality of testing of materials used in construction; the inspection of materials testing laboratories and the distribution of proficiency test samples. The National Voluntary Laboratory Accreditation Program (NVLAP), which has a laboratory accreditation program for freshly mixed concrete and is considering a broader program for construction materials, is also based here at NBS. These programs will be discussed in two papers to be delivered at this conference.

There are many research areas here at NBS which relate to the construction industry. I do not have time to discuss other activities but I would encourage you to review NBS publication lists at the registration desk for reports which may be of interest. You are also encouraged to visit our laboratories as time permits.

NBS is very pleased to be a part of this conference which has brought together many experts in the field of evaluation and accreditation of construction materials testing laboratories. Please remember we really want to work cooperatively with industry. That is certainly true not only in our technical

work but also in our procedures. If industry does not want a scheme of accreditation, for example, we are not going to try to foist it on them. Thank you, and I wish you a most successful conference and hope you enjoy your visit to the Bureau.

Conference Chairman Remarks

Walter Kunze[1]
Portland Cement Association

I want to thank Dr. Ambler for his kind remarks of welcome and for making these excellent facilities available for this meeting. You have been welcomed several times and I would like to add one more on behalf of the CCRL Subcommittee which is a joint subcommittee of ASTM Committees C1 on Cement and C9 on Concrete and Concrete Aggregates.

A little history of how this conference came about may be helpful. A year ago the Executive Group of the CCRL Subcommittee held its annual meeting here at the National Bureau of Standards. During the course of discussions it became evident that there is a misunderstanding needing clarification regarding the scope of CCRL programs. Many people in the construction industry believe that CCRL is an accrediting organization. CCRL, as Dr. Ambler and Jim Pielert mentioned previously, is an organization intended to inspect laboratories involved with cement, concrete and aggregate testing and to distribute proficiency samples. CCRL is sponsored jointly by ASTM Committees C-1 and C-9 and is based at NBS as a Research Associate Program. Jim Pielert, Manager, is an employee of NBS while all other CCRL staff members are employees of ASTM. This relationship between CCRL, ASTM and NBS probably is not widely understood by people who use CCRL nor by the construction industry in general.

CCRL does not certify or accredit laboratories. However, many laboratories that are inspected by CCRL believe that they are accredited and sometimes present themselves as such, without realizing that they are incorrect in doing so. This illustrates the kind of confusion that exists today with respect to accreditation of laboratories in general. The scope of each existing accreditation program differs and certainly if those of us who work closely with inspection and accreditation programs do not completely understand these differences, how can we expect others to do so? Also, these differences apparently are not clear to specifying agencies. If we are to be successful in raising the quality standards of laboratories, we must encourage construction specifications to recognize the benefit of specifying use of laboratories which have been accredited. Such an accreditation system must be one on which we all agree.

A discussion during the CCRL Subcommittee meeting one year ago suggested that it might be appropriate for CCRL to extend its programs to include accreditation of testing laboratories. As a result, we presented a recommendation along these lines to the ASTM Board but found that a Panel on Accreditation headed by Mr. Wayne Ellis, a former president of ASTM who is with us today, was already deeply involved in a study of accreditation. Therefore it appeared that as a next step it might be appropriate to call a general conference of all agencies interested in accreditation to provide a forum for in-depth discussion of all viewpoints. Our presence here today is an outgrowth of that thinking.

---

[1] See Appendix B for addresses of speakers.

The purpose of today's Conference is to provide everyone with as clear a picture as possible of the current status of the accreditation of construction materials testing laboratories. Certainly, if we are to participate in any kind of a decision making process, our first need is to understand where we are today. This is the purpose of this Conference. The scope of the Conference is intended to be limited to primary construction materials such as cement, concrete, aggregates, rock, soil, asphalts, metals, wood, and masonry. In order to assure broad participation in this Conference we sought and secured sponsorship of other organizations. These groups have already been mentioned. Let me quickly repeat that this Conference is being sponsored by ASTM Committees C-1 and C-9, the American Association of State Highway and Transportation Officials, the American Concrete Institute, the American Council of Independent Laboratories, and the Florida Concrete and Products Association. We thank these organizations for their participation, support and counsel.

As Dr. Ambler mentioned, the purpose of this Conference is to lay on the table, if you will, the statement, "there is a need for a coordinated methodology for accrediting construction materials testing laboratories," to discuss it and to hear all viewpoints. The Conference has been planned to permit a number of speakers to address different points of view. There may be some viewpoint that is not included, but this certainly is not intentional. It was mentioned that this evening we will be going into smaller workshop sessions where everyone will have an opportunity to air his views. These workshops will continue through tomorrow morning with workshop chairmen reporting back to all participants tomorrow afternoon. This procedure has been found in other conferences to be a good method for involving everybody. Each of you is here because you have ideas and because you have an interest in this subject, and we want to hear your viewpoint. And I repeat again what Jim Pielert said, feel free to ask questions of all speakers. They may not know all the answers but your questions will stimulate thinking among others and there may be someone in the audience who has an answer to a question that the speakers do not have.

During this Conference we want to achieve a broad examination of current laboratory evaluation and accreditation systems including their strengths and weaknesses. These are the foundation stones with which we build. If, in response to the hypothesis being examined, a need for a coordinated accreditation process is determined, then we want to develop recommendations for proceeding with its development. And finally, we want to have your recommendations as to how the acceptance and use of an evaluation and accrediting system might be encouraged. We accomplish little if an acceptable accreditation system is not used. This is the final test for success.

The laboratory is but one link in the chain that makes up the quality system for construction. But each link in that chain is equally important in terms of the quality of the end result. The laboratory and the role it fulfills is extremely important. By upgrading the quality of laboratory work, we want this two-day conference to make a significant contribution toward upgrading the overall product of the construction industry.

ASTM and Laboratory Accreditation

Peter Brown
American Society for Testing and Materials

The subject of today's Conference, "Accreditation of Construction Materials Testing Laboratories" is of direct interest to both ASTM management and to the many volunteers, many like yourselves, who participate on ASTM technical committees. In fact, out of the 140 ASTM committees, approximately 40 of them are heavily involved with test methods used daily in construction related testing laboratories. These methods, and related specifications, span the entire spectrum from acoustical materials, adhesives, aggregates, aluminum, bituminous, brick, cement, clay, concrete, copper, gypsum, iron, masonry, and natural building stones, to nickel, plastics, reference radiographs, refractories, roofing, rubber, steel, thermal insulation, ultrasonics and wood. One of the newest ASTM publications in the construction field is a software package for economic evaluation of buildings. In total, over 700 standards are listed and referenced in the twenty second edition of the ASTM Standards Building Codes.

Before I deal with the subject of ASTM and laboratory accreditation, let us review the ASTM standards development process for those of you who are not familiar with it. As many of you here know, ASTM is basically a management system for the development of voluntary consensus standards and the promotion of knowledge. We are one of the largest organizations in the world in this area and we have to date published over 7500 standards. There are basically six types of ASTM standards: specifications, test methods, guides, practices, classifications, and definition standards. There is an axiom in ASTM, that in a properly constituted and managed committee, what needs to happen will happen. It is up to the constituencies in the committees, not the ASTM staff, not the ASTM Board of Directors, to develop standards. Usually these standards are driven by the marketplace. As stated in the forward to the two volume compilation of construction standards, "The standards included in this compilation represent the combined efforts, experience, knowledge, and abilities of a great number of technical experts serving on various ASTM technical committees." Overall, close to 30,000 people around the world belong to ASTM. Engineers, designers, business people, industrialists, researchers, administrators, and consumers from both the private and the government sectors have one thing in common in joining ASTM, they find that membership in ASTM serves, most importantly, their professional growth, and secondly, it provides a valuable benefit to them in getting the job done.

Now lets take a look at the subject of ASTM and laboratory accreditation. In doing so this morning I will address four major components. First is the involvement of ASTM technical committees in the development of criteria for accreditation and the resulting standards. Second is the role of accreditation criteria as it relates to test methods, proficiency evaluation, and to training and education. Third is a brief review of the ASTM Ad Hoc Study Group and Panel on Laboratory Accreditation recommendations and findings. And finally, if time permits, an update on the ASTM staff implementation study of the Panel's recommendations.

When one first hears of a laboratory accreditation system, the first questions

that usually come into mind are, what are the criteria for accrediting the laboratory, and second, who developed these criteria and how were they developed? In ASTM, any of the 140 technical committees can develop a standard practice which addresses criteria for the evaluation of laboratories within the scope of that committee. That's an important concept, it has to be within the scope of that committee. Over the last decade at least 20 of our committees have developed such practices on water, chemical analysis, soils, acoustics, bituminous materials, coal, metalography, cement and concrete, to mention a few. These standards contain criteria for accreditation of laboratories in these areas. Just recently the Executive Committee of our Committee A-1 on Steel reiterated their commitment to develop a standard practice for the accreditation of laboratories engaged in the analysis of ferrous metals. We can see that one of ASTM's major roles in the area of laboratory accreditation is to develop specific standard practices which can be used by any accrediting organization or agency.

I would like now to focus on a particular standard and relate it to test methods and proficiency evaluation. The standard is E548 which is a Standard Practice for the Preparation of Criteria for the Use in the Evaluation of Testing Laboratories and Inspection Bodies. That is a lot of words, but it is basically generic guidelines that provide a basis for the more specific standards described above. This standard was developed by Committee E-36. These guidelines include the area of test methods, proficiency evaluation, standard reference materials, and the training of people who actually conduct the tests. Let's take a look at the first one, test methods. Test methodology is one of the key criteria in any laboratory accreditation program. The methods that are used by a laboratory will have a tremendous impact on the other criteria used in accreditation. The development of test methods is a major objective in the many construction related technical committees in ASTM. In fact, out of the 7500 standards that ASTM publishes each year, 4700 are test methods. Many laboratories have incorporated these methods in their everyday practice. What are some of the advantages of using the ASTM or other national consensus test methods? First of all they are developed by all sectors having an interest in the method. Second, they represent a uniform approach to testing and they provide uniformity in the methodology. Third, they contain a mandatory section on precision and bias. Fourth, they are readily revised, in other words kept up-to-date, and finally, the format of an ASTM test method is orderly and precise.

Lets take a look at the second area, proficiency evaluation and standard reference materials. The oldest proficiency test program in ASTM is the Cement and Concrete Reference Laboratory Program which is going to be covered later in the program. Another ASTM sponsored program for proficiency evaluation is the Engine Oil Test Monitoring Center. Laboratory tests have been used to determine the properties and performance of engine oils for more than 40 years. In 1957 General Motors, Ford and Chrysler developed the laboratory engine sequence test as a yardstick of engine oil quality. These tests eventually came into our own ASTM Committee D-2 on Petroleum and in 1973 the ASTM Reference Oil Test Monitoring Center was established with the Carnegie Mellon Institute as the housing facility and administrator.

Presently there are three ASTM-NBS Research Associate Programs for the development of standard reference materials (SRM). They cover the areas of metals, glass, and particulate metrology. Up until 1974 the NBS SRM programs were perceived as being mostly in the health and environmental areas. At that

time the metals industry along with ASTM sponsored a symposium and concluded that metals were not being given the necessary priority. In response, ASTM staff and three leading ASTM metals committees formed a Research Associate Program at NBS. They began by raising over $200,000 from industry to fund the program. They set up a coordinating committee which set priorities for the SRMs and finally they hired one research associate and signed a memorandum of agreement between ASTM and NBS to finalize the program. Two other programs that have come along since then on glass and particulates. All three are quite successful.

The third aspect of E-548 that ASTM is involved in is the area of training of new and experienced laboratory staff. The need to provide the technical community with education programs on the use of ASTM test methods and the technology associated with them came to the attention of the ASTM Board of Directors about 3 1/2 years ago. They approved the concept of a standard technology training program and at present we have about a half dozen of these programs actively moving forward. They include programs on classification of soils, instrumental analysis, laboratory computers and plastics.

Lets now examine ASTM studies and recommendations over the last two years of laboratory accreditation. At the first meeting of the ASTM ad hoc study group on laboratory accreditation in January of 1984, Mr. William Cavanaugh, then President, stated, "Although ASTM has had a very successful experience with the CCRL program, it has always taken the firm position that ASTM's primary mission is the development of voluntary consensus standards. However, over the last few years, numerous individuals have commented that it may be past time to restudy the question of ASTM and laboratory accreditation." "Today's meeting", he went on to say, "was called to explore the role of ASTM, if any, in the field of laboratory accreditation with the realization that ASTM's primary mission is standards." The ad hoc study group, after a wide range of discussions, recommended the following to the ASTM Board of Directors:

1. That ASTM become more active in the laboratory accreditation field to include the ASTM Board reviewing this area and ASTM in general showing more interest in active involvement.

2. That a number of models be developed of what an accreditation system under ASTM would look like. These models would address everything from the existing infrastructure within ASTM through the concept of a large umbrella organization, keeping in mind the current ASTM committee structure. The concept of a private/government cooperative effort would also be addressed by these models.

And finally, the study group recommended that there also needs to be a careful examination of the advantages and disadvantages of ASTM getting more involved in accreditation.

As a result of these recommendations, the ASTM Board of Directors created a Panel on Laboratory Accreditation in September, 1984 to look at the role of the voluntary standard system and ASTM in laboratory accreditation. The Panel consisted of three past chairmen of the board of ASTM; Wayne Ellis, the panel chairman, Rudy Jones and Bryant Mather. As you can see, all three of these individuals were very experienced in the construction area. The panel immediately identified the need for certain information and developed a

questionnaire that was sent to all ASTM members involved in laboratory accreditation and others involved in accreditation systems throughout the country. Now lets take a look at some of these questions. What laboratory accreditation systems exist now and would ASTM complement these programs or just add another program? Why is ASTM expected to be more effective than AALA, NVLAP, or any other existing programs? Are there other organizations that might like to do what is being proposed by ASTM? Are they likely to do it better, be better equipped, be more successful? What turf problems are likely to be troublesome? How can they be dealt with? What relations as an accreditor of laboratories would ASTM have with the National Bureau of Standards? What is required from an organizational standpoint to enter this field? Should ASTM be an accreditor or an accreditor of accreditors? Finally, what have we learned from the CCRL program which can be transferred into a successful ASTM laboratory accreditation program? As a result of responses to this questionnaire, to one on one interviews with numerous people around the country, and to a thorough review of international and national activities, the panel recommended the following to the ASTM Board of Directors in September of 1985; (1) ASTM, the corporation, should not establish another overall laboratory accreditation system; and (2) the ASTM Board should establish a system based upon an individual technical committee needs and competence to direct accreditation activities in a field specific to its scope. Such an operation would have to be designed to be financially self supporting and would include a reference laboratory. Lets take a look at the rationale for these recommendations. First of all, many of the responses to the Panel's questionnaire expressed concern over any move by ASTM to establish another layer of accreditation. Others questioned the effectiveness of ongoing accreditation programs, but wanted ASTM to reduce the proliferation of accreditation programs and not to add another accreditation layer or another accreditation authority. Some respondents felt there was no need for a laboratory accreditation other than that which the government mandates. Finally, a few respondents wanted greater ASTM involvement, but only through the establishment of an authority outside the current ASTM system. The Panel's recommendations reflect those concerns. Furthermore, a system recommended by the Panel could provide to existing accreditation organizations a proficiency verification service to augment or supplement present costly audit and inspection programs.

Finally, I'd like to touch on the recent staff study in terms of implementing some of these recommendations. The Board requested that staff study the legal, financial, and administrative aspects of ASTM moving in this direction. From a legal point of view ASTM counsel offered some preliminary comments and concerns. There is always a potential impact on ASTM's tax free status, specifically at the local and state level. In addition to the tax issue, ASTM needs to be sensitive to an increased liability exposure as a result of being an accrediting body. Final legal opinion is being reserved until further policy directions are established by the ASTM Board of Directors. Staff's financial evaluation up to now has come up to two distinct conclusions. One is that organizations currently involved in accrediting laboratories are, generally speaking, not currently generating sufficient income to meet their needs. Here it is important to separate the concepts of accreditation and certification. Certification is a very lucrative field. Accreditation doesn't seem to be as much. Secondly, well defined standard reference materials calibration systems and laboratory proficiency programs, such as CCRL's, driven by the needs of the technical committee are marketable services and have proven to be successful in the marketplace. Therefore, all

ASTM programs should strive to meet some marketplace needs in order to be financially self sustaining. That is important, I don't think any association today should necessarily take on a program if it is not projected to be at least self sustaining financially.

I would like to conclude by saying that at this time it appears that ASTM is well positioned to provide technical committees the opportunity to play a role in laboratory accreditation. As demonstrated by past efforts this interface should be contributory to an overall system and should not be directly involved in acts of accreditation. There should be a link-up between the technical committee and outside accreditation authority. Many outstanding opportunities exist for ASTM in the expansion of laboratory accreditation activities and in the creation of a data base in this area. The staff study will continue between now and the September 1986 Board meeting for the establishment of specific guidelines for the committees as a major focus of our efforts. In addition, ASTM staff will further explore the possibilities that exist in utilizing the standards technology training programs to promote criteria for training of assessors and other accreditation related personnel.

Of additional interest in this area is early discussions at the ASTM Board of Directors level of an ASTM Standards Research Institute. This institute could incorporate, if it ever comes into being, many of the programs I have mentioned above. It could provide an administrative, financial, and management system for methods validation, proficiency evaluation, and assessor and other training needs. So in summary I would like to say ASTM is committed to many of the components of the laboratory accreditation system and is actively exploring new possibilities for technical committee interaction with outside accreditation bodies.

AASHTO Staff Views

David J. Hensing
American Association of State Highway and Transportation Officials

The American Association of State Highway and Transportation Officials is the national association of the state departments of highways and transportation. Its members include such departments from all 50 states, the District of Columbia and Puerto Rico.

In 1973, AASHTO added the "T" to its name and became multi-modal in character. Its official areas of interest now extend to public transportation, aviation, rail operations and waterways as well as highways. From its inception in 1914 until 1973, however, its exclusive interest was highways. Since that date, highways continue to be a principal area of interest in reflection of the heavy responsibility at the state level for that transportation mode.

One of the original reasons for AASHTO's inception more than 70 years ago was the desire of the then newly forming state highway departments to compare experiences and to learn how others were solving problems. That desire and need continues unabated to the present day. Its modern manifestation in AASHTO is our list of publications. It includes some 80 technical titles containing standards, guides, tests and specifications on all aspects of highway planning, design, construction and operation. AASHTO technical committees produce and update these documents as technologies develop and mature in meetings held around the country each year. As you know, many of these documents are incorporated in the Code of Federal Regulations by reference and thereby guide the development of the several federal aid highway systems. Also, many of them are in widespread use outside the United States. Perhaps, the best known example among this audience is the two-volume set of AASHTO Material Tests and Specifications produced approximately every four years with annual updates in the intervening years.

Another longstanding AASHTO activity is the development of national transportation policy positions from the perspective of the states collectively. AASHTO works hard to establish sound policies based on the extensive experience of its members in transportation affairs. In turn, the Association is frequently invited to provide its policy views to various Congressional committees and subcommittees as they consider national legislation affecting our transportation systems. We also make such views known to the agencies of the U.S. Department of Transportation and others in the Executive Branch whose administrative or regulatory activities impact on transportation.

A third area in which AASHTO is now heavily involved is a number of activities grouped under the general rubric of Technical Services Programs. These are voluntary, cooperative efforts -- generally technical in nature -- in which groups of our member departments find it mutually advangeous to work together within the AASHTO structure to accomplish a common purpose or end. The oldest of these technical service programs now underway is the AASHTO Materials Reference Laboratory, or AMRL, which is operated here at the National Bureau of Standards. This is, as you know, a voluntary quality control program, mainly involving the materials laboratories of our member departments, and aimed at assuring participating laboratories of their ability to properly and

accurately test soils, aggregates and asphaltic materials. Through a cooperative arrangement with the parallel, ASTM-sponsored Cement and Concrete Reference Laboratory, or CCRL, similar services are afforded with respect to those and related materials as well.

