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ABSTRACT

The report describes revision of the Compliance Safety and Health Officers (CSHO) course for the Department of Labor, Occupational Safety and Health Administration (OSHA). The CSHO's job was analyzed in depth, in accord with OSHA standards, policies, and procedures. A listing of over 1,700 violations of OSHA standards was prepared, and specialists in occupational safety and health then evaluated each violation in terms of criticality based on likelihood of hazard, probability of effect, severity of effect, and range of effect. A set of "performance" and "knowledge" instructional objectives was then established, and a four-week course was developed including these features: (1) instructional paralleling sequence in which activities are performed; (2) an instructor manual having course guide and lesson plans; (3) a student handbook having a course outline, course objectives, and reference materials; (4) an intermingling of "compliance" and "standards" instruction; and (5) role-playing exercises to provide realistic practice for CSHOs in dealing with employers and employees. The document concludes with 35 pages of appended materials: compliance officer functions; sequential relationship among tasks; sample pages of the Hazard Questionnaire and compliance officer task descriptions; sample lesson formats; and an outline of the compliance and health officer course. (Author/BP)

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Training Course for Compliance Safety and Health Officers

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PREFACE

This report describes the rationale and procedures under which the Human Resources Research Organization developed a revised training program for Compliance Safety and Health Officers, under a contract for the Occupational Safety and Health Administration, U.S. Department of Labor.

The work was performed by HumRRO Division No. 1 (System Operations), Alexandria, Virginia, Dr. J. Daniel Lyons, Director. Dr. A. James McKnight was the Principal Investigator, with Mr. Paul Loustaunau and Mr. James D. Tschechtelin as members of the project team.

Development of the training program was begun in July 1971, under Department of Labor Contract L-71-205. Technical monitorship was provided by Dr. Lenelle Perry, Office of Training and Education, Occupational Safety and Health Administration.

SUMMARY

In July 1971, the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, awarded a contract for revision of the Compliance Safety and Health Officers (CSHO) course to the Human Resources Research Organization (HumRRO), a non-profit behavioral research organization with 20 years' experience in developing training programs for federal government agencies. The object of the course revision was to provide OSHA with a highly efficient, standardized, fully documented program of instruction.

The development of the revised course was based upon three fundamental principles:

(1) The objective of the course is to train CSHOs to perform their jobs competently; it is not merely to "orient" or "familiarize."

(2) The job for which CSHOs are to be trained is limited to carrying out the provisions of the Occupational Safety and Health Act; it does not include attempts to ameliorate hazards, improve worker safety practices, or contend with a variety of other safety program elements.

(3) In the limited time available for instruction, CSHOs must become fully qualified in recognizing the most critical standards and familiar with the less critical standards; receiving a "once over lightly" on all standards is ineffective.

In order to adhere to these principles, it was necessary to approach the development of the revised CSHO course systematically and scientifically. First, a detailed analysis was made of the CSHO's job—his duties and responsibilities and the specific activities that they entail. This analysis was performed using OSHA standards, policies, and procedures; literature from the field of occupational safety and health in general, and many hours of interviews with Compliance Officers themselves.

In line with giving greatest emphasis to the most critical standards, an evaluation of hazard criticality was undertaken. Over 1700 specific violations of OSHA standards—including construction and maritime standards—were identified and assembled into a questionnaire that was disseminated among area offices as well as to non-governmental specialists in occupational safety and health. Each violation was evaluated in terms of the following:

- Hazard Likelihood. How often a violation of the standard, sufficient to constitute a safety or health hazard, is likely to be found at a work site.
- Probability of Effect. The probability that the violation would result in injury or illness.
- Severity of Effect. The severity of injury or illness resulting from a violation of the standard.
- Range of Effect. The number of employees likely to be injured or made ill as a result of the violation.

The evaluations of the four variables were combined into an overall measure of criticality and averaged across all the evaluators. The resulting individual criticality values were grouped into five general levels of criticality.

The next step was to establish a set of instructional objectives. There were two types—"performance" objectives and "knowledge" objectives. Performance objectives were activities that CSHOs were expected to be able to perform without assistance upon completion of the training program. They included all of the administrative activities set forth in the Compliance Operations Manual and those activities required in the detection and evaluation of the 750 most critical standards. The remaining activities—dealing with the less critical standards—were treated as knowledge objectives. This meant that the CSHO had to be familiar with the standards and be able to apply them with the aid of reference materials.

What resulted from this systematic development process was a four-week course designed to qualify new CSHOs to carry out their responsibilities in enforcement of the Occupational Safety and Health Act. Important features of the course itself are:

- A "functional" training sequence in which instruction generally parallels the sequence in which activities are actually performed.
- An Instructor Manual including a course guide and detailed lesson plans describing course objectives, training content, and related training aids.
- A student handbook containing a course outline, instructional objectives, and related reference materials.
- An intermingling of "compliance" and "standards" instruction, starting early enough in the course to allow problem exercises to be worked throughout the course.
- Role-playing exercises to provide realistic practice in dealing with employers and employees.

The new CSHO course was pilot tested in November 1971 and put into operation at the Occupational Safety and Health Administration Training Institute, Rosemont, Illinois, on January 25, 1972. The course will undergo continuous revision in response to changes in compliance procedures and standards.

CONTENTS

Training Course for Compliance Safety and Health Officers

INTRODUCTION

This report describes the rationale and procedures under which the Occupational Safety and Health Administration (OSHA) training program for Compliance Safety and Health Officers (CSHOs) was developed. It is hoped that an understanding of the course and its origin not only will encourage and aid in its implementation, but will also pave the way for course revision as this may be necessitated by changes in circumstances surrounding the carrying out of the Safety and Health Standards promulgated by the Secretary of Labor.

Development of the course described in this report was begun in July 1971. It replaced an undocumented interim course that had been in operation since April 1971.

The remainder of the report will describe the development of the CSHO training program including: (a) the rationale upon which it was founded; (b) the approach taken; (c) the course materials; and (d) requirements for additional work.

RATIONALE

The development of the Compliance Officer training program is based upon a set of assumptions as to its purposes. These assumptions constitute a rationale that must be understood, and hopefully accepted, if the training program is to appear a reasonable one.

Assumption 1. The purpose of the training program is to enable Compliance Officers to perform. The goal of training, as the term is generally used, is to enable people to do something, in contrast to simply knowing about something. Knowledge as an end in itself is considered characteristic of "education." In developing a training program for Compliance Officers, it has therefore been assumed that the objective is to enable the individual being trained to perform a set of job functions.

The performance orientation which underlay development of the Compliance Officer training program is somewhat at odds with views expressed and implied by many, namely that the range and complexity of the Compliance Officer's job is too great to be encompassed by a single training program.

It has been suggested that an initial course can do no more than *orient* prospective Compliance Officers to provisions of the Occupational Safety and Health Act and the standards that it applies. Skill in carrying out compliance inspections would be acquired on the job under the tutelage of an experienced Compliance Officer.

Two objections are raised to this point of view. First, if all that the Compliance Officer training program were to provide is an orientation or an overview, there is little point in convening Compliance Officers in a resident training program at all. This same objective could be attained far less expensively through the provision of such literature as the Compliance Operations Manual, the Standards, and some type of text. What a resident training program can provide is (a) the controlled practice required to develop performance skills, (b) a means of identifying specific deficiencies, and (c) a way of assuring that the Compliance Officer meets minimum qualifications before he assumes his duties.

Secondly, while it is true that performance skills can be developed through closely supervised on-the-job training, it is frequently inefficient to do it this way. Each time a more experienced person must accompany the Compliance Officer, it means that two

people are doing one man's job. The idea that on-the-job training "doesn't cost anything" is a myth. Considering the number of site visits that could be required to expose the Compliance Officers to the full range of tasks, the use of a one-to-one student - teacher ratio could be quite expensive.

The new Compliance Officer's first few inspections would, of course, be made in the company of a more experienced individual. However, the number of two-man site visits required to merely assure that the Compliance Officer is qualified would be far less than the number needed to qualify him in the first place.

In summary, the primary function of the Compliance Officer training program should be to assure that the Compliance Officer is capable of meeting minimum job performance requirements.

Assumption 2. The primary job of the Compliance Officer is the application of OSHA standards. The Occupational Safety and Health Act (OSHA) authorizes the Compliance Officer to enter places of work to look for violations of safety and health standards. This is his primary function. To be sure, he should be alert to unsafe conditions other than those covered by standards and should be prepared to consult with both employees and employers on matters of safety. However the ability of the Compliance Officer to carry out inspections effectively should not be compromised by such peripheral considerations.

The focus upon OSHA standards is not easily maintained. Many of the students and instructors involved in the original Compliance Officer course possessed broad backgrounds in occupational safety and health. As a result, attention frequently strayed somewhat from the standards and their enforcement. Considerable time was often devoted to such areas as (a) unsafe worker practices not covered by any standards, (b) safety requirements related to standards other than those called forth by the Act, or (c) methods of correcting unsafe conditions. While there may be some disagreement as to the degree to which the CSHO should become a "policeman" versus a "consultant," there should be no disputing his need to be thoroughly knowledgeable in the nature and application of standards.

Assumption 3. Training priorities must be related to criticality of subject matter. Each CSHO may be expected to know and be able to carry out the procedures which OSHA has set forth governing the conduct of compliance visits from initial preparation to final disposition of citations. These procedures are set forth in the OSHA Compliance Operations Manual[1] and the Compliance Officer's failure or inability to abide by these procedures jeopardizes the success of the entire compliance program.

On the other hand, a somewhat different situation prevails with respect to the OSHA standards he is to enforce. No individual can reasonably be expected to identify every violation of these standards that may exist in a particular place of work. Oversights are inevitable. However, the more familiar the Compliance Officer is with the specifics of the standards he is to enforce, the more likely he is to detect violations. Recognizing that time does not permit the new Compliance Officer to master all standards in the time available, it is important to the effectiveness of the overall program that he become thoroughly familiar with those standards that are most critical to employee safety and health. For those standards that are less critical he may be expected to have recourse to the published standards. So long as he learns how to look up and interpret the standards, his familiarity with less critical standards will improve as he becomes more experienced.

The assumption that the Compliance Officer's knowledge and ability to apply standards should vary with the criticality of the standards is in conflict with the view held by some instructors that the Compliance Officer course should merely provide a

[1] U.S. Department of Labor, Occupational Safety and Health Administration. *Compliance Operations Manual*, (OSHA 2006), January 1972, U.S. Government Printing Office, Washington, D.C.

"broad brush" treatment of all standards. Instructors holding this view would devote class time reading through the standards, giving examples and answering such questions as may arise, but not attempting to achieve any genuine mastery. The view taken here is that a resident training program that merely acquaints students with standards without being able to apply those that are most critical does not do what a resident program is supposed to do.

APPROACH

The development of an effective training program must be a systematic process that begins with the job that the individual to be trained will have to perform. First the specific *tasks* within his areas of responsibility must be identified and then each task must be analyzed in detail to identify the activities required. The relative *criticality* of each activity to the success of the compliance program is then analyzed and the results used in establishing instructional *objectives* for the course. Once objectives have been specified, *subject matter* may be collected and organized and appropriate instructional methods established. The results are then packaged in the form of an *instructor manual*, *student manual*, and *instructional aids*. This systematic training development process is depicted in Figure 1. The remainder of this section will describe in detail the various elements in the training development process.

ANALYSIS OF COMPLIANCE OFFICER'S TASKS

The first step in the development of the Compliance Officer training program was an analysis of the Compliance Officer's job. This included: (a) identification of the specific tasks that comprise the Compliance Officer's job, and (b) analysis of the Compliance Officer's job tasks into the specific behaviors of which they are constituted.

