Appendix E - Excerpts from the Final Report of the NCWM Task Force on Safety

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This appendix includes a brief summary of the work of the Task Force and the Task Force's recommendations to the NCWM. Also included are four sections excerpted from the Task Force's final report; these sections include the major points to be addressed when establishing a safety program, and they are considered to be the most significant portion of the Task Force's report. The final report of the Task Force is available in its entirety as a separate NCWM publication, Number 19.

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I)   Summary

The NCWM Task Force on Safety was established in August 1989 by the NCWM chairman at that time, Fred Gerk. The Task Force was established in response to concerns raised by members of the NCWM about how safety is being addressed in the weights and measures workplace.

The Task Force held a total of four meetings: January 1990, April 1990, November 1990, and April 1991. The major accomplishments and activities of the Task Force during this time included:

- Developed an addendum to NIST Handbook 143 and to NIST Handbook 145;
- Collected, reviewed, and collated information on safety to create a safety library;
- Developed suggested additions to NCWM Publication 12, including revisions to the EPO's to include safety information, the development of an introductory section on safety, and the development of a glossary of safety key phrases;
- Established a working relationship between the NCWM and OSHA;
- Developed a final report in a format designed to:
  (1) Provide assistance to the NCWM Committee on Education, Administration, and Consumer Affairs in its development of the NTP Module on Weights and Measures Administration; and
  (2) Assist weights and measures jurisdictions and other NCWM members in the development of a new safety program or the modification of an existing program.

The Task Force recognized that safety in the weights and measures workplace can be a complex issue due to the variation in designs of weighing and measuring equipment; the many different types of potential hazards to which the weights and measures inspector, metrologist, and serviceperson are exposed; and differing policies and regulations from jurisdiction to jurisdiction. Because of these variations, the Task Force realized that it would be impractical to develop a "model" safety program to be used by the weights and measures community. The recommendation of a model program could even have potentially dangerous consequences; an agency might overlook a safety hazard present in its area that was not specifically addressed in the model program, or the agency might violate a local or departmental safety requirement by following the model program.

In the course of its work, the Task Force found that many NCWM members have long had well-established safety programs while many others have few or no recognized safety policies in place. Consequently, the Task Force's recommendations were designed to be useful to jurisdictions with safety programs at all levels. As a result of its work with OSHA, the Task Force was able to develop suggested guidelines which can be useful to any jurisdiction in establishing or maintaining a safety program.

The final report of the Task Force provides suggestions of guidelines to be considered when developing safety policies and procedures and is presented in a format intended to assist an agency in developing a new safety program or in maintaining a current program. An agency must evaluate the safety hazards which are created by the unique combinations of equipment, procedures, and environmental factors present in its own workplace, and it must develop a safety program which is tailored to meet its individual needs and any applicable local and State safety requirements. *It is absolutely essential that the agency work closely with the local or State Occupational Safety and Health Administration (OSHA) official or departmental safety officer when developing a safety program to insure that all potential safety hazards have been adequately addressed.*

The Task Force emphasizes that even the most well-developed safety program must be continually evaluated and monitored; safety procedures or policies are of little use if they do not adequately address the safety hazards actually present in the workplace or if they are not followed.

The intent of the final report of the NCWM Task Force on Safety is to provide information about the work of the Task Force and to emphasize to agencies in the weights and measures community the importance of establishing and maintaining an effective safety program. All agencies in the weights and measures community are urged to make safety a priority issue. The Task Force encourages members of the weights and measures community to work with their local or State OSHA official to develop and implement a safety program which is tailored to meet the specific needs of their agency and all local and State safety requirements.

II) Recommendations to the National Conference on Weights and Measures (NCWM)

The NCWM Task Force on Safety presents the following recommendations to the Executive Committee of the NCWM.

1) **Establish a Subcommittee of the Committee on Education, Administration, and Consumer Affairs (the Education Committee) to address safety in the weights and measures workplace, thereby reaffirming the commitment of the NCWM to safety in this arena. Such a Subcommittee should include representation of all segments of the NCWM including the Associate Membership, the Metrologist's Group, and the general membership of the NCWM.**

While the Executive Committee will be responsible for determining the specific structure and duties of the Safety Subcommittee, the Task Force has identified several basic areas of responsibility with which the Subcommittee should be charged:

(a) The primary responsibility of the Subcommittee should be to address any questions pertaining to safety in the weights and measures workplace, including field, laboratory, and office environments;

(b) Additional responsibilities should include:

- Expanding upon the approach used in the revisions of the Examination Procedure Outlines and extending the approach to other types of routine weights and measures activities such as package checking;

- Updating and sharing information pertaining to safety in the weights and measures workplace (format to be used might include a biannual safety newsletter or a regular section in the National Institute of Standards and Technology, Office of Weights and Measures newsletter, Weights and Measures Today);

- Providing a listing of information available in the safety library established by the Task Force;

- Providing the NCWM and regional weights and measures associations with a report of any activities or issues pertaining to safety that are identified during the year, including a list of safety training seminars and materials;

- Assisting the Education Committee as requested in revising the National Training Program (NTP) training modules to include safety information;

- Assisting the Metrologist's Group as requested in revisions to laboratory documents to include safety information;

- Identifying sections of NCWM documents that should be revised to include safety information, and taking steps to encourage revision of these documents (this would necessitate regular review of the recommendations of the other standing committees to revise or add to existing NCWM documents -- e.g., other NCWM committees' annual and interim reports); and

- Maintaining the working relationship between OSHA and the NCWM.

The Task Force also emphasizes that the Subcommittee should not be expected to provide analyses of individual safety programs, and that it should only meet as needed.

2) **Request that the Education Committee include the recommended safety revisions to the EPO's, the "Safety Considerations" section, and the "Glossary of Safety Key Phrases" in the next publication of NCWM Publication 12, and encourage NCWM members to follow the revised versions of the EPO's.**

3) **Encourage NCWM members to follow the safety recommendations that will be added to or issued as addenda to NIST Handbook 143, State Weights and Measures Laboratories Program Handbook, and to NIST Handbook 145, Handbook for the Quality Assurance of Metrological Measurements.**

4) **Encourage the Education Committee to include at least a chapter in each National Training Program (NTP) Training Module to address safety precautions.**

5) **Request that the NCWM Specifications and Tolerances Committee recommend the addition of a section pertaining to safety to the General Code of NIST Handbook 44 (and to any other codes deemed appropriate by the S & T Committee), and request that the various sectors of the Technical Committee on National Type Evaluation revise the checklists of NCWM Publication 14 as appropriate to reflect this change to Handbook 44.**

The Task Force recommends consideration of the following language for inclusion in HB 44 as an additional section and/or incorporation into existing sections of the **General Code**:

Specifications Section:

G-S.X.   Safe Design Principles

A device shall be designed, manufactured, constructed, and marked in accordance with applicable Federal, State, or local safety requirements and trade or industry standards of safety.

Notes Section:

G-N.X.   Safe Inspection Practices

Inspection and testing shall be conducted:

(a) Using safe work practices, equipment, and procedures; and
(b) In conformance with Federal, State, and local safety laws and regulations and with the safety policies in effect at the inspection site.

If a violation of the safety provisions of this code occurs or a hazardous condition occurs in the work environment, inspections and tests shall be suspended and the equipment under test placed in an unapproved status until the violation or hazardous condition has been corrected.

User Requirements Section:

G-UR.X.   Safe Installation, Maintenance, and Use Practices

(a) Devices shall be installed in accordance with Federal, State, and local safety laws and regulations; applicable trade or industry safety standards or recommendations; and all safety warnings or procedures specified by the manufacturer.

(b) Devices shall be maintained (i.e., marking and warning labels, safety mechanisms, and environment) in accordance with the provisions specified in (a).

(c) Devices shall be operated or used in conformance with the instructions or markings provided by the manufacturer and used only when all safety appliances are operational.

6) **Encourage the regional weights and measures associations to establish regional safety committees and to promote the presentation of safety training seminars at regional weights and measures conferences.**

7) **Disband the Task Force as of July 1991.**

III) Who Needs a Safety Program? -- Making a Commitment

Almost every organization can realize benefits from establishing a safety program. The reasons for establishing a safety program are many. Among the most basic reasons for establishing a safety program are reducing workplace injury, disability, and property damage. In addition, many agencies are obligated by legal requirements to establish a safety program. There are also a number of less evident, but just as valuable, benefits which can be derived from

the implementation of an effective safety program. Both employers and employees benefit from a well-established safety program; moreover, both have specific responsibilities in maintaining a safety program that is beneficial and worthwhile. The long term cost savings which are often realized from an effective safety program are significant incentives to implement a safety program. However, it is the human element, the basic responsibility for maintaining a safe work environment for employees, that should remain the prime impetus for an agency to establish a safety program.