The AMRL activities are in two basic programs: a reference sample program, and a physical inspection tour. AMRL has been in existence since 1965. Its success, I think, is attested to by the fact that all 52 of our member departments participate in the AMRL programs and routinely contribute resources to it annually. Beyond this, a number of laboratories from both public and private non-AASHTO organizations have obtained some or all of the services offered by AMRL on a fee basis. Recently, that outside activity has experienced something of a growth spurt, to the point where we have approved a modest staff increase to accommodate the increased work load. Participating laboratories receive regular inspection reports and reference sample reports pertaining to their specific laboratory in which the results are set forth and any observed variances or deficiencies noted.

The AMRL program is by any measure an unqualified success. We are gathered together today and tomorrow to examine the question of laboratory certification or accreditation and, from our perspective at least, how this might possibly fit into, or otherwise impact, our present inspection and reference sample program. We applaud the decision to hold this conference to explore these matters. While it seems that certifying a laboratory participating in our program might be a simple matter, further reflection results in some questions to which we, at least, do not have ready answers. For instance what, exactly, would a certification program be certifying? That certain procedures and equipment were being correctly applied on a given day? That the personnel had adequate training and experience? What about noted deficiencies? What kind of follow-up would be required? How frequently must inspections be made to continue a certification? What procedures must be followed to decertify a laboratory whose performance has fallen to unacceptably low levels?

Beyond such practical or technical questions, we are interested in exploring potential legal questions as well. One of these, of course, is the question of liability. To what potential liability risks would AASHTO be exposed by its conduct of, or participation in, a certification program? What similar risks would our member departments bear, either collectively or individually, either through AASHTO or apart from it? Secondly, we feel the need to explore questions relating to anti-trust or restraint of trade statutes in recognition of the fact that voluntary standards setting and certifying organizations need to establish procedures and safeguards to assure comportment with such statutes. Our general counsel, Mr. Jim Anderson, is in the audience and will be speaking to you this afternoon on these very questions.

We know that certification programs have long existed and that these and many other questions have been successfully dealt with. We are here to learn and listen over the next two days to the views of your speakers and you on such questions and issues in the context of the highway building materials with which we are concerned.

In closing, I emphasize again that, in AASHTO's view, our AMRL laboratory is functioning well, and is achieving the goals we have set for it. At the same time, we are aware that there is interest in certification programs, and feel

it is our responsibility to listen to those proposals and take part in related discussions. If it becomes clear that AASHTO should consider changes in our AMRL Laboratory and its procedures to accommodate a certification program, or that AASHTO should become involved in some other manner with certification, then I am certain that our policy committee will take up the issue.

In order for change to occur within AASHTO on what we believe is a major area of interest, it would be necessary to obtain the support of at least two-thirds of our member departments. Before considering taking action, we would want to answer four overriding questions:

1. Why is a change desirable?
2. What specific benefits would flow to our member departments from changing to a certification program and, conversely, what benefits, if any, would arise from not changing?
3. What potential liabilities might our member departments and the Association face because of changing to a certification program?
4. What would be the cost impact on our member departments of a certification program?

To these four basic questions, of course, must be added the several other questions I posed earlier, and probably many more. We hope this meeting will provide responses to these questions, and that at the end of these two days everyone here will more clearly understand the issues so that we can jointly chart out a course of action.

State of the Art of Laboratory Accreditation Procedures in the National and International Levels

John Locke
American Association of Laboratory Accreditation

These discussions on national and international standards activities related to laboratory accreditation are intended to be very broad. All fields of testing, not just construction materials, are discussed to put activities in construction materials in perspective for further deliberations on the specific aspects of accreditation.

Laboratory Accreditation in the United States

First a very few words about the current status of laboratory accreditation in the United States. Charles Hyer of the Marley Organization, who is in the audience today, is trying to keep up with the various laboratory accreditation systems in operation in the United States today. He has a tracking system he calls the Principle Aspects of U.S. Laboratory Accreditation Systems (PAUSLAS). He tries to keep up to date on the newly developed systems and the changes in the systems, and offers the updates as a service which keeps people abreast of what is going on in this country. I think that it is a very useful method for understanding laboratory accreditation and how it is evolving.

One impression that you receive from following these updates is that there is a considerable and growing interest in laboratory accreditation system development across the board. New formal systems are being developed here, there and almost everywhere; laboratory accreditation is not something that people are out trying to market, it is being requested in the marketplace. Many different types of organizations are trying to fulfill this need to the satisfaction of a wide variety of users who are expressing particular interests and needs. I have to agree with Walter Kunze that there is not a lot of money in the accreditation business, so it is not a matter of people out there trying to develop laboratory accreditation systems because of some pot of gold. They are out there because users want them.

There is very little cooperation among the various laboratory accreditation systems which creates a problem for the testing laboratories. Testing laboratories which have a broad range of capability may have to participate in several systems which may be expensive. Again, these systems are evolving because of user demand.

Laboratory Accreditation Technology in the United States

I would like to now focus on the technology of accreditation which is evolving beginning with the state-of-the-art in the United States. Peter Brown of ASTM referenced Committee E36 and the fact that it has several standards related to laboratory accreditation. There is E329 which will be described in a talk directly after mine. There is Standard E548 which provides guidelines for committees of ASTM or anyone else to use in establishing criteria for laboratory accreditation. There are a number of us in the accreditation community who have been saying that this document needs to be a stronger document. We need to have a general criteria which is going to be used

consistently across the fields of testing. Subcommittee E36.10 met in Philadelphia yesterday and agreed to look at international standards such as ISO Guide 25 and 38 in an attempt to define general criteria that could be adopted verbatum by various laboratory accreditation systems. We also talked about the need for differentiating between a general criteria and a specific criteria, where the specific criteria deals with the unique requirement in particular fields of testing, such as areas and classes of testing, and even test methods. ASTM E994 is a new standard which describes what should be the ingredients of a good laboratory accreditation system.

The other ASTM committees that Peter Brown referenced, some twenty or more, are addressing the issue of specific criteria for a particular measurement technology. What should be in place in the laboratory in order to qualify the laboratory as a competent laboratory? By the way, the definition of laboratory accreditation is the formal recognition of the competence of a testing laboratory to do certain tests or types of tests. That is an international definition generally accepted throughout the world.

Committee E36 has several other projects currently underway. Committee E36 met on Monday and Tuesday of this week and I will try to summarize the kinds of issues dealt with as I go along. One issue is in the field of testing. How can we describe the areas of testing in some sort of consistent way which might provide a relationship between laboratory accreditation systems and different testing areas? This is of particular interest in establishing laboratory accreditation systems directories and defining the scope of a laboratory's accreditation. There was good progress made in this area at the E36 meeting on Monday. There is some more work to be done, but we will have a document that's worthy of E36 committee ballot before the next meeting.

There is a task force on proficiency testing looking at criteria for conducting such testing. What are the basic ingredients of proficiency testing as used in laboratory accreditation systems? A preliminary document has been prepared for review and will be revised based on task force comments. The document is based on some material that comes out of ISO, but it goes much farther.

There is Subcommittee E36.30 on nomenclature. We have been struggling with nomenclature since the committee was established and have not had very much success in coming up with a document. But there are many definitions, international as well as national, which are beginning to be recognized as the most useful and appropriate definitions. With this work we are moving towards development of a document which will provide some help in the terminology area.

Laboratory Accreditation Internationally

I would now like to talk about what is taking place internationally in terms of laboratory accreditation systems operations. A signficant development from my point of view is the laboratory accreditation system operated by the British over the last few years. They have had a calibration service, the British Calibration Service (BCS), in existence since 1966. They began a laboratory accreditation system, National Testing Laboratory Accreditation Scheme (NATLAS), about four years ago. Just recently they integrated these two systems under one service called the National Measurement Accreditation Service (NAMAS). The NATLAS was started with a consolidation of five

different systems in the U.K.

This integration of systems has required the expenditure of considerable time and money over the past year in upgrading their documentation. I believe their efforts have been very effective. In fact, almost all national and international systems have invested considerable time in the past year improving the documentation, including their general and specific criteria, and procedures for accrediting laboratories. Many countries now are focusing on improvements and consolidation of existing systems and a decrease in the development of new systems.

Internationally there seems to be a gathering together of the accreditation process under fewer and fewer banners. There are new national laboratory accreditation systems developing in other countries including Italy, Norway, the Netherlands, Hong Kong, Spain, and Ireland. Other countries such as Bangladesh and India are exploring new concepts for accrediting testing facilities.

Laboratory Accreditation Technology Internationally

The technology of accreditation on the international scene seems to be leading the work done in the United States and it is a source of information, standards and guidance. The driving force behind this work is the International Laboratory Accreditation Conference (ILAC). This is an ad hoc assembly of laboratory accreditation practitioners from around the world which meets every one to two years. ILAC has a number of task forces which address the different aspects of technology of laboratory accreditation and try to develop related documents. ILAC is not a formal international organization and does not produce documents that are classified as international standards. It does produce documents that are suitable as base reference in the evolution of a standard by other organizations -- prestandard documents if you will. The funding for each ILAC meeting is met by the attendees with the host country supplying some resources such as meeting facilities. The U. S. is represented by Stanley Warshaw from the National Bureau of Standards and he publishes a meeting notice in the Federal Register prior to the meeting and anyone who is interested and willing to pay his way, including the modest fee at the conference, is invited to come. Several ILAC Task Groups will be meeting in Geneva later this week. Task Force C has developed most of the working papers. It started out with a description of the objectives for laboratory accreditation in a 1978 document. The Task Force addressed the common question of why an accreditation system is needed and developed criteria for the accreditation of laboratories. These criteria were taken by the International Standards Organization (ISO) CERTICO committee and ISO Guide 25 "General Requirements for the Technical Competence of Testing Laboratories" evolved. The ILAC work was a precursor to a criteria for accrediting laboratories.

Documents developed by ILAC are generally supported by the participating organizations because of the way ILAC operates. After a task force develops a document, it presents the document to the ILAC Plenary Conference where the document is approved if agreement is reached. If someone objects at the Plenary Conference and the differences cannot be resolved, the document is withdrawn and sent back to the Task Force for more development. When a document comes from ILAC as a publication of the conference it has to be basically agreed upon by everybody that attends. Voting in ILAC is by nation.

Dr. Warshaw consults with other U.S. members of the delegation and casts one vote for the United States.

There is another ILAC task force (Task Force D) on calibration since there was concern on how to incorporate the requirement for calibration in a laboratory accreditation system operation. A document was developed which probably does not serve that purpose very well, but it was found acceptable as kind of an initial document in the area. It was published by the International Organization for Legal Metrology (OIML). This is another case where the work of ILAC is reviewed by some other organization, modified somewhat, and then published as their document. A proficiency testing document developed by ILAC Task Force C became the basis of ISO Guide 43 on Proficiency Testing. Another document on administrative procedures and forms was developed, and although it has not been accepted as an international standard by some other organization to date, it has been included in the "Collected Reports 1979-1983" of the committee which were prepared and distributed by ISO. This collection includes reports on specific technological areas which represent a kind of a history of some of the work of ILAC Task Force C over the last 6 or 7 years.

ILAC has done a considerable amount of work on terminology. This eventually lead to the development of 16 definitions. ISO in its Guide 2 presents a very extensive set of definitions relating to product certification and laboratory accreditation and includes the terms that were presented by ILAC.

The U. K. has been especially interested in the selection and training of assessors which is a difficult task because the capabilities of individual assessors must be matched with the needs and testing capabilities of laboratories and the procedures of the accreditation system. NAMAS developed a very successful training course and presented it through a university. The Australians have developed a whole manual on assessors. It is fair to say that the work of ILAC has led to some consistency in this area.

In other areas, ILAC has prepared an international directory of laboratory accreditation systems and a document on the content of a laboratory's quality control manual. There was considerable discussion and disagreement on the latter document. Representatives from one country wanted to describe the specific form and substance of such a manual. Representatives of another country believed that the manual should be written by the laboratory in whatever sequence it finds most useful in its own quality control procedures. In the end an alphabetical listing of all the things that should be in the manual was presented and then an appendix was provided which described one way to present the form and substance.

Bilateral and multilateral agreements are being addressed in Task Force F of ILAC. This covers the political relationship among laboratory accreditation systems of different countries and how testing capabilities from one country should be recognized by a second. It focuses more on the political process than on the technical process. Much of the work done by ILAC Task Force C was to establish a common technical process so that we all start doing things the same way. But Task Force C does not get involved in the political process which is concerned with liability laws, restraint of trade, etc.

Task Force G is now developing documents on accreditation systems and bodies. What is a good laboratory accreditation system? What is a good laboratory accreditation body? It is a pre-standard standard being developed by the

French with considerable input from people in the United States. It is in the final phases of development and appears to be a very good document. I would like to certainly present that information to Committee E36 to see if there is some interest in it. It was built, at least in part, on the E36 Standard E994.

There are additional issues related to laboratory accreditation being worked on by ILAC. These are:

- Complaints and disputes - How does a laboratory handle complaints and disputes and what should be the basic criteria?

- Surveillance of accredited laboratories (reassessment) - What kind of standard procedure should be used?

- Accreditation for site testing - If a permanent laboratory is recognized, what is the status of its temporary laboratories in the field and what about mobile laboratories? An excellent document has been developed which is about a month old which deals with this issue.

- Quality control charts and their use. - Can quality control charts be required which would eliminate or minimize some of the reliance on proficiency testing which is very expensive?

- Directories - We tried for two years within ILAC to come to some agreement on how we are going to treat directories without much success so far.

- Traceability and Measurements - If a laboratory makes a measurement should it link back to the national standards and if so, how? What is involved in that process?

ILAC and E36 provide considerable background in the technology of laboratory accreditation which can be used as we strive for coordination among accreditation systems in the United States.

The Status of ASTM E329 and Other Related Standards

Spencer Thew
Atlantic Testing Labs, Ltd.

I would like to discuss the purpose of ASTM Standard E329 and how it is used by the construction community. It's very important that we have a document like E329 that can be used in the marketplace by the laboratories providing construction materials testing and inspection services, by people retaining the laboratories, and by people evaluating the laboratories. There are many applications of this particular standard. I will be discussing the history of E329, reviewing its scope, and summarizing current activities and the use of the standard by the construction community. ASTM Committee E36 (Subcommittee E36.93) met in Philadelphia these past two days and spent considerable time on ASTM E329.

E329 was developed in 1967 as an ASTM Recommended Standard Practice. The title at that time was "Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction." The "as used in construction" in the title is significant and it should be remembered. The document continued to be reapproved without change through 1977. About 1980-81 there were feelings within ASTM E36 that there should be a review of the E329 document. At that time there was a lot of work being done on E548, "Standard Practice in Preparation of Criteria for Use in the Evaluation of Testing Laboratories in Inspection Bodies, which was discussed earlier today by John Locke. Committee members wanted to bring E329 into conformance with E548 so there would be better meshing of the documents. There were also some other relevant things happening in other ASTM committees at the same time. Committee D4, under the leadership of Conway Burton, had developed Standard D3666 prior to 1981 which is entitled "Standard Practice for Evaluation of Inspection and Testing Agencies for Bituminous Paving Materials." There was also a standard on the books for soil and rock (D3740), developed by Committee D18. The sections in E329 on steel and concrete are somewhat out of date. There were some people within the industry that wanted to do something about these two construction materials, as well as masonry. And what I am really addressing now, as you can see, are the major construction materials. This was mentioned earlier today and while there may be different ideas as to what materials comprise "major construction materials," there are at least five materials (soil, concrete, bituminous, steel and masonry) for sure, with possibly wood being another.

It is important to remember that E329 has been used, and used successfully by many agencies, consultants, and laboratories. It is a document that is widely accepted. While it provides a procedure for evaluation of laboratories doing concrete work through the CCRL program, there really wasn't any other body looking at the other construction materials. AMRL was, however, referenced in the bituminous document, D3666.

It should be remembered that E329, like all ASTM standards, is a voluntary standard and is only made mandatory if an owner, a municipality, a government agency, an evaluation authority, or whomever, decides to make it so.

E329 was reapproved in 1982 with the understanding that it would be reviewed

and revised so that it could be even more widely used. In other words, bring it from the 1967 language to the current state-of-the-art to make it even more useful in the marketplace. This commitment was important when the vote was taken in Committee E36 to reapprove Standard E329. We knew it would be a tough task and we gave ourselves a couple of years to accomplish that review and prepare a new standard. Chuck Britzius was the chairman of Subcommittee E36.93 which is responsible for E329. He formed a task force to begin the review. This work resulted in complete revisions of Sections 1 through 8 and a change of the name of the document to "Standard Recommended Practice for Use in the Evaluation of Testing and Inspection Agencies as Used in Construction." Sections 1 through 8 provide generic type criteria. These sections have been balloted three times at Subcommittee level and one time at E36 Main Committee, with the last ballot at Subcommittee and Main Committee being taken concurrently on May 1 of this year. The negatives were considered at the E36 meeting in Philadelphia earlier this week and the decisions of the Subcommittee were upheld. Sections 1 through 8 were approved. E329, Sections 1 through 8 will be revised to reflect these changes and will be processed through ASTM.

Sections 1 through 8 provide information of a generic type. The theory that the subcommittee is currently working under is that each one of the major construction materials should have a committee developing specific criteria and that in fact is happening. I will not give you all the ASTM committee numbers, but basically there are existing standards for bituminous materials and soils, and there is work underway for concrete, steel, and masonry. You will hear more later from Jack Roebuck about the work in Committee C9 on concrete. Therefore, all of the five major construction materials are currently being addressed. The way that we propose to use the specific criteria developed by these committees is to reference them in ASTM E329. Standard D3666 which provides specific information for bituminous testing laboratories would be referenced in E329 if someone really wants to get specific criteria for that material. This indicates that the materials standards relate to the criteria established by E329 which is consistent with Standard E548.

Let's take a look at some of the specific information provided in Sections 1 through 8 of the revised E329. I have already talked about the title of the the document which indicates that the practice provides criteria for the operation and evaluation of a technically oriented testing agency or inspection agency. Standard E548 is referenced and there is a "Significance and Use" section which discusses purpose and relationships. This section states "This Recommended Practice provides the necessary criteria for selecting and retaining a testing agency or inspection agency which will execute a quality control or quality assurance program as related to construction practices or materials." The project sponsor or project sponsor's representative may use this document to aid in the selection process. If they elect not to use E329 and take advantage of what we think to be the excellent "criteria", that is their business. Duties and responsibilities are defined under "Scope" where minimum requirements are established for personnel and the equipment of materials testing and inspection agencies.

There must be a spirit of cooperation between Subcommittee E36.93 which is revising E329 and the other ASTM committees writing the specific criteria for various construction materials. For example in the section on "Terminology"

in the revised E329, we define concrete. The people who are writing the specific standard for concrete in C9 have their definition of concrete. When the C9 standard is in place, the terminology in E329 will be revised accordingly. These are very easy changes to make. However, it is important that certain terms such as "agency", "authority", and "project sponsor" be the same in all documents. We'd like to make all the terminology similar even though it is a difficult task. We currently are working on coordinating with all the documents that will be referenced in E329 to try and get similar terminology. It is important that "agency" as defined in E329 is the same as the definition in D3666 and the other specific standards.

Other sections in the revised E329 standard are related to organization of the agency. The document references E548 by stating "Items in ASTM E548 regarding the organization of the agency shall be considered in developing the specific criteria." By this we are promoting consideration of E548 when specific criteria are being developed for various construction materials. Again, we are trying to obtain uniformity between related documents.

In the area of human resources, Section 5 of the revised E329 provides some minimum requirements for personnel. We know this will generate a lot of discussion in the subcommittees providing specific criteria for various materials. One of these issues is the criteria that "when services are being provided for construction, the laboratory must be under the direction of a licensed engineer." This was in the original E329 and is believed to be very important for laboratories testing and inspecting major construction materials. E329 has a requirement that the supervising laboratory technician have five years minimum experience. Field supervising technicians also require a minimum experience of five years. We know that this is going to be controversial, but hopefully it will generate discussion and we can work together to reach a satisfactory conclusion. Some people may want to make the requirements much more stringent than what is provided in E329. Hopefully, that would be the case instead of the other way around. Other items covered in Sections 1 through 8 are the materials resources, the quality system, and the responsibilities and duties of the testing and/or inspection agency.