DETERMINATION OF TASKS

The responsibilities of the Compliance Officer may be divided into two major categories, *technical* and *administrative*. Technical responsibilities are those involved in detecting and evaluating violations of Federal occupational safety and health standards. The administrative responsibilities of the Compliance Officer include all activities leading up to and following the actual compliance visit. They represent requirements imposed by the Occupational Safety and Health Administration and the Act under which it was created, to assure that rights of employers, employees, and the public are preserved.

The Compliance Officer's responsibilities with respect to the identification and evaluation of job hazards are set forth in the following documents:

"Occupational Safety and Health Standards; National Consensus Standards and Established Federal Standards," Part 1910, Ch XVII, Title 29, *Federal Register*, Vol. 36, No. 105, Part II, May 29, 1971.

"Safety and Health Regulations for Construction," Part 1910, Ch XVII, Title 29, *Federal Register*, Part II, Vol. 36, No. 75, April 17, 1971.

Department of Labor, Wage and Labor Standards Administration publications:

"Safety and Health Regulations for Longshoring," Part 1504, Ch XIII, Title 29, May 1969 (reprint from *Federal Register* through April 4, 1969);

Model of CSHO Course Development Process

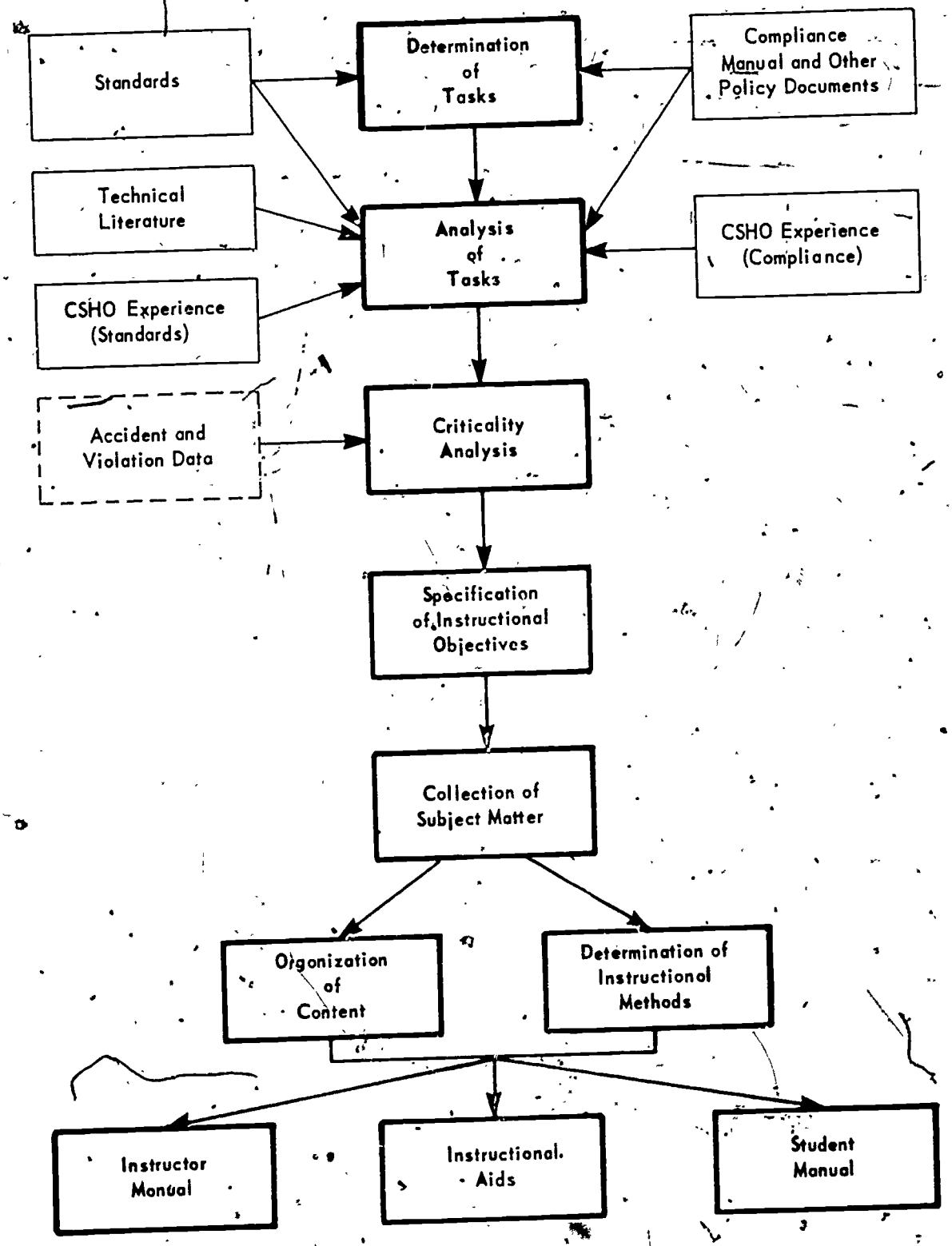


Figure 1

"Safety and Health Regulations for Ship Repairing, Part 1501, Ch XIII, Title 29, 1970 (reprint from *Federal Register* through January 1, 1970);

"Safety and Health Regulations for Ship Breaking," Part 1503, Ch XIII, Title 29, January 1970 (reprint from *Federal Register* through January 1, 1970);

"Safety and Health Regulations for Shipbuilding," Part 1502, Ch XIII, Title 29, January 1970 (reprint from *Federal Register* through January 1, 1970);

"Gear Certification Regulations," Part 1505, Ch XIII, Title 29, January 1969 (reprint from *Federal Register*, through March 4, 1969).

These publications list or reference all standards that the Compliance Officer is required to enforce under the Occupational Safety and Health Act. They provided the primary sources of information concerning the technical responsibilities of the CSHO. The primary source of information concerning the CSHO's administrative tasks is the OSHA *Compliance Operations Manual.* This document sets forth OSHA policy and procedure governing the role of the CSHO.

From the various sources listed, a set of Compliance Officer functions was established. This list of functions and the major tasks within each function appears in Table 1.

Once a set of tasks had been prepared and verified by OSHA as representing the scope of the CSHO's responsibility, the next step was to analyze each task in detail to determine just what the CSHO was required to do.

ANALYSIS OF TECHNICAL TASKS

The principal source of information concerning the CSHO's technical activities is a set of standards referenced in the preceding section. Some standards will describe or otherwise make evident the specific activities that are required in the detection of hazards. Others assume a knowledge of certain general or specialized safety procedures. Among the latter standards are those that require use of measuring instruments, the operation of which must be known before the standards may be adequately applied. Much of the information that entered the development of the CSHO training program was obtained from technical literature such as textbooks, reference tables, and operating manuals. The National Safety Council's *Accident Prevention Manual for Industrial Operations*[1] was of particular value in providing information required in the implementation of standards.

In any job, there is a volume of important practical information that does not customarily appear in books, information—that can be obtained only by experienced personnel. In an attempt to collect as much of this type of information as possible, members of the training development staff visited CSHOs in five area offices. In each office, a particular set of "subparts" of the standards was reviewed in detail with CSHOs to identify special procedures and techniques they employ. At the time of these field visits, the OSHA program of site visits had just commenced and the amount of experience that had been gained in application of standards under the Occupational Safety and Health Act was quite limited. However, it was generally possible to identify individuals who had prior experience in conducting safety inspections related to the standards under some state, federal, or industry program.

[1] National Safety Council. *Accident Prevention Manual for Industrial Operations*, 6th Edition, Chicago, Illinois, 1969.

Table 1

Compliance Safety and Health Officer Functions

ADMINISTRATIVE FUNCTIONS

Information Dissemination
- Type of Dissemination
  - Handling of Inquiries
  - Consultive Services
  - Assistance in Training Programs
  - Public Information
- Type of Information
  - Codes and Standards
  - Enforcement Directives
  - Safety and Health Entered

Administration
- Programing Inspections
  - Catastrophies
  - Complaints
  - Targeted Industries
  - General Inspection
- Handling Complaints
  - Receiving Complaints
    - Letter Complaints
    - Oral Complaints
  - Investigating Complaints
    - Interviews
    - Letter Follow-up
    - Preventing Discrimination Against Complaintants
    - Preparing Forms
      - Inspection-related Forms
      - Notifications
        - Violations
        - Immediate Danger
      - Periodic Summarys
      - Penalty Assessment

Arranging for Inspections
- Notification (where appropriate)
- Travel
- Equipment Requirements
- Coordination with Labor Representatives
- Pre-inspection Familiarization
- Appropriate Clothing and Protective Gear

Entry
- Timing
- Dealing with Refusal, Partial Refusal, Waiver Requests
- Dealing with Labor Representatives
- Determining Appropriate Accompaniment
- Security Requirements
- Special Problems (strikes, etc.)

Worksite Inspection
- Recording Violations
- Immediate Correction
- Dealing with Employers and Employees

Closing Inspections
- Advising Employer of Hazards
- Advising of Citations
- Classifying Hazards
  - Serious
  - Non-serious
  - Imminent
- Immediate Action
  - Hazard Removal
  - Informing Employees, On-and Off-duty

Follow-Up Inspections
- Scheduling
- Use of Original Information

Preparing Citations
- Determining Responsibility (e.g., contractor-sub-contractor)
- Preparing Citations
  - Serious Violations
  - DeMinimis Notification

Participation In Review Proceedings
- Commission Hearings
- Judicial Review

TECHNICAL FUNCTIONS

Facilities
- Flooring
  - Surface
  - Strength
- Platforms, Scaffolding, etc.
  - Construction
  - Restraints
- General Housekeeping
  - Trash, rubbish
  - Spillage
  - Clutter
- Ventilation
  - General Ventilation
  - Emergency Apparatus
- Sanitation
  - Drinking Water
  - Food Handling
  - Toilet Facilities
- Light
  - Amount
  - Consistency
  - Location
  - Glare
- Noise
  - Intensity
  - Suration
- Excavations and Tunnels
  - Location (power lines)
  - Support
- Ventilation
- Communication

Materials
- Nature
  - Fluids (irritants, hot, cold)
  - Air
    - Vapors
    - Particles
    - Pressure
  - Surfaces
    - Sharp, Abrasive
    - Toxic
    - Disease Carrying
- Protective Equipment
  - Head
  - Hair
  - Face and Eyes
  - Hearing
  - Hands and Arms
  - Respiratory
- Storage
  - Height
  - Proximity
  - Accessability

Machinery (including hand tools)
- Exposure to Hazards
  - Snagging
  - Cutting
  - Pressure
  - Flying Debris
  - Burns
  - Shock
- Inadequate Guarding
- Poor Location

Material Handling Equipment
- Motor Vehicles
  - Design and Construction
  - Safety Equipment
  - Operating Practices
  - Loading and Parking
  - Maintenance and Inspection
  - Route and Trip Planning
  - Scheduling
  - Driver Selection
- Elevators, Conveyors, Hoists
  - Moving Parts
  - Rigging
  - Loads

Fire
- Fire Hazards
  - Construction
  - Storage of Combustibles
  - Fuel Transport
  - Open Flame (torches, etc.)
  - Smoking
  - Heating Equipment
  - Friction
  - Waste
- Inadequate Protection
  - Extinguishers
  - Water Supply
  - Alarms
  - Cut-offs
  - Warning Signals and Signs
  - Access
  - Exits
  - Respirators
  - Electricity
- Electrical Hazards
  - Layout
  - Loading
  - Grounding
  - Installation
  - Conductors (e.g., frayed)
  - Batteries
  - Fuses, interlocks
  - Warning signs and signals

Explosives
- Storage
- Transportation
  - Loading
  - Driver Qualifications
- Use
  - Location
  - Detonation
  - Misfire Procedures

Radiation
- Hazards
  - X-radiation
  - Gamma radiation
  - Alpha radiation
  - Beta radiation
- Detection and Monitoring
- Exposure Control
  - Shielding
  - Protective Clothing
  - Distance Control

General Environment
- Water
  - Life-saving Equipment
  - Observation
- Compressed Air
  - Level
  - Duration

ANALYSIS OF ADMINISTRATIVE TASKS

The procedures to be used by CSHOs in carrying out the administrative functions and tasks described earlier were described in the *Compliance Operations Manual* and various policy statements issued by the Assistant Secretary of Labor for Occupational Safety and Health. However, these documents, like most policy statements, leave a great many situations uncovered. Two particular types of situations were those involving interpersonal relations and legal matters.

