STATEMENT OF

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I am happy to be here today to discuss our experiences in evaluating the performance of industrial personal protective equipment against standards devised by consensus organizations. With me are Dr. Donald Campbell, Chief, Safety Equipment Section, and Mr. William Cook, Electrical Engineer, Safety Equipment Section.

The National Institute for Occupational Safety and Health (NIOSH) was established by the Occupational Safety and Health Act of 1970 to conduct programs of occupational safety and health research, standards development, technical assistance and manpower development. NIOSH is also responsible for conducting mine health research, recommending health standards and conducting health hazard evaluations in mines under the Federal Mine Safety and Health Act. As required by the Federal Mine Safety and Health Act, NIOSH tests and certifies respirators and coal mine personal dust sampler units. We have also certified industrial sound level meters and gas and vapor detector tubes under our voluntary certification program.

The Institute has also evaluated the performance of many workplace safety devices--including safety shoes, eye and face protective devices, safety helmets, and other products--for which accepted performance standards are those established by a consensus organization, the American National Standards Institute (ANSI). NIOSH does not certify these devices. However, we do purchase a selection of each item "off the shelf," test the specimens according to the applicable standard, and publish the results in technical reports available from the U.S. Government Printing Office. It is our experience in evaluating the

performance of these devices against standards developed by consensus organizations that will be the subject of this statement.

We believe that workers are sometimes lulled into a false sense of security by the manufacturer's claims that industrial safety devices comply with applicable standards. The purchaser of a pair of safety shoes, for example, is told that the shoes comply with ANSI standard Z 41.1 (Exhibit 1). Manufacturers commonly display this information prominently in advertising and packaging and in the inside of each shoe. A worker who paused to consider the meaning of such a claim might reasonably expect several things:

1. A responsible person or group has carefully considered the product and its intended use and developed a product standard that assures a reasonable level of performance;

2. Adequate testing has been performed to ensure that performance of the product is equal to or exceeds the product standard; and

3. Independent testing in any laboratory could be performed to verify the product's compliance with the standard.

Unfortunately, our evaluations indicate that although a consumer might reasonably expect these things, his expectations are often not met. In many cases, the product does not meet the requirements of the

standard with which it supposedly complies. In some cases, the applicable standard is inadequate or otherwise inappropriate for the device. Today I will illustrate these problems by discussing several ways in which labels indicating compliance with consensus standards fail to offer the user a reasonable level of protection. The judgments and conclusions to be drawn from the examples may apply to consensus product standards in general.

Example 1

First let us consider the most obvious way in which a compliance label may mislead the consumer; the product may simply fail to comply with the indicated standard. This device, an eyecup safety goggle, is an example of such a product. Recent NIOSH tests show that over 50 percent of the models of eyecup goggles available to the American worker are defective. Contrary to what the compliance label indicates, the defective models do not meet the impact resistance requirements of the ANSI Z87.1 standard (Exhibit 2). I have here a photograph that illustrates the type of lens failure involved, in which shards of glass may penetrate the wearer's eye (Exhibit 3). Obviously, NIOSH considers this type of lens failure a serious defect. Ironically, it is a defect that could be easily corrected by the manufacturer.

In the NIOSH technical report, "Impact Performance of Safety Eyecup Goggles," we present the details of this problem (Exhibit 4). We do not

know why defective lenses are marketed. However, in our report we suggest three possibilities:

1. The manufacturers have made no serious effort to monitor the quality of their lenses;

2. The manufacturers knowingly market defective lenses; or

3. Individual manufacturers have devised test procedures that do not ensure adequate impact resistance.

The first two possibilities are, of course, matters involving the integrity of manufacturers, not the adequacy of consensus standards. They are certainly important problems but they are not relevant to the issues at hand, and I will not discuss them today. The third possibility, however, is quite significant here.