The plans are to use the Sections 9 through 14 of E329 to refer to the documents of other ASTM committees that have been specifically prepared for the different construction materials. Unfortunately, there are some irregularities in these specific documents because of the delay in revising E329. Currently there is a document being prepared on masonry which because they did not have the guidance of the revised E329, contains differences in terminology. Of necessity, they logically began developing their own terminology. Key terms such as accreditation, evaluation agency and authority vary from those in the revised E329. This illustrates what we are trying to accomplish in Subcommittee E36.93 by preparing a revised E329 Standard. When one uses an ASTM document relating to masonry, concrete, soil, bituminous or steel they should all be similar in format and terminology.

In summary, the E329 document is beneficial to committees writing standards, those using the standards to evaluate testing and inspection agencies, those using or selecting testing and inspection agencies in the marketplace, and especially the testing and inspection agencies themselves. It provides a "road map" for the systematic evaluation of a construction materials testing and inspection agency with the ASTM committees having the technical expertise

for specific construction materials providing the criteria necessary for testing and inspection of these materials.

Status of NVLAP Activities Related to Construction Materials

Robert Gladhill
National Voluntary Laboratory Accreditation Program

NVLAP was established in 1976 as the national program to accredit testing laboratories. The program is administered by the National Bureau of Standards under the direction of the Office of Product Standards Policy. Accreditation is granted to laboratories to perform specific standard test methods, such as those of ASTM or ANSI. NVLAP is fully self-sufficient through collection of fees from participating laboratories.

NVLAP provides national recognition of the competence of testing laboratories based on defined, written criteria. Generic criteria address an organization's quality systems, personnel, and recordkeeping. Specific criteria address unique requirements in a given technical area, including test equipment and procedures. Assessment of a construction materials testing laboratory would differ from that of a laboratory which performs radiation dosimetry or carpet testing and this difference would be reflected in the specific criteria. These criteria are not developed by NVLAP staff, but by technical experts in relevant testing fields through activities such as public workshops. All interested parties, primarily laboratories and users of laboratories thus have an opportunity to have an equal input and assure a truly representative program.

When a laboratory meets all of the NVLAP criteria, NBS issues a certificate of accreditation which includes the scope for which the laboratory is specifically accredited. For example, in the area of concrete testing, a certificate would list those specific methods for which the laboratory was assessed and found competent to perform.

NVLAP publishes an annual directory which contains the names and addresses of all accredited laboratories and the specific scopes of their accreditation. This directory is widely distributed nationally and internationally. It is sent to NVLAP accredited laboratories and organizations such as code groups, state regulatory agencies, architectural firms and trade associations. Anyone who is contemplating using or specifying a laboratory for any type of service can therefore refer to this directory and determine if there are NVLAP accredited laboratories capable of performing the required type of testing.

NVLAP currently has accreditation programs for thermal insulation, concrete, carpeting, solid fuel burning devices (woodstoves), acoustic measurements, electromagnetic compatibility, photographic film, radiation dosimetry and commercial products, which includes paint and paper testing. All of these programs have been established in response to a request from an individual or organization and after a determination that an accreditation program was needed in the specific area. The concrete program, requested several years ago, was established after several public forums developed the specific scope and criteria.

NVLAP has bilateral agreements with national systems in other countries which provide reciprocal recognition of accreditations. Pertinent test reports provided by a NVLAP accredited laboratory will be accepted as if they were

produced by an accredited laboratory in the agreeing country. Similarly, data provided by an accredited laboratory in the other country will be accepted here as if it were provided by a NVLAP laboratory.

The evaluation process that NVLAP uses consists of two basic elements: an on-site evaluation and proficiency testing. The on-site visits are generally conducted on a two year cycle. A technical expert, generally a peer assessor who is recognized as an expert in the field, is sent to the laboratory. These assessors are not NBS personnel, but are under contract to NVLAP and are predominantly from the private sector. NVLAP currently has 40 assessors, five of whom are (non NBS) government employees. The assessors also provide advice concerning development of criteria, changes occurring in the industry, and other technical issues. If disagreements occur between an assessor and a laboratory, a panel of technical experts is convened to discuss and resolve the issue.

The on-site visit is conducted against a checklist which delineates specific requirements with which the laboratory must comply. This assures uniformity in assessing all laboratories. A regularly scheduled on-site visit is conducted every two years, with additional monitoring visits as required. Unscheduled monitoring visits to a laboratory may occur at any time.

Laboratory performance is also monitored through proficiency testing, differing from one program to another. A laboratory may be sent an artifact with instructions for testing and be required to return the data to NVLAP, or they may be required to participate in a reference sample program. Data from individual laboratories are compared to data from other laboratories doing the same types of testing. In some cases, laboratories are rated by comparing their results to precision and accuracy statements that can be applied to the tests.

The proficiency testing program for the concrete LAP requires laboratories to maintain data on the coefficient of variation of concrete cylinder strength and to periodically send test data to NVLAP. By doing so they can detect trends in their test results and pinpoint problems in their operations. We have been told how valuable this is in assisting laboratories to identify problems in their day-to-day operations.

Statistical analyses that compare results of each laboratory to all other participants are issued in NVLAP reports. Each laboratory is sent an analysis of its individual performance and an analysis of the group performance of all participating laboratories. These reports are also given to standards committees for consideration in changing standard methods, or developing precision and accuracy statements. Information is also disseminated to trade groups to be helpful in upgrading the technology.

NVLAP staff participate in technical standards committees where appropriate. To the extent possible, NVLAP activities are coordinated with those of other organizations to take advantage of existing programs. The AMRL/CCRL reference sample programs are good examples of activities that could be utilized in the NVLAP program.

NVLAP has recently been requested to expand the concrete LAP to include construction materials testing. Specifically, the inclusion of soils and bituminous products was requested since these very often are tested at the

same laboratory. The comments that have been received as a result of Federal Register notices, and information that has been published in magazines, has for the most part been positive. By all indications, A NVLAP accreditation program is apparently needed. A large number of test methods have been proposed for inclusion in the program. Other test methods may be added on request.

One potential problem in operating a construction materials testing program may be the availability of peer assessors qualified to perform on-site assessments over the entire range of testing activities. To the extent possible, we would like to use one peer with a broad knowledge of several construction materials areas. However, more than one assessor may be required for laboratories that are highly diversified.

In summary, a national accreditation program appears to be needed for laboratories that test construction materials. NVLAP has been requested to develop such a program and is actively pursuing that goal. Anyone who has comments on the subject should contact: NVLAP, National Bureau of Standards, Admin A531, Gaithersburg, MD 20899.

Status of AALA Activities Related to Construction Materials

John Locke
American Association of Laboratory Accreditation

The American Association for Laboratory Accreditation (AALA) is a non-profit membership organization dedicated to the formal recognition of testing organizations which have been shown to be competent. This is the definition of laboratory accreditation. AALA accreditation is available to all laboratories whether they are owned by private companies or government bodies. We have some of both in the program.

AALA was formed in 1978 by a group of concerned individuals to develop a management system to verify competence of a wide variety of testing organizations. It is a membership organization open to all persons interested in quality testing and as such we invite people to join the Association and become involved in the development of its programs. A fact sheet (available at the Conference) describing AALA is attached.

AALA is governed by a Board of Directors whose membership is representative of industry, laboratories, government and the professions. The Board of Directors maintains two councils. The Criteria Council manages, administers and interprets the criteria documents developed for each program. The Accreditation Council makes final recommendations for granting, denying or terminating accreditation based on assessment and evaluation provided by the AALA staff and assessors. Appeals of any accreditation action are made first to that Council and then to the Board of Directors if necessary.

Most of the AALA resources are used to monitor the performance of the laboratories. When a laboratory seeks accreditation, it is advised of the requirements for granting accreditation. After a laboratory submits an application for accreditation, an assessor performs an on-site visit to audit the administration, staffing, test procedures, equipment, and other aspects related to quality. (See attached diagram of the accreditation process.) Additional visits are made when there are significant changes made to the scope of the work in the laboratory. The initial accreditation is normally granted for two years, and one year after the initial accreditation the laboratory is requested to provide updated information on laboratory personnel. The laboratory will be reassessed in the second year with a procedure very similar to the assessment conducted initially. Accredited laboratories are entitled to indicate AALA endorsement on their general correspondence and their test reports, as long as the reports are for tests for which they have been explicitly accredited.

AALA is funded by dues from members, fees charged to the laboratory seeking accreditation, and gifts made on behalf of the work of the Association. Accreditation fees are in two parts; one for the management of the system, the other for assessor fees.

AALA has about 71 laboratories currently accredited in 19 states. It has granted accreditation in the following fields of testing: biology, chemistry, construction materials, geotechnology, electrical, mechanical, non-destructive testing and thermal areas of testing. Our job is to develop the procedure for

accrediting laboratories for the work that they do. We try to be flexible with the laboratories specifically identifying the tests or types of tests that they perform and for which they seek accreditation. The reason for this flexibility is that identifying specific tests in some fields of testing is not always straightforward. For example, tests from textbooks and equipment manufacturers are often used in chemical testing and the flexible approach to identifying test methods we have tried to build into the AALA system permits us to more clearly depict a laboratory's competence.

The Chairman of the Board of AALA is Gladys Berchtold. She is also the Chairman of the Board of Standards Laboratories and the current Chairman of the ASTM Board of Directors. The Vice-Chairman is John Blair of DuPont. The Secretary-Treasurer is Chester Grant from General Motors. Other members of the Board include Bob Belfit, formerly with Dow Chemical now with Omni-Tech International, Albert Chabek - American Gas Association, Tom Flint - American Plywood Association, Howard Forman - formerly with the Department of Commerce, and Rohm and Haas, John Grant - formerly with AMOCO Research Laboratory, Ray Hauser with Hauser Laboratories, Earl Hess - Lancaster Laboratories, Richard Kuchnicki from the Council of American Building Officials, Robert Peach - Consultant (formerly with Sears and Roebuck), David Reyes-Guerra with the Accreditation Board for Engineering and Technology, Lou Rossi with PSE & G an electrical utility laboratory, Duke Schuerer with US Steel Corporation, and Grover Williams - Trinity Engineering and Testing Organization.

There has been a change in the management of the Association. I was named Executive Director on the 1st of April and I have assumed that responsibility full time as of the 1st of May, so I have been on the job for about two weeks. Our first priority is to assess our accredited laboratories as their reaccreditations become due. To do this, we will be identifying and training new assessors, preparing and monitoring their visits to the laboratories, submitting their findings to the Accreditation Council for decision and granting accreditation where approved. Our next priority is to improve all documentation so that our operations are clear and our application forms are easy to follow. We will be announcing new programs: environmental testing, coal, plastics, and automotive are examples. We will be encouraging membership in the Association; AALA is a professional society. Finally, we will be trying to increase the awareness of the testing and user community in the value of the AALA recognition of competence.

The AALA offices are located across the street from the National Bureau of Standards at 656 Quince Orchard Road, #704. Everyone is welcome to visit us at any time.

F A C T S H E E T

The AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (AALA) is a nonprofit, scientific, membership organization dedicated to the formal recognition of testing organizations which have achieved a demonstrated level of competence. Accreditation is available to all laboratories regardless of whether they are owned by private companies or government bodies. The essential requirement is competence.

AALA was formed in 1978 by a group of concerned individuals as a practical and efficient organization to develop and manage a system to verify and recognize qualified testing laboratories. Accreditation is available for all types of tests, measurements and observations which are reproducible and properly documented.

Membership in AALA is open to all persons interested in quality testing services. Members pay dues, receive a periodic newsletter, and attend annual meetings and symposia sponsored by the Association.

WHY?

Laboratory accreditation supports the needs of both users of testing data and the laboratories which produce those data. Briefly stated, the needs are:

Users:

- recognized sources of competent testing services
- assurance of internal quality control testing competence
- attesting to purchasing and regulatory agencies
- as support to product certification operations

Laboratories:

- quality assurance of operations
- marketing demonstrated performance
- overall improvement in the quality and efficiency of operations

656 Quince Orchard Road • #704 • Gaithersburg, MD 20878 • 301-670-1377

HOW?

LABORATORY ACCREDITATION INVOLVES:

- Developing and maintaining defined criteria for the operation of laboratories, appropriate to each kind of testing
- Examining applicant laboratories in terms of these criteria, and ensuring that accredited laboratories maintain this level of performance

AALA is governed by a Board of Directors whose membership represents interests of industry, laboratories, government, and the professions. The Board maintains two councils.

- The Criteria Council oversees the development and interpretation of criteria documents. The general criteria used by AALA are from the international standard ISO/IEC Guide 25 "General Requirements for the Technical Competence of Testing Laboratories" and are basically equivalent to the U.S. practice found in ASTM E-548 - 84 "Standard Practice for the Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies". If appropriate, specific criteria are developed for the fields of testing, specific testing technologies, specific types of tests, or specific tests.

- The Accreditation Council makes final recommendations for granting, denying, or terminating accreditation, based on the assessment and evaluation provided by the AALA staff and assessors. Appeals of Council decisions are made first to the Council and then to the Board of Directors.

Much of AALA's resources are used to monitor the performance of laboratories. When a laboratory seeks accreditation it is advised of the requirements for granting accreditation. After an application for accreditation is submitted, assessors visit the laboratories to examine the administration, staffing, test procedures, equipment, testing environment, records, reporting and quality control procedures of the laboratory.

Visits are also made when there is any significant change in the scope of the work and at scheduled intervals of approximately two years. Laboratory performance in proficiency testing is also included in evaluating the laboratories. Laboratories are required to promptly correct any deficiencies that are disclosed by monitoring visits.

These procedures for accreditation have been adopted to conform with the recommendations of the International Laboratory Accreditation Conference (ILAC) which are generally followed by laboratory accreditation systems throughout the world. AALA's procedures conform to those specified in ASTM Standard E-994 - 84 "Standard Guide for Laboratory Accreditation Systems".

Accredited laboratories are entitled to use the AALA endorsement (logo) on their general correspondence and on their test reports if the tests covered are included in their scope of accreditation.

AALA is funded by dues from members, fees charged to laboratories seeking accreditation, and donations made on behalf of the work of the Association.

Accreditation fees are separated into management and assessor fees. Management fees are charged to participating laboratories on a yearly basis and vary, with the highest fees charged for initial accreditation, and graduated scale for routine assessments and yearly monitoring. Additional fees are charged for laboratories in more than one field of testing.

Assessor fees are charged only for the actual time and expenses for assessor(s) at a laboratory site.

WHO?

AALA has accredited 71 laboratories in 19 states. Accreditation has been granted in the following fields of testing:

Biological	Geotechnical
Chemical	Mechanical
Construction Materials	Nondestructive Testing
Electrical	Thermal

Other more specific programs are being developed in areas such as environmental testing. Users of accredited laboratories are advised to seek the specific scope of the accreditation from the laboratory which identifies the tests or types of test for which the laboratory is accredited.

The Executive Committee of the AALA Board of Directors:

Gladys B. Berchtold, Chairman of the Board. Chairman of the Board of Standard Laboratories, Inc.
John A. Blair, Vice-Chairman. DuPont.
Chester N. Grant Secretary/Treasurer. General Motors.
Foster C. Wilson, Past Chairman of the Board. Formerly with Owens Corning Fiberglas.
Carl E. Miller, Chairman of the AALA Criteria Council. Factory Mutual Research
Leland J. Walker, P.E., Chairman of the AALA Accreditation Council. Northern Engineering and Testing Co.

Other members of the Board of Directors include:

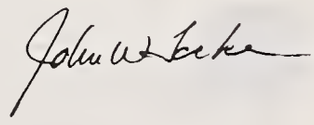
Robert W. Belfit Jr., PhD., OMNI Tech International Ltd., formerly with Dow Chemical Co.
Albert J Chabek, American Gas Association Laboratories
Thomas R. Flint, American Plywood Association
Howard I. Forman, PhD., Esq., Consultant, formerly with the Department of Commerce and Rohm and Haas Co.
John A. Grant, Consultant, formerly with AMOCO.
Ray Hauser, PhD., Hauser Laboratories

Earl Hess, PhD., Lancaster Laboratories
Richard P Kuchnicki, Council of American Building Officials
Robert W. Peach, Consultant, formerly with Sears and Roebuck
David R. Reyes-Guerra, Accreditation Board for Engineering and Technology
Louis R. Rossi, PSE&G Research Corporation
E. L. Schuerer, U.S. Steel Corporation
Grover C. Williams, Trinity Engineering Testing Corporation.

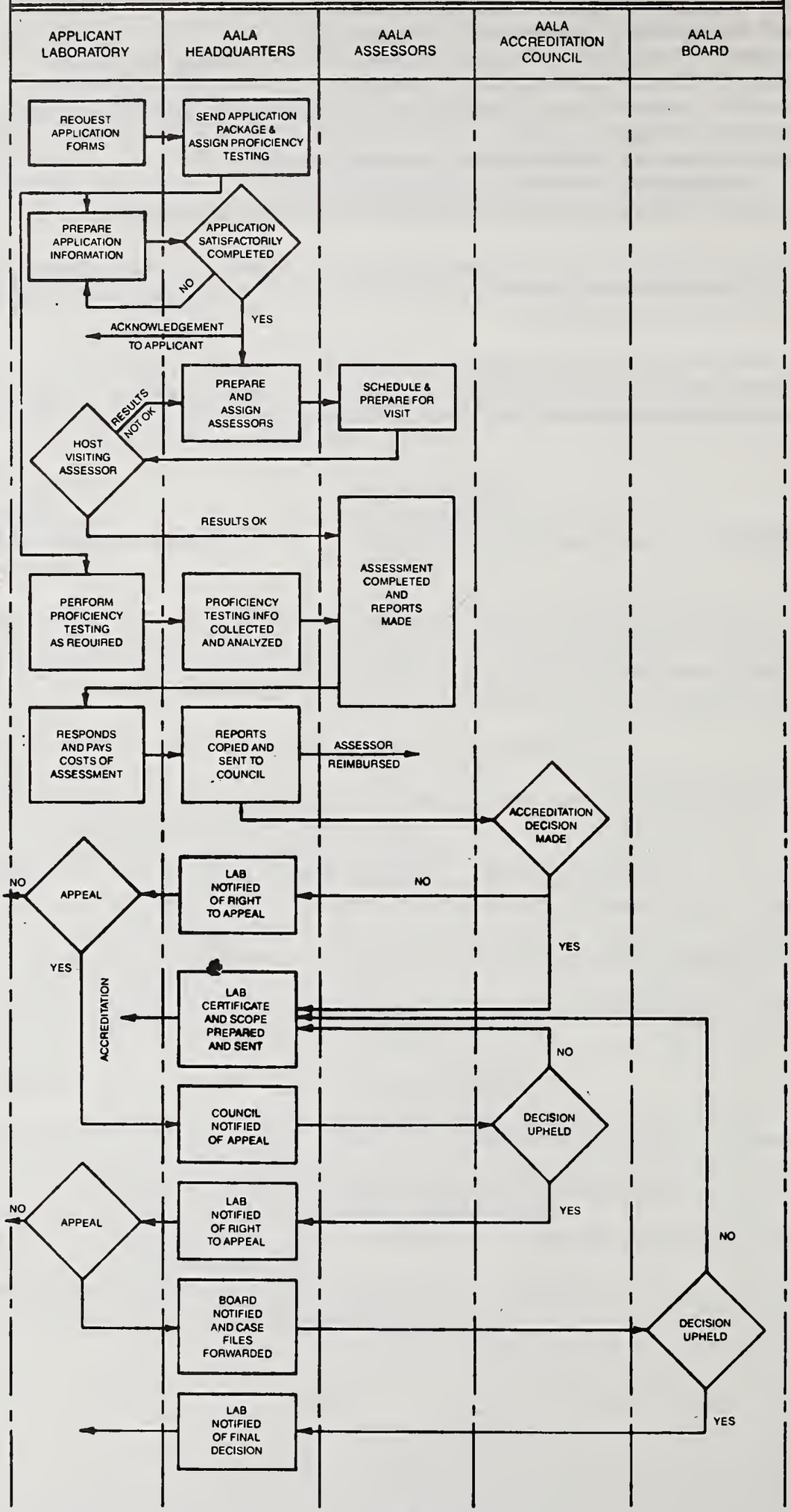
The Executive Director of the Association is John W. Locke, formerly manager of the National Voluntary Laboratory Accreditation Program at the National Bureau of Standards.