In his interpersonal relations with employers and employees, the CSHO encounters situations for which it is very difficult to prescribe a set of procedures. What, specifically, does the CSHO do when an employer demands to know the identity of a complainant? While the *Compliance Operations Manual* makes it clear that a complainant cannot be identified, it does not attempt to provide any guidance on how to interact with employers. A variety of legal questions may also arise during the course of a site visit. Many of these are unanswered by existing policy.

In order to render the CSHO training program as practically useful as possible, the interviews with experienced CSHOs, described in the preceding section, also included queries as to particular problems that had been encountered in attempting to administer the Act.

Many important legal points having a bearing upon the activities of the CSHO were being resolved at the time the task analysis was in process. This fact made it impossible to prescribe appropriate procedures in many cases. Many of the most critical issues were resolved in a later revision of the *Compliance Operations Manual*, released in November 1971. However, inability to gain access to contemplated revisions at the time of the task analysis rendered the initial analysis deficient in many areas.

TASK DESCRIPTIONS

The results of the administrative task analysis were assembled into a detailed description of administrative tasks. The various administrative activities performed by CSHOs were arranged in chronological order from initial receipt of complaints or instructions from the area director through the CSHOs participation and final disposition of citations. A diagram depicting the sequential relationships among tasks is shown in Appendix A.

Extensive changes had to be made in the task descriptions as a result of the revision of the *Compliance Operations Manual*. A sample of the revised task descriptions is presented in Appendix B.

No formal description of the CSHO's technical activities was prepared owing to the large volume of descriptive information that would have to be provided to cover all the activities involved in enforcement of OSHA standards, and the fact that the nature of the activity is reasonably well set forth—by description or implication—in the standards themselves.

CRITICALITY ANALYSIS

One of the assumptions underlying development of the training program was that the ability of the CSHO to identify violations of OSHA standards should be related to the criticality of those violations to employee safety and health. In order to formulate an efficient set of training objectives, it was necessary to evaluate the criticality of the various hazards covered by OSHA standards.

"Criticality" for the purposes of the training development effort was a function of the following four variables:

(1) Hazard Likelihood—how often a violation of the standard, sufficient to constitute a safety hazard, is likely to be found at a worksite.

(2) Probability of Effect—the likelihood, if a violation of the standard were to exist, that an accident or illness would occur before the hazard was noticed and corrected.

(3) Severity of Effect—the extent of any injury or illness likely to result from a violation of the standard.

(4) Range of Effect—the number of people likely to be injured or rendered ill by violation of the standard.

At some time in the future there may be sufficient data bearing upon the incidence and consequence of accidents and violation to support an empirical determination of criticality (see "Additional Requirements"). However at the time the course was being developed, such data were not available, hence the "Accident and Violation Data" box in Figure 1 is outlined with dashes. It was therefore necessary to turn to judgments of occupational safety and health specialists whose previous education and experience would place them in a position to make reasonably reliable estimates concerning each variable. One logical group of criticality evaluators were CSHOs themselves, all of whom had experience in the inspection of worksites under the Occupational Safety and Health Act, and most of whom had extensive backgrounds in occupational safety. A second group consisted of seven occupational safety and health specialists who were identified with the assistance of the American Society of Safety Engineers.

A questionnaire was prepared to collect the judgments of criticality evaluators. This questionnaire consisted of a list of over 1700 hazards identified in the various Federal standards covered by the Occupational Safety and Health Act. The list was subdivided into 17 subparts, each of which dealt with a particular group of hazards, such as platforms, means of egress, walking and working surfaces. The hazards were arranged in a format that permitted evaluators to rate the hazard likelihood, injury probability, number of persons affected, or severity of the hazard. In rendering his judgment, the evaluator was asked to check one of four categories representing the range of a variable in question. The categories were:

Hazard Likelihood

(1) Rarely (less than 1 in 100 visits)
(2) Occasionally (one in 10 to 100 visits)
(3) Frequently (once in 3 to 10 visits)
(4) Almost always (at least once in every 2 visits)

Probability of Effect

(1) Extremely unlikely (less than 1 in 100 violations would cause injury)
(2) Unlikely (1 in 10 to 100 violations would produce an injury)
(3) Moderately likely (1 in 3 to 10 violations would produce injury)
(4) Probable (at least half of the violations would produce an injury)

Severity of Effect

(1) Minor (no time lost, only first aid required)
(2) Moderate (1 to 5 days lost, medical treatment required)
(3) Major (over a week lost, extensive medical treatment required)
(4) Total (total disability or death)

A sample page from the questionnaire appears as Appendix C.

With the large number of hazards to be evaluated, it was not reasonable to expect any one evaluator to deal with all subparts. Rather, they were asked to deal with only those subparts relating to hazards with which they had some experience. The number of individuals evaluating each set of hazards ranged from 15 individuals for Subpart

"R"—Special Industries, to 30 for construction hazards. The average was approximately 25 evaluators per hazard.

In order to arrive at an overall evaluation of criticality, it was necessary to combine the ratings assigned to each of the four variables. The impact of a particular hazard upon occupational safety and health appears to be a multiplicative function of each of the variables described. The likelihood of a hazard existing multiplied by the likelihood of its causing an injury when it does exist yields an "injury or illness likelihood." If this value is multiplied by the number of individuals that would on the average be affected by the hazard, we obtain an estimate of injury or illness "rate." If this rate is then multiplied by the severity of the injury or illness, we obtain an estimate of something that approximates the total cost of injuries and illnesses resulting from violations of the hazard.

It must be admitted that this system constitutes an oversimplified formulation based upon crude estimates. However, for the purposes of setting training priorities, it was considered to be acceptable. It is at least superior to treating all hazards as being equally important, something that is clearly untrue.

Strict adherence to the above rationale would have required that the weights assigned each of the response categories be proportional to the ranges of the variables involved. A hazard that occurs once in every two site visits should receive 50 times the weight of a hazard that arises once in every 100 visits. However, giving such disproportionate emphasis to judgmental values appeared unwise in view of the lack of precision in estimates. Therefore, simple linear 1-2-3-4 weights were applied to the response categories. In actuality, different weighting systems are unlikely to have a material effect upon the ordinal position of a particular hazard in a group of hazards.

Each judge's evaluations were "scored" in the multiplicative fashion just described. The results of all evaluators were averaged in arriving at an overall criticality value for each hazard. In order not to imply any more precision than the system used in generating these values warranted, the range of criticality values was reduced to five criticality levels.

The list of hazards and associated criticality values is too large to be included within this report. They do, however, appear in the "index" described in the next section.

INDEX OF STANDARDS

Many CSHOs taking part in the criticality evaluation found that the questionnaires provided a useful digest of Federal standards covered by the Occupational Safety and Health Act. Moreover, the fact that the hazards were grouped under the specific paragraph designations of the standards made the listing of standards useful as an index to the standards themselves. With the concurrence of OSHA, the questionnaire, the format modified somewhat, was reproduced as an "Index of Violations of OSHA Standards,"[1] submitted with the final project report and disseminated among OSHA area offices.

The modifications involved removal of the portion of the questionnaire in which ratings were made and its replacement by (a) the numbers of the pages upon which the listing of the specific subgroup of hazards begins in the standards, and (b) reference to National Fire Protection Association (NFPA), American National Standards Institute (ANSI), or other sources of standards. In addition, the criticality level—using the five-level classification—is provided for each hazard.[2]

[1] "Index of Violations of OSHA Standards," Human Resources Research Organization, November 1971.

[2] The criticality rating *is not* to be used in evaluating the legal seriousness of a hazard. True, the expected extent of injury and the number of people affected by an accident are factors in the rating, but the effect of these factors may be altered by the expected frequency of occurrence and expected probability of causing an accident.

SPECIFICATION OF INSTRUCTIONAL OBJECTIVES

The identification, analysis, and evaluation of the CSHO's technical and administrative tasks provided the basis for establishment of instructional objectives for the CSHO course. These objectives set forth the performances of which the CSHO was to be capable upon completion of the training program. The emphasis upon ability to perform is a reflection of the first of the assumptions stated at the beginning of this report.

Each of the *administrative tasks* constituted a performance objective for the CSHO course. It is clear that the CSHO must be capable of preparing for, conducting, and following up inspections in accordance with the letter and spirit of the Occupational Safety and Health Act. However, the number and variety of standards to be enforced by the CSHO was too great to include all of them among performance objectives for a course the duration of which was limited to four weeks. Therefore, only those tasks involving the most critical hazards were included among performance objectives. The top two levels of criticality, numbering approximately 750 specific hazards, were selected for inclusion as performance objectives. There were a few high criticality hazards that could not be accepted as performance objectives because they were either (a) not capable of being dealt with adequately in a classroom training situation, or (b) occurred so infrequently that the CSHO would not be able to maintain required skills.

Those standards that were not sufficiently critical to become performance objectives or for some other reason ineligible, were established as "knowledge" objectives. The requirements for standards falling into this category were that the CSHO must (a) know of their existence, and (b) be able to locate, interpret, and apply them.

COLLECTION OF SUBJECT MATTER

Once the instructional objectives were established, subject matter pertaining to each objective was assembled to form the content of the CSHO training program. Such subject matter included narrative material, numerical tables, drawings, diagrams, pictures, forms—almost all varieties of written material. Strict control was exercised to see that (a) each instructional objective was supported by appropriate content, and (b) only content related to one or more specific objectives was included. Sources of information used in the development of training content were essentially those used in the identification and analysis of the CSHO's tasks, notably the *Compliance Operations Manual*, Standards, the Act, and various items of safety literature.

ORGANIZATION OF CONTENT

Once the content of the training program had been collected, it was assembled into instructional units. Each of these units represented a set of related performance and knowledge objectives. An outline of the CSHO course appears in Appendix D. Following is a list of the individual courses:

Lesson Number	Title
1	Introduction
2	The Act and OSHA–Overview
3	Safety rationale
4	Training (Material Provided by OSHA)
5	The AFGE Union (Material Provided by the Union)
6	Employer Records

Lesson Number	Title
7	CSHO Tasks and Role
8	Administrative Preparation for Inspection
8A	Opening Conference
9	Employee Representation
10	Walkaround
11	Closing Conference
12	Introduction to Standards and Technical Pre-Inspection Preparation
13A	Walking and Working Surfaces
13B	Scaffolds, Powered Platforms, Manlifts
14	Fire Exits and Fire Protection
15A	Personnel Protection–Eye, Face, Respiration
15B	Personnel Protection–Head, Foot, Electrical
15C	Personnel Protection–Noise, Safety Belts, Medical
16	OSHA-1 Series
17	Seriousness
18	Use of Camera
19	Legal Elements
20A	General Environment
20B	Temporary Labor Campsite
20C	Warning Signs
21A	Air Contaminants
21B	Ventilation
21C	Radiation
21D	Instruments
22	Hazard Recognition
23	Hazard Recognition and Use of the Standards
24	Citations
25	Penalties
26	Site Entry Problems
27	Complaints
28	Imminent Danger
29	Use OSHA-8
30	Compressed Gases
31A	Flammable and Combustible Liquids
31B	Spray Finishing
31C	Anhydrous Ammonia
31D	Explosives
31E	LP Gas
32	Electrical
33	Machinery and Machine Guarding
34	Special Industries
35	Accidents
36	Welding and Cutting
37	Hazard Recognition
38A	Material Handling and Storage
38B	Industrial Trucks
38C	Cranes and Derricks
39A	Maritime–Longshoring
39B	Maritime–Shipbuilding, Ship Repair, Ship Breaking

Lesson Number	Title
40A	General Construction
40B	Excavation, Concrete
40C	Steel, Tunnels, Caissons, Compressed Air
40D	Explosives.
40E	Demolition

The effectiveness of a training program is greatly influenced by the sequence in which material is introduced. Unfortunately, the organization of a course is often more responsive to administrative considerations than to principles of effective learning. For example, subjects may be taught when a particular instructor happens to be available rather than at a time when the student is most prepared to receive it. Obviously, there are always practical constraints placed upon the organization of a course. However, in view of the heavy financial investment that development and administration of a training program entails, it is important to make sure that steps taken for administrative convenience do not compromise the effectiveness of the course.