The central problem is that standards such as ANSI Z87.1 do not specify a procedure to be used for measuring the performance of the product. Although Z87.1, for example, tells the manufacturer that his lenses must resist impacts of specified energy levels, it does not define the procedure to be used to test impact resistance.

In the absence of detailed, step-by-step test procedures, a manufacturer may devise a method which he believes is appropriate but which is not. Consequently, he may market safety goggles he believes meet the ANSI standard but which actually afford the wearer inadequate protection. This is one of several reasons that NIOSH recommends that

each standard include a detailed and validated test procedure. "Validated," used in this context, means that the test procedure has been shown to yield reproducible results from one laboratory to another.

These defective lenses are therefore either the result of a simple failure to conform to the standard or they result from a more fundamental flaw in the standard itself.

Example 2

My next example illustrates another way in which the compliance label can fail to assure workers a reasonable level of protection. This industrial safety shoe is typical of many dress shoes available for use in the workplace. It is identical to dress shoes designed for street wear, except that it is equipped with a steel toe box to provide impact protection. The standard applicable to industrial safety shoes is ANSI Z41.1, a consensus standard (Exhibit 1). The manufacturer of the shoe has stamped the phrase "ANSI Z41.1 - 1972/75" in the shoe, indicating the product meets the requirements of the standard.

The worker might reasonably be expected to ask, "What does the label in this shoe assure me?" Unfortunately, the answer is nothing! This shoe is a size 8-D and the standard stipulates only that 9-D shoes must meet performance requirements. If the shoe is anything other than a size 9-D, the standard does not assure the consumer any level of performance. No testing is required for any other shoe size.

This is an example of a case in which a major loophole in a consensus standard prevents the worker from being assured any level of protection. The standard should, of course, apply to all shoes regardless of size.

Example 3

As my third example let me consider a safety shoe that is a size 9-D. We will see that even in this case the compliance label fails to assure an adequate level of protection. Let me explain. The standard requires that only three shoes be tested. A manufacturer can test three shoes on the first day of production and then, finding that the three shoes meet the requirements, continue to produce that style of shoe year after year and never do another test. It would, under these circumstances, be perfectly proper for the manufacturer to stamp "Complies with ANSI Z41.1" in each shoe he manufacturers.

Obviously, three shoes is not an adequate test sample to determine with any degree of assurance the performance of additional shoes of the same model. The performance of a manufacturer's product may vary considerably over time and may certainly fall below the level required by the standard. Results of our testing, published in a NIOSH technical report in 1976, show that this happens all too often (Exhibit 5). Forty-three percent of all models tested do not pass the requirements for resistance to impact and compression.

The basic problem is that the standard does not require a test sample that is statistically representative of the product line. This may be a reflection of a more fundamental problem: consensus standards tend to be written from the point of view of the manufacturer, not the consumer. The standard is met if three samples tested by the manufacturer meet the requirements. A standard written from the point of view of the consumer should provide him with assurance that the shoes he has purchased will provide him with a reasonable degree of protection. Consensus standards which focus on what is required of the manufacturer, rather than what a manufactured shoe must offer to the consumer, tend to offer less protection to the consumer.

Example 4

In my final example today, I want to highlight a case in which a consensus standard has been applied to a product for which it was not intended and is inappropriate. This is a faceshield we recently purchased in a local department store. An indelible label on the shield indicates it complies with ANSI Z87.1, the standard for industrial faceshields (Exhibit 2). We have no reason to believe it doesn't. However, if it complies, there is still a major problem. This product is not an industrial faceshield. It is a faceshield for a motorcycle helmet. The Z87.1 standard was never intended to be applied to motorcycle helmet faceshields, and we believe that applying the standard to this device is misleading.

It is misleading in that it implies to the wearer that his safety has been carefully considered. As I mentioned earlier, it is reasonable for a consumer to interpret the compliance label to mean that the standard-making organization has properly considered the product and its intended use. This is not the case; the role of the ANSI Z87.1 committee never included the safety of the motorcyclist.