Some Basic Philosophy

When considering the establishment of a safety program, many questions arise. Among the most common questions that are asked by many employers are "Why should I establish a safety program?" and "How will it help the agency?" The reasons for establishing a program are varied, but all have the same end result -- reducing workplace injury, disability, and property damage.

Providing a safe working environment reduces the potential for injury to employees and other persons, medical costs for injuries, lost work time due to injuries, decreased productivity due to injury, and damage to equipment and property. A safe working environment also contributes to the improvement of employee morale; an employer who establishes and conscientiously maintains a safe work environment sends a clear message to employees that their safety and health are important to the agency. A correctly implemented safety program may even increase productivity since better equipment, better working conditions, and improved employee moral can all contribute to increased efficiency.

Legal Reasons

Many employers may not realize that there are probably legal obligations that require them to establish a safety program. There are currently OSHA rules in effect in many States requiring employers to notify employees of potential safety hazards that may be present in their workplace environment. OSHA standards such as the Hazard Communication Standard (29 CFR 1910.1200) (also known as "The Employee's Right-to-Know") and the Occupational Exposure to Hazardous Chemicals in Laboratories Standard (29 CFR 1910.1450) (which includes requirements for a "Chemical Hygiene Plan") are intended to reduce the possibility of workplace injury by informing employees about potential safety hazards that may exist in the workplace and providing a full disclosure about the nature of products to which they are exposed. The implementation and enforcement of such laws help to educate the employer and the employee about the potential hazards associated with a product or procedure; to decrease the exposure of employees to hazardous products and conditions; and to encourage the use of safe work practices by all employees, thereby decreasing the potential for injuries.

Failure to establish and maintain a safety program or to follow established safety laws and regulations may possibly result in penalties to the employer. In many cases, if an agency does not establish a program, it can and will be forced to establish a program and its budget will be used for that purpose.

Benefits

Among the most elemental benefits for establishing a safety program are reducing workplace injury, disability, and property damage. In addition to these benefits, there are other less-evident, but just as valuable, benefits to be derived from implementing an effective safety program. The implementation of a safety program often has a monetary benefit for an agency which is measured not only in terms of dollars, but also in terms of employee work time and employee health. Many employers find that the benefits realized from the decreases in costs far outweigh the expenses incurred in the implementation of the safety program.

Following the implementation of an effective safety program, an agency often observes an improvement in employee health, moral, and well-being. Better working conditions, proper safety equipment, and proper training can decrease the amount of work-related illness and injury experienced by the employee. For example, training a scale inspector on the use of proper lifting techniques can decrease the frequency of back injuries due to improper lifting. Similarly, a well-ventilated work area and the use of chemical hoods in the laboratory can help to prevent illness due to inhalation of chemical fumes. When an employee understands that the employer is concerned about maintaining a safe work environment for the health and safety of the employees, an increase in employee morale often results. This

improvement in morale also contributes to the employee's general feeling of well-being and may generate renewed enthusiasm about the work.

A comparison of costs before and after the implementation of a safety program often reveals beneficial changes. Better working conditions, proper safety equipment, and proper training can impact significantly on the employee's performance and, consequently, can affect the costs observed by the agency. For example:

Sick Leave, Medical Costs, and Insurance Costs

A decrease is often observed in work-related illness or injury as a result of the byproducts of better working conditions, proper safety equipment, and proper training. This also results in a decrease in the amount of sick-leave paid to employees. Similarly, the employer may see decreased costs in health care for injured employees and a decrease in insurance claims for work-related injuries.

An employer may also observe a decrease in health insurance premiums with a well-implemented safety program. An insurance company may look upon a safety program as a preventative measure for decreasing work-related injury and illness.

The improvements made to the work environment with the implementation of a safety program may eliminate other risks such as fire hazards. Training such as defensive driving techniques and improved maintenance on vehicles may decrease the risk of vehicle accidents. The reduction of risks such as these may help to decrease property insurance premiums.

Property, Equipment, and Production Costs:

As part of implementing a safety program, an agency often purchases new equipment, modifies or repairs existing equipment, and provides employee training to reduce a potential safety hazard. Although some initial costs may be experienced in the purchase or modification of equipment, these costs are usually outweighed by the benefits that can be derived. Suitable, properly operating equipment decreases the amount of employee injuries and absences, improves efficiency and production, and reduces repair costs.

Worn, faulty equipment can contribute to work-related injury and illness. As the frequency of employee absence due to work-related injury or illness increases, production can decrease. The cost of production can rise even higher if it is necessary to require other employees to work overtime to compensate for absent employees. Similarly, worn, faulty equipment may not operate as efficiently as equipment that is in good operating condition; this can also decrease productivity. The frequent repairs required for worn equipment can increase repair costs and decrease productivity due to the amount of time required for equipment repair.

The use of inappropriate equipment for a task can be dangerous, inefficient, and costly. Inappropriate equipment can increase injury to employees and, consequently, increase employee absence and decrease production. Because inappropriate equipment is not as efficient for a task as properly selected equipment, it can also contribute to decreased efficiency and decreased production. If equipment is not being used as intended by the manufacturer of the equipment, damage to equipment can often result; this leads to costly repairs and decreased production while the equipment is being repaired. In some cases, improper use of equipment can damage other pieces of equipment or property.

Safety and procedural training teaches the employee how to operate equipment properly and safely; this decreases the chance for injury and employee absence and also decreases the likelihood of damage to the equipment. In addition, training can enable employees to perform more efficiently and effectively.

Another less evident benefit of establishing a safety program is the discovery of existing, but unobserved safety hazards. When implementing a safety requirement, other safety hazards may be uncovered which would not otherwise be discovered until they resulted in personal injury or damage. For example, part of complying with the requirement to post a placard on a vehicle which transports hazardous materials the vehicle must be inspected. During the vehicle inspection other potential safety problems (e.g., faulty brakes or loose parts) may be discovered; such problems can be corrected before causing injury or damage. Similarly, the job hazard analysis is useful in revealing many of the

potential safety hazards associated with a particular activity and the potential hazards can be minimized before injury or damage occurs.

The following is a summary of the benefits to be derived from establishing a safety program that were discussed in detail above:

- Improved employee health, morale, and well-being;
- Improved employee attitude and enthusiasm;
- Decrease in work-related injury and illness;
- Decrease in the amount of sick-leave paid to employees;
- Decrease in health care costs for injured employees;
- Decrease in insurance claims for work-related injuries;
- Decrease in insurance premiums;
- Decrease in employee absence due to work-related injury or illness;
- Decrease in the costs for damaged equipment or property;
- Increase in production time;
- Increase in efficiency and productivity; and
- Increase in the discovery and resolution of safety hazards before injury or damage occurs.

The Responsibilities of the Employer and the Employee

Perhaps the most crucial responsibility shared by the employer and the employee is the commitment which each makes to safety in the workplace. This commitment is essential to reducing workplace injury and property damage and is demonstrated in many ways:

The Employer

The demonstration of the employer's commitment goes beyond simply announcing or publishing safety policies; the employer's commitment must be evident in many other facets of the workplace operations. The employer's commitment is demonstrated through the employer's personal concern for the safety of the employees; the emphasis which is placed on adhering to safety regulations and following safe work practices; the response of the employer to correct unsafe work conditions or safety violations as they are discovered; and the fulfillment of the other responsibilities of the employer/employee such as those listed later in this section. One of the most critical demonstrations of the employer's commitment is that of setting a good example for workplace safety and health.

The Employee

The demonstration of the employee's commitment to maintaining a safe working environment is just as crucial as that of the employer; workers are just as accountable as their employer for their own safety and health. Safety policies and regulations have little benefit if they are not followed by one of the groups they are designed to protect -- the employees. The employee's commitment is demonstrated by a conscientious adherence to safety policies and regulations; to the development of safe work habits and proper use of equipment; and to the immediate reporting of unsafe working conditions. Employees must understand that their own personal commitment to workplace safety promotes not only their own personal safety but also that of their coworkers; failure to adhere to safety policies and regulations threatens not just their own personal safety but that of those around them.

Among the other responsibilities of employers and employees are the following:

(1) Mandating and maintaining better working conditions;

The employer must mandate the implementation of safety regulations and policies and must clearly outline the consequences of violating these requirements. The employer must also thoroughly evaluate and, if needed, improve the working conditions of the employee to decrease potential safety hazards. The employees have the responsibility of maintaining a safe work environment by carefully following all safety requirements mandated by the employer and local laws.