An attempt was made to adhere to a "functional" sequence in organizing the CSHO course. This meant that, to the extent possible, material was introduced in a fashion that paralleled the manner in which activities are normally carried out, starting with processing of complaints and scheduling of site visits through final disposition of citations. Official OSHA forms, for example, were not taught as a block, but introduced individually at that point where they are used. The preliminary portions of the OSHA-1 form were introduced in connection with "Preparing for Inspection," those portions dealing with safety programs were covered as a part of the "Opening Conference," and final completion of the form delayed until a sufficient number of standards had been covered to allow the student to make meaningful entries. Coverage of administrative procedures was interspersed with coverage of standards in order to allow for practical exercise in dealing with administrative procedures.

DETERMINATION OF INSTRUCTIONAL METHODS

The course was designed to be taught using conventional instructional techniques. The manner of presentation is largely lecture and conference. A variety of exercises have been provided to allow as much practical experience to be obtained as is possible. Under the terms of the development contract, preparation of audio-visual aids was limited to slides or transparencies and the use of motion pictures limited to those already available.

The provision of realistic practical experience was greatly limited by the inability to conduct field visits as a part of the training program.[1] A great deal of the CSHO's work depends upon his ability to detect and properly identify violations of standards. While some simulated practice can be provided with visual aids, the low fidelity of such aids, along with the fact that they tend to focalize attention, renders them less than satisfactory as a means of teaching or testing for hazard recognition. Realistic practice in filling out forms cannot be provided if the trainee is supplied the information that is to be entered. Regrettably the provision of practical training and testing in enforcement of standards requires some form of field exercise or better simulation than is possible at present.

[1] Since trainees were already CSHOs, a field visit would have required them to identify and report violations and prepare citations.

Another important aspect of the CSHO's job is his interaction with employers and employees. While the quality of this interaction depends to a great extent upon his knowledge of compliance procedures and standards, his manner of dealing with different types of individuals will have a great deal to do with his effectiveness in carrying out provisions of the Act. Unfortunately, not even a field visit will provide realistic practice in personal interactions since neither the employers or the conditions of the visit are representative of those encountered in a normal compliance inspection.

Role-playing exercises provided the only feasible method of dealing with this aspect of instruction. A set of exercises was prepared to cover the following types of interactions:

Receiving complaints
Dealing with site entry problems
Opening conference with employer
Dealing with employee representatives
Investigating accidents
Closing conference with employer

Each exercise required the CSHO to interact with another party, an employer or employee, who presented something of a problem. Detailed background statements were provided to both the CSHO and the other party in order to set the scene for the interaction. While only one student receives actual practice playing the role of a CSHO, the remaining students "participate" by making observations of the CSHO's behavior. To this end, the instructor is encouraged to repeat exercises using different students who either by their natural proclivities or by the instructor's direction, can vary the nature of the interaction.

CASE STUDIES

The original CSHO course made limited use of case studies which detailed the events surrounding a particular compliance inspection from its initial instigation through the issuance of citations and the review process. The case study method is a useful educational device when the various elements of a case fit together to form some problem or situation that is relevant to the student's educational objectives. The approach might be valuable, for example, to those concerned with legal problems arising from compliance inspections.

The CSHO, however, is only concerned with particular aspects of a compliance inspection, and even these are generally undertaken in discrete steps. There is no particular advantage in dealing with the entire process in one case study. Each of the elements in the process can be dealt with in great detail at appropriate points in the course. The case study approach was therefore dropped in the final CSHO course.

CONSTRUCTION AND MARITIME STANDARDS

Early planning called for subcourses dealing with standards unique to the construction and maritime industries. These courses would be added to the basic core of content dealing with compliance procedures and standards for industry in general. At that time an overall six-week program covering all three courses was envisioned. However, when a later decision was made to reduce the length of the overall program to a maximum of four weeks, it was necessary to limit the coverage of construction and maritime standards to approximately one day each. Such limited coverage did not warrant identification as separate subcourses. Therefore, coverage of these two areas was integrated into the single CSHO course.

Since development of the CSHO course, a decision has been made by OSHA to develop and teach one-week courses in construction and maritime standards as "add-on" courses for those CSHOs who will specialize in each of the industries.

COURSE MATERIALS

The final step in the training development process, following the preparation and organization of course content and the development of instructional aids, was the preparation of course materials. These materials consisted of an instructor manual, a set of instructional aids, and a student manual.

INSTRUCTOR MANUAL

The principal product of the course development activity described is an instructor manual which outlines in detail the content to be presented. A course outline including titles, time allocations, and major topics of each lesson unit is followed by a lesson plan for each of the subjects.

Each individual lesson plan contains the following:

Title of lesson

Time allocation

Statement of lesson objective—a broad overall statement of the student capability to be achieved through the instruction provided.

Performance and knowledge objectives—a list of hazards in two categories (a) those the student must be able to recognize (performance), and (b) those the student must be familiar with (knowledge).

Content outline—a highly detailed outline of the material to be covered in the lesson.

Content description—complete descriptions of key information items including the following:

(1) narrative descriptions of standards, compliance procedures, etc.
(2) excerpts from OSHA publications (e.g., *Compliance Operations Manual*, Standards) and relevant safety literature
(3) specific facts and figures, e.g., clearances, definitions, etc.

Instructor aids—references to and reproductions of all exercises, and graphic aids included in the course; references to related motion pictures.

Student handouts—reference to student handouts and copies of those student handouts to be used in class.

The format of the lesson plans is shown in Appendix E. Following the lesson title, objective, and time allocation, both the outline and complete descriptions of content appear in a column down the left-hand side of the page. On the right-hand side of the page under "Methods and Materials to be Used," appear references to student handouts, outside materials to be used in class, exercises, and motion pictures, as well as complete reproductions of graphic aids used in the classroom. Copies of student exercises, key handouts, and reference materials too voluminous to be integrated into the content are included at the end of each lesson. In all, the 40 lessons comprising the instructor's manual ran to approximately 650 pages. Materials were prepared in loose-leaf format to allow content to be updated in response to changes in compliance procedures and standards. Two standard three-inch loose-leaf binders are required for the instructor manual.

STUDENT MANUAL

The student manual entitled "Handout Material: OSHA Compliance Officer Training" contains the following items:

- A course outline
- A list of instructional objectives for each lesson
- Reproduction of key graphic aids
- Copies of OSHA and other forms
- Sample pages from key reference materials
- Excerpts from reference materials
- Numerical values relating to various standards
- Definitions
- Classroom exercises
- Summary of requirements for critical standards

All materials in the student manual are ordered according to the lessons they are intended to support. The student manual would be retained by the student as a reference aid upon return to his area office.

INSTRUCTIONAL AIDS

As noted earlier, instructional aids were limited by contract to existing items and those that could be developed at minimum cost. The training program calls for a total of seven motion pictures, five of which are commercially available and two of which were prepared by OSHA. A total of 250 slides were prepared in the following categories:

(1) Summary outlines of course materials, prepared by HumRRO (approximately 125).
(2) Photographs of safe and unsafe conditions obtained primarily from OSHA but supplemented by other sources (approximately 75).
(3) Diagrams, charts, tables, and other reference material obtained from OSHA and a variety of other sources (approximately 50).

All instructional aids were referenced by item and reproduced in the instructor lesson plans to facilitate their incorporation into the course. Key graphic aids were also included in the student manual.

ADDITIONAL REQUIREMENTS

The CSHO training program represents a product of a systematic development program. It should, if it is reasonably closely adhered to, do about as much as possible to prepare a CSHO to fulfill his job responsibilities within the limited time that is available. However, there are two major components of an effective training system that must be provided before the course can function efficiently. These are (a) an updating process, and (b) a quality control system.

UPDATING PROCESS

The CSHO course must undergo constant revision if it is to be responsive to changes in OSHA's needs or its perception of its needs. The major elements of the updating process are those depicted in the course development model provided earlier in Figure 1. The same information sources that are used in the original development serve to initiate the updating process.

At the left-hand side of the model diagram, new standards will be created or standards revised as a result of such events as (a) policy decisions to incorporate additional standards, (b) technical developments that permit improved identification of hazards, and (c) statistics compiled on accidents or previous violations that indicate the need for new standards. Any additional or revised standards will alter the CSHO's tasks and the procedures by which he carries them out. This will in turn lead to new instructional objectives and revision of training content and materials.

A compilation of statistics concerning accidents and violations of various standards will provide an empirical data base for reappraisal of the criticality of standards. Changes in recognized criticality of standards should lead to revision of instructional objectives, elevating certain standards to performance objectives, while reducing others to knowledge objectives.

Turning from standards to administrative matters, changes in OSHA policy will, it is presumed, be reflected in the *Compliance Operations Manual* and other policy documents. In addition, new legal interpretations of the Act and implementing procedures will lead to changes in policy. While these changes are not likely to alter the task the CSHO must perform, they may have a significant impact upon the manner in which he performs them.

Another administrative input to the revision of the course is experience of CSHOs themselves. A good working program of feedback from those who have been previously trained is indispensible to an effective training program. It is not likely that this form of information will alter the CSHO's tasks and activities or the objectives of the training program, although it may lead to realignment of priorities.

The content of training itself, however, should be revised constantly to help remedy problems CSHOs encounter in the field. Each such problem represents, in a sense, a deficiency in the training program; either the appropriate content was not included or it was not well presented. For example, problems in the assignment of penalties by area directors (in consultation with CSHOs)—a tendency to be either too lenient or too severe—may reveal the need for more definitive procedures or a better means of communicating than those that have been devised. Experience of CSHOs may also help identify strengths of the course that could be expanded. If, for example, the role-playing exercises appear to help prepare CSHOs to interact with employers and employees, more class time might be allocated to this form of instruction to cover more situations or allow more students to participate.

QUALITY CONTROL

At the present time, anyone who completes the initial CSHO course graduates from it. This state of affairs is less attributable to the universal proficiency of CSHOs than it is a result of the failure to impose any graduation standards. The principal argument against standards at this time is that since students are already CSHOs when they enter training, whether or not they graduate would have no practical impact. However, the lack of a practical impact is no reason for certifying as qualified those who do not meet minimum standards.

Discussions with OSHA area directors revealed a general desire on their part to identify those who are not well prepared so that they could schedule them for intensive on-the-job training. Moreover, even if graduation is not a condition for employment, it is likely to become a matter of pride for most CSHOs. A more selective program would therefore allow graduation to supply an incentive that is currently missing from the course. In any case, it is recommended that area directors be provided a summary of the progress, strengths, and weaknesses of students attending the CSHO course.

Before graduation may be withheld from any student, some minimum standards must be established. These standards would represent the minimum levels of performance considered necessary for successful operation of the compliance program. With an elaborate research program, it might be possible to establish such standards on a cost-effectiveness basis taking into account personnel and training costs, costs of overlooking hazards, and so on. It might also be possible to relate these standards to specific levels of performance on various tests. In the absence of such an analytic/empirical approach, it is necessary to derive standards judgmentally.