Offices are located at 656 Quince Orchard Road, #704, Gaithersburg, MD 20878. Telephone is (301) 670-1377. Requests for membership forms and applications for accreditation are invited.

AALA G1080786



ACCREDITATION PROCESS
AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION



John W. Locke
October, 1986

Accreditation of Testing Laboratories in Florida

John Roebuck
Florida Mining and Materials Corporation

Concrete is the most widely tested construction material in the world and sometimes I worry that maybe our problem with concrete testing is that familiarity breeds contempt. Engineering reports on concrete testing that have a great deal of engineering significance may not be based on good testing. This is of added concern since decisions related to code conformance are made based on the data included in these reports. Concrete testing is not something done in the back yard with an automobile jack, it is a little more sophisticated science than that. For over thirty years we have had private engineers and CCRL inspect laboratories in Florida, we have had representatives of AALA and NVLAP in the state on a limited basis, and we still find deficiencies in laboratories testing concrete.

I've had it on my mind for a long time that if in ASTM we have the very best standard test methods, why do we care so little about how the tests are performed. The lack of enforcement is where the problem lies. ASTM Standard E329 has been on the books for over twenty years and everybody specifies it. For example, ASTM C94, incorporated in the ACI-318 Building Code, requires that concrete testing laboratories meet the requirements of E329. E329 is an excellent document but inadequately enforced. Occasionally when it has been enforced, it is embarrassing since there are too many deficiencies.

The truth is that we in the concrete industry are disappointed in our testing and this is what we are concerned with today. We believe that an accreditation system can improve this. In Florida we had the good fortune to have an industry association representing about 90% of the concrete and cement industry. Twenty years ago the Florida Engineering Society and Florida Institute of Consulting Engineers formed a subsidiary called The Engineering Laboratories Forum. In 1981 we again brought the problem of inadequate concrete testing to the attention of the industry and recommended a cooperative venture between the industry and the laboratories. A preliminary meeting was held and it was decided to form a new group to improve the quality of concrete testing in Florida. Within the year the new organization was incorporated as a nonprofit institution and known as Engineering Laboratories Forum/Florida Concrete and Products Association (ELF/FCPA) Joint Technical Committee. Each member group elected six members to serve on a twelve-man Board of Directors. Co-chairmen were selected, one from industry (FCPA) and one from the engineers (ELF). Five committees were formed; Disputes Committee, Training and Inspection Committee, Education Committee, Publicity Committee, and a Finance Committee. Initial activities involved dissemination of technical materials from ACI and the preparation of educational information.

Florida has done a great amount of work in the area of field technician certification over the last four or five years. Our program is based on the ACI Grade I field technician certification. We provide testing only and let the training be the responsibility of the employer. We run as many as 50 or 60 technicians on a Saturday morning through the testing program and our success story has been excellent. The ELF/FCPA supports the program by

providing concrete samples, test examiners and proctors. We schedule the testing in 6 locations throughout Florida annually. Over 40 percent of the technicians tested in Florida have initially failed the test which consists of six standard concrete tests.

The ACI program has focused our attention on the problem that we have neglected the role of training of concrete field technicians. We have tested over 1500 technicians in the first four years and now have over 700 certified for competency.

Concurrently with technician testing we embarked on laboratory accreditation. We found it necessary to prepare a document for use in evaluating the performance of a testing laboratory. A preliminary document was drafted with input from the ready mixed concrete industry and the laboratories and we applied it in the laboratories themselves. We both agreed that there was a problem since very few laboratories were found to be in compliance with the document. We decided to use ASTM E329 as our basic guideline document with a joint group of ELF/FCPA determining which specific areas should be addressed. The broad areas we picked out for our report included identification of samples, curing, capping and testing of cylinders, and reporting of data. We employed a professional engineer as a consultant who had over five years of testing laboratory experience to perform the assessments.

During the formulation of our program in Florida, Pete Unger of NVLAP witnessed an inspection and provided advice including the recommendation that the inspection must be objective. The Florida program was implemented and it has been expanded and improved over the three years it has been operating. It is estimated that Florida has about 200 test laboratories. This includes 110-120 commercial engineering laboratories, about 50 industry laboratories (primarily prestressed plants, ready mixed concrete plants, etc.) and about 30 public laboratories. The Department of Transportation and some of the cities and counties have elected to set up their own concrete test facilities and are included in the later category. In 1984, the first year of operation, we managed to have a total of 37 laboratories volunteer for inspection. All but two finally were approved after correcting their deficiencies. In 1985 this number went to 53 laboratories which included 40 commercial labs. We are just beginning our summer inspection program for 1986 and we already have fees paid for 50 commercial labs and 10 industry labs. We are hoping for 70 laboratories in total.

You may ask how we got about half of the commercial labs volunteering for this program. We have solicited the major engineering firms in Florida and we have publicized the program to Florida contractors and builders. We advertise the fact that there is a better way to get your concrete testing done and that is by using an approved laboratory in Florida. We are putting commercial ads in all the major professional bulletins, and we are getting a lot of positive editorial space in the technical press. We would like to see all the failing test reports in the future being totally accounted for by concrete problems and not testing problems. The concrete industry appears to think that this new program is a step in that direction.

One of the reasons for starting this accreditation program in Florida was the high cost of utilizing NVLAP or ALAA programs. Our group was set up as a nonprofit organization with the industry and the engineering fraternity lending us $25,000 - $30,000 in start up working capital if needed. We had

accumulated some funds from implementation of the ACI technician certification program. We charged $30 a test for the ACI examination while actual out-of-pocket expenses were $5 or $10. The examination staff were primarily volunteers so we quickly accumulated some cash. We have continued to operate with a surplus and we spend our excess funds primarily on advertising and to finance laboratory inspection costs. The actual cost of an accreditation initially ran $500 per laboratory visit which is made annually. This includes calibration service on a compression testing machine. This is attractive to testing laboratories since use of a private calibration service was costing $250 to $350. Our accreditation program includes verification, calibration and some minor repairs of the compression machine, and inspection of facilities and procedures. Electrical or mechanical repairs are not made. We have been steadily gaining laboratories in the accreditation program to where we now have about half of the laboratories in Florida participating. We will have about 60 laboratories this year and the annual fee has been increased to $525 (our 1985 actual cost). We did lose ten laboratories last year because they did not wish to pay for the inspection or they felt they could not meet the requirements. I believe that many of those that are not participating decided to go into another business which is not a bad idea, because we have too many seekers of the sunshine in Florida. It might help also if we take everybody's automobile jack out of their car when crossing the Florida line.

We have many other positive programs that have been developed through this cooperative venture between industry and the engineering profession which can be models for the rest of the country. We like the local nature of our accreditation program. The group running the Florida program might give some consideration to letting ASTM and AASHTO, whatever organization which has the strongest connections in the construction specifying industry, create a need for such accreditation. Neither NVLAP or AALA has the level of laboratory participation needed which is partially related to the lack of specifier requirements. The laboratories in Florida enjoy being accredited and there is peer pressure being exerted. Local specifications are incorporating the requirement for an accredited laboratory.

A major problem in Florida is the lack of enforcement of the E329 standard. The status of current revisions being made to E329 and other related standards activities have been discussed by other speakers. I am chairing ASTM Subcommittee C09.01.07 which is developing a standard for the evaluation of concrete testing laboratories. This standard will be referenced by the revised E329 document as discussed by Spencer Thew.

We have not encountered any problems whatsoever in the legal area. We did take out a 2 1/2 million dollar liability policy on our Board members. The one letter of threat came from a laboratory who insisted he was approved by the U.S. Corps of Engineers which we accepted. However, we did deny to his request that we include him in our advertising since we do not advertise Corps of Engineers approval. The laboratory's contention was since he was approved by the Corps of Engineers he should be listed in our ELF/FCPA accredited laboratory list.

We have had some problems with deficiencies being found in some of the compression testing machines in laboratories in the Florida program. These are related to the C39 tolerance on readability, which is 250 pounds. About a year and a half ago, we asked the manufacturers what their intention was in regard to readability, but the issue remains unresolved.

Some jurisdictions in South Florida, Miami, and Fort Lauderdale have their own buildings codes in which they require that a laboratory be inspected by CCRL. In our inspections, over the last 15 years, we have found labs who have complied with their requirements, but as Walt mentioned, the problem is that many deficiencies found by CCRL are not corrected. We found one laboratory with seven pages of deficiencies with no corrections, and he was able to provide services in that area. It was incorrectly assumed by the specifier that the laboratories were making corrections of noted deficiencies. Only follow-up accreditation will accomplish this.

The participating laboratories in Florida appreciate our efforts related to accreditation. They want to do a better job. They are proud of their approved status as compared to some of their peers who have elected not to join the program. We are still having the problem of both publicizing the good guys and being careful not to offend the bad ones. We have made some great strides in the last several years and thank you for your interest in our program.

Construction Materials Reference Laboratories at NBS

James H. Pielert
Construction Materials Reference Laboratories, NBS

Programs of the Construction Materials Reference Laboratories (CMRL) will be discussed along with highlights of recent changes which have made them more responsive to the needs of the construction community.

CMRL consists of the Cement and Concrete Reference Laboratory (CCRL) and the AASHTO Materials Reference Laboratory (AMRL). CCRL was established at the National Bureau of Standards (NBS) in 1929 as a Research Associate Program sponsored by the American Society for Testing and Materials (ASTM) [1,2]. Similarly, AMRL was established at NBS under the sponsorship of the American Association of State Highway and Transportation Officials (AASHTO) [3,4].

The goal of CMRL is to promote improvement in the quality of testing of construction materials in the nation's testing laboratories. The inspection of construction materials testing laboratories and the distribution of proficiency samples are the primary activities of CMRL. Two complementary activities are the study of testing problems related to construction materials, and participation in the work of the technical committees of ASTM, AASHTO, and the American Concrete Institute (ACI). This later activity provides a direct link between the users and developers of standards. CCRL is primarily supported by fees paid by users of the laboratory inspection and the proficiency sample services. AMRL is supported by funds provided by State Departments of Transportation and the Federal Highway Administration. There is increasing use of AMRL services by independent testing laboratories who are willing to pay the specified fees.

CCRL and AMRL have oversight committees; the Joint ASTM C1/C9 Subcommittee on the CCRL chaired by Walter Kunze and the AASHTO Subcommittee on Materials for AMRL chaired by Garland Steele.

The scope of the CMRL inspection services has evolved over the years to be responsive to the needs of the construction industry. The programs of the CCRL are involved with portland and masonry cement, portland cement concrete, concrete aggregates, and reinforcing steel. There is currently a plan to introduce a pozzolan inspection activity beginning early in 1987. The AMRL is involved with materials related to the transportation industry including bituminous materials and mixtures, aggregates, soils, metals, and verification of highway friction testing equipment. It is also possible that in the next year AMRL may become involved with verification of road roughness measuring devices.

The CCRL and AMRL operate under policies established by their sponsors and NBS. The inspection service is limited to laboratories using the standard methods of test prepared by ASTM (CCRL) and AASHTO (AMRL). The concrete inspection program is based on the ASTM Standard E329 and the bituminous and soils programs are based on ASTM Standards D3666 and D3740. Use of CMRL services is voluntary on the part of any laboratory who is willing to pay the fees established by the oversight committees. When CCRL and AMRL were

established, it was specifically agreed that they would not become involved with accreditation or certification, would not rate laboratories, or become referees in disputes concerning qualities of materials. As discussed by Walt Kunze this morning, actions have been taken by the CCRL Executive Group of the Joint C1/C9 Subcommittee to possibly change this policy.

Laboratory inspections are conducted around the country in an organized sequence. Inspection teams are continually on the road conducting inspections. A "tour" is the length of time it takes to complete a trip around the United States including Alaska and Hawaii, Canada and Puerto Rico. There are almost 600 laboratories participating in the CCRL inspection program and over 100 in the AMRL program.

Inspectors travel around the country in vehicles equipped with the necessary verification apparatus, hand tools, and reference literature. Generally, each team consists of three inspectors, with each inspector spending approximately a month in the field. In this way, there is a leap-frogging effect with a member of the team continually conducting inspections. The inspection consists of an examination of apparatus used in testing materials for conformance to the specifications, and in most cases, witnessing of test procedures carried out by laboratory technicians. Great care is taken to ensure that inspection equipment is calibrated with traceability to NBS. The cement and concrete inspections take from one and one-half to two days each, the combined CCRL cement and concrete inspection may take three days, and the combined AMRL bituminous and soils inspections may take up to four days.

An important component of the inspection activity is the use of qualified individuals as laboratory inspectors. The training program for inspectors lasts six months including both laboratory and field work. When fully trained, CMRL inspectors are competent to evaluate the various test methods and to provide guidance to the laboratories being inspected. Many positive comments are received from the laboratories inspected by CCRL and AMRL relative to the performance of the inspectors.

The uniformity of the inspection procedure is achieved through the use of detailed work sheets based on applicable standards. There is a constant updating required since these standards are changing, some of them annually. The size of the inspection packages vary from 22 sheets for cement to 151 sheets for bituminous, soils, and aggregate inspection.

While the inspection is in progress, the inspector brings each departure from the specification or test method to the attention of the personnel in the laboratory so that on-the-spot corrections may be made. The inspector also occasionally finds it necessary to demonstrate the correct test procedure to the laboratory personnel, so there is a training aspect when necessary. At the completion of each inspection, the inspector provides a comprehensive oral report to the laboratory official based on his findings. Later, after the inspector gets back to the office, a written confirmatory report is sent to the laboratory based on the results of the inspection. These reports are treated in a confidential manner with no distribution unless directed otherwise by the laboratory.

Even though CMRL is not involved with accreditation or certification, laboratory evaluation support is provided to several existing programs. The on-site inspection and the evaluation of the quality control system of the

laboratory is provided for the National Voluntary Laboratory Accreditation Program (NVLAP) Concrete Laboratory Accreditation Program. Many State Departments of Transportation laboratories are specifying AMRL and CCRL inspection of laboratories doing testing for state projects. The Massachusetts State Building Code Commission requires laboratories providing services to the state to have the CCRL inspection. Therefore, while CCRL and AMRL do not accredit laboratories, there are organizations and governmental agencies who use the inspection and the proficiency sample programs of CMRL for accreditation purposes.

The number of laboratories participating in the CCRL program has grown over the years with 577 laboratories inspected during the most recently completed tour. There has been a decline in the number of cement producer laboratories inspected, which is probably due to the consolidation and contraction of the cement industry. At the same time, there has been an increase in the participation of concrete and aggregate testing laboratories.

The AMRL inspection program, until fairly recently, has been primarily utilized by the State Departments of Transportation. There was a significant increase in independent laboratory participation in the tour recently completed. The fees have been reduced to make the service more attractive and as was indicated before, state transportation departments are specifying AMRL inspections.

The operation of proficiency sample programs is the second primary function of CMRL which provides an additional procedure for a laboratory to evaluate the quality of its work. A portland cement proficiency sample was first distributed by CCRL in 1936. Participation in the CCRL program varies from 92 laboratories for masonry cement to over 250 laboratories for portland cement. There are currently 13 foreign countries participating in the program. Participation in AMRL proficiency sample programs varies from 130 for bituminous concrete to more than 270 for soils. The bituminous concrete sample was recently added by AMRL which is also evaluating the experimental distribution of an asphalt emulsion cut back proficiency sample.

The proficiency sample programs all operate in a similar way. At intervals of either 6 or 12 months quantities of two slightly different materials are procurred, homogenized, and divided into two groups of individual samples. Each laboratory receives a pair of samples and performs the specified tests and returns the results to CMRL offices for evaluation. A final report is distributed to participating laboratories so that they can determine how well they have done in conducting these tests relative to the other participants in the program. The results of these proficiency testing programs are routinely distributed to the appropriate ASTM and AASHTO committees who find them very useful in the development of standards. Sample reports generally contain average values, standard deviations and other statistical information based on procedures developed by Youden, Crandall and Blaine [5,6,7]. Scatter diagrams are provided to the laboratories to assist them in determining how their results compare to the others in the program. A substantial variation advises the laboratory that there is a problem, and should encourage them to look for the reason such as an equipment problem, a technician problem or a materials problem. A continuous tendency to get poor results would hopefully stimulate the laboratory to make a detailed search for the problem. Performance charts which graphically displayed the performance of the laboratory over time for the last ten recent pairs of samples are a routine part of the proficiency

sample program.

Technical studies are a very small but significant part of CMRL activities. This includes in-house studies such as those related to changes in programs and the development of specific data for the work of various standards committees; cooperative studies with other NBS units; and cooperative work with the Center for Building Technology such as that currently taking place in the soils and cement chemistry areas. Cooperative studies are also carried out with organizations outside of NBS as illustrated by studies of cement cube strength being done in conjunction with the National Ready Mixed Concrete Association. CMRL has a very unique data base going back to 1929 which is having a beneficial application in standards development.

It is estimated that CMRL has a significant impact on over 1000 construction materials testing laboratories throughout the world and its programs are being revised to be more responsive to the needs of the industry.

References

1. "The Cement and Concrete Reference Laboratory," NBS Letter Circular No. 1044, National Bureau of Standards, July 1981.

2. "The Cement and Concrete Reference Laboratory -- A Case History in Collaborative Standardization," ASTM Materials Research and Standards, Vol. 10, No. 9, 1970.

3. "AASHTO Materials Reference Laboratory," NBS Letter Circular No. 1122, National Bureau of Standards, March 1980.

4. Steele, G. W., "Quality Assurance for Our Highways -- The AASHTO Materials Reference Laboratory (AMRL) -- Fifteen Years of Service," AASHTO Quarterly, Vol. 60, No. 1, 1981, p.35.

5. Youden, W.J., "Statistical Aspects of the Cement Testing Program," Proceedings, American Society for Testing and Materials, Vol. 59, 1959, p. 1120.

6. Crandall, J. R. and Blaine, R. L., "Statistical Evaluation of Interlaboratory Cement Tests," Proceedings, American Society for Testing and Materials, Vol 59, 1959, p. 1129.

7. Youden, W. J., "The Collaborative Test," Journal of the Association of Official Agricultural Chemists, Vol. 46, 1963, pp.55-62.

Laboratory Accreditation From the Perspective of a Construction Materials Engineer

Grover C. Williams
American Council of Independent Laboratories

Introduction: My name is Grover C. Williams. I am President of Trinity Engineering Testing Corporation, a Texas firm established in 1929. Trinity is a medium-sized firm with approximately 260 employees. We operate laboratory facilities to support our construction materials engineering, geotechnical engineering and non-destructive examination services. I am the current President-Elect of the American Council of Independent Laboratories (ACIL) and have been requested to make this presentation on behalf of ACIL and its Construction Materials Engineering Committee.

My personal experience includes thirty-five years as a geotechnical and construction materials engineer. I have been actively involved throughout my career in the development of construction materials engineering and the defining of its area of practice. Additionally, I have been a participating member of ASTM Committee E-36 since 1975. I am presently serving on the Board of the American Association for Laboratory Accreditation. This background should indicate a long-term commitment to the development and improvement of construction materials engineering practice. I will draw on this background to provide a brief history of construction materials engineering, examine the relationship between the construction materials laboratory and the construction materials engineer and offer a perspective on the value of a credible program of accreditation for the construction materials laboratory.

Brief History of Construction Materials Engineering: The first construction materials engineer may have been the Stone Age hunter-fisherman, who mixed red lime with sand, gravel and water to produce concrete for the floor of his hut on the banks of the Danube in Yugoslavia about 5,600 B.C. The modern-day construction materials engineer may trace his heritage to 1874 in England or to 1881 in the United States where services offered by these 19th-Century practicioners bear a remarkable similarity to some of the present-day practices.

Some of us who practice construction materials engineering today are keenly aware of the significant advances made in our specialty during the years of World War II. The massive program of construction to support the war effort required this country to respond with a superhuman effort. It is in this critical period of our country's history that I believe construction materials engineering "came of age". Subsequent events have been supportive and have contributed to the advancement of the practice, but, in my judgment, no other period of time has had such an impact on the emergence of construction materials engineering as a distinct discipline of engineering practice.

