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Instructors' Manual on Achieving Health and Safety in the Building and Repair of Ships and Boats

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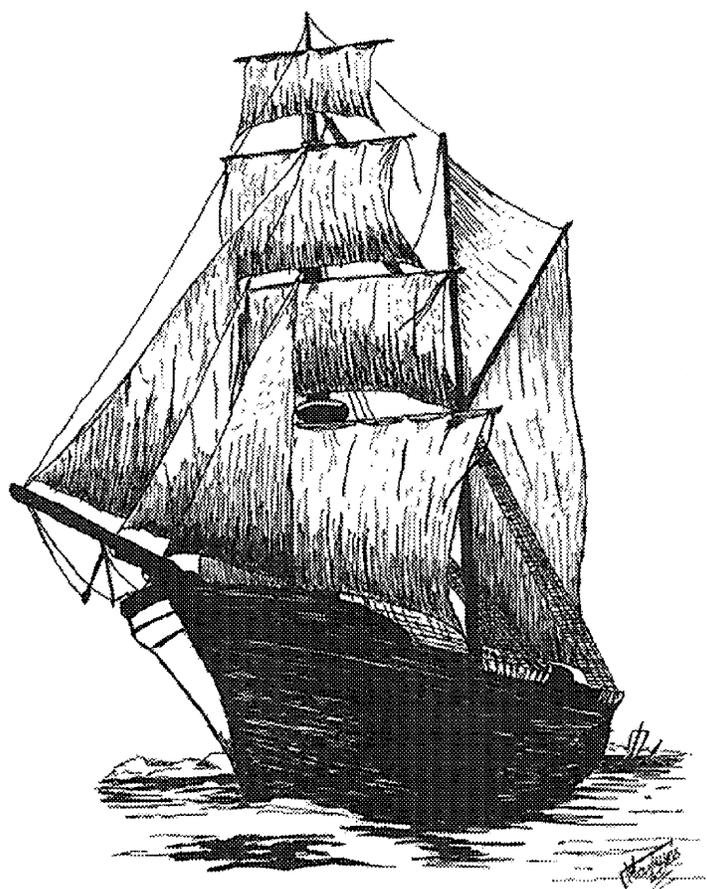
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**INSTRUCTORS' MANUAL ON:
ACHIEVING HEALTH AND SAFETY
IN THE BUILDING AND REPAIR
OF SHIPS AND BOATS**



**By the
Bureau of Labor Education
The University of Maine**

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INTRODUCTION AND FORMAT

This manual contains step by step approaches that instructors can use when teaching from the project book entitled: *Achieving Health and Safety In The Building and Repair of Ships and Boats*. The chapters in this manual match those contained in the book. Each chapter is broken down into the following sections:

A. Summary

Provides a brief narrative highlighting the specific law(s) and/or approaches under that topic. This can be used as introductory background for the instructor prior to the start of a class or program.

B. Need

The need for the law(s) and/or approaches is explained via the safety and health conditions which led to their adoption.

C. Definitions

Occupational health and safety terminology that is used. What does it mean and how is it applied?

D. Concepts

All the concepts discussed in the project book are significant and important. The concepts included in this section comprise the basic principles or major information upon which the law or approach is based. These concepts can be used by the instructor to explain, clarify, and/or emphasize the key issues of the topic discussed in that chapter. However, this section should not replace a complete study of the topic in the project book itself.

E. Objectives

These learning objectives for program participants direct the instructor to what a good teaching plan should be, and what participants should learn from the program and book.

F. Activities

This section presents ways and methods for teaching about the material contained in the corresponding chapters in the project book in order to accomplish the stated objectives. These activities include teaching approaches designed to facilitate participant learning through small group discussion and case studies followed by suggested questions. Through the discussion generated from these activities, participants have an opportunity to apply what they have learned through the program, as well as utilize their own practical work experience and knowledge.

The instructor should teach program participants to find the detailed answers to case study questions by using the index, and the question and answer narrative contained in the project book. To assist the instructor, detailed answers to the case study questions also are provided at the end of each chapter in the *Instructors' Manual*. Copies of the case studies without answers are provided in Appendix I of this *Manual*. This will enable the instructor to replicate the case studies for use in future programs. In addition, these case studies (without answers) also can be found at the end of each chapter in the project book.

Appendix II contains a Self Inspection Check List which can be reviewed and utilized with participants when teaching about hazard recognition. Appendix III is comprised of teaching resources for enabling the instructor to make overhead or computer projector transparencies on hazard recognition, occupational health and safety law, safety and health committees, and suggested safety structures. And finally, Appendix IV contains two survey evaluation questionnaires which can be administered to participants for obtaining important evaluation feedback on the program. The first survey, to be administered right after a program is conducted, is designed to measure initial participant evaluations of the program and project book. The second survey, which should be administered approximately two months later, is designed to assess the overall longer term impact and effectiveness of the program and book.

Resources - For all the chapters in this *Instructors' Manual*, pages 51 through 59 of the project book, *Achieving Health and Safety In The Building and Repair of Ships and Boats*, contain a list of additional resources the instructor can consult and read for background in preparing for a program. This list includes internet resources, printed OSHA materials, OSHA regulatory standards for boatyards and shipyards, video, periodical, and related resources including those for special safety training.

G. Issues

This subdivision provides discussion questions that might be of added interest or useful inquiry for program participants.

CHAPTER I

IDENTIFYING AND ABATING HAZARDS IN SHIP/BOAT BUILDING AND REPAIR

A. Summary

A very important step necessary for reducing accidents, injuries, and occupational diseases in ship/boat building and repair, involves establishing ongoing education on hazard identification and abatement for employees and employers. While there are many commonalities in hazards across the ship/boat building and repair industries, there are also some major differences, and also much diversity based on the size and type of the operation. This chapter discusses approaches instructors can use for developing a program to identify and abate hazards in these industries.

B. Need

Shipyard work is very hazardous, with an injury-illness incidence rate of 16.6 that is more than twice that of construction and general industry.¹ While boatyard work is more diverse, and usually smaller in scale, it also poses many serious risks to workers. Hazards in shipyards and boatyards include exposure to toxic substances, ergonomic injuries, hazardous atmospheres, electrocution, falls, fires, and explosions, among others.² Effective safety and health programs, particularly those involving hazard recognition and abatement, can help to eliminate or minimize such hazards.³

C. Definitions

1. Asphyxiant - any substance that denies oxygen to the body: simple asphyxiant-an inert substance merely displacing air or oxygen (nitrogen);chemical asphyxiant- any substance capable of chemically bonding to blood cells preventing the use of oxygen by the cells (carbon monoxide).
2. Flashpoint - the lowest temperature at which a material will generate a flammable vapor.
3. Fume - a condensed vapor of molten metal.
4. Galvy Poisoning - illness resulting from exposure to zinc fume from welding or burning galvanized metal.
5. Hazard - a source of risk or danger which can cause or produce an accident, injury, and/or occupational disease.
6. Mesothelioma - cancer of the lining of the body cavity (usually around the lungs).

7. PEL - Permissible Exposure Limit - an exposure limit that is published and enforced by OSHA as a legal standard.

¹U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): "Safety and Health Topics: Ship Building and Repair," and U.S. Dept. of Labor, Bureau of labor Statistics, Injury and Illness Incident Rates, 2002, p. 1 (The incidence rate for private industry is 5.3).

<http://www.osha.gov/SLTC/shipbuildingrepair/index.html#Processes%20and%20Related%20Hazards>

² OSHA: <http://www.osha.gov/SLTC/etools/shipyard/index.html>

³ OSHA: http://www.osha.gov/SLTC/etools/shipyard/shiprepair/sr_index.html

8. Process - a series of actions or operations or continuous treatments leading to a particular result.
9. PSM - Process Safety Management; the management of highly hazardous chemicals in processes exhibiting one or more of these characteristics; flammable, toxic, reactive or explosive.
10. Promulgated - to proclaim or to put a law into action or force.
11. Reactive - readily responsive to heat, light, pressure, air, or incompatible materials.
12. Systemic Poison - affecting the body generally, acting through bodily systems after ingestion or absorption.
13. TWA - Time Weighted Average concentration; refers to airborne concentrations of toxic materials which have been measured and weighted for a certain time duration, (sample measured over a one hour duration and extrapolated into an 8 hour exposure).
14. TLV - Threshold Limit Value; a time-weighted concentration under which most persons can work 8 hours per day, day after day, with no harmful effects. A table of values for substances is published annually by the American Conference of Governmental Industrial Hygienists.
15. Toxicity - a relative property of a chemical agent referring to a harmful effect on some biological mechanism and the condition under which this effect occurs.
16. Toxin - a poisonous substance.
17. Welder's Flash – inflammation of the cornea from exposure to the ultraviolet radiation of electric arc welding.

D. Concepts

1. Ship/boat building and repair have several characteristics in common. Both industries involve the construction and repair of vessels, often but not always next to or on the water. There are many extremely hazardous conditions and job tasks frequently associated with both industries. In general, the larger the boatyard facility or operation, the more similar it will be to a shipbuilding facility.
2. While shipbuilding typically involves working primarily with metals as the most fundamental material, boat building varies greatly, depending on whether the operation builds boats of fiberglass, metal or wood. In addition, while shipyards are typically quite large, the size and nature of boat building operations ranges from larger manufacturing plants where boats may be mass produced, to small boatyards with only a few employees, to backyard boat building projects with only one individual or a family involved in the construction of the boat.
3. Boat builders need to be especially mindful of a number of different hazardous substances, depending on the materials in which they are coming in contact with at work. At a minimum, sufficient ventilation and personal protective equipment, including but not limited to safety glasses, hearing protection, gloves, protective footwear, and respirators are among the basic precautions that are critically important in a boatyard, in addition to complying with all applicable OSHA standards.

4. Wood dust is one of the most commonly encountered chemical hazards in boat building, particularly in the construction of wooden boats.⁴ Methylene chloride (MC)⁵ and styrene⁶ are also major concerns in boat building and repair, and there are detailed guidelines for working with these chemicals. Other chemical hazards in the boat building industry include: epoxy resins, methyl ethyl ketone peroxide (MEKP)⁷, sodium hydroxide, toluene, acetone, isocyanates⁸, and even such natural materials as turpentine and pine tar.⁹ Manufacturers of aluminum boats may encounter hazards similar to those found in shipbuilding, such as welding hazards.

5. Boat builders, whether at the commercial boatyard or in the backyard boat shop, can protect themselves by keeping their shops well ventilated and clean, and by following product safety information. Boatyards that comply with OSHA 1910, General Industry standards (*CFR 29, Labor*) should consult Subpart Z, Toxic and Hazardous Substances, Parts 1915.1000 through 1915.1450. OSHA 1915, Shipyard Industry, also covers hazardous substances under Subpart Z, and under the same parts as the 1910 standards.

6. For both shipyards and boatyards, it is useful to divide occupational illness and injury into three major categories: accidents or injuries, chronic ergonomic and noise injuries¹⁰, and occupational illnesses, both acute and chronic. Since accidents are typically discrete events and are more easily observable and documented, much training material tends to focus on accidents. However, it is extremely important for workers to be aware of other workplace hazards that may cause potentially debilitating chronic injury and illnesses as well.

7. A useful approach to hazard recognition, the ability to identify hazards specific to a work area, process, and/or environment, is to break down the potential hazards and the resulting injuries or illnesses that may result, into general categories of similar cause and effect.

⁴ See OSHA guidelines and information on wood dust at: <http://www.osha.gov/SLTC/wooddust/recognition.html>

⁵ See OSHA guidelines on exposure to methylene chloride: <http://www.osha.gov/SLTC/methylenechloride/factsheets/mcfsno1.html>

⁶ See OSHA guidelines on styrene exposure: <http://www.osha.gov/SLTC/styrene/solutions.html> and NIOSH information: <http://www.cdc.gov/niosh/pel88/100-42.htm>

⁷ See NIOSH information on methyl ethyl ketone peroxide (MEKP): <http://www.cdc.gov/niosh/pel88/1338-23.html>

⁸ For NIOSH information on isocyanates, see: <http://www.cdc.gov/niosh/topics/isocyanates/>

⁹ The use of these chemicals is well documented from many resources available to boat builders; although much of the regulatory language governing their use is found in the OSHA 1910 General Industry Standards, rather than being specific to boat building. See, for example, David W. Carnell, "Safe Boatbuilding", <http://www.messingaboutinboats.com/archives/mbissuejanuary01.html>.

Note: For additional information on MSDS please see <http://ilpi.com/msds/index.html> under the OSHA, NIOSH, and Other Government Resources Section located in the Safety References Section of this manual. Electronic Material Safety Data Sheets should be used as a reference only due to the possibility of power failure or computer malfunction during emergencies.

¹⁰ Noise injuries are included in this category along with repetitive motion and other ergonomic injuries. They are similar in that they both tend to be long-term and cumulative in nature, and may both result in nerve damage, although noise would not typically result in musculo-skeletal injury.

8. The general Hazard Recognition Program contained in this instructor's manual and the project book, was developed originally by the Labor Education and Research Service at Ohio State University. These hazard categories can be used easily by employees and employers in everyday work settings to recognize, reduce and abate such hazards:

- | |
|--|
| <ol style="list-style-type: none">1) <u>Falling Hazards</u>2) <u>Struck By or Striking Against Hazards</u>3) <u>Getting Caught Hazards</u>4) <u>Contact Hazards</u>5) <u>Inhalation and Swallowing Hazards</u> |
|--|

9. This five-category system of Hazard Recognition is highly effective for identifying workplace risks and dangers in the building and repair of both ships and boats. Here are some examples from these industries, keeping in mind the special hazards common to each industry – particularly heavy metal exposure, explosions, and confined space hazards in shipyards, and exposure to toxic chemicals such as styrene and other toxics in boatyards.

10. Workplace Hazards in Ship/Boat Building and Repair, with Selected Examples:

A. Falling Hazards – There are two types of falling hazards: falls from a higher to lower level, and falls on the same level. Examples of ship/boat building and repair work where these hazards exist include:

- work around unguarded areas and edges on a ship or boat, including hatches;
- surface preparation and descaling from staging, decks, and end and wing walls of dry docks, where falls are complicated by a drowning hazard;
- falls from an overturning ship during dry docking and launching operations;
- fabricating and repairing large structural components, where falls can result in drowning; and
- falls due to poor housekeeping practices, such as failure to remove debris, tools and equipment, or ice from a work floor or surface.

B. Struck By or Striking Against Hazards – These hazards occur in ship/boat building and repair work where employees can be struck by objects, materials, equipment and/or vehicles. Often such hazards result from unsafe work practices, poor planning, and lack of training. Examples of hazards in ship/boat building and repair that fall under this category involve:

- handling large materials can lead to injuries associated with moving equipment for boat/ship building and repair (cranes, derricks, hoists, travel lifts, powered industrial trucks, etc.);
- injuries caused by objects falling from carrying devices, similar to construction industry;
- powered industrial truck operations in shipbreaking, building and repairing;
- work where materials or equipment are improperly stored or handled overhead; and
- work where equipment, machinery, power tools or instruments are not fitted with appropriate guards.

C. Getting Caught Hazards – The three common types of hazards found in this category include caught in, caught on, and caught between. Examples of ship/boat building and repair work where these problems can occur encompass:

- injuries, fatalities associated with an overturning ship during dry docking and launching operations;
- traumatic injury among divers while using underwater hull cleaning devices, where divers may get caught by moving brushes or the current created by the impeller;
- injuries from fire, asphyxiation, and toxic exposures upon entry into confined spaces during fitting out process;
- spaces with limited openings for entry and exit with unfavorable natural ventilation — not intended for human occupancy — can readily aggravate a hazardous exposure because of its design (e.g., double bottom tank, wing tank, cofferdam); and
- unexpected complications associated with a relatively large confined space such as boat freezers, where explosions can occur.

D. Contact Hazards – Hazards within this category are quite varied. They include contact with: extreme temperatures resulting from hot or cold working surfaces that are not covered or shielded adequately; electrical current from improperly grounded or maintained electrical equipment, machines, or wiring; dangerous, toxic working materials, substances, chemicals, and vapors; welding hazards, and exposure to excessive noise without adequate hearing protection. Employees and employers need to pay particularly close attention to electrical hazards, which according to OSHA, constitute the second highest cause of job-related fatalities in the U.S. Also, ergonomic hazards are in this contact category, such as unsafe work actions or procedures caused by aggravated, repetitive motions; forced and strained exertions, excessive vibration, and strained or awkward postures over extended periods of time. (See Appendix I of the project book, “Shipyard Trade Occupational Risk Matrix (STORM),” for further information on ergonomic injuries in shipbuilding). Examples of some ship/boat building and repair hazards in this area include:

- fitting out work exposes workers to electrocution hazards from portable electric hand tools, or working on a ship’s electrical circuits;
 - hearing loss from noise is pervasive in fitting out work; engineering controls are difficult to implement because workstations are not fixed;
 - fitting out work also may expose workers to frost bite, hypothermia, heat exhaustion, heat cramps, dehydration, etc., from exposure to extreme weather;
 - underwater work on ships can cause decompression sickness among divers while making temporary underwater hull repairs;
 - fires and explosions from explosive atmospheres in tanks during tank cleaning for ship repair; and;
 - ionizing radiation not only on conventionally powered but also on nuclear powered vessels.
- [1915.57]

E. Inhalation and Swallowing Hazards – These hazards result from toxic vapors and substances released into the work environment. Such worksite toxics may not only contaminate water and food consumed by workers, but also may be absorbed through the skin. Examples of these hazards found in ship/boat building and repair are:

- respiratory irritation and systemic poisoning from exposure to toxic fumes and particles from welding and painting operations;
- respiratory damage and systemic poisoning from exposure to toxic substances used in boat building and repair;
- lead poisoning during stripping and chipping operations involving lead paints;
- respiratory damage or chronic disease from exposure to asbestos;
- damaging exposure to pigments, anti-fouling and anti-rust paint components (e.g., organo-mercury compounds, copper oxide, arsenic, organo-tin compounds, cadmium, and chromium).

Many hazards fall into more than one category. For example, a worker may be exposed to danger in a confined space where there is a hazard from explosion or inhalation of toxic fumes.

11. Using a “Worksite Systems” Approach for Hazard Recognition and Abatement in Ship/Boat Building and Repair:

A. The University of Maine/Bureau of Labor Education “Worksite Systems” approach is based on an “organizational systems” model or way of thinking. This approach looks at a worksite or work situation as a system of interacting and interdependent parts, within a larger environment or context. This can be thought of as a *worksite system*.

B. Each part or element of the worksite system, and its environment – such as the employer, employees, contractors, and the physical environment (including weather or bodies of water) -- may potentially affect the functioning of the other parts. The worksite system and its environment is not a single snapshot or “still shot” at one point in time; rather, it is a constantly changing, dynamic process that is not entirely predictable. And larger worksites, with more elements, will be more complex.