Previous HumRRO experience in this area has shown that substantial agreement as to minimum standards may be obtained from specialists in a particular area provided that (a) they are familiar with the activity, (b) they are in a position to see the relationship between the activity and the larger program of which it is a part, and (c) they have some exposure to the capabilities and limitations of individuals with respect to the activity. It is likely, for example, that the ability to identify highly critical hazards or to fill out OSHA forms accurately would be subject to high standards—90 to a 100% accuracy. On the other hand, the ability to detect hazards of low criticality would be subject to lower standards, perhaps as low as 70% accuracy.

A system of minimum standards is not quickly developed and is, almost of necessity, a trial-and-error process. In most applications, it will remain a highly judgmental process. However, even with its limitations, a system of judgmental standards is better than having no standards at all. In addition to providing a control over the quality of the training product, standards serve as an incentive for all parties to the training process—to students to achieve acceptable level of performance and to instructors to expend the effort to see that that level is achieved. The use of differential standards, geared to the differential criticality of course objectives, goes one step further by encouraging both students and instructors to allocate their efforts in the most effective manner.

Appendix A

COMPLIANCE OFFICER FUNCTIONS: SEQUENTIAL RELATIONSHIPS AMONG TASKS

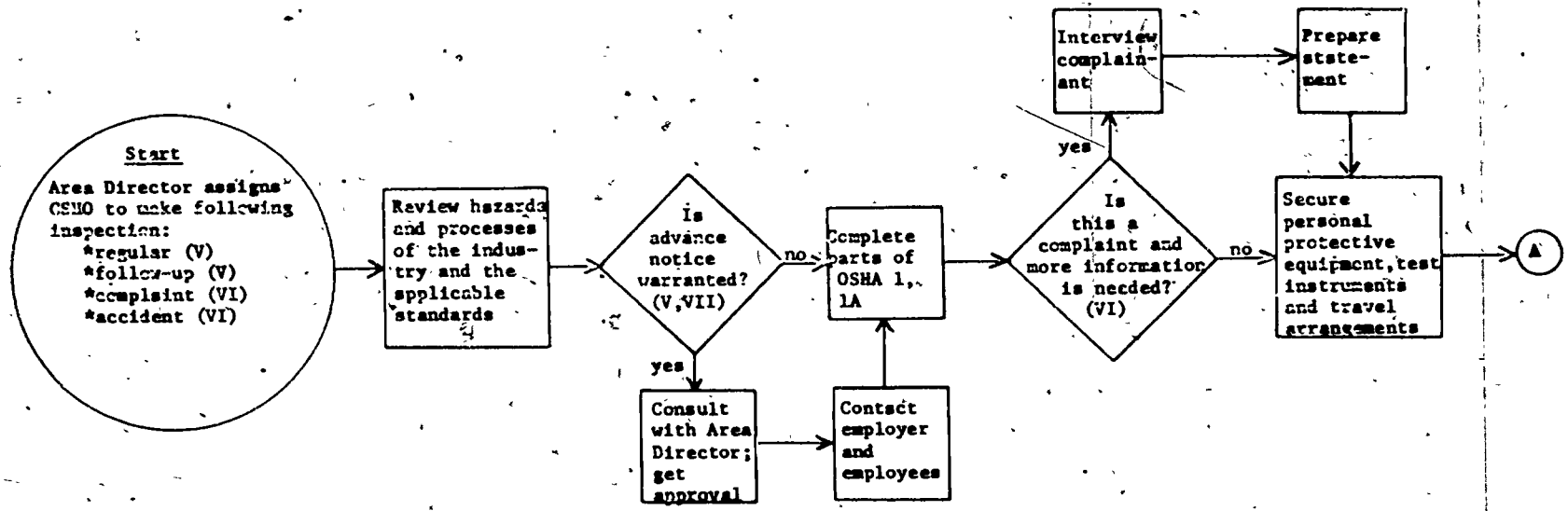
Page One

TASK FLOW DIAGRAM

(For Classroom Use Only)

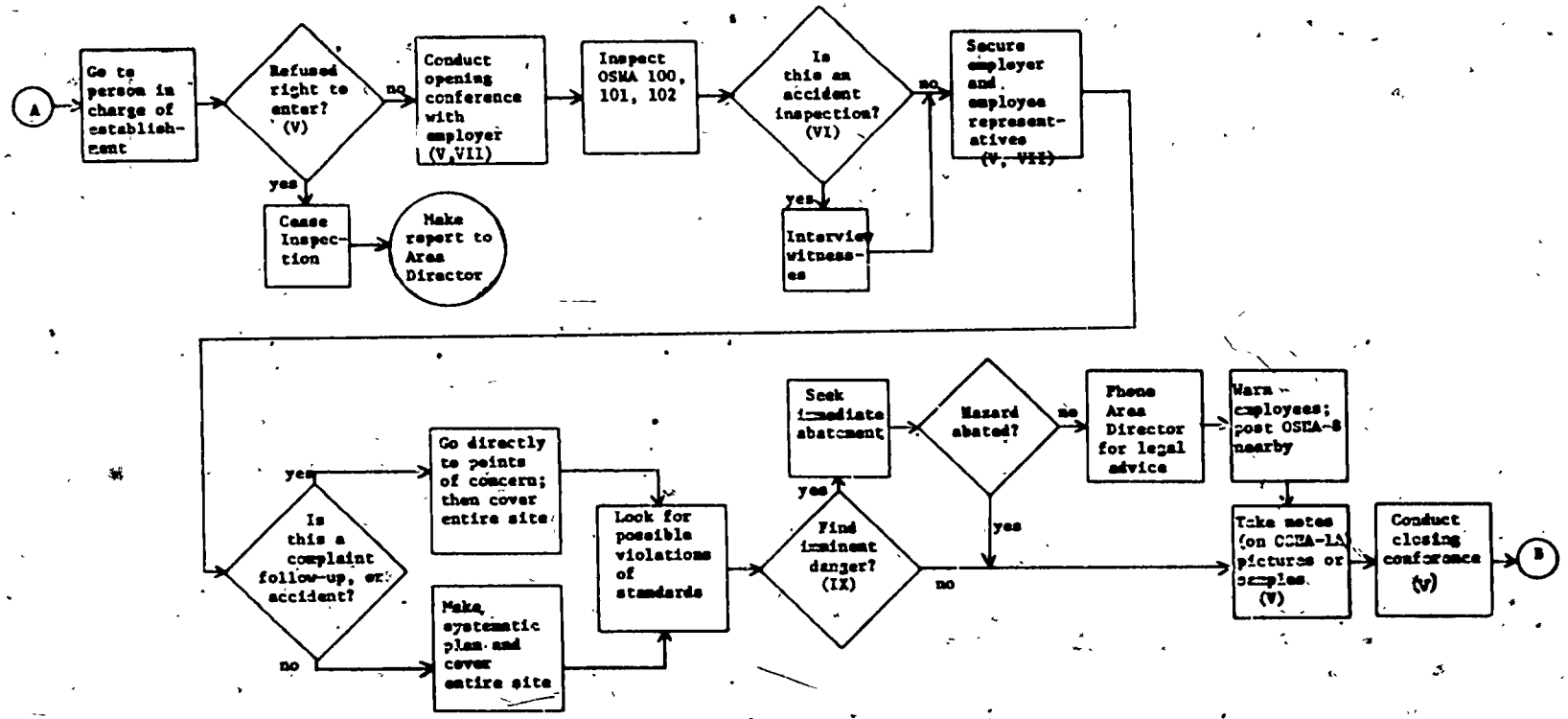
This three-part flow diagram shows the main functions performed by the Compliance Officer in the course of an inspection, from the initial assignment through penalty recommendation. The purpose of the diagram is to provide a simplified overview of the Compliance Officer's job, with a clear illustration of the sequence of his tasks. It also may be helpful as a cross reference, as the roman numerals in parentheses refer to chapter numbers in the Compliance Manual.

To read the flow diagram, begin at the "start" circle and follow the arrows, answering the questions in the diagonals and noting the tasks in the rectangles. Page one shows Pre-Inspection Tasks, page two shows Inspection Tasks, and page three shows Post-Inspection Tasks.



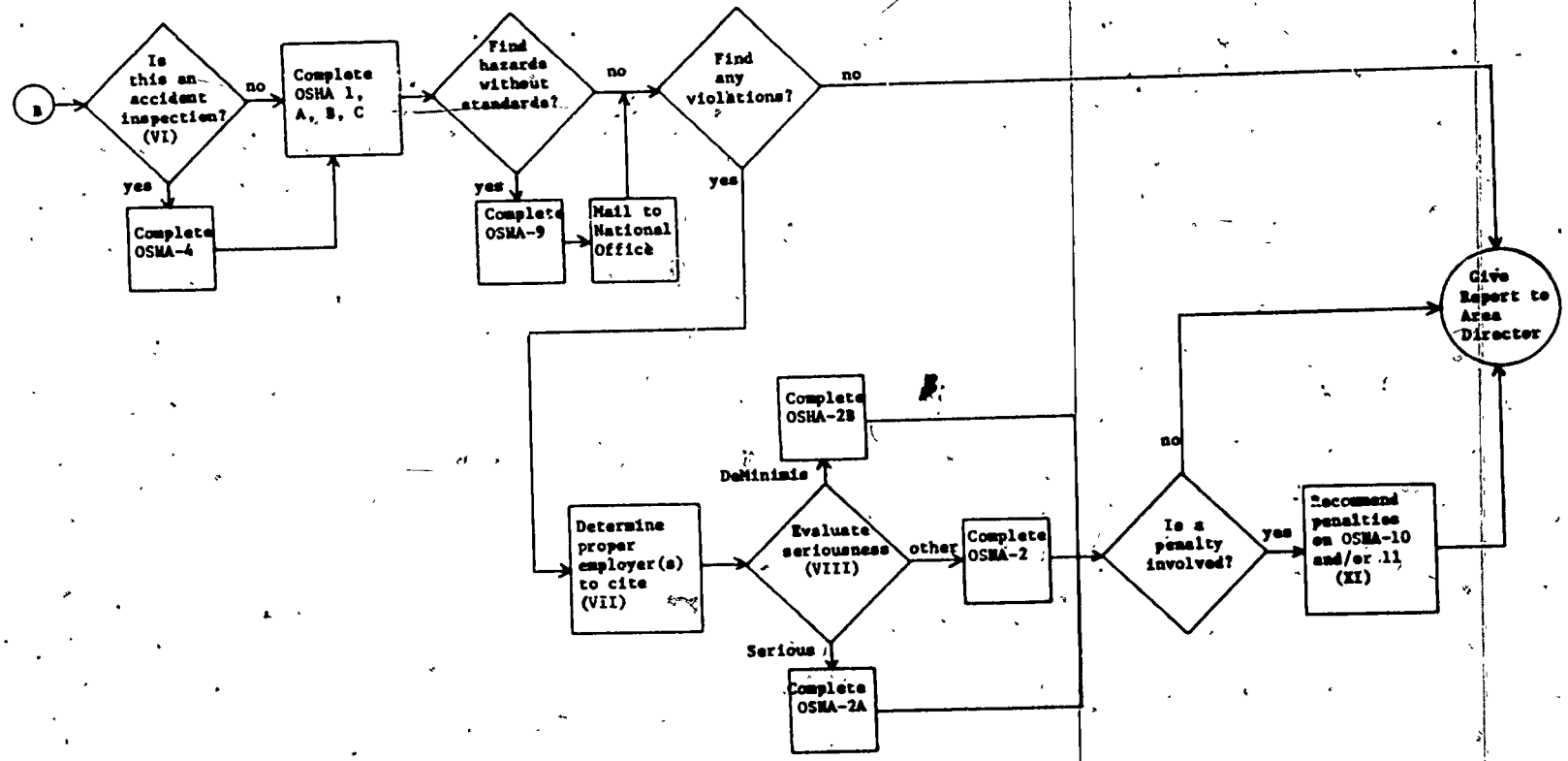
COMPLIANCE OFFICER FUNCTIONS: PRE-INSPECTION TASKS

TASK FLOW DIAGRAM (For Classroom Use Only)



COMPLIANCE OFFICER FUNCTIONS: INSPECTION TASKS

TASK FLOW DIAGRAM (For Classroom Use Only)



COMPLIANCE OFFICER FUNCTIONS: POST-INSPECTION TASKS

Appendix B

COMPLIANCE OFFICER TASK DESCRIPTIONS
(sample page)

Task Code	Task Description	Related General Skills

2.0 Inspection

2.1 Entering job site.

2.1.1 Entering job site to:

A. Make general inspection
   1. Proceed to 2.1.2

B. Investigate a complaint (VI-1)
   1. If time and resources permit, inspect the entire establishment; proceed to 2.1.2
   2. If time and resources do not permit entire inspection, limit walkaround to area of complaint.