Any reasonable consideration of the needs of the motorcyclist would not prescribe for his faceshield the impact test of the Z87.1 standard. Let me explain. The standard stipulates that a faceshield must withstand only the impact of a 7/8th inch-diameter steel ball weighing approximately 1½ ounces and dropped from a height of 50 inches. We can easily simulate such a test right here. As you can see, the test is certainly not severe, especially when compared with the level of impact a motorcyclist might encounter. If an object of the same weight were to fall from a truck traveling in the opposite direction and strike the faceshield, the impact energy created could easily be 100 times that of the ANSI Z87.1 standard.

But, of course, impact resistance is only one consideration for the motorcycle driver. Visual acuity, for example, is quite important in driving, yet the Z87.1 standard does not consider optical distortions that could affect visual acuity. I think you'll agree that the Z87.1 standard is not appropriate for a motorcycle helmet faceshield. It does not assure a reasonable level of protection to the user. Examples such

as this one illustrate to us the importance of applying standards only to those products for which the standard is intended.

As we have seen, there are a number of ways in which the compliance label may fail to provide the assurance the user may reasonably expect. In addition, there are two general deficiencies in almost all the consensus standards we have worked with which make it difficult to interpret and apply the standards.

First, the standards lack technical justification and documentation. Second, they each lack detailed and validated test procedures.

Proper technical justification should document the assumptions made about two important issues: the magnitude of the hazard the product is to protect against and the threshold of human tolerance to injury. The need for understanding both of these can be illustrated by considering an industrial safety helmet. The present standard (Exhibit 6) specifies that a helmet subjected to 40-foot-pound impact (an 8-pound object falling 5 feet) may transmit a force of no more than 850 pounds to the headform used in the test. There is essentially no technical justification for either of those figures. The biomechanics research to determine whether an 850-pound limit is appropriate to define human tolerance to impact has not yet been conducted. Nor has causal injury data been generated to determine whether an impact of 40 foot-pounds is typical of the injury-producing hazards of the workplace.

Even when there are gaps in the information required to develop a product standard it is still necessary to produce the best possible standard. To do so it is necessary to make assumptions and rely on estimates. We don't criticize this. It's often the only way to proceed. What we do stress is the importance of documenting these assumptions and the rationale that is the basis of a standard. Every product standard should be accompanied by a supporting document that provides the technical basis for each requirement.

The second essential element missing from most consensus standards is a detailed, validated test procedure. Without precise, reproducible test methods, the standard is vague and ambiguous. Unfortunately, most standards include no test procedures at all.

The importance of properly validated test methods is, of course, not something we at NIOSH have discovered. It has long been recognized, for example, by the American Society for Testing and Materials (ASTM). Our concern is that these concepts have not been applied to the development of standards that directly affect the safety of this country's workforce. Further information on our testing and certification program and comments on the consensus standards process can be found in the attached NIOSH testimony, given before the Senate Judiciary Committee, Subcommittee on Antitrust and Monopoly, April 25, 1977 (Exhibit 7).

These examples illustrate why the worker and other consumers cannot rely on labels indicating conformance to a performance standard. Based on our experience, we have serious doubts about whether consensus

standards organizations, as presently constituted, can serve the public interest. If the FTC chooses to develop regulations governing these groups, however, we suggest that as a minimum the following provisions be included:

1. Every group or committee developing product standards should also develop and make available to the consumer a statement of the scope of the product standard. It would list the attributes that are considered by the particular standard along with brief descriptions of the requirement for each attribute and test method used for evaluation. Relevant attributes not considered would also be listed.

2. Product standards should be accompanied by a supporting document that provides the technical basis for each of the requirements of the standard.

3. Detailed, validated test procedures should be included.

4. A clearly defined systematic procedure for proposing changes in writing and for commenting on proposed changes in writing should be a part of any standard-making process. This procedure would provide documentation of all proposals and resulting comments from individual members of the standard setting group. It would also allow a significant level of participation by those without the resources to travel to committee meetings.