C. Most workers and supervisors use such a dynamic “systems” approach intuitively, at least to some extent, in their planning and thinking in daily life. Similarly, when dealing with hazardous situations or machinery, an employee and/or employer must be able to anticipate or project possible outcomes based on his/her decisions, and also must take into account the possible actions or behaviors of other workers and supervisors, as well as the physical conditions. Of equal importance, the employer must do a job hazard analysis during each phase of the work, and each specific task assigned, and communicate this important hazard information to all employees and supervisors involved in the work.

D.. Systems also involve inputs (e.g., labor, raw materials) and outputs (e.g., a completed physical structure or service), as well as some kind of work process which transforms the inputs into outputs. A worksite system has certain goals as well; such as completing a ship or boat structure within time deadlines, keeping within cost limits, and maintaining high quality.

E. Within a system such as a shipyard or boatyard, each part or element can be seen as playing a certain role or function within the system. When the parts mesh well together, the worksite system as a whole will tend to work smoothly, at least in theory – the project or tasks for each day or week are completed, deadlines are met, quality is attained, goals are fulfilled, morale is high, and workers leave at the end of their work day without accidents or hazardous incidents. Unpredictable occurrences are dealt with effectively.

F. On the other hand, if there is a problem with one or more of the pieces or elements – a crucial part does not come in when promised, bad housekeeping creates a hazard, communications are unclear, a key worker gets sick, or a machine malfunctions – the whole system may come to a grinding halt. This worksite systems model also highlights the key importance of appropriate, clear and complete information, and of effective communications. In other words, it is not only important to have the necessary labor, tools, materials, and technical plans; it's also critical to ensure that necessary information gets communicated effectively to different players.

G. This organizational systems approach to worksites can be very useful when applied to issues of health and safety in boatyards and shipyards. Experienced workers, supervisors, and others who analyze both the “big picture” (the workplace system as a whole) AND the individual elements or parts, often use this perspective intuitively, because it works.

H. Two major advantages of the worksite system model are that a) it can be applied to any situation, and b) it can be used to analyze the potential for different possible outcomes over time. For example, the combination of inexperienced workers and/or managers, old or malfunctioning equipment, poor communications and hazardous weather conditions may greatly increase the probability of serious workplace accidents occurring at a given workplace.

I. One last element of a worksite, considered as a kind of organization, is that it tends to develop its own workplace culture or set of beliefs, values and norms over time. Even identifiable occupational groups tend to develop their own subcultures, such as an emphasis on “toughness” or bravado. Whatever “rules” exist at any workplace, the informal culture may or may not support responsible health and safety practices. Any perceptive person who begins work at a new site quickly learns about the informal values and expectations of behavior at the site. Is the habit of “cutting corners” usually overlooked? Is a person's maximum standard performance typically at the minimum standard set for that job?

J. To summarize, workers, supervisors, owners and contractors can apply this worksite systems approach to analyze and abate specific hazards, as well as unsafe or unhealthy conditions or practices in shipyards and boatyards. This approach can help all the players at the worksite to work jointly to *identify and maximize* those factors and resources promoting safety and health within their work environment, and to *minimize and/or correct* those factors and conditions preventing the attainment of a safe and healthful worksite.

K. Appendix II-A of the project book, *Achieving Health and Safety in the Building and Repair of Ships and Boats*, lists some of the key factors promoting or undermining worksite safety and health, and can be used to help conduct a worksite systems analysis. In addition, Appendix II-B (in the project book) provides illustrations of some of the key elements in a worksite system, and offers a worksite systems analysis of an accident developing across time.

E. Objectives

1. Participants will be able to:

- A. list and describe the five major categories of the hazard recognition program, and provide specific examples of each hazard in their area of employment;
- B. develop solutions and propose abatement methods for identified hazards;
- C. discuss how the worksite systems approach can be used for identifying and resolving challenges impeding the attainment of a safe and healthful workplace or site.
- D. demonstrate an understanding of how to use and/or apply other resources and organizations for identifying and abating hazards.

F. Activities

1. In order to teach about the process of hazard identification, instructors should:

- A. discuss the important role hazard recognition programs can play in the workplace; (Sections A & B provide useful information as a starting point for generating this dialogue).
- B. have students learn and gain an understanding of the definitions cited in section C;
- C. review and discuss all of the concepts contained in section D;
- D. educate participants about the process of hazard recognition by reviewing the Self Inspection check list contained in Appendix II. In addition, Appendix III contains teaching resources that can be made into transparencies on hazard recognition for use with an overhead or computerized projector;

2. In conjunction with the previously cited activities and resources, instructors should have participants break into small groups to discuss the case studies for this chapter. These case exercises, which start on the next page, correspond with those contained at the end of the first chapter in the project book. Each group working on a case study should select a team spokesperson will be responsible for summarizing and reporting on the group's findings and recommendations.

Chapter I: Case Study Exercises

Case I

Discuss and identify the hazards you are exposed to where you work.

1. Using the information and approaches cited previously in this chapter, develop strategies for abating these hazards.
2. How can labor and management work effectively to abate occupational safety and health hazards?

Answer:

The team spokesperson should serve as the group facilitator by asking participants to identify the types of hazards they are exposed to at their worksite, and generating discussion on the case questions dealing with these hazards. Some examples of possible hazard areas can include:

- Dust control: Dust removal equipment in proper working order;
- Clean filters in dust removal equipment;
- Clean out collection containers in collection equipment;
- Need and use of respirators;
- Chemical Vapors: Need for prior notification to employees when vapors are introduced into the workplace;
- Know MSDS hazard information on chemicals used in the workplace;
- Housekeeping: Keep walking and working surfaces clear of debris;
- Awareness of changing weather conditions and the impact on walking surfaces.

Case II

“A burner working in a confined space noticed that it was five minutes past the start of lunch break. In hurrying to get to the lunch area, he did not completely close the gas valve on his torch. Neither did he take the time to disconnect or shut off the gas supply to the torch at the manifold on deck, as he was taught to do in training. The escaping gas mixed with the air in the space until its explosive potential was reached and an electrical spark from equipment in the space ignited the mixture causing an explosion and fire. Fortunately, all the workers had left the area for lunch and no injuries occurred.”¹¹

1. Identify the specific hazards in this case.

Answer:

There were several hazards involved in this case. These included contact hazards caused by escaping gas from the valve not completely shut off on the torch, as well as electrical, explosive, and fire hazards when the escaping gas was ignited by an electrical spark. Inhalation hazards also were created from the resulting explosion and fire.

¹¹ Source: U.S. Department of Labor, OSHA, “Safety and Health Injury Prevention Sheets: Working with the Shipyard Industry”; http://www.osha.gov/dts/maritime/sltc/ships/ships_combined.pdf (Process: Hot Work, p. A23)

2. What preventive measures should be taken to avoid this problem in the future?

Answer:

“Although the worker’s haste in leaving the area without ensuring that the valves on the torch were tightly shut off contributed to this accident, the fact that the gas supply was not shut off at the manifold as procedure required was the root cause of this accident. It is good practice to shut off the gas at a point outside the confined space when the torch is to be left unattended for a substantial period of time, such as during the lunch hour. It is even better practice to remove the torch entirely from the confined space any time the space is unattended to eliminate the hazard. However, 29 CFR section 1915.52(a)(4) only requires the torch and hoses be removed from the space entirely when it is left unattended for longer periods, such as overnight. The accident investigation revealed that even though workers were trained to shut the gas supply off at the gas manifold, some supervisors were lax in enforcing this rule. These circumstances clearly had the potential for catastrophic consequences.”¹²

To prevent this accident from recurring in the future, supervision has a responsibility to make sure that the gas supply is shut off properly at the manifold, and to make sure this rule is carried out adequately through effective enforcement at all times. Also, as cited previously, it would be “even better practice to remove the torch entirely from the confined space any time the space is unattended to eliminate the hazard.”¹³

3. Whose responsibility is it to make sure this problem does not happen again?

Answer:

Under the general duty clause of the Occupational Safety and Health Act, as well as specific OSHA standards applicable to this work situation, management has the responsibility to make sure this problem does not happen again. In addition, once they have been informed of the applicable OSHA standards, rules, and regulations, as well as the employer’s safety rules, policies, and procedures, employees are responsible for complying with them.

Case III

An employee was working on a deck where a crane was being used to transport materials. As the worker was directing the crane, she started walking backwards, signaling as she went. The worker experienced a major injury when she accidentally stepped off the deck.

1. What was the hazard and unsafe practices which caused this injury?

Answer:

The hazard of this case involved a falling hazard resulting from an elevated work area. The unsafe practices causing this injury encompassed exposure to an unguarded deck edge with no adequate guardrail, a lack of a personal fall arrest system, and a lack of proper planning and coordination regarding the work.

¹² Ibid.,

¹³ Ibid.,

2. What OSHA violations were committed?

Answer:

The following OSHA standards were violated:

Shipyard Industry

- 1915.73 Guarding of Deck Openings and Edges
- 1915.159 Personal Fall Arrest Systems (PFAS)

1910 General Industry (Boatyards)

- 1910.23 Guarding floor and wall openings and holes
- 1910.23 (a) (7) *Protection for floor openings*. Every temporary floor opening shall have standard railings, or shall be constantly attended by someone.
- 1910.23 (c) (1) *Protection of open-sided floors, platforms, and runways*. Every open-sided floor or platform 4 feet or more above adjacent floor or ground level shall be guarded by a standard railing (or the equivalent as specified in paragraph (e) (3) of this section) on all sides except where there is entrance to ramp, stairway, or fixed ladder. The railing shall be provided with a toe board wherever, beneath the open sides.
- Fall protection and fall restraint come under the heading for this standard which is Powered Platforms for Building Maintenance. If the employee had been wearing fall protection the degree of injury would most probably have been reduced. If the employee had been using fall protection for restraint purposes then the employee would not have been able to step off the deck.
- Section 5 (a) (1) The General Duty Clause. The employer may be cited under the General Duty Clause if the employer has a policy in place to prevent this fall from happening and the policy was not followed.

3. What actions should have been taken to avoid the injury?

Answer:

There are a number of actions that should have been taken to avoid this injury. First, proper planning and coordination of the work to be done should have been initiated by the supervisor, the crane operator, and the worker directing the crane. This planning should have included an assessment of all the hazards involved in this work operation. Other actions that needed to be taken involved proper compliance with all the applicable OSHA standards just cited.

Case IV

A worker went to see his doctor, and reported that he had been having low back pain for some time. Until recently, he had dismissed his symptoms as those associated with the job, and with aging, and had been treating himself with ibuprofen. “As a burner and welder he would frequently perform his work while bent over at the waist for long periods of time. Lately, he had been experiencing severe pain when bending at the waist, and had developed a weakness in his left leg that seemed to be getting worse.” Finally, he decided to seek medical treatment.¹⁴

1. What is the likely source of this worker’s pain?

Answer:

“Bending forward at the waist and maintaining a bent-over posture places significant strain on the lower back, compresses the spine, and over time can cause damage to the shock absorbing pads or disks which are located between the vertebrae. In this case, a herniated or ruptured disk developed creating pressure on the spinal cord and the nerves to the worker’s leg.”¹⁵

2. What kinds of hazards are present in this situation?

Answer:

Unhealthy, improper positioning of the body when performing repeated, stressful work operations has created a significant and harmful ergonomic hazard.

3. Given the demands of this job, how might this kind of situation be avoided?

Answer:

“Maintaining strength and flexibility in the muscles of the abdomen, back, buttocks, and thighs will reduce the risk of back injury. Whenever possible, work should be positioned to avoid or limit the amount of bending required. When work must be performed in a bent position, stopping and stretching periodically will help strained muscles to recover.”¹⁶

4. What are the possible solutions or responses to this situation? Is this problem only the worker’s responsibility? If not, why not?

Answer:

While the worker should have reported his back pain problem when it first started, this is an occupational safety and health issue that both labor and management should have addressed way before it reached this point. The human body is not a machine. Proper and sufficient identification of this ergonomic problem could have been realized through a joint labor/management hazard identification program. Based on this identification, specific steps could have been taken to avoid or at least reduce the continued repetitive work and positioning that caused this injury. For example, the following possible actions could have

¹⁴ U.S. Department of Labor, OSHA, “Safety and Health Injury Prevention Sheets: Working with the Shipyard Industry”; http://www.osha.gov/dts/maritime/sltc/ships/ships_combined.pdf (Process: Hot Work, p. A7)

¹⁵ Ibid.,

¹⁶ Ibid.,

played a helpful role: training to reduce improper body positioning, job redesign to reduce repetitive work stress, and medical analysis focusing on intervention techniques. In addition, where possible and feasible, job rotation to allow this employee to perform another work operation not stressful to his back, would have been very helpful.

Case V

A new worker at a shipyard had been assigned to perform welding and other hot work in an outside location on a metal surface which had been coated with toxic coatings involving epoxies and lead-based paints. She had done this type of work before in enclosed spaces, but because this job was outside in the open air, she believed that there was sufficient ventilation, and assumed that no protective equipment was needed.¹⁷

1. Was this worker correct in her assessment that she did not need respiratory protection?

Answer:

No. "Hot work performed on potentially toxic materials in open air may result in over exposure if adequate precautions to protect workers are not taken. This employee assumed incorrectly, that because she was working outside she did not need to wear a respirator ."¹⁸

2. What kinds of hazards are present in this situation?

Answer:

"Hot work performed on surfaces coated with toxic preservative coatings may result in employee illness. As noxious fumes, gasses, and particularly odors are frequently emitted by these coatings when heated, workers are prone to report such exposures immediately."¹⁹

3. What steps or strategies should be followed in this case, by both the employee and employer?

Answer:

"Filter type respirators may be used in most cases for open air hot work on potentially toxic materials. Employees must be properly trained in respirator usage and fit-tested. Additionally, tool room or other personnel who dispense respirators and cartridges should receive training in order to ensure that the correct equipment is being issued. Hot work on beryllium-containing materials will require the use of airline respirators even when performed outdoors."²⁰

¹⁷ Based on information from U.S. Department of Labor, OSHA, "Safety and Health Injury Prevention Sheets: Working with the Shipyard Industry";
http://www.osha.gov/dts/maritime/sltc/ships/ships_combined.pdf
(Process: Hot Work, p. A27)

¹⁸ Ibid.,

¹⁹ Ibid.,

²⁰ Ibid.,

Case VI

“A worker performing hot work on a bulkhead stripped back the paint four inches where the welding was to be done, and began working. As the heat passed through the bulkhead, the epoxy paint on the other side of the bulkhead in the adjacent space began to smolder. Several employees working in the adjacent space were quickly affected by the noxious fumes and exited the space. Their eyes were burning and their throats were already becoming sore. They were advised to go to the medical department for treatment. One of the employees was suffering considerably more than the others. Her medical record revealed a preexisting sensitivity to epoxies, due to past exposures.”²¹

1. What kinds of hazards are present in this case?

Answer:

The noxious fumes, gasses, and odors in this case pose severe and acute contact and inhalation hazards. The fact that employees in an adjacent area were exposed to these hazards indicated very poor work planning and coordination.

2. Discuss the actions that should be carried out by the employer and employees in order to prevent this type of accident in the future?

Answer:

This accident never should have happened. Management had a responsibility to initiate proper planning and coordination of all work tasks at or near this operation, to be cognizant of the hazards involved, and the need to protect all employees involved in this work or adjacent to it.

“Whenever possible, hot work should be completed before painting is done. Some [yards] employ a technique called “no paint mark up,” that identifies areas where hot work will be required later and no paint is applied until after the hot work has been completed.”²² Prior to the start of this job, supervision should have planned the work carefully with employees, identified the hazards they would be confronting, and taken the appropriate and needed actions to protect themselves as well as the workers around them. This would have involved being in compliance with all applicable OSHA standards, and wearing the proper and necessary, personal protective equipment.

²¹ U.S. Department of Labor, OSHA, “Safety and Health Injury Prevention Sheets: Working with the Shipyard Industry”; http://www.osha.gov/dts/maritime/sltc/ships/ships_combined.pdf (Process: Hot Work, p. A28)

²² Ibid.,

G. Issues

1. Every year new chemicals are introduced into U.S. workplaces and sites. What on-going actions can labor and management take to protect themselves from these chemicals and the hazards they pose?

2.. How can employees and supervisors keep up with changes in the field of hazard identification and abatement? Specifically, what resources and organizations exist for enabling these groups to remain up-to date in this important area?

CHAPTER II OCCUPATIONAL SAFETY AND HEALTH LAW

A. Summary

When employees and supervisors in ship/boat building and repair are confronted by safety and health hazards, they have a right to take one or all of the following actions:

- exercise their rights under the Occupational Safety and Health Act (OSHA);
- request the National Institute for Occupational Safety and Health (NIOSH) to conduct an occupational health evaluation of their workplace;
- utilize OSHA standards and resources to identify as well as abate hazards found in ship/boat building and repair.

B. Need

In 2002 there were over 5,500 fatalities reported by industries in the United States.²³ A total of 4.7 million injuries and illnesses were reported in private sector workplaces in 2002, resulting in a rate of 5.3 cases per 100 equivalent full-time workers.²⁴ The Liberty Mutual 2002 Workplace Safety Index estimates that direct costs for occupational injuries in 1999 rose to \$40.1 billion, with indirect costs reaching over \$200 billion.²⁵ These statistics point out the great need for labor and management to play an active role towards insuring that healthful and safe working conditions are provided for them on the job.

C. Definitions

1. Carcinogen - any substance, gas, chemical or material which causes cancer.
2. Health Hazard - any type of job related noise, dust, gas, toxic chemical, substance or dangerous working condition that could cause an accident, injury or disease to employees.
3. OSHA Standard - a legally enforceable health and safety regulation governing work conditions, practices, or operations designed to assure a safe and healthful workplace.
4. OSHA Compliance Officers - Occupational Safety and Health Administration staff responsible for enforcing federal safety and health standards. They are professionals in the occupational safety and health field with years of training and experience. These individuals are responsible for conducting inspections and enforcing the Occupational Health and Safety Act within workplaces or sites covered by the law.

²³ U.S. Department of Labor, Bureau of Labor Statistics: <http://www.bls.gov/news.release/pdf/cfoi.pdf>

²⁴ U.S. Department of Labor, Bureau of Labor Statistics: <http://www.bls.gov/iif/oshwc/osh/os/ostb1232.txt>

²⁵ U.S. Centers for Disease Control and Prevention, National Institute of Occupational Safety and Health (NIOSH): <http://www.cdc.gov/niosh/about.html>

5. Citation - a notice issued to an employer when a violation of an OSHA standard is found within the workplace. The citation lists the nature of the violation and the time allowed to repair, fix, or replace it. This period of time is referred to as the “abatement time.”
6. Penalties - fines or sanctions which can be assessed against employers for willful and repeated violations of duties, standards, rules, regulations, and orders of OSHA. Example: absence of guards on industry presses or saws is a violation subject to penalties.
7. Imminent Danger - a working condition where “there is reasonable certainty that a hazard exists that can be expected to cause death or serious physical harm immediately.”