C. Follow-up (to determine compliance after an uncontested citation or determination by Review Commission) (V-26)
   1. Consult area director for scheduling.
   2. In general, follow procedure for regular inspection but inspect only the areas covered in the citation.
   3. If the workplace has undergone appreciable changes since the last inspection, do a complete walkaround.

D. Investigate an accident (VI-5)
   1. Receive authorization to investigate from Area Director.
   2. Coordinate with an investigating team, if requested.
   3. Interview witnesses (see 1.1.3.2 - 1.1.3.5) after opening conference.
   4. Make a complete inspection of the entire site if time and resources permit.

2.1.2 When to enter

A. During the regular working hours of the establishment (V-5)
B. For exceptions to A, get Area Director approval (V-6)
C. If a follow-up on construction, should be done very shortly after original inspection (VII-9).

Appendix C

HAZARD QUESTIONNAIRE
(sample page)

INSTRUCTIONS FOR ANSWERING QUESTIONNAIRES

The purpose of this questionnaire is to rate violations of safety standards in the order of their criticality. The criticality assigned to each possible standard violation will be based on four factors, frequency of occurrence, likelihood of injury or damage, number of people affected, and extent of injury. Please indicate by putting an (x) in the appropriate column under each factor your answers to the questions below regarding these factors.

Frequency. How often is a violation of this standard sufficient to constitute a safety hazard likely to exist, on the average, at an industrial work site?

1. Rarely (less than one in a hundred visits)
2. Occasionally (once in ten to one hundred visits)
3. Frequently (once in three to ten visits)
4. Almost always (at least once in every two visits)

Probability of Injury or Damage. If a violation of this standard were to exist, how likely is it that an accident would occur before the hazard were noticed and corrected?

1. Extremely unlikely (less than one in a hundred violations would cause injury)
2. Unlikely (one in ten to 100 violations would produce an injury)
3. Moderately likely (one in three to ten violations would produce injury)
4. Probable (at least half would produce an injury)

Number of People Affected. If a violation of the above standard were to produce an injury, how many people might be affected?

1. A single individual
2. A small group (two-five individuals)
3. Moderate group (five to ten individuals)
4. Large group (ten or more individuals)

Extent of Effect. What is the likely extent of any injury resulting from violation of the standard?

1. Minor (no time lost, only first aid required)
2. Moderate (one to five days lost, medical treatment required)
3. Major (over a week loss, extensive medical treatment required)
4. Total (total disability or death)

We don't anticipate that you will be able to give precise answers to these questions. We expect the answers to be your best estimate based upon your experience and background.

Upon completion and not later than 17 September 1971, please mail this questionnaire direct to:

Human Resources Research Organization
300 North Washington Street
Alexandria, Virginia 22314

ATTN: P.E. Loustaunau

SUBPART E
MEANS OF EGRESS

I have _____ years safety experience in these types of hazards.

HAZARD	Frequency: 1 in 100 (1)	1 in 10 (2)	1 in 3-10 (3)	1 in 2 (4)	Probability of Injury or Damage: 1% or Less (1)	10% (2)	10-30% (3)	50% or More (4)	Number of Persons Affected: 1 (1)	2-5 (2)	5-10 (3)	10 or More (4)	Extent of Injury: No Time Lost (1)	1-5 Days Lost (2)	Over 5 Days Lost (3)	Disability or Death (4)
1910.36 General Requirements																
Inadequate number of exits for conditions																
Places with only one exit																
Egress obstructed or locked shut																
Exit or exit route not marked or illuminated																
Doors to dead-end spaces not properly marked																
No fire alarm (when warranted)																
Construction or repair restricting normal safety																
1910.37 Means of Egress, General																
Unapproved hardware or materials																
Protective exit enclosure:																
Improper materials in construction																
Non self-closing fire doors																
Inadequate egress capacity for number of occupants																
Access to exit through lockable room																
Exterior ways of exit access obstructed																
Exit access routes narrower than exits																
Exit doors concealed or obscured																
Inadequate exit discharge area																
Improper maintenance of doors, hardware, etc.																
Doors swing against exit travel																

Appendix D

OUTLINE OF COMPLIANCE SAFETY AND HEALTH OFFICER COURSE

COURSE OUTLINE SUMMARY

FIRST DAY

Lesson #1 (1 period)

1 hour

Introduction
- Welcome
- Purpose of course
- Course organization
- Course method of approach
- Administrative details

Lesson #2 (3 periods)

2 hours

The Act and OSHA - Overview
- History of the Act
- OSHA organization
- State programs
- Priorities

¼ hour Break

1 hour

Lunch

1 hour

Lesson #2 cont'd

¼ hour

Break

Lesson #3 (1 period)

1 hour

Safety rationale
- It's the law!
- Economic savings
- Production losses
- Morale problems
- Increased quality

½ hour

Discuss second day

SECOND DAY

½ hour

Discuss previous day

Lesson #4 (½ period)

½ hour

Training
- Brief overview of training available to compliance officers (Material provided by OSHA)

Lesson #5 (1 period)

1 hour — The AFGE Union
Brief survey of the union's activities
(Material provided by union)

½ hour — Break

Lesson #6 (1 period)

1 hour — Employer records
Authority for recordkeeping
What forms to review
What to check for
Substitutes for OSHA-101
Other records
Records and citations

1 hour — Lunch

Lesson #7 (2 periods)

2 hours — CSHO tasks and role
Task Flow Diagram
Role of CSHO
Role as a Professional

¼ hour — Break

Lesson #8 (1 period)

1 hour — Administrative preparation for inspection
Advance notice decision
Valid uses
What to do
Pre-fill out of OSHA-1

½ hour — Discuss next day's program

THIRD DAY

½ hour — Discuss second day's program

Lesson #8A (2 periods)

2 hours — Opening Conference
Goals to be achieved
Points to be covered
Part of OSHA-1
Hints
Roleplaying exercise

¼ hour	Break
1 hour	Lesson #9 (2 periods) Employee representation Authorization Union relationships CSHO guidelines Representativeness Employee rights Role of trust Roleplaying exercise
1 hour	Lunch
1 hour	Lesson #9 Cont'd.
¼ hour	Break
1 hour	Lesson #10 (2 periods) Walkaround Plan for covering site Note-taking Role in on-site abatement Trade secrets Interviewing employees
½ hour	Discuss fourth day

FOURTH DAY

½ hour	Discuss third day
1 hour	Lesson #10 cont'd.
¼ hour	Break
2 hours	Lesson #11 (2 periods) Closing conference Goals to be achieved Points to be covered Roleplaying exercise
1 hour	Lunch

	Lesson #12 (1 period)
1 hour	Preparation for Inspection - technical Determine company products, processes, hazards, applicable standards Standards overview. Violations of Standards Index
¼ hour	Break
	Lesson #13A (1 period)
1 hour	Part of Subpart D Guardrails for floors and wall openings, stairs, ladders
½ hour	Discuss next day's program

FIFTH DAY

½ hour	Discuss fourth day's program and first week
	Lesson 13B (1 period)
1 hour	Part of Subpart D and Subpart F Scaffolds, Work Platforms, Manlifts
¼ hour	Break
	Lesson #14 (1 period)
1 hour	Subparts E & L Fire Protection - definitions and egress Fire Protection - hose, portable extinguishers, sprinklers
	Lesson #15A (1 period)
1 hour	Part of Subpart I Personnel Eye and Face protective equipment, and respirators
1 hour	Lunch
	Lesson #15B (1 period)
1 hour	Part of Subpart I and Subpart S Personnel Head and Foot Protection and Personnel Electrical Protection
¼ hour	Break

Lesson #15C (1 period)

1 hour — Part of Subpart I and Subpart K
Industrial noise protection, use of safety belts, medical and first aid standards

½ hour — Discuss next day

SIXTH DAY

Lesson #16 (2 periods)

2 hours — OSHA-1 Series
Explanation of items
Sample OSHA-1, 1C
Practice with OSHA-1A

¼ hour Break

Lesson #17 (2 periods)

1 hour — Seriousness
Levels of seriousness
Definitions
Conditions for a serious violation
Seriousness Exercise

1 hour — Lunch

1 hour — Lesson #17 Cont'd

¼ hour — Break

Lesson #18 (1½ periods)

1½ hours — Use of camera
Explain principles
Hands on use of Polaroid

½ hour — Discuss seventh day

SEVENTH DAY

½ hour — Discuss sixth day

	Lesson #19 (3 periods)
3 hours	Legal elements Why legal elements important Ideas for a strong case Liability and powers of the CSHO Employee rights Contest/Hearing process Legal points exercise
¼ hour Break	
1 hour	Lunch
	Lesson #20A (1 period)
1 hour	Part of Subpart J Sanitation, housekeeping, water supply, toilet facilities, wash facilities, food handling facilities and personnel lunch areas
¼ hour	Break
	Lesson #20B (1 period)
1 hour	Part of Subpart J Temporary campsites
	Lesson #20C (½ period)
½ hour	Part of Subpart J Warning and caution signs
½ hour	Discuss eighth day
	EIGHTH DAY
½ hour	Discuss seventh day
	Lesson #21A (1 period)
1 hour	Part of Subpart G Introduction to Subpart G, Air Contaminants TLV for dust, vapor and gas
¼ hour	Break

	Lesson #21B (1 period)
1 hour	Part of Subpart G Ventilation - Hoods Respiratory Guards
	Lesson #21C (2 periods)
1 hour	Part of Subpart G Ionizing radiation Records maintained to identify personnel with dosage received, use of monitoring equipment, periodic test, notification of exposure procedures
1 hour	Lunch
	Lesson #21C Cont'd
1 hour	Non-ionizing radiation Warning signs (Fig. G-11 OSHA) Power and energy density for exposure
¼ hour	Break
	Lesson #21D (3 periods)
2 hours	Environmental test equipment Hands on use of test equipment (MSA Appliances, light, noise level, electrical)
½ hour	Discuss ninth day

NINTH DAY

½ hour	Discuss previous day
	Lesson #21D Cont'd
1 hour	
¼ hour	Break
	Lesson #22 (½ period)
½ hour	Hazard recognition
	Lesson #23 (½ period)
½ hour	Hazard recognition Using the standards

	Lesson #24 (2 periods)
1 hour	Citations Which employer to cite Grouping violations Abatement period General duty Explanation of forms Sample OSHA-2
1 hour	Lunch
1 hour	Lesson #24 Cont'd
¼ hour	Break
	Lesson #25 (2 periods)
2 hours	Penalties When to recommend Determining gravity Determining penalty adjustment Good faith exercise
½ hour	Discuss next day
	TENTH DAY
½ hour	Discuss ninth day and second week
	Lesson #26 (1 period)
	Site entry problems Authority Types of problems Responses Roleplaying exercise
¼ hour	Break
	Lesson #27 (2 periods)
2 hours	Complaints Validity Sources Evaluation Responses Use of OSHA-7 Roleplaying exercise
hour	Lunch

