NATIONAL BUREAU OF STANDARDS REPORT

10 349

ALTERNATIVE PLANS FOR A CENTER FOR LAW-ENFORCEMENT EQUIPMENT USER STANDARDS

Prepared for the

National Institute of Law Enforcement

and Criminal Justice

U.S. DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS

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The National Bureau of Standards [1] was established by an act of Congress March 3, 1901. Today, in addition to serving as the Nation's central measurement laboratory, the Bureau is a principal focal point in the Federal Government for assuring maximum application of the physical and engineering sciences to the advancement of technology in industry and commerce. To this end the Bureau conducts research and provides central national services in four broad program areas. These are: (1) basic measurements and standards, (2) materials measurements and standards, (3) technological measurements and standards, and (4) transfer of technology.

The Bureau comprises the Institute for Basic Standards, the Institute for Materials Research, the Institute for Applied Technology, the Center for Radiation Research, the Center for Computer Sciences and Technology, and the Office for Information Programs.

THE INSTITUTE FOR BASIC STANDARDS provides the central basis within the United States of a complete and consistent system of physical measurement; coordinates that system with measurement systems of other nations; and furnishes essential services leading to accurate and uniform physical measurements throughout the Nation's scientific community, industry, and commerce. The Institute consists of an Office of Measurement Services and the following technical divisions:

Applied Mathematics—Electricity—Metrology—Mechanics—Heat—Atomic and Molecular Physics—Radio Physics [2]—Radio Engineering [2]—Time and Frequency [2]—Astrophysics [2]—Cryogenics.[2]

THE INSTITUTE FOR MATERIALS RESEARCH conducts materials research leading to improved methods of measurement standards, and data on the properties of well-characterized materials needed by industry, commerce, educational institutions, and Government; develops, produces, and distributes standard reference materials; relates the physical and chemical properties of materials to their behavior and their interaction with their environments; and provides advisory and research services to other Government agencies. The Institute consists of an Office of Standard Reference Materials and the following divisions:

Analytical Chemistry—Polymers—Metallurgy—Inorganic Materials—Physical Chemistry.

THE INSTITUTE FOR APPLIED TECHNOLOGY provides technical services to promote the use of available technology and to facilitate technological innovation in industry and Government; cooperates with public and private organizations in the development of technological standards, and test methodologies; and provides advisory and research services for Federal, state, and local government agencies. The Institute consists of the following technical divisions and offices:

Engineering Standards—Weights and Measures — Invention and Innovation — Vehicle Systems Research—Product Evaluation—Building Research—Instrument Shops—Measurement Engineering—Electronic Technology—Technical Analysis.

THE CENTER FOR RADIATION RESEARCH engages in research, measurement, and application of radiation to the solution of Bureau mission problems and the problems of other agencies and institutions. The Center consists of the following divisions:

Reactor Radiation—Linac Radiation—Nuclear Radiation—Applied Radiation.

THE CENTER FOR COMPUTER SCIENCES AND TECHNOLOGY conducts research and provides technical services designed to aid Government agencies in the selection, acquisition, and effective use of automatic data processing equipment; and serves as the principal focus for the development of Federal standards for automatic data processing equipment, techniques, and computer languages. The Center consists of the following offices and divisions:

Information Processing Standards—Computer Information — Computer Services — Systems Development—Information Processing Technology.

THE OFFICE FOR INFORMATION PROGRAMS promotes optimum dissemination and accessibility of scientific information generated within NBS and other agencies of the Federal government; promotes the development of the National Standard Reference Data System and a system of information analysis centers dealing with the broader aspects of the National Measurement System, and provides appropriate services to ensure that the NBS staff has optimum accessibility to the scientific information of the world. The Office consists of the following organizational units:

Office of Standard Reference Data—Clearinghouse for Federal Scientific and Technical Information [3]—Office of Technical Information and Publications—Library—Office of Public Information—Office of International Relations.

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[1] Headquarters and Laboratories at Gaithersburg, Maryland, unless otherwise noted; mailing address Washington, D.C. 20234.
[2] Located at Boulder, Colorado 80302.
[3] Located at 5285 Port Royal Road, Springfield, Virginia 22151.

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Prepared for the
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by
B. M. Levin and J. J. Diamond
Technical Analysis Division
Institute for Applied Technology
National Bureau of Standards

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NATIONAL BUREAU OF STANDARDS

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SUMMARY

1. Introduction

At the present time, law enforcement agencies usually purchase equipment using specifications that serve mainly to identify the product and specify the desired options or that are written around the product of a single manufacturer. Equipment purchased in this manner encompasses the good, the bad and the mediocre. Law enforcement agencies recognize the need for effective performance standards that will enable them to specify products of high quality and known performance. The National Institute of Law Enforcement and Criminal Justice (NILE) of the Law Enforcement Assistance Administration, Department of Justice, is planning to respond to this need.

Standards for some items can be developed within a relatively short time, say one to two years. These are items for which adequate test methods already exist and for which standards for analogous uses have already been written and promulgated by other organizations. In these cases, the main task is to adapt the existing standards to the specific needs of law enforcement agencies and obtain from producers and users some consensus of agreement on the details of the standard.

Standards for many items, however, cannot be developed so readily. The needed test methods either do not exist or the existing test methods correlate very poorly with actual performance. In such cases, research and development work must be performed to develop new test methods and to demonstrate their correlation with performance. This is a difficult task, may take anywhere from one to several years to accomplish, and requires the services of competent scientists and engineers who are expert in the subject area.

2. Principles of the Standards Laboratory

There is both a need and a desire for a program to develop standards for law enforcement equipment. To meet this need, we recommend the establishment of a Center for Law-Enforcement Equipment User Standards (CLEUS).

There are three basic requirements for the successful operation of such a Center.

First, to ensure the technical quality of the standards it develops, its technical activities must rest on a solid base of scientific and engineering expertise. Second, to ensure the utility and acceptance of the standards it develops, its staff must be expert in writing standards and in obtaining a consensus. Third, in order to ensure the fulfillment of the first and second requirement, CLEUS must have adequate control of its program and be located

within an organization whose management understands its nature and needs.

Law enforcement equipment encompasses several major areas of technology including motor vehicles and electronic communications, as well as a wide variety of special items including personnel protective equipment, sundry emergency devices, and security, alarm and detection systems. CLEUS must have access to competence in all of these as well as the other relevant fields of science and engineering. This can be accomplished most quickly and economically if CLEUS makes use of existing centers of competence.

The development of test methods is a difficult and time consuming activity. It is especially difficult to develop test methods which are useful predictors of the utility and performance of a device as it is normally used. To accomplish its purpose, CLEUS must establish continuing programs of research and development of test methods for each of the major categories of law enforcement equipment. These programs will serve to maintain the expertise needed for the CLEUS operation and result directly in the development of test methods on which meaningful performance standards can be based. Such programs of test development will be most successful if they are part of larger programs of research and development in the same technical areas. Interaction with his colleagues is extremely useful to the scientist and engineer.

The standards to be developed for NILE are to be voluntary standards. CLEUS must therefore ensure that they will be acceptable to the law enforcement community, that they specify items that manufacturers can produce at acceptable costs and that the standards are unambiguous, fair and workable. This is often accomplished by obtaining a consensus, which can be a very protracted process. Since standards are urgently needed as soon as possible, CLEUS must be prepared to recommend interim standards, to develop methods of speeding the consensus procedure, and to devise effective substitutes for the concensus procedure. Where the needs of its program require it, CLEUS must also be prepared to work efficiently within the very extensive existing standards-making system. CLEUS must arrange to participate in the appropriate standards committees and to establish or sponsor new ones as needed for its effective operation. Expertise in the standards-setting process is indispensable for such activities.

As important to the success of CLEUS as its technical and standards-setting expertise, is the organizational environment in which it operates. Three important factors in the environment are: (1) CLEUS should be located in a technical organization; (2) this organization should have an earned reputation for integrity and independence; and (3) this

organization should have a tradition of cooperation with industry and other Government agencies.

3. Outline of the Standards Laboratory

We recommend that CLEUS consist of a central staff and an in-house laboratory, and that the bulk of the work of test development and standards writing be performed at existing centers of competence.

The CLEUS central staff should comprise three groups: the Director and his staff; the Standards Coordinators and their clerical and editorial assistants; and the Resource Specialists.

The Standards Coordinator will be the central figure in the CLEUS operation. When a standard is to be developed, he will arrange for and monitor the necessary laboratory work, consult with the laboratory to define the relevant product attributes, interact with the user community, and help write the standard. He will have primary responsibility for standards in specific areas and will work with interested groups to obtain a consensus for the standard. The Standards Coordinator should be personally involved in laboratory work to the maximum extent possible.

The Resource Specialists will supply the auxiliary expertise required by CLEUS operations and should include personnel with backgrounds in the following areas: law

enforcement, law, statistics, urban environment, human factors engineering and human physiology. Each resource specialist should be involved professionally in the work of CLEUS as well as be available as a consultant to the staff.

The CLEUS in-house laboratory should be relatively small and be concerned with areas where current laboratory facilities are limited or unavailable, such as physical security devices and forensic science.

The bulk of the work of test development and standards writing should be performed at existing centers of competence. At these centers, CLEUS should establish continuing programs of research and development of test methods for each of the major categories of law enforcement equipment.

4. Program of the Standards Laboratory

Table 1.1 outlines the budget and program of CLEUS for its first five years and is based on the priorities given in Appendix C. Chapter VIII should be consulted for further detail.

Table 1.1

CENTER FOR LAW-ENFORCEMENT EQUIPMENT USER STANDARDS

SUMMARY FUNDING CHART

	FY 71*	FY 72	FY 73	FY 74	FY 75
CLEUS Central Staff**	225	470	580	630	680
Vehicles and Tires	175	300	400	500	600
Communications Equipment	150	250	250	250	250
Computers	50	100	150	150	150
Forensic Science	--	25	75	75	75
Personnel Protective Equipment	75	200	300	300	300
Security Hardware	70	200	250	275	275
Detection and Surveillance	--	100	150	200	250
Weapons	100	300	500	700	800
Buildings and Fixtures	80	150	150	150	150
Emergency Equipment & Supplies	50	100	150	150	150
Information & Reference Services	25	25	40	70	100
Reference Laboratory	--	100	300	500	700
TOTAL	1000	2320	3295	3950	4480

* For nine months.

** Based on assumption that CLEUS will be located in a Federal Government agency with overhead charges similar to those of NBS.

5. Organization of the Standards Laboratory

There are several ways in which the program could be organized: (1) the entire program could be conducted at the National Institute of Law Enforcement and Criminal Justice (NILE); (2) the entire program could be conducted at an existing scientific and engineering institution; (3) the CLEUS central staff could be located in NILE and separate arrangements made with existing centers of competence for continuing programs of research and development of test methods for various categories of law enforcement equipment; and (4) the CLEUS central staff could be located in NILE and individual contracts given to existing centers of competence to develop test methods for specific items or categories of law enforcement equipment.

Option One has the advantage of simplicity - everything will be done in one organization. However, it involves the recruitment of staff and the establishment of laboratories competent in a variety of scientific and engineering fields. The time and cost of developing and maintaining the necessary laboratory competence makes this a poor alternative.

Option Two (conducting program at an existing institution) requires a decision to delegate some of NILE's authority to develop voluntary standards for law enforcement equipment to a technically qualified organization. This option involves the forming of a special-purpose partnership between NILE and

the scientific organization. Each partner will contribute its unique abilities to the joint enterprise. NILE will contribute its knowledge of law enforcement and the needs of law enforcement officials. This will lead directly to a priority list of needs for standards for specific items of equipment and a description of user requirements for the items. Task priorities will be based on the needs of law enforcement officials and the ability of CLEUS to respond to these needs as determined by the state-of-the-art and the availability of necessary talents. NILE will also furnish introductions to appropriate law enforcement officials and guidance for direct interaction with users, as required in the operation of CLEUS. The scientific organization in which CLEUS is located will contribute its expertise in the technical areas of interest to CLEUS, in the process of standards-setting and in the management of research. This will lead directly to effective research and development programs, appropriate test methods and meaningful standards. It will contribute to the setting of priorities by ascertaining the state-of-the-art and the availability of necessary talents to work on the problem.

Option Three is a compromise between Options One and Two, with NILE retaining all central staff functions of CLEUS as well as overall responsibility for the technical effort.

Under this option there is the advantage to CLEUS-NILE that it can make individual arrangements with a variety of scientific institutions for the accomplishment of specific tasks or functions, utilizing each institution in the area where it is deemed to be most competent. Within each of these existing centers of competence, CLEUS-NILE will give long-range stable support to a program devoted to the problems of CLEUS in specific technical areas. However, CLEUS-NILE will retain full authority to write the standards and to use or modify the test methods developed for it by the laboratories it supports. This option substitutes a sponsor-contractor relationship for the partner relationship of Option Two.

Option Four is similar to Option Three with the exception that no continuing programs of research and development or test methods are established. Specific contracts are let for each task as required to implement the plans of the CLEUS central staff. This option gives CLEUS greater control of operations than Option Three and requires it to have correspondingly greater competence in the management of scientific programs.

It should be noted that, under Options One and Two, the talents and facilities of the major technical organization developing the standards can be supplemented by contracts with other laboratories with specific competences of value to the standards program.

Table 1.2 summarizes the features of the four organization plans.

Table 1.2

Optional Organization Plans

	1	2	3	4
Who Furnishes User Requirements?	NILE	NILE	NILE	NILE
Where Is CLEUS Central Staff Located?	NILE	one scientific institution	NILE	NILE
Who Determines Priorities?	NILE	NILE Plus partner institution	NILE	NILE
Who Does Major Portion of Test Development?	NILE	one scientific institution	no one institution	no one institution
Who Sub-Contracts Other Work?	NILE	The Centers of Competence	The Centers of Competence	NILE
Long-Range Programs or Task Assignments?	Long-range Programs	Long-range Programs	Both	Task Assignments
Who Prepares Standards?	NILE	one scientific institution	NILE	NILE
Who Is Responsible For Over-All Technical Program?	NILE	one scientific institution	NILE	NILE
Who Promulgates Standards?	NILE	NILE	NILE	NILE

6. The Role of NBS

A brief statement of the qualifications of the National Bureau of Standards in the standards area is in order before one considers the ways in which NBS might be involved in the work of CLEUS.

Since its organization in 1901, NBS has operated as the National Standards Laboratory of the United States and as such has been responsible for the basic standards undergirding the country's physical measurement system. Soon after its organization, the Bureau became deeply involved in the development of material and technological standards, i.e. in the certification of Standard Reference Materials and in the development of the voluntary industry standards now called Product Standards. A great many standard tests and methods of analysis have been devised, based on very careful experimental work. Members of the staff are involved in the work of many of the major standards-setting organizations in this country and have close ties with the foreign national and international standards laboratories. Preliminary results from an on-going survey indicate that more than 300 staff members are participating in the work of over 700 standardization committees. The NBS reputation for competence and integrity in the standards area is unexcelled.

The National Bureau of Standards is one of the major Federal Government scientific and engineering research

institutions, and has expertise in almost all of the fields relevant to law enforcement equipment.

1. The NBS Product Evaluation Division has expertise in the areas of personnel protective equipment (such as body armor and helmets), first-aid supplies, uniforms and clothing, etc.

2. The NBS Office of Vehicle Systems Research has expertise in the areas of vehicles, tires, vehicle safety equipment, etc.

3. The NBS Radio Standards Engineering Division is expert in the fields of communications, and electronic alarm and surveillance equipment.

4. The NBS Building Research Division is competent in the area of prison buildings and fixtures, fire extinguishers, etc.

5. The NBS Office of Fire Research and Safety has expertise in the areas of gas masks, rescue equipment, etc.

6. The NBS Center for Computer Sciences and Technology is responsible for Federal Government information processing standards, and is directed to advise other Federal agencies and coordinate government participation in voluntary industry standardization in this field.

7. NBS has staff members with many years of experience in the field of physical security devices.

The National Bureau of Standards has had a great deal of experience in managing programs sponsored by other Government agencies and by trade associations, and this Report incorporated many recommendations based on this experience. The Office of Vehicle Systems Research, sponsored by the Department of Transportation, is a major recent program of this type, and operates under an arrangement with DOT which corresponds closely to Option Three above.

If NILE opts for Option Two, NBS would be an eminently suitable organization in which to establish CLEUS.

If NILE selects Option Three or Four, the facilities of NBS could be used for the test research and development operations of CLEUS.

If Option One, Three or Four is selected, and NILE establishes CLEUS in-house, NBS could detail its specialists to NILE as needed to assist in organizing CLEUS and getting it well under way.

Chapter II

THE VOLUNTARY STANDARDS SYSTEM

Product standards used in commerce are mainly voluntary standards developed by a voluntary standardization system. The standards are written and issued by a large number of organizations. In developing voluntary standards for use by law enforcement officials, the Center for Law Enforcement Equipment User Standards should work with these organizations in order to develop rapidly the most useful standards at the lowest possible cost.

1. The Voluntary Standards System

1.1 The System

The Directory of United States Standardization Activities (NBS Misc. Publ. 288, 1967) lists 486 organization that are concerned with standards and standardization. Some 360 of these organizations have issued about 19,000 standards of an engineering type (non-food and non-drug). The majority of the voluntary standards issued in the United States have been developed and promulgated by about a dozen professional societies and trade associations. Of this dozen, there are three which are devoted solely to standards, standardization and

test methods for inclusion in standards: the American National Standards Institute (ANSI), formerly called the United States of American Standards Institute (USASI), the American Society for Testing and Materials (ASTM) and the Office of Engineering Standards Services of the National Bureau of Standards.

The process for developing voluntary standards has not been standardized. Each of the many organizations that develop standards uses its own mode of operation. Similarly, the quality of the operations of the various organizations varies, as does the quality of the standards. (By quality of standards we mean the quality of the document, not the quality of the product described by the document).

As a result, most people who are slightly familiar with the process, or even thoroughly familiar with the operation of one or two organizations, have many misconceptions about the total system; this results in honest differences of opinion. Nevertheless, there are some generalizations that can be made.

One characteristic of voluntary standards is the fact that participation in the "system" is voluntary; that is, the choice of what to standardize is voluntary, the representation on the technical group writing the standard is voluntary, and the use of the standard is usually not required by law.

Standards can be regarded as the language of the marketplace. They permit the buyer and the seller to communicate with each other so that they can agree as to whether or not the delivered article meets the requirements of the purchase order. This is done by including a reference to a standard in the description of the article that is being purchased. Standards are voluntary in that there is no compulsion on the buyer or seller to use them, but many standards are so commonly used that reputable dealers handle only products that meet the standards, leaving the buyer with no real choice. Examples are viscosity of motor oil, lumber sizes, and photographic film speed.

Sometimes voluntary standards are referenced in local, State or Federal laws. In areas covered by the law they are mandatory; in other areas they remain voluntary. For example, the Flammable Fabrics Act of 1953 requires that clothing must meet a voluntary standard for flammability. However, there is no legal requirement that curtains meet this standard; the use of the standard with that product is purely voluntary.

The suggestion or impetus for developing a standard may come from a variety of sources, including members and non-members of the organization developing the standard. The decision to develop a standard and the delegation of the activity to a technical group is usually made by a policy board or committee of the standardization organization. The

first draft of the standard is generally developed by a technical group (technical committee, subcommittee, task group, project committee, ad hoc committee, etc.). After the draft has been prepared, there is usually a technical review. At each review level the draft can be resubmitted to the technical group for comment or redraft.

1.2 Consensus

"Consensus" and "balanced representation" are terms commonly used in describing the work of the various standardization bodies. These terms are used to indicate that a broad spectrum of users, producers and other interested parties have agreed that a proposed standard is generally acceptable. A desire for a consensus is based on the realization that usage of a standard depends on it being satisfactory to both the consumer and producer. Unanimity is not required, and there are various criteria for determining whether a consensus has been obtained. The Office of Engineering Standards Services of NBS has published its criteria for a consensus as part of its formal procedures. The procedures of OESS require that a standard be supported by at least 70 percent of those responding to the distribution of the recommended standard in the production segment, in the distributor segment, and in the user and consumer segment of the industry. Furthermore, it is required that the average of the three segments be not less

than 75 percent, and that there be no substantive objections deemed to be valid.

Although the major standards-writing and promulgating bodies attempt to obtain a consensus prior to issuing a standard, there is no such requirement other than that adopted by the organization developing the standards. Many groups make little or no effort to ascertain whether a proposed standard is acceptable to a broad spectrum of users and producers.

1.3 Antitrust Considerations

The question has occasionally been raised as to whether voluntary standards-setting activities can be in violation of the antitrust laws of the United States. While any individual case must be judged on its merits, the general answer to the question must be that the possibility does exist.

A standard may be judged to be in violation of the antitrust laws if it constitutes an unreasonable restraint upon interstate trade or commerce, because of arbitrary impairment of the competitive abilities of a significant portion of an industry, or the arbitrary elimination of desired consumer options.

Procedural safeguards which would tend to decrease the possibility of such a judgement include the requirement of a valid consensus, and an emphasis on the voluntary nature of the standard.

1.4 The Use of Standards

Product standards have value only to the extent that they are used. Since a large percentage of those people who use a standard do so because the standard is generally accepted, and not because they have evaluated the standard, the question arises as to how a standard becomes generally accepted. To oversimplify, we can say that a standard becomes generally accepted for either of two reasons: (1) some private or public organization has the power to require its use or (2) people expect the standard to be generally used and their behavior helps fulfill their expectations.

The reference to a voluntary standard in a law or code obviously requires its use. Private organizations also have this power at times. For example, until recently, computer standards adopted by IBM quickly became commonly used industry standards. Insurance companies can require that devices protecting insured items meet voluntary standards.

Some organizations have such prestige that any standard they issue will be quickly accepted and used. Others will promulgate a standard only after a strict consensus requirement has been met. In either case, everyone expects the standard to be used, and producers quickly develop or modify a product line to meet it.

1.5 Purchase Specifications

When an organization (or individual) wishes to purchase an item, it may prepare a document that is called a purchase specification. It describes the desired item in sufficient detail to fully inform the supplier of the required characteristics. When standards are available that describe the required characteristics, the standards may be referenced in the purchase specification. Sometimes, if no satisfactory standard is available, the type of information that is included in the specification is similar to that found in a standard. In such cases the purchase specification can be referenced in other purchase specifications in the same way that a standard is. Many military specifications are of this type. In this report, the term "standard" will include specifications that are commonly referenced in purchase specifications.

1.6 The Use of Standards Promulgated by NILE

The standards for law enforcement equipment to be promulgated by the National Institute of Law Enforcement and Criminal Justice (NILE) will be useful only to the extent that the law enforcement officials are willing to make use of them. This use, in turn, will have both a cause and effect relationship with the willingness of producers to develop products that meet the standards.

It is by no means certain that law enforcement officials will use NILE standards. However, once standards promulgated by NILE do become commonly used and accepted, new standards will tend to gain immediate acceptance. The following factors will affect the acceptance of the initial standards: (1) the degree to which the product described by the standard meets the needs of law enforcement officials, (2) the quality of the standards, (3) the extent to which both producers and users had an opportunity to participate in and influence the development of the standard, (4) the ability of producers to manufacture products that meet the standard at a cost that permits a reasonable profit, and (5) the availability of a system, including test procedures and testing laboratories, that assure law enforcement agencies that products meet the standards. The program described in this report is designed to meet these needs. The recommended mode of operation is to obtain a consensus whenever possible, in an effort to give the standards the above characteristics.

2. Standards Organizations

2.1 Types of Organizations

As stated above, there are over 400 organizations that are concerned with standards and standardization. One way of classifying these organizations is the following:

A. Scientific Bodies such as the American Chemical Society (ACS), the American Physical Society (APS), the International Union of Pure and Applied Chemistry (IUPAC), etc. These are usually concerned with the exchange of information. Their standards tend to be in the fields of definitions, terminology and symbology.

B. Professional Societies such as the Institute of Electrical and Electronic Engineers (IEEE), the Instrument Society of America (ISA), the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the American Society of Mechanical Engineers (ASME), etc. These societies tend to be concerned with engineering matters which overlap the interests of the scientific bodies but, additionally, involve product requirements and test methods of general application.

C. Trade Associations such as the Business Equipment Manufacturers Association (BEMA), the Scientific Apparatus Makers Association (SAMA), the Electronic Industries Association (EIA), the National Electrical Manufacturers Association (NEMA), etc. To an overwhelming extent, these groups are interested only in the products of their member companies.

D. "Listing" Bodies such as Underwriters' Laboratories (UL), Factory Mutual Engineering Corporation (FMEC), etc. These organizations develop standard requirements and test methods for a variety of products and, at the request of manufacturers, members and/or sponsors, test samples for compliance and publish lists of those products meeting the requirements for construction and/or performance.

E. Voluntary Standards Writing and Promulgating Bodies. The American Society for Testing and Materials (ASTM), the American National Standards Institute (ANSI), and the Office of Engineering Standards Services (OESS) of the National Bureau of Standards are unique because their activities are exclusively concerned with standards and standardization. Many of the organizations that fall into the other classes are active on the technical committees of these three bodies.

2.2 Relationship with Standards Organizations

As a matter of principle and expediency, the private voluntary standards system should be used to help develop standards. The range and depth of experts available to the standards organizations is unmatched, and much of this competence is available at little or no cost to the organization sponsoring the standardization activity.

The paid professional staffs of the standards organizations usually restrict their activities to administrative functions. The technical input is usually contributed by experts throughout the United States and abroad who are members of the technical committees of the organizations. They serve on these committees without pay for a variety of reasons including personal interest and the possibility that the proposed standard might have an important economic impact on their employer. NBS staff members serve on over 1,000 of these committees and most, if not all, Government agencies, major manufacturers and retailing corporations also have staff members serving on these technical committees.

Unfortunately, these technical committees cannot be used to develop all the standards for the National Institute of Law Enforcement and Criminal Justice (NILE) for a variety of reasons. First, the procedures used by these committees usually require a consensus, and the time delays in obtaining a consensus will often be unacceptable. While NILE should prefer to promulgate only consensus standards, arbitrary resolution of disagreements could be tolerated and might be necessary. Secondly, the committee members usually spend only a portion of their time on committee activities, thereby further delaying the standardization process. Finally, industry must limit the standardization activities of its staff, and a standard given high priority by NILE may be given a low priority by industry.

It should be pointed out that if a standards organization undertakes to develop a standard for the Center for Law Enforcement Equipment User Standards (CLEUS), there will still be expenses to be met by NILE. CLEUS must spend staff time to negotiate with the standards organization. CLEUS and law enforcement personnel should be represented on the technical committees, and NILE will support CLEUS participation and probably participation by law enforcement officials. CLEUS will need to develop new test procedures or help evaluate existing tests in support of the committees. CLEUS may contribute to the administrative costs of the technical committee. Finally, CLEUS and NILE will have to evaluate the standard prior to accepting it as a NILE standard. Nevertheless, this mode of operation is relatively effective and inexpensive, and the participation of the relevant standards organization should make the voluntary standard more universally accepted.