D. Concepts

1. OSHA covers every worker in a business affecting commerce which has one or more employees. This law does not affect workplaces where a federal agency other than the U.S. Department of Labor has been given legal authority and has implemented an occupational safety and health program.
2. The Occupational Safety and Health Act rests on the duty of the employer to provide safe and healthful working conditions. First, the employer “shall furnish to each of his/her employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm” Second, employers “shall comply with occupational safety and health standards promulgated under this Act.” The standards are set by the Secretary of Labor, after notice and public hearings.
3. Each employee also is required to comply with occupational safety and health standards and “all rules, regulations, and orders issued pursuant to this act which are applicable to his/her own actions and conduct,” such as wearing appropriate personal protective equipment, and following proper procedures.
4. Employees also have a responsibility to report any of the following to their employer: hazardous conditions, and any job related injury, illness, or fatality. Employees also must cooperate with OSHA compliance officers.
5. In addition to the general right to a healthy and safe workplace or worksite, other specific employee rights under this law include the right to know about the hazards of their jobs; the right to refuse to work under certain specific circumstances; and the right to complain to OSHA to have their workplace or worksite inspected. These rights are discussed in more detail in chapter II on pages 24–26 of the project book, *Achieving Health and Safety in the Building and Repair of Ships and Boats*.
6. OSHA Investigations and Inspections - OSHA responds to complaints by conducting either on-site inspections or off-site investigations. Generally, complaints involving “low-priority” hazards that are filed by phone, fax, email, or online, are dealt with through OSHA’s off-site, phone/fax investigation approach. Pages 27–28 of the project book describes this approach in detail.

7. Any of the following conditions will trigger an OSHA inspection:

- a written, signed complaint, from a past or present employee, an employee representative, a concerned citizen, or an OSHA discrimination inspector seeking resolution of a discrimination complaint;
- inadequate response from an employer to a previous OSHA phone/fax investigation;
- imminent danger situation or condition; (OSHA places a top priority on taking immediate and corrective actions in cases of imminent danger);
- accident resulting in the death of an employee or the hospitalization of three or more workers;
- “planned or programmed inspections” in employment sectors with statistically high incidences of occupational hazards and related injuries;
- follow-up or check-up inspections to OSHA inspections conducted previously;²⁶
- referrals received from any source not included in the 1st bullet, including media reports.

8. An OSHA inspection consists of four parts:

First, an OSHA compliance officer arrives at the workplace or site, where they present their credentials to a designated employer representative.

Next, an opening conference is held to enable this official to explain the purpose of the inspection and why it is being conducted. Also, during this meeting the employer and employees select their respective representatives to accompany the compliance officer during the walkaround part of the inspection. If one exists, a union designates this employee representative.

The third part is the inspection itself, which may involve only an inspection of a specific complaint or problem area, or it may involve an inspection of the entire work establishment or site. Work areas, processes and procedures, tools, equipment, machinery, and any other relevant factors are inspected for both hazards and violations. During this inspection, the compliance officer may consult with the employer and employee representatives, as well as other employees in both labor and management. This official also checks and monitors whether the employer has maintained records properly on work related injuries, deaths, and illnesses required by OSHA (discussed previously). Records also are reviewed regarding employee exposure to dangerous substances and materials.

The fourth part consists of the closing conference where the compliance officer meets with the employer and employee representatives together or separately. At this conference or conferences any unsafe or unhealthful conditions identified during the inspection are discussed along with “all apparent violations for which a citation may be recommended.”²⁷ In addition, both employers and employees are informed of their respective rights and responsibilities after the inspection.²⁸

9. The specific rights employees and employers have after an inspection is conducted, are discussed on pages 29–31 of the project book.

²⁶ *Ibid.*, p. 22-23

²⁷ *Ibid.*, p. 25

²⁸ *Ibid.*, p. 23-26 provide detailed information on the entire OSHA inspection process.

10. In addition to the general-duty clause, OSHA has established safety and health standards that cover virtually all conceivable aspects of the work environment. Examples of specific areas covered are cited on pages 31-32 of the project book.

11. The standards also set limits for air contaminants, fumes, and exposure to toxic chemicals. Periodic testing and monitoring of certain substances is required. Some examples are asbestos, dust, radiation, and carbon monoxide. As cited previously, when monitoring is required, employees have a right to observe the testing and have access to the records which indicate exposure to toxic or harmful materials.

12. OSHA Standards

Shipyards

OSHA's 1915 standards "apply to all ship repair, shipbuilding, and shipbreaking employments, and related employments on the navigable waters of the U.S. (including dry docks, graving docks, and marine railways) or at facilities located adjacent to navigable waters."²⁹ "Subpart B – *Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment*, and Subpart I – *Personal Protective Equipment*, apply to shipyard employment work in vessels and vessel sections and on land-side operations regardless of geographic location."³⁰

For clarification, in its directive OSHA points out how when a shipyard hazard exists and the 1915 standard covering it is either limited or nonexistent, then OSHA's applicable Part 1910 general industry standard would apply.³¹

Boatyards

Employees and employers engaged in "boat building, repairing, or breaking operations, and related activities on or adjacent to a navigable waterway of the U.S.," also are covered by the previously cited OSHA Part 1915 shipyard standards, and applicable Part 1910 general industry standards.³² However, OSHA's Shipyard Toolbag Directive of October 2003 allows manufacturers of mass-produced recreational boats that do happen to need a water launch to comply under 1910 rather than 1915, at their discretion. Otherwise, the "navigable waters" ruling still applies.

Boatyards that are not adjacent to or located on navigable waters of the U.S. are covered by OSHA's 1910 standards. This includes enterprises performing boat building, repair, breaking, and related activities, including recreational boats.

13. It is important to remember that for identified hazards not covered by a specific OSHA standard, then OSHA's General Duty Clause, 5(a)(1), is applicable to both shipyards and boatyards.

14. Shipyards and boatyards are covered under OSHA's Hazard Communication Standard. Specifically, boatyards covered by 1910 standards are covered by this standard. Also,

²⁹ U.S. Dept. of Labor, OSHA, "OSHA INSTRUCTION," Effective Date: 10/22/03, Appendix A, p. A-1

³⁰ *Ibid.*,

³¹ *Ibid.*, p.A-2

³² *Ibid.*, p. 15

the requirements specified in OSHA's Hazard Communication standard in the shipyard industry "are identical" to those specified in the 1910.1200 general industry standard on hazard communication.³³

15. It is illegal for a worker to be disciplined or punished for filing an OSHA complaint. Section 11(c)(1) of the law, states: "No person shall discharge or in any manner discriminate against any employee because such employee has filed any complaint or instituted any proceeding under .. this act... or because of the exercise... of any right afforded under this act."³⁴ If the employee notifies the Secretary of Labor or a local OSHA office within thirty days of any act of discrimination, the Secretary can investigate the complaint and go to federal district court to get appropriate relief including rehiring or reinstatement with back pay.

16. OSHA can give employers advance notice for an inspection only under very specific circumstances which include:

- imminent danger situations which require swift correction;
- inspections that must take place after regular business hours, or that require special preparation;
- cases where notice is required to assure that the employer and employee representative(s), or other personnel will be present; and or
- situations in which the OSHA area director determines that advance notice would produce a more thorough or effective inspection. In such a case, employers must inform their employees' representative or arrange for OSHA to take this action.

17. Other resources for helping employees and employers achieve and maintain a healthful, safe workplace or site include the National Institute for Occupational Safety and Health (NIOSH), and the Safety Division of the Maine Bureau of Labor Standards. Information, procedures, and approaches for utilizing these agencies are contained on pages 35 – 36 of the project book.

E. Objectives

1. Participants will gain practical and usable knowledge on:

- A. the purpose, coverage, provisions, and administration of laws dealing with occupational health and safety;
- B. rights and responsibilities of labor and management under these statutes;
- C. OSHA standards covering boat and shipyards, in terms of how they can be obtained, accessed, and utilized;

³³ OSHA, U.S. Dept. Of Labor, *Shipyard Industry*, OSHA 2268, 1998 (Revised), p. 192.

³⁴ Occupational Safety and Health Act, P.L. 91-596, 1970, and amended by P.L. 101-552, 1990, Sec. 11(c)(1), p.14

F. Activities

1. When teaching participants about occupational health and safety law, instructors should:
 - A. generate a class discussion on:
 - 1) why these laws are needed;
 - 2) the constructive role this body of law can play in assisting employees and employers in achieving as well as maintaining healthful and safe workplaces or sites; (Sections A & B provide useful information for initiating this discussion).
 - B. have students learn and gain an understanding of the definitions cited in section C;
 - C. review and discuss all of the concepts contained in section D;
 - D. educate participants about the purpose, coverage, provisions, and administration of these statutes, as well as the rights and responsibilities labor and management have under this legislation. In addition to reviewing the information contained in this chapter as well as chapter II of the project book, Appendix III contains teaching resources that can be made into transparencies on occupational health and safety law for use with an overhead or computerized projector.
2. The following case study exercises can be used for teaching participants about occupational health and safety law. These case exercises, which start on the next page, correspond with those contained at the end of the second chapter in the project book, *Achieving Health and Safety in the Building and Repair of Ships and Boats*. Instructors can discuss these cases and questions with the class as a whole or in small group settings. The small group approach works best when each group is assigned with developing answers on the case study questions and reporting their findings back to the entire class. Each group should select a team spokesperson who will be responsible for summarizing and reporting on the group's findings and recommendations.

Chapter II: Case Study Exercises

Instructions: For each of the following case study exercises, select a team spokesperson who will be responsible for summarizing and reporting on your group's findings and recommendations:

Case I

As a group, develop strategies on how labor and management can work together to achieve a healthful and safe workplace or site by exercising their rights and responsibilities under the Occupational Safety and Health Act.

Answer:

The team spokesperson should serve as the group facilitator by getting participants to discuss and identify approaches and strategies to accomplish this joint action. This should include not only utilizing the law, but other resources and organizations as well. Pages 23 – 28 and 51 – 59 of the project book can be helpful in this discussion.

Case II

At the XYZ Ship and Boat Company employees often work below a crane while heavy objects are being moved and placed overhead. There is a rule against doing this while the crane is in operation, but the company doesn't enforce it and the workers want to make more money. Three months ago a worker was injured severely when a piece of steel slipped off a hook that lacked a safety latch. Hoists for moving objects are used far above capacities. A number of employees are very worried about their safety, but also need the money.

1. What rights do these employees have in this highly dangerous situation?

Answer:

The federal OSHA law stipulates that workers have a right to refuse to do a job under certain specific circumstances when they believe "a danger exists which could reasonably be expected to cause death or serious physical harm immediately." In other words, a hazard must be both serious and imminent. For example, a boiler about to explode is clearly an "imminent danger." On the other hand, a long-term exposure to toxic substances may not meet the "imminent danger" classification because there would normally be sufficient time to have such a hazard abated through regular OSHA inspection procedures.

2. When exercising these rights, what are the correct procedures that should be followed by these workers?

Answer:

When an "imminent danger" condition is discovered by an employee, he/she should act immediately by contacting a supervisor, and union representative if a member of a union. If the condition or act is not corrected, and the worker then chooses to exercise the right to refuse in this imminent danger situation, it is very important that they tell their supervisor, preferably with another person present, that while they are refusing to work at that location or function which places their life in immediate imminent danger, they are willing to continue to work at another location or function that does not pose an imminent danger.

Also, if an imminent danger situation is not remedied, the OSHA Area Office should be contacted. If the compliance officer determines an “imminent danger” exists, the official will attempt to have the employer abate the condition. Failing to accomplish such action, the OSHA official can then initiate legal action with the Secretary of Labor’s office.

3. What should management do in this case?

Answer:

Management has a legal responsibility to investigate an imminent danger situation, and to take immediate action to correct or eliminate the OSHA violation, and unsafe condition, environment or practice that is causing it.

4. In the future, what approaches and procedures need to be adopted by labor and management to insure greater protections against abnormally dangerous work situations?

Answer:

Labor and management need to work together in developing procedures for identifying and abating occupational health and safety hazards, particularly those involving abnormally dangerous conditions. Joint labor/management safety and health committees are a proven and effective approach for implementing this important activity. In particular, it would be very important for employees and supervisors to develop a policy for dealing with any future imminent danger situations.

Case III

Identify the chemical hazards where you work.

1. How can labor and management work together to educate each other about the hazards posed by these chemicals, and the proper safeguards to employ when using and storing them?

2. Develop a specific strategy utilizing OSHA’s Hazard Communication Standard and Material Safety Data Sheets (MSDS) outlined in Appendix III of the project book.

Answer:

For both of these discussion items, participants should formulate findings and recommendations based on the information contained in the project book as well as their own experiences and expertise. The team spokesperson should assist the group in identifying specific joint approaches that can be adopted for educating labor and management about chemical hazards, and the safeguards to employ when using and storing them. Ways to utilize and follow OSHA’s Hazard Communication Standard and Material Safety Data Sheets (MSDS), also should be incorporated into this discussion.

Case IV

Recently, a boatyard has started using a new chemical compound in the coating of its fiberglass boats. As this chemical is being applied, a number of employees have complained that it causes dizziness and nausea.

1. What can the employees and employer of this yard do about this situation?

Answer:

The employer and employees need to identify the specific hazards posed by this new chemical compound, and the proper safeguards that need to be employed when using it, and/or being exposed to it.

2. Which government agencies can provide assistance?

Answer:

There are two governmental agencies that can provide assistance in this area:

National Institute for Occupational Safety and Health (NIOSH)

The resources of this agency can be helpful for identifying and evaluating new or challenging health hazards on the job. An employee, employee representative, and employer have the right to request a Health Hazard Evaluation from NIOSH when any of the following conditions apply:

- “employees have an illness from an unknown cause;
- employees are exposed to an agent or working condition that is not regulated by OSHA;
- employees experience adverse health effects from exposure to a regulated or unregulated agent or working condition, even though the permissible exposure limit is not being exceeded;
- medical or epidemiological investigations are needed to evaluate the hazard;
- the incidence of a particular disease or injury is higher than expected in a group of employees;
- the exposure is to a new or previously unrecognized hazard;
- the hazard seems to result from the combined effects of several agents.”³⁵

Information to request a NIOSH health-hazard evaluation can be provided by contacting NIOSH via:

Phone: 1-800-35-NIOSH (1-800-356-4674) Fax: 513-841-4488

Mail: NIOSH, Hazard Evaluation and Technical Assistance Branch
4676 Columbia Parkway, R-9

Cincinnati, Ohio 45226

E-mail: Using the form available through the NIOSH home page by going to:

HHE Request Form.

³⁵ NIOSH Home Page, NIOSH Health Hazard Evaluations, p.2

Onsite Consultation Services are Available to Small Maine Businesses

Upon request, consultation services can be provided to small employers seeking occupational health and safety assistance at their workplace or site. Because the program is funded by OSHA, there is no cost to an employer who requests it. This service is designed to provide a thorough “appraisal of all work practices and environmental hazards of the workplace and all aspects of the employer’s present job safety and health program.”³⁶ These confidential consultation services, which are completely separate from OSHA’s enforcement functions, are administered in Maine by the:

Safety Division
Maine Bureau of Labor Standards
45 State House Station
Augusta, Maine 04333-0045
Phone: 207-624-6400.

Since this program is a consultation service, no penalties or citations can be issued for any occupational health and/or safety problems identified during the process.³⁷

G. Issues

1. Despite passage of numerous occupational health and safety laws on both the federal and state levels, the number of occupational injuries, diseases, and deaths in the U.S. remains consistently high each year. What additional actions can be taken to reduce this problem?
2. Each year new toxic chemicals and substances are introduced into U.S. workplaces. What steps can be initiated to insure that employees are not injured and/or diseased through exposure to these new workplace hazards?

³⁶ OSHA, U.S. Dept. Of Labor, Shipyard Industry, OSHA 2268, 1998 (Revised), p.194

³⁷ *Ibid.*,

CHAPTER III

Attaining Health and Safety in Ship and Boat Yards

A. Summary

Three effective ways for enabling labor and management to work together on hazard identification and abatement involve:

- joint safety and health committee activities;
- using safety structures in ship and boat yards; and
- the application of a worksite systems approach designed to identify and maximize those factors and conditions promoting safety and health, and reduce and/or correct those factors and conditions preventing the attainment of a safe and healthful workplace.

B. Need

In addition to utilizing laws on occupational health and safety, experience has shown that joint labor/management programs in this area are an efficient and effective method for helping these groups attain and maintain safety and health at the worksite or in the workplace. As safety systems mature and evolve demand for attention to particular areas of safety will rise. To address these demands a safety structure “menu” has been created for use by the yard depending current needs. The safety structure is designed so that it can be changed to meet the needs of the yard.

C. Concepts

1. Labor/Management Safety and Health Committees:

A. Criteria – There are a number of important criteria for determining the effectiveness of a joint safety and health committee. Such a committee should be comprised of an equal number of labor and management representatives; co-chaired by one representative from labor and one representative from management; manageable in terms of size; able to resolve safety and health problems; meeting at least once per month or at the call of either chair or a member; mobile in terms of being able to observe and interview workers as well as supervisors about about safety and health issues; and conducting follow up meetings to make sure that previously identified hazards and safety problems have been corrected.

B. Role – Effective and useful roles for safety and health committees include: coordinating a continual and active program on hazard recognition and monitoring; responds to safety and health concerns/suggestions submitted by workers; educating labor and management about their rights, protections, and responsibilities under applicable occupational health and safety statutes, including new changes and developments in these laws; recommending approaches on safety and health issues and preventing workplace hazards.

C. Selection – Selection of committee members should be based on: an individual’s interest and commitment to health and safety; practical knowledge and experience in the field; willingness to participate in educational programs designed to broaden expertise; and serve under staggered term limits in order to insure greater participation, involvement, and continuity.

D. Preparation – In order to function effectively, committee members need to be provided with the following information and resources: past and current records on accidents, injuries, and diseases in the workplace; any occupational health and safety problems identified by labor and management; bibliographical, audio-visual, internet, and organizational resources on occupational health and safety in ship and boat yards; information on available training and meeting opportunities relating to this field.

2. Suggested Safety Structures for Ship/Boat Yards:

The following are suggestions on how a ship/boat yard may choose to organize a formal safety structure at the worksite. This outline is designed as an overview, and may not apply to all yards. The best structure for any particular yard depends on the size and the current health and safety needs of the yard. Therefore, it is up to the individual yard to establish a safety structure that will best serve the yard and its employees to support the health and safety effort. As safety needs change within the yard the safety structure may also change. For example, a new safety regulation will have an implementation date by which time the employer must comply with the new regulation. The yard may assign this work to a safety coordinator to oversee the training and implementation of the new regulation or that work may be done by the safety committee or a sub-committee created specifically for that purpose by the safety committee.