	Lesson #28 (1 period)
1 hour	Imminent danger Conditions for imminent danger Voluntary abatement Abatement refused
¼ hour	Break
	Lesson #29 (1 period)
1 hour	Use of OSHA-8 Explain items Posting
½ hour	Discuss next day
	ELEVENTH DAY
½ hour	Discuss tenth day
	Lesson #30 (1 period)
1 hour	Subpart M and Part of Subpart H Compressed gases - containers, systems, safety devices - Acetylene, Hydrogen oxygen
	Lesson #31A (1 period)
1 hour	Part of Subpart H Flammable liquids - tank storage, location, handling
¼ hour	Break
	Lesson #31B (1 period)
1 hour	Part of Subpart H Spray finishing and dip tanks, spray booths - ventilation, storage
1 hour	Lunch
	Lesson #31C (1 period)
1 hour	Part of Subpart H Anhydrous ammonia - ventilation storage, location, handling
	Lesson #31D (1 period)
1 hour	Part of Subpart H Explosives handling and storage Definitions, storage Tables, use tables, OSHA standards

¼ hour	Break
	Lesson #31E (1 period)
1 hour	Part of Subpart H LP Gas
½ hour	Discuss twelfth day

TWELFTH DAY

½ hour	Discuss Eleventh Day
	Lesson #32 (2 periods)
2 hours	Subpart S and Electrical part of P Electrical Current overloads, grounding, hazardous locations, transformers conductor guards, junction and switch boxes Grounding of hand-powered tools
¼ hour Break	
	Lesson #33 (2 periods)
1 hour	Subpart O and Guard part of P Machinery guarding and power transmission guards. Guard of power hand tools.
1 hour	Lunch
1 hour	Lesson #33 Cont'd
¼ hour	Break
	Lesson #34 (3 periods)
2 hours	Subpart R Discuss Special Industries Standards
½ hour	Discuss 13th day

THIRTEENTH DAY

½ hour	Discuss previous day
1 hour	Lesson #34 Cont'd

¼ hour	Break
	Lesson #35 (2 periods)
2 hours	Accidents General accident theory Human factors Technological factors Relativity of accident truths Interviewing Use of OSHA-4 Roleplaying exercise
1 hour	Lunch
	Lesson #36 (2 periods)
2 hours	Subpart Q Welding, Brazing, Cutting - ventilation systems, fire protection
¼ hour	Break
	Lesson #37 (1 period)
1 hour	Hazard Recognition
½ hour	Discuss next day

FOURTEENTH DAY

½ hour	Discuss previous day
	Lesson #38A (1 period)
1 hour	Part of Subpart N Materials handling - aisles, storage, docking, trucks, trailers, rail-road cars, use of duck boards, billboards
¼ hour	Break
	Lesson #38B (1 period)
1 hour	Part of Subpart N Industrial trucks - types and use - correct loading and operating
	Lesson #38C (1 period)
1 hour	Part of Subpart N Cranes and derricks - types of rigging

1 hour	Lunch
2 hours	Lesson 39A (2 periods) Maritime Introduction and Longshoring
¼ hour Break	
½ hour	Discuss next day

FIFTEENTH DAY

½ hour	Discuss previous day
2 hours	Lesson #39B (2 periods) Shipbuilding, breaking, repair
¼ hour Break	
1 hour	Lunch
1 hour	Lesson #40A (1 period) Introduction to Construction
¼ hour	Break
1 hour	Lesson #40B (1 period) Excavation, Concrete
1 hour	Lesson #40C (1 period) Steel Tunnels, Caissons, Compressed Air
½ hour	Discuss Next Day

SIXTEENTH DAY

½ hour	Discuss previous day
1 hour	Lesson #40D (1 period) Explosives
¼ hour	Break

Lesson #40E (1 period)

1 hour	Demolition
1 hour	Course Critique
1 hour	Lunch

Appendix E

SAMPLE LESSON PAGE FORMAT

Lesson 14: Fire Exits and Fire Extinguishing Systems - Subparts E and L

Lesson Objective: The student will be able to recognize the more critical hazards and be familiar with less critical hazards of egress and fire protection (Subparts E and L).

Estimated Time to Complete: 1 period

Recognize:

Inadequate number of exits

Exits blocked

Routes and doors not properly marked

Non-self-closing fire doors

Poor maintenance

Inadequate fire alarm

Standpipe and hose systems not properly inspected

Outline of Specific Content to be Covered:

1. Pass out handouts--Introduction

   State objective--Show Slide 14-1-1.

   Read off slide.

2. General: This section contains general fundamental requirements essential to providing a safe means of egress from fire and like emergencies. Nothing in this section shall be construed to prohibit a better type of building construction, more exits, or

Be Familiar With:

Exits and/or discharge area too small.

Doors not properly equipped or mounted.

Construction material inadequate.

Wrong type of portable fire extinguishers - wrong size, inconspicuous, mounted too high, inaccessible.

No provision for personnel escape from CO_2.

Methods and Materials to be Used:

Lecture--Use slides

Handouts--Copies of all slides.

Slide 14-1-1 - Lists of Hazards in "Recognize" and "Be Familiar With" categories.

(Lesson 14 Cont.)

otherwise safer conditions than the minimum requirements specified in this subpart.

Definitions: Use Slide 14-2-1 and define the egress terms listed.

Definitions in the Standard are:

Low hazard contents. Classified as those of such low combustibility that no self-propagating fire therein can occur and that consequently the only probable danger requiring the use of emergency exits will be from panic, fumes, or smoke, or fire from some external source.

High-hazard contents. Classified as those that are liable to burn with extreme rapidity or those from which poisonous fumes or explosions are to be feared in the event of fire.

Ordinary hazard contents. Classified as those that are liable to burn with moderate rapidity and to give off a considerable volume of smoke, but from which neither poisonous fumes nor explosions are to be feared in case of fire.
(Mid-col. p.10494 OSHA)

Width and capacity of means of egress. The capacity in number of persons per unit of exit width for approved components of means of egress shall be as follows:

Level Egress Components (including Class A Ramps), 100 persons.

Inclined Egress Components (including Class B Ramps), 60 persons.

Slide 14-2-1 - Egress Terms: Definition

Low Hazard Content: Fire not self-propagating as in masonry construction, steel furniture, plaster board, etc.

High Hazard Content: Burns extremely rapidly, poisonous fumes or explosion possibility. Gasoline, excelsior, paint highly inflammable material.

Ordinary Hazard Content: Burns moderately, smoke, no explosion or poison; wood damp combustibles.

Level Egress Components: 100 persons, passageway - ordinary entrance.

Inclined Egress Component: 60 persons, ramp, stairs.

Limit of Exit Width: 22 inches.

Minimum Exit Dimensions: 28 inches.

Means of egress shall be measured in units of exit width of 22 inches. Fractions of a unit shall not be counted, except that 12 inches added to one or more full units shall be counted as one-half a unit of exit width.

Units of exit width shall be measured in the clear at the narrowest point of the means of egress except that a handrail may project inside the measured width on each side not more than 3 1/2 inches and a stringer may project inside the measured width not more than 1 1/2 inches.

An exit or exit access door swinging into an aisle or passageway shall not restrict the effective width thereof at any point during its swing to less than the minimum widths hereafter specified. The minimum width of any way of exit access shall in no case be less than 28 inches.

Where a single way of exit access leads to an exit, its capacity in terms of width shall be at least equal to the required capacity of the exit to which it leads.

Where more than one way of exit access leads to an exit, each shall have a width adequate for the number of persons it must accommodate. (Rt. Col. p. 10495 OSHA)

3. Use Slide 14-3-1 and discuss arrangement and access to exits.

The Standard reads:

Arrangement of exits. When more than one exit is required from a story, at least two of the exits shall be remote from each other and so arranged

Slide 14-3-1 - Arrangement and Access to Exits

At least two exits are required.

Access provided to at least two exits.

Doors of side-hinged swinging type, crash bar.

(Cont.)

as to minimize any possibility that both may be blocked by any one fire or other emergency condition.

Access to exits. Exits shall be so located and exit access shall be so arranged that exits are readily accessible at all times. Where exits are not immediately accessible from an open floor area, safe and continuous passageways, aisles, or corridors leading directly to every exit and so arranged to provide convenient access for each occupant to at least two exits by separate ways of travel, except as a single exit or limited dead ends are permitted by other provisions of this subpart shall be maintained.

A door from a room to an exit or to a way of exit access shall be of the side-hinged, swinging type. It shall swing with exit travel when the room is occupied by more than 50 persons or used for a high hazard occupancy.

In no case, shall access to an exit be through a bathroom, or other room subject to locking, except where the exit is required to serve only the room subject to locking.

Ways of exit access and the doors to exits to which they lead shall be so designed and arranged so as to be clearly recognizable as such.

Hangings or draperies shall not conceal exit doors.

Mirrors shall not be placed on exit doors.

Slide 14-3-1 - Arrangement and Access to Exits (Cont.)

Access not through locked room or bathroom.

Access not through high hazard area and non-exits.

Exits well-marked and recognizable.

Exits consist of approved components.

Mirrors shall not be placed in or adjacent to any exit so as to confuse the direction of exit.

Exit access shall be so arranged that it will not be necessary to travel toward any area of high hazard occupancy in order to reach the nearest exit, unless the path of travel is effectively shielded from the high hazard location by suitable partitions or other physical barriers.

Permissible exit components. An exit shall consist of only the approved components. Exit components shall be constructed as an integral part of the building or shall be permanently affixed thereto.

4. Discuss Exit Enclosures using Slide T4-4-1. Highlight these points:

Requirements for enclosed exits and self-closing fire doors.

Construction being fire resistant for one hour for three-story buildings, and two hours for four or more stories.

The Standard reads: Protective enclosure of exits. When an exit is protected by separation from other parts of the building, the separating construction shall meet the following requirements:

Separation shall have at least a one-hour fire resistance rating when the exit connects three stories or less. This applies whether the stories connected are above or below the story at which exit discharge begins.

Fire Exits

Slide 14-4-1

(Lesson 14 Cont.)

Separation shall have at least a two-hour fire resistance rating when the exit connects four or more stories, whether above or below the floor of discharge.

It shall be constructed of non-combustible materials.

It shall be supported by construction having at least a two-hour fire resistance rating.

Any opening therein shall be protected by an approved self-closing fire door.

Openings in exit enclosures shall be confined to those necessary for access to the enclosure from normally occupied spaces and for egress from the enclosure. (Mid. Col. p.10495 OSHA)

5. Exit Maintenance. Use Slide 14-5-1. Discuss each point on the slide.

Maintenance and Workmanship: Means of egress, i.e. doors, stairs, ramps, passages, signs and other components shall be of substantial, reliable construction and shall be built or installed in a workmanlike manner.

Means of egress shall be continuously maintained free of all obstructions or impediments to full instant use in the case of fire or other emergency.

Any device or alarm installed to restrict the improper use of an exit shall be so designed and installed that it cannot, even in cases of failure, impede or prevent emergency use of such exit.

Slide 14-5-1 - Exit Maintenance Requirements

Construction in workmanlike manner.

Exits free of obstructions.

Fool-proof devices to restrict use.

Furnishings/decorations do not hide exits.

Furnishings and decorations. No furnishings, decorations, or other objects shall be so placed as to obstruct exits, access thereto, egress therefrom, or visibility thereof. No furnishings or decorations of an explosive or highly flammable character shall be used in any occupancy. (Rt. Col. p.10496 OSHA)

6. Use Slide 14-6-1. Define Fire Protection terms related to portable fire extinguishers.

Class A fires: Ordinary combustible materials, such as wood, cloth, paper, and rubber.

Class B fires: Flammable liquids, gases, and greases.

Class C fires: Involve energized electrical equipment, where the electrical nonconductivity of the extinguishing media is important. (When electrical equipment is deenergized, extinguishers for Class A or B fires may be used safely.)

Class D fires: Combustible metals, such as magnesium, titanium, zirconium, sodium, and potassium.