(2) Providing and properly using resources;

Adequate equipment, training, and access to safety information resources must be provided to the employee to promote a safe working environment. Employees must use all equipment as intended and follow all safety policies to insure that a safe working environment is maintained.

(3) Encouraging everyone to participate;

Safety programs are most effective when everyone participates, and encouragement to participate in a safety program can be generated from various sources. The employer must look for and use ways to encourage everyone's participation in workplace safety, including all levels of management. Employees can be very influential in persuading coworkers to participate in and follow a safety program.   Outside functions such as training seminars and demonstrations can also provide needed encouragement to inspire all levels of employees to participate in the program.

(4) Maintaining open channels of communication;

An effective safety program can only be sustained if channels of communication are kept open between the employer and the employees. The employer must be made aware of safety hazards in order to take corrective action, and the employee must be made aware of potential safety concerns as management learns of them in order to protect himself or herself from possible injury. The employee must feel free to voice concerns and must also be assured that the concerns will be given serious consideration.

(5) Implementation and use of a good reporting system

A good reporting system insures that the employer is notified of a safety hazard as soon as it is discovered. An effective reporting system can decrease the potential that a hazard will be discovered only as the result of an accident; by discovering the hazard before an accident occurs and taking corrective action, the possibility of personal injury can be decreased. Employees should be provided with instructions on how to report a potential or acknowledged safety hazard, and the employer should employees to submit such reports. In order for a reporting system to remain effective, the employer must respond quickly to reports of safety hazards and must indicate to the employee that measures have been or will be taken to correct the hazardous condition. Regular self-inspections are an excellent means of insuring that safety regulations and policies are being followed and also for uncovering potential safety hazards that may not have been evident before the inspection. Taking corrective action as the result of a reported hazard is a decisive act that confirms the company's commitment to maintaining a safe workplace environment.

(6) Balancing Productivity and Safety

Neither the employer nor the employee should sacrifice safety for productivity. An employer or employee will often claim that productivity will be sacrificed if safe work habits are followed or safety equipment is used. In the long run, an increase in productivity is often realized when an effective safety program is in place; there are usually fewer injuries and less lost time of employees and equipment, and employees are often more productive when they know that the employer is committed to maintaining a safe work environment for them.

IV) Establishing a Safety Program in the Weights and Measures Workplace -- Where to Start

Because of the variability in the design of equipment used by weights and measures officials and servicepersons and various other factors in the workplace that can affect the safety of its use, it is difficult to provide comments about the potential hazards associated with a particular task or about the structure of a safety program for an individual jurisdiction. However, there are several general areas to consider when establishing a safety program or evaluating the potential safety risks associated with a particular task. *These recommendations are provided only as guidelines or suggestions. These recommendations are not intended to describe the only means of establishing a safety program or to describe the elements of a program which is ideal or appropriate for every jurisdiction. Conditions and circumstances are different for every jurisdiction as are many local and state safety requirements. It is essential that an agency work closely with the local or State OSHA official or departmental safety officer when developing a safety program to insure*

that all potential safety hazards have been adequately addressed for the unique situation of the agency, to insure that the program meets the specific needs of the agency, and to insure that all local and State safety requirements are met.

Appoint a safety officer.

One of the first steps in establishing a safety program in an organization is to designate a person as the "safety officer." By addressing all safety concerns through a single person, an organization can help insure that safety policies and decisions will be uniformly and consistently implemented. The safety officer should be given responsibility for overseeing the organization's safety program; this should include the organization, management, and regular maintenance of the safety program. The safety officer should also be responsible for working with any existing safety committees within the organization as well as local and State safety officials as deemed necessary. The safety officer should also be given the authority to make decisions necessary to maintain an effective program. When selecting the safety officer, the administrator should be sure that the individual understands the time commitment necessary to properly maintain the safety program and that the individual will be permitted to set aside the time required. The safety officer can perform the duties associated with the title on a full time or part-time basis depending upon the size of the agency and the workload of the agency's staff.

If a program is part of a larger organization, there may already be a safety officer designated for the entire organization as well as a structured safety program for the organization. If this is the case, the administrator of a program should work with that person to ensure that the program meets all departmental safety requirements and to discuss any specialized needs which the program may have. The administrator may still wish to designate a safety officer for his or her own program to act as a liaison with the departmental safety officer and to facilitate the resolution of specific safety issues within the individual program.

If a program has personnel located at more than one facility, the program administrator may find it advantageous to appoint a safety officer at each location. This would help to insure that safety information is distributed and safety concerns are addressed as quickly as possible at each site. This can improve the implementation of safety practices at each facility since the safety officer is able to monitor the activities of the facility on a daily basis. In addition, this can be helpful in establishing organizational policies to address specific circumstances within the organization since the safety officer at each facility is familiar with the geographical layout of the site and the equipment located there.

Some weights and measures programs have more than one major **type** of activity (e.g., a motor-fuel testing division and a packaging and weighing division). If this is the case, the program administrator may consider appointing a safety officer in each division to monitor the division's activity. Since the potential safety hazards associated with different types of activities can vary, the establishment of a safety officer for each activity can help to insure that these potential hazards are adequately addressed. Since the safety officer works in the division being monitored, it is likely that he or she will be very familiar with the procedures used in the division and can better respond to questions concerning the establishment and implementation of organizational safety policies.

Developing the Basic Structure

After appointing a safety officer, an overall structure for the safety program must be developed.

In a letter dated March 29, 1991, Mr. Thomas J. Shepich, U.S. Department of Labor, OSHA, outlined four main areas to consider when establishing a safety program. (This letter was sent to the Task Force by Mr. Shepich in response to a request from the Task Force to review the safety information added to the EPO's in NCWM Publication 12.)

Using the recommendations contained under each of the headings in Mr. Shepich's letter, the Task Force has expanded these ideas into the following suggestions. OSHA's recommendations for each heading are indicated by *italicized* type immediately following each of the four lettered headings:

(a) Conduct a job hazard analysis.

Information regarding actual job conditions should be used to identify potential hazards.

A job hazard analysis can help to identify potential safety hazards associated with a specific task. The information obtained from the job hazard analysis can then be used to determine what actions are required to reduce the potential risk to the person performing the task.

Collect Information on Current Practices and Procedures

Information on current practices and procedures should be collected and a detailed description of how each job or task is performed should be documented. This should be done for various tasks using different types of equipment which is available within your jurisdiction (e.g., testing a vehicle scale using two different types of weight movers). This information should also be gathered for various environmental conditions to insure that potential hazards from environmental conditions are addressed (e.g., testing a vehicle tank meter in icy weather introduces the hazard of slipping on icy surfaces when mounting the prover and moving around and requires extra care in locating a stable surface for setting up the prover). A review should be made of the examination procedure outline used for each testing procedure within your jurisdiction to insure that all conditions specific to your jurisdiction are considered in the safety reminders and instructions.

An agency may find it helpful to develop a checklist or form for gathering information about the details of a procedure and for recording observed or potential safety hazards. Such a form or checklist could provide a uniform method of documenting all of the inspection or laboratory procedures used by an agency's employees, and the completed checklists could be used to facilitate the development of safety policies for the agency.

It may be helpful also to document the procedures of a particular activity on videotape. For example, a videotape might be made of the inspection and testing of a retail-motor fuel dispenser, starting at the time that the inspector or serviceperson arrives at the test site and ending when he or she leaves the site. The videotape can be reviewed repeatedly and it serves to document the procedure in great detail. The videotape can be reviewed by the safety officer and/or a departmental safety committee when establishing safety policies to help identify potential safety hazards in the procedure. The agency may find the videotape useful when working with local OSHA officials or consultants to develop a safety program which will address the safety hazards which are present in the jurisdiction. The agency may also consider using videotapes of procedures as a means to emphasize the use of proper testing procedures. Videotapes can be shown during training sessions or safety meetings to point out the "right" way to perform a procedure, using correct test procedures and adhering to all safety policies and also to point out the "wrong" way of performing the procedure.

Review the Procedures and Identify Potential Safety Hazards

When the information has been collected, a thorough review of the current procedures and practices should be made to identify potential safety hazards. Once the potential hazards are identified, additional steps can be taken to reduce or eliminate the potential risks.

A review by an individual or individuals outside of your program can be valuable; potential hazards may be inadvertently overlooked by someone who is very familiar with your procedures, but quite obvious to another person who is not connected with your program. A job hazard analysis should include input from an individual or individuals with training in safety to insure that no potential safety hazard is disregarded.