2.3 Descriptions of Some Existing Organizations

A fair number of the many organizations that develop standards are currently developing standards and test methods for equipment used by law enforcement officials. A brief description and discussion of a few of these organizations and their possible relationship to the Center for Law Enforcement Equpiment User Standards follows. The specific standards organization with which the Center for Law Enforcement

Equipment User Standards will cooperate in developing a standard, and the relationship between the two groups, will depend on the standard to be developed. The organizations described below are definitely not the only ones with which CLEUS should work.

2.3.1 American National Standards Institute

The American National Standards Institute (ANSI) is the successor organization to the American Standards Association. Until recently it was called the United States of America Standards Institute (USASI). ANSI is attempting to take on the role of national clearinghouse for all voluntary standards activities. It encourages other standards groups to submit their standards to ANSI for adoption and distribution as an "American National Standard." The additional prestige and publicity resulting from ANSI adoption of a standard often increases the general acceptance and use of the standard. ANSI also develops new standards, in cooperation with or under the sponsorship of associations, professional societies and Government agencies.

A major source of income for ANSI is the sale of documents containing "American National Standards." It also receives income from company and association membership dues.

Most ANSI activities and operations are conducted by a variety of committees, including 17 Technical Advisory Boards

and a Board of Standards Review which determines if the views of all interested parties have been given full consideration in the development of a standard.

There are two procedures used in developing and approving an American National Standard:

1. Canvass Method - This procedure is used in approving an existing standard written by a responsible standards organization. The sponsor of the standard prepares a list of organizations known to have an interest in the standard and a competence to comment on it. After approval of the list by its appropriate Technical Advisory Board, comments on the standard are solicited from the selected organizations. Before the standard is accepted by ANSI as an American National Standard, the Board of Standard Review determines that appropriate procedures have been followed, that the views of all interested parties have been considered, and that a consensus has been reached.
2. Committee Method - This procedure uses a specially-constituted committee to develop a standard and to determine if a consensus has been achieved. This committee includes representatives from all types of parties interested in the standard, e.g., producers, users, distributors. While it is possible

for the committee to write a standard, the usual procedure is for the group sponsoring the development of the standard to submit the proposed standard to the committee. If necessary, the committee makes changes in the proposed standard in order to achieve a consensus. The committee operates under the supervision of the appropriate Technical Advisory Board. The Board of Standards Review determines that proper procedures have been followed and that a consensus has been reached.

The proposed Center for Law Enforcement Equipment User Standards should cooperate with ANSI and should consider sponsoring ANSI committees that will obtain a consensus for proposed NILE standards.

2.3.2 American Society for Testing and Materials

The American Society for Testing and Materials (ASTM) is a national nonprofit technical, scientific and educational society of over 13,000 individual members. It was founded in 1898 and was formally incorporated in 1902 for the purpose of "the promotion of knowledge of the materials of engineering, and the standardization of specifications and the methods of testing." In addition, there are over 2,000 regular corporate memberships, 400 sustaining corporate memberships with higher dues, and 1,500 Government agency members (Federal, State and local). Membership dues are a major source of income.

The Society is one of the five originators of the American National Standards Institute (ANSI) and is the sponsor of many ANSI standards projects. About one-half of the standards approved by ANSI were developed and published by ASTM.

Development of ASTM standards is undertaken by technical committees. The four areas of major interest are materials, test methods, products, and material-attributes. Technical committees in these four areas are established on authorization of the Board of Directors. Subcommittees, which are appointed by the technical committees, do the actual work but have no official standing in the Society.

A proposed standard may be written by the subcommittee or submitted to it. The subcommittee modifies the proposed standard as necessary and recommends it to the Technical Committee. A Committee on Standards determines whether the requirements of the Society relating to committee procedures have been met and whether a satisfactory consensus has been reached.

The proposed Center for Law Enforcement Equipment User Standards should investigate the possibility of cooperating with ASTM in developing specific standards and standard test methods in areas of interest to ASTM. For example, ASTM committees can assist in the evaluation of proposed test methods by having its members use and comment on the proposed

methods. Checks can be made to determine if there is sufficient inter-laboratory agreement to permit acceptance of the proposed test methods. (Other professional organizations can perform similar reviews in their area of concern, e.g. Institute for Electrical and Electronic Engineers). Also, as is mentioned in Chapter IV-D, ASTM is organizing a Committee on Forensic Sciences. A close working relationship between CLEUS and this committee is anticipated.

The Cement and Concrete Reference Laboratory discussed in Chapter VII, Section 7 and described in Appendix B is a joint ASTM-NBS activity. This relationship might serve as a model for other Reference Laboratory functions.

2.3.3 Underwriters' Laboratories

Underwriters' Laboratories (UL) is chartered as a non-profit corporation. It provides a system for assuring that certain types of products meet minimum standards for safety, security, fire resistance, etc. It publishes standards, tests products to ascertain if they meet these standards, maintains an inspection and follow-up program in the factories manufacturing products in conformity with the standards, and lists acceptable products. Manufacturers may publicize that their products have been accepted by UL. Many underwriters, governmental units, and architects require UL acceptance as a condition for purchase and installation of some items, especially

those items having a bearing upon fire hazards, and upon theft and accident prevention. That is, they use UL standards and rely on UL to assure that labelled items meet their standards.

In its work in standardization, the Underwriters' Laboratories cooperates with many organizations, including the American National Standards Institute and the National Fire Protection Association. It is also officially represented on many ANSI sectional committees.

The Underwriters' Laboratories also cooperates with the American Society for Testing and Materials through representation on technical committees dealing with the development of standards and methods of test for items such as gypsum, electrical insulating materials, rubber products, bituminous waterproofing and roofing materials, petroleum products and lubricants, and spread of flame on interior finishes.

The Underwriters' Laboratories is divided into several engineering departments, as follows: burglary protection; casualty and automotive; chemical, electrical, gases and oils; and fire protection. The Underwriters' Laboratories has issued more than 230 standards and sets of requirements.

2.3.4 Office of Engineering Standards Services

The Office of Engineering Standards Services (OESS) of the National Bureau of Standards develops voluntary standards in response to requests by producers, distributors, consumers, users or other government agencies.

When the request is approved, a specific proposal is developed in consultation with interested groups and other Government agencies. This proposal is then subjected to an editorial review within the Bureau as well as an impartial technical review by an appropriate Government agency or by several agencies interested in the standard. If it is appropriate, the technical review may be accomplished by an unbiased group outside the Federal Government. A draft of the proposal is then circulated for consideration and comment to interested groups, including consumers and users.

At this point, a Standard Review Committee is established to review the proposed standard, which has been amended to incorporate the suggestions received from all interested parties. The procedures specify that the Standard Review Committee must be representative of all groups interested in the product for which the standard is sought. It is also the Bureau's policy to see that small business, as well as big business, is represented on the committee. Once the committee approves the proposal, it is distributed to known producers and a representative sampling of distributors, users, consumers, and general interest groups for final consideration and acceptance. Any objections received from these groups are carefully considered by NBS during a final review. If there are no substantive objections, if the proposal is supported by a consensus, and if all criteria are met, the Bureau

announces the approval of the proposal as a Product Standard. The standard is then published by the Department of Commerce.

Product Standards may cover definitions, classes, sizes, dimensions, capacities, quality levels, performance criteria, testing equipment, and test procedures. They may vary in scope from the most complex requirements for precision instruments to size standards for the simplest of items.

OESS also offers information services on published engineering standards and specifications. The Information Section of OESS has collected 19,000 standards published by more than 350 domestic trade, professional, and technical societies. These standards have been cataloged and indexed and are maintained in a technical library. The Section functions both as a technical library and as a referral activity in providing answers to questions on engineering standards and standards activities, and directs inquirers to appropriate organizations for copies of published standards.

If OESS were to assist in the development of standards for the Center for Law Enforcement Equipment User Standards, its published procedures would probably have to be modified to eliminate the strict percentage requirement for a consensus. A possible set of procedures that OESS might use in developing standards for CLEUS is presented in Appendix A.

Chapter III

PERFORMANCE REQUIREMENTS

1. The Performance Standard Concept

Performance standards are based on the premise that a product is produced to fill a need, and that the best way to evaluate the product is to determine how well it succeeds in filling this need by directly measuring its performance through the use of standard tests. No attempt is made to specify its construction details, the materials to be used, or how the product is to accomplish the desired result.

Design standards, on the other hand, are based on the premise that the best way to get the required product is to describe the important construction details, specify the use of the materials known to be best for the purpose, and include tests and other objective means of insuring that the requirements are met.

It should be recognized that performance standards at one level of organization cease to be performance standards when higher levels of organization are being considered. Thus, the performance standard for a carburetor valve would not be part of the performance standard for the carburetor, nor would the performance standard for an automobile include the performance standard for the carburetor. It is characteristic

of a design standard, on the other hand, that it very frequently includes performance specifications for some of its component parts or materials.

The first step in the development of a performance standard is the statement of the need, and its definition in terms of performance requirements. These are qualitative statements which describe the need in all of its ramifications, as well as the pertinent characteristics of the user and of the environment of use. In the case of a floor covering for example, the user needs to indicate whether the intended use will subject the product to heavy traffic, mud, water, or hob-nailed boots; whether it must be sound absorbing, anti-static, easily patched, hard, soft, and so on.

The second step involves the identification of the performance criteria. These are the specific product attributes whose evaluation can disclose the degree to which the product satisfies the performance requirements.

The third step is the development of performance evaluation techniques. These are the test methods designed to evaluate the product in terms of its performance criteria, as accurately, reproducibly, simply, and inexpensively as possible. If adequate tests do not exist, new ones must be developed. While the most readily acceptable tests are those which yield reproducible numerical results, tests which require evaluation by an expert may also be required. Thus,

the flavor of tea may be evaluated by a professional tea-taster or by a taste-panel of people who like to drink tea, and the security of a vault door may be evaluated in terms of the length of time it takes an expert to open it, using tools that are normally available to a knowledgeable burglar.

The fourth step is the establishment of the performance specification. The specification describes the product attributes to be evaluated, the test methods or techniques for doing the evaluation, the acceptable values of test scores, and any other detailed requirements.

A performance specification becomes a performance standard when it has been officially promulgated by the recognized cognizant organization.

The notion of a performance standard is readily accepted because it is so obviously a logical one. A performance standard has the great advantage that it does not fix product design, and the manufacturer is thus free to innovate in order to achieve cost reduction, accommodate to materials shortages, or improve performance to reflect the current state-of-the-art.

While a performance standard may be accepted as the ideal, it should be recognized that this ideal is not always attainable in practice. Performance tests to measure the ability of a product to meet certain performance requirements may simply not exist. Similarly, the performance requirements may require tests so numerous, complex and expensive

that a design specification may be both simpler and more efficient. A product that has been manufactured can always be specified in terms of its materials and details of construction.

We recommend that performance standards for law enforcement equipment be utilized to the maximum possible extent. Where suitable tests do not exist, they should be developed. In cases where a standard is needed and the state-of-the-art makes it impractical or impossible to write a performance standard, the standard should be written around component performance, design details, and materials specifications as appropriate. Standards of this type should be reviewed more frequently than performance standards, to help insure that they are kept abreast of the state-of-the-art. They should be replaced by performance standards as soon as practicable.

Certain design specifications warrant a permanent place in even the ideal performance standard. They should be included in those cases where interchangeability of parts is a necessity (as when a wearing part such as a tire must be readily replaceable), or a distinct advantage (as when sub-assemblies of the product may be available from different manufacturers).

2. The Human Engineering Concept

In evaluating any device intended to be used by a human being, the characteristics of the human are as important as the characteristics of the device.

This is not a novel idea. The first human factors engineer may well have been the man who first picked up a large stick by its small end because he found it easier to grip, and thus invented the club. Some degree of human engineering must be involved in every device, be it a hammer or a space-ship control chamber. On the quality of the human engineering effort, however, depends the effectiveness with which the human being can use the device.

Therein lies the relevance of the human engineering concept to the development of standards for law enforcement equipment. Complex equipment such as the automobile or the two-way portable radio, which has been human-engineered with the needs of other users in mind, is not necessarily suited to the needs of the police officer.

While this concept is obviously relevant to the designing of law enforcement equipment, it must also be considered in the selection of performance evaluation criteria, the development of test methods and the setting of standard levels of performance.

It is recommended that competence in human factors engineering be available on the staff of the Center for Law-Enforcement Equipment User Standards.

Chapter IV

SURVEY AND ASSESSMENT

1. Introduction

Law enforcement agencies purchase and use a wide variety of items. They use motor vehicles, electronic communications equipment, computer systems, weapons, protective devices, prison buildings and furnishings, uniforms, etc.

A great many standards and specifications have been written for a great many items. It is estimated that there now exist about 20,000 non-governmental standards and specifications, 4,500 Federal Specifications and 40,000 Military Standards and Specifications.

A small number of these standards describe items of interest to law enforcement agencies. An even smaller number are directly useful for procurement purposes. For most law enforcement equipment, however, either no standards exist, or the existing standards will require major revision before they can fill the needs of law enforcement agencies.

Among the reasons for this state of affairs are the following: 1) the financial incentive for industry to develop a standard has been insufficient; 2) the item is too new for a standard to have been developed; 3) the existing standard does not reflect the special requirements of law enforcement

agencies; 4) the existing standard is obsolete, poorly prepared, or otherwise unsuitable.

In this chapter is presented a survey of the field of law enforcement equipment and an assessment of the needs and possibilities for standardization. Several of the major categories of law enforcement equipment have been selected for detailed discussion. No implication is intended that the categories not selected for discussion are less important or less suitable for standardization.

Chapter IV-A

VEHICLES AND TIRES

1. Introduction

Law enforcement agencies purchase and use a wide variety of vehicles including automobiles, ambulances, helicopters, fixed wing aircraft, motor skooters, and motorcycles. In fact, a very large percentage of police expenditures for equipment is for vehicles. Among these vehicles, the automobile is, of course, the most important. For this reason, it is a prime candidate for attention.

2. Automobiles

Law enforcement agencies adopt and modify existing passenger cars for use as police vehicles. Although agencies differ significantly from one another in their procurement policies and vehicle specifications, a number of progressive agencies have worked with automotive manufacturers in an effort to improve vehicle performance in braking, roadability and other characteristics of performance. "Police Package" vehicles are available from all the major auto manufacturers. However, the vehicles are actually modified "high performance" passenger cars that have been primarily designed to meet the

needs of the motoring public rather than the specialized needs of law enforcement agencies.

To assist law enforcement agencies in their procurement of vehicles, performance standards that are based on the requirements of the user will have to be developed. The use of such uniform standards throughout the nation for procurement will undoubtedly encourage automotive companies to produce these vehicles. Moreover, if modifications and installation of special equipment are considered in the design and production phase of the vehicle, some cost reductions are likely to be realized.

2.1 User Requirements

Law enforcement agencies throughout the country have vehicle needs that vary with the function and location of the agency. Thus, the needs of a state highway patrol are significantly different from those of a large municipal police force. Requirements for the extreme cold temperature environment of North Dakota are totally different from those for the extreme hot climate of Arizona.

Special equipment needs are currently being considered by law enforcement agencies and the Law Enforcement Assistance Administration. Wayne State University, the Detroit Police Department and auto manufacturers are working together on a project to design a more comfortable and efficient police car.

The research is aimed at determining whether air-conditioning improves police efficiency, whether a teletypewriter can be installed to record messages when the policeman is away from the vehicle, how best to carry prisoners, etc.

An article in the January 1969 issue of The Police Chief discussed "Tomorrow's Police Car." Mr. G. Ray Wynne, Director of Police Transportation, Los Angeles Police Department, raised the question, "Will tomorrow's police car be an ordinary sedan or will it be a versatile mobile platform for specialized equipment?" He predicts that future police vehicles will require installation of sophisticated communications equipment such as two four-way radios and an electronic computer for instant identification of suspects or vehicles. Special speed measuring equipment is currently being installed in some large fleets, and more and more police cars are being equipped with shotguns which are mounted for quick access. Mr. Wynne concludes, "When law enforcement truly takes advantage of the tools available, the police vehicle will in fact become a platform for transportation of equipment as well as man. ... As the training and skill of the officer improves, there will be a need for better equipment and communications."

2.2 Existing Standards

The National Highway Safety Bureau of the Department of Transportation issues mandatory safety standards. Since all

vehicles are required by law to meet these standards, it is important that law enforcement agencies determine the effect of these standards upon their operations. An examination of police requirements and current safety standards makes obvious the need for special safety standards for police cars. A few illustrations that lead to this conclusion are cited below.

Stolen vehicles account for a significant number of accidents that result in death and injury. Safety standards which were promulgated to help prevent theft of vehicles and subsequent accidents include steering wheel locks and door locks that must be lifted manually before the door lever can open the door. This equipment prevents an officer from rapidly leaving his vehicle when, in the course of his duties, such action is imperative.

The required seat belt and shoulder harness can restrain the driver of a police car from reaching certain equipment, such as a radio microphone. This difficulty can be overcome by using ordinary inertia reel shoulder harnesses as special equipment.

Federal Motor Vehicle Safety Standard No. 201 - Occupant Protection in Interior Impact - Passenger Cars prohibits the intrusion of equipment into the passenger compartment. Padded dashboards, recessed controls, break-away mirrors and control levers are required to help prevent injury resulting from the "second collision" of the passenger. The installation

of the special equipment required by the police officer involves considerable invasion of the passenger compartment with potential injury-producing hardware, contrary to the existing federal standard. Restraint system design and performance standards for police vehicles should provide safety for the police officers while permitting installation of required equipment.

Future federal safety standards for items such as air bags will create special problems for law enforcement vehicles.

The Center for Law-Enforcement Equipment User Standards should work closely with the National Highway Safety Bureau to establish special safety standards for police vehicles so that police cars: 1) will comply with these special standards; 2) when stripped of their special equipment and sold to private citizens, will comply with the general standards issued by the Department of Transportation; and 3) will be able to serve the needs of the police. These would be mandatory standards (or exceptions to mandatory standards) issued by the Department of Transportation in response to its legislative responsibility. The role of CLEUS would be to assist DoT in modifying existing and proposed standards to meet the special needs of law enforcement agencies. The Department of Transportation has not yet been contacted on this matter.

There are many existing standards that relate to the performance of automobiles. Those standards for tires, braking,

steering, and acceleration that were designed to meet the needs of the general public usually will not be suitable for police use although many of the test techniques included in the standards will be applicable.

The specifications for vehicles and vehicle equipment issued by the General Services Administration for procurement by the Federal government should be surveyed and analyzed for application to police vehicles. It is to be noted that some GSA specifications, such as ZZ-T-00381K for Tires, Pneumatic, Vehicular (Highway), are more severe than the equivalent Federal Safety Standards. Department of Defense standards contain special requirements to meet the needs of the Department which may be applicable to the needs of law enforcement agencies. For example MIL-STD-640B is for Sedans, Station Wagons----Standard Models and Special Equipment Requirements. A thorough review and evaluation of existing standards should be part of the process of developing standards in this area.

2.3 Development of Standards

The test methods used for measuring required performance are critical to the effectiveness of standards. In the area of motor vehicle performance, many of the existing test methods are not satisfactory. For example, some of the test procedures involve the subjective judgments of an individual or jury. Some test methods are adequate, however, for inclusion

in initial or first generation standards. In some cases it would be more advantageous to use the existing state-of-the-art rather than wait for improved test methods, while in other cases it would be better to wait for and to support the development of improved techniques.

The development of the initial standards will involve a comparison of the state-of-the-art in the currently available vehicle systems with the operational requirements. Existing standards and specifications for this equipment should be evaluated for their adequacy in describing and testing the required performance. As appropriate, the best existing standards should be adopted for use or modified to better reflect the needs of law enforcement agencies. Development of new standards, with emphasis on developing standard test procedures, would also be required.

A good illustration of the inadequacy of some existing standards is provided by the braking performance requirements for police vehicles. Typical specifications require that a number of stops be made at high speed to warm up the brakes, and that the test then be conducted using a "panic" stop with lock-up of brakes on all wheels. A better test of braking performance, however, is one conducted at incipient skid rather than at wheel lock-up. NBS is currently developing such a test which includes the use of a device that eliminates driver variability or skill.

Initial standards that would be recommended to NILE would be based on an evaluation of the existing state-of-the-art in vehicle performance compared with operational requirements and the test methods to measure that performance.

There are a number of vehicle systems and equipment items in various stages of development which it would be desirable to incorporate into police vehicle standards for future procurement. For example, the installation of four-wheel disc brakes and anti-locking braking systems in police vehicles would result in improved braking performance and wet-pavement safety. Double shoulder-harness restraint systems with inertia reels would provide added protection to officers. High-speed, high-performance tires can be demonstrated in vehicle and laboratory test standards. Standards should be developed that will assist law enforcement agencies in procuring those innovations that have proved to be of value.

2.4 Office of Vehicle Systems Research

The Office of Vehicle Systems Research (OVSR) of the National Bureau of Standards has an established competence in the field of developing motor vehicle standards and test techniques for inclusion in standards. The Office maintains a trained staff of 40, a well equipped laboratory and access to field test sites. OVSR has developed an expertise

over the past three years in test method development in tires, braking systems and occupant restraint systems. This experience is directly applicable to vehicle and tire standards development for law enforcement agencies and could serve as a base for developing similar competence in related areas of interest to NILE. Although the major emphasis of OVSR's work is in the development of safety standards for the Department of Transportation, the scheduling and coordination of programs for NILE can be arranged. Other NBS facilities for research and testing in areas such as vehicle glazing, mirrors, flammability, etc., could be used for police vehicle test development.

Two test sites are available to OVSR.

1. The Agricultural Research Service at Beltsville, Maryland, has facilities set up for training of the Maryland State Police. Serpentine and violent maneuvers of vehicles can be safely conducted on the runway set up. NBS has an inter-agency agreement with the Department of Agriculture for the use of these facilities in connection with other vehicle programs.
2. The National Aeronautics and Space Administration's Wallops Station on Wallops Island, Virginia is currently being utilized by OVSR for vehicle testing.

It is recommended that the proposed Center for Law-Enforcement Equipment User Standards use the Office of Vehicle Systems Research to assist in the development of standards for motor vehicles.

3. Aircraft

Law enforcement agencies make use of aircraft for a variety of purposes. This use can be expected to increase in the future. Although the total number of aircraft that law enforcement agencies will purchase is likely to be significant, the number of any particular type of aircraft purchased during any year is expected to be rather small. The annual purchases will be divided among helicopter, fixed wing aircraft with a very low minimum cruising speed, and conventional aircraft. Within each of these categories, there is a need for craft of different sizes and cruising ranges. Since the market for any particular model will be small, manufacturers are not likely to produce aircraft that will be specially tailored to a set of specifications used by police departments. Therefore, standards in this area should be limited to specific aspects of the aircraft that are of particular interest to law enforcement agencies and can be provided by manufacturers with minor modifications to the basic design of their normal product line.

4. Motorcycles

The situation with regard to motorcycles is similar to that for automobiles, in that motorcycles also require special modification in order to adapt them for use by law enforcement agencies. There are several types in current use, namely, highway patrol motorcycles, city and traffic cycles, motorcycles with side car, three-wheel motorcycles and motor scooters.

With the exception of the scooter, all of these types have been purchased almost exclusively from the production of one domestic manufacturer. This resulted partly from the fact that the basic cycle of this manufacturer was the only one deemed of sufficient power and size to accommodate the extensive radio equipment required. Now that miniature solid-state radio equipment is available, a reexamination of this situation seems to be indicated. It seems likely that some of the smaller and more easily handled cycles which are available will prove to be more useful for some applications.

Standards for motorcycles have only recently been given attention. For example, the National Highway Safety Bureau has only three standards that pertain to motorcycle performance. They are Standard 108 - Lamps, Reflector Devices and Assorted Equipment, Standard 112 - Head Lamps, and Standard 205 - Glazing. The industry recently requested the Society of Automotive Engineers (SAE) to assist in developing

motorcycle standards, and a motorcycle committee under the supervision of SAE has been in existence for approximately two years. The SAE is writing standards in the following areas: Definitions, Brakes, Lighting and Signaling, Electrical Systems, Driving Mirrors, Horns, Tires, Sound Levels, Emission Control, Vehicle Identification Numbers, Side and Center Stands, Fuel Tank Caps and Lines, and Heat Shielding.

Although this is a significant step, it must be anticipated that these SAE standards, because they are the first of their kind, will represent a fairly low common denominator, and will not adequately reflect the more stringent requirements of law enforcement agencies.

Personnel of the Office of Vehicle Systems Research have had both official and personal interest in the development of the Government and SAE standards and are in an excellent position to assist in the development of meaningful motorcycle standards for law enforcement agencies.

There is a significant need for standards in the area of protective clothing for motorcyclists. Standards for helmets and eye protection devices have been developed, and should be evaluated for possible use as NILE standards for these items.

The Z-90 helmet standard developed by the Snell Memorial Institute specifies several degrees of protection and is now in general use. Other standards exist, such as those

developed by the British Standards Institute. A large body of information concerning the performance of helmets, both with and without integrated communication equipment, exists in the military establishment. A comprehensive review of this information recently appeared in the publication, "A Study of Military Applications of Protective Devices Designed to Prevent or Ameliorate Head and Neck Injuries."

Studies on eye protection devices have recently been made on behalf of the National Highway Safety Bureau. The resulting ratings of shields, goggles, and similar devices should be evaluated for their relevance to the needs of law enforcement agencies.

It should be possible to develop adequate NILE Standards for head and eye protective devices within a relatively short period of time. The NBS Products Evaluation Division has had experience in the evaluation of such devices and could assist CLEUS in the development of standards in this area.

5. Tires

An urgent need exists for a series of rational performance standards to cover the wide variety of vehicle tires used by law enforcement agencies.

The performance requirements vary widely with the type of vehicle and its intended use. Thus, cornering ability is of basic importance in a motorcycle tire while the ability to

cruise at highway speeds and perform safely at chase speeds is of great importance in a tire for a highway patrol car. Neither of these characteristics, however, have any relevance to tires for vehicles used by meter maids.

Recent research has emphasized that the tire is a complex item, and that changes introduced to optimize one performance characteristic will very often degrade another desirable property. As one example, a decrease in tread rubber thickness will enhance high speed capability but will reduce tread life. As another example, under-inflation of a tire to give a soft ride on an ambulance can lead to catastrophic failure in high speed operation.

The Tire Systems Section of the Office of Vehicle Systems Research at the National Bureau of Standards has been involved in tire research and the development of methods for tire testing for several years, and has developed a unique expertise in this field. The laboratory is developing and improving test methods for the measurement of tire properties such as high speed capability, endurance, impact resistance, traction and tread wear. These standard test methods are available for inclusion in NILE Standards for vehicle tires.

It is recommended that the development of tire standards receive early attention, and that the NBS Office of Vehicle Systems Research be requested to assist in the development of these standards.

Chapter IV-B

PRISONS AND DETENTION CENTERS

1. The Problem

Buildings intended for confinement, detention and rehabilitation purposes should be designed and constructed so as to conform with accepted standards referring to the health and safety of the occupants. The buildings should therefore, in addition to performing their primary mission, conform with the local codes. Nevertheless, the nature of the activities in these buildings is such that deviations from general purpose codes are sometimes desirable and often necessary. It is obvious that buildings intended exclusively for detention purposes have some performance requirements that are significantly different from those of structures such as apartments, office buildings, hospitals and the like. An apparent conflict exists. The conflict may be resolved if certain trade-offs are made so that the building can function as intended and still provide a comfortable, safe and healthy shelter for its occupants. A major difficulty in seeking a solution lies in the determination of the nature and extent of the trade-offs that must be made. The question arises as to what are the definite boundaries and how they should be defined.