A. Safety Department - For larger yards a full time safety professional may be on staff to work with all departments within the yard on health and safety issues. For smaller yards these responsibilities may be assigned to either designated individuals with other responsibilities or to supervisors/managers. Typical duties and qualifications for a full time safety professional include:

- Monitoring removal of physical, biological, and chemical hazards;
- Training of employees on safety policies, procedures, regulations;
- Maintains and prepares records according to established guidelines;
- Manages participation in OSHA inspections;
- Provides OSHA inspectors with appropriate documents and records (medical, OSHA 300 Log, training, monitoring);
- Ensures projects are completed on time and within budget;
- Advises on projects, tasks, and operations;
- Interprets state and federal regulations relative to health and safety;
- Post secondary education and experience in the field or related area;
- Familiar with standard concepts, practices, and procedures within a field;
- Certain degree of creativity and latitude is required.

B. Safety Coordinator - A safety coordinator may be needed to assist the person with designated safety responsibilities in the yard. This position may be of limited duration during a time of need or it may be a full time commitment. Typically this person maintains a presence “on the floor” and attends to specific duties required of the position. Duties and qualifications for a safety coordinator include:

- Outlines and implements training programs about procedures and accident prevention;
- Inspects company facilities and generating reports;
- Recommends corrections or precautions to ensure compliance;
- May require post secondary education with 5 – 8 years experience in the field;
- Familiar with concepts, practices, and procedures in a given field;
- Relies on experience and judgment to accomplish goals;
- Works under minimal supervision;
- Degree of creativity and latitude is required.

C. Safety Committee - The role of the Safety Committee is to provide goals and the vision necessary to improve health and safety in the workplace. This committee should meet once a month to review safety statistics from the previous month, receive updates from active sub-committees, respond to proposals from members, discuss and address health and safety issues that have surfaced, and oversee the safety effort year-to-date based upon goals established at the beginning of the year. **Instructor’s notes:** It is particularly important to note that the safety committee needs to establish a specific date and time on the calendar for meetings. This establishes the level of importance of the committee as recognized by management and employees. Meetings should not be cancelled because things “are just too busy now,” or some other hot button issue may have arisen.

D. Sub-Committees - To support the Safety Committee several subcommittees may need to be formed to address specific areas of health and safety. A sub-committee should be activated to look at issues that need to be reviewed and make recommendations to the Safety Committee for action. Once a sub-committee’s work has been completed the sub-committee may be deactivated until its services are needed on future issues. To provide continuity and coordination, at least one member of any given sub-committee also should sit on the Safety Committee. Examples of subcommittee activity might be in the following areas; a) proposed new OSHA standards, b) communications, c) training, d) inspections and follow up, e) safety policy review. It is good practice to periodically review safety procedures and standard operating procedures to insure that the procedures are up to date. Safe work performance must match what is required by procedure. **Instructor’s notes:** A sub-committee provides a good opportunity to involve employees who may not wish to sit on the safety committee but may have expertise and knowledge on a particular topic that they could lend to the sub-committee on a short term basis. Examples might include welders addressing issues on hot work, engineers investigating various technical applications, fire fighters with expertise in evacuations, extinguishing systems, etc, and electricians on electrical safe work practices.

E. Yard Safety and Housekeeping Inspections - On at least a quarterly basis all areas of the ship/boat yard should receive a safety and housekeeping inspection. These inspections should be comprehensive in nature to cover areas such as employee training, welding/burning permits documentation, confined space entry permit review, lockout audit, life safety equipment inspections, chemical labeling and disposal, and physical and health hazards identified by a walk around inspection. **Instructor's notes:** One safety checklist that will assist in determining if a workplace is meeting the requirements of OSHA is located at the website address <http://osha.gov/SLTC/smallbusiness/chklist.html> This checklist is helpful in identifying areas that need attention and may be used as a baseline to start the inspection process. It is strongly recommended that persons performing inspections are not inspecting their own work areas so that an objective inspection will be done.

F. Department Safety and Housekeeping Inspections - On a monthly basis each department within the yard should hold its own safety and housekeeping inspection. These inspections should serve as a learning tool for department employees to build upon findings performed by the quarterly yard inspections. From the yard inspections department employees will learn hazard awareness and methods of preventing hazards from reoccurring in the future. **Instructor's notes:** This is a good opportunity for a department supervisor or leader to educate employees on hazard recognition and regulatory requirements in the workplace. By selecting one or two employees to participate on each inspection every employee in the department will have an opportunity to make a contribution to the safety effort.

G. Crew Safety Representative - The crew safety representative is a person who serves as designated point of contact for employees within a work group. In some cases employees may be hesitant to make direct contact to a supervisor or manager and may be more at ease to bring issues to a designated person in the work group. Typically the crew safety representative is a part of the work group. The crew safety representative works with the department supervisor to address health and safety issues in the work area. It is important that the supervisor and the yard provide the support necessary for the crew safety representative to succeed. **Instructor's notes:** To be effective, the crew safety representative will need to receive some basic training on hazard recognition and regulatory requirements. The crew safety representative will also need the support of management to be an effective safety leader.

H. Monthly Department Safety Meetings - Every department in the yard should hold a monthly safety meeting with all department employees. The monthly safety topic may be selected by the yard safety representative or the department supervisor, depending on the standard that has been established. In addition to a monthly safety topic the monthly meeting should be a place where safety goals are reviewed to give an indicator on performance and any accidents and preventive measures that have taken place over the previous month. At this meeting employees also should have the opportunity to bring up any safety issues or concerns that may need to be addressed.

I. Tool Box Safety Review - At the start of each work day or shift a brief discussion of the day's upcoming activities should take place. This is a good opportunity to use the "Systems" approach to make employees aware of activities that may affect their work that is outside of the normal day to day operations or activities that they perform that may affect others. Depending on the particular work plan for the day this is also a good opportunity to focus on specifics such as condition of hand tools, cleanliness of glasses, goggles, and respirators, or other items that may be in use that particular day. This is also a very useful time to stress the importance of planning and coordinating jobs that may be particularly hazardous – so that everyone is on the same page regarding what needs to be done and how it should be done in terms of health and safety.

D. Objectives

Enable participants to apply approaches through which they can work together in identifying and abating hazards in ship and boat yards by utilizing:

1. labor/management safety and health committee activities; and
2. establishing a safety structure for the ship or boat yard.

E. Activities

Instructors can use the following questions and case studies as a way to facilitate group discussion and application. By working in small groups, participants can be assigned with developing answers based on the information contained in the project handbook, as well as their own experience and expertise. Each group should select a spokesperson to summarize and present their findings. These presentations can be used to initiate a large group discussion on how labor/management committees and safety structures can best be applied for attaining and maintaining safety and health in ship and boat yards.

General Discussion Activity

The following are questions and an activity the instructor can initiate with participants:

1. What specific roles can a joint labor/management committee perform in dealing with occupational health and safety challenges in the yard?

Answers:

- a. monitor safety incident rates;
- b. review accidents in the yard and other yards;
- c. take preventive measures to prevent those same accidents from occurring again;
- d. review accident statistics (incident rate over time, times accidents are occurring, departmental breakdown of accidents industry statistics, lost time injuries, restricted duty injuries)
- e. conduct yard and department inspections
- f. follow up on inspection items
- g. provide required training for employees

2. Could this joint committee approach be effective in your work? ___Yes___No
If yes, how could such a committee operate, who should be selected and trained to serve on it, and for how long? If no, why not and what alternative approach could be adopted instead?
3. Prior to reviewing each of the elements of the safety structure have the group create a block flow diagram of each department or area of activity that takes place in the yard. From their input make a block flow diagram on a flip chart so that the yard can now be visualized in the classroom. Use this as a teaching aid for the case study exercise when participants will be asked to create a safety structure specific to their yard.

Case Study Exercises

For each of the following case study exercises, select a team spokesperson who will be responsible for summarizing and reporting on your group's findings and recommendations:

Case I

You are working at a yard that has 200 employees. There are 140 employees that are involved in boat construction, 20 maintenance employees, 20 yard service personnel, and 20 management and office support employees.

Exercise A:

By using your handbook as a reference guide, what type of a formal safety structure would you propose for this yard?

Answers:

- Either a full time safety department or a full time safety coordinator would be justified for a yard with 200 employees.
- A Safety Committee would be needed for a yard of 200 employees. This committee should be made up of labor and management representatives who would represent the major functions in the yard.
- A Sub-Committee would be necessary only on a temporary basis to address specific issues.
- Yard wide safety inspections should be performed quarterly. The inspection team should not inspect their own work areas.
- Department safety inspections should be conducted on a monthly basis.
- A crew safety representative would not be necessary for a yard this size unless one particular department was very large in size and depending on the state of labor relations.
- Monthly safety meetings should be held with all employees.
- Toolbox safety reviews are probably a good idea for a yard of this size as many different activities and a constantly changing work environment present many challenges.

Exercise B:

Looking at your own yard what type of formal safety structure would you propose?

Answer:

Using information from the handbook prepare recommendations for your yard and be prepared to share them with the group.

Case II

Your company has decided to form a labor – management safety committee. There are fifty employees at the company which operates one boat yard. The boat yard is made up of the following departments:

- Marine Services** – Provides launching and hauling services, tends moorings, repairs outboard and inboard engines, and takes care of boat storage areas.
- Boat Repair** – Repairs wooden, steel, and fiberglass hulled boats ranging in size from 12 to 70 feet.
- Maintenance** – Takes care of equipment repairs throughout the yard (this includes mechanical and electrical) for all yard owned equipment.
- Management** – Includes human resources, yard manager, accounting, and two supervisors.
- Sales** – Two sales personnel spend 90% of their time on the road locating new business for the company.
- Manufacturing** – Involved in the building of steel and fiberglass hulled boats and occasionally a wooden hulled craft of various lengths. There are four standard models but custom built models will be made if the yard is capable.
- Parts Room** – Storage room for spare parts, rigging, and daily supplies.
- College Student** – “Helps out” in the yard in July and August.
- Seasonal Help** – Additional staff put on during the summer months to assist with launchings and moorings.

Based on the information provided above, a labor/management safety committee needs to be established, and the following questions and issues need to be addressed:

1. What will be the size of the committee?

Answer:

Six will be sufficient.

2. List what areas that should be represented on the committee and the reasons why:

Answer:

One each from services, repair, manufacturing, maintenance, management, and sales. It is important that committee members are representative of the workforce and knowledgeable about safety and health issues in all departments.

3. How often should the committee meet?

Answer:

Once per month unless a special meeting is called by one of the chairs.

4. Which workplace safety and health issues need to be dealt with first and why?

Answer:

Those issues that are affecting certain areas or issues that are having the greatest impact on large numbers of employees. Examples might include those who are involved with manufacturing that are receiving chemical exposures that need to be controlled, or if a particular type of injury is recurring (ex. sprains & strains).

Case III

Recent accident statistics show that your yard is experiencing a high rate of back injuries. The safety committee, of which you are a member, needs to come up with recommendations on how to prevent back injuries in your workplace.

1. Identify resources, organizations, and individuals who can provide assistance to the committee in its work to reduce back injuries:

Answer:

Resources, organizations, and individuals might include the internet, a local hospital or clinic for printed matter or a medical professional, Maine Safety Council, the yard's worker's compensation insurer, Safety Works from the Maine Dept of Labor, OSHA's ergonomics standard, OSHA publications as noted in the safety handbook, an athletic trainer, and rehabilitation specialist.

2. The committee is responsible for the implementation of certain policies and practices to help reduce back injuries. How should the committee do this?

Answer:

Assemble a package of information that is standardized for the yard so that everyone is getting the same information. Members of the safety committee could be used to cover the policies with employees to help them understand why the policies are being implemented or yard management could be utilized to perform this function. After a review of the policies a training session on proper lifting techniques and ways to use equipment to perform certain functions could be conducted to educate employees on back injury prevention.

Case IV

Assume that presently, the yard where you currently work does not have a safety committee or a formal safety structure in place. Although there are safety meetings and periodic training sessions you and your coworkers feel that health and safety issues could be improved by having an active safety committee at the yard along with some type of safety structure.

You will need to propose this idea to yard management by developing a rationale on why a safety structure and a safety committee are needed. This rationale should contain the following parts which need to be completed by you:

Part 1: Using the Suggested Safety Structures information in the handbook as a guide propose a safety structure for your yard and list the reason(s) why each of the elements of the structure are necessary.

Answer:

Using the elements of the safety structure on pages 48 – 50 in the safety handbook develop a list of elements that would be effective for your yard and prepare notes on why you think each of those elements is needed.

Step 2: Propose a safety committee by listing departments within the yard that should be represented and how many members from each department.

Answer:

Establish the total number of employees at the yard (this can be obtained from the human resources/personnel office). Get a breakdown by department of how many people are employed in each department. Those departments with the largest employee populations should have representation on the safety committee. Take into consideration other departments that may need a representative on the committee because of any special circumstances. Be sure to have an equal number of members representing labor and management.

Part 3: Propose roles that the safety committee would play in assisting with health and safety issues in the yard (list specific issues in your yard)?

Answer:

Identify yard specific issues for the committee to work on once it is established. Monthly activities for the committee need to include a review of the accident rate for the previous month, types of injuries that are occurring, and what preventive measures that need to be taken. The committee should also be looking at any seasonal influences that may expose employees to unsafe conditions such as weather induced hazards.

Part 4: What are you prepared to do as an individual to support the yard's new safety efforts?

Answer:

For a safety effort to succeed in any workplace all employees need to support the effort and become active players not just for their own safety but the safety of others as well. The importance of workplace safety needs to be stressed and how that carries over to employee well being for their families. An effective method to get employees to support the safety effort is to obtain agreement from them, typically done in a group setting, on how they will conduct themselves in the workplace. Involving employees and supervisors in the establishment of guidelines on what will be accepted safety practices also is very important. For example, this should include wearing proper PPE, proper tool use, informing others of hazards that may be created as a result of work activity, and following proper safety and health procedures, as well as OSHA standards.

F. Issues

1. In addition to the ones already cited, what other roles and activities can be implemented by health and safety committees?
2. How can joint committees insure the full and active participation of both labor and management in working towards the achievement of a safe and healthful working environment in ship/boat building and repair?
3. Why is it important to establish some kind of a safety structure in a boat or shipyard? What departments and functions should be included in this structure?

Appendix I: Case Study Discussion Exercises For Replication

Instructions: For each of the following exercises, select a team spokesperson who will be responsible for summarizing and reporting on your group's findings and recommendations.

Chapter I: Identifying and Abating Hazards

Case I

Discuss and identify the hazards you are exposed to where you work.

1. Using the information and approaches cited previously in this chapter, develop strategies for abating these hazards.

2. How can labor and management work effectively to abate occupational safety and health hazards?

Case II

"A burner working in a confined space noticed that it was five minutes past the start of lunch break. In hurrying to get to the lunch area, he did not completely close the gas valve on his torch. Neither did he take the time to disconnect or shut off the gas supply to the torch at the manifold on deck, as he was taught to do in training. The escaping gas mixed with the air in the space until its explosive potential was reached and an electrical spark from equipment in the space ignited the mixture causing an explosion and fire. Fortunately, all the workers had left the area for lunch and no injuries occurred."³⁸

1. Identify the specific hazards in this case.

2. What preventive measures should be taken to avoid this problem in the future?

3. Whose responsibility is it to make sure this problem does not happen again?

³⁸ Source: U.S. Department of Labor, OSHA, "Safety and Health Injury Prevention Sheets: Working with the Shipyard Industry"; http://www.osha.gov/dts/maritime/sltc/ships/ships_combined.pdf (Process: Hot Work, p. A23)

Case III

An employee was working on a deck where a crane was being used to transport materials. As the worker was directing the crane, she started walking backwards, signaling as she went. The worker experienced a major injury when she accidentally stepped off the deck.

1. What were the hazards involved which caused this injury?
2. What OSHA violations were committed?
3. What actions should have been taken to avoid the injury?

Case IV

A worker went to see his doctor, and reported that he had been having low back pain for some time. Until recently, he had dismissed his symptoms as those associated with the job, and with aging, and had been treating himself with ibuprofen. As a burner and welder he would frequently perform his work while bent over at the waist for long periods of time. Lately, he had been experiencing severe pain when bending at the waist, and had developed a weakness in his left leg that seemed to be getting worse. Finally, he decided to seek medical treatment.³⁹

1. What is the likely source of this worker's pain?
2. What kinds of hazards are present in this situation?
3. Given the demands of this job, how might this kind of situation be avoided?
4. What are the possible solutions or responses to this situation? Is this problem only the worker's responsibility? If not, why not?

³⁹ Slightly adapted from U.S. Department of Labor, OSHA, "Safety and Health Injury Prevention Sheets: Working with the Shipyard Industry"; http://www.osha.gov/dts/maritime/sltc/ships/ships_combined.pdf (Process: Hot Work, p. A7)

Case V

A new worker at a shipyard has been assigned to perform welding and other hot work in an outside location on a metal surface which has been coated with toxic coatings such as epoxies and lead-based paints. She has done this type of work before in enclosed spaces, but because this job is outside in the open air, she believes that there will be sufficient ventilation, and assumes that no protective equipment is needed.⁴⁰

1. Is this worker correct in her assessment that she does not need respiratory protection? Explain.
2. What kinds of hazards are present in this situation?
3. What steps or strategies should be followed in this case, by both the employee and employer?

Case VI

“A worker performing hot work on a bulkhead stripped back the paint four inches where the welding was to be done, and began working. As the heat passed through the bulkhead, the epoxy paint on the other side of the bulkhead in the adjacent space began to smolder. Several employees working in the adjacent space were quickly affected by the noxious fumes and exited the space. Their eyes were burning and their throats were already becoming sore. They were advised to go to the medical department for treatment. One of the employees was suffering considerably more than the others. Her medical record revealed a preexisting sensitivity to epoxies, due to past exposures.”⁴¹

1. What kinds of hazards are present in this case?
2. Discuss the actions that should be carried out by the employer and employees in order to prevent this type of accident in the future?

⁴⁰ Based on information from U.S. Department of Labor, OSHA, “Safety and Health Injury Prevention Sheets: Working with the Shipyard Industry”; http://www.osha.gov/dts/maritime/sltc/ships/ships_combined.pdf (Process: Hot Work, p. A27)

⁴¹ U.S. Department of Labor, OSHA, “Safety and Health Injury Prevention Sheets: Working with the Shipyard Industry”; http://www.osha.gov/dts/maritime/sltc/ships/ships_combined.pdf (Process: Hot Work, p. A28)

Chapter II: Occupational Safety and Health Law

Case I

As a group, develop strategies on how labor and management can work together to achieve a healthful and safe workplace or site by exercising their rights and responsibilities under the Occupational Safety and Health Act.