A review of the EPO's in NCWM Publication 12 with your local OSHA official is useful in helping you to determine how to address the hazards present in individual situations in your jurisdiction. The Task Force has developed suggested revisions to NCWM Publication 12 to include safety information. The revisions include the addition of an introductory section on safety, "Safety Considerations"; revisions to each EPO to include safety reminders; and a "Glossary of Key Safety Phrases" to further define the reminders in the EPO's. When the revised NCWM Publication 12 is issued, a review of the safety reminders in each EPO and in the glossary may help you to identify potential safety hazards that may be present during routine inspection activities in your agency.

Collect Related Safety Information

During the process of performing the job hazard analysis you may find it useful to collect information pertaining to safety hazards associated with the various procedures used in your jurisdiction. Several of the organizations listed in

Section VI maintain safety libraries that contain information on a wide variety of safety-related subjects as well as information about the hazards associated with exposure to various products.

(b) Determine what safety and health training is needed.

As a result of the job hazard analysis, areas where training is necessary for the NCWM inspectors can be identified.

By identifying potential safety hazards associated with a particular task, the job hazard analysis will help you to identify the types of training that would help to reduce the risk of personal injury to the people who routinely perform that task. For example, an inspector or serviceperson testing a medium capacity scale is exposed to the potential risk of a back injury when moving 50-lb weights during the test procedure; providing safety training in the use of proper lifting techniques may decrease the risk of a back injury for that person.

When you have completed your job hazard analysis, you should contact your local and/or State OSHA representatives to determine if they can assist you in determining what types of safety training are needed (or even required by law) for your employees for the various tasks performed within your jurisdiction. Consultants are also available in many areas to assist you in devising a training plan or obtaining safety training for your employees. When working with agencies other than OSHA to arrange for safety training, your safety officer should verify that the training will meet with any requirements established by OSHA.

Schedule Training on a Regular Basis for All Employees

Regular safety training for employees is essential both for establishing a new safety program and maintaining an existing program. Formalized safety training for employees will insure that all employees receive uniform, consistent information pertaining to safety hazards and how to minimize the risk of personal injury. Ideally, the training should be presented by someone who is an expert in the field of workplace safety and who is familiar with all applicable state and local OSHA requirements.

When new equipment is purchased or current equipment is modified, training must be provided to all employees who will use the equipment to insure that they understand the safe and proper use of the equipment. This is especially essential if the new equipment operates differently or has different features from equipment currently used by the employee. Similarly, if the modification of current equipment changes the operation of the equipment, it is important that the employee be familiar with the changes and understand the proper and safe operation of the modified equipment.

Training should be presented to all employees both new and experienced on a regular basis. New employees should receive proper safety training before engaging in any activity which involves a potential safety risk. Even employees who have been employed with the agency for a long period of time can benefit from routine safety training. Safety requirements periodically change as new information is discovered, and procedures to protect an individual from potential safety hazards can change accordingly. Only through routine training can employees receive the updated training needed to help them take proper precautions to protect themselves and their coworkers from hazardous conditions. Many times an experienced employee who has been performing a particular task on a routine basis can lapse into bad habits and become careless in following required safety procedures; regular training can help to reinforce the importance of good safe work practices and can reduce the possibility that these bad habits will be passed on to other employees. Conversely, many experienced employees are extremely conscientious about adhering to safety practices and can provide a good example to new employees. Such employees can often emphasize the necessity for adhering to a particular safety practice by relating to other employees a personal experience with a hazardous condition, thus underscoring the importance of safe work habits.

Reviewing with employees the safety information proposed for inclusion in NCWM Publication 12 and NIST Handbooks 143 and 145 may be useful in emphasizing the importance of safety in the workplace and in conveying information about potential safety hazards. The "Safety Considerations" section, the EPO's with safety revisions, and the "Glossary of Key Safety Phrases" in Publication 12 may be helpful in highlighting potential safety hazards which are associated with various types of inspection activities for inspectors and servicepersons. Similarly, the proposed safety revisions for NIST Handbook 143 and the proposed addendum for NIST Handbook 145 may be helpful in emphasizing the importance of safety to laboratory metrologists.

The agency may consider videotaping examples of inspections and testings and of laboratory procedures as a means to emphasize the use of proper testing procedures. These videotapes can be shown during training sessions to point out the "right" way to perform a procedure, using correct test procedures and adhering to all safety policies and also to point out the "wrong" way of performing the procedure.

Safety training should not be limited to just teaching employees about the proper use of equipment and safety procedures. Other types of training which relate to the health and safety of the employee are also very beneficial. For example, classes in first-aid and cardiopulmonary resuscitation can help to prepare coworkers to assist an injured employee.

(c) Determine the control (administrative, engineering, and personal protective) method needed.

The Material Safety Data Sheets and the job hazard analysis should be helpful in the proper selection of personal protection equipment and the reduction of exposure time. If engineering controls are utilized on a site, lesser measures of protective equipment and administrative controls may be needed.

When a safety hazard has been identified it is necessary to determine the type of control that will be most effective in minimizing the risk involved. In order to reduce the safety risk it may be necessary to change the way a procedure is carried out or to obtain personal protection equipment for the person performing the task. **Before making changes to a procedure or purchasing new equipment, you should carefully consider the results of the job hazard analysis and other tools available to you such as the Material Safety Data Sheets (MSDS's) provided by manufacturers of hazardous products (for more information see page 42); prudent use of these tools to evaluate the situation can save time and money and will help you to identify the most effective way of reducing the risk.** After modifying existing equipment or purchasing new equipment, training on the safe and proper use of the equipment should be provided to those individuals who will be using it.

Selecting the Control Method

A potential safety risk can often be minimized or eliminated completely simply by changing the established policy or procedure to be followed for a given task. Use the information obtained in the job hazard analysis of the task to determine how the task is currently performed, then examine alternative means of performing the task which would eliminate that part of the procedure which precipitates the safety hazard or would minimize the risk associated with the activity. For example, if an inspector or serviceperson stores a weight kit on the top shelf of a rack in the rear of his vehicle, there is a potential for a back injury due to the height to which the weight kit must be lifted. By changing the designated storage location for the weight kit to the bottom of the rack, the potential for injury due to lifting the weight kit to a higher level is reduced. The potential risk can be further reduced by providing the inspector or serviceperson with training in the use of proper lifting techniques.

Purchasing Equipment

Before purchasing **any** equipment, check to be sure that the equipment meets all local, State, and Federal safety requirements. Evaluate the equipment carefully before purchasing, and be sure that the manufacturer or supplier understands the intended application for the equipment. Documenting the safety requirements in written specifications for the equipment will help to insure that the manufacturer or supplier understands the safety requirements applicable to the intended use of the equipment.

When purchasing **new test equipment,** consideration should be given to ways in which equipment design can minimize potential safety hazards; the job hazard analysis can provide information about the potential hazards which were identified for any procedure in which the new equipment might be used. For example, the design of the steps on a trailer-mounted prover should be reviewed to insure that they minimize the risk of slipping or falling from the prover.

Personal protection equipment should only be purchased after determining that potential safety hazards have been minimized as much as possible by a careful review and modification of procedures. In some cases changing the policy for procedures to be used to perform a given task may eliminate the risk in question completely; purchasing equipment without first carefully reviewing alternative controls can be a costly and sometimes ineffectual action. Use the information obtained in the job hazard analysis and input from your local and State OSHA officials to determine

whether or not other means of controlling the safety hazard as discussed earlier in this section will adequately minimize the risk; once these other means have been addressed, personal protection equipment can be considered.

There are many sources of personal protection equipment available. Only personal protection equipment that meets all local, state, and federal safety requirements and that will mitigate the safety hazard should be considered. The proper use of personal protection equipment can not be overemphasized. Once appropriate personal protection equipment has been purchased, it is essential that employees be given adequate training on the use of the equipment; improper use can render the equipment ineffectual and even hazardous to the employee.