Recognition of construction materials engineering as a new discipline of engineering practice did not occur immediately. Even those firms engaged in the practice continued to consider themselves to be civil engineers, or mechanical engineers, or chemists or simply laboratory operators. Most of the discussions about the practice were held informally by small groups convened at some technical or professional engineering society meeting. No formal

action was taken by any group, to my knowledge, until 1961, when the Engineering Laboratory Practices Committee of the Florida Engineering Society formulated and published a policy statement that recognized the professional responsibilities of firms involved in the testing of materials used in construction. It was the position of the Florida Engineering Society that it would be impossible merely to provide test data without being required to interpret that data, and that the process of interpreting the data would constitute the practice of engineering. They further observed: "Raw data that is not evaluated is merely a collection of figures, and the orderly marshalling of such data changes this fact not one whit. In fact, where such a presentation creates the appearance of meaning, the potential danger increases, because the designer may be deceived into acceptance of non-evaluated information."

The Florida Engineering Society initiative was extremely influential in stimulating discussions in other parts of the country. It led directly to the adoption by ASTM of the E-329 standard in 1967. The adoption of E-329, which required professional oversight of concrete and steel testing and inspection by a full-time registered engineer, was a monumental step. ASTM for the first time had established a standard for personnel qualifications.

Florida took the lead again in 1970 by forming the Engineering Laboratories Forum. The purpose of the Forum was: "To provide a continuing professional forum to advance the position of engineering laboratories by focusing cooperative efforts on the conditions affecting their practice." The Forum was sponsored by the Florida Engineering Society and the Consulting Engineers of Florida. During the same period, a Task Group of five engineering laboratories in Texas was formed to consider the desirability of a formal organization devoted to the practice of engineering testing. The Task Group concluded that there was a need for such an organization and accepted the responsibility to petition the industry for support. The Texas Council of Engineering Laboratories (TCEL) was established in 1971 in response to the Task Group's solicitation.

The first order of business for TCEL was the drafting of a "Manual of Practice for Materials Engineering". This manual defined for the first time the practice of construction materials engineering in the State of Texas. The TCEL manual received immediate national acceptance. Permission was granted to the American Council of Independent Laboratories in 1974 to modify the manual for publication as a national document.

Other regional organizations were established within a relatively short period of time. Although I do not have first-hand knowledge of these organizations, I have heard of the good work of one of them in the Washington, D.C. area, the Washington Area Council of Engineering Laboratories (WACEL). The objectives of all these groups has been the same: define the practice; establish standards of professional performance; and cooperate to advance the professional stature of the practice. These various regional initiatives seem to have culminated in the national effort to establish a Materials Engineering Division in the American Society of Civil Engineers. The effort was successful and the new Division was approved in 1984.

Relationship Between the Construction Materials Laboratory and the Construction Materials Engineer: Construction Materials testing has been defined as the integral part of construction materials engineering involved with the

determination of the engineering properties of materials and products used in construction. Procedures for performing construction materials tests have generally been standardized by the American Society for Testing and Materials, the American Association of State Highway and Transportation Officials, the U.S. Army Corps of Engineers and various other Federal and State Agencies.

Requests for tests are accompanied by instructions that identify the applicable test method. The laboratory is not given flexibility to deviate from the requested procedure, although the requested test may not provide the needed information. Frequently, complaints about unreliable test data can be traced to the specifier's designation of an inappropriate test standard or a non-standard sampling technique. The classic example is the specification that requires one compressive strength test sample to be taken from each load of concrete delivered to the project and further requires that a portion of these single samples be tested in three days, a portion tested at seven days and the remainder held for a decision by the architect. It would be difficult, if not impossible, to attach any significance to the data obtained in this fashion, regardless of the preciseness of the tests.

The proper relationship between the construction materials laboratory and the construction materials engineer can be found in the above definition of construction materials testing. The definition declares that construction materials testing is an "integral" part of construction materials engineering. The two should not exist in separate environments. They should function harmoniously and cooperatively. A test should not be specified or evaluated by anyone who is unaware of the significance of the data obtained in the test, unless he or she is advised and counseled by an experienced construction materials engineer. Equally as important, the construction materials laboratory should not alter the specified sampling and testing plan without the approval of the engineer who will evaluate the data.

Most of the present-day construction materials laboratories function as the support for construction materials engineering services. The extensive use of ASTM E-329 in specifications and building codes and the wide growing acceptance of the benefits of construction materials engineering has nearly eliminated the practitioner who considers himself to be only a laboratory operator. The importance of this trend and the interdependent relationship of the construction materials laboratory and the construction materials engineer should not be ignored in the structuring of an accreditation system that will adequately respond to the needs of both parties.

Accreditation of Construction Materials Laboratories: Having been involved for so many years with the issue of laboratory accreditation, I am acutely aware of most of the fears, frustrations and skepticisms articulated by a variety of groups in the United States. The only other issue to my knowledge, that has occasioned a comparable level of emotional reaction has been the environment. Ironically, there is fairly good agreement on the general principles. The issue is rapidly polarized, however, when it comes to specifics. Unless a group is unalterably opposed to the basic concept of accreditation, most will agree that accreditation should be meaningful; it should be fair; it should be administered by knowledgeable people; it should be cost efficient; and it should receive the broadest possible acceptance and respect. This is the point, in all the discussions to which I have been party, where the wheels fall off. Group one argues vehemently that an accreditation will be meaningless unless every test method utilized in the

laboratory schedule of tests is completely monitored. Group two proclaims the discipline approach to be superior, infinitely more valuable and less expensive. Those in group three sit on the sidelines smirking. They would like to see the whole issue go away.

Accreditation of laboratories has been heavily discussed and debated for well over fifteen years, to my personal knowledge. It would appear reasonable to assume that something of value had been learned in that length of time. The National Voluntary Laboratory Accreditation Program (NVLAP) has been in existence since 1976. The American Association for Laboratory Accreditation (AALA) was established in 1978. ASTM Committee E-36 has all but exhausted the subject of generic criteria. I have the feeling that the fires of passion have begun to subside and perhaps, maybe just perhaps, some folks are beginning to hear what the other side is trying to say. I am beginning to hear the proponents of the "product-by-standard" approach talk in terms of increasing the number of tests in a "field of testing" to make possible a broader accreditation. I am also beginning to hear the "discipline group" say that by adding to a "field of testing" accreditation you can get as detailed an assessment as you want or need. The marketplace has also spoken on the issue and that resounding voice should be heeded.

As a construction materials engineer, I am interested in obtaining reliable test data. I am especially interested in assuring that the test data from my own laboratory are reliable. I have stressed repeatedly in this paper that it is absolutely necessary to have the test data evaluated by a knowledgeable construction materials engineer. The Florida Engineering Society made this very important point in their policy statement in 1961. A significant part of the evaluation is an assessment of test data reliability. An experienced engineer can generally identify inconsistencies in the tests even though he did not witness the tests being performed. Laboratory accreditation would be an excellent additional safeguard for the engineer to utilize in assessing the reliability of the data.

An outside source of verification can provide a discipline that is beneficial to most laboratories. The willingness to be scrutinized and the desire to improve are the characteristics of professionals with long-term commitments to their business enterprise and to their field of practice. Laboratory accreditation represents one more forward step in the long history of professional development. I think the step is worth taking.

Closure: Events of the past several months have been encouraging. It appears now that the agreement on form and content of laboratory accreditation is much closer to being an accomplished fact. Some of the other diversions have also been resolved. The road ahead looks much smoother and calmer. Lest we all slip and fall into our old ways, let me remind us all to begin at the point of general agreement. Accreditation should really mean something; it should be fair to the party being accredited; it should be administered by knowledgeable people of integrity, it should consider the economic impact on the accreditee and his clients; and it should be marketed to receive the broadest possible acceptance. Having accomplished those objectives, it will receive the respect it deserves.

Laboratory Accreditation From the Perspective of a Model Building Code

Thomas Frost
BOCA, International

I certainly appreciate the opportunity to speak to this group. I am afraid that you'll probably conclude that I've learned more from listening to you than you will from listening to me. It's a very ambitious undertaking to try to give you a perspective regarding the role of laboratory accreditation in the building code regulatory process.

In a most fundamental sense, laboratory accreditation is a key element of the code process. It is absolutely critical that the regulatory official, whose burden it is to ensure safe occupancy of structures, has a reasonable basis to prequalify the test data from which the anticipated building performance is determined.

With that, let me start with a tailored definition of a building code. A building code is a document intended for law enforcement. A code official is not there to be a friend or a consultant, but a law enforcement officer in the true sense. He is there to make people do things, that in many cases, they don't want to do, hence the term enforcement.

Let's look briefly at the type of codes. It's been my experience as a practicing architect that the prevailing view of a building code is of a body of ill conceived, obstructionary text, frequently dominated by labor unions, placed there to make the practice of architecture more difficult that it normally would be. Perhaps in some locales that is the case. The modern, performance-oriented model code document is a rational, consensus-based document that does a pretty good job considering the complexity and scope of modern construction. There are two types of codes that still exist today in this country. I would guess that about 20% of the codes used as regulatory documents in this country are home-grown codes, local codes. The code of the city of Chicago is one example. These codes are by-and-large undesireable, since they are inconsistent, may not be current and are prescriptive in format. In many cases the standards referenced in these codes are out of date. Most of the local code organizations provide no technical support. If you have a question regarding the application, interpretation, or meaning of a section of a code, you are going to find very little assistance at the local level. The formulation of such codes unfortunately tends to be dominated by special interests in the political process.

Model building codes are promulgated at this time by three organizations; BOCA, ICBO, and SBCC. A model code organization, such as BOCA, is a private, not for profit membership organization consisting principally of enforcement officials. I estimate that the model codes represent about 80% of the text used to regulate building construction in this country. These codes are life safety oriented and performance based, requiring engineering analysis and technical judgment. Therefore, they are heavily dependent on reliable, reproducible test data. At the risk of oversimplification, all three model codes take the perspective that we do not care if the building burns down as long as everyone gets out safely.

The BOCA code is subject to an annual code change cycle where anyone who takes exception to a code section, a code philosophy, or a standard which is referenced is free and is indeed encouraged to submit a code change. These changes must meet the annual code change deadline which is August 1 of each year. These changes are then debated in an open forum where Robert's Rules of Order apply. There are various committees, such as the Building Code Change Committee, which hear proposed changes and make recommendations considered at the January code change meeting. The membership present at the annual convention in June will vote on actions taken in January and will either uphold or go in opposition to the committee's recommendations. There are open hearings where everyone including special interest groups is free to advance their case. This results in a very current state-of-the-art code. The most recent BOCA building code was promulgated in 1984. There is a 1986 supplement and we are in the process of printing the 1987 edition. We have many representatives from the construction community and we certainly look forward to increased participation in the code change process from the testing and inspection community.

I would again like to emphasize that BOCA provides technical support to the users of its documents. This technical support includes product evaluation under the auspices of the National Evaluation Service for both the users of the BOCA code and the two other model codes. The principal mission of the Service is to provide an alternative to current acceptance procedures for innovative materials. Historically under the old procedures of building codes, someone with a better mousetrap, a new structural product, or the like, found it very difficult to gain code acceptance. Because of the procedures of the National Evaluation Service we are able to facilitate the acceptance of materials which have been demonstrated to work and where good documentation is available. The use of test data is very intensive when evaluating new and innovative materials. I am talking about materials for which there may be no referenced standards in the codes. Engineering analysis may be used to determine if the new product performs in a manner as intended by the code which is a rigorous and data intensive procedure. The National Evaluation Service has taken off exponentially since the beginning of BOCA's stewardship in July 1984, which will run until July 1987. The greater participation of such a national program provides economy of scale. There is a higher level of scrutiny since not only does the BOCA staff review these evaluation reports but also the staffs of the two other model codes. These reports may be for a product, a design method, quality assurance agency, or in a few cases testing laboratories. This procedure affords a much broader range of scrutiny than is possible to achieve on the local level since the building official will probably not have the time and may not have the expertise to conduct such reviews.

I should point out that there are three model codes and we are competitors since we compete for territory and use of the codes. BOCA is used principally in the Midwest, the East Coast, New England area, Maryland and Virginia. All, or in part, some 27 states use the BOCA building, mechanical, fire, existing structures codes. We are not governmental, but we serve government. We do agree to function together in certain cooperative activities under the umbrella organization of CABO, Council of American Building Officials. The National Evaluation Service is one such cooperative activity.

I would like to take some time to discuss how the BOCA code regulates building performance. At the risk of oversimplification, let's look at two principal

methods; configuration and materials performance. Configuration can be dispensed with quickly since that is not what we are discussing today. Height and area constraints are examples. Would the code permit construction of a highrise building of woodframe construction? Certainly not, since it is potentially much more vulnerable to fire than a building constructed of reinforced concrete or steel having a high degree of fire resistance. Other configuration regulations include means of egress, locations of exits, travel distance, spacing of buildings from each other and conflagration or large building fire hazard. These appear more in a schematic design phase than in a subsequent engineering analysis of a new, innovative material.

The performance of material in a fire can be evidenced by fire resistance ratings; ASTM E119 considers flame resistance, and ASTM E84 considers flame spread ratings and thermal transmission. We are seeing more and more innovative uses of wood materials including particle board composites, laminated veneer lumber, and combinations of these materials. This is getting very interesting since we are dealing with test data that we have not had an occasion to look at before. The performance of a material may be measured in several ways. There is usually a referenced standard if we are dealing with a material which is not all that new or innovative. Model codes documents reference approximately three to four hundred standards. These standards are not in themselves reproduced in the BOCA code, but are listed in the appendices. It's comparably straightforward given a viable system of laboratory accreditation to correlate the test data with the product. In some cases for specific types of products where the performance is deemed critical - let's take closed prefabricated structural assemblies as an example - it is essential to have third party in plant verification developing a reasonable sampling protocol. But in any case, the reliance is on test data and we as technical support staff for BOCA must aid the building official to prequalify data upon which acceptance is based. How do we provide a common, reliable, objective forum to evaluate such materials? I think the best way to answer this question as well as to illustrate what is meant by performance based code, is to read Section 107.4 out of the BOCA Code entitled Alternative Materials and Equipment.

> The provisions of this code are not intended to prevent the use of any material or method of construction not specifically prescribed by this code provided any such alternative has been approved. The building official may approve such alternative provided the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code and that the material, method or work offered is for the purpose intended at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

Supporting evidence for material performance may be derived by testing or in some cases rational analysis. Testing is frequently not in accordance with standard procedures and may even indeed require the modification of existing standards. One example would be ASTM E108, Measures of Flammability of Roof Coverings, where a modified version has been commonly used to measure the fire hazard characteristics of an exterior insulation system.

I used the word approved, but who approves materials? "Approved" is simply defined as approval by the building official or other authority having

jurisdiction for use within the jurisdiction. It is simply the exercise of police power by the building official. I have dealt with some laboratories that may or may not have been reputable, who wanted to conclude that if BOCA evaluated their ability to perform certain tests, than it was axiomatic that all such subsequent products that they evaluated were "approved" under this code. This is not true. When we issue an evaluation report on an innovative product, material, or system or a testing laboratory or an inspection agency, we are reporting findings to our association members. We are telling them; "here's the scope of the use of this product or the scope of the operation of the agency in question." Under certain constraints or limitations of use, we feel that these products can be used in a manner that complies with the code. We are not hedging when we say we do not approve anything. We are making it clear rather that an evaluation report is intended to be the basis upon which approval by the code official can be based.

Given the above, what is the role of accreditation? Quite simply, it is to provide a basis for the use of the data by the code official. As you can see, the programs that I manage which deal principally with new and innovative materials, are closely tied to reliable, reproducible data.

BOCA's role is both direct and indirect. We evaluate a laboratory based on data or information they submit when seeking evaluation in accordance with ASTM E548. We issue a report which describes the laboratory and the tests we feel they have demonstrated their ability to conduct. This report is an aid to the building official in the decision making process. Indirectly, we have to prequality data for our own use. If we are doing an evaluation of a new and innovative product, we need to verify through reasonable means that the test data being supplied to us is accurate and reproducible. Our methodology is based on ASTM E548, with the requested information broken into categories. The nature of the organization, is it independent; human resources, does the laboratory have qualified personnel, professional credentials; materials resources, do they have the proper equipment to run the tests in question and is it calibrated? Additionally, quality systems, sample selection procedures, interpretation of results are evaluated.

My final point is that while, in fact, we visit very few laboratories, we have very effective methods of feedback. We have a cadre of 3,000 building officials in building departments in the BOCA area, and I am constantly on the phone with various problems associated with products that we may or may not have evaluated or test laboratories which we may or may not have evaluated. It is not a requirement under the code that anyone seek an evaluation or report. It is a voluntary process whereby we provide assistance to the code official.

Laboratory Accreditation from the Perspective of State Building Code Officials

William Connolly
State of New Jersey

About a year ago I was reading my favorite newspaper, The New York Times, and I stumbled on a column by George Will. That day he was doing something he doesn't very often do, reflecting on the legitimate role of government. If you know George Will he is one of those columnists who is not very fond of government, but he had just had an experience in which he was a little more observant than usual. Getting on the elevator he had noticed the elevator inspection certificate on the wall, and for whatever reason he began to think to himself what chance would he have, a newspaper columnist, of determining with the information that was available to him whether or not he would get to the twelfth floor safely. Obviously he could not. That caused him to realize there were certain things that government really did need to do. He talked about things such as the certification of an elevator as sort of the bread and butter of government. Government has a role in removing uncertainties and eliminating the necessity for ordinary citizens to make judgments regarding their health and safety in areas where they do not have the necessary expertise or information. From my perspective as a building code official this is what material certification is all about.

I know from some of the earlier presentations today that not everyone shares that perspective completely, but believe there are other purposes to which materials testing and materials certification can be put. We in the National Conference of the States on Building Codes and Standards (NCSBCS) do not disagree with much that has been said today, but we do bring a slightly different perspective.

I want to start with two points which I hope will demonstrate my perspective as a building regulator. I speak based on experience with a rather large and sophisticated building code enforcement system in New Jersey. We have a state-wide building code system with roughly 3,000 inspectors who are trained and pre-qualified by my agency. Any of them can be removed from office by my agency. We interpret the code and review plans for the most sophisticated structures that are going to be built in the state. We have a close working relation with local governments.

Because the state building code agency is large, we have an opportunity that many building departments do not have and that is to reflect on what we are doing, why we are doing it, and whether it makes any sense. What I am going to tell you is something that any building official would say if he had the time to reflect.

Laboratory accreditation is not an independent subject as it relates to construction materials. The laboratory is but a part, a key part to be sure, but nonetheless just a part of the entire product certification system. It provides probably the most substantial technical input into that system but it is only a part of the system. In the NCSBCS we have a greater concern with the entire product certification system than with the laboratory accreditation component.

Laboratory accreditation and product certification insofar as they involve health and safety issues are ultimately and essentially governmental in nature, because they are an integral part of the law enforcement system. As Tom Frost mentioned earlier, building codes are instruments of law enforcement. I am probably one of the few people in this room with a badge, because ultimately when you strip it all away I am a cop. This is not to say that every material or product certification is ultimately subject to governmental interest or control since many do not concern health and safety. Those that are health and safety in nature are subject to control.

Let me talk now about the present system as we see it. Some might suggest that I have just overstated the governmental role in this system, but in fact the entire material testing and product certification system is presently subject legally at least to strict and complete governmental oversight. It is also presently subject from a practical standpoint to virtually no governmental oversight. This marvelous paradox is due to a couple of things; our federal system of government with police power resting with the states, and proclivity of states to sub-delegate this responsibility to their units of local government. The degree to which our remarkably decentralized and overlapping structure manages to conceal major inconsistencies in utterly opaque administrative arrangements is, I am sure, a source of considerable amazement to people from other nations. I think this is a fair description of material product certification in the United States in 1986. The existence of a system in America which standardizes the characteristics of construction materials with real assurance is fundamentally important to building safety. The system for construction materials is administered and managed by some 28,000 essentially sovereign regulatory jurisdictions by law if not by practice.