Case II

At the XYZ Ship and Boat Company employees often work below a crane while heavy objects are being moved and placed overhead. There is a rule against doing this while the crane is in operation, but the company doesn't enforce it and the workers want to make more money. Three months ago a worker was injured severely when a piece of steel slipped off a hook that lacked a safety latch. Hoists for moving objects are used far above capacities. A number of employees are very worried about their safety, but also need the money.

1. What rights do these employees have in this highly dangerous situation?
2. When exercising these rights, what are the correct procedures that should be followed by these workers?
3. What should management do in this case?
4. In the future, what approaches and procedures need to be adopted by labor and management to insure greater protections against abnormally dangerous work situations?

Case III

Identify the chemical hazards where you work.

1. How can labor and management work together to educate each other about the hazards posed by these chemicals, and the proper safeguards to employ when using and storing them?

2. Develop a specific strategy utilizing OSHA's Hazard Communication Standard and Material Safety Data Sheets (MSDS) outlined in Appendix III of the project book, *Achieving Health and Safety in the Building and Repair of Ships and Boats*.

Case IV

Recently, a boatyard has started using a new chemical compound in the coating of its fiberglass boats. As this chemical is being applied, a number of employees have complained that it causes dizziness and nausea.

1. What can the employees and employer of this yard do about this situation?

2. Which government agencies can provide assistance, and how can they be utilized effectively?

Chapter III: Attaining Health and Safety in Ship and Boat Yards

Case I

You are working at a yard that has 200 employees. There are 140 employees that are involved in boat construction, 20 maintenance employees, 20 yard service personnel, and 20 management and office support employees.

Exercise A.

By using your handbook as a reference guide, what type of a formal safety structure would you propose for this yard?

Exercise B.

Looking at your own yard, what type of formal safety structure would you propose?

Case II

Your company has decided to form a labor–management safety committee. There are fifty employees at the company which operates one boat yard. The boat yard is made up of the following departments:

Marine Services – Provides launching and hauling services, tends moorings, repairs outboard and inboard engines, and takes care of boat storage areas.

Boat Repair – Repairs wooden, steel, and fiberglass hulled boats ranging in size from 12 to 70 feet.

Maintenance – Takes care of equipment repairs throughout the yard (this includes mechanical and electrical) for all yard owned equipment.

Management – Includes human resources, yard manager, accounting, and two supervisors.

Sales – Two sales personnel spend 90% of their time on the road locating new business for the company.

Manufacturing – Involved in the building of steel and fiberglass hulled boats and occasionally a wooden hulled craft of various lengths. There are four standard models but custom built models will be made if the yard is capable.

Parts Room – Storage room for spare parts, rigging, and daily supplies.

College Student – “Helps out” in the yard in July and August.

Seasonal Help – Additional staff put on during the summer months to assist with launchings and moorings.

Based on the information provided above, a labor/management safety committee needs to be established, and the following questions and issues need to be addressed:

1. What should be the size of the committee?
2. List what areas will be represented on the committee and the reasons why.
3. How often should the committee meet?
4. Which workplace safety and health issues need to be dealt with first and why?

Case III

Recent accident statistics show that your yard is experiencing a high rate of back injuries. The safety committee, of which you are a member, needs to come up with effective recommendations on how to prevent back injuries in the workplace.

1. Identify resources, organizations, and individuals who can provide assistance to the committee in this area.

2. The committee is responsible for the implementation of certain policies and practices to help reduce back injuries. How should the committee do this?

Case IV

Assume that presently, the yard where you are employed does not have a safety committee or a formal safety structure in place. Although there are safety meetings and periodic training sessions, you and your coworkers feel that health and safety issues could be improved by having an active safety committee at the yard along with some type of safety structure.

You will need to propose this idea to the yard's management and owners by developing a rationale on why a safety structure and a safety committee are needed. This rationale should contain the following parts which need to be completed by you:

Part 1: Using the suggested safety structure information in the handbook as a Guide, propose a safety structure for your yard and list the reason(s) why each of the elements of the structure are necessary.

Part 2: Propose a safety committee by listing departments within the yard that should be represented, and the number of employees from each department that should be on this committee.

Part 3: Propose roles that the safety committee would play in assisting with specific health and safety issues.

Part 4: What are you prepared to do as an individual to support the yard's new safety efforts?

Appendix II: Self – Inspection Checklists

The checklists contained in this appendix are derived from the Occupational Safety and Health Administration's *Handbook for Small Business*, Publication #2209, 1996 (revised).

SELF-INSPECTION CHECK LISTS

These check lists are by no means all-inclusive. You should add to them or delete portions or items that do not apply to your operations; however, carefully consider each item as you come to it and then make your decision. You also will need to refer to OSHA standards for complete and specific standards that may apply to your work situation. (NOTE: These check lists are typical for general industry but not for construction or maritime.)

EMPLOYER POSTING

- Is the required OSHA workplace poster displayed in a prominent location where all employees are likely to see it?
- Are emergency telephone numbers posted where they can be readily found in case of emergency?
- Where employees may be exposed to any toxic substances or harmful physical agents, has appropriate information concerning employee access to medical and exposure records and "Material Safety Data Sheets" been posted or otherwise made readily available to affected employees?
- Are signs concerning "Exiting from buildings," room capacities, floor loading, biohazards, exposures to x-ray, microwave, or other harmful radiation or substances posted where appropriate?
- Is the Summary of Occupational Illnesses and Injuries (OSHA Form 200) posted in the month of February?

RECORDKEEPING

- Are all occupational injury or illnesses, except minor injuries requiring only first aid, being recorded as required on the OSHA 200 log?
- Are employee medical records and records of employee exposure to hazardous substances or harmful physical agents up-to-date and in compliance with current OSHA standards?
- Are employee training records kept and accessible for review by employees, when required by OSHA standards?

- Have arrangements been made to maintain required records for the legal period of time for each specific type record? (Some records must be maintained for at least 40 years.)
- Are operating permits and records up-to-date for such items as elevators, air pressure tanks, and liquefied petroleum gas tanks?

SAFETY AND HEALTH PROGRAM

- Do you have an active safety and health program in operation that deals with general safety and health program elements as well as the management of hazards specific to your worksite?
- Is one person clearly responsible for the overall activities of the safety and health program?
- Do you have a safety committee or group made up of management and labor representatives that meets regularly and report in writing on its activities?
- Do you have a working procedure for handling in-house employee complaints regarding safety and health?
- Are you keeping your employees advised of the successful effort and accomplishments you and/or your safety committee have made in assuring they will have a workplace that is safe and healthful?
- Have you considered incentives for employees or workgroups who have excelled in reducing workplace injury/illnesses?

MEDICAL SERVICES AND FIRST AID

- Is there a hospital, clinic, or infirmary for medical care in proximity of your workplace?
- If medical and first-aid facilities are not in proximity of your workplace, is at least one employee on each shift currently qualified to render first aid?

- Have all employees who are expected to respond to medical emergencies as part of their work*

(1) received first-aid training; (2) had hepatitis B vaccination made available to them; (3) had appropriate training on procedures to protect them from bloodborne pathogens, including universal precautions; and (4) have available and understand how to use appropriate personal protective equipment to protect against exposure to bloodborne diseases?

- Where employees have had an exposure incident involving bloodborne pathogens, did you provide an immediate post-exposure medical evaluation and followup?
- Are medical personnel readily available for advice and consultation on matters of employees' health?
- Are emergency phone numbers posted?
- Are first-aid kits easily accessible to each work area, with necessary supplies available, periodically inspected and replenished as needed?
- Have first-aid kit supplies been approved by a physician, indicating that they are adequate for a particular area or operation?
- Are means provided for quick drenching or flushing of the eyes and body in areas where corrosive liquids or materials are handled?

FIRE PROTECTION

- Is your local fire department well acquainted with your facilities, its location and specific hazards?
- If you have a fire alarm system, is it certified as required?

*Pursuant to an OSHA memorandum of July 1, 1992, employees who render first aid only as a collateral duty do not have to be offered pre-exposure hepatitis B vaccine only if the employer puts the following requirements into his/her exposure control plan and implements them: (1) the employer must record all first-aid incidents involving the presence of blood or other potentially infectious materials before the end of the work shift during which the first-aid incident occurred; (2) the employer must comply with post-exposure evaluation, prophylaxis, and followup requirements of the standard with respect to "exposure incidents," as defined by the standard; (3) the employer must train designated first-aid providers about the reporting procedure; and (4) the employer must offer to initiate the hepatitis B vaccination series within 24 hours to all unvaccinated first-aid providers who have rendered assistance in any situation involving the presence of blood or other potentially infectious materials.

- If you have a fire alarm system, is it tested at least annually?
- If you have interior stand pipes and valves, are they inspected regularly?
- If you have outside private fire hydrants, are they flushed at least once a year and on a routine preventive maintenance schedule?
- Are fire doors and shutters in good operating condition?
- Are fire doors and shutters unobstructed and protected against obstructions, including their counterweights?
- Are fire door and shutter fusible links in place?
- Are automatic sprinkler system water control valves, air and water pressure checked weekly/periodically as required?
- Is the maintenance of automatic sprinkler systems assigned to responsible persons or to a sprinkler contractor?
- Are sprinkler heads protected by metal guards, when exposed to physical damage?
- Is proper clearance maintained below sprinkler heads?
- Are portable fire extinguishers provided in adequate number and type?
- Are fire extinguishers mounted in readily accessible locations?
- Are fire extinguishers recharged regularly and noted on the inspection tag?
- Are employees periodically instructed in the use of extinguishers and fire protection procedures?

PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING

- Are employers assessing the workplace to determine if hazards that require the use of personal protective equipment (e.g. head, eye, face, hand, or foot protection) are present or are likely to be present?

- If hazards or the likelihood of hazards are found, are employers selecting and having affected employees use properly fitted personal protective equipment suitable for protection from these hazards?
- Has the employer been trained on ppe procedures, i.e. what ppe is necessary for a job tasks, when they need it, and how to properly adjust it?
- Are protective goggles or face shields provided and worn where there is any danger of flying particles or corrosive materials?
- Are approved safety glasses required to be worn at all times in areas where there is a risk of eye injuries such as punctures, abrasions, contusions or burns?
- Are employees who need corrective lenses (glasses or contacts) in working environments having harmful exposures, required to wear *only* approved safety glasses, protective goggles, or use other medically approved precautionary procedures?
- Are protective gloves, aprons, shields, or other means provided and required where employees could be cut or where there is reasonably anticipated exposure to corrosive liquids, chemicals, blood, or other potentially infectious materials? See 29 CFR 1910.1030(b) for the definition of "other potentially infectious materials."
- Are hard hats provided and worn where danger of falling objects exists?
- Are hard hats inspected periodically for damage to the shell and suspension system?
- Is appropriate foot protection required where there is the risk of foot injuries from hot, corrosive, poisonous substances, falling objects, crushing or penetrating actions?
- Are approved respirators provided for regular or emergency use where needed?
- Is all protective equipment maintained in a sanitary condition and ready for use?
- Do you have eye wash facilities and a quick Drench Shower within the work area where employees are exposed to injurious corrosive materials?

- Where special equipment is needed for electrical workers, is it available?
- Where food or beverages are consumed on the premises, are they consumed in areas where there is no exposure to toxic material, blood, or other potentially infectious materials?
- Is protection against the effects of occupational noise exposure provided when sound levels exceed those of the OSHA noise standard?
- Are adequate work procedures, protective clothing and equipment provided and used when cleaning up spilled toxic or otherwise hazardous materials or liquids?
- Are there appropriate procedures in place for disposing of or decontaminating personal protective equipment contaminated with, or reasonably anticipated to be contaminated with, blood or other potentially infectious materials?

GENERAL WORK ENVIRONMENT

- Are all worksites clean, sanitary, and orderly?
- Are work surfaces kept dry or appropriate means taken to assure the surfaces are slip-resistant?
- Are all spilled hazardous materials or liquids, including blood and other potentially infectious materials, cleaned up immediately and according to proper procedures?
- Is combustible scrap, debris and waste stored safely and removed from the worksite promptly?
- Is all regulated waste, as defined in the OSHA bloodborne pathogens standard (29 CFR 1910.1030), discarded according to federal, state, and local regulations?
- Are accumulations of combustible dust routinely removed from elevated surfaces including the overhead structure of buildings, etc.?
- Is combustible dust cleaned up with a vacuum system to prevent the dust going into suspension?
- Is metallic or conductive dust prevented from entering or accumulating on or around electrical enclosures or equipment?
- Are covered metal waste cans used for oily and paintsoaked waste?

- Are all oil and gas fired devices equipped with flame failure controls that will prevent flow of fuel if pilots or main burners are not working?
- Are paint spray booths, dip tanks, etc., cleaned regularly?
- Are the minimum number of toilets and washing facilities provided?
- Are all toilets and washing facilities clean and sanitary?
- Are all work areas adequately illuminated?
- Are pits and floor openings covered or otherwise guarded?
- Have all confined spaces been evaluated for compliance with 29 CFR 1910.146?

WALKWAYS

- Are aisles and passageways kept clear?
- Are aisles and walkways marked as appropriate?
- Are wet surfaces covered with non-slip materials?
- Are holes in the floor, sidewalk or other walking surface repaired properly, covered or otherwise made safe?
- Is there safe clearance for walking in aisles where motorized or mechanical handling equipment is operating?
- Are materials or equipment stored in such a way that sharp projectives will not interfere with the walkway?
- Are spilled materials cleaned up immediately?
- Are changes of direction or elevations readily identifiable?
- Are aisles or walkways that pass near moving or operating machinery, welding operations or similar operations arranged so employees will not be subjected to potential hazards?
- Is adequate headroom provided for the entire length of any aisle or walkway?

- Are standard guardrails provided wherever aisle or walkway surfaces are elevated more than 30 inches (76.20 centimeters) above any adjacent floor or the ground?
- Are bridges provided over conveyors and similar hazards?

FLOOR AND WALL OPENINGS

- Are floor openings guarded by a cover, a guardrail, or equivalent on all sides (except at entrance to stairways or ladders)?
- Are toeboards installed around the edges of permanent floor opening (where persons may pass below the opening)?
- Are skylight screens of such construction and mounting that they will withstand a load of at least 200 pounds (90 kilograms)?
- Is the glass in the windows, doors, glass walls, etc., which are subject to human impact, of sufficient thickness and type for the condition of use?
- Are grates or similar type covers over floor openings such as floor drains of such design that foot traffic or rolling equipment will not be affected by the grate spacing?
- Are unused portions of service pits and pits not actually in use either covered or protected by guardrails or equivalent?
- Are manhole covers, trench covers and similar covers, plus their supports designed to carry a truck rear axle load of at least 20,000 pounds (9000 kilograms) when located in roadways and subject to vehicle traffic?
- Are floor or wall openings in fire resistive construction provided with doors or covers compatible with the fire rating of the structure and provided with a self-closing feature when appropriate?

STAIRS AND STAIRWAYS

- Are standard stair rails or handrails on all stairways having four or more risers?
- Are all stairways at least 22 inches (55.88 centimeters) wide?

- Do stairs have landing platforms not less than 30 inches (76.20 centimeters) in the direction of travel and extend 22 inches (55.88 centimeters) in width at every 12 feet (3.6576 meters) or less of vertical rise?
- Do stairs angle no more than 50 and no less than 30 degrees?
- Are stairs of hollow-pan type treads and landings filled to the top edge of the pan with solid material?
- Are step risers on stairs uniform from top to bottom?
- Are steps on stairs and stairways designed or provided with a surface that renders them slip resistant?
- Are stairway handrails located between 30 (76.20 centimeters) and 34 inches (86.36 centimeters) above the leading edge of stair treads?
- Do stairway handrails have at least 3 inches (7.62 centimeters) of clearance between the handrails and the wall or surface they are mounted on?
- Where doors or gates open directly on a stairway, is there a platform provided so the swing of the door does not reduce the width of the platform to less than 21 inches (53.34 centimeters)?
- Are stairway handrails capable of withstanding a load of 200 pounds (90 kilograms), applied within 2 inches (5.08 centimeters) of the top edge, in any downward or outward direction?
- Where stairs or stairways exit directly into any area where vehicles may be operated, are adequate barriers and warnings provided to prevent employees stepping into the path of traffic?
- Do stairway landings have a dimension measured in the direction of travel, at least equal to the width of the stairway?
- Is the vertical distance between stairway landings limited to 12 feet (3.6576 centimeters) or less?

ELEVATED SURFACES

- Are signs posted, when appropriate, showing the elevated surface load capacity?

- Are surfaces elevated more than 30 inches (76.20 centimeters) above the floor or ground provided with standard guardrails?
- Are all elevated surfaces (beneath which people or machinery could be exposed to falling objects) provided with standard 4-inch (10.16 centimeters) toeboards?
- Is a permanent means of access and egress provided to elevated storage and work surfaces?
- Is required headroom provided where necessary?
- Is material on elevated surfaces piled, stacked or racked in a manner to prevent it from tipping, falling, collapsing, rolling or spreading?
- Are dock boards or bridge plates used when transferring materials between docks and trucks or rail cars?

EXITING OR EGRESS

- Are all exits marked with an exit sign and illuminated by a reliable light source?
- Are the directions to exits, when not immediately apparent, marked with visible signs?
- Are doors, passageways or stairways, that are neither exits nor access to exits, and which could be mistaken for exits, appropriately marked "NOT AN EXIT," "TO BASEMENT," "STOREROOM," etc.?
- Are exit signs provided with the word "EXIT" in lettering at least 5 inches (12.70 centimeters) high and the stroke of the lettering at least 1/2-inch (1.2700 centimeters) wide?
- Are exit doors side-hinged?
- Are all exits kept free of obstructions?
- Are at least two means of egress provided from elevated platforms, pits or rooms where the absence of a second exit would increase the risk of injury from hot, poisonous, corrosive, suffocating, flammable, or explosive substances?
- Are there sufficient exits to permit prompt escape in case of emergency?
- Are special precautions taken to protect employees during construction and repair operations?

- Is the number of exits from each floor of a building and the number of exits from the building itself, appropriate for the building occupancy load?
- Are exit stairways that are required to be separated from other parts of a building enclosed by at least 2-hour fire-resistive construction in buildings more than four stories in height, and not less than 1-hour fire-resistive constructive elsewhere?
- Where ramps are used as part of required exiting from a building, is the ramp slope limited to 1 foot (0.3048 meters) vertical and 12 feet (3.6576 meters) horizontal?
- Where exiting will be through frameless glass doors, glass exit doors, or storm doors are the doors fully tempered and meet the safety requirements for human impact?

EXIT DOORS

- Are doors that are required to serve as exits designed and constructed so that the way of exit travel is obvious and direct?
- Are windows that could be mistaken for exit doors, made inaccessible by means of barriers or railings?
- Are exit doors openable from the direction of exit travel without the use of a key or any special knowledge or effort when the building is occupied?
- Is a revolving, sliding or overhead door prohibited from serving as a required exit door?
- Where panic hardware is installed on a required exit door, will it allow the door to open by applying a force of 15 pounds (6.75 kilograms) or less in the direction of the exit traffic?
- Are doors on cold storage rooms provided with an inside release mechanism which will release the latch and open the door even if it's padlocked or otherwise locked on the outside?
- Where exit doors open directly onto any street, alley or other area where vehicles may be operated, are adequate barriers and warnings provided to prevent employees from stepping into the path of traffic?
- Are doors that swing in both directions and are located between rooms where there is frequent traffic, provided with viewing panels in each door?