The results of the job hazard analysis may indicate that new testing equipment or the modification of current equipment is not necessary; the hazard may be mitigated by the purchase of **supplemental equipment** which will make a task easier and less hazardous to perform. For example, the purchase of a roller table to facilitate the movement of heavy weights; the use of small hand carts to reduce the amount of lifting and carrying required in transporting provers during the inspection of retail motor-fuel dispensers; the use of caution signs, safety cones, or fluorescent vests to reduce the potential of personal injury or equipment damage during the testing of retail motor-fuel dispensers, taximeters, vehicle-tank meters, or large scales; the purchase of 25-lb weights to replace 50-lb weights; or the purchase of first-aid kits for installation in all vehicles and in the metrology laboratory. *As with the purchase of new equipment or the modification of equipment, the individual requirements of a jurisdiction must be carefully considered before purchasing supplemental equipment to determine that the equipment is appropriate and necessary for the task.*

Modification of current equipment

In some cases, it may be possible to modify existing equipment to minimize or eliminate a potential safety hazard. The decision to modify equipment should be made based on information obtained from the job hazard analysis and information from local and State OSHA officials; this information should indicate that modification of the equipment provides the most effective means to minimize the potential safety hazard. *Prior to making any modification to equipment, an agency must take appropriate precautions to insure that the proposed modification does not violate any local or State safety requirements or change the equipment manufacturer's design in a manner which might render the equipment unsafe in another way.*

In the course of its work, the Task Force was provided with a number of examples of how weights and measures jurisdictions or service agencies have modified existing equipment to address a safety concern. Some of the many examples brought to the attention of the Task Force are listed below. NOTE: *These modifications may not be appropriate for every jurisdiction. Check with local and State OSHA officials to determine whether these modifications would be appropriate for the specific circumstances in your jurisdiction before making any such modifications.*

- Metal cage enclosure around an LPG prover -- The cage prevents tampering with the prover and valves when the prover is unattended, yet provides adequate ventilation to prevent the accumulation of product fumes. The cage also reduces the possibility of damage to the prover.

- Securing of weights on a vehicle -- Securing of weights can be accomplished in a number of ways: using a separate enclosure or box in which to store weights; using weights that can be locked down with specialized fasteners.

- Modification to vehicles -- Installation of a separate enclosure with venting to the outside of the vehicle for storing 5-gallon test measures. Installation of a partition between the driver and the area where equipment is stored to reduce the possibility of injury from the equipment in the event of a vehicle collision.

- Extension of height on funnels used in testing retail motor-fuel dispensers -- The added height may help to reduce stress on the back when returning product to storage.

Training Employees to Use the Equipment

New equipment may operate differently from equipment currently in use or have features which are unfamiliar to the employee, and modified equipment may operate differently from the original version. It is important that adequate training be provided to all employees who will use the equipment to insure that they understand how to safely and properly operate the new equipment and also to insure that safety hazards are not created by the improper use or

operation of the equipment. Check to see if the manufacturer or supplier of new equipment is willing to provide instructions on the use of the equipment. Other sources to check include local or State OSHA offices, consultants, organizations which provide safety training, and local industry groups. Without proper training on the safe use of equipment, the care taken in the selection and purchase of the equipment will be ineffectual, and the use of the equipment may even be hazardous to the employee.

(d) Provide a written safety and health program.

An effective method for emphasizing safety and health is to have a written program as exemplified in your document [The EPO's in NCWM Publication 12 as revised by the Task Force and the introductory section on safety and glossary of terms]. *We recommend that it would be made available to all inspectors for pre-inspection planning.*

Even the most carefully designed safety program can be ineffectual if the program is not adequately documented. Documentation of the program's structure and policies helps to promote consistency in adhering to safety regulations and to emphasize the safety and health policies established by the organization. All employees should receive written copies of the documentation and the information should be communicated and reinforced through training seminars and safety meetings. Once the documentation is complete, the policies and procedures can be communicated to the management and employees and implementation of the safety program can progress.

The structure and format used to document the safety program depends on the needs of the agency. Documentation might be in the form of a single safety manual with separate sections to address different areas, or in the form of separate publications that each address a particular area. Documentation should include a statement of purpose; a clear indication of the agency's commitment to the safety and health of the employees; an overview of how the program is structured; the local, State, and/or Federal safety requirements which must be followed or a source where the regulations can be obtained; a description of safety policies established by the organization; procedural information such as how to report unsafe conditions, how to obtain safety information on hazardous materials, and the scheduling of safety meetings; information on obtaining copies of MSDS sheets for materials used by the employees and how to obtain an explanation of the information on the MSDS sheet; and any other information pertinent to the safety program.

Although the documentation may include a variety of safety issues which are specific to an individual program, there are several areas that should be included in any safety program. Information pertaining to these procedures should be included in the documentation and implemented as part of the safety program as it is established:

- How to Report Unsafe Conditions and Potential Safety Hazards

  Instructions should be provided to advise the employee how to report an observed unsafe condition or potential safety hazard including who to contact, what observations to make, what documentation and information to provide to the contact person or persons, and any other required actions.

- What to Do in the Event of an Accident

  Specific instructions should be given to assist the employee in preparing to respond to an accident. More than one set of instructions may be required to address different types of inspection activities. These instructions should include basic information such as where to go; the names and phone numbers of the people or agencies to be contacted and the information to provide to them.

- How to Submit Recommendations to Reduce Risks or Hazards

  This should include a step-by-step description of how to submit recommendations on reducing risks or hazards, including: the name(s) of the person(s) to submit the recommendation to; the type of information to provide; the required format of the submission; and the time frame in which the employee should receive a response to the submission. (NOTE: When establishing the time frame for responding to an employee submittal, management should be particularly careful to select a time frame which can reasonably be met by management. Failure to respond within a stated time frame may send the message that management does not consider safety a high priority issue. This apparent lack of management commitment to maintaining a safe work environment can discourage

employees from submitting recommendations in the future and may even discourage the reporting of safety hazards.)

- Safety Meetings

Information should be provided that details how frequently meetings will be held, who will attend, how issues should be presented for discussion, and other relevant information.

In addition to documenting these procedures, the success of the safety program is dependent upon both management and employees consistently following the procedures. If management does not respond to an employee's report of an unsafe condition in a timely manner or does not acknowledge the submission of a suggestion for reducing a safety risk, it is unlikely that the employee will go to the trouble of reporting future incidents or making future submissions. Likewise, by failing to report an observed unsafe condition employees may endanger themselves and other employees and set a poor example for other employees to follow.

Copies of the documentation should be distributed to all employees. The effective operation of the safety program is dependent upon all employees operating under the same safety policies and requirements. Distribution of the documentation to all employees is an effective way of communicating to employees all of the safety policies and procedures that must be followed and insures that all employees receive the same information. The documentation can also serve as a reference document that the employee can use to become familiar with the potential safety hazards to which he or she is exposed. The documentation should be updated on a regular basis as needed to reflect changes in safety requirements or policies and other information included in the documentation.

Communicating Safety Information to Employees

In addition to the four main elements outlined earlier in this section, there are several other components which should be considered and included in an effective safety program. These additional components provide an effective means of encouraging participation in the safety program and of insuring that information about the safety program and its implementation is communicated to management and employees.

Effective communication between management and employees is essential to the smooth operation of the safety program, and lines of communication must be established to insure that pertinent safety information reaches those affected by it as quickly as possible. Management must be able to quickly notify the employee of any unsafe conditions or changes in safety requirements, and employees must be able to quickly and easily inform management of observed hazards or potential hazards. A good communication system is also effective for the interchange of ideas concerning the implementation of safety policies and how the program can be improved. The communication link between management and employees can be facilitated by the agency's safety officer.

An effective safety program employs a variety of communication forms, including written, visual, and verbal to emphasize vigilance and safety awareness and to motivate people to participate in the safety program. The additional elements which are outlined below use various means to communicate the importance of safety in the workplace.

Written Communication

Provide employees with copies of the written documentation of the safety program as indicated in the basic element that describes documentation for a safety program. Written communication of safety information can help management and employees to better visualize the structure of the safety program. The documentation can also serve as a reference to help resolve questions about safety issues as they arise.

Safety Meetings

Safety meetings and seminars facilitate the verbal communication of safety information and can be used to emphasize the commitment of management and the employees to maintaining a safe work environment. These meetings can be used in addition to safety training to communicate the application and use of policies and procedures in the written safety documentation provided to the employee. Safety meetings can also be used to examine and revise existing

policies and procedures. Safety meetings should be scheduled as needed or as required by local requirements and should be scheduled to include all employees who are affected by the topics of discussion.

Safety meetings also provide an excellent forum for responding to and discussing input from management and employees on ways in which the safety program can be improved. Employees are encouraged to present their views on the current program based on personal experience and management can obtain feedback on how the program is actually functioning.

Motivating People to Participate

The presentation of certificates, awards, and other incentives can help to encourage the participation of employees and management in the safety program. By publicly recognizing contributions to the operation and improvement of the safety program, people are encouraged to participate and contribute new ideas. Similarly, publicly recognizing accomplishments involving safety practices helps to generate enthusiasm about participation in the safety program and emphasizes the importance placed on maintaining a safe work environment by management.