Another major question that arises concerns the durability of building materials and building systems. Durability is of particular interest in designing detention centers because of the excessive abuse to which such centers and their furnishings are subjected. For the purpose of this document, a building system refers to any specific integrated combination of materials that make up some part of the building. Some examples of building systems are the plumbing network, the electrical distribution system, the roof, floor and wall assemblies, and the like. Unfortunately, durability is often unconsciously overlooked or ignored in the building code and in the standards area. However, the durability of a building material or system is a very significant characteristic, since it may be considered the time dimension of performance. To place durability in perspective, two questions must be asked: 1) How long will a material or system continue to perform as it was originally intended, and 2) what kind and frequency of maintenance, repair and replacement will be required to ensure acceptable performance over some predetermined period of time?

A third consideration in the design of buildings for use by law enforcement officials is that the buildings must be secure. Those parts of the buildings that hold prisoners must be secure against escape. Storage areas for weapons must be secure against loss of the weapons. While it is not anticipated that standards will be developed for total security

systems, standards should be developed for parts of the system, such as locks, surveillance and alarm systems, wall assemblies, etc. (See also Chapter IV-C.)

The Center for Law Enforcement Equipment User Standards should give high priority to work in the area of standards for structures designed for detention purposes. Indications are that there will soon be a major surge of construction of such buildings. If the activities of NILE and CLEUS are to be of use in this area, standards will have to be available during the design stage of the construction projects.

2. Durability

Durability is a relative term indicating the degree of permanence of a material used in a building. It is the time dimension of performance. There appears to be no single measure of durability because of the variations in the nature and intensity of the degrading and destructive forces that result from natural, man-generated and normal wear sources. However, if the chemical nature of a material is known and its environment can be identified, the durability can be predicted with a high degree of accuracy. For example, a paint composed of materials that are susceptible to moisture will not be durable in a washroom. It will fail in a short period.

The durability (and strength) requirements for materials used in detention-type buildings will, in many cases, be

significantly different from those used in buildings of other types. For example, lighting fixtures, plumbing fixtures, window glass, floor, ceiling and wall coverings may be required to resist physical forces and exposure to chemicals that are not generally common to other structures.

A sound approach to use in considering the durability of materials, furnishings and the like is to identify the needs of the occupants in terms of the performance of the building and its furnishings. Obviously, durability plays a major role as a performance requirement, since it implies a change or the absence of a change in the material with time and use. The nature, rate and quality of change which occurs determines whether or not the occupants' needs will be met for the required period of time.

A major technical problem in developing standards for durability is the development of satisfactory tests of the desired performance. Obviously, field tests require too much time and are not appropriate. Arm-chair evaluation based on knowledge of the materials used is often accurate but lacks the objectivity needed. Accelerated tests, however, when they exist, do meet the need. Support of the development of accelerated tests should be an integral part of any effort to develop durability standards for use in prisons and other detention centers.

3. Fire Protection

Fire protection is as necessary for the safety of life in detention centers as in other structures. Although a relatively infrequent occurrence, fire, once initiated, becomes a hazard not only in the area of its origin but also in adjoining areas. The performance requirements for safety from fire are:

- building elements shall resist the effects of heat, flame and combustion products without structural failure
- building elements shall contribute a minimum of fuel to a fire
- interior surfaces (floor, ceiling, and wall) shall resist the spread of flame
- building elements shall produce a minimum of hazardous combustion products
- mechanical systems shall not initiate, contribute to, or spread fire
- fire detection systems shall quickly signal the presence of fire
- exitways shall be adequate for the building occupancy.

4. Building Codes

Detention centers are usually subject to state building codes for public buildings that are designed to ensure the

health and safety of the occupants of the building. These codes must take into account the special requirements of prisons. For example, in the event of fire, the affected area must be evacuated in time to ensure the safety of the occupants. However, because of the nature of the population, it is a primary requirement that the evacuation must be to a controlled area. As with all building codes, each jurisdiction develops its own code, although the code might be based on one of a number of model codes. It is likely that the portions of the codes related to prisons and other detention centers in most, if not all states, should be updated and improved. Improved codes often permit the construction of more useful structures at lower cost by eliminating unnecessary restrictions.

An improved "model code" for prisons and other detention centers could and should be developed. CLEUS should help support such an effort, but the model code should be developed by an organization that the state and local building code officials trust. The National Conference of States on Building Codes and Standards appears to be one of the appropriate organizations to assist NILE and CLEUS in the development of provisions for the special requirements of detention centers for inclusion in state codes. The National Conference is an organization of states. Cooperation of the states in the development of the code provisions will aid in getting the provisions accepted by the state building code

officials. The officers of the Conference have not been approached concerning the possibility of their participation in developing the special provisions for detention centers, but the Executive Secretary has been apprised of the possibility and has reacted very favorably. The four major national groups that publish model codes should also be given an opportunity to participate and, if they wish, to publish any products of the suggested cooperative effort as part of their own model codes.

The National Conference of States on Building Codes and Standards was organized in 1967 to provide a forum of the States for studying problems relating to the development and use of building codes and standards. A major purpose of the Conference is to assist in the development of programs leading to the adoption and administration of uniform comprehensive building codes and standards among the agencies involved in the regulation of construction within and among the States, whenever such uniformity is deemed necessary for interstate purposes.

The Building Research Division of NBS serves as the secretariat and provides a research capability for the Conference. It also provides a staff member to serve as the Executive Secretary.

This relation between the two organizations provides the means to cross Federal-State as well as State-State boundaries

to expedite the multi-directional flow of information among the states and between the public and private sectors of the economy.

A full discussion of the building code problem is not appropriate for this report. The interested reader is referred to the Report of the Advisory Commission on Intergovernmental Relations, "Building Codes: A Program for Intergovernmental Reform," January 1966. The four model code groups are the Building Officials Conference of America, the International Conference of Building Officials, the Southern Building Code Congress, and the American Insurance Association which promulgates the National Building Code. A major share of the financial support of these four groups comes from the sale of documents containing their model codes.

5. NBS Building Research Division

The Building Research Division of NBS has an outstanding group in the area of interest to CLEUS and NILE. This is the obvious group to assist in developing standards for CLEUS, irrespective of the eventual organizational location of CLEUS. The major competence of the group is in the area of measurement methodology. Furthermore, its association with and support of the National Conference of States on Building Codes and Standards provides a valuable link between the group and state and local code officials.

The Building Research Division has a staff of approximately 180 members, including over 100 scientists, engineers, building code specialists, materials technologists and the like who are skilled in all phases of building technology. From this personnel pool, the Building Research Division is able to assemble multi-disciplinary teams of experts to attack the multifaceted problems which confront the designer, constructor and the users of the building in question. For example, it was such a team that recently developed four volumes of guide criteria for the design and evaluation of housing systems for Project Breakthrough of the Department of Housing and Urban Development.

The research teams are supported by the modern laboratory facilities of the National Bureau of Standards. The Building Research Division occupies a specially constructed building at the NBS facilities at Gaithersburg, Maryland. This building has 65,000 sq. ft., of which 45,000 sq. ft. are devoted to laboratory space containing a spectrum of modern test equipment and instrumentation for conducting building research. The Division also retains at the former NBS site in Washington certain facilities for conducting fire research since such facilities are not currently available at the Gaithersburg location. Two new mobile laboratories, one for acoustical investigations, and the other for fire studies, enable the Division to conduct on-site investigations in the

field. Eight weathering sites, ranging in location and climate from Puerto Rico to Alaska, enable Division researchers to study the effects of climatic variations on the weathering of building materials and systems.

It is important to note that by virtue of the availability of a modern laboratory and of mobile and field facilities that can be utilized immediately, the Building Research Division can undertake a wide variety of projects without requiring additional support for facilities.

Chapter IV-C

SECURITY, DETECTION, DETERRENT AND SURVEILLANCE SYSTEMS AND DEVICES

1. Introduction

Security, detection, deterrent and surveillance systems and devices are designed to help protect against crime and to help keep accused and convicted individuals in detention centers. These devices and systems can be divided into four groups: (1) physical security equipment and systems; (2) detection and alarm systems; (3) deterrent devices and systems; and (4) surveillance systems. While the discussion in this section will emphasize the need of Government officials to keep accused and convicted individuals in detention centers, the same technology can be used by business, the public and others to protect themselves against crime.

2. Physical Security Systems

2.1 The Need for Standards

Detention centers represent a diversity of requirements. There are many types of detention centers which require different types and levels of security. There are the prisons that house hardened criminals under long-term sentences, who devote considerable effort to devising methods of escape. In

addition, there are the overnight lock-ups for intoxicated persons, local jails for short term detention, juvenile centers, women's detention centers, half-way houses, and working farms, to name but a few. As can be seen, the security requirements of these systems vary greatly. The general observation of those particularly concerned with this matter, such as architects for federal prisons, members of the International Association of Chiefs of Police, and the President's Crime Commission, is that these systems have not been carefully evaluated in the past and that they often do not incorporate the latest technology in their physical plant and operational procedures.

The hesitancy of prison officials to adopt new devices and modern technology stems from the fact that they must be sure that the innovations do, in fact, provide the level of security required for their type of institution. Conservatism in accepting new ideas and new equipment is often the prudent course of action, because the real level of security provided by an innovation can only be determined through actual use. The introduction of innovations with unproven claims is risky.

Unfortunately, this necessary conservatism sometimes fosters actual negativism. For example, the following is quoted from Chapter IX of "The Modern Jail" by Casey, from a discussion of contracting for jail equipment. "Of the hundreds of new ideas proposed and tried out for the betterment of jails

over the last half century, all but 8 or 10 have failed." It is inferred that one should not select jail equipment that has not been proven in service for at least 40 years. That this does not give a true picture of current technological progress is indicated by so eminent an authority as the Division of Security of the Atomic Energy Commission, which states that there have been at least 8 or 10 highly significant developments in the electronics security field alone within the past two years.

The development and field testing of new security equipment will not be part of the standardization activity being discussed in this report. However, standards for new and existing equipment will help assure prison officials that when they do acquire new equipment, it will be the same as that shown to be effective.

2.2 Locks

Locks in jails are a good example of items for which standards could be of help to law enforcement officials. It appears that the majority of such locks are obtained from a single supplier and that these locks do not incorporate some of the more recent advances in lock technology. There have been at least three highly significant developments in key locks within the past several years which have increased their resistance to picking "ten fold." If other parts of the NILE

program indicate that these new advances should be introduced into prison locks, standards should be developed to facilitate their introduction. Further, if standard cylinders were used in future prison locks, new improvements in locks could be introduced gradually on a continuing basis. Finally, the use of standards would help foster competition in the industry.

2.3 Current Standards

There are in existence some excellent standards for key tumbler locks, combination locks, vault doors, vaults, and other security devices. These standards have been promulgated by the General Services Administration, the Department of Defense, the Atomic Energy Commission, and other Government agencies. These standards are readily adaptable for a variety of purposes and can serve as a basis for developing standards to be promulgated by NILE. Therefore, it appears that rapid progress can be made in developing standards in this area.

2.4 Groups Experienced in the Field

At the present time there appears to be only one commercial laboratory which has had extensive administrative and laboratory experience in evaluating security equipment -- The Underwriters' Laboratories, Inc. (UL), Northbrook, Illinois. This group has been concerned with providing security to commercial establishments at reasonable costs. It is the practice

of the manufacturer of security equipment, the insurance company, and the purchaser of the equipment to work in sort of an economic triangle in which UL acts as the referee. The cost and susceptibility of the security equipment to violation, the cost of insurance to the purchaser of the equipment, and the payments for loss by the insurance company are the factors that are kept in balance. This assignment has dictated the types of competencies that have been developed at UL and they would need to develop or hire additional competencies in order to get into the field of security devices for detention centers. At present it is not known whether Underwriters' Laboratories would be interested in such a program.

2.5 Tests of Security Devices and Systems

Security devices and systems are designed for protection against skillful individuals who wish to violate the security provided by the device or system. Evaluation of such devices cannot be limited to prescribed objective tests. Included in the evaluation should be an attempt by a trained individual to violate the security provided by the device or system, i.e. to outsmart the security device or system. To insure comparability of evaluations among devices, all such tests should be performed by a single group.

One obvious location for such a group is the Center for Law-Enforcement Equipment User Standards. This group would

be involved in standards development, product evaluation and, to some extent, in acceptance testing. This would be a departure from the anticipated usual mode of operation that separates these three functions.

Government agencies such as the Central Intelligence Agency, Atomic Energy Commission, National Security Agency, State Department, and Department of Defense maintain laboratories and experts who evaluate security equipment. These people tend to specialize depending on the philosophy of protection that the agency prefers. It is believed that these agencies do not have the freedom to use their security departments for evaluating the commercial equipment and the specialized apparatus in which the Justice Department is interested. The National Bureau of Standards has had experience with security devices and has in its employ several staff members who could be available, at least for consultative services. The General Services Administration had a small competent group in this area but had two untimely deaths of key personnel.

2.6 Alarm and Surveillance Systems

One of the most promising avenues of improvement in the crime fighting effort is that of the many new developments in electronic detection and surveillance equipment. Many individuals and companies have endeavored to develop devices to give an alarm when a crime is being committed or provide

continuing surveillance of an area where a crime might be committed.

Many people misunderstand the purpose of this equipment. The equipment does not eliminate the need for physical restraint, security devices or guards. The alarm and surveillance systems provide the guards with information that might not otherwise be available to them, thereby helping them do a better job. The use of the devices does, of course, mean that additional guards are not needed to obtain this information, but it does not eliminate the need for personnel to monitor the equipment, especially television surveillance systems, and to respond to the need for the physical presence of law enforcement officers.

As previously mentioned, there are some standards in this area. There are standards developed by the Underwriters' Laboratories, whose interests have been explained above, and by the various Government agencies with a vital interest in security. Commercial enterprises tend to be more willing than Government agencies to accept some losses in their effort to keep down the cost of alarm systems and false alarms. UL standards reflect this industrial approach, whereas Government specifications reflect a desire for a higher level of protection irrespective of cost. It would appear that a middle course would be most appropriate. In setting these standards, the problem of false alarms would be of particular concern. The cost of false alarms to the various police agencies that

must respond to alarms must be taken into consideration in setting performance levels.

Recently, a group of manufacturers of alarm equipment have founded "The Alarm Industry Committee for Combating Crime." This group claims to represent the manufacturers of 95% of the alarm equipment produced. In recent testimony to the Housing Subcommittee of the House Banking and Currency Committee, the group announced their intention of developing standards for alarm systems. (See Appendix E.) They told the Congressional Committee that they "look forward to working closely with the Bureau of Standards and making available to it our vast experience in this area." It is recommended that the Center for Law-Enforcement Equipment User Standards respond favorably to this offer. While the offer was made on the assumption that CLEUS would be located at NBS, the offer was not restricted to NBS. It is recommended that CLEUS also cooperate with Underwriters' Laboratories.

It is obvious that all detection and surveillance systems must have standards not only for their use and application in security systems but also for minimizing the safety hazards that normally accompany electrical devices.

Although many of the alarm and surveillance systems will be purchased by private citizens and corporations, these systems are a proper area of concern for NILE. Some of this type of equipment will be purchased by law enforcement agencies. Some

private systems will interface with police equipment so that the police can respond to the alarm. Moreover, a case can easily be made for NILE helping the general public to select suitable alarm systems through the development of standards. Expenditures for crime prevention and detection are in the public interest even when the funds are non-public.

It is recommended that the development of alarm standards be initiated soon and that an attempt be made to work closely with the Alarm Industry Committee for Combating Crime and with Underwriters' Laboratories.

Chapter IV-D

PHYSICAL EVIDENCE IN CRIMINAL INVESTIGATION

After a crime has been committed, the police must determine the nature of, motives for, and other circumstances surrounding the crime, identify the criminals and any victims, and collect the evidence needed for the trial and conviction of the offenders.

The nature of the police investigation will vary with the type of crime committed, but will normally include the acquisition of both testimonial evidence, obtained by interviewing victims, suspects, witnesses, informers, and any others who may be able to contribute information, and of non-testimonial or physical evidence.

Physical evidence includes such things as fingerprints, shoe prints, hairs, fibers, blood stains, paint chips, broken glass, guns, bullets, tool marks, etc. A fuller listing, together with suggestions for obtaining, preserving, and packing such items of evidence for shipment to a crime laboratory, is given in the booklet "Scientific Aids - FBI Laboratory", issued by the Federal Bureau of Investigation.

Standardization activities in connection with physical evidence can be considered from two points of view: the acquisition of the evidence, and the examination and interpretation of the evidence.

The typical investigating officer devotes most of his effort to the acquisition of testimonial evidence, and tends to minimize the collection and use of physical evidence. We feel that the officer could be encouraged to devote more attention to physical evidence if standardized procedures and kits that reflect the latest advances in criminology and the expertise of police officers who have specialized in this area were readily available for his use.

Examples of items which could benefit from standardization and specification are:

1. Fingerprint kits.
2. Plaster-casting kits.
3. Tire and shoe print lift kits.
4. Photographic equipment for scene-of-crime use.
5. Evidence container and label kits designed to preserve the evidence and maintain the legal chain of custody.

Our on-going search has disclosed two existing specifications for the first item, fingerprint kits. For some items in this area, meaningful standards can be developed in a relatively short time; for others, a moderate amount of preliminary development work will be required.

Most physical evidence achieves maximum effectiveness at trial when an expert witness testifies as to its nature and significance. The expert witness is at best a highly

qualified forensic scientist who is fully educated in his specialty - be it serology, toxicology, ballistics or other - and has had many years of special training and experience. Few things are more convincing to a jury that the testimony of such a witness, and he can have a substantial influence on the outcome of a trial.

Conversely, few things are more hopelessly confusing to a jury than the testimony of two expert witnesses who have come to exactly opposite conclusions. Since, in such circumstances, the jurors are forced to make an evaluation of the conflicting testimony, they may well conclude that one or both of the expert witnesses are stretching the truth for the sake of a fee, or that one of them is completely incompetent. Also, since they must conclude that at least one of the witnesses is wrong, their belief in the scientific basis of all expert testimony in that field tends to be shaken. Moreover, if the jurors do not choose to ignore the conflicting testimony entirely, they are likely to believe the witness who either makes the better impression or has the more impressive list of qualifications.

It is unfortunately true that well-qualified forensic scientists can reach different conclusions because of differences in the scientific procedures that they use to examine the evidence. Such differences could be greatly reduced if the scientific procedures were standardized on the basis of detailed studies conducted by a group of competent specialists.

The American Society for Testing and Materials is in the process of organizing an ASTM Committee on Forensic Sciences for this very purpose. We recommend that the Center for Law-Enforcement Equipment User Standards participate in and support the work of this committee and, where appropriate, recommend that the standards produced be adopted as NILE Standards.

Standard reference materials are well known to be invaluable adjuncts to the standardization of many scientific procedures. They are carefully selected materials whose relevant properties have been accurately determined and are certified by some recognized authority. The National Bureau of Standards has been issuing standard materials since 1906, and currently makes available about 650 different materials. The NBS Office of Standard Reference Materials accepts the support of other agencies to prepare standard materials requested by such agencies. The other agency support covers only the research cost associated with certifying the material. The cost of preparing and distributing Standard Reference Materials is covered by revenue from sales. We recommend that NILE request the development of such standard materials by the NBS Office of Standard Reference Materials as the need for specific reference materials becomes apparent.

Chapter IV-E

DATA PROCESSING AND DATA COMMUNICATIONS

1. Statement of the Problem

Computer based information processing systems have evolved in a singularly free fashion, and without the restraints of uniformity or standards. Systems designers and programmers have been free to describe information and develop programs in the manner best suited to the available equipment, the nature or structure of the information to be handled, the requirements of software, or the preferences of the innovators of the system.

The freedom employed in data processing and data communications systems is now limiting the use of both data and programs and is making their interchange more difficult and costly in all areas of application including law enforcement.

Individual state and local data processing centers rely on vendor-supplied operating systems and the manufacturer's version of the applicable programming language. This is the major deterrent to the interchange of data and programs. It encourages and usually even forces the user to embed implicitly in his computer programs many details of the equipment on which the programs were implemented, such as word length, character code, etc. In order to transfer a program or data

for use on other equipment, reprogramming is often required to reconcile the differences. For complex programs, such changes can amount to a complete reprogramming or file conversion effort.

Predicated upon the multiplicity of users and processes which may be involved with LEAA's large and jurisdictionally distributed (state and regional) data bases, there is a need to establish, to the maximum extent possible, common operational compatibility among the computer based information systems at the state and national levels.

2. Background

The objectives and requirements for information processing and data communication standards must be identified in the early stages of the LEAA program involving grants-in-aid to State and local law enforcement agencies. It is recognized that initially State information systems can generally be independent of other State systems. The standards that are established can be voluntarily adopted on strictly a local basis. However, as the LEAA program expands and the number of states using information processing systems increases, the need for standardization becomes more apparent. Information systems acquired and operated by the State and local Governments are being expanded to interchange information across jurisdictional boundaries. These local systems may

thus be integrated into a complex national network involving remote terminals, central processing units and telecommunication facilities that are used and operated by Federal as well as State or local authorities.

Acquiring all computer systems from a single manufacturer is one way to insure a certain amount of standardization and compatibility within a given local environment. In this case a single manufacturer provides nearly all the system components including communications hardware. However, this type of "single vendor" procurement does not insure compatibility with other local systems acquired from other manufacturers. An example of the kind of problem that this can create is that of record sizes. Some operating systems provide data management subsystems that are able to handle only fixed-length records. For very large, complex records, this restriction can be wasteful of significant amounts of expensive computer storage (memory) space, so much so that program specifications are often changed to reduce the capability of the programs rather than tolerate the inefficiency. Intelligence data is typical of that which is quite variable. The length of the record on a single person may vary from a few lines of text to the equivalent of many pages. If the maximum number of pages is set aside for all names in the file, an intolerable cost burden is imposed. If records are arbitrarily limited in size, critical information on key persons may be omitted. There

are compromise solutions, such as restricting records to a fixed size but allowing a variable number of them to be chained together to complete the needed description of any one person. The problem is that these "jury-rigged" solutions tend to vary widely from installation to installation, making each other's records unreadable.

An interchange format can be devised for use within law enforcement agencies. Such a format would require each agency desiring to share data with others to acquire the needed software to convert its own files to the standard format, or to convert received data from the standard to the local format and vice versa. The development of a data interchange language should be a joint undertaking of the various potential users. Prior agreement is important in assuring consensus when the product is finally available.

Another approach to solving this complicated problem is for a Standards Laboratory to regard the nation's criminal justice system as a single unified information system and establish standards designed to achieve the maximum degree of interchange capability and compatibility within this system. State and Regional centers desiring to share data with others would have to agree to implement the resulting standards developed for the total system in local design, procurement and operating situations. This approach has more far-reaching and lasting benefits in that the interchangeability of equipment, transferability of programs and data

throughout the entire criminal justice system can be achieved with significantly reduced procurement and operating costs. However, the implementation of this approach raises policy issues that are beyond the scope of this report.

3. Standards Development Procedures

3.1 Relationships among NILE, Federal, ANSI and ISO Standards

Information processing standards are being developed under the auspices of the National Bureau of Standards, the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO). It is important that Federal, State and local computers and information systems be compatible with one another. It is also important that the design of these Government systems remain in step with technology and maintain a degree of compatibility with systems used in the private sector. Accordingly, standards developed to meet NILE requirements should, to the extent practicable, be consistent with corresponding Federal, ANSI and ISO standards.

The desirability of consistency, however, should not prevent NILE from (1) adopting standards on its own when Federal, ANSI and ISO standards do not exist or are inadequate, (2) modifying Federal, ANSI and ISO standards when they do not completely meet NILE requirements, and (3) embarking on independent standards development efforts when Federal, ANSI and ISO efforts do not exist, or are too slow, or are leading to results which will not satisfy NILE needs.

On the other hand, many law enforcement agencies will share their computers with other agencies. It is important that standards developed for NILE not disrupt these relationships unnecessarily.

3.2 Risks of Over and Under Standardization

Two types of risks commonly occur in the standardization process. The first is the failure to standardize in an area in which standards are desirable and appropriate. The costs associated with this type of risk are those of the continued existence of unnecessary incompatibilities. The second type of risk is that of standardizing in an area in which standards are undesirable, inappropriate or premature. The result of this action can be to lock the user into an inferior technology or prematurely move the producer of computers away from areas in which he can be responsive and into areas in which he cannot be responsive. The cost associated with this type of risk is that of foregoing the opportunity for improvement.

Unfortunately, both risks frequently exist in the same area. In such cases, one is faced with balancing the expected cost of continued incompatibility against the expected cost of lost technological opportunity.

A good case in point is the adoption of the proposed Federal Standard COBOL levels. COBOL is a standard computer programming language that can be used in programming a wide

variety of computers. It comes as several levels which differ in size of problem that can be handled and in sophistication of the language. A computer compiler that can handle a given level of COBOL can also handle all COBOL programs written for a lower level compiler. It has been suggested that within Federal agencies restrictions be placed on the use of COBOL compilers that contain features of higher levels than their rated level. This restriction would preclude the need for reprogramming before using the program on computers whose compilers do not have the additional features. The question that arises is whether the compatibility achieved by prohibiting the use of features not included in the levels is worth the potential for language growth that is inherent in permitting specifically identified additional features.

There are several ways of attacking the problem. First, one can try to apply standards in such a way that they will remove incompatibilities without inhibiting technological change. The Government used this approach when it decided to apply the Federal Standard Code for Information Interchange to information interchanged between installations, but not to the representation of information within any individual installation.

Second, one can rely on the adoption of standards by consensus as a means of protecting himself from precluding imminent technological improvements. So long as NILE confines

itself to the adoption of standards that receive the approval of all interested parties, anticipated technological improvements are unlikely to be overlooked. This is simply another way of saying that the voluntary standards development process is more susceptible to risks of failure to standardize than to the risk of over-standardization.

Third, one can attempt to set up a responsive mechanism for modifying, after the fact, those standards found to be too inhibiting. This is more easily said than done, since the development of useful voluntary standards is a complex process involving technical and management decisions by a variety of groups. Also, it is difficult in many cases to distinguish between a true technological improvement and a superficial change until after it has been time-tested.

In the final analysis, however, all three of the aforementioned approaches merely skirt the problem. The most advantageous approach would be that of carefully evaluating both types of risk associated with each proposed standard, on a case-by-case basis, using the most mature professional judgment and the best technological and economic forecasts avilable. NBS is highly qualified to offer this type of talent to the NILE problem.

3.3 NBS Participation

NBS participates extensively in the development of information processing standards at home and abroad through

such bodies as ANSI and ISO, and through its development of Federal Information Processing Standards. In addition, NBS has taken the lead within the Federal Government in establishing the new Federal Information Processing Standards Coordinating and Advisory Committee which has become a principal vehicle for interagency coordination and cooperation in ADP standardization matters.