PORTABLE LADDERS

- Are all ladders maintained in good condition, joints between steps and side rails tight, all hardware and fittings securely attached and moveable parts operating freely without binding or undue play?
- Are non-slip safety feet provided on each ladder?
- Are non-slip safety feet provided on each metal or rung ladder?
- Are ladder rungs and steps free of grease and oil?
- Is it prohibited to place a ladder in front of doors opening toward the ladder except when the door is blocked open, locked or guarded?
- Is it prohibited to place ladders on boxes, barrels, or other unstable bases to obtain additional height?
- Are employees instructed to face the ladder when ascending or descending?
- Are employees prohibited from using ladders that are broken, missing steps, rungs, or cleats, broken side rails or other faulty equipment?
- Are employees instructed not to use the top step of ordinary stepladders as a step?
- When portable rung ladders are used to gain access to elevated platforms, roofs, etc., does the ladder always extend at least 3 feet (0.9144 meters) above the elevated surface?
- Is it required that when portable rung or cleat type ladders are used, the base is so placed that slipping will not occur, or it is lashed or otherwise held in place?
- Are portable metal ladders legibly marked with signs reading "CAUTION" - Do Not Use Around Electrical Equipment" or equivalent wording?
- Are employees prohibited from using ladders as guys, braces, skids, gin poles, or for other than their intended purposes?
- Are employees instructed to only adjust extension ladders while standing at a base (not while standing on the ladder or from a position above the ladder)?
- Are metal ladders inspected for damage?

- Are the rungs of ladders uniformly spaced at 12 inches, (30.48 centimeters) center to center?

HAND TOOLS AND EQUIPMENT

- Are all tools and equipment (both company and employee owned) used by employees at their workplace in good condition?
- Are hand tools such as chisels and punches, which develop mushroomed heads during use, reconditioned or replaced as necessary?
- Are broken or fractured handles on hammers, axes and similar equipment replaced promptly?
- Are worn or bent wrenches replaced regularly?
- Are appropriate handles used on files and similar tools?
- Are employees made aware of the hazards caused by faulty or improperly used hand tools?
- Are appropriate safety glasses, face shields, etc. used while using hand tools or equipment which might produce flying materials or be subject to breakage?
- Are jacks checked periodically to ensure they are in good operating condition?
- Are tool handles wedged tightly in the head of all tools?
- Are tool cutting edges kept sharp so the tool will move smoothly without binding or skipping?
- Are tools stored in dry, secure location where they won't be tampered with?
- Is eye and face protection used when driving hardened or tempered spuds or nails?

PORTABLE (POWER OPERATED) TOOLS AND EQUIPMENT

- Are grinders, saws and similar equipment provided with appropriate safety guards?
- Are power tools used with the correct shield, guard, or attachment, recommended by the manufacturer?
- Are portable circular saws equipped with guards above and below the base shoe?

- Are circular saw guards checked to assure they are not wedged up, thus leaving the lower portion of the blade unguarded?
- Are rotating or moving parts of equipment guarded to prevent physical contact?
- Are all cord-connected, electrically operated tools and equipment effectively grounded or of the approved double insulated type?
- Are effective guards in place over belts, pulleys, chains, sprockets, on equipment such as concrete mixers, and air compressors?
- Are portable fans provided with full guards or screens having openings 1/2 inch (1.2700 centimeters) or less?
- Is hoisting equipment available and used for lifting heavy objects, and are hoist ratings and characteristics appropriate for the task?
- Are ground-fault circuit interrupters provided on all temporary electrical 15 and 20 ampere circuits, used during periods of construction?
- Are pneumatic and hydraulic hoses on power-operated tools checked regularly for deterioration or damage?

ABRASIVE WHEEL EQUIPMENT GRINDERS

- Is the work rest used and kept adjusted to within 1/8 inch (0.3175 centimeters) of the wheel?
- Is the adjustable tongue on the top side of the grinder used and kept adjusted to within 1/4 inch (0.6350 centimeters) of the wheel?
- Do side guards cover the spindle, nut, and flange and 75 percent of the wheel diameter?
- Are bench and pedestal grinders permanently mounted?
- Are goggles or face shields always worn when grinding?
- Is the maximum RPM rating of each abrasive wheel compatible with the RPM rating of the grinder motor?
- Are fixed or permanently mounted grinders connected to their electrical supply system with metallic conduit or other permanent wiring method?

- Does each grinder have an individual on and off control switch?
- Is each electrically operated grinder effectively grounded?
- Before new abrasive wheels are mounted, are they visually inspected and ring tested?
- Are dust collectors and powered exhausts provided on grinders used in operations that produce large amounts of dust?
- Are splash guards mounted on grinders that use coolant to prevent the coolant reaching employees?
- Is cleanliness maintained around grinders?

POWDER-ACTUATED TOOLS

- Are employees who operate powder-actuated tools trained in their use and carry a valid operators card?
- Is each powder-actuated tool stored in its own locked container when not being used?
- Is a sign at least 7 inches (17.78 centimeters) by 10 inches (25.40 centimeters) with bold face type reading "POWDER-ACTUATED TOOL IN USE" conspicuously posted when the tool is being used?
- Are powder-actuated tools left unloaded until they are actually ready to be used?
- Are powder-actuated tools inspected for obstructions or defects each day before use?
- Do powder-actuated tool operators have and use appropriate personal protective equipment such as hard hats, safety goggles, safety shoes and ear protectors?

MACHINE GUARDING

- Is there a training program to instruct employees on safe methods of machine operation?
- Is there adequate supervision to ensure that employees are following safe machine operating procedures?
- Is there a regular program of safety inspection of machinery and equipment?

- Is all machinery and equipment kept clean and properly maintained?
- Is sufficient clearance provided around and between machines to allow for safe operations, set up and servicing, material handling and waste removal?
- Is equipment and machinery securely placed and anchored, when necessary to prevent tipping or other movement that could result in personal injury?
- Is there a power shut-off switch within reach of the operator's position at each machine?
- Can electric power to each machine be locked out for maintenance, repair, or security?
- Are the noncurrent-carrying metal parts of electrically operated machines bonded and grounded?
- Are foot-operated switches guarded or arranged to prevent accidental actuation by personnel or falling objects?
- Are manually operated valves and switches controlling the operation of equipment and machines clearly identified and readily accessible?
- Are all emergency stop buttons colored red?
- Are all pulleys and belts that are within 7 feet (2.1336 meters) of the floor or working level properly guarded?
- Are all moving chains and gears properly guarded?
- Are splash guards mounted on machines that use coolant to prevent the coolant from reaching employees?
- Are methods provided to protect the operator and other employees in the machine area from hazards created at the point of operation, ingoing nip points, rotating parts, flying chips, and sparks?
- Are machinery guards secure and so arranged that they do not offer a hazard in their use?
- If special handtools are used for placing and removing material, do they protect the operator's hands?

- Are revolving drums, barrels, and containers required to be guarded by an enclosure that is interlocked with the drive mechanism, so that revolution cannot occur unless the guard enclosure is in place, so guarded?
- Do arbors and mandrels have firm and secure bearings and are they free from play?
- Are provisions made to prevent machines from automatically starting when power is restored after a power failure or shutdown?
- Are machines constructed so as to be free from excessive vibration when the largest size tool is mounted and run at full speed?
- If machinery is cleaned with compressed air, is air pressure controlled and personal protective equipment or other safeguards utilized to protect operators and other workers from eye and body injury?
- Are fan blades protected with a guard having openings no larger than 1/2 inch (1.2700 centimeters), when operating within 7 feet (2.1336 meters) of the floor?
- Are saws used for ripping, equipped with anti-kick back devices and spreaders?
- Are radial arm saws so arranged that the cutting head will gently return to the back of the table when released?
- Are all equipment control valve handles provided with a means for locking-out?
- Does the lock-out procedure require that stored energy (mechanical, hydraulic, air, etc.) be released or blocked before equipment is locked-out for repairs?
- Are appropriate employees provided with individually keyed personal safety locks?
- Are employees required to keep personal control of their key(s) while they have safety locks in use?
- Is it required that only the employee exposed to the hazard, place or remove the safety lock?
- Is it required that employees check the safety of the lock-out by attempting a startup after making sure no one is exposed?
- Are employees instructed to always push the control circuit stop button immediately after checking the safety of the lock-out?
- Is there a means provided to identify any or all employees who are working on locked-out equipment by their locks or accompanying tags?
- Are a sufficient number of accident preventive signs or tags and safety padlocks provided for any reasonably foreseeable repair emergency?
- When machine operations, configuration or size requires the operator to leave his or her control station to install tools or perform other operations, and that part of the machine could move if accidentally activated, is such element required to be separately locked or blocked out?
- In the event that equipment or lines cannot be shut down, locked-out and tagged, is a safe job procedure established and rigidly followed?

LOCKOUT/TAGOUT PROCEDURES

- Is all machinery or equipment capable of movement, required to be de-energized or disengaged and locked-out during cleaning, servicing, adjusting or setting up operations, whenever required?
- Where the power disconnecting means for equipment does not also disconnect the electrical control circuit:
 - Are the appropriate electrical enclosures identified?
 - Is means provided to assure the control circuit can also be disconnected and locked-out?
- Is the locking-out of control circuits in lieu of locking-out main power disconnects prohibited?

WELDING, CUTTING AND BRAZING

- Are only authorized and trained personnel permitted to use welding, cutting or brazing equipment?
- Does each operator have a copy of the appropriate operating instructions and are they directed to follow them?
- Are compressed gas cylinders regularly examined for obvious signs of defects, deep rusting, or leakage?

- Is care used in handling and storing cylinders, safety valves, and relief valves to prevent damage?
- Are precautions taken to prevent the mixture of air or oxygen with flammable gases, except at a burner or in a standard torch?
- Are only approved apparatus (torches, regulators, pressure reducing valves, acetylene generators, manifolds) used?
- Are cylinders kept away from sources of heat?
- Are the cylinders kept away from elevators, stairs, or gangways?
- Is it prohibited to use cylinders as rollers or supports?
- Are empty cylinders appropriately marked and their valves closed?
- Are signs reading: DANGER—NO SMOKING, MATCHES, OR OPENLIGHTS, or the equivalent, posted?
- Are cylinders, cylinder valves, couplings, regulators, hoses, and apparatus kept free of oily or greasy substances?
- Is care taken not to drop or strike cylinders?
- Unless secured on special trucks, are regulators removed and valve-protection caps put in place before moving cylinders?
- Do cylinders without fixed hand wheels have keys, handles, or non-adjustable wrenches on stem valves when in service?
- Are liquefied gases stored and shipped valve-end up with valve covers in place?
- Are provisions made to never crack a fuel gas cylinder valve near sources of ignition?
- Before a regulator is removed, is the valve closed and gas released from the regulator?
- Is red used to identify the acetylene (and other fuel-gas) hose, green for oxygen hose, and black for inert gas and air hose?
- Are pressure-reducing regulators used only for the gas and pressures for which they are intended?
- Is open circuit (No Load) voltage of arc welding and cutting machines as low as possible and not in excess of the recommended limits?
- Under wet conditions, are automatic controls for reducing no load voltage used?
- Is grounding of the machine frame and safety ground connections of portable machines checked periodically?
- Are electrodes removed from the holders when not in use?
- Is it required that electric power to the welder be shut off when no one is in attendance?
- Is suitable fire extinguishing equipment available for immediate use?
- Is the welder forbidden to coil or loop welding electrode cable around his body?
- Are wet machines thoroughly dried and tested before being used?
- Are work and electrode lead cables frequently inspected for wear and damage, and replaced when needed?
- Do means for connecting cable lengths have adequate insulation?
- When the object to be welded cannot be moved and fire hazards cannot be removed, are shields used to confine heat, sparks, and slag?
- Are fire watchers assigned when welding or cutting is performed in locations where a serious fire might develop?
- Are combustible floors kept wet, covered by damp sand, or protected by fire-resistant shields?
- When floors are wet down, are personnel protected from possible electrical shock?
- When welding is done on metal walls, are precautions taken to protect combustibles on the other side?
- Before hot work is begun, are used drums, barrels, tanks, and other containers so thoroughly cleaned that no substances remain that could explode, ignite, or produce toxic vapors?

- Is it required that eye protection helmets, hand shields and goggles meet appropriate standards?
- Are employees exposed to the hazards created by welding, cutting, or brazing operations protected with personal protective equipment and clothing?
- Is a check made for adequate ventilation in and where welding or cutting is performed?
- When working in confined places, are environmental monitoring tests taken and means provided for quick removal of welders in case of an emergency?

COMPRESSORS AND COMPRESSED AIR

- Are compressors equipped with pressure relief valves, and pressure gauges?
- Are compressor air intakes installed and equipped so as to ensure that only clean uncontaminated air enters the compressor?
- Are air filters installed on the compressor intake?
- Are compressors operated and lubricated in accordance with the manufacturer's recommendations?
- Are safety devices on compressed air systems checked frequently?
- Before any repair work is done on the pressure system of a compressor, is the pressure bled off and the system locked-out?
- Are signs posted to warn of the automatic starting feature of the compressors?
- Is the belt drive system totally enclosed to provide protection for the front, back, top, and sides?
- Is it strictly prohibited to direct compressed air towards a person?
- Are employees prohibited from using highly compressed air for cleaning purposes?
- If compressed air is used for cleaning off clothing, is the pressure reduced to less than 10 psi?
- When using compressed air for cleaning, do employees wear protective chip guarding and personal protective equipment?

- Are safety chains or other suitable locking devices used at couplings of high pressure hose lines where a connection failure would create a hazard?
- Before compressed air is used to empty containers of liquid, is the safe working pressure of the container checked?
- When compressed air is used with abrasive blast cleaning equipment, is the operating valve a type that must be held open manually?
- When compressed air is used to inflate auto ties, is a clip-on chuck and an inline regulator preset to 40 psi required?
- Is it prohibited to use compressed air to clean up or move combustible dust if such action could cause the dust to be suspended in the air and cause a fire or explosion hazard?

COMPRESSORS AIR RECEIVERS

- Is every receiver equipped with a pressure gauge and with one or more automatic, spring-loaded safety valves?
- Is the total relieving capacity of the safety valve capable of preventing pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10 percent?
- Is every air receiver provided with a drain pipe and valve at the lowest point for the removal of accumulated oil and water?
- Are compressed air receivers periodically drained of moisture and oil?
- Are all safety valves tested frequently and at regular intervals to determine whether they are in good operating condition?
- Is there a current operating permit used by the Division of Occupational Safety and Health?
- Is the inlet of air receivers and piping systems kept free of accumulated oil and carbonaceous materials?

COMPRESSED GAS CYLINDERS

- Are cylinders with a water weight capacity over 30 pounds (13.5 kilograms), equipped with means for connecting a valve protector device, or with a collar or recess to protect the valve?

- Are cylinders legibly marked to clearly identify the gas contained?
- Are compressed gas cylinders stored in areas which are protected from external heat sources such as flame impingement, intense radiant heat, electric arcs, or high temperature lines?
- Are cylinders located or stored in areas where they will not be damaged by passing or falling objects or subject to tampering by unauthorized persons?
- Are cylinders stored or transported in a manner to prevent them from creating a hazard by tipping, falling or rolling?
- Are cylinders containing liquefied fuel gas, stored or transported in a position so that the safety relief device is always in direct contact with the vapor space in the cylinder?
- Are valve protectors always placed on cylinders when the cylinders are not in use or connected for use?
- Are all valves closed off before a cylinder is moved, when the cylinder is empty, and at the completion of each job?
- Are low pressure fuel-gas cylinders checked periodically for corrosion, general distortion, cracks, or any other defect that might indicate a weakness or render it unfit for service?
- Does the periodic check of low pressure fuel-gas cylinders include a close inspection of the cylinders' bottom?
- Is each cage-controlled hoist equipped with an effective warning device?
- Are close-fitting guards or other suitable devices installed on hoist to assure hoist ropes will be maintained in the sheave groves?
- Are all hoist chains or ropes of sufficient length to handle the full range of movement of the application while still maintaining two full wraps on the drum at all times?
- Are nip points or contact points between hoist ropes and sheaves which are permanently located within 7 feet (2.1336 meters) of the floor, ground or working platform, guarded?
- Is it prohibited to use chains or rope slings that are kinked or twisted?
- Is it prohibited to use the hoist rope or chain wrapped around the load as a substitute, for a sling?
- Is the operator instructed to avoid carrying loads over people?

INDUSTRIAL TRUCKS—FORKLIFTS

HOIST AND AUXILLARY EQUIPMENT

- Is each overhead electric hoist equipped with a limit device to stop the hook travel at its highest and lowest point of safe travel?
- Will each hoist automatically stop and hold any load up to 125 percent of its rated load if its actuating force is removed?
- Is the rated load of each hoist legibly marked and visible to the operator?
- Are stops provided at the safe limits of travel for trolley hoist?
- Are the controls of hoist plainly marked to indicate the direction of travel or motion?
- Are only employees who have been trained in the proper use of hoists allowed to operate them?
- Are only trained personnel allowed to operate industrial trucks?
- Is substantial overhead protective equipment provided on high lift rider equipment?
- Are the required lift truck operating rules posted and enforced?
- Is directional lighting provided on each industrial truck that operates in an area with less than 2 foot-candles per square foot of general lighting?
- Does each industrial truck have a warning horn, whistle, gong, or other device which can be clearly heard above the normal noise in the areas where operated?
- Are the brakes on each industrial truck capable of bringing the vehicle to a complete and safe stop when fully loaded?
- Will the industrial trucks' parking brake effectively prevent the vehicle from moving when unattended?

- Are industrial trucks operating in areas where flammable gases or vapors, or combustible dust or ignitable fibers may be present in the atmosphere, approved for such locations?
- Are motorized hand and hand/rider trucks so designed that the brakes are applied, and power to the drive motor shuts off when the operator releases his or her grip on the device that controls the travel?
- Are industrial trucks with internal combustion engine, operated in buildings or enclosed areas, carefully checked to ensure such operations do not cause harmful concentration of dangerous gases or fumes?
- Are powered industrial trucks being safely operated?