The use of posters, videotapes, and various audio-visual aids can help to generate interest and participation in the safety program and can help the employee to better retain the information in memory. Items such as posters also provide a constant, visible reminder of the importance of safety. These items can help employees to better visualize proper safety techniques and practices and to relate to how the techniques are used.

Safety Committees

Safety committees (either existing or newly established) can be useful in evaluating safety issues and communicating information to employees and management. A safety committee can be appointed as a permanent body or in response to a specific safety issue which needs to be reviewed. While the composition of these committees varies, it is often helpful to include management as well as employees who represent various interests (e.g., a large-capacity scale inspector, a laboratory metrologist, an LPG meter inspector, a field supervisor, etc.) in the agency according to the tasks assigned to the committee. By including representation from all of the groups which are affected by an issue, the views of the committee tend to be more balanced and the decisions may be more readily accepted by the groups represented on the committee.

Obtain and post current Material Safety Data Sheets (MSDS's)

MSDS's are provided by the manufacturer of a product to identify the product's basic characteristics and hazardous information. MSDS's typically provide information pertaining to the characteristics of a product such as hazardous ingredients, physical data, fire and explosion hazard information, health hazard information, reactivity data, spill or leak procedures, special protection information, special precautions, toxicological information, and other relevant information. MSDS's can be obtained from the manufacturer of the product. For further information on MSDS's, contact your local OSHA office.

MSDS's are used widely to determine the potential hazards exposed to an employee who is working with or near a particular product. As new information is discovered concerning the properties of a product and the effects of various levels of exposure to it, MSDS's can change. The manufacturer of a product is responsible for providing updated copies of these sheets to individuals who have requested MSDS's for that product. In order to insure that your agency does in fact have a copy of the most current MSDS sheet for reference, it is suggested that the safety program have its own mechanism for updating the agency's MSDS files on at least an annual basis.

Employees and management should receive training in the use and interpretation of the information on an MSDS; this will insure that they adequately understand the potential hazards associated a product and are aware of the necessary precautions to take when working with the product. MSDS's should be made accessible to employees at all times. Posting MSDS's in a location available to everyone and advising employees of the location insures that all employees will have access to the information. Check with your local or State OSHA representative to determine whether or not your agency is required to meet specific requirements concerning providing the information in MSDS's to employees.

Obtain Information from Outside Agencies

The resources of outside agencies can be helpful in trying to determine the most appropriate way to address a safety concern, and sharing information with other agencies can be helpful to them. As mentioned earlier in this document, OSHA representatives can be of great assistance in resolving safety concerns. Other resources are also available as indicated in Section VI of this document. Another source of information is that of input from agencies which may have encountered a similar problem; contacting an agency which has successfully dealt with the safety concern saves the resources involved in researching and devising ways to resolve the issue. For example a weights and measures jurisdiction in one State may have reduced the hazards associated with transporting a 5-gallon test measure; sharing their findings with other States with similar concerns can help those States avoid the costs and delays associated with researching the issue. Establishing and maintaining cooperation and information exchange with the NCWM, private industry, and other W & M jurisdictions can benefit everyone.

V) Evaluating the Effectiveness of a Program and Making Modifications

Many policies and regulations will vary from jurisdiction to jurisdiction. It is essential that the inspector or serviceperson be aware of all safety regulations and policies in place at the inspection site and to practice the safety policies established by the inspector's or serviceperson's employer. When modifying an existing program or establishing a new program, it is necessary to verify that all State and local safety requirements as well as any safety policies within the agency are satisfied.

Once a safety program has been established it is necessary to evaluate the effectiveness of the program to insure that the program and its policies and procedures meet the objective of maintaining a safe work environment and minimizing potential safety hazards. A safety program must be flexible enough to respond to the changing needs of the workplace environment, and if a procedure is no longer effective in minimizing a safety risk it must be modified. OSHA is the expert in analyzing the effectiveness of a safety program; check with the local or State OSHA representative for input on the effectiveness of a program.

To begin the evaluation of a program, it is first necessary to monitor what is practiced -- not what is supposed to be practiced. This can be done in several ways. Regular self-inspections are an excellent means of monitoring a safety program and of insuring that safety regulations and policies are being followed. Request input from the local or State OSHA representative and check to see if there is a hygienist employed within the agency who might evaluate the program. It may be possible to contract an industrial hygienist to evaluate the effectiveness of the safety program.

Many jurisdictions and service agencies have well established safety programs which continue to operate effectively and require few changes. Even these organizations recognize the benefits of continual evaluation of the effectiveness of the safety program. The safety programs of such organizations usually include a mechanism for providing a periodic evaluation of the operation of the program, and a mechanism for making changes to the program to respond to changes in requirements and to the dynamic workplace environment.

If the evaluation indicates the existence of a potential safety hazard, it is necessary to determine why the potential exists. If the hazard is present because an employee has failed to follow the policies and procedures established by the program, additional training or reinforcement of the policy may be needed. Attempts should be made to determine why the employee is not following the procedure and inquiries made into possible ways of correcting the problem. For example,

- Is the procedure impractical? If so, does an alternative means of accomplishing the task exist?
- If no alternatives to the procedure exist, ways must be found to encourage the employee to use the procedure.
- Can a related procedure be changed to make the safety procedure more practical and more likely to be followed by the employee?
- Is the procedure not being followed because of a lack of commitment from management (e.g., lack of resources such as proper safety equipment)? If so, ways of obtaining and demonstrating a positive commitment must be obtained from management.
- Is a lack of employee involvement in establishing the safety procedures the cause of the problem? If so, attempt to involve employees in evaluating the program and work to encourage their suggestions for improvements of the program; they are the ones working with the procedures. Ask the employee for suggestions on how the procedure could be improved to be a practical means for minimizing the safety hazard.

If the hazard is present because the policies and procedures of the safety program have not adequately addressed the problem, it is necessary to reevaluate the situation and discover a way to minimize or eliminate the risk. Can the procedure be modified to adequately address the safety concern? Would new testing equipment or personal protection equipment correct the problem? Any changes made to the policies and procedures of the safety program as a result of the evaluation and reanalysis should be included in the next revision of the safety program's documentation; until such time as the documentation is revised, a written description of the modified procedure should be provided to employees and they should also be notified verbally.

As part of the normal maintenance of a safety program, it is necessary to periodically review the policies and procedures to insure that they comply with all local, State, and Federal safety requirements, especially any new requirements which have gone into effect since the establishment of the safety program. Changes to the policy and procedures must be made to address any changes in the safety requirements, and all employees must be properly notified of the change.

Changes to a safety program may also be necessary to address any new equipment or modifications to current equipment. An evaluation should be made of the operation of the new or modified equipment to determine whether or not changes are needed in the safety procedures to adequately address any potential safety hazards.

VI) Resources for Maintaining an Effective Safety Program

There are many resources available for safety training or safety information which can help to maintain an effective safety program. These resources can be in the form of training to insure that proper safety procedures are known and followed or in the form of information about a product or test procedure which may prevent potential injury to an employee.

Safety Training and/or Information Resources

Listed below are a number of resources which can provide safety training or safety information. This is not intended to be a complete list of all possible resources for safety information, rather this is a list of some of the agencies that the Task Force has worked with or obtained information from in the course of its work.

Occupational Safety and Health Administration (OSHA)
(Check for local and State listings; Federal OSHA is located in Washington, DC)

National Safety Council
   Chicago, IL

National Institute Occupational Safety and Health (NIOSH)

American Petroleum Institute (API)
   Washington, DC

National Conference on Weights and Measures (NCWM)
   Gaithersburg, MD

National Institute of Standards and Technology (NIST)
   Gaithersburg, MD

American Industrial Hygiene Association
   Akron, OH

American Meat Institute
   Arlington, VA

In addition to these and other agencies which are not listed, local industry trade groups conduct many training seminars which may be open to W&M. For example local distributors of liquefied petroleum gas (LPG) often

conduct safety training for employees; this information may be useful for weights and measures officials who inspect LPG meters. Equipment suppliers and consultants also conduct training seminars concerning the safe use of equipment and safe procedures.

Another resource for maintaining a safety program is a regular review and update of all procedures by a group within your agency (e.g., safety committee). Such a group would be familiar with your equipment, personnel, and any constraints which you have, and can provide excellent feedback about the effectiveness of your current safety practices.