In brief, the NBS approach to developing ADP standards is to insure responsiveness to participants' needs on the part of both voluntary and Federal standards. Since the vast majority of contributions to standardization have in the past come from voluntary efforts, NBS makes a concerted effort to direct new contributions from the Federal ADP community into a voluntary private program of standards development, e.g., ANSI committees. When private groups develop standards which are responsive to Federal Government needs, NBS processes them as Federal Standards. A similar approach should be taken by the Center for Law-Enforcement Equipment User Standards in developing data processing standards for promulgation by NILE.

4. Standards for Information Processing and Communication

A majority of the Federal information processing and data communication standardization activities and the results of these activities will be directly applicable to the States in developing components of the nation's criminal justice system.

In those instances in which the program objectives of the Federal Government in general and of the local law enforcement agencies are identical or very similar, a small amount of coordination should be necessary, which would include the conveying of specifications from the Center for Computer Sciences and Technology at NBS to the Center for Law-Enforcement Equipment User Standards. On the other hand, there will be a need for special standards or conventions for law enforcement applications, e.g. data formats. The NBS Center for Computer Sciences and Techology has considerable experience and competence in the development of data processing standards and would be an appropriate laboratory to assist CLEUS in developing such standards.

4.1 Program Objectives

The standards program must establish, where applicable, common standards for both information processing and data communication systems to facilitate:

a. the interchange of data in machine readable form among the various Federal, State and local installations,

b. the transferability of common application programs among the various data processing installations,

c. the interfacing of data processing and data communications equipment and provide for the exchange and use of equipment and devices among the Federal, State and local systems,

d. the establishment of objective measures of performance of the various data processing components, software packages and data communications equipment,

e. the mechanics of acquiring information processing systems, components, software and related material, supplies and services,

f. the procurement of components of a computer-based system, particularly peripheral devices, from different vendors, and

g. the procurement of computer systems from different suppliers.

To achieve these objectives the development of the standards program must proceed in parallel with the development of the operational components of the nation's criminal justice system, i.e. both must progress in a systematic and timely manner. Standards cannot be established on a local basis, but must be properly coordinated at the Federal, State and local levels to ensure consistency among the individual systems. In addition, priorities need to be given those standardization efforts that are the most urgent and have the greatest potential benefits. The implementation of standards

must be planned and phased in such a manner as to minimize later disruption and additional costs.

4.2 Standards Requirements

It is recognized that the specific requirements for standards will change with time as the nation's criminal justice system evolves in response to technological advances and innovation. Thus, it will be necessary that presently identified needs be revised from time to time. In general, the standards requirements listed for each objective are necessary, but may or may not be sufficient and/or necessary for LEAA's immediate needs.

The following is a sample listing of Federal standardization efforts that have been completed or are still in progress and which will probably be applicable to LEAA-sponsored systems. Requirements that have already been completely or partially met by a Federal Information Processing Standard are marked with an asterisk; requirements for which a draft Federal Information Processing Standard has been proposed are marked with a double asterisk.

4.2.1 Data Interchange

Objective:

To facilitate the interchange of machine-readable data within and among the data processing installations of the local, state and regional centers.

Standards Tasks:

(1) Character sets and codes

(a) Code for Information Interchange for use on input/output media and data communication links.*

(b) Subsets of code for information interchange.**

(c) Registration of expanded and extended codes for particular application areas.

(2) Input/Output Media

(a) Unrecorded and recorded magnetic tape standards for densities of 200, 800 and 1600 CPI.*

(b) Unrecorded and recorded magnetic disks and disk pack standards.

(c) Reference tapes and measuring techniques for evaluating manufacturers' products and calibrating read/record equipment.

(d) Data formats for magnetic tape and disk packs.

(e) Punched cards including card quality and dimensions, locations of holes and data representation.**

(f) Perforated tape and reels including tape quality and dimensions, locations of holes and data representation.*

(3) Data Standards

(a) Data elements, codes and record formats for data commonly interchanged among law enforcement agencies.

(b) Methods (other than programming languages) for specifying data formats and data contained therein.

(c) Procedures and guidelines for classifying and standardizing data for use by regional and local centers.

4.2.2 Program Transferability

Objectives:

To facilitate the transferability of programs among computers of the different state-implemented systems and enable users to query data from central stores of information.

Standards Tasks:

(1) Programming languages

(a) Programming language standards for those languages in common use such as COBOL and FORTRAN.

(b) Standard levels for programming language compilers based on appropriate standard languages.

(c) Inquiry and retrieval languages and procedures.

4.2.3 Data Communication

Objectives:

To facilitate the interfacing of information processing and data communication systems.

Standards Tasks:

(1) Interface standards for electrical, mechanical and logical interfaces of data processing and data communication equipment.

(a) Signal quality and interface between information processing terminal equipment and synchronous data communication equipment for serial data transmission.

(b) Interface between data terminal equipment and data communication equipment employing serial binary data interchange.

(c) Interface between data terminal equipment and automatic calling equipment for data communication equipment.

(2) Character structures and formats.

(a) Bit sequencing in serial-by-bit data transmission.**

(b) Character structure and character parity sense for serial-by-bit data communication.**

4.2.4 Performance Standards

Objectives:

To provide objective measures of performance for the various data communication facilities, data processing systems, components and software packages.

Standards Tasks:

(1) Data communication system performance evaluation to include comprehensive measures of:

(a) Terminal equipment.

(b) Communications path.

(c) Circuit and message switching facilities.

(2) Data processing system performance evaluation to include measures that can be used:

(a) In support of procurement actions to compare one vendor's product with another's.

(b) To optimize the performance of existing facilities and enable the comparison of the effectiveness of one installation with others of the same class.

(3) Software package performance evaluation to provide the means for qualitative comparisons of competitive software products.

Chapter IV-F

RADIO AND COMMUNICATIONS EQUIPMENT

1. Statement of the Need

Police departments purchase and use a large number of rather expensive two-way radio sets and other communications equipment. Communications equipment is usually selected for purchase by police departments from the available product line of the major suppliers. To the best of our knowledge, most purchases of this type of equipment are made with no guidance regarding the technical aspects of the equipment except for that furnished by salesmen. Standards issued by the National Institute of Law Enforcement and Criminal Justice could provide this needed guidance. Efforts at establishing standards in this area are expected to assist police departments in obtaining at a lower cost equipment that better meets their specific needs. High priority should be given to the development of standards in this area.

There are many standards, specifications and test methods in the communications area, some of which are of high quality. These purchasing aids are of little value to local police departments and their purchasing agents for several reasons. (1) Many of the standards are highly

technical in nature and relate to only one performance characteristic or one component. They are in a form that only specialists in the area can use. A number of such standards should be assembled into a document that can be used in specifying communications equipment to be used by police departments. (2) Some of the standards could be used with little modification to specify radio sets. These standards were prepared by the military for their own use or by the Electronic Industry Association for general purpose equipment. The equipment they describe is not the proper equipment for police use, although it could be used. For example, the military requirements on some variables, such as resistance to vibration and shock, would be much greater than police requirements. Such requirements add to the purchase price and repair costs. (3) Specifications developed by manufacturers are usable and are being used. However, they describe the performance of the products of the manufacturer and are not proper documents for use in competitive bidding.

The latest state-of-the-art in electronic technology is not incorporated in police radio equipment currently being purchased. The equipment was designed a number of years ago before inexpensive high quality transistors, integrated circuits and other recent developments became available. While the manufacturers have been continually

modifying and updating their equipment, the changes have been of an evolutionary type -- e.g., substitution of a transistor for a vacuum tube -- and have not made full use of the technology currently available. The cost of developing a radically different product line deters the established suppliers from making the change. At the same time, the lack of usable standards makes it difficult for an unknown supplier to enter the field and fill the void. The availability of useful standards would give the established suppliers the incentive to update their product by helping to define and guarantee a market for such equipment. It would also make it easier for new firms to compete for that market.

2. Radio Equipment

It is a recognized fact that three manufacturers control the market for police two-way radio sets. Their products are of high quality but often incorporate costly features that contribute to high purchase cost, difficult maintenance, mutual interference and complicated operational requirements. These features include: selective calling, coded squelch, high power output, and environmental hardening. While these are all desirable features for some law enforcement applications, many police departments are purchasing equipment that contains unnecessary features that increase the cost of both purchase and maintenance, intensify mutual interference and often cause complicated operational requirements.

For example, unnecessarily high power output is of little value in getting messages through but can cause interference with other, somewhat distant, police departments assigned the same frequency, thereby degrading the total law enforcement communication network. A problem that needs to be faced is how many different standardized transceiver models would be required to meet the needs of cities of different sizes as well as the needs of county and state systems. High priority should be given to the development of standards in this area.

The recent advances in miniaturization of electronic systems make possible radio systems that only a few years ago would have been considered science fiction. For example, policemen assigned to control crowds could have radio sets installed in their helmets. If NILE determines that such exotic equipment would be of value, high priority should be given to standardization efforts in this area so that potential manufacturers may be given guidance in their designing of their product lines in line with the desires of law enforcement officials.

Design standards for radio equipment should be developed that would permit interchangeability of major components of radio sets. For example, microphones should be interchangeable. This would decrease dependence on one supplier for replacement parts and would simplify upgrading of existing equipment. A related problem is standardized equipment design to accomodate

possible future innovations such as car locators, mobile teletype, spectrum conserving modulation schemes, car radio repeaters for patrolmen away from their car, and scramblers.

3. Other Communications Equipment

Law enforcement agencies use other communications equipment such as private telephone systems, teletype systems, and public address systems. A survey of needs in this area was not included in the study upon which this report is based but these items were given high priority by NILE; see Appendix C. CLEUS should be prepared to develop standards for these items.

Chapter IV-G

WEAPONS

1. Introduction

No discussion of law enforcement equipment would be complete without a discussion of weapons. Despite the importance of weapons to police operations, we have not been able to find evidence of any weapons designed for police use based on a careful analysis of modern police requirements. Instead, the police frequently purchase traditional weapons, especially lethal weapons, which may not be sufficiently suited to their needs.

Weapons used by police are generally divided into two categories, lethal and nonlethal. Some, such as clubs and blackjacks, are borderline, but are generally considered nonlethal. For both types of weapons, the needs of the police are poorly defined, and most purchase decisions are made on the basis of conventional wisdom and experience with equipment available from reputable suppliers. This may result in law enforcement agencies purchasing the better models of traditional equipment but does not provide the agencies with the equipment they need.

The development of new equipment is not a function of the Center for Law-Enforcement Equipment User Standards (CLEUS). CLEUS could relate to the development of new weapons in two ways: 1) it could write standards for equipment newly developed by NILE or by others; 2) it could develop standards for weapons that have not yet been produced, but which are known to be within the state-of-the-art. In both cases, the standards would help manufacturers establish a market for new or improved weapons.

2. Lethal Weapons

Lethal weapons now used by police include pistols, revolvers, carbines, rifles and shotguns. There are military specifications that can be used in purchasing these items, but these specifications describe weapons that meet the needs of the military, not the needs of the police. While some of the acceptance tests may be useful, the performance levels will be different. Variables for which there may be differences between police and military requirements include: maximum and minimum effective range, danger to the bystander, weight, bulk, ease of use, accuracy, training requirements, maintenance, shelf life of the ammunition, safety for the user, reliability, and the ability to withstand the effects of water, mud, sand, etc.

3. Nonlethal Weapons

3.1 Chemicals and Smokes

The use of irritant chemical aerosols and smokes by law enforcement personnel, particularly for riot control, has become quite commonplace in these times of mounting student unrest and racial disturbances. We anticipate the increased and more sophisticated use for crowd dispersal and control of nonlethal chemical agents and smokes that temporarily harass, confuse, or irritate the subjects rather than permanently injure or kill them.

Currently available chemical weapons have many weaknesses. Some of them are dangerous for the law enforcement officer to use, especially in loading. Some of them can hurt the victim more severely than intended; for example, some tear gas projectiles are shot like bullets, are shaped like bullets and can severely hurt anyone in their path.

The shelf life of the chemical or the charge that propells it is rather short considering the infrequency of use. In addition, according to Crockett in the "Police Chemical Agent Manual," some of this equipment is ineptly made and inadequately tested by small firms with scant technical resources.

3.2 An Example of Standardization and Material Testing for a Chemical Weapon

This Section was prepared by the IIT Research Institute. It illustrates the many factors and variables that need to be considered in developing a standard for a single product. While the performance requirements for the item are not available, research leading to the development of pertinent test procedures can be initiated immediately.

A chemical irritant spray weapon such as MACE can be standardized with respect to the specifications of materials, dimensions, and operation such that the safety of the operator and enforcee are protected while the effectiveness of the weapon is maximized.

Standard methods have been developed for analyzing the spray from an aerosol product in terms of pressure, delivery rate, particle size, and spray angle. There are government regulations on pressure to protect the consumer which make it imperative that the pressure be measured by a standard technique. The Aerosol Division of the Chemical Specialties Manufacturers Association has adopted the use of a standard type of Bourdon pressure gauge attached to a standard can piercing device. Another method for measuring pressure utilized a Bourdon diaphragm gage, making it possible to take the pressure through the valve without damaging the

can and without contaminating the pressure gauge. A mercury monometer can also be used and is extremely accurate.

The delivery rate of an aerosol product can be measured by weighing the container and activating the valve for a fixed period of time at a fixed temperature. From the loss in weight the delivery rate in grams per second can be calculated.

The particle size or spray pattern is not as easily determined. One method involves collection of the spray droplets in a wind tunnel on a rotating microscope slide. After counting and sizing in a microscope, a correction must be applied to determine the original particle sizes in the spray.

In another method, the spray pattern is determined by spraying a dye treated paper. The dye spots on the paper can be counted and sized and a visual record of the pattern is obtained. The dye must be soluble in the spray drops for this method to work. The size of the dye spots are in direct relation to the size of the impacting drops and a correction must be applied to account for this factor.

The spray angle or the angle at which a spray diverges on leaving the orifice can also be determined with the dye treated paper. By holding the paper with one edge under the orifice at right angles to the valve stem, a quick spurt of spray will form a triangular pattern from which the spray angle can be measured directly.

The following categories are expected to be included in chemical aerosol weapon specifications and standards. No doubt other categories can be included and this is certainly not a complete listing.

Material Specifications

Propellant

. Type

. Composition

. Fill weight

. Vapor volume for thermal expansion of liquid

Aerosol Can

. Material

. Pressure rating

. Size

. Shape

. Color

. Coating or lining (internal)

. Labeling (interactions, safety, disposal)

Aerosol Valve

. Materials

. Type

. Orifice size

. Expansion chamber

. Delivery rate

. Type of closure

. Actuation

. Protective head

Aerosol Fill

. Composition

. Purity

. Fill weight

. Solubility in propellant

Operational and Storage Specifications

Spray Characteristics

. Projected throw of spray

. Spray pattern and coverage

. Spray drop size

. Temperature (pressure) effect on spray

. Ease of aiming

. Evaporation rate

. Effectiveness

Stability and Safety

. Shelf life of contents (chemical stability)

. Loss of propellant through leakage

. Corrosion of valve or can

. Valve seal tightness after partial discharge

. Blocking of valve inlet orifice

. Blocking of valve spray orifice

. Operation under extremes of temperature (spray stability)

. Pressure rise with temperature

. Pressure for test to rupture

. Loss of pressure as contents are discharged in use

Chapter V

THE PROCESS FOR THE DEVELOPMENT OF NILE STANDARDS

In planning a system for the establishment of standards for law enforcement equipment, one should consider the methods by which standards are developed in this country. The practices of standards-making organizations can be adapted to the standards needs of the criminal justice system. In this manner, advantage can be taken of the customary laboratory practices and evaluation procedures which have evolved through experience in the standards field.

1. Current Standards-making Procedures

There are no hard and fast rules for standards-making, but certain general guidelines have evolved over the years. Essentially these practices include:

(1) The establishment of performance requirements, based upon user needs. These are qualitative statements that describe a problem for which a solution (i.e. product) is sought, although the format of the problem statement may also appear as a general description of a solution.

(2) The identification of performance criteria, i.e. a statement of the specific attributes that are to

be measured. In addition to the primary criteria concerned with the ability of the product to fill the need, there may be secondary criteria of varying importance. Secondary but imperative criteria relate to items such as health or safety; secondary but desirable criteria may be related to the interface between the proposed product and the larger system of which it will be a part.

(3) The development of performance evaluative techniques. This involves the application of existing test methods or the development of new tests where needed. Although the most acceptable evaluations are reproducible tests, some criteria may not lend themselves to objective numerical evaluation. It is at this stage of the standards process that requirements determined subjectively are coupled with objective measurement techniques, insofar as this coupling is possible.

(4) The development of performance specifications which define the criteria, evaluative tests, and acceptable levels of test scores for solutions to the problem defined by the user requirements. Design standards that define interfaces between subsystems in order to foster interchangeability are also developed at this stage.

(5) The issuance of performance standards. In this step recognized organizations accept performance specifications and issue them as voluntary standards for general use. State or local governments may adopt such standards as mandatory codes.

2. Law Enforcement Equipment User Standards

2.1 Allocation of Responsibilities

The current practices, described above, can readily be divided into several areas of responsibility within an operating system. First, there is the determination of the need for a standard, its relative urgency, and the user requirements for the item. In the case of standards for law enforcement equipment, this responsibility should rest with the National Institute of Law Enforcement and Criminal Justice (NILE).

The development of performance criteria, evaluative techniques and specifications is a task involving laboratory practice, technical evaluation of information provided by a wide variety of interested parties, and the integration of all available information into performance specifications. This function, i.e. the preparation of recommended specifications, standards, and tests, is recommended as the assignment of a

Center for Law Enforcement Equipment User Standards (CLEUS). The two most likely organizational locations for CLEUS are the National Institute of Law Enforcement and Criminal Justice and the National Bureau of Standards.

The final decision on the issuance of specifications and standards should be a responsibility of NILE.

A description of the proposed system for carrying out these functions follows.

2.2 Determination of Need

NILE is the agency responsible for the standards it issues. It, therefore, should determine the needs of law enforcement officials for new or improved standards. In consultation with these officials, and any other groups that NILE may wish to include, NILE should express the needs in terms of user requirements of items proposed for use by law enforcement groups. The user requirements would establish the boundaries for standards development by CLEUS.

2.3 Establishment of Priorities

Priorities for the development of standards would be established by NILE in consultation with CLEUS.

Among the various factors to be considered in establishing priorities will be the urgency for developing the standard, the projected cost, the anticipated effectiveness, the expected

development time, the potential benefits to be derived, and the availability of the necessary staff members in CLEUS. In each case, the projected cost of developing a given standard should be compared to the anticipated effectiveness of that standard and the benefits to be derived from its use.

3. Standard and Test Method Development

The main purpose of the Center of Law Enforcement Equipment User Standards (CLEUS) would be to develop standards that law enforcement officials could use in purchasing a wide variety of equipment and other items. CLEUS would be guided by the user requirements set by NILE. During the development of performance criteria and of any test or other evaluative technique, CLEUS would consult with or seek the assistance of law enforcement officials, producers and technical experts as necessary to carry out the requirements set by NILE.

The development of standards is a process based upon consensus of experts in concert with users. Feedback to all interested parties of data derived during the development is essential. It follows, therefore, that CLEUS would be in almost continuous communication with NILE during the process. NILE would be kept informed of any modifications in requirements or criteria that are dictated by technical information derived during the standards development. This would insure

satisfaction of the NILE guidelines and increase the chances of acceptance and promulgation of the proposed standards by NILE.

Standards should be written in such a way that buyers and sellers can agree that the equipment or article to be delivered does, in fact, meet the standard. This requirement is often accomplished by including test procedures. These tests must be relevant to the desired performance of the item; they must be reproducible so that buyers and sellers will come to the same conclusion independently; and they must be sufficiently inexpensive that the cost of testing does not prevent their use.

The selection of test procedures that meet these criteria is an integral part of standards development. Sometimes, well established and commonly used tests will serve the needs. Often, however, it will be necessary to develop new tests.

CLEUS will define and develop such standards and will recommend them to the National Institute of Law Enforcement and Criminal Justice (NILE) for approval and promulgation. Specifically, CLEUS will have responsibility for performing these functions: establishing performance criteria; providing for the selection and/or development of test methods; modifying priorities or performance requirements as experience dictates, in full consultation with NILE; providing coordination to ensure the practicality and effectiveness of standards; and

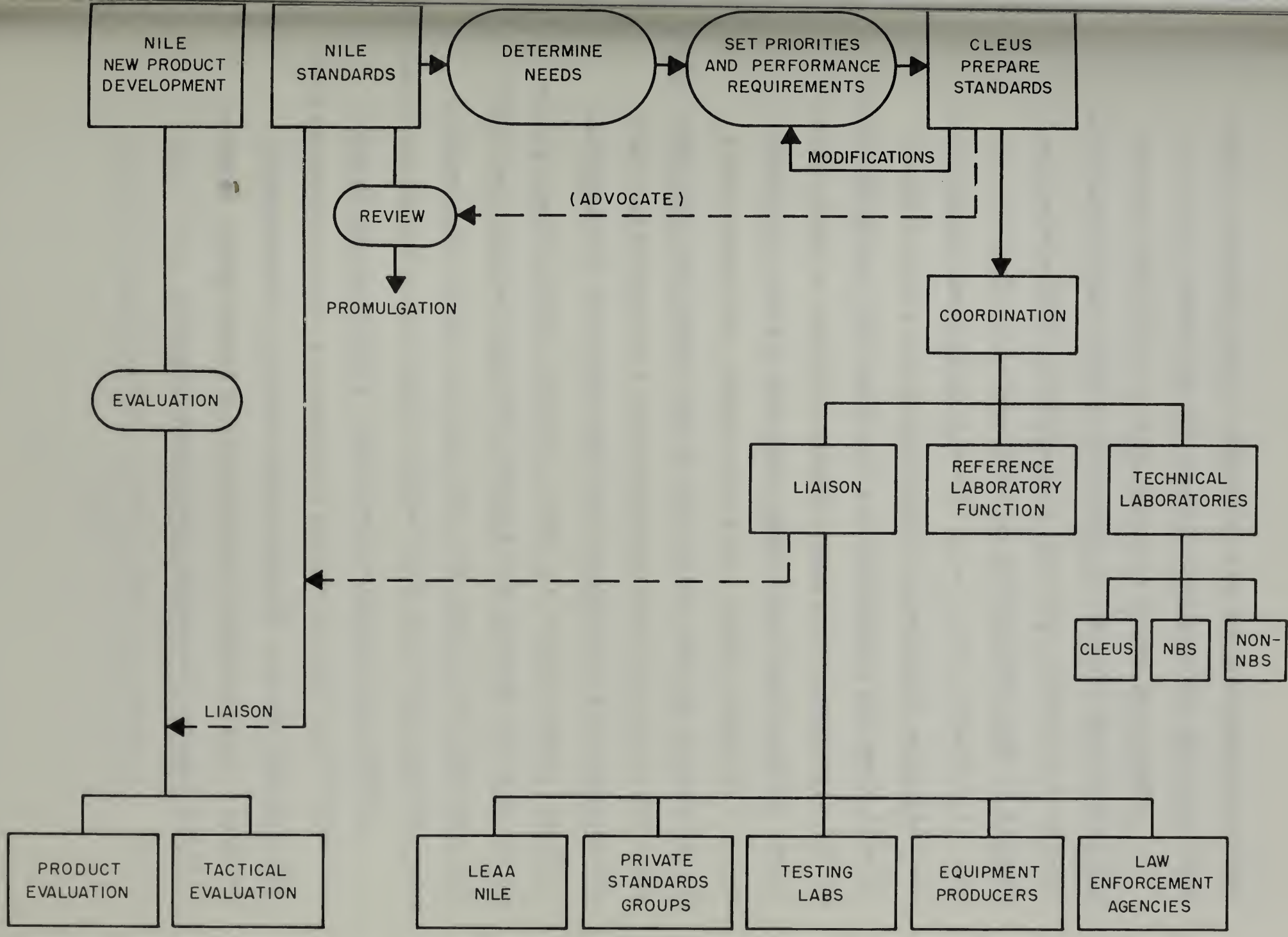


FIGURE I — THE PROCESS FOR THE DEVELOPMENT OF NILE STANDARDS

making recommendations for standards to be adopted. These functions are represented pictorially in Figure 1.

There are organizations, such as the Institute of Electrical and Electronic Engineers (IEEE) and the American Society for Testing and Materials (ASTM), that are actively engaged in the development of test methods. Their usual mode of operation is to work through committees composed of knowledgeable scientists and engineers who serve without payment from the organization sponsoring the committee. Many of the committee members are deeply involved as part of their normal work in the measurement problems related to the test under development which, in a large part, motivates their participation in the activities of the committee. The assistance and cooperation of these groups should be requested. Where appropriate, test procedures already developed and approved by these groups should be used. In other cases, these groups may be able to develop and approve new test methods for CLEUS. This approach will keep down the costs to CLEUS, and provide good quality practical test methods that have general acceptance.

CLEUS will have to develop the laboratory capability and technical staff to enable it to select the best test methods and, when necessary, develop needed tests. As currently envisaged, the laboratories that will provide these services to CLEUS can be classified into three groups.

In-house Laboratory: CLEUS may need to develop an in-house capability to conduct research in several areas. The areas of expertise of the laboratory will be determined as the need arises. Generally the selection of areas would be determined by:

1) the lack or non-availability of laboratory services in the areas required;

2) the need to conduct highly specialized research peculiar to the needs of law enforcement officials.

One area in which CLEUS may immediately establish a capability is in the development and evaluation of test methods for security devices (locks, etc.).

NBS Laboratories: During the nearly 70-year period of its existence, NBS has accumulated substantial competence in developing measurement and performance testing methods in specific areas. These areas include tires, motor vehicle seat belts, buildings and building materials, radio and electronics equipment, and computer systems. CLEUS should avail itself of this expertise.

Other Laboratories: Much of the development of test methods should be conducted under contract in laboratories which have the required special competence. These groups would include Federal laboratories, (i.e. other than NBS but including military), non-profit research organizations, and private laboratories.

It is clear that much of the test development for lethal and non-lethal weapons will be performed by these laboratories. It is estimated that about one-half of the laboratory work in test method development supported by CLEUS will be performed under contract to such groups.

4. Standards Development

4.1 Coordination in Standards Development

The development of effective and practical standards will require extensive interface with industry (the producers of the equipment), law enforcement officials (the users), tactical experts, test laboratories, the Department of Justice including NILE, other interested groups, and, of course, experts in the relevant test methods. Thus, providing coordination of all activities and among all groups and organizations involved in the development of standards will constitute the most significant function of the Center for Law Enforcement Equipment User Standards.

A common way of developing standards is to have committees composed of many interested parties develop a standard which is next approved by an even broader representation of those parties who might be affected by its issuance. While this method has limitations, it does foster the development of standards that are acceptable to a wide range of interests and does help forestall the incorporation in

the standard of requirements that: (1) prevent the product from performing as expected by the users; (2) require expensive features of limited value; (3) prescribe test procedures that are either not suitably relevant or too expensive to perform; or (4) give one supplier an unfair competitive advantage over others. A large spectrum of interested parties should be involved in the standardization process to help avoid the weaknesses mentioned above. Chapter II of this report discusses, in some detail, ways that this type of coordination is accomplished by several standards organizations. The desired contribution of some of the interested groups will be briefly discussed below.