SPRAYING OPERATIONS

- Is adequate ventilation assured before spray operations are started?
- Is mechanical ventilation provided when spraying operations are done in enclosed areas?
- When mechanical ventilation is provided during spraying operations, is it so arranged that it will not circulate the contaminated air?
- Is the spray area free of hot surfaces?
- Is the spray area at least 20 feet (6.096 meters) from flames, sparks, operating electrical motors and other ignition sources?
- Are portable lamps used to illuminate spray areas suitable for use in a hazardous location?
- Is approved respiratory equipment provided and used when appropriate during spraying operations?
- Do solvents used for cleaning have a flash point to 100°F or more?
- Are fire control sprinkler heads kept clean?
- Are "NO SMOKING" signs posted in spray areas, paint rooms, paint booths, and paint storage areas?
- Is the spray area kept clean of combustible residue?
- Are spray booths constructed of metal, masonry, or other substantial noncombustible material?

- Are spray booth floors and baffles noncombustible and easily cleaned?
- Is infrared drying apparatus kept out of the spray area during spraying operations?
- Is the spray booth completely ventilated before using the drying apparatus?
- Is the electric drying apparatus properly grounded?
- Are lighting fixtures for spray booths located outside of the booth and the interior lighted through sealed clear panels?
- Are the electric motors for exhaust fans placed outside booths or ducts?
- Are belts and pulleys inside the booth fully enclosed?
- Do ducts have access doors to allow cleaning?
- Do all drying spaces have adequate ventilation?

ENTERING CONFINED SPACES

- Are confined spaces thoroughly emptied of any corrosive or hazardous substances, such as acids or caustics, before entry?
- Are all lines to a confined space, containing inert, toxic, flammable, or corrosive materials valved off and blanked or disconnected and separated before entry?
- Are all impellers, agitators, or other moving parts and equipment inside confined spaces locked-out if they present a hazard?
- Is either natural or mechanical ventilation provided prior to confined space entry?
- Are appropriate atmospheric tests performed to check for oxygen deficiency, toxic substances and explosive concentrations in the confined space before entry?
- Is adequate illumination provided for the work to be performed in the confined space?
- Is the atmosphere inside the confined space frequently tested or continuously monitored during conduct of work?

- Is there an assigned safety standby employee outside of the confined space, when required, whose sole responsibility is to watch the work in progress, sound an alarm if necessary, and render assistance?
- Is the standby employee appropriately trained and equipped to handle an emergency?
- Is the standby employee or other employees prohibited from entering the confined space without lifelines and respiratory equipment if there is any question as to the cause of an emergency?
- Is approved respiratory equipment required if the atmosphere inside the confined space cannot be made acceptable?
- Is all portable electrical equipment used inside confined spaces either grounded and insulated, or equipped with ground fault protection?
- Before gas welding or burning is started in a confined space, are hoses checked for leaks, compressed gas bottles forbidden inside of the confined space, torches lighted only outside of the confined area and the confined area tested for an explosive atmosphere each time before a lighted torch is to be taken into the confined space?
- If employees will be using oxygen-consuming equipment—such as salamanders, torches, and furnaces, in a confined space—is sufficient air provided to assure combustion without reducing the oxygen concentration of the atmosphere below 19.5 percent by volume?
- Whenever combustion-type equipment is used in a confined space, are provisions made to ensure the exhaust gases are vented outside of the enclosure?
- Is each confined space checked for decaying vegetation or animal matter which may produce methane?
- Is the confined space checked for possible industrial waste which could contain toxic properties?
- If the confined space is below the ground and near areas where motor vehicles will be operating, is it possible for vehicle exhaust or carbon monoxide to enter the space?
- Are employees instructed in proper first-aid and other emergency procedures?
- Are hazardous substances, blood, and other potentially infectious materials identified, which may cause harm by inhalation, ingestion, or skin absorption or contact?
- Are employees aware of the hazards involved with the various chemicals they may be exposed to in their work environment, such as ammonia, chlorine, epoxies, caustics, etc.?
- Is employee exposure to chemicals in the workplace kept within acceptable levels?
- Can a less harmful method or process be used?
- Is the work area's ventilation system appropriate for the work being performed?
- Are spray painting operations done in spray rooms or booths equipped with an appropriate exhaust system?
- Is employee exposure to welding fumes controlled by ventilation, use of respirators, exposure time, or other means?
- Are welders and other workers nearby provided with flash shields during welding operations?
- If forklifts and other vehicles are used in buildings or other enclosed areas, are the carbon monoxide levels kept below maximum acceptable concentration?
- Has there been a determination that noise levels in the facilities are within acceptable levels?
- Are steps being taken to use engineering controls to reduce excessive noise levels?
- Are proper precautions being taken when handling asbestos and other fibrous materials?
- Are caution labels and signs used to warn of hazardous substances (e.g., asbestos) and biohazards (e.g., bloodborne pathogens)?
- Are wet methods used, when practicable, to prevent the emission of airborne asbestos fibers, silica dust and similar hazardous materials?
- Are engineering controls examined and maintained or replaced on a scheduled basis?

ENVIRONMENTAL CONTROLS

- Are all work areas properly illuminated?

- Is vacuuming with appropriate equipment used whenever possible rather than blowing or sweeping dust?
- Are grinders, saws, and other machines that produce respirable dusts vented to an industrial collector or central exhaust system?
- Are all local exhaust ventilation systems designed and operating properly such as air flow and volume necessary for the application, ducts not plugged or belts slipping?
- Is personal protective equipment provided, used and maintained wherever required?
- Are there written standard operating procedures for the selection and use of respirators where needed?
- Are restrooms and washrooms kept clean and sanitary?
- Is all water provided for drinking, washing, and cooking potable?
- Are all outlets for water not suitable for drinking clearly identified?
- Are employees' physical capacities assessed before being assigned to jobs requiring heavy work?
- Are employees instructed in the proper manner of lifting heavy objects?
- Where heat is a problem, have all fixed work areas been provided with spot cooling or air conditioning?
- Are employees screened before assignment to areas of high heat to determine if their health condition might make them more susceptible to having an adverse reaction?
- Are employees working on streets and roadways where they are exposed to the hazards of traffic, required to wear bright colored (traffic orange) warning vests?
- Are exhaust stacks and air intakes so located that contaminated air will not be recirculated within a building or other enclosed area?
- Is equipment producing ultraviolet radiation properly shielded?

- Are universal precautions observed where occupational exposure to blood or other potentially infectious materials can occur and in all instances where differentiation of types of body fluids or potentially infectious materials is difficult or impossible?

FLAMMABLE AND COMBUSTIBLE MATERIALS

- Are combustible scrap, debris, and waste materials (oily rags, etc.) stored in covered metal receptacles and removed from the worksite promptly?
- Is proper storage practiced to minimize the risk of fire including spontaneous combustion?
- Are approved containers and tanks used for the storage and handling of flammable and combustible liquids?
- Are all connections on drums and combustible liquid piping, vapor and liquid tight?
- Are all flammable liquids kept in closed containers when not in use (e.g., parts cleaning tanks, pans, etc.)?
- Are bulk drums of flammable liquids grounded and bonded to containers during dispensing?
- Do storage rooms for flammable and combustible liquids have explosion-proof lights?
- Do storage rooms for flammable and combustible liquids have mechanical or gravity ventilation?
- Is liquefied petroleum gas stored, handled, and used in accordance with safe practices and standards?
- Are "NO SMOKING" signs posted on liquefied petroleum gas tanks?
- Are liquefied petroleum storage tanks guarded to prevent damage from vehicles?
- Are all solvent wastes, and flammable liquids kept in fire-resistant, covered containers until they are removed from the worksite?
- Is vacuuming used whenever possible rather than blowing or sweeping combustible dust?

- Are firm separators placed between containers of combustibles or flammables, when stacked one upon another, to assure their support and stability?
- Are fuel gas cylinders and oxygen cylinders separated by distance, and fire-resistant barriers, while in storage?
- Are fire extinguishers selected and provided for the types of materials in areas where they are to be used?

Class A Ordinary combustible material fires.

Class B Flammable liquid, gas or grease fires.

Class C Energized-electrical equipment fires.

- Are appropriate fire extinguishers mounted within 75 feet (2286 meters) of outside areas containing flammable liquids, and within 10 feet (3.048 meters) of any inside storage area for such materials?
- Are extinguishers free from obstructions or blockage?
- Are all extinguishers serviced, maintained and tagged at intervals not to exceed 1 year?
- Are all extinguishers fully charged and in their designated places?
- Where sprinkler systems are permanently installed, are the nozzle heads so directed or arranged that water will not be sprayed into operating electrical switch boards and equipment?
- Are "NO SMOKING" signs posted where appropriate in areas where flammable or combustible materials are used or stored?
- Are safety cans used for dispensing flammable or combustible liquids at a point of use?
- Are all spills of flammable or combustible liquids cleaned up promptly?
- Are storage tanks adequately vented to prevent the development of excessive vacuum or pressure as a result of filling, emptying, or atmosphere temperature changes?
- Are storage tanks equipped with emergency venting that will relieve excessive internal pressure caused by fire exposure?

- Are "NO SMOKING" rules enforced in areas involving storage and use of hazardous materials?

HAZARDOUS CHEMICAL EXPOSURE

- Are employees trained in the safe handling practices of hazardous chemicals such as acids, caustics, etc.?
- Are employees aware of the potential hazards involving various chemicals stored or used in the workplace such as acids, bases, caustics, epoxies, and phenols?
- Is employee exposure to chemicals kept within acceptable levels?
- Are eye wash fountains and safety showers provided in areas where corrosive chemicals are handled?
- Are all containers, such as vats, and storage tanks labeled as to their contents, e.g., "CAUSTICS"?
- Are all employees required to use personal protective clothing and equipment when handling chemicals (gloves, eye protection, and respirators)?
- Are flammable or toxic chemicals kept in closed containers when not in use?
- Are chemical piping systems clearly marked as to their content?
- Where corrosive liquids are frequently handled in open containers or drawn from storage vessels or pipe lines, are adequate means readily available for neutralizing or disposing of spills or overflows and performed properly and safely?
- Have standard operating procedures been established, and are they being followed when cleaning up chemical spills?
- Where needed for emergency use, are respirators stored in a convenient, clean, and sanitary location?
- Are respirators intended for emergency use adequate for the various uses for which they may be needed?
- Are employees prohibited from eating in areas where hazardous chemicals are present?
- Is personal protective equipment provided, used and maintained whenever necessary?

- Are there written standard operating procedures for the selection and use of respirators where needed?
- If you have a respirator protection program, are your employees instructed on the correct usage and limitations of the respirators? Are the respirators NIOSH-approved for this particular application? Are they regularly inspected and cleaned, sanitized and maintained?
- If hazardous substances are used in your processes, do you have a medical or biological monitoring system in operation?
- Are you familiar with the Threshold Limit Values or Permissible Exposure Limits of airborne contaminants and physical agents used in your workplace?
- Have control procedures been instituted for hazardous materials, where appropriate, such as respirators, ventilation systems, and handling practices?
- Whenever possible, are hazardous substances handled in properly designed and exhausted booths or similar locations?
- Do you use general dilution or local exhaust ventilation systems to control dusts, vapors, gases, fumes, smoke, solvents or mists which may be generated in your workplace?
- Is ventilation equipment provided for removal of contaminants from such operations as production grinding, buffing, spray painting, and/or vapor degreasing, and is it operating properly?
- Do employees complain about dizziness, headaches, nausea, irritation, or other factors of discomfort when they use solvents or other chemicals?
- Is there a dermatitis problem? Do employees complain about dryness, irritation, or sensitization of the skin?
- Have you considered the use of an industrial hygienist or environmental health specialist to evaluate your operation?
- If internal combustion engines are used, is carbon monoxide kept within acceptable levels?
- Is vacuuming used, rather than blowing or sweeping dusts whenever possible for clean-up?

- Are materials which give off toxic asphyxiant, suffocating or anesthetic fumes, stored in remote or isolated locations when not in use?

HAZARDOUS SUBSTANCES COMMUNICATION

- Is there a list of hazardous substances used in your workplace?
- Is there a current written exposure control plan for occupational exposure to bloodborne pathogens and other potentially infectious materials, where applicable?
- Is there a written hazard communication program dealing with Material Safety Data Sheets (MSDS), labeling, and employee training?
- Is each container for a hazardous substance (i.e., vats, bottles, storage tanks, etc.) labeled with product identity and a hazard warning (communication of the specific health hazards and physical hazards)?
- Is there a Material Safety Data Sheet readily available for each hazardous substance used?
- Is there an employee training program for hazardous substances?

Does this program include:

- An explanation of what an MSDS is and how to use and obtain one?
- MSDS contents for each hazardous substance or class of substances?
- Explanation of "Right to Know?"
- Identification of where an employee can see the employers written hazard communication program and where hazardous substances are present in their work areas?
- The physical and health hazards of substances in the work area, and specific protective measures to be used?
- Details of the hazard communication program, including how to use the labeling system and MSDS's?

- Does the employee training program on the bloodborne pathogens standard contain the following elements:
 - (1) an accessible copy of the standard and an explanation of its contents; (2) a general explanation of the epidemiology and symptoms of bloodborne diseases; (3) an explanation of the modes of transmission of bloodborne pathogens; (4) an explanation of the employer's exposure control plan and the means by which employees can obtain a copy of the written plan; (5) an explanation of the appropriate methods for recognizing tasks and the other activities that may involve exposure to blood and other potentially infectious materials; (6) an explanation of the use and limitations of methods that will prevent or reduce exposure including appropriate engineering controls, work practices, and personal protective equipment; (7) information on the types, proper use, location, removal, handling, decontamination, and disposal of personal protective equipment; (8) an explanation of the basis for selection of personal protective equipment; (9) information on the hepatitis B vaccine; (10) information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials; (11) an explanation of the procedure to follow if an exposure incident occurs, including the methods of reporting the incident and the medical followup that will be made available; (12) information on postexposure evaluations and followup; and (13) an explanation of signs, labels, and color coding?
- Are employees trained in the following:
 - How to recognize tasks that might result in occupational exposure?
 - How to use work practice and engineering controls and personal protective equipment and to know their limitations?
 - How to obtain information on the types, selection, proper use, location, removal, handling, decontamination, and disposal of personal protective equipment?
 - Who to contact and what to do in an emergency?

ELECTRICAL

- Do you specify compliance with OSHA for all contract electrical work?
- Are all employees required to report as soon as practicable any obvious hazard to life or property observed in connection with electrical equipment or lines?
- Are employees instructed to make preliminary inspections and/or appropriate tests to determine what conditions exist before starting work on electrical equipment or lines?
- When electrical equipment or lines are to be serviced, maintained or adjusted, are necessary switches opened, locked-out and tagged whenever possible?
- Are portable electrical tools and equipment grounded or of the double insulated type?
- Are electrical appliances such as vacuum cleaners, polishers, and vending machines grounded?
- Do extension cords being used have a grounding conductor?
- Are multiple plug adaptors prohibited?
- Are ground-fault circuit interrupters installed on each temporary 15 or 20 ampere, 120 volt AC circuit at locations where construction, demolition, modifications, alterations or excavations are being performed?
- Are all temporary circuits protected by suitable disconnecting switches or plug connectors at the junction with permanent wiring?
- Do you have electrical installations in hazardous dust or vapor areas? If so, do they meet the National Electrical Code (NEC) for hazardous locations?
- Is exposed wiring and cords with frayed or deteriorated insulation repaired or replaced promptly?
- Are flexible cords and cables free of splices or taps?
- Are clamps or other securing means provided on flexible cords or cables at plugs, receptacles, tools, equipment, etc., and is the cord jacket securely held in place?

- Are all cord, cable and raceway connections intact and secure?
 - In wet or damp locations, are electrical tools and equipment appropriate for the use or location or otherwise protected?
 - Is the location of electrical power lines and cables (overhead, underground, underfloor, other side of walls) determined before digging, drilling or similar work is begun?
 - Are metal measuring tapes, ropes, handlines or similar devices with metallic thread woven into the fabric prohibited where they could come in contact with energized parts of equipment or circuit conductors?
 - Is the use of metal ladders prohibited in areas where the ladder or the person using the ladder could come in contact with energized parts of equipment, fixtures or circuit conductors?
 - Are all disconnecting switches and circuit breakers labeled to indicate their use or equipment served?
 - Are disconnecting means always opened before fuses are replaced?
 - Do all interior wiring systems include provisions for grounding metal parts of electrical raceways, equipment and enclosures?
 - Are all electrical raceways and enclosures securely fastened in place?
 - Are all energized parts of electrical circuits and equipment guarded against accidental contact by approved cabinets or enclosures?
 - Is sufficient access and working space provided and maintained about all electrical equipment to permit ready and safe operations and maintenance?
 - Are all unused openings (including conduit knock-outs) in electrical enclosures and fittings closed with appropriate covers, plugs or plates?
 - Are electrical enclosures such as switches, receptacles, and junction boxes, provided with tight-fitting covers or plates?
 - Are disconnecting switches for electrical motors in excess of two horsepower, capable of opening the circuit when the motor is in a stalled condition, without exploding? (Switches must be horsepower rated equal to or in excess of the motor hp rating.)
 - Is low voltage protection provided in the control device of motors driving machines or equipment which could cause probable injury from inadvertent starting?
 - Is each motor disconnecting switch or circuit breaker located within sight of the motor control device?
 - Is each motor located within sight of its controller or the controller disconnecting means capable of being locked in the open position or is a separate disconnecting means installed in the circuit within sight of the motor?
 - Is the controller for each motor in excess of two horsepower, rated in horsepower equal to or in excess of the rating of the motor it serves?
 - Are employees who regularly work on or around energized electrical equipment or lines instructed in the cardiopulmonary resuscitation (CPR) methods?
 - Are employees prohibited from working alone on energized lines or equipment over 600 volts?
- NOISE**
- Are there areas in the workplace where continuous noise levels exceed 85dBA?
 - Is there an ongoing preventive health program to educate employees in: safe levels of noise, exposures; effects of noise on their health; and the use of personal protection?
 - Have work areas where noise levels make voice communication between employees difficult been identified and posted?
 - Are noise levels being measured using a sound level meter or an octave band analyzer and are records being kept?
 - Have engineering controls been used to reduce excessive noise levels? Where engineering controls are determined not feasible, are administrative controls (i.e., worker rotation) being used to minimize individual employee exposure to noise?
 - Is approved hearing protective equipment (noise attenuating devices) available to every employee working in noisy areas?
 - Have you tried isolating noisy machinery from the rest of your operation?

- If you use ear protectors, are employees properly fitted and instructed in their use?
- Are employees in high noise areas given periodic audiometric testing to ensure that you have an effective hearing protection system?

FUELING

- Is it prohibited to fuel an internal combustion engine with a flammable liquid while the engine is running?
- Are fueling operations done in such a manner that likelihood of spillage will be minimal?
- When spillage occurs during fueling operations, is the spilled fuel washed away completely, evaporated, or other measures taken to control vapors before restarting the engine?
- Are fuel tank caps replaced and secured before starting the engine?
- In fueling operations, is there always metal contact between the container and the fuel tank?
- Are fueling hoses of a type designed to handle the specific type of fuel?
- Is it prohibited to handle or transfer gasoline in open containers?
- Are open lights, open flames, sparking, or arcing equipment prohibited near fueling or transfer of fuel operations?
- Is smoking prohibited in the vicinity of fueling operations?
- Are fueling operators prohibited in buildings or other enclosed areas that are not specifically ventilated for this purpose?
- Where fueling or transfer of fuel is done through a gravity flow system, are the nozzles of the self-closing type?