Attachment A - Safety Notes

This attachment contains a glossary of safety considerations and reminders that were identified by the Task Force in the course of its work. Many of these safety reminders will be incorporated into the 1992 version of NCWM Publication 12, Examination Procedure Outlines for Weighing and Measuring Devices. Many of these reminders will also be added to future editions (or issued as addenda to current editions) of NIST Handbooks 143, State Weights and Measures Laboratories Program Handbook, and 145, Handbook for the Quality Assurance of Metrological Measurements. Those safety reminders which are specifically oriented toward the laboratory environment are identified with the notation (*L).

This attachment is <u>not</u> intended to include all possible safety precautions which should be taken before proceeding with the inspection of a weighing or measuring device, nor are the listings of safety information and contacts a comprehensive source of safety information and guidance. Additional information is available on various safety topics in the National Conference on Weights and Measures (NCWM)

Many policies and regulations will vary from jurisdiction to jurisdiction. Prior to beginning any inspection or testing activity, it is essential that the inspector, metrologist, or serviceperson be completely familiar with all safety regulations and policies in effect at the inspection site or in the laboratory; such regulations and policies include federal, state, or local Occupational Safety and Health Administration (OSHA) regulations, safety policies established by the firm in which the inspection is taking place, and safety policies established by the inspector's, metrologist's, or serviceperson's employer. The inspector, metrologist, or serviceperson must practice and adhere to these requirements and policies at all times during the inspection and testing process. This attachment identifies general guidelines for safety which are useful in alerting inspectors, metrologists, and servicepersons to the importance of taking adequate precautions to avoid personal injuries. These guidelines can only be effective in mitigating safety hazards if inspectors and servicepersons receive training in hazard recognition and controls.

Chemicals, Petroleum Products, and Hazardous Materials:

Be familiar with the nature of the products at an inspection site that is located in a plant or other facility which handles, uses, or packages chemicals, petroleum products, or hazardous materials; it is essential that the inspector or serviceperson be familiar with the nature of the product and any protective measures which should be taken prior to working around the product. For example, some products may cause injury through exposure to the skin or through inhalation of the fumes or airborne particulates. Similarly, caustic products may also damage field standard weights or measures or equipment used in the test process.

Determine whether or not protective clothing or equipment is needed prior to working with the product.

Material Safety Data Sheets (MSDSs) can provide much of the basic information about the hazards involved with a product. The manufacturer of the product should be able to provide further information about the product. Several sources of information concerning chemicals, petroleum products, and hazardous materials are listed below. Some additional sources of information are included in the NCWM Safety Library.

American Chemical Society
1155 16th Street, NW
Washington, DC 20036
(202) 872-4600

Chemical Manufacturer's Association
2501 M Street, NW
Washington, DC 20037
(202) 887-1100

American Petroleum Institute
1220 L Street, NW
Washington, DC 20005
(202) 682-8000
FAX#: (202) 682-8036

Look for leakage or spillage of chemicals, petroleum products, or hazardous materials at or near the inspections site. Leakage or spillage of these products can be potentially hazardous if the inspector/serviceperson or facility employee is exposed to the product and is not wearing personal protection equipment. Additionally, any product collecting on the ground surface can result in slippery, unsafe conditions for an individual moving about the inspection area. If leaking or spilled product results in unsafe conditions at the inspection site, it is recommended that the testing procedure be discontinued until the unsafe conditions are corrected.

Chemicals, Petroleum Products, and Hazardous Materials (*L):

Be familiar with the nature of the chemicals being used in the laboratory. It is essential that the metrologist be familiar with the nature of the product and any protective measures which should be taken prior to working with the product. For example, some products may cause injury through exposure to the skin (acids and caustics) or through inhalation of the fumes or airborne particulates (molten lead fumes, lead dust, and mercury vapors). Similarly, caustic products may also damage field standard weights or measures or equipment used in the test process.

Determine whether or not protective clothing or equipment is needed prior to working with the product. Material Safety Data Sheets (MSDSs) can provide much of the basic information about the hazards involved with a product. Look for leakage or spillage of chemicals, petroleum products, or hazardous materials. Leakage or spillage of these products can be potentially hazardous if the metrologist is exposed to the product and is not wearing personal protective equipment. Additionally, any product collecting on the ground surface can result in slippery, unsafe conditions for an individual moving about the inspection area. If leaking or spilled product results in unsafe conditions at the inspection site, it is recommended that the testing procedure be discontinued until the unsafe conditions are corrected.

Clothing:

Synthetic clothing should not be worn when working around flammable products. Synthetic clothing melts at high temperatures; if the person wearing the synthetic clothing is exposed to flames, the clothing may melt and stick to the persons skin to result in severe burns.

Combustion can result when an ignition source is present and fuel and oxygen are also available.

Many types of synthetic clothing also tend to build up a static charge; this can be dangerous as a potential ignition source around flammable products.

Use caution when wearing loose clothing (or hanging jewelry) around machinery such as conveyor belts, weight movers, meat hooks, gears, etc. The clothing (or jewelry) may become entangled in the machinery and result in personal injury.

Electrical Hazards:

Be particularly aware of potential electrical hazards in or near the inspection site when testing electronic devices or working in the vicinity of electrical equipment. Loose or exposed wiring and a frayed or worn electrical cord should be brought to the attention of management at the inspection site. Avoid standing on wet surfaces unless the electrical equipment is properly insulated and grounded.

Combustion can result when an ignition source is present and fuel and oxygen are also available. Electrical hazards may also be potential ignition sources when testing devices which dispense flammable products or working near flammable products. Be sure that provers and other test equipment are equipped with explosion-proof motors. Always check the electrical supply lines for testing equipment carefully for signs of wear or damage, and correct any potentially hazardous conditions. Take steps to protect these supply lines from damage during use.

Executive Committee

Emergency Procedures:

Always be familiar with emergency procedures **BEFORE** beginning an inspection. After an emergency has developed, crucial time can be lost if emergency procedures are not known. Be familiar with the procedures to follow in the event of an equipment malfunction or the development of a dangerous situation with the equipment or in the vicinity of the inspection site when operating specialized testing equipment.

Be familiar with the nature of any product being dispensed by a device or being used in or near the inspection area. Know the emergency procedures to be followed when a spill has occurred or a person has been exposed to the product. Knowledge of emergency procedures and related information should include the correct selection and use of fire extinguishers, the location of emergency shut-offs, and evacuation procedures.

Keep a list of emergency phone numbers handy at all times in a notebook or on a card. Examples of numbers to keep are the local fire department, emergency medical facility, and other appropriate public safety agencies.

Eye Protection:

Appropriate eye protection is recommended when working around hazardous products which may inadvertently splash into the eyes, and eye-wash facilities should be considered. Contact lens wearers should be particularly careful to follow the instructions of their eye-care practitioner and local OSHA representative when working around hazardous products.

Appropriate eye protection should also be worn when working in an area with overhead projections such as meat hooks or other sharp objects or where there is a potential of flying projectiles (e.g., when working near tools that grind, chip, etc.).

Fire Extinguisher:

Know the proper use and selection of fire extinguishers for a given application. Contact your local fire department for current information and training.

First Aid Kit:

An appropriate first aid kit or kits should be provided for every vehicle and in every laboratory. Consideration should be given to the type of work that the inspector, metrologist, or serviceperson typically performs and the types of hazards typically encountered in these types of activities. Items in addition to those contained in a basic first aid kit may need to be added to address the potential hazards which may be encountered by the person who will be most likely to use the first aid kit. Check with your local OSHA office or with your departmental safety officer for input on the items to be included in each kit.

First Aid Kits (*L):

Appropriate first aid kits should be located throughout the laboratory in highly visible locations. All laboratory personnel should be familiar with the location and contents of each of these kits. Consideration should be given to the type of work that the metrologist typically performs and the types of hazards typically encountered in these types of activities. Items in addition to those contained in a basic first aid kit may need to be added to address the potential hazards which may be encountered by the metrologist who will be most likely to use the first aid kit.

First Aid Training (*L):

An adequate number of laboratory personnel should be trained and certified in first aid procedures (including Cardiopulmonary Resuscitation - CPR) to assure that any accident victim will receive proper first aid treatment. This certification should be maintained through periodic training as recommended by each program.

Grounding:

It is essential to properly ground the prover being used when inspecting meters which dispense flammable products. Be sure to connect the grounding wire or jumper cable to bare metal surfaces, not to painted or plastic surfaces.

Retail Motor Fuel Dispensers:
When testing retail motor fuel dispensers, be sure to:

- Ground the nozzle against the prover neck when dispensing product.
- Ground the neck of the prover against the metal funnel when returning product to the storage tank.
- If a test measure is left on a cart when dispensing product or returning product to the storage tank, be sure the card is properly grounded.