Classification of portable fire extinguishers: Classified for use on certain classes of fires and rated for relative extinguishing effectiveness at 70°F by nationally recognized testing laboratories. This is based upon the preceding classification of fires and the fire extinguishing potentials as determined by fire tests. (Rt. Col. p.10601 OSHA)

Slide 14-6-1 - Classes of Fires

Class A Fires:	Ordinary combustible wood, cloth, etc.
Class B Fires:	Flammable liquids and gases.
Class C Fires:	Energized electrical equipment is involved.
Class D Fires:	Combustible metals.

(Lesson 14 Cont.)

Quantity of portable fire extinguishers is shown in Tables L-1 and L-2 page 10603 of OSHA, Slide 14-6-2. Here are the requirements for Class A fires. (Table L-1) Briefly go over Table L-1 and explain it.

Fire extinguisher size and placement for Class A hazards: Minimal sizes of fire extinguishers for the listed grades of hazard shall be provided on the basis of Table L-1.

Extinguishers shall be easily located (specified in Table L-1).

Protection requirements may be fulfilled by several extinguishers of lower ratings for ordinary or extra-hazard occupancies (specified in Table L-1).

Where the floor area of a building is less than that specified in Table L-1, at least one extinguisher of the minimum size recommended shall be provided.

The protection requirements may be fulfilled with extinguishers of higher rating provided the travel distance to such larger extinguishers shall not exceed 75 feet.

Class B Fire requirements. Use Slide 14-6-3 - Liquids not of appreciable depth.

Briefly go over Table L-2 explaining its use.

The Standard reads: Fire extinguisher size and placement for Class B fires other than for fires in flammable liquids of appreciable depth. Minimum sizes of fire extinguishers for the listed grades of hazard shall be provided on the basis of Table L-2.

Slide 14-6-2 - Table L-1

Basic minimum extinguisher rating for area specified	Maximum travel distances to extinguishers (feet)	Areas to be protected per extinguisher		
		Light Hazard Occupancy (sq. ft.)	Ordinary Hazard Occupancy (sq. ft.)	Extra Hazard Occupancy (sq. ft.)
1A	75	3,000	Note 1	Note 1
2A	75	6,000	3,000	Note 1
3A	75	9,000	4,500	3,000
4A	75	11,250	6,000	4,000
6A	75	11,250	9,000	6,000

Slide 14-6-3 - Table L-2
(See next page)

(Lesson 14 Cont.)

Extinguishers shall be located as specified in Table L-2.

Two or more extinguishers of lower rating, except for foam extinguishers, shall not be used to fulfill the protection requirements of Table L-2.

Up to three foam extinguishers may be used to fulfill these requirements.

The protection requirements may be fulfilled with extinguishers of higher ratings provided the travel distance to such larger extinguishers shall not exceed 50 feet.

Fire extinguisher size and placement for Class B fires in flammable liquids of appreciable depth. For flammable liquid hazards of appreciable depth (Class B), such as in dip or quench tanks--Class B fire extinguishers shall be provided on the basis of one numerical unit of Class B extinguishing potential per square foot of flammable liquid surface of the largest tank hazard within the area.

Fire extinguisher size and placement for Class C hazards.

Extinguishers with Class C ratings shall be required where energized electrical equipment may be encountered that would require a nonconducting extinguishing media. This will include fire either directly involving or surrounding electrical equipment. Since the fire itself is a Class A or Class B hazard, the extinguishers are sized and located on the basis of the anticipated Class A or B hazard. (Mid. Col. p.10603 OSHA)

Slide 14-6-3 - Table L-2

Liquids - Depth not Appreciable

Type of hazard	Basic minimum extinguisher rating	Maximum travel distance to extinguishers (feet)
Light	4B	50
Ordinary	8B	50
Extra	12B	50

(Lesson 14 Cont.)

Use Slide 14-6-4--(Extinguisher Location Requirement).

Briefly discuss the points about the location from slide.

The Standard reads:

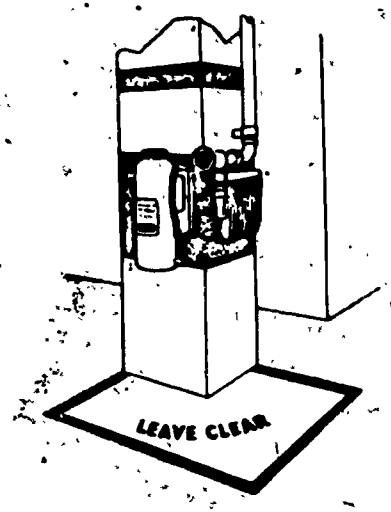
Location. Extinguishers shall be conspicuously located where they will be readily accessible and immediately available in the event of fire. They shall be located along normal paths of travel.

Marking of location. Extinguishers shall not be obstructed or obscured from view. In large rooms, and in certain locations where visual obstruction cannot be completely avoided, means shall be provided to indicate the location and intended use of extinguishers conspicuously.

Marking of extinguishers. If extinguishers intended for different classes of fire are grouped, their intended use shall be marked conspicuously to ensure choice of the proper extinguisher at the time of a fire.

Mounting of Extinguishers. Extinguishers shall be installed on the hangers or in the brackets supplied, mounted in cabinets, or set on shelves unless the extinguishers are of the wheeled type.

Height of mounting. Extinguishers having a gross weight not exceeding 40 pounds shall be installed so that the top of the extinguisher is not more than 5 feet above the floor. Extinguishers having a gross weight greater than 40 pounds (except wheeled types) shall be so installed that the top



Extinguisher Location Requirement

1. Conspicuous location.
2. Marked plainly in bright color.
3. Tops 3 1/2' to 5' off floor.
4. Temperature range 40° to 120° F.

Slide 14-6-4

of the extinguisher is not more than 3 1/2 feet above the floor.

Temperature range. Extinguishers shall be suitable for use within a temperature range of at least plus 40 to 120°F. (Mid and Rt. Col. p. 10602 OSHA)

Portable fire extinguisher inspection and maintenance. Use Slide 14-6-5. Discuss each point listed.

Inspection. Extinguishers shall be inspected monthly, or at more frequent intervals when circumstances require, to ensure they are in their designated places, to ensure they have not been actuated or tampered with, and to detect any obvious physical damage, corrosion, or other impairments.

Maintenance. At regular intervals, not more than 1 year apart, or when specifically indicated by an inspection, extinguishers shall be thoroughly examined and/or recharged or repaired to ensure operability and safety; or replaced as needed.

Extinguishers removed from the premises to be recharged shall be replaced by spare extinguishers during the period they are gone.

Pails or drums of powder-extinguishing agents for scoop or shovel application to metal fires shall be kept full at all times.

Each extinguisher shall have a durable tag securely attached to show the maintenance

Slide 14-6-5 - Inspection and Maintenance

Monthly Inspection

Thorough Annual Inspection

Replaced those under repair

Pails or drums of extinguishing agents to be kept full

Extinguishers tagged to show inspections and maintenance

Hydrostatic tests when warranted

or recharge date and the initials or signature of the person who performs this service.

Hydrostatic tests. If, at any time, an extinguisher shows evidence of corrosion or mechanical injury, it shall be subjected to a hydrostatic pressure test, or replaced. (Rt. Col. p. 10603 OSHA)

Have the students take their handout Table 14-6-1 and briefly review the characteristics of the extinguishers listed.

7. Standpipe and hose systems. Use Slide 14-7-1 and discuss the three classes of standpipe service:

Class I for use by trained personnel has 2 1/2" (large) hose connections.

Class II is for use by building occupants and has small hose connections.

Class III is for use by either.

Hose connections shall be provided within 6 feet of the floor. The connection shall be conspicuously marked.

For Class III, small hose connections shall be located in the corridor adjacent to a stairway enclosure and large hose shall be located in the stairway enclosure. The small hose shall be 50 to 75 feet in length. Pressure for small hose shall be reduced to 80 psi.

Slide 14-7-1 - Classes of Standpipe Service

Class I: For use by trained personnel
Fire Departments (2 1/2" hose)
500 gpm for one standpipe, 30 min.
250 gpm for additional standpipe,
65 psi

Class II: For use by building occupants
100 gpm for 30 min, 65 psi
(1 1/2" hose)

Class III: For use by both building occupants and trained personnel.
Same as for Class I.

TABLE 38-E

SUMMARY OF FIRE EXTINGUISHER CHARACTERISTICS

Type	Class of Fire				Common size	Total wt (lb)	Horizontal range (ft)	In place expelling pressure	Hydrostatic test pressure (psi)	Discharge time (sec/sec)	Classification
	A	B	C	D							
Water Solution											
Pump tank	✓				2½ gal	8	30-40	100	300	60	2-A
Cartridge actuated	✓				2½ gal	8	30-40	100	300	60	2-A
Soda acid	✓				2½ gal	8	30-40	100	300	60	2-A
Stored pressure	✓				2½ gal	8	30-40	100	300	60	2-A
Loaded stream	✓				2½ gal	8	30-40	100	300	60	2-A
Foam	✓				2½ gal	8	30-40	100	300	60	2-A
Wetting agent	✓				2½ gal	8	30-40	100	300	60	2-A
Carbon Dioxide		✓			2½ lb	5	3-4	850	2500	8-10	1-B:C
		✓			5 lb	9	3-6	850	2500	8-10	1-B:C
		✓			15 lb	20	5-10	850	2500	8-10	2-B:C
Dry Chemical	✓	✓	✓		2½ lb	7	8-11	350	1000	8-10	1-A:B:C
	✓	✓	✓		5 lb	12	10-12	350	1000	8-10	1-A:B:C
	✓	✓	✓		10 lb	22	15-20	350	1000	15-20	2-A:B:C
	✓	✓	✓		20 lb	36	20-25	350	1000	15-20	10-B:C
	✓	✓	✓		30 lb	55	20-25	350	1000	15-20	20-B:C
Dry Powder (Metal fires)				✓	30 lb	55	6-8	50	250	30*	
Liquefied Gas	✓	✓	✓		2½ lb	6	3-5	350	1000	10*	4-B:C

NOTES

*May be operated intermittently

*Limited to small fires for best results follow up with water

*Not satisfactory for fires of water-miscible solvents such as alcohol and certain types of foam as of polar type

*U.S. Dept. of Transportation or Board of Transport Commissioners of Canada may require testing at more frequent intervals

*Models using factory sealed disposable (nonrefillable) containers are not subject to hydrostatic testing

*Models using multipurpose dry chemical are effective on Class A fires

*Several different dry powders may be used; their effectiveness depends on material that is burning

*Limited to small fires

*Dry chemical extinguishers with stainless steel, aluminum, or soldered brass shells should be tested at 5 year intervals

Source: National Fire Protection Association

Table 14-6-1

Water supplies - minimum supply for Class I service:

Service shall be sufficient to provide 500 gpm for a period of at least 30 minutes.

For more than one standpipe, the minimum supply shall be 500 gpm for the first standpipe and 250 gpm for each additional standpipe.

Total supply not to exceed 2,500 gpm for a period of at least 30 minutes.

The supply shall be sufficient to maintain a residual pressure of 65 psi at the topmost outlet of each standpipe (including the roof outlet) with 500 gpm flowing.

Minimum supply for Class II service.

Service shall be sufficient to provide 100 gpm for a period of at least 30 minutes.

The supply shall be sufficient to maintain a residual pressure of 65 psi at the topmost outlet of each standpipe (including the roof outlet) with 100 gpm flowing.

Minimum supply for Class III service.

Service shall be the same as for Class I service. (Rt. Col. p.10604 OSHA)

(Lesson 14 Cont.)

8. Carbon Dioxide Extinguishing Systems: Fixed Carbon Dioxide Extinguishing Systems shall be inspected and tested annually for proper operations. Cylinders shall be weighed semi-annually.

   Provisions shall be made for: warning personnel when the system is used, prompt evacuation of personnel, rescue of trapped personnel.

9. Fire Alarm Signalling Systems: Fire Alarm boxes shall be conspicuously located, accessible, and securely mounted.

   A box must be within 200' of any location of the site.