IDENTIFICATION OF PIPING SYSTEMS

- When nonpotable water is piped through a facility, are outlets or taps posted to alert employees that it is unsafe and not to be used for drinking, washing or other personal use?

- When hazardous substances are transported through above ground piping, is each pipeline identified at points where confusion could introduce hazards to employees?
- When pipelines are identified by color painting, are all visible parts of the line so identified?
- When pipelines are identified by color painted bands or tapes, are the bands or tapes located at reasonable intervals and at each outlet, valve or connection?
- When pipelines are identified by color, is the color code posted at all locations where confusion could introduce hazards to employees?
- When the contents of pipelines are identified by name or name abbreviation, is the information readily visible on the pipe near each valve or outlet?
- When pipelines carrying hazardous substances are identified by tags, are the tags constructed of durable materials, the message carried clearly and permanently distinguishable and are tags installed at each valve or outlet?
- When pipelines are heated by electricity, steam or other external source, are suitable warning signs or tags placed at unions, valves, or other serviceable parts of the system?

MATERIAL HANDLING

- Is there safe clearance for equipment through aisles and doorways?
- Are aisleways designated, permanently marked, and kept clear to allow unhindered passage?
- Are motorized vehicles and mechanized equipment inspected daily or prior to use?
- Are vehicles shut off and brakes set prior to loading or unloading?
- Are containers of combustibles or flammables, when stacked while being moved, always separated by dunnage sufficient to provide stability?
- Are dock boards (bridge plates) used when loading or unloading operations are taking place between vehicles and docks?

- Are trucks and trailers secured from movement during loading and unloading operations?
- Are dock plates and loading ramps constructed and maintained with sufficient strength to support imposed loading?
- Are hand trucks maintained in safe operating condition?
- Are chutes equipped with sideboards of sufficient height to prevent the materials being handled from falling off?
- Are chutes and gravity roller sections firmly placed or secured to prevent displacement?
- At the delivery end of the rollers or chutes, are provisions made to brake the movement of the handled materials?
- Are pallets usually inspected before being loaded or moved?
- Are hooks with safety latches or other arrangements used when hoisting materials so that slings or load attachments won't accidentally slip off the hoist hooks?
- Are securing chains, ropes, chockers or slings adequate for the job to be performed?
- When hoisting material or equipment, are provisions made to assure no one will be passing under the suspended loads?
- Are material safety data sheets available to employees handling hazardous substances?

TRANSPORTING EMPLOYEES AND MATERIALS

- Do employees who operate vehicles on public thoroughfares have valid operator's licenses?
- When seven or more employees are regularly transported in a van, bus or truck, is the operator's license appropriate for the class of vehicle being driven?
- Is each van, bus or truck used regularly to transport employees equipped with an adequate number of seats?

- When employees are transported by truck, are provisions provided to prevent their falling from the vehicle?
- Are vehicles used to transport employees equipped with lamps, brakes, horns, mirrors, windshields and turn signals and are they in good repair?
- Are transport vehicles provided with handrails, steps, stirrups or similar devices, so placed and arranged that employees can safely mount or dismount?
- Are employee transport vehicles equipped at all times with at least two reflective type flares?
- Is a full charged fire extinguisher, in good condition, with at least 4 B:C rating maintained in each employee transport vehicle?
- When cutting tools or tools with sharp edges are carried in passenger compartments of employee transport vehicles, are they placed in closed boxes or containers which are secured in place?
- Are employees prohibited from riding on top of any load which can shift, topple, or otherwise become unstable?

CONTROL OF HARMFUL SUBSTANCES BY VENTILATION

- Is the volume and velocity of air in each exhaust system sufficient to gather the dusts, fumes, mists, vapors or gases to be controlled, and to convey them to a suitable point of disposal?
- Are exhaust inlets, ducts and plenums designed, constructed, and supported to prevent collapse or failure of any part of the system?
- Are clean-out ports or doors provided at intervals not to exceed 12 feet (3.6576 meters) in all horizontal runs of exhaust ducts?
- Where two or more different type of operations are being controlled through the same exhaust system, will the combination of substances being controlled, constitute a fire, explosion or chemical reaction hazard in the duct?
- Is adequate makeup air provided to areas where exhaust systems are operating?

- Is the source point for makeup air located so that only clean, fresh air, which is free of contaminants, will enter the work environment?
- Where two or more ventilation systems are serving a work area, is their operation such that one will not offset the functions of the other?

SANITIZING EQUIPMENT AND CLOTHING

- Is personal protective clothing or equipment that employees are required to wear or use, of a type capable of being cleaned easily and disinfected?
- Are employees prohibited from interchanging personal protective clothing or equipment, unless it has been properly cleaned?
- Are machines and equipment, which process, handle or apply materials that could be injurious to employees, cleaned and/or decontaminated before being overhauled or placed in storage?
- Are employees prohibited from smoking or eating in any area where contaminants that could be injurious if ingested are present?
- When employees are required to change from street clothing into protective clothing, is a clean change room with separate storage facility for street and protective clothing provided?
- Are employees required to shower and wash their hair as soon as possible after a known contact has occurred with a carcinogen?
- When equipment, materials, or other items are taken into or removed from a carcinogen regulated area, is it done in a manner that will contaminate non-regulated areas or the external environment?

TIRE INFLATION

- Where tires are mounted and/or inflated on drop center wheels, is a safe practice procedure posted and enforced?
- Where tires are mounted and/or inflated on wheels with split rims and/or retainer rings, is a safe practice procedure posted and enforced?
- Does each tire inflation hose have a clip-on chuck with at least 24 inches (6.9 centimeters) of hose between the chuck and an in-line hand valve and gauge?
- Does the tire inflation control valve automatically shutoff the air flow when the valve is released?
- Is a tire restraining device such as a cage, rack or other effective means used while inflating tires mounted on split rims, or rims using retainer rings?
- Are employees strictly forbidden from taking a position directly over or in front of a tire while it's being inflated?

Appendix III: Teaching Resources For Transparency

- Hazard Recognition**
- Occupational Safety and Health Law**
- Joint Labor/Management
Safety and Health Committees**
- Suggested Safety Structures**

Hazard Recognition Program

- Originally developed by Labor Education Research Service, Ohio State University.
- Easy to use because it identifies hazards by type or category.
- Very helpful for identifying risks and dangers in boat/ship building and repair.

5 Hazard Categories

- Falling
- Struck by or Striking Against
- Getting Caught
- Contact
- Inhalation and Swallowing

Hazard Recognition Program

- Falling Hazards – Falls from two levels
- Struck by, Against – Caused by work practices, poor planning, lack of training
- Getting Caught – In, On, or Between

Hazard Recognition Program, cont'd.

- Contact Hazards – Temperature, electrical, toxic substances, impact noise
- Inhalation and Swallowing – Ingested through mouth, inhaled, absorbed through the skin

Consultation Sources for Identifying Hazards

- OSHA's Hazard Communication Standard
- Material Safety Data Sheets (MSDS)
- NIOSH
- Maine BLS onsite consultation

Employer Obligations Under the OSH Act

- “Shall furnish a place of employment free of recognized hazards that are causing or are likely to cause death or serious physical harm”
- “Shall comply with occupational safety and health standards promulgated under this act”

Compliance with Existing Safety and Health Standards

- Know OSHA stds
- Provide Training
- Provide safe tools and equipment
- Hazard evaluation
- Maintain operating procedures
- OSHA 300 Log
- OSHA Poster
- Post any citations

Employee Obligations

- Comply with all regulations, rules, and orders of the OSH Act
- Report hazardous conditions
- Report job related injury, illness, or fatality
- Cooperate with Compliance Officers

Employee Rights Under the OSH Act

- Right to know – hazards, protection
- Right to refuse – “Imminent Danger”
- Right to complain – anonymous, without retribution

Section 11 (c)(1)

- “No person shall discharge or in any manner discriminate against any employee because such employee has filed any complaint or instituted any proceeding under...this act...or because of the exercise...of any right afforded under this act”

Inspection Triggers

- Refer to page 28 in the handbook for conditions which will trigger an OSHA inspection

The Inspection Process

- Compliance Officer arrives on site
- Reasons for the inspection are presented
- Employer and employees select reps
- Inspection may be specific or wall to wall
- Review of policies and procedures
- Interviews
- Review of records

The Inspection Process

Closing Conference

- Compliance Officer may meet together or separately with employer and employees
- Review of conditions identified along with all apparent violations for which a citation may be recommended

The General Duty Clause

Section 5 (a)(1)

- There is no standard
- It is a recognized industry hazard
- Employer has knowledge of unsafe condition
- The condition may cause death or serious physical injury

Employer and Employee Rights After an Inspection

- Refer to pages 29 – 31 in the handbook to review employer and employee rights after an inspection

Labor/Management Safety & Health Committee Approach

- Equal number of labor/management reps
- Manageable size
- Co-chairs from labor & management
- Committee members are able to resolve issues and problems

Purpose/Logistics of the Safety Committee

- Establish ongoing programs
- Meet regularly
- Conduct inspections
- Follow up meetings to ensure actions have been taken
- All members are paid for time served on the committee

Safety Committee Roles

- Review injuries and illnesses
- Educate labor and management
- Recommend solutions to safety and health issues
- Adopt actions to prevent hazards

Size of the Safety Committee

1. Size of the workforce and establishment
2. Number needed to deal with health and safety issues effectively
3. Should have at least four members
4. Avoid excessively large committees

Selection and Preparation of Committee Members

- Refer to pages 46 – 48 of the handbook for background information

Safety Structures

- Safety Department
- Safety Coordinator
- Safety Committee
- Sub-Committees
- Yard & Department Inspections
- Crew Safety Rep
- Safety Meetings
- Tool Box Safety Talk

Appendix IV: Survey Evaluation Questionnaires

The two survey evaluation questionnaires contained in this appendix are designed to obtain useful participant feedback on the program. The first survey can be administered right after a program is conducted, and is designed to measure initial participant evaluations of the program and project book. The second survey, which should be administered approximately two months later, is designed to assess the overall longer term impact and effectiveness of the program and book.

Program Evaluation Survey for Training Program Participants

This survey questionnaire is designed to obtain your opinions and evaluations regarding the educational program you have just attended. We appreciate your taking the time to answer these questions and welcome any additional feedback or suggestions that you may have regarding this program. All information received from this survey will be used only for general tabulation, and no individual responses will be identified. Your feedback will be valuable in helping us to evaluate and assess the effectiveness of these training seminars. Thank you very much for your time and participation.

**For questions 1 through 3, please provide your evaluation
by filling in ONLY ONE response per question:**

How would you rate the effectiveness of this program in terms of the following:

	Excellent	Very Good	Good	Fair	Poor
1. Training overall:	<input type="radio"/>				
2. The instructor(s):	<input type="radio"/>				
3. The training manual:	<input type="radio"/>				

**For questions 4 through 7, please CIRCLE the applicable number. Check
“Not Applicable” if a question does not apply to the training you received.**

How effective was this program in increasing your knowledge of:

4. Hazard identification and abatement in ship/boat building and repair?

HIGHLY EFFECTIVE 1 2 3 4 5 NOT AT ALL EFFECTIVE
 ____ (NOT APPLICABLE – DID NOT COVER THIS TOPIC IN TODAY’S TRAINING)

5. How to use the OSHA law?

HIGHLY EFFECTIVE 1 2 3 4 5 NOT AT ALL EFFECTIVE
 ____ (NOT APPLICABLE – DID NOT COVER THIS TOPIC IN TODAY’S TRAINING)

6. How to establish and/or improve a Safety and Health Committee?

HIGHLY EFFECTIVE 1 2 3 4 5 NOT AT ALL EFFECTIVE
 ____ (NOT APPLICABLE – DID NOT COVER THIS TOPIC IN TODAY’S TRAINING)

7. How to establish and/or improve a Safety Structure at work?

HIGHLY EFFECTIVE 1 2 3 4 5 NOT AT ALL EFFECTIVE
 ____ (NOT APPLICABLE – DID NOT COVER THIS TOPIC IN TODAY’S TRAINING)

(* Developed by the Bureau of Labor Education, University of Maine)

8. What is your overall evaluation of the success or usefulness of this program in providing you with practical information on hazard recognition and abatement that you can use on the job? (Please circle the applicable number)

EXCELLENT 1 2 3 4 5 POOR

9. What is your overall evaluation of the program handbook, *Achieving Health and Safety in the Building and Repair of Ships and Boats*, for supplying useful information on hazard recognition and abatement that you can use in your work? (Please circle the applicable number)

EXCELLENT 1 2 3 4 5 POOR

10. Are there any other areas, hazards, or issues regarding occupational health and safety in boatyards and shipyards for which you would like to have more information and/or training?

PLEASE PRINT YOUR RESPONSE: _____

DEMOGRAPHIC DATA

11. Do you work (primarily) in a shipyard, a boatyard, or some other facility? (CHECK ONE)

___ 1) Shipyard ___ 2) Boatyard ___ 3) Other kind of facility _____

12. Roughly how many years of work experience do you have in shipyard or boatyard work? (CHECK ONE)

___ 1) 0-2 years ___ 3) 6-10 years ___ 5) 16-20 years ___ 7) 26-30 years
___ 2) 3-5 years ___ 4) 11-15 years ___ 6) 21-25 years ___ 8) 31+ years

13. Are you a (an): (CHECK THE ONE THAT BEST APPLIES TO YOU)

___ 1) Owner/Employer ___ 2) Supervisor ___ 3) Employee ___ 4) Other

14. Do you have a leadership role related to occupational safety and health in your workplace or organization? 1) ___ Yes 2) ___ No

15. Sex: 1) ___ Male 2) ___ Female

16. Age:

___ 1) 18-25 ___ 3) 36-45 ___ 5) 56-65
___ 2) 26-35 ___ 4) 46-55 ___ 6) 66 plus

17. DATE _____ **PROGRAM LOCATION** _____

Two Month Follow-up Evaluation Survey for Training Program Participants*

This survey questionnaire is designed to obtain your opinions and evaluations regarding the usefulness of the educational program on Safety and Health in Ship/Boat Building and Repair which you attended approximately two months ago. We appreciate your taking the time to answer these questions and welcome any additional feedback or suggestions that you may have regarding this program. All information received from this survey will be used only for general tabulation, and no individual responses will be identified.

Your feedback will be valuable in helping us to evaluate and assess the effectiveness of these training seminars. Thank you very much for your time and participation.

For questions 1 through 4, please **CIRCLE** the applicable number.
Check "Not Applicable" if a question does not apply to the training you received.

Since attending the training program approximately two months ago, how useful was the program in helping you to:

1. Identify and abate hazards on the job?

HIGHLY USEFUL 1 2 3 4 5 NOT AT ALL USEFUL
____(NOT APPLICABLE – Did not cover this topic in the training I attended)

2. Use or understand OSHA law?

HIGHLY USEFUL 1 2 3 4 5 NOT AT ALL USEFUL
____(NOT APPLICABLE – Did not cover this topic in the training I attended)

3. Establish and/or improve a Safety Structure at work?

HIGHLY USEFUL 1 2 3 4 5 NOT AT ALL USEFUL
____(NOT APPLICABLE – Did not cover this topic in the training I attended)

4. Establish and/or improve a Safety Committee at work?

HIGHLY USEFUL 1 2 3 4 5 NOT AT ALL USEFUL
____(NOT APPLICABLE – Did not cover this topic in the training I attended)

5. Thinking over the past couple of months since the training program, are there any other areas, hazards, or issues regarding occupational health and safety in boatyards and shipyards for which you would like to have more information and/or training?

(PLEASE PRINT YOUR RESPONSE)

(* Developed by the Bureau of Labor Education, University of Maine)

For questions 6 through 10, please **CIRCLE** the applicable number.
 Check "Not Applicable" if a question does not apply to you and/or your workplace.
 Since attending the training program approximately two months ago, to what extent has the program handbook, *Achieving Health and Safety in the Building and Repair of Ships and Boats*, been useful in supplying you with information to:

6. Identify and abate hazards on the job?

HIGHLY USEFUL 1 2 3 4 5 NOT AT ALL USEFUL
 ___(NOT APPLICABLE – Does not apply to me and/or my workplace at this time)

7. Use or understand the OSHA law?

HIGHLY USEFUL 1 2 3 4 5 NOT AT ALL USEFUL
 ___(NOT APPLICABLE – Does not apply to me and/or my workplace at this time)

8. Increase your understanding of Safety and Health Committees?

HIGHLY USEFUL 1 2 3 4 5 NOT AT ALL USEFUL
 ___(NOT APPLICABLE – Does not apply to me and/or my workplace at this time)

9. Increase your understanding of a Safety Structure at work?

HIGHLY USEFUL 1 2 3 4 5 NOT AT ALL USEFUL
 ___(NOT APPLICABLE – Does not apply to me and/or my workplace at this time)

10. Increase your knowledge of resources available on occupational health and safety in ship/boat building and repair?

HIGHLY USEFUL 1 2 3 4 5 NOT AT ALL USEFUL
 ___(NOT APPLICABLE – Does not apply to me and/or my workplace at this time)

Demographic Data

11. Do you work (primarily) in a shipyard, a boatyard, or some other facility? (CHECK ONE)

___1) Shipyard ___2) Boatyard ___3) Other kind of facility _____

12. Roughly how many years of work experience do you have in shipyard or boatyard work?

CHECK ONE:

___1) 0-2 years ___3) 6-10 years ___5) 16-20 years 7) ___26-30 years
 ___2) 3-5 years ___4) 11-15 years ___6) 21-25 years 8) ___31+ years

13. Are you a (an): (CHECK THE ONE THAT BEST APPLIES TO YOU)

___1) Owner/Employer ___2) Supervisor ___3) Employee ___4) Other _____

14. Do you have a leadership role related to occupational safety and health in your workplace or organization?

1) ___Yes 2) ___No

15. Sex: 1) ___Male 2) ___Female

16. Age: ___1) 18-25 ___2) 26-35 ___3) 36-45 ___4) 46-55 ___5) 56-65 ___6) 66 plus



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Bureau of Labor Education

The University of Maine

Orono, Maine

ABOUT THE BUREAU

The Bureau of Labor Education, established in 1966, conducts educational programs, presentations, and research on labor related issues of interest to workers; students, leaders in government, labor, and education; and public policymakers. General topics include employment, law, occupational health and safety, labor/management relations, leadership development, and labor economics. The Bureau also analyzes and speaks on timely issues involving such topics as discrimination and sexual harassment, the Americans With Disabilities Act, productivity, workplace innovations, the global economy and competitiveness. For more information on the Bureau, or to request a program, call 207-581-4124.