4.2 LEAA and NILE

Since CLEUS will function under the auspices of NILE which, in turn, is a division of the Law Enforcement Assistance Administration (LEAA), CLEUS will have to maintain a close and continuous working relationship with those two agencies in the Department of Justice. As mentioned earlier, NILE will determine the needs and set the user requirements for the development of standards. Also, NILE will accept or reject the standards submitted by CLEUS. Accordingly, there should be a constant interaction and exchange of ideas between NILE and CLEUS during the process of developing a standard.

After CLEUS submits a proposed standard, NILE will have to subject the standard to an internal review process prior to

a decision to promulgate or reject the standard. This Review Panel should include a representative of CLEUS who is familiar with the standard and can act as its advocate.

One of the major goals of NILE is the development of new and improved devices, systems, and techniques. It is expected that NILE will provide, either in-house or in a contractor organization, for groups to perform product evaluation and perhaps tactical use evaluation of these new devices, systems, etc. It is recommended that the NILE officer responsible for liaison with CLEUS also maintain liaison with these NILE new-product evaluation activities. At such time as he determines that a new product is likely to enter into commerce, he should notify CLEUS, so that the process of developing a standard to cover the new item can be started without delay. This early involvement of CLEUS will enable it to observe the final stages of the evaluation, and give it the benefit of consultations with the experts developing and evaluating the new product. This will greatly enhance the likelihood that a standard will be available for early use by purchasers of the new product.

4.3 Law Enforcement Agencies

The primary beneficiaries of the standards to be developed by CLEUS will be the State, local, and other law enforcement authorities across the country. These authorities,

to whom the standards will be made available on a purely voluntary basis, will be free to make use of the standards in their purchase requisitions for law enforcement equipment, devices and other articles. In so doing, these law enforcement authorities will be purchasing products whose performance characteristics will have been officially tested and established.

CLEUS will be expected to maintain close contact with law enforcement authorities in order to obtain detailed information on the needs of such authorities for the types, specifications, practical effectiveness, and other characteristics of equipment for which standards are being developed. This approach will give law enforcement authorities the opportunity to contribute actively to the development of desired standards. It will also encourage broader adoption of such standards after their promulgation for two reasons: (1) the contribution of law enforcement officials will make products meeting the standard better from the user standpoint and (2) their participation will make the standards more acceptable. Details about the best way to effect this exchange between CLEUS and law enforcement authorities will have to be worked out with NILE after the organizational location of CLEUS is determined.

4.4 Producers of Law Enforcement Equipment

A group which will be immediately and directly affected by the promulgation of standards will be the producers of law enforcement equipment, devices, and other articles. Although producers, in manufacturing the aforementioned products, will not be legally bound to adhere to the specifications stipulated in the standards, they may eventually have to do so, if more and more law enforcement authorities limit their purchases to items that meet NILE standards. Thus the producers of law enforcement equipment and articles will be another group of people with which CLEUS will have to maintain close contact and seek active participation in the development of standards. This group will supply CLEUS with valuable information on cost and the practical problems involved in manufacturing law enforcement products at various levels of performance and effectiveness. The group will be particularly valuable in spotting: test procedures whose relevance is questionable; specifications that give one producer an unfair competitive advantage; and requirements that have poor benefit-cost relationships.

4.5 Testing Laboratories

Testing laboratories will use the standard tests that are incorporated in the standards to evaluate equipment produced for law enforcement agencies. These testing

laboratories, which will be both government and commercial, should be invited to contribute their comments regarding proposed standards and the associated tests procedures. Among the contributions they can make is the spotting of test procedures that are excessively difficult to perform.

4.6 The Reference Laboratory

The Reference Laboratory described in Chapter VII is concerned with the problem of ensuring that all laboratories performing a given test obtain similar results. Its experience with the problem should be used to help CLEUS select among available test methods. Furthermore, the Reference Laboratory should be involved in this part of the operation in order to obtain information necessary for its advanced planning.

4.7 Standards Organizations

There are many private organizations in the United States that develop and issue voluntary product standards. Many of them use a procedure that permits all interested parties to influence the development of the standards. It is fitting and proper for such organizations to develop standards for or in cooperation with CLEUS. As is true of organizations engaged in the development of test methods (and organizations may do both), organizations concerned with the issuance of product standards usually work through

committees composed of knowledgeable people who receive no fee for their services from the organization sponsoring the committee. There are two major problems in having these groups prepare standards for CLEUS: (1) sometimes the committees do not have a sufficiently broad base of representation; (2) since a consensus procedure is used and the committee members normally have other priority responsibilities, the length of time required to develop a standard is usually long, say around three years. Since the first problem can be easily solved and the second problem can often be tolerated, private standards organizations are a valuable resource for developing standards.

The Office of Engineering Standards Services of NBS uses committees in much the same way as the private organizations to develop voluntary product standards. This office could be requested to assist when appropriate.

5. Approval and Promulgation

As stated earlier in this section, the National Institute of Law Enforcement and Criminal Justice will receive the recommended standard from the Center for Law Enforcement Equipment User Standards. NILE will have the responsibility and authority for approving or rejecting the proposed standard. The options open to NILE will include: (1) acceptance and

promulgation of the standard; (2) rejection of the standard; and (3) return of the proposed standard to CLEUS for revision.

Chapter VI

STANDARDS INFORMATION SERVICES

This report describes a major undertaking to be carried out over many years, namely the development of standards for law enforcement equipment. This undertaking will have less than maximum effectiveness unless machinery is provided whereby all potential users can be kept fully informed concerning the standards that are generated under this program.

The issuance of each standard will be made known by the National Institute of Law Enforcement and Criminal Justice through such media as publication in the Federal Register, press releases, and perhaps distribution of copies of the standard to state and major city law enforcement agencies and purchasing offices. It is estimated that all potential users can be directly reached if some 40,000 copies of each standard are printed, and a copy sent to each law enforcement agency in the country. Nevertheless, even this approach will not fully serve the purpose. What is needed is a central information source to which all interested parties may apply for current information on these standards.

The purchasing of law enforcement equipment must obviously continue during the period when standards are being developed. During that interim period, local purchasing

officials could be greatly assisted if the above-mentioned central source of information could also have available details on comparable standards and specifications written by other government agencies, national standards associations, industry groups, and users.

Present procurement practices for law enforcement equipment vary widely with the jurisdiction and the type of equipment. Some of the equipment obtained is purchased under performance specifications, and considerably more under design specifications. However, most purchases are made under specifications which serve mainly to identify the product and specify the desired options, or the specifications are written around the product of a single manufacturer, because the purchaser knows by experience, or is persuaded by a salesman, that this approach will get him a desirable product.

Purchasing officials are very much interested in the development and use of improved purchasing procedures and specifications, and work towards the attainment of these goals through their professional organizations. The National Association of State Purchasing Officials (NASPO) has a standards committee which coordinates state standards activities and writes standards which it recommends to the states for adoption. The National Institute of Governmental Purchasing (NIGP) publishes the NIGP Letter Service, which serves to exchange

among state and local purchasing officials information concerning standards and specifications writtern or needed by members of their group.

It must be emphasized, however, that most purchasers of law enforcement equipment do not at present use quality assurance testing procedures to any extent, although they are well aware of their existence. If the transition is to be successfully made to a system of procurement that is based on a philosophy of performance standards and quality assurance, maximum circulation must be given to information such as Qualified Products Lists, testing laboratories whose capabilities to test for compliance with NILE Standards is assured by a Reference Laboratory, and the location and capabilities of any NILE Regional Testing Laboratories which may be established.

The standards information function could be performed by CLEUS, NILE, NASPO, NIGP, or IACP. In considering the possible alternatives, mention should be made of an organization currently in operation, which answers inquiries from the general public on all federal, military and industry standards and specifications, including those of the American Society for Testing and Materials and the American National Standards Institute. This organization is the NBS Office of Engineering Standards Services. This Office is in the process of expanding its capability to encompass state standards and specifications

as well. It will, of course, automatically add to its collection all of the standards promulgated by NILE.

CLEUS of necessity must also assemble its own specialized collection of standards and specifications for law enforcement equipment to serve as an adjunct to its standards-writing activities. The process of searching through the vast and varied collection of the Office of Engineering Standards Services is well under way. The results of this search as of the time of completion of this report are given in Appendix D.

Through its Reference Laboratory function and its cognizance over the establishment of Qualified Products Lists, CLEUS will have available all the basic information in these areas.

We recommend that the responsibility for receiving user inquiries on NILE and other relevant standards, and on the quality assurance program, be retained within NILE. This responsibility is consistent with the basic NILE function of maintaining close contact with local law enforcement agencies, and should be a source of valuable insights into the current needs and problems of these agencies. CLEUS should be given the function of answering inquiries, since it will be in a position to furnish inquirers with the best current information. We also recommend that CLEUS contract with the NBS Office of Engineering Standards Services to handle inquiries in the area of standards information.

We further recommend that frequently updated publications be issued in which the current status of NILE Standards and of the quality assurance program will be analyzed. These can function as basic reference documents for law enforcement agencies and their purchasing officials.

Chapter VII

QUALITY ASSURANCE

1. Statement of the Problem

After a standard has been promulgated, adopted as official by a state or local jurisdiction, and specified in a purchase order, one crucial step still remains. How can the purchasing agency be assured that the material supplied does, in face, meet the requirements of the standard? There are several possible means of ascertaining this, each of which must be carefully considered for its advantages and limitations before a rational quality assurance program can be recommended.

2. Manufacturer Certification

The pride of the manufacturer in the quality of his product and his interest in preserving his reputation for integrity are very potent forces for quality assurance. These two elements underlie much of the quality assurance that currently exists in the purchase of law enforcement equipment.

The introduction of standards will encourage the use of low-bid purchasing which, in turn, will decrease the reliance for quality assurance on the manufacturer's reputation.

On the other hand, the introduction of standards will permit the use of legally binding certification by the manufacturer that the item meets the standard. All orders for purchase of a standard item should routinely require such a certification by the manufacturer. For low-cost items for which the cost of testing would add prohibitively to the cost of procurement, this certification can be the main source of compliance assurance, especially if prior experience has demonstrated that a manufacturer's product is normally of standard quality and does not vary from purchase to purchase. The same practice can also be followed for somewhat higher-value items whenever circumstances warrant.

In any case, occasional shipments should be spot-tested for compliance for, no matter what the assurance mechanism, only constant vigilance can assure the desired quality.

3. In-House Acceptance Testing

The purchasing agency can assure compliance with its specifications by maintaining within its own organization the staff competence and equipment needed to take a statistically significant sample of the material purchased and test it before final acceptance. The very great advantage of this system is that it is fully under the control of the purchasing agency. Since it hires the staff and supervises the testing, it can

have full confidence in the quality of the testing and in the validity of the results. In-house acceptance testing can also be more economical than having the same tests done at a commercial testing laboratory by people of equal competence, because of the added costs of test procurement and the legitimate profit required by a commercial laboratory.

There are also, of course, disadvantages to in-house testing. If the testing volume is too low and the staff too small, costs may be high because of the resulting difficulties in developing and maintaining operator proficiency in the performance of a large number of rarely used tests. In this situation, more supervision is required, which also adds to the costs. In addition, there are tests which require the use of very expensive, specialized equipment. Even large purchasers, who find it advantageous to maintain an in-house acceptance-testing facility, may find it more economical to have such tests done by outside laboratories, where the cost of such special equipment can be amortized over many users. The same would be true of tests requiring special skills which are not available in-house.

4. Fee-For-Service Testing Laboratories

There are a great many commercial, non-profit, university and government testing laboratories which will, for a fee, perform tests to determine compliance with the

requirements of specifications. A preliminary search has located a substantial number of laboratories that claim to or seem to have the facilities for performance testing in the various categories that are relevant to the field of law enforcement equipment. They may be found listed in various compendia, including the following:

1. Directory of the American Council of Independent Laboratories, Inc., Eleventh Edition, 1969-70.
2. Directory of Testing Laboratories - Commercial and Institutional, ASTM Special Technical Publication 333A, 1969.
3. Department of Defense In-House RDT&E Activities, by E. D. Anderson, Management Analysis Report 69-4, 30 October 1969: AD 864,500.
4. Directory of U.S. Government Inspection Services and Testing Laboratories; General Services Administration Federal Supply Service, April 1967.

The services of such fee-for-service testing laboratories can be advantageously used to assure compliance with standards in many circumstances. The advantage of using them is that there is no commitment to a permanent, fairly expensive in-house facility. The costs of the tests are known in advance, and only those tests need be done that are deemed of sufficient importance and that the purchasing agency feels it can afford. At best, these laboratories are

well equipped, are competent, and give rapid, excellent service. Fees are normally kept at a reasonable level by competition among laboratories.

There are two major drawbacks to the use of such laboratories for quality assurance. First, the fees are not negligible although they may be reasonable. Where the dollar value of a purchase is low, the cost of testing the product for compliance with the standard may be prohibitive. Secondly, the quality of the service available is very variable, running the full gamut from excellent to completely worthless. Whereas the general reputation of a laboratory may be of great value in helping to choose one, its reputation may not be known to the user. Moreover, a generally competent laboratory need not necessarily have the expertise to perform a particular test.

5. Regional Testing Laboratories

One means of ensuring the availability of qualified test facilities would be the establishment by the Law Enforcement Assistance Administration of Regional Laboratories in which acceptance testing of specified standard items would be performed.

These Regional Laboratories would have much of the character of in-house testing laboratories and could be designed to be of optimum size from the standpoint of

efficiency and economy. The establishment of these laboratories would be consistent with the recommended practice of combining the procurement operations of smaller jurisdictions for greater efficiency and economy.

The decision on the establishment of such Regional Testing Laboratories should be made independently of the decision to establish a Center for Law-Enforcement Equipment User Standards. The operations of such regional laboratories should be coordinated with those of CLEUS, particularly with its Reference Laboratory function (see below).

6. Qualified Products Lists

Occasions sometimes arise, such as manufacturers having difficulty in meeting particularly stringent requirements or required tests using expensive or unusual equipment so that only a few laboratories are equipped to perform them, when it is advantageous to establish Qualified Products Lists. These can be established for a particular standard item by having inspectors representing CLEUS take samples from the production runs of specific models at specific plants of interested manufacturers. These samples would be tested at facilities designated by CLEUS.

Products that meet the standards are then placed on a Qualified Products List, which is updated as frequently as the particular situation warrants.

The inclusion of an item on a Qualified Products List assures the buyer that the product should be acceptable. Hence, a procedure must be adopted which assures that the manufacturer continues to produce a product of acceptable quality. There are a wide variety of such procedures available, ranging from continual testing of the product by CLEUS to formal acceptance procedures such as those described in Handbook H57, "Procurement Quality Assurance", Office of the Assistant Secretary of Defense (Installations and Logistics), June 1969.

Qualified Products Lists can be given full publicity and made available to purchasing agents for their use, thereby providing the agents with dependable sources of supply for troublesome items.

7. Reference Laboratory

7.1 Statement of the Problem

It is surprisingly difficult for a group of laboratories to test identical materials in accordance with a given standard and to obtain the same answer, or even a group of answers within a reasonable range. Although this discrepancy is likely to be more pronounced for some tests and materials than for others, there is no doubt of the general validity of the statement.

One solution to this problem has been the creation of a Reference Laboratory, such as the Cement and Concrete Reference Laboratory (CCRL) which has been in operation at the National Bureau of Standards since 1929. (See Appendix B.)

7.2 Inspection of Testing Laboratories

The Reference Laboratory can, at the request of a testing laboratory, inspect it, check to see that its equipment is standard and in good condition, observe the technicians perform the tests, and point out any departure from standard practices. The following comments are based on NBS experience with the aforementioned inspection service.

The inspection service is, at best, a rather expensive operation. The costs include: the time spent at the laboratory for the inspection; the preparation and review of inspection reports; travel expenses and time; training of inspectors; development of inspection procedures; and supervision. If the number of similar test facilities is large, say more than 50, the Reference Laboratory can maintain a term of inspectors (at, say, the GS 9-12 grade level) to perform the inspection function rather efficiently at a cost that could be kept as low as $1,000 per laboratory. It should be noted, however, that the cost is also a function of the number and type of test procedures involved at each location.

As the number of testing laboratories in a particular speciality decreases, the overhead costs, such as the development of inspection procedures, become a major part of the cost. If a small number of laboratories perform tests for which a team of inspectors is qualified, problems related to keeping the team fully occupied may arise thereby driving the cost up accordingly. It should be noted that each inspector specializes in only a limited number of tests.

One way of keeping costs down is to make the laboratory inspection program part of a large service of inspecting testing laboratories. Inspection teams could include in the area of their specialty and as part of their assignment inspection services for NILE, thereby utilizing their time as efficiently as possible. On July 2, 1969, Mr. T. A. Marshall, Jr., who was Executive Secretary of the American Society for Testing and Materials, wrote to the Director of the National Bureau of Standards requesting NBS endorsement and participation in the establishment of a Testing Agency Inspection Service. This Service was intended to fill the need for a nationally recognized organization which would be qualified to evaluate a wide variety of testing agencies on a regular basis. It is likely that NBS will establish such a service and close cooperation between the Service and CLEUS is obviously desirable.

7.3 Reference Materials

Test results from different laboratories often do not agree because either the equipment in one or both laboratories is not calibrated or the test technician unconsciously introduces a bias. This problem can be overcome if testing laboratories a) are provided with materials or products whose properties are known, and b) are given an opportunity to modify their equipment or procedure so that they can obtain the "right" answer.

Since 1906, the National Bureau of Standards has been distributing Standard Reference Materials (SRM's) as crucial reference points in the establishment of an effective measurement system for the Nation. Through the use of the Bureau's certified SRM's, laboratories can make their own on-site calibrations and evaluations of their measuring instruments, methods, and systems. It is likely that crime laboratories can benefit from the availability and use of special reference materials. When the need for such reference materials is specified, NILE or CLEUS should request the NBS Office of Standard Reference Materials to prepare and distribute the needed material. If the request is accepted, NILE will have to pay for the research costs necessary to develop sufficiently precise measurement methods to certify the material. The cost of material preparation, inventory maintenance, and sales is supported by income from the sales.

The use of this established and recognized mechanism will help keep costs down and will facilitate acceptance of the reference material by the laboratories.

Another approach to this problem is the use of Collaborative Reference Programs where the Reference Laboratory distributes samples for comparative testing. Each laboratory tests the samples and reports its results to the Reference Laboratory. The results are summarized and each laboratory is provided sufficient information to check its results against those of the group as a whole, and to modify its procedures or calibrations as needed to make their results concordant. (Confidentiality of data is maintained). Such programs can be established as needed.

The existing Reference Laboratories (and Reference Programs) at NBS are successful because of their demonstrated value to the testing laboratories and to their customers. Since participating laboratories are inspected every two to three years, and reference materials are provided rather frequently, the testing laboratories are assured of maintenance of their competency in spite of turnover in their personnel and changes in the standards. An especially valuable feature is that, at the option of the inspected laboratory, copies of the Reference Laboratory report can be sent to designated customers or other interested parties. Potential customers can, of course, restrict their patronage

to laboratories using the services of the Reference Laboratory.

Reference Laboratory services are available to all testing laboratories that request it, including those of manufacturers, purchasers, government agencies, and fee-for-service testing laboratories. While a Reference Laboratory often charges for its services, it usually requires a subsidy for a large portion of its expenses, especially during its early years.

It is recommended that a Reference Laboratory be established as part of or as a contractor to the Center for Law Enforcement Equipment User Standards.

8. Conclusions

To ensure that the standards which are established for law enforement equipment can be effectively used by purchasing agencies, we recommend that:

1. The Center for Law Enforcement Equipment User Standards incorporate among its functions a Reference Laboratory function to inspect and otherwise aid in the qualification of testing laboratories to produce concordant test results;
2. The Center for Law Enforcement Equipment User Standards establish Qualified Products Lists when and as needed;

3. All purchasing agencies be encouraged to specify NILE Standards as the latter become available, and all purchase contracts include a certification by the manufacturer that the product has been tested according to the specified Standard and found to conform;
4. Large law enforcement agencies or their parent governmental units be encouraged to establish in-house testing facilities to help ensure that their purchases of standard items comply with standards and that the in-house laboratories use the services of the Reference Laboratory;
5. Smaller law enforcement agencies be encouraged to utilize Reference-Laboratory-Inspected testing laboratories to assure the quality of important purchases and to spot-check compliance with standards of low-dollar-value items; and
6. The NBS Office of Standard Reference Materials be requested to prepare and distribute reference materials when the need for such materials arises.

Chapter VIII

PROGRAM PLAN

1. Establish CLEUS

It is recommended that the National Institute of Law Enforcement and Criminal Justice (NILE) establish a Center for Law Enforcement Equipment User Standards (CLEUS) to prepare standards for equipment and other items that law enforcement agencies purchase and use, and to assist law enforcement agencies in using those standards. The organizational location of CLEUS is at this time uncertain; two likely locations are the National Bureau of Standards and the National Institute of Law Enforcement and Criminal Justice. While other organizational locations are possible, the plan proposed in this chapter is based on the assumption that the location will be in a Federal Government agency.

2. Introductory Comments

This report was prepared by staff of the National Bureau of Standards. Accordingly, the recommendations reflect the opinions of the staff, particularly the project leader, acting as consultants to NILE; they should not be considered to represent the views of NBS or to constitute a proposal for NBS to provide technical services to CLEUS or NILE.

The staff preparing this report is composed of experts in developing standards and associated test methods rather than in evaluating law enforcement practices. Comments and conclusions regarding the needs of law enforcement agencies were provided to the project staff by a variety of reliable sources including staff members of NILE. As additional information becomes available, the recommended program will evolve accordingly.

The planning effort reported here is being conducted in parallel with planning efforts for other parts of the NILE program that relate to and affect the program of CLEUS. The results of those planning efforts may suggest or require changes in the program presented here.

The budget recommendations are based on the following assumptions: (1) NILE will provide financial support to NBS to continue its current planning operation through September 30, 1970; and (2) CLEUS will start operations on October 1, 1970. The letter from Nerenstone to Levin dated June 26, 1970 contains the latest NILE priorities by product categories (see Appendix C).

CLEUS can grow more rapidly than would ordinarily be expected of a new technical organization because it will use expert services both in and out of government, i.e. the

capabilities of organizations that are already well established. This approach permits the undertaking of a wide variety of projects while maintaining considerable management flexibility.

A limiting factor in the growth rate of CLEUS would be the recruitment of the central staff to manage the program and monitor the research. If CLEUS is located organizationally within NBS, current NBS employees would be assigned to some of those positions, especially the management positions. This would help permit a rapid build-up of the central staff. If CLEUS is located organizationally within NILE, NILE could request NBS assistance in staffing the Center, including temporary detailing of NBS staff members during the first few months of operation, while CLEUS recruits a permanent staff. This would permit a rapid response to the important need of law enforcement agencies that prompted this report.

3. Summary Recommendations

Table 8.1 presents the summary of the proposed budget for the Center for Law-Enforcement Equipment User Standards. Discussions of a majority of the project areas are presented in Chapter IV.

Table 8.1

CENTER FOR LAW-ENFORCEMENT EQUIPMENT USER STANDARDS

Summary Funding Chart

	Thousand of Dollars				
	FY71*	FY72	FY73	FY74	FY75
CLEUS Central Staff**	225	470	580	630	680
Vehicles and Tires	175	300	400	500	600
Communications Equipment	150	250	250	250	250
Computers	50	100	150	150	150
Forensic Science	--	25	75	75	75
Personnel Protective Equipment	75	200	300	300	300
Security Hardware	70	200	250	275	275
Detection and Surveillance	--	100	150	200	250
Weapons	100	300	500	700	800
Buildings and Fixtures	80	150	150	150	150
Emergency Equipment and Supplies	50	100	150	150	150
Information and Reference Services	25	25	40	70	100
Reference Laboratory	--	100	300	500	700
TOTAL	1000	2320	3295	3950	4480

* For nine months

** Based on assumption that CLEUS will be located in a Federal Government agency with overhead charges similar to those of NBS.

An important question to be addressed is what technical laboratories should assist CLEUS in developing the standards. Because of our familiarity with the facilities of NBS, we discuss this in terms of particular NBS laboratories. It should be understood that these are merely illustrative and that facilities similar to some of them are likely to be available elsewhere in and out of the Federal Government. If CLEUS is established within NBS, it would of course be logical for it to use the NBS laboratories.

In four major areas of interest to NILE, NBS maintains a leadership role in test development and standardization. In each case a major organizational unit conducts a sizeable activity in the product area. The four units are the Office of Vehicle Systems Research, the Building Research Division, the Radio Standard Physics Division and the Center for Computer Sciences and Technology. Each of these groups has the capability to assist CLEUS to develop standards and the associated test methods in the area of its competence. It is recommended that CLEUS negotiate with a group equivalent to each of these with a view toward developing a working relationship with each. These working relationships would involve: the laboratory developing a project group that is knowledgeable of the needs of law enforcement agencies; CLEUS providing a source of continuous funding; the laboratory letting contracts to supplement its in-house capabilities, as

appropriate; and task assignments that are in response to the needs and priorities of NILE. The remainder of this chapter is based on the assumption that this recommendation is accepted by NILE and CLEUS and that these working relationships are successfully and rapidly negotiated.

The area of weapons is one of the areas of interest to CLEUS. There are several research organizations that have a competence to work in this area. As part of this study, three of these groups have been contacted and all three have shown an interest in accepting contracts from CLEUS. These are the Cornell Aeronautical Laboratory, The Franklin Institute Research Laboratories, and the IIT Research Institute. While all qualified organizations should be encouraged to bid on proposed contracts, the availability of these three groups indicates that there are qualified groups that will bid.

It is recommended that CLEUS develop as part of its own staff a small group in the area of security devices and hardware. This group would be active in setting standards and in evaluating new devices.

In the area of the Forensic Sciences, it is recommended that CLEUS support the proposed ASTM committee in this area and sponsor NBS research necessary to provide the Standard Reference Materials defined by the ASTM committee. CLEUS

should also take the leadership in developing standards for evidence collection kits.

Detection and surveillance devices also need standards. CLEUS could establish an in-house group to develop these standards, request the NBS Radio Standards Engineering Division to assemble a project group in this area, go the contract route, or depend upon private standardization efforts. A tentative recommendation is to use a combination of private standardization efforts and the research capability of a group such as the Radio Standards Engineering Division.

Personnel protective equipment and emergency equipment include a wide variety of products. The NBS Product Evaluation Division has a broad range of competence in these areas and CLEUS could negotiate a working relationship with this Division. Specific products for which the staff of the Product Evaluation Division have had standardization experience include clothing, uniforms, overcoats, raincoats, helmets, protective vests and first aid supplies.

There are other groups in NBS that could assist CLEUS in the area of personnel protective and emergency equipment. The NBS Building Research Division could be requested to develop standards for fire extinguishers. The NBS Office of Fire Research and Safety could be requested to cooperate with CLEUS to develop standards for rescue equipment, face masks and other items used by both police and firemen.