Vehicle Mounted Tank, Loading Rack, or Wholesale Meters:

- Use a grounding wire, jumper cable, or terminal ground to ground the prover to the vehicle from which the product is obtained.
- Use a grounding wire, jumper cable, or terminal ground to ground the prover to the vehicle or tank when returning product to storage.
- These guidelines also apply when testing liquefied petroleum gas liquid-measuring devices. Although these devices are tested as a "closed system", the possibility of leaks is always present and can present a potential hazard.
- Always ground yourself to an above ground storage tank before climbing onto the tank by touching the tank or the hand rails.

Ignition Sources:

Combustion can result when an ignition source is present and fuel and oxygen are also available. It is necessary to avoid possible sources of ignition when testing meters which dispense petroleum products or other flammable materials. Possible sources of ignition include, but are not limited to: open flames or smoking, metal to metal contact which causes sparking (e.g., metal wrench or hammer on a pipe fitting), a running motor, static discharge, worn or faulty electrical wiring, improper grounding, and the wearing of synthetic clothing. Also be sure that provers and other test equipment are equipped with explosion-proof motors. If ignition sources cannot be eliminated at the time of the inspection, it is recommended that the testing procedure be discontinued until the hazardous conditions are corrected.

Because disposable lighters can spark upon impact, the inspector should avoid carrying a lighter in his or her front shirt pocket.

ALWAYS USE A METAL FUNNEL TO RETURN PRODUCT TO PRODUCT STORAGE TANKS. NEVER USE A PLASTIC SAFETY CONE AS A FUNNEL!!   Pouring product into the return fill can build up static electricity; a proper ground must be made by placing the metal neck of the prover against the metal lip of the funnel.

Lifting:

Be familiar with and use proper lifting techniques when lifting test weights or heavy equipment to prevent personal injury. To reduce the possibility of back injury, use equipment which would decrease the amount of lifting required whenever possible (For example: an extended height funnel, carts for transporting weights, platforms suspended from monorail scales instead of overhead meat hooks, etc.).

Periodic training in proper lifting techniques is encouraged.

Location:

Carefully examine the inspection site prior to beginning an inspection and testing procedure. Look for potentially dangerous situations such as wet areas which may be slippery (see also **Wet/Slick Conditions**), the use or presence of hazardous and/or flammable materials and any spillage or leakage of these products (see also **Chemicals, Petroleum Products, and Hazardous Materials**), adjacent activities which may contribute a potential hazard to the inspection (e.g., welding near the inspection area would provide a potential ignition source when testing devices which dispense flammable liquids), obstructions in the area which may prove to be safety hazards (e.g., objects on the ground which the inspector might trip over, objects in the path of the inspector to and from the device being tested, exits blocked by test equipment or vehicles, etc. -- see also **Obstructions**), pedestrian or vehicle traffic (see also **Traffic**), steep or narrow stairways, overhead hazards (e.g., feed bins, loading rack equipment, low-hanging beams in feed mills and warehouses, overhead activities, low doorways, etc. -- see also **Overhead Hazards**), lack of or defective handrails, and loose or exposed wiring (see also **Electrical Hazards**). Use great care when moving around and working in areas in which these potential hazards are present. When using flammable products (e.g., testing metering devices), note the location of the fire extinguisher, emergency shut-offs, etc. prior to beginning the inspection.

Material Safety Data Sheets (MSDS):

MSDSs are provided by the manufacturer of a product to identify the product's basic characteristics and hazardous information. MSDSs typically provide information pertaining to the characteristics of a product such as hazardous ingredients, physical data, fire and explosion hazard information, health hazard information, reactivity data, spill or leak procedures, special protection information, special precautions, toxicological information, and other relevant information. MSDSs can be obtained from the manufacturer of the product. As new information is discovered concerning the properties of a product and the effects of various levels of exposure to it, MSDSs can change. It is recommended that updated versions of the MSDSs be obtained on at least an annual basis. For further information on MSDSs, contact your local OSHA office.

Nature of Product:

Be knowledgeable about the nature of the product being dispensed by a device prior to beginning a test on the device. For all hazardous materials it is recommended that a copy of the Material Safety Data Sheet (MSDS) be obtained for that product and reviewed prior to testing the device. Carefully read and follow the instructions on any warning labels posted on the device or affixed to a packaged product for precautions which should be taken when working around the product.

Obstructions:

Care should be taken to avoid injury from obstructions in the work area during the course of an inspection. Obstructions which might prove to be safety hazards include objects on the ground which the inspector might trip over, objects in the path of the inspector to and from the device being tested, steep or narrow stairways, exits blocked by test equipment or vehicles, etc.

Overhead Hazards:

Note any overhead hazards such as feed bins, loading rack equipment, low-hanging beams in feed mills and warehouses, activities overhead, and low doorways prior to the inspection. Take precautions (such as wearing a hardhat) to avoid potential injuries as the situation dictates.

Personal Protection Equipment:

Included among the many types of personal protection equipment which is available are items such as non-synthetic clothing, coveralls, gloves, barrier cream, non-permeable safety aprons, safety sleeves, safety shoes, respirators, goggles or safety glasses, hearing protection, and hardhats. OSHA and safety-clothing and safety-equipment manufacturers can provide additional information concerning the selection of personal protection equipment for a given type of inspection activity.

Before providing personal protection equipment (PPE), management should determine whether or not PPE is actually required for a particular inspection activity. If it is determined that an employee is exposed to a hazard, the management should first try to minimize the hazard by examining and modifying work methods and conditions. If it is determined that the employee is still exposed to the hazard after modifying work methods and conditions, consideration should be given to purchasing PPE. It should be realized that certain types of PPE such as respirators can require employee physicals and extensive ongoing training and maintenance; failure to follow these requirements may render the PPE ineffective or even dangerous.

Safety Shoes:

Safety shoes are recommended to be worn when performing certain weights and measures activities to prevent personal injury. Safety shoes are available to prevent possible injury to the foot from falling weights or equipment and also to provide protection from slippage and static discharge. Many styles and types of safety shoes are available. The American National Standards Institute and safety-shoe manufacturers can provide additional information concerning the selection of safety shoes for different types of inspection activities.

Safety Cones/Warning Signs:

Safety warning signs or safety cones should be positioned to block off the work area when the inspection site is exposed to vehicular or pedestrian traffic . These precautions should also be taken when working around flammable liquids to warn people of a potential hazard; in this instance, it is also recommended that "No Smoking" and "No Open Flame" signs be posted.

Static Discharge:

Combustion can result when an ignition source is present and fuel and oxygen are also available. Sources of static discharge introduce the potential of an ignition source into the testing area. Avoid all sources of static discharge when testing flammable products.

Support:

    Scales: Be certain that the installation is adequate to support the scale, test weights equal to the capacity of the scale, and any weight carts, test platforms, platters, chains, hooks, or other accessories used to suspend or support the test weights prior to proceeding with a testing procedure. Any test platforms, platters, chains, hooks, or other accessories must be capable of supporting the test weights necessary for the inspection.

    Meters: Be sure the inspection site surface is rigid enough to support the weight of a large volume prover when the prover is filled with the test liquid. **Chocks** should be used to secure the wheels of the prover during the testing procedure.

Switch Loading:

Do not use a test measure that has been used for drafts of gasoline to measure diesel fuel until you are certain that all gasoline vapors have dissipated. This practice, called "switch-loading" is extremely hazardous because diesel fuel is likely to produce a static charge while being dispensed. Sparks from this charge could easily ignite gasoline vapors inside the measure.

Traffic:

Be aware of vehicular and pedestrian traffic patterns in and around the inspection site. Mark the test spot appropriately by using safety cones, flags, etc.

Transportation of Equipment:

Consideration must be given to isolating the inspector/serviceperson from weighing and measuring equipment during the transportation of the equipment to and from the work site. The inspector/serviceperson must be isolated from hazardous fumes; means of such isolation include, but are not limited to, vehicles outfitted with protective barriers; equipment carriers located outside of the vehicle; vehicles with separate driver/equipment compartments, etc.

All equipment must be properly secured to avoid exposing the inspector/serviceperson to the potential of flying projectiles.

Wet/Slick Conditions:

Caution should be exercised when working in wet, slippery, or icy conditions to avoid slipping or possible injury from electrical sources. Shoes with non-skid soles should be worn to provide adequate traction to prevent slipping.

Absorbent material should be used on any product spills to prevent possible injury due to slipping on a slick surface.