Lets look at how a building code law regulates materials, tests, and laboratories. Buildings are designed essentially in accordance with accepted engineering practice or design standards. Those practices and standards rely extensively on knowing the characteristics of the materials. These reference standards and their associated test requirements are adopted in building codes. The 1984 Edition of the Basic Building Code prepared by BOCA (Building Officials and Code Administrators) from which Tom Frost was reading a few moments ago is the law in New Jersey since it is adopted without amendment. It is the same as a piece of statutory law passed in the legislature. Section 1104 of the 1984 edition of the code titled Approval states that an "approved agency" shall test a "representative sample." It goes on to say that an approved agency should be independent, should have adequate equipment and qualified personnel. Approved by who? Approved by the building official? A regulatory world is buried in that one word. Section 201 of the BOCA Code defines an approved agency as an established and recognized agency. The question is recognized by who? Another world buried in a single word. Needless to say, those regulatory worlds are frequently superficial, slap-dash or non existent in fact. Many local and state officials are not fully cognizant of the obligations those two words place on them or are they fully able to carry out the role that those two words establish for them. Responding to that in this country we have an often workable, informal and largely private system which is widely recognized and has grown up to respond to real needs. The bottom line, however, is that our systems are at variance with our laws. So what, it's working isn't it?

That our current system frequently works and sometimes works reasonably well can not be allowed to obscure some fundamental problems. First, we have to assume that health and safety is somewhat in jeopardy when we do not have a coherent, organized way to assure that the tests needed to verify that the laws being complied with are in fact being properly performed by qualified persons. Second, we have to be concerned about restraint of trade and denial of due process when we lack procedures to fairly and adequately assess the competence of all who seek to perform the tests that the government requires. This is especially true as organizations that perform the tests, and organizations that accredit the organizations that perform the tests proliferate. I certainly think I see them proliferating and have not heard anything here today that suggests that proliferation is a thing of the past. I think that we are going to see more types of certification programs.

Let me share with you just one little experience that we had in New Jersey that indicates to me at least that this is a real issue. One of the things that the State of New Jersey does is to approve plans when a municipal official in the town where the building will be built is not qualified to do so. We know whether the official is qualified by our licensing system. When the state approves a plan the local official is required to immediately grant a permit without further approval. This system eliminates duplication and assures that plans are approved in reasonably good order. A private profit making company about eight years ago decided that it would go into the business of approving plans by boldly asserting the right to approve plans. It sounds a little strange, but it took us six years in the federal courts to put a stop to it and we had to go to the circuit court of appeals since we lost at the district court level. The reason we won was because it was decided that we surely have a right to not use private agencies. But imagine for a moment that we have a regulation or a code that says that laboratories will be accredited, just to use an example, by NVLAP. Easy Approved Laboratory Accreditation then comes to us and says "we want equal standing." If we don't have a real basis for evaluating an accreditation program that affords adequate due process to Easy Approved Laboratory Accreditations then we have no choice but to accept them. There could be a problem on the horizon with the proliferation of essentially private laboratory accreditation programs. It is not possible for government to simply recognize one private entity without recognizing others unless it has substantial and carefully put together procedures, standards, and critieria. This system that we have often works, but we need to be concerned about the proliferation of accreditation systems and the multiple recognitions that are needed. Not only have private organizations moved into this area, but many state governments have as well. We need to think about the degree to which this non-system is beginning to impose unnecessary expense on producers and inhibiting the flow of new materials and technology to the marketplace. Unnecessary expenses result when a single test laboratory has to seek multiple private and governmental approvals in order to do a job.

Well, what is the solution to this problem? This is a subject that has been much discussed over the last two years amongst the states through NCSBCS. In addition to being a member of the Board of Directors of that organization I also chair a special committee on the recognition of certification programs. Its goal is to plan what the state governments can do, working together, to actually discharge the responsibility that the words "approved" and "recognized" give to them under the codes in a way that is efficient, effective, and does not duplicate what is already being done. We need to meet

our obligation to afford adequate due process without being arbitrary or capricious to people that come before us either with certification programs or accreditation programs that they want accepted. In the course of that work I think we have been able to identify what we consider to be the essential elements of reform and improvement in the system which I would like to share with you before I close. First, we do in fact need certification programs for testing laboratories and all testing laboratories whose data are used in a regulatory sense ought to be certified. There is room for a variety of such programs, especially if they are private. The law in fact requires that variety. We are not in the position to say that this program is the one that is going to be accepted to the exclusion of comparable systems. There is plenty of room for a variety of programs and approaches which appears to be consistent with the general trend of events.

Next, there is a need for an authoritative, and when I say authoritative you can read governmental organization, which will set, monitor, and enforce minimum criteria for laboratory accreditation programs. It does not mean that government needs to take over laboratory accreditation, but government agencies that are going to recognize laboratory accreditation programs need to have the ability to monitor and enforce minimum criteria. Hopefully, this can be done jointly rather than separately. If done jointly an authoritative mechanism will be needed in which a government agency can place full reliance. Such an authoritative organization should be self-supporting, should be as independent as possible of the vagaries of political and funding problems, should draw upon the authority of the states and the Federal Government, and be recognized by both. Such a system also needs to be based on the premise that decertification is one of the most important parts of the certification program. It is not something you get once and you keep forever. It does require a serious effort not only at monitoring, but on taking action when monitoring results show unsatisfactory performance.

The development of a coherent system for recognition of product certifiers is probably even more desirable. The reason I say more desirable, is that in product certification the proliferation is far greater than in laboratory accreditation. Also, there is a good deal more involvement by profit making and non-membership organizations in product certification which almost by definition are somewhat less responsible, than non-profit membership organizations.

We need to start moving more quickly. We have seen any number of efforts described here today that intellectually make all the sense in the world but are growing far too slowly. We need something that is going to drive this system and we think that an authoritative process that rests on the authority of the states and the Federal government will in fact derive acceptance. I find it a little bit odd talking about, as a number of our speakers talked about earlier today, the concept of marketing accreditation, when this accreditation is required by law.

All of this we think is necessary, not just because it is rational or because it is intellectually tidy, but because it protects health and safety, it would not restrain trade, and it would allow and encourage innovation. These things are not adequately promoted by the present situation to the degree that it should. Thank you very much.

Legal and Liability Concerns Associated with Certification and Accreditation Programs

James Anderson
Loomis, Owen, Fellman and Howe

It is a pleasure to be here. The law school I attended was located next to the engineering school and the medical school. An entrepreneurial type person set up a bar nearby and said that in order to be a patron you had to be either an engineer, a doctor or a lawyer. So I got to know a lot of your brethren. That particular comradery generated a lot of competition between us, intramural football, etc. and there was the continuing controversy whether St. Patrick was an engineer or a lawyer. The lawyers claimed he was a lawyer and the engineers claimed he was an engineer. I've always heard that was an age old controversy and never figured out where it came from.

As indicated by the conference program the purpose of my discussion is to highlight some of the potential legal problems that an accreditation program might have. There are essentially two areas where a liability can occur. The first is the situation where injury to a third party occurs as a result of an alleged mistake made on the part of an accredited laboratory and creates potential liability for the accrediting agency. The second area is a violation of the antitrust laws which concerns liability on the part of an accrediting agency when the part of an injured party, specifically a laboratory, has been either denied accreditation for some reason, or whose accreditation was withdrawn.

My experience has shown that if you look statistically at the number of cases in recent years, there have been more antitrust than tort cases. But the question of the liability of an accrediting agency when a laboratory does not do a proper job is one which I think will come up soon, because the general rule as far as lawsuits are concerned is to sue everybody in sight. This is done to ensure that the party with the deepest pockets becomes involved. Recently I was talking with a reporter in another industry who was trying to attach some significance to a case where a particular defendent had to pay $1.5 million. The conclusion that I came to was that it shows that a plaintiff can successfully sue anyone in the business. It doesn't mean that everybody is going to be liable, but what happened in this case, is that the plaintiff had an injury and looked around and found someone able to pay. So, if I were a plaintiff's lawyer, and I found out that an accident occurred as a result of the failing of some type of material that had been certified by a laboratory, I think I would consider whether or not the laboratory who made the certification had done its job properly. If in fact that laboratory had been accredited, I would then determine whether or not the accreditation procedures were such to ensure that the laboratory could do its job. This raises all kinds of issues as to how one would protect himself from liability if he were to establish an accreditation procedure.

In thinking about this issue, it seems to me that the question of the degree of certification, issues raised in earlier talks, is very important. One level of accreditation would be to ensure that the laboratory has the proper equipment. A second level might be to certify that the laboratory has the proper equipment and follows the proper procedures. A third level of

accreditation would be to accredit and/or certify, (I use the term synonomously here), that the laboratory has the proper equipment, that it uses the proper procedures and that it has proper personnel. The next level of accreditation would be to say that the laboratory, in addition to all of the above based upon the accreditation procedures, is at present following all of the proper procedures, is equipped with the proper equipment, and has competent personnel. Obviously, each level exposes you to more liability. The best procedure would be to certify that the laboratory has all of the proper equipment. If you do this you're not saying that the laboratory is properly using the equipment, or that they are following the proper procedures. Now, in the course of establishing an accreditation program, minimum criteria would have to be developed. If they did the tests correctly 90% of the time, would that be the requirement; or would 50%, 40%, etc. be appropriate?

The issue of whether or not an accrediting agency and/or an accredited laboratory is going to find itself in court, in my view, will probably relate to the degree of publication of the fact that a laboratory is accredited. The commercialization of the fact of accreditation, if you will. Based on what I have heard here today, and my experience in the construction industry, it is obvious that by obtaining accreditation a laboratory would be able to compete better and anticipate higher profits. Higher fees can be charged, and the laboratory can bid for jobs where the specifying organization requires an accredited laboratory. The more that accreditation becomes publicized, the more likely it is that the accredited laboratory, and perhaps the accrediting agency, could find itself as a party to a law suit.

Statistically, I have not seen an awful lot of cases where an accrediting agency has found itself in court. Most of the cases that have been recently recorded were related to consumer injuries where a certifying agency has said that the product meets certain standards. There is a case involving fire extinguishers where one exploded causing a person to be injured, and not only was the manufacturer sued, but also the certifying agency. I have seen a case involving a trade association where the plaintiff said that the trade association failed to establish proper criteria, and that they did this purposely in order to not tell the public that a particular type hazard existed in a product. The plaintiff believed that exposure to this particular product caused his cancer. The case was subsequently dismissed on other grounds and the issue was never decided.

The area that I have seen litigation, however, is in cases involving antitrust and trade regulation matters, where someone has either been denied certification, or denied accreditation, or where the accreditation or certification has been removed. In this case, the person comes in under the theory that his ability to compete in a specific industry has been substantially reduced, alleging that, the party removing his certification has violated the antitrust laws.

I think that the New Jersey examples discussed earlier are similar to some of the situations that I have seen, and in the short run those are the kinds of problems that you are going to experience in accreditation of laboratories in the construction industry. It appears that steps have been taken to establish procedures to insure that laboratories being accredited are carrying out the procedures properly. By virtue of the discussion we have heard today, I think there has been a tremendous amount of effort to establish procedures for

reviewing the work of the laboratories, to ensure that they have the proper equipment and that their personnel are properly trained.

I do think that work must be done to establish procedures for reviewing applications that are consistent with the antitrust laws. In that regard, some of you may be aware of the Hydrolevel case, which has had a significant impact on standards making activities and other trade association activity. I think that it might be helpful to review the facts of that case briefly. Hydrolevel Corporation manufactured a device that shut off water that flowed into tanks which was somewhat revolutionary to the extent that it was something that none of the competitors had at their disposal. The Hydrolevel device used a computer while its competitors had sort of a float type device that shut off the water. At a very low level committee meeting of the American Society of Mechanical Engineers (ASME), committee members in a backroom session drafted a new standard which eliminated Hydrolevel's device thus effectively preventing them from competing in the industry. While this was a voluntary standard, the committee members knew that it would be adopted by most specifying agencies. The standard subsequently went through the various levels of the ASME and was ultimately approved by the Board of Director who did not know about the intent of the backroom committee to eliminate Hydrolevel. They sort of rubberstamped the standard as it went all the way through the system.

As a result, Hydrolevel went out of business. Hydrolevel then filed an antitrust case against the participants in the backroom session, as well as the ASME. Everyone settled out of court except ASME which took the position that because the Society was not aware of and was not a party to the illegal activities, specifically the discussions in the backroom, that they were not liable. Well, the case ultimately went to the Supreme Court. The Supreme Court said sorry ASME, our view is that all trade association activity must be conducted in accordance with the antitrust laws, and the parent organization is responsible for the actions of all members acting in behalf of the association.

The importance of Hydrolevel is that it requires that all certifying and standards making agencies follow due process requirements, and insure that standards are not promulgated in such a way as to eliminate certain segments from competition. Now, what impact does this have on accrediting agencies? When you establish your procedures or your policies regarding accreditation, you must insure that these policies, criteria, and procedures are set up in a fair and proper way. Procedures must be established whereby persons or organizations that are denied accredition are aware of the reasons, and that there are procedures within the accreditation process to insure that they can appeal the decision. Problems have occurred, for example, in situations where persons have been denied accreditation based upon hearsay evidence. There was a case involving a company that manufactured a certain type of a signal for boat trailers whose product certification was removed by a trailer manufacturer association. At a hearing of the certifiers a competitor got up and said, "You know Smith's Company doesn't follow our standards." And someone from the association got up and said, "You're right. Smith doesn't do it and unless Smith makes the changes we're going to decertify him." Smith never got an opportunity to come forward and say what he did, and subsequently the fact that he was decertified resulted in an antitrust litigation with the plaintiff in the case recovering against the association.

So the bottom line as far as limiting your liability for an accrediting agency is to establish reasonable accreditation criteria consistent with the job that the laboratory is going to have to perform. The criteria has to be reasonable so that it can be met by all qualified parties and they will be able to compete. Secondly, you have to establish fair and complete accreditation procedures so that the persons who are denied accreditation will know where they are and in effect what they have to do to establish accreditation. So when someone applies for accreditation they have to know what the standards are that they have to meet, if they fail to meet the standard they have to be told why and what they have to do in order to meet the standards. If they are being decertified or disaccredited, they have to be told why and they have to be given an opportunity to come forward and appeal the decision of the body that decertified or disaccredited. In that regard, if complaints are made against them, it is very important that when complaints are investigated that efforts be taken to insure that the complaints are valid and that the party against whom the complaints have been made has a reasonable opportunity to respond. It is also important that accreditation procedures be properly represented to third parties. In that regard, I think that the problem will occur more when private sector laboratories get involved in representing themselves or holding themselves out to be accredited. It is important that if you are the accrediting agency you make sure that the laboratories that you accredit set forth properly what they are accredited to do to the third party. If they hold themselves out to be something that they are not, it could result in liability.

So in conclusion, I believe that this is not an area fraught with so much litigation that it should be avoided. It is an area where the exercise of care and caution can limit your liability, and as I said in the beginning, I think your problems will result not so much from injuries that occur as a result of negligence, but more as a result from injuries that occur to people who have been refused accreditation or have had their accreditation withdrawn.

Certification Program Experiences Relative to Liability Issues

Richard Gaynor
NSGA - NRMCA

I will be discussing the certification programs of The National Ready-Mixed Concrete Association (NRMCA). These have been in operation since 1965 and include a certification program for ready-mixed concrete production facilities including the plant, the aggregate handling equipment, and the transport vehicles, and a program for certification of personnel.

We have been conscious of potential liability problems with such programs and have taken steps which we hope will prevent such problems. This includes the development of requirements by a broad based group including those who will be affected. The plant certification program is under the jurisdiction of the NRMCA Standards Committee which primarily includes those to be certified. A program should not promise more than it can deliver and should be available at a realistic cost to anybody who wants to use it. Record keeping is important including the original development of records, minutes of meetings, and letter ballots on revisions.

I have handed out a sheet which on one side shows a certificate that we issue for plant certification, and on the other side a certificate for personnel. I would like to present a brief outline of how our system works for the ready-mix concrete production facilities. The company hires a registered professional engineer (P.E.) who is required to have certain experience in the technical area of certification. An area where we have been on the edge of getting in trouble is that case where the obviously qualified person is not a P.E. and we have taken the position that we will not accept the check list for a facility that he has prepared. In spite of this problem, we still require a P.E. The P.E. takes the check list and inspects the plant, the trucks and related facility components and returns it to us. We do an audit procedure to see if it is filled out correctly and if the inspector has done an acceptable job. We write letters and question information on 10 to 20 percent of the check lists that are submitted to make sure that they have been done properly. If we are satisfied, we issue a certificate which the P.E. and the company official sign. At the bottom of the certificate there is a place for the signature of the company official stating that he will maintain the facilities in accordance with the check list requirements for the remainder of the two-year certification period. The personnel certificate states that the person has passed the examination and has demonstrated his ability to perform the tests.

An important issue related to certification is the referencing of the system by a specifying body. In our case, we want to make sure that the specifying agency does not specify that the applicant be certified by the National Ready-Mixed Concrete Association, but rather that the facilities meet the requirements of the check list or that the person has the knowledge and ability to perform the tests. It should not be specified that the individual should have a certificate from NRMCA. Our documents are available for use and if someone shows that he can comply with the requirements as they appear in those documents then he should be accepted. I understand that that creates some problems for the specifying agency. It may be much easier for the

specifier to accept one of our certificates and say he complies, but in the absence of that certificate, we would like for him to have the option of coming to us or to somebody else to make the judgment about whether or not he meets the requirements. We believe this helps us a great deal in shielding NRMCA from liability as it relates to the antitrust issues discussed by Jim Anderson.

What about liability and liability coverage? Well, in the 20 years we have had coverage, we have had no court cases, or even near court cases. The NRMCA system is probably a great deal simpler than the accreditation system being discussed at this Conference. Our system has been incorporated in a number of specifications and is widely used across the country. It has been used in Illinois, Florida and Arizona as a requirement for furnishing concrete to State construction projects at various times. Other than that, it hasn't been a hard requirement anywhere which has probably helped us some. I think our procedures for access by those who have an interest has headed off things that might have been potential problems. We do have liability insurance coverage and it's getting more expensive. We probably benefit from the fact that we've carried the coverage with the same carrier for almost 20 years and he may not have looked at us closely in the last couple of years. This may change on October 1 when the policy comes up for renewal, but I hope not.

As discussed by Jim Anderson a short time ago, one area of concern is when a company or person is denied certification. It is obvious that openness in record keeping and reasonableness of the requirements themselves all help in both avoiding and ultimately in defending law suits. This is one thing we have been sensitive to from the beginning and we sometimes have been criticized for not making the requirements more strict. However, development of a system that does not discriminate against companies or personnel who can perform is a sensitive issue from the point of view of restraint of trade. We do not think that we have exposure in this area. The note at the bottom of our plant certification certificate states that the plant will operate properly, but there's more to it than that. Our check list has a paragraph that talks about limitations of facility certification.

I was interested in listening to the discussions of NVLAP and ILAC that a real attempt is being made in the International area to assure the quality of testing. I have a fundamental belief that there isn't a police force in the world that is going to succeed without the support of those that are being protected and I believe this applies to the area being considered at this Conference. I do not believe that we will be successful in guaranteeing that labs will do things correctly or that any agency can be an effective police force to ensure that testing is done in accordance with standards. Certainly, efforts can be improved, but if we attempt to certify performance we will incur much more serious liability exposure.

Plant Certification Program of the Prestressed Concrete Institute

George H. Krepel, Jr.
Prestressed Concrete Institute

The Prestressed Concrete Institute, as a group 20 years ago, decided that if the industry was to survive it would have to provide quality products. The members of the Institute decided that what they needed to do was to develop standards for their products and a standard form of inspection which the industry could live with. It is very possible to say that PCI's program is close to self regulation. This program is available to over 400 manufacturers of precast and prestressed concrete. It does not apply to concrete block or concrete pipe manufacturers.

PCI's program is voluntary, but the institute has been very successful over the years in getting specifiers to recommend PCI plant certification. The Corps of Engineers and the Department of the Navy utilize the program in many parts of the country, and the overall acceptance of the program is increasing. Agencies are actively looking for companies or organizations such as ours that will help ensure that they are getting the product they are specifying. One of the things that always bothers me is that many specifiers will require PCI certified plants until the final bid, at which time that requirement goes out the window and the only thing that matters is the price tag. This bothers me because it indicates that specifiers don't understand the purpose of a certification program.

I am amazed at the discussion we have heard today about two, three and four year inspection periods. We fought very diligently with BOCA to allow us to visit a plant only three times a year for four days worth of inspection. This adds a lot of credibility to PCI's plant certification program, which is necessary if a program is to be viable. An inspection every four years doesn't sound very credible and I agree with Mr. Anderson that you may be increasing your liability by saying that four years is enough. I am not so sure that liability stops after every four months. PCI has never been sued or been party to a suit. We have come closest to litigation when a plant has been denied certification by the program. Of course, what we have to protect us there is our process of certification. This includes a step by step application procedure. This begins with a letter of interest requesting information which may include contract documents. When a properly completed contract and payment for the inspection is received arrangements are made for an inspection. When the inspection is successfully completed the plant is recognized as being certified. Initial certification is probational until the plant passes a second inspection. In addition to probation, the program has a decertification and an appeal process.

Quality assurance, to be effective has to be ongoing. PCI's program has three inspections a year, two of which are unannounced. This makes scheduling three inspections a year at 130 plants less difficult since two of the visits do not require coordination with the plant. The inspections for the program have been performed by an engineering firm from Nashville, Tennessee since its inception. Every inspector is a graduate engineer and some are certified Professional Engineers. All initial inspections are done by one of three individuals who are P.E.'s in anywhere from 9 to 13 states. PCI's program is

viable because it uses credible inspectors.

In regard to the standards, we use the PCI Quality Control Manuals, MNL116 and MNL117, and for glass fiber reinforced concrete (GRFC) we have a "Recommended Practice for Glass Fiber Reinforced Concrete Panels." We do not try to write standards, but accept what ASTM, ACI or others develop. For example, some precast procedures do not have concrete batching operations; therefore, the program requires that they should use an operation recognized by the National Ready Mixed Concrete Association or meet their requirements.

Listening to Mr. Anderson, I find that PCI may be doing things wrong because our inspectors go into a plant and say that it has a confirmed capability, has the equipment, has competent personnel, and is operating in accordance with the industry standards. I doubt that PCI is going to change that. What the program does is grade each production facility using a weighted checklist where 80% or more in compliance is the minimum acceptable grade for certification. There are 140 items identified in MNL116 and a similar number in MNL117. There are six major areas to each inspection report, and the applicant must meet minimum standards in each area. A grade of 70 or better must be obtained in each section with a total overall grade of 80. So PCI is accepting plants that are not perfect. This is done, not because we are polite, but because the program is designed to improve a plant's Q.C. program. The inspections help them improve their program by pointing out shortcomings, potential problems and recommendations for improvement. We believe this is very important. There is no sense in having an inspection if it doesn't generate viable feedback.

The restraint of trade issue has always been a consideration in our program. The program is open to any producer who is interested. We recently had a septic tank manufacturer who wanted to provide products for a prison. They failed their first inspection when they were unable to get 800 psi concrete out of a state approved mix. This same producer had been approved by other programs indicating another potential problem, that our standards may be more stringent. PCI believes that everyone should be using the same standard. I personally have had the privilege of running a precast plant in the past. When I took that plant over, they had to test in the morning to see if the concrete had reached required stripping strength. The foreman would go out to the product and with a key he would scratch along the concrete; if the color was gray it wasn't hard yet, if it was white it was hard. That was the plant's quality control program!

We have recently had to face the fact that, with the advent of GFRC and other types of precast products, foreign manufacturers will be bidding and obtaining some jobs. The first one which we became involved with was in Mexico which has a tremendous labor advantage. One U. S. producer went across the border and his labor costs went from $4 an hour to $4 a day. PCI does have a designated program which will allow us to go outside the U.S. Canada is a different situation since they have their own certification program for their precast industry. PCI has a reciprocal arrangement with Canada. We have had some inquiries from Singapore in getting some plants certified. We notified them that we would be happy to go to Singapore and provide the certification, but we have not had any response as yet.

Again, restraint of trade is a consideration that has to be addressed at all times. I am often asked why anyone would want one of our reports, since they

are often negative. I respond that they may be liable for not having one. The question is, if there is an instrument available to help you do your job better, are you potentially liable for not using it? In Illinois we have a "Good Samaritan" law that says that you can't be sued if you stop at an accident and help somebody to the best of your knowledge. But if they can prove that you didn't utilize the best of your knowledge, such as a doctor, they can sue you. I think some lawyers, or some engineers, may be falsely under the impression that if they do not go on a job site that they are not liable. However, this may not be true if in their realm of responsibility they should have gone there. So possibly using this reasoning, it may be the responsibility of the plant to participate in the program since thereby they may reduce some of their problems. Again, on the negative reports, I recommend to every member who participates in our program that it is in their best interests to correct the deficiencies found. In essence, if there are 14 items that need to be addressed, there should be a notation after each one as to the disposition of that item. If testing equipment is found broken, there should be a work order to have it fixed; there should be some information as to whose responsibility it is; and who is going to check up to see that it gets done. We have had producers hold the report and do nothing.

Again, the question was raised as to why would specifiers want to utilize a program of the type I have discussed. I'd like to mention the certification program of the State of Washington which utilizes our program as well as other programs. A fellow from the State called me and said, "George, we'd like to just require PCI's program." I said, "Well, I thought you had a program that included other approved agencies and that it was working fine." He said, "Well, it is. It is just that we have fewer problems with your program."

Therefore, in closing, a good certification program is a tool that can and does serve the specifiers.

4. WORKSHOP FINDINGS AND PROPOSED ACTIONS

The workshop assignments shown in Appendix B were made on a random basis except that, where possible, individuals representing the same organization were not assigned to the same workshop. Attendance records at each workshop session were not kept, but attendance was generally less than the assigned number. Therefore, it should not be assumed that each registrant participated in the discussions resulting in the findings and proposed actions of the assigned workshop.

4.1 WORKSHOP I. CHAIRMAN - PAUL KLIEGER[1]

Findings

1. There is a need for a coordinated approach to the accreditation of construction materials testing laboratories. Coordination would have a significant impact in improving the quality of construction in this country.

2. CCRL and AMRL are providing the type of inspection and proficiency testing programs that ought to be included in the requirements of a laboratory accreditation system.

3. The NVLAP program is not as broad in scope as CCRL and AMRL and does not have their credibility even after about eight years of existence.

4. The AALA accreditation program for construction materials is not near the stage of development of CCRL and AMRL and would require a significant amount of time to attain their level.

5. There will be an increasing demand for laboratory accreditation since more and more specifying bodies are requiring it in contract documents.

6. The accreditation system should offer different levels of accreditation depending on the scope of activities of the particular laboratory rather than just one broad accreditation effort.

7. The initial coordinated accreditation effort should be with the primary construction materials; concrete, steel, asphalt, etc. CCRL and AMRL have well-established programs for many of these materials.

8. There is a need for some type of accreditation for project and branch laboratories.

9. Available standards for laboratory accreditation are improving rapidly (e.g. ASTM E329 Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction), but work remains to be done to insure coverage for all primary construction materials.

---

[1] See Appendix B for affiliation of workshop chairmen

10. Certificates of accreditation should be sufficiently detailed so that the client using the laboratory is made aware of the limitations and constraints put on the accreditation. Wording on the certificate can be selected to reduce the potential liability of the accrediting organization.

11. Promotion of a coordinated accreditation program could be accomplished through technical societies such as ACI, ASME, and ASCE, and through technical publications. Workshops and seminars could also be used to bring the program to the attention of specifying agencies.

Action Proposed

The first step in the consolidation and coordination of accreditation activities should be taken by CCRL and AMRL by requesting their organizational sponsors (ASTM and AASHTO) to take on the role of accreditors, possibly under the supervision of their oversight committees. Accreditation can best be accomplished by a voluntary consensus organization rather than either a governmental organization or a private sector organization.

4.2 WORKSHOP II. CHAIRMAN - THOMAS FLINT

Findings

1. There is a need for a coordinated laboratory accreditation system for the primary construction materials defined for the Conference. The individuality of organizations currently involved with accreditation such as CCRL, NVLAP, AALA and AMRL should be retained where possible.

2. Implementation of the accreditation system should be through an umbrella organization such as ASTM, AASHTO, NIBS, a U.S. conference structured similarly to ILAC, or some combination thereof.

3. Implementation of a coordinated system should attempt to minimize duplication of individual programs such as through the use of shared assessors (e.g. AALA acceptance of CCRL assessments for concrete laboratories).

4. AALA and NVLAP appear to be coming together in that both use specific test methods in evaluating the construction materials discipline.

5. Laboratory accreditation needs to cover equipment, test and operational procedures, and personnel.

6. Educational programs, seminars and publications should be used to promote accreditation along with the use of specification references and regulatory requirements.

Action Proposed

Convene a working group of organizations clearly identified as concerned with laboratory accreditation of primary construction materials to quickly follow up the work of this Conference. The charge to this group should be to define the goals, scope, format and procedures of a coordinated national

accreditation system for construction materials testing laboratories. Selected individuals and organizations should be invited to insure a continuity of consideration based on the conclusions and recommendations of this Conference. Participation in the working group should be from organizations such as AALA, NVLAP, CCRL, AMRL, ASCE, AASHTO, WACEL, ELF/FCPA, NCSBCS, CABO, ASTM, ACIL, ACI, NBS, DoD, HUD, GSA and FHWA. It is suggested that this meeting be hosted by ASTM and that Wayne Ellis be approached to serve as temporary chairman based on his previous involvement with ASTM and laboratory accreditation. Planning for this working group meeting would be carried out by the chairman and representatives of the primary organizations involved (ASTM, AASHTO, AALA and NBS). The organizing committee of this Conference should see that this meeting is held as soon as possible.

4.3 WORKSHOP III. CHAIRMAN - EDWARD GALLOWAY

Findings

1. There is a need for a coordinated accreditation system for the primary construction materials. This system should involve the present CCRL and AMRL programs.

2. There should only be one level of accreditation. A laboratory should not be permitted to pick and choose from among several levels of accreditation.

3. A laboratory should be inspected every two years with an annual review of records.

4. An accreditation program should have an unbiased credibility; have knowledgeable, experienced, and professional personnel; have proper equipment; and possess the ability to adapt to changes in test methods. The program should be operated on a not-for-profit basis.

5. There already are, or soon will be, sufficient standards available (e.g. ASTM E 329) to govern an accreditation system for the primary construction materials.

6. The time from when a laboratory requests an accreditation to the time the evaluation is made is critical and should be minimized.

Actions Proposed

1. The Federal Highway Administration and other appropriate Federal Agencies should encourage/request that state highway administrations require that all testing of primary construction materials be accomplished by accredited laboratories.

2. Building code bodies should be approached and encouraged to require the use of accredited laboratories.

3. Professional organizations such as ACI, ASCE, ASTM, AASHTO, ASME, AIA and others should be encouraged through their membership and publications to make people aware of such an accreditation system and to promote its use to the utmost.

4. Future development of accreditation systems should provide for local or state involvement in order to make these systems work.

5. NVLAP should not move forward to establish an independent laboratory accreditation program but, instead, NVLAP officials should enter the dialogue with other sponsors of this Conference and help develop a harmonized, coordinated system.

6. ASTM and sponsors of this Conference should be encouraged to continue their efforts to reach other organizations to establish policies and to promote the coordination of accreditation of construction materials testing laboratories. These efforts should include the accrediting of the accrediting bodies.

4.4 WORKSHOP IV. CHAIRMAN - WILLIAM GUNDERMAN

Findings

1. There is definitely a need for a coordinated laboratory accreditation system for the primary construction materials.

2. Problems are created by multiple standards for the same construction materials such as may occur for standards of ASTM, AASHTO, or State DoT's.

3. Periodic follow-up evaluation of laboratory performances must be part of the accreditation system.

4. The current system where a laboratory may be required to hold several evaluations and accreditations is causing problems relative to costs and impact on operations.

5. Standards for accreditation are currently well developed, but procedures and acceptance levels for accrediting or disaccrediting are non-existent except for NVLAP. International standards for accreditation should be used where possible.

6. There is a need for a major educational and/or sales approach to promote acceptance of the system.

7. There should be a minimum scope of accreditation for any given material area such as concrete.

8. If CCRL and AMRL were to expand into accreditation, these services should be marketed as a joint program where applicable. It would be desirable to schedule a common visit by these two inspecting agencies.

9. The format of the accreditation certificate should be appropriate for public display, be relatively simple and, where necessary, be backed up with other documents such as a scope statement. The laboratory commitment should be indicated by a signature on the part of the laboratory, but not necessarily on the certificate.

10. The ideal way to gain acceptance of a coordinated accreditation

system is by reference in specifications. There is a need for better dissemination of current information on laboratory inspection and accreditation systems.

Action Proposed

An executive summary of the Conference and workshops should be published and widely distributed to gain the kind of publicity needed to implement a coordinated accreditation system.

5. RECOMMENDATIONS OF THE CONFERENCE

After presentation of the workshop reports and extensive discussion by Conference participants, there was a strong consensus on the following two issues:

1. There is a need for a coordinated national system for the accreditation of construction materials testing laboratories and its development should be initiated.

2. An Executive Summary including findings and proposed actions of the workshops and recommendations of the Conference should be prepared as quickly as possible.

The following recommendations were moved, discussed and passed by the Conference participants.

1. ASTM should, without delay, host a working group of organizations clearly identified as concerned with laboratory accreditation and with principal emphasis on construction materials testing. The charge to the working group should be to define the goals, scope, format and procedures of such a coordinated laboratory accreditation system. Participation in the working group should be by special invitation to individuals from organizations such as: AALA, AASHTO, AMRL, ASCE, CABO, CCRL, DoD, EFL/FCPA, FHWA, GSA, HUD, NBS, NCSBCS, NVLAP and WACEL. Efforts should be made to keep this group small and thus assure that everyone is heard and progress is furthered. Wayne Ellis was recommended as the chairman of the working group if he would agree to serve. A small planning group to organize the meeting should be established consisting of the chairman and representatives of groups such as AALA, AASHTO, ASTM and NBS. The organizers of this Conference should take a lead role in assuring that the working group meeting on the development of a coordinated laboratory accreditation system is expedited to maintain the momentum from this Conference.

2. NVLAP should not move forward to establish an independent laboratory accreditation program for construction materials but, instead, NVLAP officials should enter the dialogue with sponsors of this Conference and help develop a coordinated laboratory accreditation system.

3. CCRL and AMRL should not move forward to establish an independent laboratory accreditation program but, instead, CCRL and AMRL officials should enter the dialogue with sponsors and help develop a coordinated laboratory accreditation system for construction materials.

Appendix A

Conference on Accreditation of Construction Materials Testing Laboratories

PROGRAM

May 14, 1986

8:00 a.m. Registration (Coffee and Danish in Employees Lounge)

9:00 a.m. Welcome.....Dr. Ernest Ambler
Director, National Bureau of Standards

9:10 a.m. Conference Chairman Remarks.....Mr. Walter Kunze
Chairman, ASTM Joint C1/C9 Subcommittee on the CCRL

9:25 a.m. ASTM and Laboratory Accreditation.....Mr. Peter Brown
Vice President, Finance and Administration, ASTM

9:55 a.m. AASHTO Staff Views.....Mr. Francis Francois
Executive Director, American Association of State Highway and Transportation Officials

10:20 a.m. Coffee (Employees Lounge)

10:40 a.m. National and International Standards Activities Related to Laboratory Accreditation.....Mr. John Locke
Chairman, ASTM Committee E-36

11:10 a.m. Status of ASTM Standard E329 and Other Related Standards.....Mr. Spencer Thew
Chairman, ASTM Subcommittee E36.93

11:40 a.m. Status of NVLAP Activities Related to Construction Materials.....Mr. Robert Gladhill
Project Leader, National Voluntary Laboratory Accreditation Program

12:05 p.m. Status of AALA Activities Related to Construction Materials.....Mr. John Locke
Executive Director, American Association for Laboratory Accreditation

12:30 p.m. Accreditation of Testing Laboratories in Florida.....Mr. John Roebuck
Member, Engineering Laboratories Forum/Florida Concrete and Products Association

1:00 p.m. Lunch (NBS Cafeteria)

1:55 p.m. Construction Materials Reference Laboratories at NBS.....Mr. James Pielert
Group Leader, Construction Materials Reference Laboratories

2:20 p.m. Laboratory Accreditation from the Perspective of a Construction Materials Engineer.....Mr. Grover Williams
American Council of Independent Laboratories

2:45 p.m. Laboratory Accreditation from the Perspective of a Model Building Code.....Mr. Thomas Frost
Manager, Evaluation Services, Building Officials and Code Administrators International, Inc.

3:10 p.m. Coffee (Employees Lounge)

3:30 p.m. Laboratory Accreditation from the Perspective of State Building Code Officials.....Mr. William Connolly
National Conference of States on Building Codes and Standards

3:55 p.m. Legal and Liability Concerns Associated with Certification and Accreditation Programs.....Mr. James Anderson
Partner, Loomis Owen Fellman and Howe

4:20 p.m. Certification Program Experiences Relative to Liability Issues.....Mr. Richard Gaynor
Executive Vice President
National Sand and Gravel Association/National Ready-Mixed Concrete Association
and
Mr. George Krepel, Jr.
Manager of Production Programs, Prestressed Concrete Institute

5:00 p.m. Conference Chairman Remarks

5:30 p.m. Reception and Dinner at NBS Senior Lunch Club

7:00 p.m. Workshop Sessions at NBS

9:00 p.m. Adjournment for Evening

May 15, 1986

9:00 a.m. Reconvening of Workshop Sessions (Coffee and Danish available)

10:30 a.m. Coffee

10:50 a.m. Continuation of Workshop Sessions

1:00 p.m. Lunch (NBS Cafeteria)

2:00 p.m. Reports of Workshop Chairmen

5:00 p.m. Concluding Remarks by Conference Chairman

5:15 p.m. Conference Adjournment

Appendix B
PARTICIPANTS IN CONFERENCE ON
ACCREDITATION OF CONSTRUCTION MATERIALS TESTING LABORATORIES

May 14-15, 1986

James Anderson
Loomis, Owen, Fellman & Howe
2020 K Street, N.W.
Washington, DC 20006
Phone: 202 296-5680
Workshop No.: 1

Michael S. Anselmo
United States Testing Co., Inc.
1415 Park Avenue
Hoboken, NJ 07030
Phone: 201 792-2400
Workshop No.: 2

John D. Antrim, General Manager
NICET
1420 King Street
Alexandria, VA 22314
Phone: 703 684-2835
Workshop No.: 3

Harvey Berger
National Bureau of Standards
Admin. Bldg. Rm. A531
Gaithersburg, MD 20899
Phone: 301 921-3431
Workshop No.: 2

Joseph Berke
Naval Civil Engineering Lab.
Code L-53
Port Hueneme, CA 93043
Phone: 805 982-5555
Workshop No.: 4

Joe Bhatia & Hank Collins
Underwriters Laboratories
818 18th Street
Washington, DC 20006
Phone: 202 296-7840
Workshop No.: 3

C. W. Britzius
Twin City Testing Co.
622 Cromwell
St. Paul, MN 55114
Phone: 612 645-3601
Workshop No.: 1

Peter Brown
ASTM
1916 Race St.
Philadelphia, PA 19103
Phone: 215 299-5400
Workshop No.: 2

Conway C. Burton
Chicago Testing Laboratory, Inc.
3360 Commercial Ave.
Northbrook, IL 60062
Phone: 312 498-6400
Workshop No.: 3

Walter E. Capper
E. L. Conwell & Co.
Continental Business Cen.
Front & Ford Streets
Bridgeport, PA 19405
Phone: 215 277-2402
Workshop No.: 1

Michael A. Clark
American Concrete Institute
22400 W. Seven Mi.Rd
Detroit, MI 48219
Phone: 313 532-2600
Workshop No.: 4

William Connolly
State of New Jersey
363 W. State St.
P. O. Box CN804
Trenton, NJ 08625
Phone: 609 292-7899
Workshop No.: 1

Gary L. Cooper, Assistant State Engr
Arizona DoT
Room 127A
206 S. 17th Ave.
Phoenix, AZ 85007
Phone: 602 255-7286
Workshop No.: 2

Charles Culver
NBS
Structures Division
Bldg. 226, Rm. B268
Gaithersburg, MD 20899
Phone; 301 921-2196
Workshop No.: 1

Richard Davidson
HQ - Corps of Engineers
DAEN-ECE-G
Washington, DC 20314-1000
Phone: 202 272-0207
Workshop No.: 3

Calvin L. Dodl
Froehling & Robertson
3015 Dumbarton Road
Richmond, VA 23228
Phone: 804 264-2701
Workshop No.: 3

Kingsley D. Drake, Executive V.P.
PTL Inspectorate, Inc.
850 Poplar St.
Pittsburgh, PA 15220
Phone: 412 922-4000
Workshop No.: 4

Rolland Drouin, Committee Member
Standards Council of Canada
123 Jean Proulx
Hull, Quebec, Canada J8X 1T4
Phone: 819 778-1770
Workshop No.: 4

Wayne P. Ellis, Standards Consultant
754 Bobbea Lane
Harleysville, PA 19438
Phone: 215 628-2600
Workshop No.: 1

Emery Farkas
W. R. Grace & Co.
62 Whittemore Ave.
Cambridge, MA 02140
Phone: 617 876-1400
Workshop No.: 2

Frank Fee, Manager Tech. Serv.
West Bank Oil
P. O. Box 638
Pennsauken, NJ 08110
Phone: 609 428-8808
Workshop No.: 2

Lynne Fitzpatrick, Director
National Research Council
2101 Constitution
Washington, DC 20418
Phone: 202 334-3137
Workshop No.: 2

Thomas Flint, Director, Tech.Serv.
American Plywood Association
P.O. Box 11700
Tacoma, WA 98411
Phone: 206 565-6600
Workshop No.: 2

J. R. Forbes
Law Engineering
P.O. Box 888013
Atlanta, GA 30352
Phone: 404 396-8000
Workshop No.: 3

Colin A. Franco
Rhode Island DoT
372 State Office Bldg.
Smith Street
Providence, RI 02903
Phone: 401 277-2525
Workshop No.: 4

Francis B. Francois, Executive Director
AASHTO
444 N. Capitol St.NW
Washington, DC 20001
Phone: 202 624-5800
Workshop No.: 0

John H. Frank
Certified Testing Labs., Inc.
1105 Riverbend Dr.
Dalton, GA 30720
Phone: 404 226-1400
Workshop No.: 0

Geoffrey Frohnsdorff
NBS
Bldg. 226, Rm. B368
Gaithersburg, MD 20899
Phone: 301 921-3704
Workshop No.: 3

Thomas Frost, Manager, Eval. Serv.
BOCA, International
4051 W. Slossmoor Rd
Country Club H., IL 60430
Phone: 312 799-2300
Workshop No.: 4

J.E. Galloway, Jr.
VA Dept. of Hwys. & Transp.
1221 East Broad St.
Richmond, VA 23219
Phone: 804 737-7731
Workshop No.: 3

Richard D. Gaynor
NSGA-NRMCA
900 Spring St.
Silver Spring, MD 20910
Phone: 301 587-1400
Workshop No.: 3

Robert Gladhill
NBS
Admin. Bldg., A531
Gaithersburg, MD 20899
Phone: 301 921-3431
Workshop No.: 4

Roger Goughnour
Federal Highway Administration
Cons. & Maint. Div.
400 7th St., SW
HHO 33
Washington, DC 20590
Phone: 202 426-6520
Workshop No.: 1

James G. Gross, Dep. Director
Center for Building Technology
NBS
Bldg. 226, Rm. A250
Gaithersburg, MD 20899
Phone: 301 921-3481
Workshop No.: 2

W. G. Gunderman
Transportation Research Board
National Academy Sciences
2101 Constitution Av
Washington, DC 20418
Phone: 202 334-2952
Workshop No.: 4

Mukand V. Handa
Canadian Standards Association
178 Rexdale Blvd.
Rexdale, Ontario, Canada M9W 1R3
Phone: 416 747-4255
Workshop No.: 2

Rodney B. Hawkins
Inland Steel
3210 Watling
Mail Code 2101
East Chicago, Indiana 46312
Phone: 219 392-3271
Workshop No.: 3

R. E. Hay, Director, R&D
Federal Highway Admin, HNR-1
6300 Georgetown Pike
McLean, VA 22101
Phone: 703 285-2001
Workshop No.: 4

D. J. Hensing, Dep. Ex. Director
AASHTO
Suite 225
444 N. Capitol N.W.
Washington, DC 20001
Phone: 202 624-5800
Workshop No.: 4

Charles W. Hyer
The Marley Organization, Inc.
11 Todd's Road
Ridgefield, CT 06877-9990
Phone: 203 438-3801
Workshop No.: 1

Claude E. Jaycox
Municipal Testing
160 Lauman Lane
Hicksville, NY 11801
Phone: 516 938-7120
Workshop No.: 2

Ralph E. Jenkins
Core Laboratories
7501 Stemmons Frwy.
Dallas, TX 75247
Phone: 214 631-8270
Workshop No.: 3

Kenneth Keeling
The Robert B. Balter Co.
7646-B Fullerton Rd.
Springfield, VA 22153
Phone: 703 569-3050
Workshop No.: 3

Paul Klieger
Portland Cement Assoc.
5420 Old Orchard Rd.
Skokie, IL 60077
Phone: 312 966-6200
Workshop No.: 1

Paul Knodel
Bureau of Reclamation
D1540
P. O. Box 25007
Denver, CO 80225
Phone: 303 236-8098
Workshop No.: 4

William C. Koehler
Pennsylvania DoT
Materials & Testing Div.
1118 State St.
Box 2926
Harrisburg, PA 17120
Phone: 717 783-8417
Workshop No.: 1

Raymond M. Kolos
CCRL-NBS
National Bureau of Stand.
Bldg. 226 Rm. A365
Gaithersburg, MD 20899
Phone: 301 921-3481
Workshop No.: 1

George Krepel
Prestressed Concrete Institute
201 N. Wells Street
Chicago, IL 60606
Phone: 312 346-4071
Workshop No.: 2

Walter E. Kunze
Portland Cement Association
5420 Old Orchard Rd.
Skokie, IL 60077
Phone: 312 966-6200
Workshop No.: 1

Joseph F. Lamond
HQ - Corps of Engineers
DAEN-ECE-D
Washington, DC 20314-1000
Phone: 202 272-0222
Workshop No.: 2

John Locke
Amer. Assoc. for Lab. Accreditation
656 Quince Orchard
Gaithersburg, MD 20878
Phone: 301 670-1377
Workshop No.: 3

Hugh MacDonald
Brick Institute of America
Suite 300
11490 Commerce Pk Dr
Reston, VA 22091
Phone: 703 620-0010
Workshop No.: 4

Malcolm MacLean
Ministry of Transp. and Communica.
Central Bldg. Room 309
120 Wilson Ave.
Downsview, Ontario M3M 1J8
Phone: 416 248-3696
Workshop No.: 1

Frank Maibroda
VSE Corporation
2550 Hunington Ave.
Alexandria, VA 22303
Phone: 703 960-4600
Workshop No.: 2

G. W. Maupin, Jr.
VA Hwy. & Transp. Research Council
University Station
Box 3817
Charlottesville, VA 22903-0817
Phone: 804 296-1948
Workshop No.: 3

John Melander
Riverton Corporation
Rt 637
P.O. Box 300
Riverton, VA 22651
Phone: 703 635-4131
Workshop No.: 4

Cyril M. Miller
U.S. Army Corps of Engrs.
Baltimore District
P. O. Box 1715
Baltimore, MD 21203
Phone: 301 962-3164
Workshop No.: 4

Joseph O'Neil
American Council of Independ. Labs.
1725 K Street N.W.
Washington, DC 20006
Phone: 202 887-5872
Workshop No.: 3

Terry Patzias
Dundee Cement Co.
P. O. Box 122
Dundee, MI 48104
Phone: 313 529-2411
Workshop No.: 1

John T. Paxton, P.E.
Ohio Department of Transportation
Bureau of Testing
1600 W. Broad St.
Columbus, OH 43223-1298
Phone: 614 275-1301
Workshop No.: 2

Adrian Pelzner
U.S. Forest Service
2704 Soapstone Drive
Reston, VA 22091
Phone: 703 860-0027
Workshop No.: 1

James H. Pielert, Group Leader
Construction Materials Ref. Labs
NBS
Bldg. 226, Room A365
Gaithersburg, MD 20899
Phone: 301 921-3481
Workshop No.: 2

Maxie Pruitt
Tri-County Concrete Corp.
Carolina's Ready-Mix Asso
P. O. Box 9097
Hanahan, SC 29410
Phone: 803 744-5731
Workshop No.: 3

Paul S. Quigg, Sr. Research Assoc.
USG Corporation
700 North Highway 45
Libertyville, IL 60048
Phone: 312 362-9797
Workshop No.: 4

Michael Rafalowski
Federal Highway Administration
Construction & Maint. Div
400 7th St., SW
HHO 33
Washington, DC 20590
Phone: 202 426-0436
Workshop No.: 1

Thomas Ridgway
DMSSO
Suite 1403
2 Skyline Pl.
Falls Church, VA 22043
Phone: 703 756-2343
Workshop No.: 2

John P. Roebuck
Florida Mining & Materials Co
P.O. 23965
Tampa, FL 33630
Phone: 813 933-6711
Workshop No.: 3

Thomas R. Rutherford, P.E.
NAVFAC 04M2
200 Stovall St.
Alexandria, VA 22332
Phone: 202 325--356
Workshop No.: 4

John M. Scanlon
USA Corps of Engineers
Waterways Exp. Sta.
P.O. Box 631
Vicksburg, MS 39180
Phone: 601 634-3277
Workshop No.: 1

James R. Scarazzo
The Robert B. Balter Co.
7646-B Fullerton Rd.
Springfield, VA 22153
Phone: 703 569-3050
Workshop No.: 2

Brian Sheffler
Phoenix, Inc.
P.O. Box 676
Frederick, MD 21701
Phone: 301 663-3129
Workshop No.: 3

Frank M. Stia
New Jersey DoT
999 Parkway Ave.
Trenton, NJ 08255
Phone: 609 292-3461
Workshop No.: 3

Lawrence L. Smith, Mtls. & Res. Engr.
Florida DoT - BM&R
2006 N.E. Waldo Rd.
P. O. Box 1029
Gainesville, FL 32602
Phone: 904 372-5304
Workshop No.: 4

Spencer F. Thew
Atlantic Testing Labs, Ltd.
Box 29
Canton, NY 13617
Phone: 315 386-4578
Workshop No.: 4

David A. Smith, Jr.
City of Akron, Ohio
Building Inspection Dept.
166 S. High St. R100
Akron, OH 44308
Phone: 216 375-2220
Workshop No.: 1

Frank T. Wagner
North Carolina DoT
P.O. Box 25201
Raleigh, NC 27611
Phone: 919 733-7411
Workshop No.: 1

Peter A. Spellerberg
AASHTO Materials Reference Lab.
National Bureau of Stds.
Bldg. 226, Rm. A365
Gaithersburg, MD 20899
Phone: 301 921-3481
Workshop No.: 3

Marc Walsh, Staff Member
Standards Council of Canada
Suite 1203
350 Sparks St.
Ottawa, Ontario, Canada K1R 7S8
Phone: 613 238-3222
Workshop No.: 2

L. U. Spellman
Apt. 115
2918 Ranch Rd. 620 N
Austin, TX 78734
Phone: 512 266-3533
Workshop No.: 3

Marvin S. Ward, Jr.
Carolinas Ready Mixed Concrete
P. O. Box 11064
Charlotte, NC 28220
Phone: 704 525-2180
Workshop No.: 3

Garland W. Steele
West Virginia Dept. of Highways
1900 Washington St.E
Charleston, WV 25301
Phone: 304 348-3100
Workshop No.: 4

Charles Whitcomb
The Robert B. Balter Co.
7646-B Fullerton Rd.
Springfield, VA 22153
Phone: 703 569-3050
Workshop No.: 4

R. J. Stephenson, Director
U.S. Army Corps of Engineers
S. Atlantic Div. Lab.
611 South Cobb Dr.
Marietta, GA 30060-3112
Phone: 404 429-5296
Workshop No.: 2

Grover C. Williams
Trinity Engineering Testing Corp
3601 Manor Road
Austin, TX 78723
Phone: 512 926-6650
Workshop No.: 1

Appendix C

Guidelines for Workshop Chairmen

Each workshop will have approximately six hours to work together following the presentation of prepared talks. The workshops will begin work on the evening of May 14th at 7:00 p.m. and continue until 9:00 p.m. It is anticipated that this time will be taken to introduce the subject matter, prepare an outline of the potential topics to be discussed, plan on how best to carry out activity, and to initiate indepth discussion. The workshop session on the morning of May 15 from 9:00 a.m. until 1:00 p.m. will be for indepth discussion of the issues and the development of conclusions and recommendations for presentation to the full conference.

Each workshop room will be provided with a viewgraph, flip charts, blackboard space, and a staff support person to assist the chairman. The chairman should select a workshop participant to keep the record of the discussions and conclusions. There will be no recording of the workshop proceedings. The conclusions and recommendations of the workshop will be summarized in a report which will be delivered by the chairman to the full conference on the afternoon of May 15th. The prepared talks and the workshop reports will be recorded. Typing support will be available to assist in preparing the reports.

Each workshop is to address the Conference hypothesis that "There is a need for a coordinated methodology for accrediting construction materials testing laboratories." The following issues are suggested for workshops consideration:

I. Current methodology that may effect performance in construction material testing laboratories

- o indicators pointing out where changes in methodology may improve laboratory performance
- o relationship of laboratory testing to overall quality of construction
- o use of more than one standard for identical type testing (e.g. ASTM and AASHTO)

II. Analysis of currently operating evaluation/accreditation systems for construction materials

- o review of the current evaluation/accreditation systems (CCRL, AMRL NVLAP, AALA, ELF/FCAA, WACL, etc.)
- o impact of current laboratory evaluation/accreditation systems on laboratory performance
- o factors affecting the acceptance of current evaluation/ accreditation systems (e.g. cost, scope of coverage, lack of regulatory reference, lack of economic benefit)

- o the adequacy of current standards (both national and international) on the implementation and acceptance of laboratory evaluation/ accreditation programs

III. Is there a need for a coordinated laboratory-accreditation system or is the current approach adequate?

- o review of approach recommended by ASTM Panel on Accreditation, NVLAP Construction Materials Testing LAP, etc.

IV. If needed, what are the components and approach for implementation of such a coordinated system?

- o level of accreditation depending upon the scope of services offered by the laboratory
- o review by broad technical (e.g. construction materials) discipline vs. review by standards for specific materials
- o scope of in-laboratory evaluation
  - review of apparatus and/or procedures
  - reliance on professional engineer in charge of laboratory
- o adequacy of available standards on laboratory accreditation
- o implementation of ASTM laboratory evaluation type standards being developed
- o format of certificate of accreditation

V. Approach for gaining acceptance of a coordinated accreditation system

- o promotion of regulatory references requiring use of evaluation/ accreditation systems
- o emphasis on the benefits of laboratory accreditation programs to the construction community to justify the costs

NBS-114A (REV. 2-80)

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET (See instructions)	1. PUBLICATION OR REPORT NO. NBS/SP-736	2. Performing Organ. Report No.	3. Publication Date November 1987

4. TITLE AND SUBTITLE

PROCEEDINGS OF THE CONFERENCE ON ACCREDITATION OF CONSTRUCTION MATERIALS TESTING LABORATORIES MAY 14-15, 1986

5. AUTHOR(S)

James H. Pielert and Curtis B. Spring, Editors

6. PERFORMING ORGANIZATION *(If joint or other than NBS, see instructions)*

NATIONAL BUREAU OF STANDARDS
U.S. DEPARTMENT OF COMMERCE
GAITHERSBURG, MD 20899

7. Contract/Grant No.

8. Type of Report & Period Covered

Final

9. SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS *(Street, City, State, ZIP)*

American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103

10. SUPPLEMENTARY NOTES

Library of Congress Catalog Card Number: 87-619889

☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

11. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here)*

A two-day Conference hosted by NBS was held in Gaithersburg, Maryland on May 14-15, 1986 to test the hypothesis that "There is a need for a coordinated methodology for accrediting construction materials testing laboratories." Construction materials include primary materials such as: cement, concrete, aggregates, rock and soil, asphalts, metals, wood and masonry. The Conference was structured to consider: (1) the status of existing laboratory evaluation and accreditation programs; (2) current trends in the accreditation process; and (3) the need for and nature of a coordinated accreditation system. The Conference included the presentation of invited papers and four workshop sessions.

12. KEY WORDS *(Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)*

accreditation; building; construction; evaluation; laboratory, materials; standards

13. AVAILABILITY

☒ Unlimited

☐ For Official Distribution. Do Not Release to NTIS

☒ Order From Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

☐ Order From National Technical Information Service (NTIS), Springfield, VA. 22161

14. NO. OF PRINTED PAGES
86

15. Price

NBS Technical Publications

Periodical

Journal of Research—The Journal of Research of the National Bureau of Standards reports NBS research and development in those disciplines of the physical and engineering sciences in which the Bureau is active. These include physics, chemistry, engineering, mathematics, and computer sciences. Papers cover a broad range of subjects, with major emphasis on measurement methodology and the basic technology underlying standardization. Also included from time to time are survey articles on topics closely related to the Bureau's technical and scientific programs. Issued six times a year.

Nonperiodicals

Monographs—Major contributions to the technical literature on various subjects related to the Bureau's scientific and technical activities.

Handbooks—Recommended codes of engineering and industrial practice (including safety codes) developed in cooperation with interested industries, professional organizations, and regulatory bodies.

Special Publications—Include proceedings of conferences sponsored by NBS, NBS annual reports, and other special publications appropriate to this grouping such as wall charts, pocket cards, and bibliographies.

Applied Mathematics Series—Mathematical tables, manuals, and studies of special interest to physicists, engineers, chemists, biologists, mathematicians, computer programmers, and others engaged in scientific and technical work.

National Standard Reference Data Series—Provides quantitative data on the physical and chemical properties of materials, compiled from the world's literature and critically evaluated. Developed under a worldwide program coordinated by NBS under the authority of the National Standard Data Act (Public Law 90-396). NOTE: The Journal of Physical and Chemical Reference Data (JPCRD) is published quarterly for NBS by the American Chemical Society (ACS) and the American Institute of Physics (AIP). Subscriptions, reprints, and supplements are available from ACS, 1155 Sixteenth St., NW, Washington, DC 20056.

Building Science Series—Disseminates technical information developed at the Bureau on building materials, components, systems, and whole structures. The series presents research results, test methods, and performance criteria related to the structural and environmental functions and the durability and safety characteristics of building elements and systems.

Technical Notes—Studies or reports which are complete in themselves but restrictive in their treatment of a subject. Analogous to monographs but not so comprehensive in scope or definitive in treatment of the subject area. Often serve as a vehicle for final reports of work performed at NBS under the sponsorship of other government agencies.

Voluntary Product Standards—Developed under procedures published by the Department of Commerce in Part 10, Title 15, of the Code of Federal Regulations. The standards establish nationally recognized requirements for products, and provide all concerned interests with a basis for common understanding of the characteristics of the products. NBS administers this program as a supplement to the activities of the private sector standardizing organizations.

Consumer Information Series—Practical information, based on NBS research and experience, covering areas of interest to the consumer. Easily understandable language and illustrations provide useful background knowledge for shopping in today's technological marketplace.

Order the **above** *NBS publications from: Superintendent of Documents, Government Printing Office, Washington, DC 20402.*

Order the **following** *NBS publications—FIPS and NBSIR's—from the National Technical Information Service, Springfield, VA 22161.*

Federal Information Processing Standards Publications (FIPS PUB)—Publications in this series collectively constitute the Federal Information Processing Standards Register. The Register serves as the official source of information in the Federal Government regarding standards issued by NBS pursuant to the Federal Property and Administrative Services Act of 1949 as amended, Public Law 89-306 (79 Stat. 1127), and as implemented by Executive Order 11717 (38 FR 12315, dated May 11, 1973) and Part 6 of Title 15 CFR (Code of Federal Regulations).

NBS Interagency Reports (NBSIR)—A special series of interim or final reports on work performed by NBS for outside sponsors (both government and non-government). In general, initial distribution is handled by the sponsor; public distribution is by the National Technical Information Service, Springfield, VA 22161, in paper copy or microfiche form.

U.S. Department of Commerce
National Bureau of Standards
Gaithersburg, MD 20899