The Technical Agency Evaluation Service, which is likely to be organized at NBS, could be requested by CLEUS to review the accreditation, evaluation and inspection needs of law enforcement equipment testing laboratories and to furnish the appropriate services. If TAES does not materialize, evaluation and inspection services might be made available through other Reference Laboratory facilities.

4. Discussion of the Budget

4.1 CLEUS Central Staff

The CLEUS Central Staff, as the name implies, will be the group that supervises and coordinates the program to develop equipment standards for law enforcement users. It will be composed of three groups: 1) the Director and his staff; 2) standards coordinators; 3) resource specialists.

The Director and his staff will direct the program and will provide central administrative control and support.

The Standards Coordinators have the responsibility within CLEUS for project management. Responsibility for each standard under development will be assigned to a Standards Coordinator. He will work with NILE to define CLEUS task assignments and will then develop a project plan to meet the needs of NILE and the law enforcement users. He will enlist the assistance of other groups to help him execute his plan. These groups are the appropriate NBS

groups, other government laboratories, private laboratories, standard making organizations and other qualified groups. As necessary, he will define contracts, select the contractor and monitor the contract. His plan will include obtaining comments and suggestions from all interested groups and ensuring that these comments and suggestions are considered in the development and selection of the standard. He should be personally involved in laboratory work to the maximum extent possible.

The CLEUS central staff should have a group of resource specialists that can review proposed standards and test procedures and can serve as consultants to the Standards Coordinators. A lawyer is required to give legal advice and legal review to all actions. A Human Factor Analyst is required to encourage the inclusion in the standards of variables that ensure a proper man-machine interface. Other specialists that should be on the CLEUS Central Staff are: 1) a law enforcement specialist who may be a retired policeman; 2) a statistician to review the statistical procedures incorporated in test procedures and acceptance testing; 3) a physiologist to review standards for weapons and protective devices to insure that proper consideration is given to limitations of the body anatomy; 4) an urban environment specialist to review proposed tasks and completed standards to ascertain whether some aspect of the item being

standardized would unnecessarily antagonize law-abiding ghetto dwellers or students. Whenever these experts uncover a problem they should also suggest a solution. They should be professionally involved in the research and development work as well as be available as consultants. As needed, other expert consultants could be retained.

Figure 8.2 shows the staffing plan described above with estimated costs based on the assumption that CLEUS will be located in a Federal Government agency with overhead charges similar to those of NBS. It is forecast that this staff can be recruited by the end of FY-72. Modest growth in the staff is forecast for FY-74 and FY-75 to fill unforeseen needs. Figure 8.3 shows growth of the staff during FY-71 based on an October 1, 1970 start date.

4.2 Vehicles and Tires

It is recommended that CLEUS negotiate a working arrangement with a group such as the NBS Office of Vehicle Systems Research (OVSR) to develop standards for vehicles and tires. This activity would include developing standards for automobiles, scooters, motorcycles, aircraft and boats and would cover the performance of both the vehicles (e.g., acceleration) and associated safety equipment (e.g., seat belts). The remainder of this section is based on the assumption that such a working arrangement will be quickly

Table 8.2

CLEUS CENTRAL STAFF - FY-1973

	Grade	Cost	Total
Director and Staff			
Director	GS-16	30	
Deputy Director	GS-15	25	
Secretary	GS-7	9	
Clerk-Steno	GS-4	6	
Administrative Officer	GS-12	15	
Clerk	GS-5	7	
			92
Project Management			
3 Standards Coordinators	GS-14	66	
3 Standards Coordinators	GS-13	56	
Editorial Assistant	GS-7	9	
Secretary	GS-5	7	
Clerk	GS-4	6	
Typist-MTST	GS-4	6	
			150
Resource Specialists			
Lawyer	GS-14	22	
Human Factors Analyst	GS-14	22	
Law-Enforcement Specialist (half time)	GS-13	9	
Statistician (half time)	GS-14	11	
Physiologist (half time)	GS-14	11	
Urban Environment Specialist (half time)	GS-13	9	
Consultants		11	
Secretary	GS-5	7	
			102
TOTAL SALARIES			344
Overhead, Retirement, etc. (51%)			175
Unused Leave 6% of salaries			20
Travel, Supplies and Miscellaneous			41
TOTAL			580

Table 8.3

CLEUS CENTRAL STAFF

Oct. 1970-June 1971

Director and Staff	Grade	Man Months	Cost	Total
Director	GS-16	9	23	
Deputy Director	GS-15	9	19	
Secretary	GS-7	9	7	
Clerk-Steno	GS-4	8	4	
Administrative Officer	GS-12	9	11	
Clerk	GS-5	9	5	
				69
Project Management				
2 Standards Coordinators	GS-14	12	22	
2 Standards Coordinators	GS-13	12	19	
Secretary	GS-5	7	4	
Clerk	GS-4	3	2	
				47
Resource Specialists				
Lawyer	GS-14	4	7	
Law-Enforcement Specialist (half time)	GS-13	4	3	
Consultants			18	
Total (less 13% slippage/salaries)				125
Overhead, Retirement, etc. (51%)				64
Unused Leave 6% of salaries				8
Travel, Supplies and Miscellaneous				28
TOTAL				225

and successfully negotiated. The OVSR laboratory is equipped with test equipment purchased with Department of Transportation (DOT) funds. It is assumed that DOT will agree that this laboratory equipment can be used in connection with projects for CLEUS.

The working arrangement should permit the laboratory to develop a small program staff to work exclusively on CLEUS tasks. This staff should be composed of a program leader (GS-14), three engineers (GS-11-13), a technician (GS-8) and a Secretary - Administrative Aid (GS-6). Personnel costs for this group including overhead, division supervision, and personnel benefits would be $140,000 per year. This group could be assembled within 60 days so that, assuming on October 1 start date, the first year cost would be three quarters of this or $105,000. The remainder of the funds would cover travel, technical assistance of other staff as required, new laboratory equipment, purchase of test vehicles, and contracts to other laboratories.

NILE has given this area a high priority. Thus, the proposed plan indicates this area as the one with the most rapid growth during the first year. An effective program can be established promptly in this area provided NILE makes use of the competence and laboratory equipment available at the NBS Office of Vehicle Systems Research.

4.3 Communications Equipment

It is recommended that CLEUS negotiate a working arrangement with a group such as the NBS Radio Standards Engineering Division to develop standards for radio and other communications equipment. The activity would include standards for transceivers, intercoms, private telephone systems, public address systems and teletypes.

The Radio Standards Engineering Division could respond quickly in developing a program for CLEUS. A trained staff is available and most of the necessary laboratory facilities already exist. It is anticipated that two engineers should be assigned to work on a full-time basis and necessary specific technical assistance should be obtained on an "as needed" basis from other staff members. Contracts could be let as needed.

In this area, emphasis will be given to the development of design standards that permit the interchangeability of components of different manufacturers. Except for subsystem interfaces, however, performance standards will be used to permit and encourage the incorporation in the design of the equipment of the latest developments in the electronics field.

4.4 Computers

NILE has questioned the need for CLEUS to develop computer standards, since other units of the Department of Justice are actively developing and/or operating computer systems.

The development of a standard, it should be emphasized, is a separate and distinct activity from development, production and operations. Standardization activities for NILE should not be assigned to any group that is developing, producing or using the items to be standardized. "Third party objectivity" is an important requirement for the standards group.

There are three general types of problems associated with the area of computer related standards: 1) the selection of standards to permit physical communication among law enforcement computers; 2) the development of standards for computer "languages" to permit interchangeability of computer programs; and 3) agreement on data formats for transmitting data among computers. Standards can be easily developed in all cases suggested. The main difficulty is to reach a consensus so that all new systems will use the proposed standards and, at the same time, existing systems will require a minimum of modifications to meet the standards.

Specifically, the standards should be as consistent as possible with the conventions of the National Crime Information Center (NCIC) of the Federal Bureau of Investigation.

The Center for Computer Sciences and Technology (CCST) has legislative responsibility to perform a similar function in developing Federal Information Processing Standards. It is recommended that CLEUS negotiate a working arrangement with a group such as CCST to obtain their assistance in developing

NILE standards. It is anticipated that most of the Federal Information Processing Standards would be issued as NILE standards. The budget requests for developing computer standards will defray the cost of this assistance. No contracts are anticipated.

It would be possible to give a private consulting organization a contract to do this work. If this course is chosen, however, it is recommended that the selection be limited to organizations that have never been or are likely to be involved in computer hardware or software development. This precaution severely limits the number of potential contractors.

4.5 Forensic Science

We anticipate two activities of CLEUS in the area of Forensic Science. One is the development of standards for evidence collection kits. The other is a program to increase interlaboratory agreement among crime laboratories.

The development of standards for evidence collection kits could be handled by a single person and, therefore, is an appropriate task to be handled by a staff member of CLEUS. Since this is a low priority item, work should start in the middle of the second year. Half of the $25,000 budgeted for Forensic Science in FY-72 should be for developing standards in this area, and a full $25,000 should be budgeted for the following three years.

The American Society for Testing and Materials (ASTM) is organizing a Committee on Forensic Sciences. This committee is expected to recommend the development and distribution of Standard Reference Materials as an aid to increased inter-laboratory agreement. The proposed budget includes $12,000 in FY-72 and $50,000 in each of the following years to work with the committee and to support the development of Standard Reference Materials.

4.6 Personnel Protective Equipment

Personnel protective equipment covers a wide range of items including: body armor, shields, helmets, fire resistant and waterproof clothing, gas masks and uniforms. Standards for this category of equipment are considered by NILE to be of top priority.

The diverse nature of these products precludes the establishment of a small group in or out of CLEUS to develop standards for the entire spectrum of products. On the other hand, the NBS Product Evaluation Division has experts in most of these areas. It is recommended that CLEUS negotiate a working arrangement with a group such as the Product Evaluation Division to develop standards for personnel protective equipment.

The working arrangement should not call for any particular individual to be assigned permanently to CLEUS

projects, but rather for the laboratory to develop project groups to respond to specific task assignments. On the other hand, the working arrangement should include provision for a steady flow of task assignments to permit orderly management of the program and suitable response to CLEUS needs in this area.

Although the development of standards for uniforms has only a moderate priority in terms of immediate needs, these products are ones for which standards can be developed rather quickly. Therefore, a project to develop standards for uniforms should be initiated during the first year.

The development of performance requirements by NILE for items such as body armor, shields, helmets and the like is a particularly difficult problem. Since the standardization activities depend on the availability of performance requirements, CLEUS should start work in this area at a date later than the one implied by the high priority attached to these items by NILE. Some performance requirements are expected to be available by June 1971.

4.7 Security Hardware

Security devices and systems are designed for protection against skillful individuals who wish to violate the security offered by the device or system. Standards for such devices cannot be limited to prescribed objective tests. The standard

must also prescribe for attempts by trained individuals to violate the security offered by the devices or systems, i.e., to outsmart them. To insure comparability of evaluations among devices, all such tests should be performed by a single group.

It is recommended that CLEUS develop its own laboratory group in this area. This group would be involved in standards development, product evaluation and, to some extent, in acceptance testing. It would be initially composed of a laboratory chief (GS-14), an assistant chief (GS-13), a technician (GS-9), and an administrative aid (GS-6). It is estimated that $92,000 will be needed to equip the laboratory, mainly during FY-72.

4.8 Detection and Surveillance

Detection, alarm and surveillance equipment covers a wide range of items that include a variety of alarms systems, T.V. surveillance systems, photographic equipment, radar speed measuring systems, narcotics detectors and bomb detectors. The diverse nature of these products precludes the establishment of a small group, in or out of CLEUS, to develop standards for the entire spectrum of detection and surveillance systems. As a result, this product area should be considered a conglomerate of several product areas, each of which requires a program plan.

This is a program area that requires more management resources to initiate than other program areas because of the wide range of science and engineering fields involved. Since it is only a moderate priority area, it is recommended that the program be initiated in FY-72.

Recently, a group of manufacturers of alarm equipment have founded "The Alarm Industry Committee for Combating Crime." This Committee plans to develop standards for alarms. If it follows an acceptable set of procedures to ensure a consensus of all interested parties, CLEUS is likely to adopt the resulting standards. The CLEUS central staff should provide the necessary coordination with this group during FY-71.

Highly sensitive electronic hardware for detecting intruders has been developed for military purposes. Because much of this state-of-the-art is classified, no attempt was made to investigate this specialized area in depth. However, the NBS Radio Standards Engineering Division has had experience in this area and its assistance could be requested as needed.

Narcotics detectors and bomb detectors are under development. As new products pass an evaluation by NILE, CLEUS should initiate projects to develop standards. This activity should begin in FY-72. Many of the detectors will be modifications of standard sophisticated laboratory equipment. CLEUS should enlist the services of scientists who are familiar with the specific type of laboratory equipment.

4.9 Weapons

An important part of the NILE program is to provide assistance to law enforcement agencies regarding the selection of weapons, especially weapons that have a low probability of causing death or permanent disability. As with all CLEUS standards activities, the development of standards follows the development of performance requirements. NILE has given the development of standards for weapons a relatively low priority because the performance requirements are not expected to be available for another year. However, there are important technical tasks that CLEUS could and should initiate prior to the establishment of performance requirements. A modest program is recommended for the first year to start these technical tasks. A larger and growing program is recommended for the following years as NILE develops performance requirements that will serve as a base for the development of standards for CLEUS.

In the first year, two projects should be initiated, one concerned with the deterioration with age of small arms ammunition, and the other with the hazards involved in the launching of chemical agents. The proposed budget includes funds for this activity for FY-71.

4.10 Buildings and Fixtures

It is recommended that CLEUS negotiate with a group such as the NBS Building Research Division a working arrangement

for that group to develop standards for building materials and fixtures. It is also recommended that CLEUS work with the National Conference of States on Building Codes and Standards in developing a model code for detention centers.

It appears that there will soon be a major surge of construction of buildings designed for detention purposes. If the activities of NILE and CLEUS in this area are to be of use, they should provide standards that will be available during the design stage of the construction projects. This can be done mainly in the area of building materials and components where there are existing standards that might be used. An early project in this area should be to determine the needs for durability and the degree to which existing products and standards meet these needs. Such a project would help define the specific tasks that should be given priority. The bulk of the expenditures for the first two years should be to support the evaluation, modification where necessary and selection of existing standards. The budget is based on the assumption that, in some cases, existing standards will be satisfactory, that, in other cases, existing standards will need to be modified or new standards will need to be developed, and that finally, in many cases, nothing should be done until improved products are developed to the point that one can expect that a producer can manufacture them at a reasonable cost.

In the area of fixtures for correctional institutions, a major problem is the development of fixtures that have sufficient durability and proper security safeguards. This development is not part of the CLEUS program, and decisions regarding the standardization activities should await the actual development and evaluation of useful products. Therefore, there should be little work by CLEUS in this area until the third year.

The need for an entire model building code for detention centers is not of high priority. The priority is for those parts of the code that pertain to fire safety. The budget permits activity in this area throughout the entire five-year plan.

The size of the recommended program reflects, in part, the low priority given this area by NILE.

4.11 Emergency Equipment and Supplies

Emergency equipment and supplies cover a wide range of items including fire extinguishers, first aid supplies and rescue equipment. Many of these are standard items and law enforcement agencies do not have unique requirements. For example, the problem of ensuring that first aid supplies are sterilized - which surprisingly is a major problem - is no different for the police, the fire services, the hospitals or the military. Therefore, it is recommended that CLEUS,

for the most part, select from among available existing standards in this area rather than attempt to develop its own standards.

Selecting from among existing standards is, of course, much less expensive and much quicker than developing new standards. However, it is still important to technically evaluate an existing standard and to consult with law enforcement users before selecting it as a NILE standard. The recommended budget for this product area should be sufficient to provide this technical evaluation and consultation with users.

CLEUS should seek out experts in the specific product areas to perform the technical evaluations. For example, the NBS Product Evaluation Division has experts in the sterilization and the shelf-life of first aid supplies, and the NBS Building Research Division has experts in fire extinguishers. Experts outside NBS could also be used as necessary.

4.12 Information and Reference Services

An important part of the NILE program is to provide information to law enforcement agencies about available standards. CLEUS requires information about available standards for its own internal operation. It is recommended that these two related functions be performed by a single group and that the supervisory responsibility be given to CLEUS. It is further recommended that CLEUS negotiate an

agreement with the Information Section of the NBS Office of Engineering Standards Services to perform these functions for CLEUS.

The above recommendation is based on the assumption that CLEUS will be located at NBS. If CLEUS is located elsewhere, it would be too inconvenient to have the Information and Reference Services at NBS. The additional cost of having a separate information service is estimated at $10,000 for each of the first three years and $2,000 a year thereafter. The first year the service would be mainly serving the reference needs of CLEUS in developing standards. As the surge of this work ends, the provision of information services to law enforcement agencies would begin and grow continually during the remainder of the five-year period for which cost projections are made.

4.13 Reference Laboratory

It is surprisingly difficult for a group of laboratories to test identical materials or devices according to a prescribed procedure and still arrive at similar answers. As described in Chapter VII, Section 7, Reference Laboratories provide services that make possible satisfactory agreement. These services include laboratory inspection, collaborative reference programs and the distribution of standard reference materials.

A reference laboratory function for NILE is not needed until NILE standards have been developed and promulgated. For that reason, no reference laboratory activities are recommended for FY-71.

Reference Laboratories usually charge for the services they render. However, charges that fully cover costs are usually so high that many laboratories are unwilling or unable to pay them. Since the progress of the NILE and LEAA program will be furthered by improved agreement among test laboratories, it is recommended that NILE subsidize the Reference Laboratory. As the CLEUS program produces standards which are promulgated by NILE and used by law enforcement agencies, the cost of the reference laboratory will become an increasingly large portion of the CLEUS budget. The recommended budget levels will not support all the reference activities that are needed, but will permit a rapid and orderly growth of high priority activities while keeping the size of this activity to an acceptable portion of the total budget.

The National Bureau of Standards is considering a request of the American Society for Testing and Materials to establish a testing agency inspection service. If we were to assume that NBS will establish such a service, then it can be recommended that CLEUS negotiate with this Service to provide the Reference Laboratory services discussed in this section and Chapter VII.

Chapter IX

THE CENTER FOR LAW-ENFORCEMENT EQUIPMENT USER STANDARDS

There is both a need and a desire for a program to develop standards for law enforcement equipment. To meet this need, we recommend the establishment of a Center for Law-Enforcement Equipment User Standards (CLEUS).

1. Principles of the Standards Laboratory

There are three basic requirements for the successful operation of such a Center.

First, to ensure the technical quality of the standards it develops, its technical activities must rest on a solid base of scientific and engineering expertise. Second, to ensure the utility and acceptance of the standards it develops, its staff must be expert in writing standards and in obtaining a consensus. Third, in order to ensure the fulfillment of the first and second requirement, CLEUS must have adequate control of its program and be located within an organization whose management understands its nature and needs.

Law enforcement equipment encompasses several major areas of technology including motor vehicles and electronic

communications, as well as a wide variety of special items including personnel protective equipment, sundry emergency devices, and security, alarm and detection systems. CLEUS must have access to competence in all of these as well as the other relevant fields of science and engineering. This can be accomplished most quickly and economically if CLEUS makes use of existing centers of competence.

The development of test methods is a difficult and time consuming activity. It is especially difficult to develop test methods which are useful predictors of the utility and performance of a device as it is normally used. To accomplish its purpose, CLEUS must establish continuing programs of research and development of test methods for each of the major categories of law enforcement equipment. These programs will serve to maintain the expertise needed for the CLEUS operation and result directly in the development of test methods on which meaningful performance standards can be based. Such programs of test development will be most successful if they are part of larger programs of research and development in the same technical areas. Interaction with his colleagues is extremely useful to the scientist and engineer.

The standards to be developed for NILE are to be voluntary standards. CLEUS must therefore ensure that they will be acceptable to the law enforcement community, that

they specify items that manufacturers can produce at acceptable costs and that the standards are unambiguous, fair and workable. This is often accomplished by obtaining a consensus, which can be a very protracted process. Since standards are urgently needed as soon as possible, CLEUS must be prepared to recommend interim standards, to develop methods of speeding the consensus procedure, and to work efficiently within the very extensive existing standards-making system. CLEUS must arrange to participate in the appropriate standards committees and to establish or sponsor new ones as needed for its effective operation. Expertise in the standards-setting process is indispensable for such activities.

As important to the success of CLEUS as its technical and standards-setting expertise, is the organizational environment in which it operates. Three important factors in this environment are: (1) CLEUS should be located in a technical organization; (2) this organization should have an earned reputation for integrity and independence; and (3) this organization should have a tradition of cooperation with industry and other Government agencies.

2. Outline of the Standards Laboratory

We recommend that CLEUS consist of a central staff and an in-house laboratory, and that the bulk of the work of test

development and standards writing be performed at existing centers of competence.

The CLEUS central staff should comprise three groups: the Director and his staff; the Standards Coordinators and their clerical and editorial assistants; and the Resource Specialists.

The Standards Coordinator will be the central figure in the CLEUS operation. When a standard is to be developed, he will arrange for and monitor the necessary laboratory work, consult with the laboratory to define the relevant product attributes, interact with the user community, and help write the standard. He will have primary responsibility for standards in specific areas and will work with interested groups to obtain a consensus for the standard. The Standards Coordinator should be personally involved in laboratory work to the maximum extent possible.

The Resource Specialists will supply the auxiliary expertise required by CLEUS operations and should include personnel with backgrounds in the following areas: law enforcement, law, statistics, urban environment, human factors engineering and human physiology. Each resource specialist should be involved professionally in the work of CLEUS as well as be available as a consultant to the staff.

The CLEUS in-house laboratory should be relatively small and be concerned with areas where current laboratory facilities are limited or unavailable, such as physical security devices and forensic science.

The bulk of the work of test development and standards writing should be performed at existing centers of competence. At these centers, CLEUS should establish continuing programs of research and development of test methods for each of the major categories of law enforcement equipment.

3. Organization of the Standards Laboratory

There are several ways in which the program could be organized: (1) the entire program could be conducted at the National Institute of Law Enforcement and Criminal Justice (NILE); (2) the entire program could be conducted at an existing scientific and engineering institution; (3) the CLEUS central staff could be located in NILE and separate arrangements made with existing centers of competence for continuing programs of research and development of test methods for various categories of law enforcement equipment; and (4) the CLEUS central staff could be located in NILE and individual contracts given to existing centers of competence to develop test methods for specific items or categories of law enforcement equipment.

Option One has the advantage of simplicity - everything will be done in one organization. However, it involves the recruitment of staff and the establishment of laboratories competent in a variety of scientific and engineering fields. The time and cost of developing and maintaining the necessary laboratory competence makes this a poor alternative.

Option Two (conducting program at an existing institution) requires a decision to delegate some of NILE's authority to develop voluntary standards for law enforcement equipment to a technically qualified organization. This option involves the forming of a special-purpose partnership between NILE and the scientific organization. Each partner will contribute its unique abilities to the joint enterprise. NILE will contribute its knowledge of law enforcement and the needs of law enforcement officials. This will lead directly to a priority list of needs for standards for specific items of equipment and a description of user requirements for the items. Task priorities will be based on the needs of law enforcement officials and the ability of CLEUS to respond to these needs as determined by the state-of-the-art and the availability of necessary talents. NILE will also furnish introductions to appropriate law enforcement officials and guidance for direct interaction with users, as required in the operation of CLEUS. The scientific organization in which CLEUS is located will contribute its expertise in the

technical areas of interest to CLEUS, in the process of standards-setting and in the management of research. This will lead directly to effective research and development programs, appropriate test methods and meaningful standards. It will contribute to the setting of priorities by ascertaining the state-of-the-art and the availability of necessary talents to work on the problem.

Option Three is a compromise between Options One and Two, with NILE retaining all central staff functions of CLEUS as well as overall responsibility for the technical effort. Under this option there is the advantage to CLEUS-NILE that it can make individual arrangements with a variety of scientific institutions for the accomplishment of specific tasks or functions, utilizing each institution in the area where it is deemed to be most competent. Within each of these existing centers of competence, CLEUS-NILE will give long-range stable support to a program devoted to the problems of CLEUS in specific technical areas. However, CLEUS-NILE will retain full authority to write the standards and to use or modify the test methods developed for it by the laboratories it supports. This option substitutes a sponsor-contractor relationship for the partner relationship of Option Two.

Option Four is similar to Option Three with the exception that no continuing programs of research and development or test methods are established. Specific contracts are let

for each task as required to implement the plans of the CLEUS central staff. This option gives CLEUS greater control of operations than Option Three and requires it to have correspondingly greater competence in the management of scientific programs.

It should be noted that, under Options One and Two, the talents and facilities of the major technical organization developing the standards can be supplemented by contracts with other laboratories with specific competences of value to the standards program.

Table 9.1 summarizes the features of the four organization plans.

4. The Role of NBS

A brief statement of the qualifications of the National Bureau of Standards in the standards area is in order before one considers the ways in which NBS might be involved in the work of CLEUS.

Since its organization in 1901, NBS has operated as the National Standards Laboratory of the United States and as such has been responsible for the basic standards undergirding the country's physical measurement system. Soon after its organization, the Bureau became deeply involved in the development of material and technological standards, i.e. in the certification of Standard Reference Materials and in

Table 9.1

Optional Organization Plans

	1	2	3	4
Who Furnishes User Requirements?	NILE	NILE	NILE	NILE
Where Is CLEUS Central Staff Located?	NILE	one scientific institution	NILE	NILE
Who Determines Priorities?	NILE	NILE Plus partner institution	NILE	NILE
Who Does Major Portion of Test Development?	NILE	one scientific institution	no one institution	no one institution
Who Sub-Contracts Other Work?	NILE	The Centers of Competence	The Centers of Competence	NILE
Long-Range Programs or Task Assignments?	Long-range Programs	Long-range Programs	Both	Task Assignments
Who Prepares Standards?	NILE	one scientific institution	NILE	NILE
Who Is Responsible For Over-All Technical Program?	NILE	one scientific institution	NILE	NILE
Who Promulgates Standards?	NILE	NILE	NILE	NILE

the development of the voluntary industry standards now called Product Standards. A great many standard tests and methods of analysis have been devised, based on very careful experimental work. Members of the staff are involved in the work of many of the major standards-setting organizations in this country and have close ties with the foreign national and international standards laboratories. Preliminary results from an on-going survey indicate that more than 300 staff members are participating in the work of over 700 standardization committees. The NBS reputation for competence and integrity in the standards area is unexcelled.

The National Bureau of Standards is one of the major Federal Government scientific and engineering research institutions, and has expertise in almost all of the fields relevant to law enforcement equipment.

1. The NBS Product Evaluation Division has expertise in the areas of personnel protective equipment (such as body armor and helmets), first-aid supplies, uniforms and clothing, etc.

2. The NBS Office of Vehicle Systems Research has expertise in the areas of vehicles, tires, vehicle safety equipment, etc.

3. The NBS Radio Standards Engineering Division is expert in the fields of communications, and electronic alarm and surveillance equipment.

4. The NBS Building Research Division is competent in the area of prison buildings and fixtures, fire extinguishers, etc.

5. The NBS Office of Fire Research and Safety has expertise in the areas of gas masks, rescue equipment, etc.

6. The NBS Center for Computer Sciences and Technology is responsible for Federal Government information processing standards, and is directed to advise other Federal agencies and coordinate government participation in voluntary industry standardization in this field.

7. NBS has staff members with many years of experience in the field of physical security devices.

The National Bureau of Standards has had a great deal of experience in managing programs sponsored by other Government agencies and by trade associations, and this Report incorporated many recommendations based on this experience. The Office of Vehicle Systems Research, sponsored by the Department of Transportation, is a major recent program of this type, and operates under an arrangement with DOT which corresponds closely to Option Three above.

If NILE opts for Option Two, NBS would be an eminently suitable organization in which to establish CLEUS.

If NILE selects Option Three or Four, the facilities of NBS could be used for the test research and development operations of CLEUS.

If Option One, Three or Four is selected, and NILE establishes CLEUS in-house, NBS could detail its specialists to NILE as needed to assist in organizing CLEUS and getting it well under way.

APPENDIX A

PROCEDURES FOR DEVELOPING RECOMMENDED STANDARDS

§ 10.0 General.

(a) *Introduction.* (1) The Department of Commerce (hereinafter referred to as the "Department") recognizes the importance, the advantages, and the benefits of standardization activities. The Department also recognizes the fact that standards are needed for many products purchased by or regulated by governmental organizations which do not necessarily need to be developed and published as *consensus standards* (See 15 CFR Part 10 for *Procedures for the Development of Voluntary Product Standards*);

(2) The purpose of these procedures is to provide a mechanism for the development and coordination of product standards which are deemed to be in the public interest but for which acceptance by a large number and percentage of producers, distributors, and users or consumers is not a prerequisite to the successful application and use of the standard.

(b) *Requirements for Department of Commerce participation.* The Department will participate in the development of a Recommended Standard if, upon receipt of a request, the Department determines that such standard:

(1) Is not contrary to the public interest;

(2) Is likely to have national effect or implication;

(3) Reflects the interest of a Federal or State agency or the interest of an industry group concerned with the production, distribution, testing, consumption, or use of the product.

(c) *Role of the Department.* The Department assists in the establishment of a Recommended Standard as follows:

(1) Acts as an unbiased coordinator in the development of the standard;

(2) Provides editorial assistance in the preparation of the standard;

(3) Supplies such assistance and review as is required to assure the technical soundness of the standard;

(4) Seeks satisfactory adjustment of valid points of disagreement; and

(5) Sees that the views of producers, distributors, and users or consumers are represented during the development of the standard.

§ 10.1 Initiating development of a new standard.

(a) Any State or Federal agency or group of producers, distributors, users, or consumers, or a testing laboratory, may request the Department to initiate the development and publication of a Recommended Standard under these procedures. Requests shall be in writing, signed by a representative of the agency or group, and forwarded to the Department. The initial request may be accompanied by a copy of a draft of the suggested standard.

(b) Upon recipt of an appropriate request and, after a determination by the Department that a Recommended Standard would not be contrary to the public interest, the Department may initiate the development of the standard.

§ 10.2 Establishment of Standards Committee.

(a) The Department, after receiving and approving a request to initiate a standard under these procedures, will establish a Standards Committee for the purpose of drafting a proposed standard. This committee may be composed of representatives of the group or agency requesting the standard and producers of the product. The committee may also include representatives of distributors and consumers or users of the product for which the standard is sought and appropriate general interest groups. The committee will be appointed for a 12 month period.

(b) The Standards Committee will develop a draft of the proposed standard from either an existing State or Federal standard or specification or from the information and knowledge contributed by the proponent group or by the several members of the committee. A proposed standard approved by two thirds of the committee members will be transmitted to the Department for further processing.

§ 10.3 Development of proposed standard.

(a) A proposed standard as submitted to the Department;

(1) Shall not be contrary to the public interest;

(2) Shall be technically appropriate and such that conformance or nonconformance with the standard can be determined either during or after the manufacturing process by inspection or other procedures which may be utilized by either an individual or a testing facility, competent in the particular field,

(3) Shall follow the form prescribed by the National Bureau of Standards (Copies of the recommended format may be obtained

upon request from the Office of Engineering Standards Services, National Bureau of Standards, Washington, D.C. 20234.),

(4) Shall include performance requirements if such are deemed by the Department to be technically sound, feasible, and practical, and the inclusion of such is deemed to be appropriate; and

(5) May include dimensions, sizes, material specifications, product requirements, design stipulations, component requirements, test methods, testing equipment descriptions, and installation procedures. The appropriateness of the inclusion in a standard of any particular item listed in this subparagraph shall be determined by the Department.

(b) A proposed standard that is determined by the Department to meet the criteria set forth in paragraph (a) of this section may be subjected to further review by an appropriate individual, committee, organization, or agency (either government or nongovernment, but not associated with the proponent group).

(c) A proposed standard will be circulated by the Department to appropriate producers, distributors, users, consumers, and other interested groups for consideration and comment as well as to others requesting the opportunity to comment.

(d) The Standards Committee shall consider all comments and suggestions submitted by the reviewer designated under paragraph (b) of this section, and those received by the Department as a result of any circulation under paragraph (c) of this section, and may make such adjustments in the proposal as are technically sound and as are believed to improve the standard. The proposal will then be submitted to the Department for further processing.

§ 10.4 Establishment of the Review Committee.

(a) The Department will establish and appoint the members of a Review Committee within a reasonable time after receiving a proposed standard. The committee may consist of qualified representatives of appropriate general interest groups such as State and Federal agencies and producers, distributors, and users or consumers of the product for which a standard is sought.

(b) A Review Committee may remain in existence for a period necessary for the final development of the standard, or for 2 years, whichever is less.

(c) Department will be responsible for the organization of the committee. The committee may conduct business either in a meeting or through correspondence, but only if a quorum participates. A quorum shall consist of two-thirds of all voting members of the committee. A majority of the voting members of the committee participating shall be required to approve any actions taken by the committee.

§ 10.5 Development of a Recommended Standard.

(a) The Review Committee, with the guidance and assistance of the Department and, if appropriate, the reviewer designated under § 10.3 (b), shall review a proposed standard promptly. If the committee finds that the proposal meets the requirements set forth in § 10.3 (a), (1), (3), and (5), it may recommend to the Department that the proposal be circulated under § 10.6. If, however, the committee finds that the proposal being reviewed does not meet the requirements set forth in § 10.3 (a), the

committee shall change the proposal so that these requirements are met, before recommending such proposal to the Department.

(b) The recommendation of a standard by the Review Committee must be approved by at least two-thirds, or rejected by more than one-third, of all of the voting members of the committee eligible to vote.

(c) In those instances where a standard receives the required two-thirds vote of approval of the committee, any dissenter shall have the right to object and to support his objection by furnishing the Chairman of the committee and the Department with a written statement setting forth the basis for his objection. The written statement of objection must be filed within 15 days after the date of the meeting during which the voting on the standard was accomplished, or, in the case of a letter ballot, within the time limit established for the return of the ballot.

§ 10.6 Procedures for publication of a Recommended Standard.

(a) Upon receipt from the Review Committee of a Recommended Standard and report, the Department shall give appropriate public notice and distribute the recommended standard for final comment unless the Recommended Standard:

(1) Would be contrary to the public interest, if published,

(2) Would be technically inadequate;

(3) Would be inconsistent with law or established public policy; or

(4) The Department determines that there is a legal impediment to the Recommended Standard.

(b) Distribution will be made to a list compiled by the Department, which, in the judgment of the Department, shall be representative of producers, distributors, and users or consumers of the product being standardized.

(c) Distribution will also be made to any party filing a written request with the Department, and to such other parties as the Department may deem appropriate, including testing laboratories and interested State and Federal agencies.

(d) The Department will analyze the response to the distribution of the Recommended Standard received under paragraphs (b) and (c) of this section. If such analysis indicates there are no objections the Recommended Standard which are both substantive and valid, it will be identified and published as a Recommended Standard by the Department.

APPENDIX B

NATIONAL BUREAU OF STANDARDS
WASHINGTON, D. C.

THE

CEMENT AND CONCRETE REFERENCE LABORATORY

AMERICAN SOCIETY FOR TESTING AND MATERIALS
COMMITTEES C-1 AND C-9

October 1969

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
WASHINGTON, D. C. 20234

Letter Circular 1044

Contents Page

1. Introduction

Laboratories that have had no previous contact with the Cement and Concrete Reference Laboratory frequently inquire about its functions. In order to provide an informative reply to these inquiries, this pamphlet regarding the origin, development, and responsibilities of the Cement and Concrete Reference Laboratory has been assembled.

2. Development of the Cement and Concrete Reference Laboratory

2.1. Background Information

The Cement and Concrete Reference Laboratory came into being in April 1929 as a Research Associate Program at the National Bureau of Standards. At that time it was co-sponsored by the Bureau of Standards and by Committee C-1 on Cement of the American Society for Testing Materials, and was called the Cement Reference Laboratory. The principal reason for creating this office was to establish a recognized authority that could provide the personal inspection and instruction needed to secure a proper appreciation by all cement testing laboratories of the importance of calibration of apparatus and exact compliance with specified conditions and methods.

Inspection of laboratories was indicated as the primary activity of the new Reference Laboratory because it was believed that uniformity in apparatus and test methods might be most readily achieved in this manner. Later, when it became evident that the desired results were being achieved, it was concluded that the development of new test procedures, the relatively high turn-over in testing personnel, and the creation of new laboratories required that the inspection program be carried forward on a continuing basis.

Between 1929 and 1947, inspection operations were limited to laboratories performing physical tests for hydraulic cements. In 1948, the restriction was relaxed somewhat in order that the verification of high-capacity compression machines used in the testing of concrete could be made a part of the inspection work in cement testing laboratories. The scope of this new activity was then gradually increased to include most of the methods and equipment used in measuring the compressive strength of concrete.

On March 1, 1958, this expanded service was made available to all laboratories within the prescribed areas of operation that tested either cement or concrete, and shortly thereafter Committee C-1 invited committee C-9 to become a joint sponsor of the Fellowship. The invitation was accepted, and on July 1, 1960, the Fellowship was renamed "The Cement and Concrete Reference Laboratory" in recognition of the new arrangement.

In 1968, a third expansion of inspection coverage was effected in order to provide for a review of aggregate testing equipment called for in ASTM Recommended Practice E329..

2.2 Responsibilties

The scope and principal functions of the Cement and Concrete Reference Laboratory are currently considered to be (1) The inspection of cement and concrete testing laboratories, and the study of problems brought to light by the inspection work, (2) Distribution of samples for a comparative test program, (3) Instruction in methods of testing, and (4) Participation in the work of technical committees leading to the development and improvement of testing equipment and procedures. The sponsors have clearly stipulated that in carrying out these functions the CCRL shall not act as a referee in disputes concerning the quality of materials, the suitability of testing apparatus, or the ability of a laboratory to do testing work in a satisfactory manner. Because of these prohibitions, all of the services rendered are essentially advisory in nature.

3. The Laboratory Inspection Service

The inspection of testing laboratories is considered to be the most important of the responsibilities to which reference has been made. Utilization of this service is on a voluntary basis and a visit is scheduled only after a request for inspection has been received from a responsible official of an eligible laboratory. To be eligible, the laboratory must be equipped to make the standard A.S.T.M. tests for cement or concrete, and must express a willingness to pay the current authorized inspection fee.

Through the years, requests for inspections have been received from laboratories in all fifty states of the United States, nine provinces of Canada, Puerto Rico, Grand Bahama Island, and from a U. S. Government laboratory in Greece.

The inspection program is designed to provide for the reinspection of regularly participating laboratories at intervals of approximately two years, and it is customary to refer to each complete circuit of the laboratories as an inspection tour. In order to make efficient use of both men and equipment the inspection itineraries are laid out in accordance with long range plans, and in general only one visit is made to a given locality during a tour.

The field equipment carried by each inspector weighs about 750 pounds. The more important components are five proving rings which have load capacities of 2000, 10,000, 25,000, 100,000 and 200,000 lb.; a hydraulic tester for verifying pressure gages; a portable balance; a microammeter test set; a large assortment of machinist's tools such as scales, gages, and micrometers; and a variety of thermometers, psychrometers, precision weights, small hand tools, and reference literature. These items are transported from place to place in station wagons or panel-type trucks.

3.1 Inspection of a Cement Testing Laboratory

The inspection of a cement testing laboratory consists of an examination of the testing apparatus and procedures used in making the physical tests for portland cement set forth in ASTM Designation C150.

The examination of apparatus normally includes moist storage facilities, turbidimeter apparatus, air permeability fineness apparatus, autoclave,bar molds, 2-inch cube molds, flow table, compression testing machine, Vicat apparatus, Gillmore needles, mechanical mixer, air content equipment, and other small miscellaneous items of equipment such as mix balances and weights that are used in making the various tests concerned. Each piece of apparatus presented for inspection is checked to determine whether it meets or fails to meet specification requirements, and whether it is in satisfactory operating condition.

The procedures that are usually observed include the Test for Compressive Strength of Hydraulic Cement (Using 2-in. Cube Specimens), ASTM Designation C109; the Test for Fineness of Portland Cement by the Turbidimeter, ASTM Designation C115, the Test for Autoclave Expansion of Portland Cement, ASTM Designation C151; the Test for Air Content of Hydraulic Cement Mortar, ASTM Designation C185; the Test for Normal Consistency of Hydraulic Cement, ASTM Designation C187; the Test for Time of Setting of Hydraulic Cement by the Vicat Needle, ASTM Designation C191; the Test for Fineness of Portland Cement by Air Permeability Apparatus, ASTM Designation C204; the Test for Time of Setting of Hydraulic Cement by Gillmore Needles, ASTM Designation C266; and the Test for False Set of Portland Cement (Paste Method), ASTM Designation C451.

3.2 Inspection of a Concrete Testing Laboratory

The inspection of a concrete testing laboratory consists of an examination of the testing apparatus and procedures used in measuring a number of the more important properties of plastic and hardened concrete and of concrete aggregates.

The principal items of equipment examined are the moist and water storage facilities, concrete mixers, slump cones, tamping rods, unit weight measures, air meters, cylinder and beam molds, capping devices, balances and scales, sieves, ovens, sample splitters, Los Angeles abrasion machine, flexure test apparatus, compression machine and other miscellaneous items used in the various concrete and aggregate tests. Each piece is checked for conformance to specification requirements and its physical or mechanical condition is noted.

The tests for concrete normally observed are the Test for Weight per Cubic Foot, Yield, and Air Content (Gravimetric) of Concrete, ASTM Designation C138; the Test for Slump of Portland Cement Concrete, ASTM Designation C143; the Test for Air Content of Freshly Mixed Concrete by the Volumetric Method, ASTM Designation C173; and the Method of Making and Curing Compression and Flexure Test Specimens in the laboratory, ASTM Designation C192.

3.3 General Inspection

While an inspection is in progress, the inspector brings to the attention of laboratory personnel each departure from specification requirements that is noted in order that on-the-spot corrections may be made wherever possible. Other pertinent observations that may be of interest to the laboratory are also mentioned for their consideration. At the completion of the inspection, a comprehensive oral report is presented to the laboratory supervisor or his representative, and all specific questions that may arise are thoroughly discussed.

Within a short time after the inspection, a confirmatory written report is sent to the official who requested the inspection and to such other persons as the laboratory may designate.

The confirmatory report is treated in a confidential manner, but this does not preclude the distribution of copies to all interested parties if the inspected laboratory is agreeable to such action. It is the consensus of those who are best acquainted with the Reference Laboratory Program that this provision for the dissemination of inspection information is one of its most valuable features.

4. Response To The Inspection Program

The number of laboratories participating in the inspection program in Tours 9 through Tour 16, and a classification of these laboratories, according to the interest represented, are tabulated below. The geographical distribution of the laboratories participating in Tour 16 is shown on the maps in figures 1 and 2.

Participation

Cement and Concrete Testing Laboratories

	Tour No. 9	Tour No. 10	Tour No. 11	Tour No. 12	Tour No. 13	Tour No. 14	Tour No. 15	Tour No. 16
Approximate Tour Period	1947 1950	1950 1954	1954 1957	1957 1960	1960 1962	1962 1964	1964 1966	1966 1968
Cement Producer	129	140	165	170	188	201	195	184
Comm. Testing Labs.	36	39	24	45	56	107	120	131
Highway Department	51	48	39	43	50	59	61	57
School	9	9	4	2	6	0	0	0
Municipal	7	4	3	3	0	5	4	6
Federal	10	13	12	15	15	14	13	13
Concrete Products	---	---	---	---	---	---	27	22
Miscellaneous*	5	8	6	13	18	26	6	6
TOTAL INSPECTIONS	247	261	253	291	333	412	426	419
Cement Test. Labs.	247	261	253	266	291	316	307	280
Concrete Test. Labs.	---	131	98	131	151	223	251	261
No. of Reports Sent	389	465	514	623	748	977	1095	1280

*Includes producers of concrete products in Tour 9 through Tour 14.

5. Instructions in Methods of Testing

As previously indicated, the function of the CCRL in providing instruction in methods of testing is normally accomplished as part of the routine inspection work. However, this activity is occasionally supplemented by talks to technical groups given by the Manager of the Reference Laboratory, and by the publication of these talks and other related papers.

6. Special Studies

Special studies of problems evolving from, or related to the inspection work are usually carried forward as a coordinated laboratory-field operation. The principal aim of this work is the development of information upon which revisions in methods of test or changes in inspection procedures might be based. It is believed that this activity has been of definite benefit in both the cement and concrete field.

7. Samples For Comparative Test Program

The distribution of samples of cement for comparative test purposes has been a periodic activity of the CCRL since 1936. In 1966, a continuing program was inaugurated wherein two pairs of samples for physical tests and two pairs of samples for chemical analysis are distributed each year. These samples provide an opportunity for the comparison of test results among participating laboratories, and the data compiled from these tests provide a helpful means for checking on the status of progress toward better concordance in test results.

8. Participation in the Work of Technical Committees

Participation in the work of technical committees has developed through the years into a major function of the Cement and Concrete Reference Laboratory. Presently, the staff has memberships on two subcommittees of ASTM Committee C-1, three Subcommittees of ASTM Committee C-9, one Subcommittee of ASTM Committee C-12, and three Subcommittees of ASTM Committees E-1 on Methods of Testing. In addition, the Manager serves as Technical Assistant to Committee C-1. These Committee and Subcommittee assignments are of great value because they make it possible for the CCRL to provide direct liaison between the authors and the users of ASTM methods of testing for cement and concrete.

9. Closure

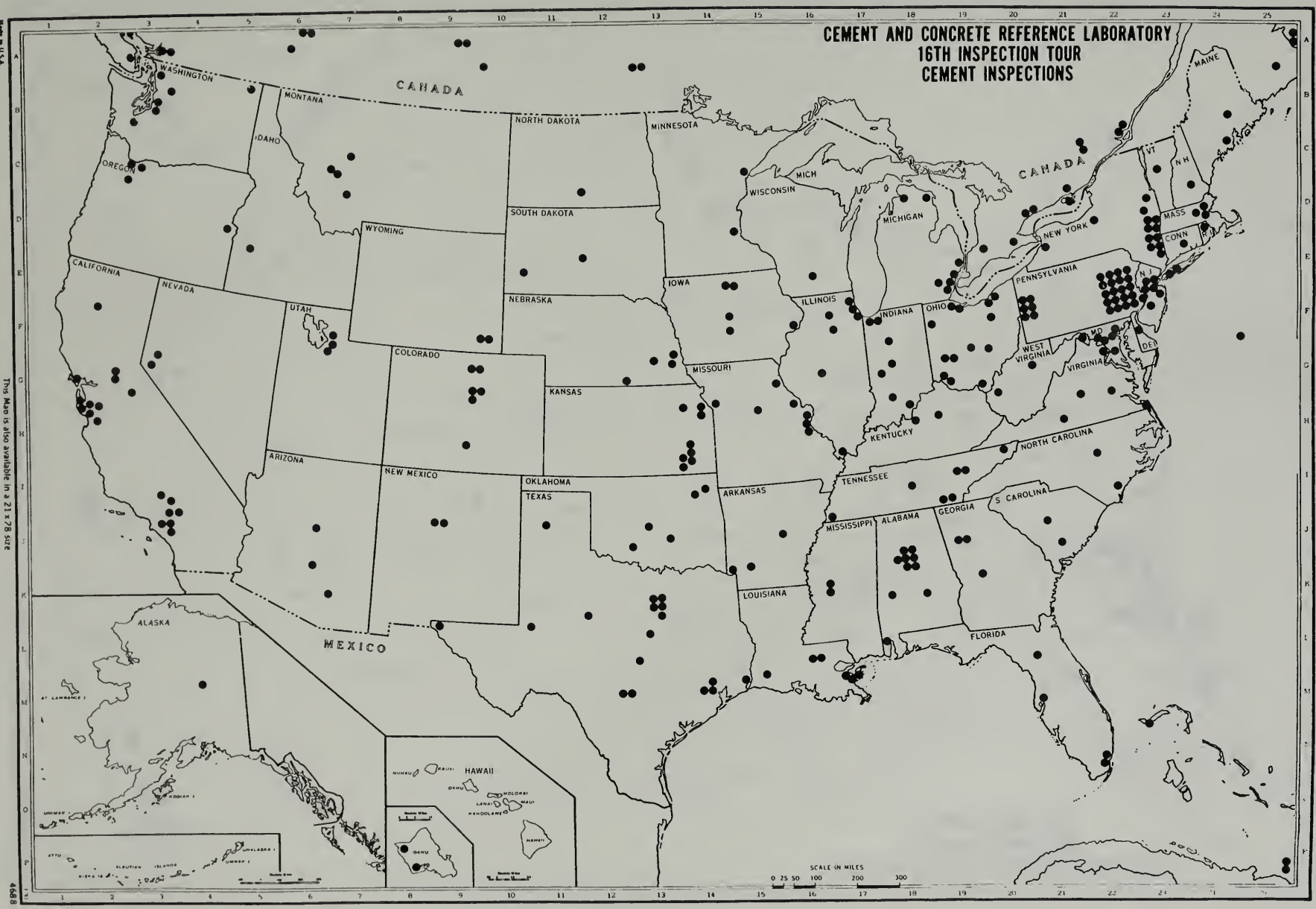
In its report to Committee C-1 on October 19, 1928, the Special Committee on the Cement Reference Laboratory advised that "Greater concordance in results is necessary if the requirements of the specifications are to closely reflect the qualities of the product, and if we are to remove a most undesirable uncertainty in both the technical and commercial ends of the cement industry." The CRL was created to assist in the effort to remove the "undesirable uncertainty" through the development of greater uniformity in testing equipment and testing techniques. The continuing interest in the inspection program by cement testing laboratories, and the rapid growth of interest in the program among concrete testing laboratories, attest to the fact that much of the expected benefit is being achieved.

Further information regarding the inspection service that has been discussed in this pamphlet may be obtained by writing to the:

Cement and Concrete Reference Laboratory
National Bureau of Standards
Washington, D. C. 20234

Prepared by: JWH:egh
Codes and Standards Section
Building Research Division
Institute for Applied Technology
National Bureau of Standards

USCOMM-NBS-DC


CEMENT AND CONCRETE REFERENCE LABORATORY
16TH INSPECTION TOUR
CEMENT INSPECTIONS
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SCALE IN MILES
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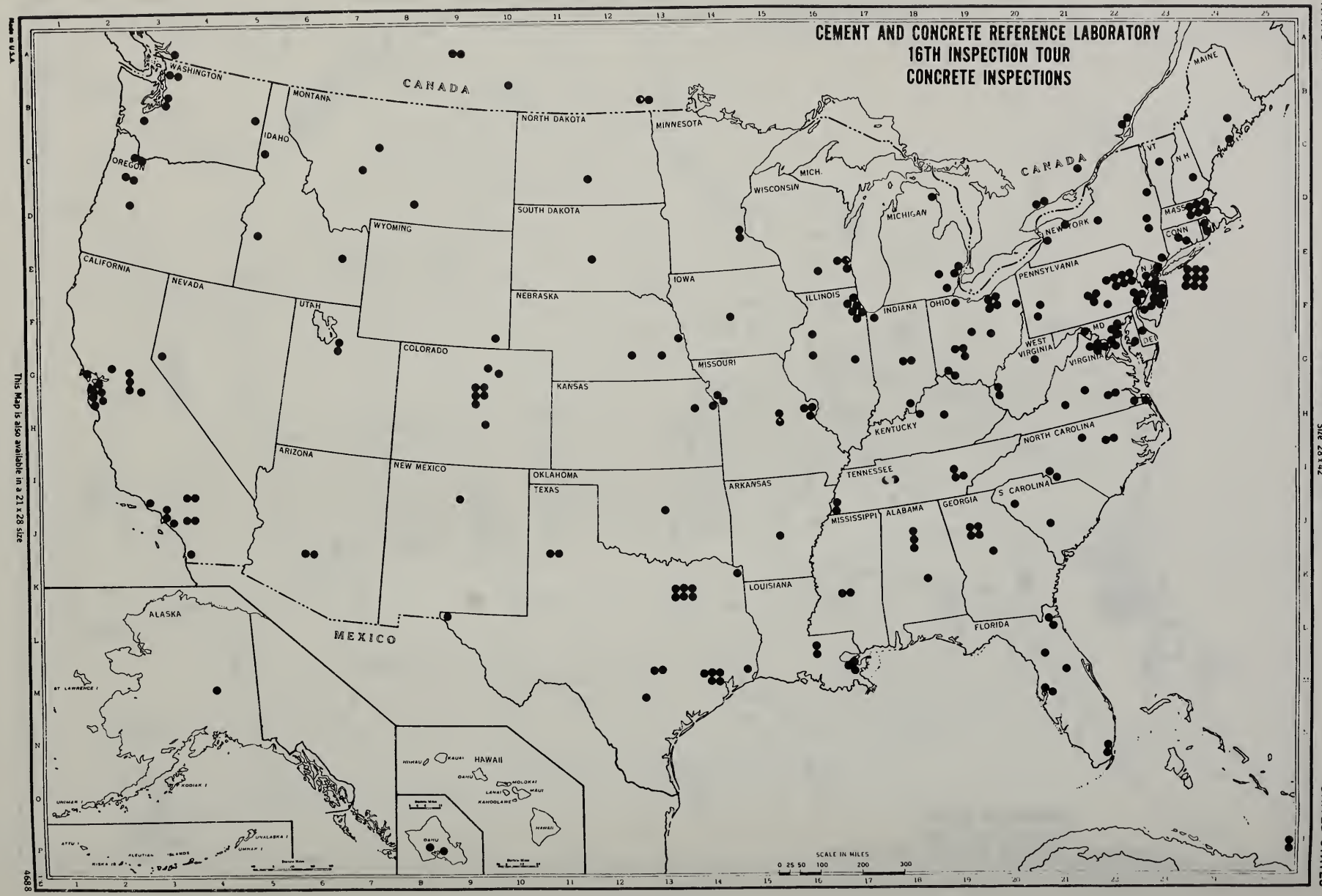
RAND McNALLY
STATE OUTLINE MAP
Size 28x42
UNITED STATES
Made in U.S.A.
This Map is also available in a 21 x 28 size
4668

Figure 1


CEMENT AND CONCRETE REFERENCE LABORATORY
16TH INSPECTION TOUR
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SCALE IN MILES
0 25 50 100 200 300
RAND McNALLY
STATE OUTLINE MAP
Size 28 x 42
UNITED STATES
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4688

Figure 2

APPENDIX C

UNITED STATES DEPARTMENT OF JUSTICE
LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
WASHINGTON, D.C. 20530

NATIONAL INSTITUTE OF LAW ENFORCEMENT
AND CRIMINAL JUSTICE

June 26, 1970

Dr. Bernard M. Levin
Special Assistant to the Director
Institute for Applied Technology
National Bureau of Standards
Washington, D.C. 20234

Dear Dr. Levin:

This is to confirm the information I telephoned to you yesterday.

The National Institute has developed an ordered set of 15 equipment categories to guide the planning for the User Standards Laboratory during Fiscal Year 1971. We would expect the plan which you are preparing to indicate that substantive work would be underway by the end of the year on items in the first ten categories, while work on the remaining five would generally be confined to reviews of existing standards for their applicability to law enforcement equipment. As a general rule, the plan should give first priority to our item 1, second priority to our item 2, and so on. However, when the natural development of the Laboratory and the application of sound planning principles indicates that a different order and emphasis would be more effective, your FY 71 plan should reflect that preferred order; moderate deviations from the indicated order of priority would be acceptable. In addition, where you know that appreciable numbers of relevant standards exist, and these can be readily adopted for law enforcement equipment, the plan should include early scheduling of such work even though the affected equipment category is further back on the priority list.

The list of categories, with examples, are in descending order of priority:

1. Protective Equipment: body armor, shields, helments, gas masks, fire resistant clothing

2. Vehicles: cars, scooters, motorcycles, aircraft, boats

3. Emergency Warning and Safety Equipment for Vehicles: sirens, lights, interior safety equipment

4. Emergency Equipment and Supplies: fire extinguishers, first aid supplies, rescue equipment

5. Auxiliary Equipment For Vehicles: communications cable

6. Communications Equipment and Supplies: transceivers, telephones (private systems), other intercoms, p.a. systems, teletypes, batteries

7. Security Hardware: locks, fences, doors, grilles, safes

8. Unique Correctional Institution Fixtures: commodes, showers, feeding tables, secure doors

9. Automatic Anti-Intrusion Alarms, also Robbery and other Emergency Alarms: includes low light level surveillance systems

10. Clothing, uniforms, reflective clothing

11. Sensors For Crime Detection: narcotics detectors, bomb detectors

12. Weapons: lethal, non-lethal

13. Forensic Sciences: evidence collection kits

14. Institutional Supplies

15. Building Materials

Sincerely,

Marc A. Nerenstone

Marc A. Nerenstone
Operations Research Analyst
Center for Criminal Justice
Operations and Management

cc: J.W. Locke, Nat'l. Bur. of Standards

APPENDIX D

Appendix D

STANDARDS AND SPECIFICATIONS FOR LAW-ENFORCEMENT EQUIPMENT

Once a decision has been reached to write a NILE Standard for a particular product, among the first questions that must be answered are the following:

(1) What are the existing standards for this product?

(2) How good are they?

(3) To what extent is the product now in use?

(4) Under what specifications is it being purchased?

(5) How satisfactory are the available varieties of this product and the procedures under which they have been purchased?

Ready answers to these questions require a basic library of information on existing product standards and local government purchase specifications. This information is being assembled through the facilities of the Information Section of the N.B.S. Office of Engineering Standards Services.

We list below those existing standards and specifications of which we have copies in hand. They have received a preliminary evaluation, and are deemed of sufficient interest to warrant consideration when and if a standard for that product becomes an issue. It must be emphasized that this is in no sense a complete listing of relevant standards and specifications. Many more are now on order, and the search for additional ones is still in progress.

I. Communications

1. Association of American Railroads

Requirement Specification 12-10, 1966; Requirement Specification for Frequency - Modulated Radiotelephone Transmitting and Receiving Equipment and Accessories

Requirement Specification 12-13, 1966; Requirement Specification for Pack or Hand-Carried Frequency Modulated Radiotelephone Transmitting and Receiving Equipment and Accessories

2. State Department-A.I.D.-Office of Public Safety

Standard Specification OPS/R-1.1, 8/30/69; Call-Box Telephone System

Standard Specification OPS/P-2.1, 2/4/69; Megaphone, Electronic

Standard Specification OPS/J-2.1, 2/4/69; VHF-FM Mobile Station

Standard Specification OPS/J-3.1, 2/4/69; VHF-FM Motorcycle Station

Standard Specification OPS/J-4.1, 12/15/69; VHF-FM Tactical Transceivers OPS/FM-1B, OPS/FM-5B and Accessories

II. Forensic Science

1. Federal Specification

GG-F-355a, May 19, 1966; Fingerprint Identification Kits and Fingerprint Ink, Black, Permanent

GG-F-00355, May 20, 1965; Fingerprint Identification Kit (Taking) and Fingerprint Ink, Black, Permanent

W-R-00168B, January 29, 1970; Recorder-Reproducer, Sound (Magnetic Tape Type)

W-R-00168B, Amendment 1, March 27, 1970; Recorder-Reproducer, Sound (Magnetic Tape Type)

W-R-170a, May 16, 1966; Recorder-Reproducer, Sound (Portable, Battery Operated)

W-R-001404A, January 30, 1970; Recorder-Reproducer, Sound (Portable, Battery Operated, Cassette Type)

W-R-001404A, Amendment 1, March 27, 1970; Recorder-Reproducer, Sound (Portable, Battery Operated, Cassette Type)

III. Security, Detection, Deterrent and Surveillance

1. American National Standards Institute

C33.43-1968, May 7, 1968; [Underwriters' Laboratories UL 464-1968]; Audible Signal Appliances

American National Standards Institute

C78.105-1957, August 14, 1957; Spotlight and Floodlight Service Incandescent Lamps 115, 120, and 125 Volts
C104.2-1968, July 19, 1968; [Electronic Industries Assoc. Standard RS-330, 11/66]; Electrical Performance Standards for Closed Circuit Television Camera 525/60 Interlaced 2:1

2. Federal Specification

W-A-00450A, December 29, 1969; Alarm Systems, Interior, Security, Components For
AA-C-001402, June 4, 1968; Cabinet, Protective Storage and Filing, Uninsulated, with Combination Padlock
AA-C-001402, Amendment 1, September 24, 1968; Cabinet, Protective Storage and Filing, Uninsulated, with Combination Padlock
AA-D-600B, March 26, 1969; Door, Vault, Security
AA-F-357e, January 24, 1966; Filing Cabinet, Steel, Legal and Letter Size, Insulated, Security
AA-F-358e, October 5, 1965; Filing Cabinet, Steel, Legal and Letter Size, Uninsulated, Security
AA-F-363B, June 2, 1969; Filing Cabinet, Security, Maps and Plans, General Filing, and Storage
AA-F-00364a, October 15, 1965; Filing Cabinet, Steel, Legal and Letter Size, Uninsulated, Security (120 Minutes Surreptitious Entry Protection)
FF-P-110e, April 14, 1967; Padlock, Changeable Combination (Resistant to Opening by Manipulation and Surreptitious Attack)
FF-P-110e, Int. Amendment 2, February 7, 1968; Padlock, Changeable Combination (Resistant to Opening by Manipulation and Surreptitious Attack)
AA-S-001518, October 7, 1968; Safe, Tool-Resistant, Uninsulated, Security

3. Illuminating Engineering Society

I.E.S. Guide for the Photometric Testing of Floodlights of 10 to 160 Degrees Total Beam Spread

4. Mill Mutual Fire Prevention Bureau

Eng. Service Dept. Bull. No. 210-65 BAL; Standards for the Installation of Local Burglar Alarm Systems
Eng. Service Dept. Bull. No. FL 401 1-64; Protective Floodlighting for Grain and Milling Properties

5. National Electrical Mfg. Ass'n. Standards Publication

Pub. No. FL 1-1964; Floodlights

6. Navy Department Specification

Intrusion Detection Systems

7. Underwriters' Laboratories

UL 505-1958 (Restricted), November 1958, 1st Edition; Security File Containers
UL 609-1970 (Restricted); Local Burglar Alarm Units and Systems
UL 611-1968 (Restricted); Central-Station Burglar-Alarm Units and Systems
UL 634-1962 (Restricted), December 1962; Connectors and Switches for Use With Burglar Alarm Systems
UL 636-1958 (Restricted), February 1958; Holdup Alarm Systems
UL 639-1969 (Restricted); Intrusion-Detection Units
UL 681-1969 (Restricted); Installation, Classification, and Certification of Burglar-Alarm Systems
UL 687-1960 (Restricted), June 1960, 5th Edition; Burglary-Resistant Safes

IV. Vehicles and Tires

1. Federal Specification

ZZ-T-381i, August 6, 1957; Tires, Pneumatic, Vehicle and Portable Equipment
ZZ-T-00381L, February 27, 1970; Tires, Pneumatic, Vehicular (Highways)
ZZ-T-441b, June 15, 1964; Tire, Pneumatic: Retreaded and Repaired
ZZ-T-441b, Amendment-1, May 24, 1965; Tire, Pneumatic: Retreaded and Repaired

V. Quality Assurance

1. Military Specification

MIL-I-45208A, 16 December 1963; Inspection System Requirements
MIL-I-45607B(MU), 22 January 1970; Inspection Equipment, Acquisition, Maintenance and Disposition of
MIL-Q-9858A, 16 December 1963; Quality Program Requirements

2. Military Standard

MIL-STD-105D, 29 April 1963; Sampling Procedures and Tables for Inspection by Attributes

MIL-STD-105D, Change Notice 2, 20 March 1964; Sampling Procedures and Tables for Inspection by Attributes

MIL-STD-109B, 4 April 1969; Quality Assurance Terms and Definitions

VI. Weapons and Defenses

1. Federal Specification

D-C-00115a, June 12, 1957; Cartridges, Projectiles, Gas and Flare, (and Shells)

D-C-00115a, Amendment-1, August 1, 1957; Cartridges, Projectiles, Gas and Flare, (and Shells)

O-D-00390, November 24, 1953; Diphenylchloroarsine (DA)

D-G-795b, December 8, 1958; Gun, Gas, Shoulder Type, 1 1/2-inch (37mm)

D-G-00795c, July 8, 1964; Gun, Gas: Shoulder Type, 1 1/2-inch (37mm), Caliber

GGG-M-131, September 11, 1951; Masks, Gas, Universal (Not for Purposes of Warfare)

GGG-M-131, Amendment-1, February 24, 1954; Masks, Gas, Universal (Not for Purposes of Warfare)

D-P-355a, September 16, 1964; Pistol, Caliber .45, Automatic; M1911A1

D-P-355a, Amendment-1, February 20, 1965; Pistol, Caliber .45, Automatic; M1911A1

D-R-1187, May 22, 1968; Revolver, Caliber .38 Special (Commercial)

2. Military Specification

MIL-A-13259B(MR), May 6, 1966; Armour, Steel, Sheet, Strip, and Fabricated Forms; Rolled, Non-Magnetic; For Helmets and Personnel Armour Requirements

MIL-A-13550D, July 8, 1969; Antifogging Kit, M1

MIL-A-13550D, Amendment-1, December 4, 1969; Antifogging Kit, M1

MIL-A-17367C(MC), February 12, 1968; Armor, Body, Fragmentation Protective; Upper Torso; (With Collar, M-1955)

MIL-A-17367C(MC), Amendment-1, January 15, 1969; Armor, Body, Fragmentation Protective; Upper Torso; (With Collar, M-1955)

MIL-A-19879A(MC), November 4, 1965; Armor, Body, Fragmentation Protective: Lower Torso

Military Specification

MIL-A-19879A(MC), Amendment 2, November 8, 1968; Armor, Body, Fragmentation Protective: Lower Torso

MIL-A-43197, February 10, 1964; Armor, Body, Fragmentation Protective (T61-5 Composite Armor)

MIL-A-43197, Amendment 1, April 28, 1965; Armor, Body, Fragmentation Protective (T61-5 Composite Armor)

MIL-A-46103A, December 22, 1967; Armor; Lightweight, Ceramic-Faced Composite, Procedure Requirements

MIL-A-46108(MR), June 24, 1966; Armor: Transparent, Laminated Glass-Faced Plastic Composite

MIL-C-1574C, November 19, 1963; Carrier, Grenade, 3-pocket

MIL-C-3880B, July 14, 1965; Club, Policeman's

MIL-C-3880B, Amendment-1, May 28, 1968; Club, Policeman's

MIL-C-10338B, August 26, 1958; Chemical Agent, Chloroacetophenone

MIL-C-11772B, June 2, 1966; Chemical Agent, Diphenylaminechlorarsine (DM)

MIL-C-17841B(MC), June 6, 1966; Carrier, Club, Policeman's: Cotton Webbing; White

MIL-C-17864B(MC), June 7, 1965; Carrier, Pistol Holster: Cotton, Duck; White (MP)

MIL-C-20267B(MC), June 6, 1966; Carrier, Club, Policeman's; Cotton Webbing, Olive Drab, (With Double Hook)

MIL-C-46392(MU), November 18, 1963; Cartridge, Reference, Caliber .38, Special (M41 Type)

MIL-C-46409A(ORD), October 1, 1962; Cartridge, Caliber .38, Special, Ball, M41

MIL-C-46409A(MU), Amendment 1, April 19, 1963; Cartridge, Caliber .38, Special, Ball, M41

MIL-G-10124(Cml C), February 7, 1950; Grenade, Hand, Irritant, CN-DM, M6

MIL-G-10162B, May 1, 1956; Grenade, Hand, Riot, CN, M25A1; Components For

MIL-G-10280B, September 7, 1956; Grenade, Hand, Riot, CN, M25A1

MIL-G-11968B(Cml C), April 7, 1960; Grenade, Hand, Tear, CN or CS, M7A1

MIL-G-11968B(MU), Amendment 1, March 20, 1967; Grenade, Hand, Tear, CN or CS, M7A1

MIL-G-45401A(MU), July 15, 1963; Grenade, Hand, Riot Control, CN-DM, M6A1

MIL-G-46459E(MU), July 12, 1968; Grenade, Hand, Riot, ABC-M25A2

Military Specification

MIL-G-46536B(MU), July 12, 1968; Grenade, Hand, Riot, CN1, DM1, or CS1, ABC-M25A2; Components For

MIL-G-46969(MU), April 17, 1964; Grenade, Hand, Riot, CS, ABC-M7A2

MIL-G-51025H, November 18, 1968; Gun, Portable Riot Control Agent Disperser, M9

MIL-G-51332(MU), March 12, 1969; Grenade, Hand, Riot, Pocket, CS, XM58

MIL-G-60087D(MU), November 26, 1969; Grenade, Hand, Riot, CS, M7A3

MIL-H-1988E, April 9, 1968; Helmets, Soldier's, Steel, M-1, (Complete)

MIL-H-1988E, Amendment-4, January 16, 1970; Helmets, Soldier's, Steel, M-1(Complete)

MIL-H-13247(Cml C), February 3, 1954; Hose, Gas Mask, M3

MIL-H-43059A, April 27, 1966; Helmet, Combat Vehicle Crewman

MIL-H-43059A, Amendment 1, July 20, 1967; Helmet, Combat Vehicle Crewman

MIL-M-10121(Cml C), February 3, 1950; Mask, Gas, M9

MIL-M-12309(Cml C); Mask, Gas, Acid and Organic Vapors, M10

MIL-M-12310(Cml C), October 27, 1952; Mask, Gas, Ammonia, M12

MIL-M-17522D(Ships), October 16, 1967; Mask, Protective, ND Mark V

MIL-M-51231, June 1, 1965; Mask, Gas, Rocket Propellant, M26A1

MIL-M-51231, Amendment 1(MU), November 10, 1966; Mask, Gas, Rocket Propellant, M26A1

MIL-R-1167A, July 1, 1955; Rifle, Automatic, Browning, Caliber .30, M1918A2

MIL-R-1296C, August 31, 1964; Rifle, Caliber .22, M12

MIL-R-1296C, Amendment 2, June 30, 1966; Rifle, Caliber .22, M12

MIL-R-45012D, March 11, 1968; Rifle, 7.62mm:M14

MIL-R-45012D, Amendment, December 5, 1968; Rifle, 7.62mm:M14

MIL-S-3443C, October 21, 1968; Shotgun, 12 gage, Riot-Type

MIL-W-13855C, September 29, 1969; Weapons: Small Arms and Aircraft Armament Subsystems, General Specifications For

MIL-W-13855C, Amendment 1, October 17, 1969; Weapons; Small Arms and Aircraft Armament Subsystems, General Specifications For

3. Military Standard

MIL-STD-607, October 15, 1968; Gas Masks
MIL-STD-635B, October 7, 1963; Weapons, Shoulder (Rifles, Carbines, Shotguns, and Submachine Guns)
MIL-STD-1236, June 13, 1960; Weapons, Hand (Pistols and Revolvers)

APPENDIX E

STATEMENT OF GEORGE A. SMITH, JR.

ON BEHALF OF THE

ALARM INDUSTRY COMMITTEE FOR COMBATING CRIME

BEFORE THE HOUSING SUBCOMMITTEE

OF THE HOUSE BANKING AND CURRENCY COMMITTEE

JUNE 5, 1970

Mr. Chairman and members of the Subcommittee, my name is George A. Smith, Jr. I am President of the Central Station Alarm Company in Dallas, Texas, Secretary of the Central Station Electrical Protection Association, and Chairman of the Alarm Industry Committee for Combating Crime. I am also a professional electrical engineer, registered in the State of Texas, and was a member of the architectural task group which prepared Appendix D in the Small Business Administration Report, Crime Against Small Business. A copy of my biography is attached (Appendix A). This morning, I shall be testifying in my capacity as Chairman of the Alarm Industry Committee for Combating Crime.

Here with me is Mr. Anthony Grosso, Chief Engineer, American District Telegraph Company; Mr. Ralph Ward, Director, Government Relations, Mosler Electronic Systems; and Mr. Robert Morin, President of Universal Development Consultants, Inc., the firm which represents the Alarm Industry Committee for Combating Crime in Washington.

Mr. Chairman, I would like permission to have inserted in the record at the end of my testimony this morning the testimony and responses to questions which were presented in a statement to the Senate Small Business Committee on May 22, 1969, by the former Chief Engineer of the American District Telegraph Company. This statement describes some of the activities of the industry in more detailed technical terms than my testimony this morning. I think

that this statement will be a useful reference for the members and staff of this Subcommittee. At this time, Mr. Chairman, on behalf of the Alarm Industry Committee for Combating Crime, I would like to extend an invitation to the members and staff of your Subcommittee to visit any of the member organizations in order to view their entire range of products and services.

The Alarm Industry Committee for Combating Crime is made up of the industry's two national trade associations, which include in their membership most established alarm service companies and major alarm equipment manufacturers. In addition, five of the leading manufacturers and service companies are personally represented on the Committee. The companies and associations which are represented on the Alarm Industry Committee for Combating Crime are as follows: American District Telegraph Company (ADT), AFA Protective Systems, Inc., Central Station Electrical Protection Association, Holmes Electric Protective Company, Mosler Electronic Systems, National Burglar and Fire Alarm Association, and Wells Fargo Alarm Services, Division of Baker Industries, Inc.

The Alarm Industry Committee for Combating Crime has for its purpose the coordination of the activities of the alarm industry in its effort to combat the ever-increasing incidence of crime. It will also serve as the industry's vehicle through which its accumulated knowledge and expertise will be made available to the

various Federal agencies and Committees of Congress which are attempting to bring about a resolution to the crime problem. The alarm industry has been in existence, and has been dealing successfully with this problem, for over a century. For this reason, I feel that the Alarm Industry Committee for Combating Crime has an important contribution to make to the crime control effort.

The Alarm Industry Committee for Combating Crime would like to take this opportunity to compliment Congressman Annunzio and this Subcommittee on their initiative in attempting to assist the small businessmen of this country to stay in business despite the increasingly precarious position in which they find themselves as a result of the increased criminal activity.

There is no need to reiterate here the statistics which indicate the extent of the losses which the small businessmen suffer annually. It is sufficient to acknowledge that the figures are staggering. The members of the Alarm Industry Committee for Combating Crime are well aware of the impact which the increase in crime is having on businessmen nationwide and the particularly deleterious effect which it is having on the business activities in the inner cities.

The Alarm Industry Committee for Combating Crime is engaged in a number of activities through which we hope to make a

constructive contribution to the nationwide effort that is being made to overcome this serious problem. I would like to take a moment to briefly describe some of these activities.

Each year the industry expends millions of dollars in research and development and in implementing new concepts and new equipment systems. As part of this research and development investment, computer technology is being utilized. All of this effort is being made in order to provide protection for both large and small businesses so that they can cope with the ever-increasing sophistication of the criminal element.

I am pleased to be able to report to you today that the Alarm Industry Committee for Combating Crime has directed its Subcommittee on Standards to give top priority to the setting of the appropriate level of protective devices standards for small businesses. Very careful consideration must be given to the delicate economic balance involved in the context of a small business situation, because the cost of the protection equipment must be balanced against the value of the property which is to be protected.

In addition, three members of the Alarm Industry Committee for Combating Crime are working with the Physical Security Subcommittee of the retail merchants Security Action Force. The Security Action Force, which represents more than a half million retail merchants throughout this country, was formed at the request of

Senator Bible, Chairman of the Senate Small Business Committee, to work with his Committee in its effort to secure the necessary legislation to assist the small businessmen in their battle with the criminal element. The objective of the Physical Security Subcommittee is to bring about an exchange of information and to establish a productive dialogue between the merchants and the alarm industry.

The expressed intent of H.R. 13666, as we understand it, is to make crime insurance available to preserve small businesses in the inner cities as viable economic units. The members of the Alarm Industry Committee for Combating Crime are cognizant of the crime insurance needs of these businessmen. In our judgment, the situation in which they find themselves could be improved considerably by the intelligent use of alarm devices and security systems in concert with the proper insurance coverage. The members of the Alarm Industry Committee for Combating Crime have had a lengthy relationship with the insurance industry and we would hope that the insurance industry could provide the market mechanism through which crime insurance can be made readily available to the small businessman. If, for any reason, the insurance industry is unable to provide a market for crime insurance, the Alarm Industry Committee for Combating Crime feels that the problem is acute enough to require remedial action such as that embodied in the legislation

which Congressman Annunzio and the other co-sponsors are proposing.

Mr. Chairman, if, after due deliberation, your Subcommittee decides to write legislation to provide for a Federal crime insurance program, we strongly urge you to include language which would require the administering agency to establish minimum standards with which persons and organizations receiving insurance under the Act must comply with respect to the installation, maintenance and operation of alarm devices and procedures (Appendix B). If such language is not included, we are concerned that little attention will be given to loss prevention with a resulting waste of taxpayers' dollars. Equipment standards must also be established in order to protect the businessmen from unscrupulous operators who might try to take advantage of them through the sale and promotion of substandard and ineffective equipment.

Another suggestion which we offer relates to financial assistance for the small businessmen. Congress enacted the FAIR plan legislation to provide a market for urban property risks which could not be insured in the normal market. If a piece of property is in such a state of disrepair that it cannot meet the minimum standards to qualify for insurance under the FAIR plan, the Federal Insurance Administration is authorized to make loans and/or grants to the property owner so that he can repair his property

and qualify. We respectfully suggest that the same principle be applied for the benefit of the small businessman. He may or may not require similar governmental assistance to qualify as a better risk for crime insurance protection.

In summary then, Mr. Chairman, the Alarm Industry Committee for Combating Crime is aware of the situation which is confronting the small businessmen and it is our desire to make a positive contribution to the efforts which are being made to assist them to minimize their crime losses. Our research is going forward in the alarm area. Our Standards Subcommittee is working to set standard levels for small business. The industry is attempting to adapt recent technological advances to the needs of small business. Members of the Alarm Industry Committee for Combating Crime are meeting with representatives of the retail merchants Security Action Force. The Law Enforcement Assistance Administration has recently awarded a grant to the National Bureau of Standards for the purpose of setting up a User's Standards Laboratory for law enforcement equipment. Although the project is still in the planning stage, we look forward to working closely with the Bureau of Standards and making available to it our vast experience in this area. The Alarm Industry Committee for Combating Crime offers its assistance to this Subcommittee or to any group which is working to resolve the the problem of crime against small business. Our industry has

demonstrated that with the proper opportunity and economic flexibility we can stop or substantially curtail losses through the use of protection devices.

Mr. Chairman, we appreciate the opportunity to testify here and we will be happy to answer any questions which you may have.

Attachment - APPENDIX A
APPENDIX B

APPENDIX A

BIOGRAPHY OF GEORGE A. SMITH, JR.

George A. Smith, Jr., was born on February 21, 1908, in Dallas, Texas. He graduated from Catholic University of America in Washington, D.C., with a degree in Electrical Engineering and then worked as a graduate engineer with Westinghouse Electric Manufacturing Company, of Pittsburgh, Pennsylvania.

In 1934 he went into the fire alarm and burglar alarm business with his father, who operated the Smith Detective Agency & Night-watch Service. In 1940 he founded Central Station Alarm Company, a company engaged in the installation of military electrical protection systems. In 1948 he organized Central Alarm Systems de Mexico in Mexico City.

He is a registered Professional Engineer in the State of Texas. He was honored with the "1958 Engineer of the Year" award by the Dallas Chapter of the Texas Society of Professional Engineers.

He has been president of the Dallas Export-Import Club; president of the Texas Society of Professional Engineers, Dallas Chapter; president of the Dallas Engineers Club; chairman of the Dallas Fire Council; director of the Dallas Rotary Club; and director of the Dallas Athletic Club, of which he is currently a trustee.

He is past president of the Central Station Electrical Protection Association, a nationwide organization; member of the

Industrial Advisory Committee of the Burglary Department of Underwriters' Laboratories, Inc; secretary of the Sectional Committee on Fire Protective Signaling Systems of the National Fire Protection Association, representing IEEE; chairman of the Frequency Advisory Committee for the alarm industry recognized by the Federal Communications Commission; president of the North Texas Chapter of the Society of Fire Protection Engineers; member of the Chamber of Commerce World Trade Committee; member of the Dallas Regional Export Expansion Council; chairman of the Radio Commission of the City of Dallas; and Honorary Fire Chief of the City of Dallas.

APPENDIX B

AMENDMENT TO H.R. 13666

Within six months from the date of this Act, the administering agency shall promulgate regulations establishing minimum standards with which each person or organization obtaining insurance under this Act must comply with respect to the installation, maintenance and operation of alarm devices and procedures which are reasonable in cost in order to deter robberies, burglaries, and larcenies and to assist in the apprehension of persons who commit such acts.

The regulations shall establish the time limit within which a person or organization subject to this Act shall comply with its provisions, and shall require the submission of periodic reports with respect to the installation, maintenance and operation of the specified alarm devices and procedures.


DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS