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Safety and Health at Work

INTRODUCTION TO THE COURSE FOR THE TRAINER

The WHO Modules in occupational health, hygiene and safety are designed to provide education for professionals who are charged with the responsibility of protecting the health of workers: public health officers, physicians, nurses, policy makers, labor inspectors, and worker health and safety advocates. These materials were developed to implement the Forty-ninth World Health Assembly global strategy for occupational health (WHA49.12). Where relevant, the materials complement the effort of the International Programme on Chemical Safety (IPCS) Global Implementation Strategy on occupational risk management.

The materials are organized into three 16-hour, case based modules for a multidisciplinary audience, by economic sector: agriculture, manufacturing, and service. Occupational health encompasses many disciplines— toxicology, epidemiology, industrial hygiene, and safety. It employs the methods of hazard/risk identification, characterization, and evaluation and touches on issues related to policy and ethics. We have used the “economic sector” as an organizing format; classroom exercises are built around cases related to each sector and cover each of the occupational health disciplines in one classroom. The instructor may choose to re-organize the content to fit a different student group. For example, the hygiene-related exercises may be pulled out and re-assembled to educate a group of physicians in exposure assessment.

Each module has an instructor manual, a student manual, and a resources section that contains files with presentations and student exercises. The materials are in Microsoft Word (training manuals), PowerPoint (photos and lecture materials), Adobe Acrobat (pdf), and jpg files. They may be copied, altered, and re-arranged to fit the needs of the student audience. Instructors are encouraged to enhance the content by providing specific examples—readings and presentations—from the country in which they are taught.

The Aim

The aim of this course is to provide a basic but comprehensive introduction to hazards in the workplace and how to deal with them. The course is designed around the following principles:

- Workers are entitled to a healthy and safe work environment
- Risk evaluation requires a systematic approach that is essential for control and prevention of work related injuries and illnesses
- Sentinel health events have been traditionally used as an indicator of exposure to an occupational hazard. However, currently there is enough knowledge of workplace hazards to intervene prior to an adverse health outcome.

Using the Materials

This educational program is designed for implementation by experienced trainers (facilitators, tutors, and teachers) familiar with occupational health and safety, public health principles and the principles of participatory, student centered educational methods. The trainer should assess the needs of the participants and select those portions of the materials that best meet their needs. The Course Overview (section 1) introduces objectives, format and materials. The Introduction to Occupational Safety and Health (section 2) describes a framework for addressing occupational health and safety issues demonstrated throughout this curriculum. All trainers should read this material as the basis for the course. The material in section 2 may also be assigned to students; however, the curriculum is not dependent on students having read the material, only that the trainer is comfortable with the background information contained in this section. The rest of manual systematically addresses occupational health and safety issues.
Each manual contains about 16 hours worth of material. The three manuals offer about 48 hours of material which together offer a comprehensive introduction to occupational health and safety. The materials have been organized to cover recognition, assessment, and intervention in three economic sectors. For an introductory course, it is best to use all of the educational material in one of the manuals. Some of the exercises can stand alone, although it is intended as an integrated curriculum. In order to assist in the process, approximate time requirements are given for the exercises.

**Educational Methods**

The materials in this manual are designed to be delivered using a variety of teaching methods that will create an interactive learning environment tailored to the needs of a particular student group. The term “trainer” will be used to describe the facilitator, teacher, or tutor and “participant” to describe the people attending. Although some of the material is designed for a presentation-discussion format, much is designed so that the participants will become self-sufficient in learning more about Occupational Health. The goal is to give the participants knowledge, skills and tools to continue working in this area after the course has ended.

In almost every training situation, there will be a diverse group of people with different educational needs. The training materials should be chosen keeping in mind some basic facts about learning processes.

- Concrete experience- problem solving, discussing and researching real life problems
- Reflective observation – discussing problems and developing strategies for solutions
- Abstract conceptualization - applying principles to other situations
- Active experimentation - hands-on problem solving, implementing ideas

**Constructing a Program**

The exercises that appear in the manual will cover most of the basic training needs for the target audience. Educators should look for opportunities to supplement the material in the manual with other relevant information. Issues, such as legal protections, are covered generally and provide training on a process. Local information on standards and worker rights will need to be assembled and introduced by the instructor.

Films and videos are not used in this curriculum, but may be useful supplementary materials to introduce topics and provide for local relevance. However, care should be taken to select material that reflects the basic principles of the manual.

**Skills Training**

A major aim of this curriculum is to provide the participants with skills to address workplace health and safety problems in their communities. In addition to increasing their knowledge of the content material, participants will develop skills in using a framework for approaching workplace health and safety problems including hazard/risk identification and characterization, qualitative risk assessment, control strategies development, and risk communication.

**Resources**

The provision of information resources is an essential part of this program. Many of the exercises will be enhanced by the use of documents, texts, factsheets, and the world wide web. Each module has a resources section that contains these documents, as well as slide shows in MS Power Point to be used in the course.
1. **Course Overview**
   a. Introduction to Course Objectives, Format, and Materials
   b. Introduction to Occupational Safety and Health
2. **Sentinel Health Event**
   a. Section Overview
   b. Sentinel Health Event Case Study
   c. Investigating Deaths Presentation
   d. Incident Investigation Discussion
   e. Investigating an Incident Exercise
   f. Writing an Incident Investigation Report Exercise
   g. Summary Points
3. **Qualitative Exposure and Health Assessment**
   a. Section Overview
   b. Identifying Hazards: Taking an Occupational History Exercise
   c. Categorizing Hazards Discussion and Presentation
   d. Preparing to Visit a Workplace Exercise
   e. Chemical Exposure Exercise
   f. Summary Points
4. **Surveillance**
   a. Section Overview
   b. Systematic Approach to Occupational Surveillance Presentation
   c. Principles of Questionnaire Design Discussion
   d. Designing a Questionnaire Exercise 1
   e. Designing a Questionnaire Exercise 2
   f. Designing a Questionnaire Exercise 3
   g. Interpreting Results Exercise
   h. Interpreting Results Presentation and Discussion
   i. Summary Points
5. **Quantitative Assessment**
   a. Section Overview
   b. Hazard Judgment Presentation
   c. Prioritizing Hazards Exercise
   d. Summary Points
6. **Communicating about Hazards**
   a. Section Overview
   b. Risk Communication Discussion
   c. Risk Communication Presentation
   d. Risk Communication Exercise
   e. Summary Points
7. **Course Evaluation**
1. **Course Overview**

   a. **Introduction to Course Objectives, Format, and Materials**

   *Instructor should:*
   - **Introduce self**
   - **Ask students to introduce themselves and to name one thing that they expect to get out of the two day class**
   - **Orient students to objectives, materials, sections of course, activities**

   **Materials**
   - Index cards
   - Markers
   - Name Tents
   - Course materials
   - Flipchart and tape

   **Things to do**
   - Distribute student course materials, index cards and markers

   **Recommended method of delivery**
   - **15 minutes** Introductions
     - Introduction of faculty and students, course organization and course materials.
   - **30 minutes** Presentation on Framework and Extent of the Problem
     - Instructor presents information in Presentation 1-Introduction to Occupational Safety and Health

   **Objectives:** At the end of this module, participants will be able to:
   1. Recognize a sentinel event as a warning signal that preventive measures need to be taken
   2. Conduct a basic incident investigation
   3. List the occupational hazards in a complex manufacturing workplace
   4. List the adverse health outcomes from exposures in this workplace
   5. Interpret data from a follow-up investigation of this workplace. Develop a questionnaire survey of adverse health outcomes in industry
   6. Discuss ethical issues related to worker surveillance
   7. Present data form that can be understood by employees and policy makers, including employers and local/state enforcement agencies.
   8. Apply information gathered from above activities to develop policy recommendations

   **Specific Skills:**
   - ✓ develop incident investigation questions
   - ✓ create a report from incident investigation
   - ✓ take a work history
   - ✓ categorize hazards
   - ✓ develop workplace exposure and health questions
   - ✓ organize questions into a surveillance tool
   - ✓ communicate about findings of a survey
   - ✓ administer a survey

   **Administration of Sections in this Module**
   Several sections are designed to be delivered using a lecture/discussion training method. Other sections are designed to be delivered using the small group activity method. Participant generated ideas will provide guidance to the trainer on how the module will be completed. The trainer should use the summary points to provide guidance on the essential points from these activities. The instructor may consider varying the groups size from individual activity, to partners, to groups of 3-5.
Also, if time is limited for a particular section, the instructor should consider doing the exercise in a class discussion format.

**Student Materials**
- Agenda
- Student Satisfaction Critique
- Course materials
- Handouts

**Materials Needed**
- Markers
- Student Materials
- Transparency for “Introduction to Occupational Health”
- Transparency of “Framework”
b. Introduction to Occupational Safety and Health Presentation (Presentation #1)

INTRODUCTION TO THE WHO MODULES IN OCCUPATIONAL SAFETY AND HEALTH

The health and safety of workers is generally given a low priority across economic sectors. Sustainability, human and material resources, and production are primary concerns in both large and small enterprises; in the informal sector, subsistence is critical. The trend toward “globalization” provides additional challenges to worker health and safety. This course is designed for public health personnel who are charged with the responsibility of protecting the health of workers. This may include public health officers, physicians, nurses, policymakers, plant managers, and union health and safety representatives.

This curriculum takes an interdisciplinary approach to addressing the injuries and illnesses related to work. It is based on the premise that primary prevention is the optimal approach to protecting the health of workers. Each section of this course helps to complete the puzzle of the people, methods, technology, and policy it takes to reduce worker illness and injury. By mastering the knowledge and skills presented, participants will be able to respond to a wide range of occupational health and safety problems across industries, in large and small enterprises.

A process-based framework has been developed for addressing health and safety in all size enterprises. Each section is based on actual cases that have come to light in different locations throughout the world. Whether it is an injured worker, an ill workforce, an unanticipated chemical release or a chronic, hazardous exposure, this framework offers a systematic approach to gathering and interpreting information and making decisions, even with limited resources. The ultimate objective is to characterize and reduce or eliminate workplace hazards.

A schematic diagram of the approach developed for this series is shown in Figure 1. It is an adaptation of the approach presented in Mulhausen and Damiano (1998). It shows a flow chart that moves linearly but loops back in several locations. The user may enter the problem-solving process at a number of locations in the diagram, depending on how s/he becomes aware of the workplace hazard. After completing individual sections (boxes), the user may move forward or go back and re-evaluate prior steps, filling in information, as needed. The ultimate goal is to reach the bottom of the chart—that is, to decide on an appropriate set of interventions with a strategy for implementing them.

It should be noted that while an approach to controlling workplace hazards may be applied internationally, a single course could not take into account all of the economic, political, social, and cultural circumstances that affect workplace health and safety around the world. There are local and international resources available that may help to inform specific solutions to specific problems. These may be brought into the framework of this WHO curriculum, or applied in other ways.
Scheme for Addressing Health and Safety in the Workplace

Basis for the Instructional Approach in this Module
Diagram Box #1: Sentinel Health Event or Awareness of Exposure Hazard

The first step in the process is recognition that a workplace health hazard exists. This may come to
light because of a worker who has been made ill, because workers or managers recognize a hazardous
situation, because a change in process is planned or anticipated, because a major event, like a
chemical release, has occurred, etc. A “sentinel health event” is a work-related injury or illness that
alerts you to the fact that workers are at risk. It is also possible to recognize a hazardous situation
before anyone becomes ill: if you know about the presence of a toxic chemical or dangerous
machinery, it is possible to take action before a worker gets injured.

Once a sentinel event or exposure hazard is recognized and there is an understanding that workers are
at risk, the next step is to define or characterize the problem through further investigation. It is
important to determine the goal of the investigation prior to starting:

- Do you want to determine if the exposure(s) are high enough to cause disease?
- Do you want to ensure compliance with standards or guidelines?
- Do you want to evaluate the effectiveness of new controls?
- Do you want to begin building an exposure profile (database)?
  - For each worker?
  - For each process?

By taking time to define the problem, it is more manageable to implement the next steps—conducting
an assessment and deciding on what additional information is needed. Characterization of the problem
is also useful in developing a team vision for addressing the problem. A multidisciplinary approach,
while ultimately the most effective, can also be a challenge because of differences among the experts
as to the definition of the problem.

Other questions that should be answered include:

- Are you investigating the risk to one worker?
- Are you investigating one incident involving one or more workers?
- Are you investigating the risk to the workforce from one hazardous agent or one part of the work
  facility?
- Are you investigating the risk to the entire workforce at one facility?

Most often, it is an individual—e.g., a health care worker, a manager, a union official, a worker—who
identifies a sentinel event or existing hazard. This individual will need to consider whom to include in
an assessment of the problem. Those included could be workers or worker representatives,
supervisors and managers, health care providers, safety and health professionals, epidemiologists,
government, and/or non-governmental organizations. In some settings, team or multidisciplinary
problem-solving may not be available and these roles may all need to be carried out by the same
person. If an interdisciplinary team is assembled, it will need to discuss the purpose of the
investigation and their point of reference. Is the purpose…

- Diagnosing and treating disease?
- Controlling exposure?
- Policy-making?
- Organizing workers?
- Other?

Answering these questions will provide important guidance for the comprehensive assessment,
control and prevention of work related injuries and illnesses. The following sections provide concepts
and tools for characterizing workplaces, assessing hazards (health and exposure), and making
recommendations on the control and prevention of workplace injuries and illnesses.

Outcome of this stage of investigation: A list of goals for further investigation.
**Diagram Box #2. Qualitative Assessment**

**Qualitative Exposure Assessment**

The overall goal of the qualitative assessment is to characterize the workplace—that is, to provide a complete summary of all available essential information on workers, tasks, agents, potential exposures, and potential health effects.

The “qualitative assessment” step involves understanding the process leading to potential exposures; developing an inventory of chemical, physical, and biological agents; characterizing the workforce, including job descriptions, tasks, and number of workers; and characterizing the environmental agents by examining the available health effects data and current regulations and exposure limits. The investigation may concern one worker or one agent or a whole or part of a workplace or a workforce. Checklists are extremely useful tools for gathering comprehensive, organized material.

Background information is a building block to understanding and defining the problem. Collect and organize available information on:

- Manufacturing or work process(es)
- Job tasks
- Raw materials
- Products
- By-products
- Waste products
- Processing aids

Detailed literature is available on processes, activities, materials, job tasks, etc. Most economic sector processes are well known and described somewhere. Information is available through books, journals, internet sites, government documents, and trade and industry publications. Information is also available from newspapers and other public documents. In addition, in some countries companies are required to collect data on exposure and injuries and illnesses and maintain these records for up to 30 years. In other countries worker representatives have the ability to collect and maintain records. Compiling general and if possible specific information on a process or task is useful for defining the scope of the problem.

In focusing the problem, well-researched background information can also be helpful in:

- Targeting resources (time, staff, financial)
- Highlighting a particular problem or concern (imminent danger) or for justifying the implementation of a less aggressive intervention
- Guiding decisions based on the similarities of the existing situation with those found in the literature.

The goal is to collect as much information on the work process as is available.

**Outcome of this stage of investigation:** Complete summary of available essential information on workers, community members, tasks, agents, potential exposures, and potential health effects

**Qualitative Health Assessment**

The overall goal of the qualitative health assessment is to get a sense of the illnesses and/or injuries that may occur in a workplace, given a known set of exposures. Adverse health conditions may come to the attention of public health practitioners through presentation of individuals or groups of workers
with an illness or injury. Alternatively, and optimally, knowledge and understanding of hazardous workplace conditions should lead to preventive measures prior to disease development.

While primary prevention is the goal, the next best alternative is recognition of an adverse health condition when it can still be reversed (secondary prevention). For an individual and a population of workers, death, disability, and chronic disease represent major failures of the public health system. We should not need to “count the bodies” before recognizing that the potential for injury exists.

Some workplaces conduct health monitoring of their employees because of the presence of known hazards. If available, examination of existing health records may enhance the understanding of the impact of a given industry on the health of its workers.

As in qualitative exposure assessment, gathering background information about health—in this case, toxicology and epidemiology—is critical to understanding how workplace conditions and chemical/physical/biological agents interface with the human organism to cause illness or injury. Through textbooks, scientific journals, internet sites, and government documents, the scope of occupational illness and injury can be defined. It is health data, and knowledge of mechanisms of disease development, that should drive control of workplace hazards.

**Outcome of this stage of investigation: a summary of health effects of a possible exposure hazard; a list of resources that cover this information**

**Diagram Box #3. Hazard Judgment or Exposure Profile**

Based on elucidation of exposure hazards and the consequent adverse health effects, a judgment about the hazard potential of a workplace may be made. The process of evaluating the health and safety of a workplace include developing an exposure profile, determining whether adverse health conditions exist, and reviewing background information on the relationship between exposure and disease. At this point, the public health practitioner must make a determination of whether:

- There is a health and safety problem in the workplace
- An imminent hazard exists
- A more in-depth assessment of exposure and disease is necessary

One way to approach these questions is to utilize the “criteria for causation” developed by Sir Bradford Hill.

- Temporal consistency: exposure to a given agent always precedes disease development. Workers’ illness should follow exposure to a putative agent or condition.
- Strength of association: expresses the disparity between the frequency of a given cause if found in disease states versus non-disease states; i.e., how tight is the association between exposure and disease. An assessment of this should come from reviewing scientific literature.
- Biological gradient: dose-response relationship—the higher the dose of exposure the more likely disease will develop and the more severe the symptoms. If studies have shown this, then there is more likely to be a cause effect relationship between a putative exposure and development of disease.
- Biological plausibility: effect is predictable based on the effects known to be caused by the agent or by agents similar to it in actions. When studies are not conclusive, one needs to consider whether the health condition in question could possibly be related to the exposure of concern.
- Consistency: similar observations by multiple investigators in different populations under different circumstances. Again, if many different studies under different circumstances have linked a specific exposure and disease outcome, one would use that information to judge the connection between the current exposure of interest and disease.
• Specificity: a unique exposure-response linkage (i.e., if you see a disease, you can assume the exposure). Malignant mesothelioma, a cancer of the lining of the lung is very rare and has been shown to be related to asbestos exposure. In fact, this cancer is almost never seen without prior exposure to asbestos.

• Coherence: cause and effect interpretation for an association is not in conflict with other scientific data. A careful review of scientific data is important to assure that there is logic in assuming a causal connection between exposure and disease.

• Analogy: Do other similar agents have similar effects? When scientific data are sparse, one could consider studies that have looked at workplace conditions or chemicals that are similar to the current chemical agent of concern.

If you gather enough background information to allow rigorous consideration of each of Bradford-Hill’s criteria, this should assist in making a judgment about whether a hazard exists that needs attention.

The current concept of “control banding” fits the qualitative assessment and hazard judgment boxes in this schematic diagram. It usually is possible to determine whether a workplace problem needs attention without actually monitoring and quantifying the hazard. Rather than using resources to get exact quantification of the amount of a chemical agent in the air, Control Banding focuses resources on exposure controls. Since it is not possible to assign a specific Occupational Exposure Limit to every chemical in use, a chemical is assigned to a "band" for control measures, based on its hazard classification according to international criteria, the amount of chemical in use, and its volatility/dustiness.

**Outcome of this stage of investigation: a decision about whether a hazardous condition exists that requires attention**

**Diagram Box #4, Quantitative Assessment**

Quantitative Exposure Assessment

Quantitative Exposure Assessment is conducted when more information is needed to determine a baseline or routine exposure; to assess compliance with existing regulations; or for diagnostic purposes. If the information is not needed for any of these reasons, then quantitative assessment may not be necessary--again, Control Banding would be the proper approach. Prior to beginning a quantitative assessment, it is essential to define the monitoring objectives and outline an exposure assessment strategy. Quantitative exposure assessment requires an understanding of:

- Routes of exposure (inhalation, ingestion, dermal absorption)
- Principles of industrial hygiene (it is best to control the hazard at the source, rather than at the worker (i.e., alter the machinery or work process before requiring personal protective equipment)
- Specialized equipment and operator skills
- Skills in data analysis and interpretation.

In some cases, observations and limited measurement information can be used to estimate exposure level. These include an estimation of average exposure from point measurements, and estimating changes based on observation of process and tasks.

Quantitative exposure assessment can be important, useful or essential if the information is needed for compliance, determining baselines or for diagnostic purposes. However, if the monitoring objectives and assessment strategy are not well thought out and available equipment and resources are scarce a more complete qualitative assessment may provide the necessary information for making decisions.
Outcome of this stage of investigation: a decision about whether to conduct an exposure assessment; a plan for the assessment

Quantitative Health Assessment

A further, quantitative health assessment may be conducted if:

- It is determined that a potential for illness or injury exists
- There are reasons to believe a workplace exposure is related to disease, but not enough research has been conducted or published in this area
- Justification for instituting environmental controls is required

The health assessment may consist of:

- A survey of workers (e.g., questionnaire, interviews) regarding exposure and health
- Physical and laboratory examination of workers
- Research on a cohort of workers to evaluate the relationship of an agent and consequent disease

Outcome of this stage of investigation: a decision about whether a quantitative assessment is needed; a design for further investigation

Diagram Box #5, Interventions

Exposure Control

There is an order or priority when it comes to evaluating controls. The best controls are those that work at the source of the problem; the least desirable are those that control the exposure when it gets to the worker. The further from the source, the less desirable or effective is the control. Again, the hierarchy is as follows:

Best: At the source
Second Best: Along the path
Least Desirable: At the worker

Every particular process must be evaluated individually to determine the optimal method of control. In some cases it will be necessary to combine a number of different methods to control, successfully and completely, a particular hazard or dangerous process.

Engineering Controls- the optimal way to prevent illness and injury

- Substitution: substitute a less hazardous alternative
- Redesign the process
- Mechanize the process
- Use local exhaust ventilation
- Improve general ventilation
- Create barrier or “dike” the process

Administrative Controls

- Isolate the process
- Improve housekeeping
- Conduct routine and Preventive Maintenance
• Implement special work methods (e.g., wetting down dusty processes)
• Incentives/disciplinary measures
• Posting of warning signs
• Proper supervision

Personal Protective Equipment
• Match the equipment to the hazard
• Fit the worker
• Train in use of the equipment
• Maintain or replace equipment
• Implement record keeping

General Cleanliness
• Sweep dirty floors and surfaces
• Frequent weeding
• Proper arrangement of working tools
• Proper disposal of waste and waste collection

Medical Interventions and/or Surveillance

Occupational health services are designed to provide prevention, diagnosis and treatment for occupational injuries and illnesses. **Primary prevention** is aimed at the individual who has the potential for exposure, but has not yet developed the disease. In this case, the goal is to change exposure conditions. This is addressed, above, in the hygiene interventions sections. In **secondary prevention**, the focus is on the individual in whom the disease has started, but the symptoms have not yet appeared or are reversible. The goal here is to reverse the process before disease develops. **Tertiary prevention** is aimed at individuals with symptomatic disease. The goal here is to cure or control the disease. The need for secondary and tertiary prevention is evidence of failure of the system to control exposure.

An occupational example of primary prevention is eliminating a hazardous substance, substituting a hazardous substance with a less hazardous substance. An occupational example of secondary prevention is the withdrawal of lead-intoxicated workers from the workplace. In this case, damage may be stopped or reversed. Obviously, the workplace must be cleaned up to prevent re-exposure to lead. Treatment of a back injury is an example of tertiary prevention. The worker undergoes clinical treatment (e.g., medication and physical therapy) to treat his back disease. When he is cured or significantly improved, he may return to the workplace. Again, intervention strategies designed to prevent re-injury of the back are important for this worker and his co-workers. Interventions may also be necessary for the continued care of workers with permanent disabilities.

Surveillance is the monitoring of health events and hazardous exposures in working populations to prevent and control hazards and their associated diseases and injuries. There are four components to a surveillance system:

• Gathering information on exposure and health outcomes
• Distilling and analyzing the data
• Disseminating data in an organized form
• Using data to target or evaluate interventions

A surveillance system is an intervention strategy that can be used to monitor and intervene in workplace health and safety.
Policy Interventions

In addition to the workplace based interventions there can be political and legal interventions that would control exposure. These interventions include regulations, policies, and programs that are implemented on a regional or national level. The policies may be developed and promoted by the government, trade or professional associations, or by employer and employee groups.

Policy recommendations for the prevention of work related disease have been set forth by the World Health Organization (WHO). In 1981 the WHO Occupational Safety and Health Conventions stated that for all branches of economic activity: “Each member shall, in the light of national conditions and practice, and in consultation with the most representative organizations of employers and workers, formulate, implement and periodically review a coherent national policy on occupational safety, occupational health and the working environment. The aim of the policy shall be to prevent accidents and injury to health arising out of, linked with or occurring in the course of work, by minimizing, so far as is reasonably practicable, the causes of hazards inherent in the working environment.” This principle provides a direction for the development of national, regional and local policies designed to reduce injury, illness and death to workers.

Outcome of this stage of investigation: to decide on and implement an appropriate health and/or exposure-related intervention; to design a plan for evaluating that intervention

Diagram Box #6. Risk Communication

Workers and their families have an obvious concern about the impact of work on health. Is the worker safe in the short run and in the long run? Will the worker be able to contribute economic support to his/her families as long as necessary? Will the worker stay healthy into old age, even after he stops working? Are family members at risk from one member’s job? Communicating findings from evaluations, plans for interventions, and effects of ongoing intervention programs is an important way to allay fears and gain cooperation of workers in health and safety programs.

Outcome of this stage of investigation: a strategy for communicating risk to interested parties
2. **Sentinel Event**

   a. **Section Overview**

**Objectives**
1. Recognize the potential of adverse health outcomes from workplace exposures
2. Utilize this information to target preventive activities
3. List the components of an Incident Investigation
4. Utilize an Incident Investigation template to investigate the Tannery incident
5. Write an incident report

**Materials Needed**
- Chalkboard or flipchart or overhead projector
- Markers
- Student Materials
  - Transparencies for “Incident Investigation”
  - Descriptions of employees of the manufacturing facility where incident occurred
- Flipchart paper and markers
- Tape

**Things to do before the lesson**
Identify space for students to work in small groups to complete poster activity

**Recommended methods for delivery**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 minutes</td>
<td><strong>Section Overview</strong></td>
</tr>
<tr>
<td></td>
<td>The instructor should orient the students to the materials.</td>
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<tr>
<td></td>
<td><em>What are common injuries or illnesses seen in manufacturing industries?</em></td>
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<tr>
<td>10 minutes</td>
<td><strong>Presentation of Case</strong></td>
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<td></td>
<td>One student reads the case report aloud.</td>
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<td></td>
<td><em>Ask the participants if they have question about the case. If there are questions, ask other participants if they can answer or clarify.</em></td>
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<tr>
<td>20 minutes</td>
<td><strong>Presentation 1: Investigating an Incident</strong></td>
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<tr>
<td></td>
<td>The instructor presents principles of an incident investigation. Emphasis should be placed on getting to the root cause, speaking with many people who might have information about the causes, and completion of a report.</td>
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<tr>
<td>3 hours</td>
<td><strong>Exercise: Investigating an Incident</strong></td>
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<td></td>
<td>This exercise involves three parts, 1) students develop and ask questions about the direct, indirect and root causes of an incident (approximately 45 minutes); 2) write an incident report based on their finding in the investigation (approximately 45 minutes); and 3) report back to class their findings and recommendations (approximately 45 minutes). The emphasis in this exercise is to ask many questions of a diverse group of people and to understand the root causes of an incident. A break should be scheduled sometime in this section.</td>
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</table>
b. Sentinel Health Event Case Presentation, Presentation, Discussion

Ask one student to read aloud:

There is an article in your local newspaper about a recent tragedy that occurred in a tannery. A tannery is a workplace that takes animal skins and changes them into leather. One worker slipped and fell into a pit designed to soak the hides (skins) in a “beam house” process. A co-worker reached out to save him, but was not successful. The first worker died and the second worker had severe chemical burns on his arm.

As a public health or occupational health worker, you are asked to evaluate this workplace and to advise company owners of what needs to be done to protect their workforce from hazardous conditions. You have complete access to company managers, to workers, and to the workplace. You also are given a small staff of public health employees to assist you in this process. You are vaguely aware that there are hazardous chemicals and working conditions in tanneries, but you have never explored this industry in depth.

Presentation and Discussion

Instructor writes the following up on the board to discuss.

Sentinel Health Event is:

A disease, disability, or untimely death that is occupationally related. Its occurrence may:
1) provide an impetus for further study
2) serve as a warning signal that preventive measures are necessary

What is the sentinel event in this case?

The sentinel event is death for one worker and a chemical burn for the other.

What are your concerns about the health and safety conditions for the workers in this tannery?

Obvious questions are:
How was it so easy to slip into a below-ground tank?
What are the chemicals in this tank?
Is there plan for saving someone who falls in?
Are there preventive measures that were not in place (guards around the tank).
Has this ever happened before?
What are the hazards found in tanneries?
c. Investigating Deaths Presentation

Note to instructor: Slide show is in the resource annex, entitled Incident Investigation. This lecture may either be given by the instructor, or by a local expert. Materials are included to fill in knowledge gaps about this particular protocol for investigating an incident in industry.

d. Incident Investigation Discussion

Case Information

You know that one worker died after falling into a hide-soaking pit in the beam house and a second worker received chemical burns on his arm. Your role is to conduct an Incident Investigation.

Instructor: put up the schematic diagram from the lecture on Conducting an Incident Investigation (slide #4 from presentation; single page showing this diagram is also located in back of this manual)
e. Investigating an Incident Exercise

Case Information

The problem: You and the other members of the team are concerned about the death. In the beam house several chemicals are used and the work is done in pits below floor level. You are interested in finding out about how the incident occurred. You and your team are trying to get more information. You visit the company owner who reluctantly agrees to let you visit the tannery and speak to a few people, although he does not want you to interfere with the work. Not only did they lose two workers, they have to train two new workers.

You can interview anyone that is willing to speak with you, and you consider interviewing the owner, supervisor, co-workers, and health care provider. For your planning you should decide on whom you want to see and in which order and make a list of questions that you would like to ask. Keep notes from the interview because you will need to write a report following your investigation.

Note to instructor: The instructor is to act as the witness in a role play related to investigating the incident. Students should be broken up into groups to review the data and to formulate questions for the instructor/witness. Give the students 15 minutes to review the slide presentation (Incident Investigation) and to formulate questions to ask the available witnesses (instructor). Instructor should become very familiar with the materials the students are studying so that you are prepared to answer their questions. It is best if there is more than one instructor playing the four roles. Alternatively, make a sign for “Supervisor,” “Fork Lift Operator,” “Doctor,” “Owner.”

Students should ask you questions similar to those listed here:

Key questions:

1. Can I look at your records?
2. Has this happened before?
3. Why do you think this happened?
4. What could have prevented this from happening?
5. What is the normal job task of the worker that got killed?
6. How long has he been doing the job he died at?
7. What kind of training did he get to do this work?
8. How many hours per day does he work?
9. How long had he been working the day the incident happened?
10. What was the hour of the day?
11. Was there a break from the normal protocol on that day?
12. If yes, what was it?
13. When was it first noted?
14. How did it occur?
15. What was the worker doing just before/at time of incident?
16. What other activities were being performed in the general area at the time of the incident?
Role Play Characters

Below is the list of people at the Tannery with whom you are allowed to speak. Ask them (instructors) questions to help you obtain information about the incident.

Instructors should be forthcoming with information and make up information that would be consistent with their role.

Supervisor- defensive. Answers questions but gives limited information about incident. Is more forthcoming about process.

Fork lift driver called me over because two people were in the pit
One worker worked in this job about a year the other worker worked here for 5 years
Their job is to put hide in the liming solution and then rinse them with deliming solution
The liming solution is calcium hydroxide, sodium sulfide, sodium hydrogen sulfide
The deliming solution is weak acids and ammonium salts, enzymes dimethylamine
They were trained to do the job when they started
We tell them to be careful because of the wet floors and chemicals
The floors are always wet and were wet when the incident occurred, but we have not had this kind of accident before
Two workers put the hides in the liming solution and delime
We had some extra orders to fill so they had come in early to start this work I don’t know how long they had been working
Usually they work from 7:00-15:00
They had been doing this job since they came in, this is their job, they were very experienced
Supervisor refer to process description
Slipping has occurred before but nobody fell in

Fork lift driver-helpful. Driver does not know much about the process.

Hides delivered to beam house.
The hides are brought in to the beam house by the forklift and placed near the pits
Hides are hung on beams above the floor prior to desalting-They are taken from beams and placed in washing tanks
Hides are heavy
Soaked in liquid in pits
Liquid drained and then rinsed with a different chemical
Floors are very wet from liquids
No railings around pits because we have to be able to get the hides in and out easily
It happened at 9:00
We were soaking the hides in the first liquid (liming)
I heard someone call for help and found one person reaching into the pit to help the other who was in the pit
I didn’t know what to do so I called the supervisor to help me get them out
Slipping has occurred before but nobody fell in
Doctor- focused on medical problem

Worker died from drowning
Second worker got a burn over the next few hours
Time of exposure to chemical caused death
 Doesn’t know about the chemicals used
Worker is being treated for severe chemical burn to the arm

Owner

Very good employees
Always willing to work and help where needed
We have information on the chemicals, however, these are the same chemicals used in all tanneries
We have used this process for many years and find that our product is exceptional
Workers are reminded to be very careful when working near the pits for just this reason
We had considered putting in railings but the employees thought that it would be too difficult to lift the hides over the railings
The work only needs two people one to lift the hides the other to rinse the hides
Are very sorry for the death and will remind people to be careful on the slippery floors
Provide pictures of beam house if asked
Cannot let them visit the plant because work is being done and this would disturb the workers
I will have to check my records

After getting the questions answered, students separate back into their groups to complete the following:
f. Writing an Incident Investigation Report Exercise

In your small group, prepare and outline of a report of your investigation. Choose a scribe in the group to take notes. Fill in the following information and be prepared to present it to the whole class—in “real life” you would be presenting these results to interested parties—plant owners, workers, and others. After completing your report discuss and answer the following questions:

a) Who was the most helpful in providing information?

b) What additional information do you need?

c) What would your next step be?

1. Background information
   
a. Where and when the incident occurred

   The incident occurred in the beam house. The beam house is where the raw hides are received and desalted. Following desalting, the hides are soaked in a lime solution to remove hair and excess flesh. The hides are then delimed in a neutralizing solution and the hair and excess flesh is removed.

   The incident occurred when a worker was pulling hides out of the below grade pit onto the floor. The wet hides on the floor created a slippery area. The worker was trying to lift an additional load of hides and slipped on the wet floor. He was unsuccessful in rescuing the 1st worker and suffered a severe chemical burn on his arm.

   A nearby worker performing similar tasks witnessed the first worker fall and attempted to rescue him by lowering himself into the pit. He also slipped and fell into the tank.

b. Who and what were involved

   The workers were working for approximately 2 hours, preparing to remove hides from the liming pits and removing hides. Three workers work in this area; two operating the process (maintaining the solutions in the baths, adding and removing hides, etc.).

   There were two workers performing the task of removing the hides. The tank contained the liming solution that is used to remove hair and soften extra flesh on the hide.

c. Operating personnel and other witnesses

   In addition to the second victim, another worker in the area witnessed the event. This worker described the events above. This worker was moving the hides from the beam house to the tanyard area.

2. Account of the incident (what happened)

   a. Order of events

      The workers were working for approximately 2 hours, preparing to remove hides from the liming pits and removing hides.

      The workers were removing hides from the liming pit onto the floor.

      The wet hides made the floor wet.
One of the workers was removing another batch of hides, when he slipped on the wet floor and fell into the pit.

The second victim, witnessed the first worker’s fall and rushed to assist. While trying to reach into the pit to rescue the first worker, he suffered burns to his arm.

The remaining worker in the area called for assistance. The first workers was removed from pit; he and the chemically burned worker were taken to hospital.

b. Damage to building or equipment

The worker who fell into the pit died in hospital from extensive chemical burns. The second worker was treated for chemical burns on his arm. There was limited damage to the facility.

c. Incident type

The incident type was a fall from height with subsequent chemical burns. Contributing factors were wet floors, creating a slipping hazard. Lack of railings or guards around the pits, and no plan for emergency response contributed to the catastrophe.

d. Agent or source (of energy or hazardous material)

The agent in this case, was the liming solution.

3. Discussion: Analysis of the incident—How? Why?

a. Direct causes (energy sources; hazardous materials)

A worker fell into an open pit that had a chemical substance in it.

b. Contributing causes (unsafe acts and conditions)

The second worker sustained a severe chemical burn while attempting to manually rescue the first worker. There were no guards around pit. The floor may have been slippery. The workers may have needed to lean over the pit to do their work.

c. Underlying causes (management policies; personal or environmental factors)

Workers not trained in how to respond to a co-worker slipping into a pit; poor housekeeping: we do not know about visibility in the workplace or noise that may have interfered; there may also have been some other activities going on in the same area that were distracting. Workers may have been fatigued. Task may have required more than one worker.

4. Recommendations (to prevent a recurrence) for immediate and long-range action to remedy:

a. Direct causes

Improved housekeeping to prevent wet floors, better training about the tasks involved and what to do in the event of an emergency. Develop emergency response procedures and implement training to make sure the response procedures are followed.

b. Contributing causes
Install railings around the pits. Put drains in floor to prevent puddles. Use mechanical
lift devices so workers don’t need to lean over pit.

c. Underlying causes (such as reduced quantities or protective equipment or structures)

railings, drains, mechanical lifts

Instructor: Ask one group to present. Ask other groups if they have anything to add to that. Write
these up on the board. Facilitate class discussion. Leave 45 minutes for debrief and discussion.
Tell us what you recommended. How did you come up with the additional questions?

Go over the three questions:
a) Who was the most helpful in providing information?
b) What additional information do you need?
c) What would your next step be?
d. Summary Points

1. Sentinel health events serve as a focal point for intervention in a workplace.
2. While this case addresses an injury, it is important to remember that illnesses are a much more common cause of workplace health problems.
3. “Incidents” are preventable; they are not “accidents.”
4. Incident investigations are critical in troubleshooting hazardous conditions in the workplace.
5. Results of incident investigations can be used to design preventive interventions in the workplace.
6. Once an Incident Investigation is completed, results should be communicated to interested parties, in writing.
3. Qualitative Risk Assessment

a. Section Overview

Objectives

1. Take an occupational history
2. Classify hazards by exposure categories (i.e., chemical, biological, physical, traumatic, psychosocial)
3. Create a table that contains the information needed to describe jobs, hazards, and health effects.
4. Locate information about workplace chemicals using existing resources (International Chemical Safety Cards, International Hazard Datasheets on Occupation, material safety data sheets, and product labels).

Materials Needed

- Wipe board, flip chart or overhead projector
- Markers
- Occupational History form
- Photos and process description in Course Materials
- Presentation on Source and Hazard Characterization*
- ILO International Hazard Datasheet on Occupation for Tanners*
- ILO International Chemical Safety Cards*
- Product labels*
- Material safety data sheets*
- ILO Chemical Control Toolkit*

*materials found in exercise annex

Things to do before the lesson

- List categories of hazards on the board or flipchart
- Identify space for small group activities for 4 people per group
- Orient students to the materials that will be used during this section
- Review control banding approach in ILO Chemical Control Toolkit

Recommended Method of Delivery

10 minutes Review objectives and answer questions. The information is covered in three sections, taking a work history, hazard identification and classification, and chemical hazards.

30 minutes Taking a work history

The instructor should divide the class into pairs. Each pair will complete the form provided by interviewing their partner. When everyone has had a chance to be interviewed the instructor will ask for volunteers to report on the work history of their partner.

20 minutes Presentation: Source and Hazard Identification

The instructor will present information on source and hazard identification.

40 minutes Preparing for and visiting a manufacturing facility

The instructor will give an overview of the activity and the resources provided. The students will work in groups of 4 to complete the chart provided. Student will have approximately 20 minutes to complete the chart and 20 minutes to report back their findings.

40 minutes Chemical Information
b. Identifying Hazards Exercise: Occupational History

Exercise: Taking an Occupational History

One of the important sources of information in characterizing occupational exposure and individual’s exposure profile, is an occupational history.

Working in pairs, use the form provided to take an occupational history from each other. Following completion of the form answer the following question and discuss some of the hazards that people were exposed to at work.
Occupational History

Name: ________________________________ Gender: M F
Birthdate: ____________________________

The following questions refer to your current or most recent job:
Job title: ____________________________
Type of industry: ______________________
Name of employer: ____________________
Date job began: _______________________
Describe this job: ____________________

Are you still working in this job? Yes No
If no, when did the job end? __________

Fill in the table below, listing all jobs you have worked including short-term, seasonal, part-time employment, and military service. Begin with your most recent job. Use additional paper, if necessary.

<table>
<thead>
<tr>
<th>Dates of Employment</th>
<th>Job Title and Description of Work</th>
<th>Hazards*</th>
<th>Protective Equipment</th>
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</table>

*List the chemicals, dusts, fibers, fumes, radiation, biologic agents, physical agents (extreme heat, vibration, noise, etc), trauma hazards (lifting, repetitive motion, work at heights, driving, operating machinery, etc.), and psychological hazards.
Have you ever worked at a job or hobby in which you came into contact with any of the following by breathing, touching, ingesting (swallowing)?

- Acids
- Alkalis
- Ammonia
- Alcohol
- Solvents
- Benzene
- Toluene
- Styrene
- Ketones
- Phenol
- PBBs
- Ethylene dibromide
- Chloriform
- Halothane
- Chloroprene
- Chlorinated naphthalenes
- Dichlorobenzene
- Methylene chloride
- Chloroform
- Phosgene
- Coal dust
- Asbestos
- Talc
- Silica Powder
- Fiberglass
- Silica Powder
- Trichlorethylene
- Talc
- Talc
- Talc
- Talc
- Talc
- Lead
- Pesticides
- Manganese
- Mercury
- Nickel
- Welding fumes
- Radiation
- X-rays
- Other (specify)
- Manganese
- Mercury
- Nickel
- Welding fumes
- Radiation
- X-rays
- Other (specify)

Have you ever worked at a job with exposure to:

- Noise
- Vibration
- Operating machinery
- Work at heights
- Mandatory overtime
- Other (specify)
- Extreme Heat
- Extreme Heat
- Electrical work
- Other (specify)
- Extreme Cold
- Driving
- Repetitive/forceful tasks
- Infrared radiation
- Repetitive/forceful tasks
- Lifting
- UV Radiation
- Microwaves
- Lifting
- Infectious Diseases
- Lasers
- Work with animals
- Work with animals
- Work with animals
- Work with animals

Have you ever been off work for more than one day because of an illness or injury related to work? Yes No
Have you ever been advised to change jobs or work assignments because of any health problems or injuries? Yes No
Has your work routine changed recently? Yes No
Is there poor ventilation in your workplace? Yes No
If you answered Yes to any of the questions, please explain.

Discussion
Instructor lists the following classifications on the board. Asks students to present each others’ occupational histories. Instructor writes the job title in the left column and then fills in hazards. These categories cover the entire range of hazards in the workplace. Using them helps to make sure that the list is complete. It also suggests potential controls and what sort of a practitioner (e.g., hygienist, physician, nurse, etc.) might address them.
## Categories of Occupational Hazards – Report on Occupational Histories

<table>
<thead>
<tr>
<th>Job Description</th>
<th>Chemical</th>
<th>Biological</th>
<th>Physical</th>
<th>Ergonomic</th>
<th>Psychosocial</th>
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</table>
c. Characterizing Hazards Discussion and Presentation

Case Information

Earlier you conducted an incident investigation in the tannery described. This allowed you to analyze a single incident and focus on a particular area of the workplace. While you were conducting this investigation, you became aware that tanneries have many hazards—so many, that you could fill up that “categories of hazards” chart very easily if you looked at tanneries, alone. As a public health official, you feel responsible to intervene in this dangerous workplace, as it employs many workers in your country. The first step is to become more familiar with tanneries through an occupational health hazard evaluation.

Discussion

How would you begin this occupational health hazard evaluation in the tannery?

- Review existing scientific literature regarding work processes of the industry
- Review medical/toxicologic literature regarding chemical, physical, biological hazards.
- Find health studies that have been done in this industry
- Find an expert to discuss tanneries
- Request a tour of the plant
- Request a list of chemical agents from the owner

Presentation: Source and Hazard Identification and Characterization

Instructor presents lecture on source and hazard identification. Power point slides and handouts are in resources section.
d. Preparing to Visit a Workplace Exercise

Note to instructor: See FactSheets #1 and 2 found in the exercise resource section. Participants can complete this exercise in small groups or as a class. If time permits students should work in small groups. If time is limited, the instructor should put a table like this up in the front. Instructor facilitates students filling in the table in front of the class.

The purpose of this activity is to familiarize yourself with the processes and agents in tanneries so that you can address exposure hazards. Review FactSheets #1 and #2, provided to you. In groups of three, generate a list of hazardous agents, route of exposure, health effects using the process flow chart, narrative process description, table of the process sequence and chemical substances and photos. Fill in Worksheet #1.
## Worksheet #1

<table>
<thead>
<tr>
<th>Location</th>
<th>Process Description</th>
<th>Physical Hazards</th>
<th>Chemical Hazards</th>
<th>Biological Hazards</th>
<th>Traumatic Ergonomic Hazards</th>
<th>Psycho-social</th>
<th>Route of Exposure (inhalation, ingestion, skin absorption)</th>
<th>Adverse Health Outcomes</th>
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e. Chemical Exposure Exercise

Qualitative information on chemical exposure is available from the label, materials safety data sheets (MSDS) and the ILO International Occupational Safety and Health Information Centre. MSDSs are prepared by a chemical manufacturer and provide basic information on the chemical, physical properties, and related health effects. The MSDS gives guidance on using, storing and handling substances safely on the job and in emergencies such as fires and spills. However, information on the MSDS may be incomplete or inaccurate. MSDS is another piece of information that can help to better understand workplace exposures. The ILO forms contain information on types of hazard/exposure, acute symptoms, prevention and first aid/fire fighting. It is important to become familiar with these resources and the type of information they provide--the first step to identifying control solutions. Control Banding is a scheme for assessing the nature of chemical agents and classifying them into broad categories; this facilitates development of control strategies to reduce exposure to workers.

Exercise:

The purpose of this exercise is to enable you to locate information on a MSDS, label, and ILO International Chemical Safety Cards and add this information to the other qualitative information collected during the Information Gathering and the Worksite Survey. In a small group (3-4 persons), use the ILO Safety Cards (FactSheets #3-8) to answer the following questions. Have one person in the group record the answers.

The groups may all be given the same Safety Card or each group given a different Safety Card.

Describe the potential health effects from exposure to this chemical?

Answers are dependent upon the chemical selected. See Chemical Safety Cards for answers.

Does this chemical have exposure limits? If yes what are they?

Does this chemical cause cancer?

What are the ways this chemical can get into the body?

What are the symptoms from exposure to this chemical?

What does this chemical look like?

How should this chemical be stored?

What are the recommendations for limiting exposure when using this chemical?
f. **Summary Points**

1. Exposure pathways describe the path by which an agent travels from the process to the work environment and from the environment to the worker.
2. Routes of exposure describe how an agent enters or is absorbed by the body.
3. Material safety datasheets, product labels, International Chemical Safety Cards are examples of available resources that provide background information on processes, hazards and controls.
4. Information on chemical hazards is useful for understanding exposures and for developing control strategies. This kind of information is essential for the process of Control Banding.
5. **Surveillance**

a. **Section Overview**

**Objectives**

1. List the purposes of surveillance
2. Develop a surveillance tool (design a questionnaire) that detects health problems.
3. Relate exposure information to health outcomes of hazardous agents
4. Develop a surveillance program that serves as an evaluation tool for health risks in tanneries.

**Materials Needed**

- Overheads
- Wipeboard or flipchart or overhead projector
- Student course materials
- Slides on Injury and Illness Surveillance*

*materials found in exercise annex

**Recommended Methods for Delivery**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
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<tbody>
<tr>
<td>55 min</td>
<td>Presentation: Injury and Illness Surveillance</td>
</tr>
<tr>
<td></td>
<td>The instructor should make a presentation on injury and illness surveillance and discuss the questions in the section on designing a questionnaire.</td>
</tr>
<tr>
<td>30 min</td>
<td>Assessing a survey tool</td>
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<tr>
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<td>Students will be divided into groups to assess a sample survey. They will identify demographic questions, health questions, and exposure questions.</td>
</tr>
<tr>
<td>50 min</td>
<td>Designing a questionnaire</td>
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<tr>
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<td>Students will be divided into groups and asked to develop a survey for a manufacturing industry. They may select the industry. They are limited to a survey of 10 questions.</td>
</tr>
<tr>
<td>30 min</td>
<td>Questionnaire Discussion</td>
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<tr>
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<td>Each group will be asked to present their questions.</td>
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</tbody>
</table>
b. Systematic Approach to Occupational Surveillance Presentation

Case Information

You recognize the many dangerous conditions associated with work in a tannery and the adverse health conditions that can arise from this work. In order to make an impact on these problems, it is essential to understand the population working in tanneries. The first piece of information you find out is that these workers are paid extremely low wages; you already know that the workplace is very hazardous, that the physical demands are great. In many cases, it is poorly regulated.

You now have a good idea of what work processes take place in tanneries, and what the conditions in this particular tannery are like. One of the ways you may be able to impact this workplace is through health surveillance of the workforce. The overall goal is prevention.

Presentation by Instructor: Injury and Illness Surveillance

*Slide show presentation on Injury and Illness Surveillance*
c. Principles of Questionnaire Design Discussion

Case Information

You decide to conduct a questionnaire survey of workers to determine the prevalence of health conditions that might arise out of work in plant described in the sentinel event case study. You have the cooperation of management and are allowed to conduct the survey during work hours. There are 332 workers in the tannery. How will you proceed?

Have you ever used a questionnaire in your work—either created or administered one?

In this tannery, which workers should be surveyed?

✓ The optimal survey would include all of the workers.
✓ Since you have cooperation of tannery management and several assistants to help you, you should be able to complete questionnaires for every worker.

What would you do if there were 3000 workers?

Choose a sample of workers.

How would you select which workers to survey?

✓ This depends on the goal of your investigation.
✓ If you are trying to understand the frequency of injury or disease in the plant overall, you will choose a sample that represents the whole plant—several workers from each area.
✓ If you note that one particular area is extremely hazardous, you could survey every worker in that area.
✓ Choose those at risk—
  • chrome workers targeted population
  • Low backpain not sure who is at risk survey generally
  • Reproductive outcomes-survey all of reproductive age

If you are looking for the frequency of injuries and illnesses in the tannery, how will interviewing current workers influence your overall assessment of the workplace?

✓ The survey will miss workers that had to leave the job because of inability to work in that setting.
✓ This “survivor effect” or “healthy worker effect” leaves the healthiest workers in the workplace. Results in potential underestimation of risk/disease

How do each of the following affect the results?

Employee literacy- anonymity, confidentiality, accuracy, implications for participation
Who conducts the interview
Who receives the results
Form of the results—aggregate or specific

How will you administer the survey?

✓ Interview employees, face-to face (the following people could conduct the interviews):
- Physician
- Employer
- Health department
- You
- Written—language

✓ Employees complete written survey

What other issues do you need to consider in planning to conduct a survey?

*How and when to ask specific questions*
*Development of appropriate questions to address the problem of interest*
*Getting workers to answer the questions—guard against coercion, retaliation*
*Workers concern about confidentiality*
*Who is going to get the results (aggregate, specific)*
*Administration*
*Logistics*
*Policies*

**Discussion: Questionnaire Development**

What steps will you take to develop the questionnaire?

*You need to be clear about the purpose of the questionnaire—what information do you wish to get? How will you use that information?*

Then,
*Decide which types of questions you will want to answer*
  ✓ What health effects are there?
  ✓ What groups at risk for known complaints?
*Look for existing questionnaires that address those questions.*
  ✓ Are you aware of validated questionnaires e.g. respiratory?
d. **Designing a Questionnaire Exercise 1**

**Exercise 1: Categorizing Questions in a Survey Instrument**

The instructor should ask the participants to individually complete the following exercise. Most questionnaires have questions that fall into three categories: demographics, exposure history, and health history. The purpose of this activity is to determine what kinds of questions are being asked on the survey provided.

Look at the questions below Worksheet #2. Read each question and figure out which category it belongs to. Is it a question that addresses demographics and social issues? Exposure History? Health History? Put the number of the question in the column with the appropriate heading. Put a comma between each number.

**Worksheet #2**

<table>
<thead>
<tr>
<th>Demographics/Social issues</th>
<th>Exposure History</th>
<th>Health History</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,8,9,14</td>
<td>1,3,4,5,10</td>
<td>6,8,10a,11,13,14,15</td>
</tr>
</tbody>
</table>

1. How many years have you worked the current company?
2. What is your gender? ___M ____F
3. What is your current job title? ________________________
4. List your past job titles ______________________________
5. Fill in the table, below, describing all of your past jobs, beginning with the current job.

<table>
<thead>
<tr>
<th>Job Titles at Tannery</th>
<th>Job Description</th>
<th>Years at this Job</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. How many years did you go to school? _____Years
   a. What is the highest grade you completed?
8. In your current work, are you ever been exposed to any of the following?
   ___Chromium   ___Noise
___Lead  ___Welding fumes
___Solvents  ___Open pits
___Acids  ___Confined space
___Radiation  ___Dangerous machinery
Other (please list) ____________________________

8  a. Have you ever been told that you have asthma?

9. Have you ever been injured at work?

What kind of injury have you had?

When did it occur?

What were you doing at the time it occurred?

10. Do you have any health problems that you think may be related to your work?

   Please list them.

   *May get answers you don’t expect.*

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

11. Do you smoke cigarettes?

   a. If yes, how many years have you smoked?
   b. How many cigarettes do you smoke per day?
   c. How many cigarettes have you smoked per day over the past year?

12. Please check off the health problems you have had that you think may be related to your work in the tannery.

   *Asking about known health effects.*

   ___Shortness of Breath  ___Asthma
   ___Memory problems  ___Numbness/tingling in your hands or feet
   ___Skin rashes  ___Skin ulcers
   ___Difficulty concentrating  ___Cancer
   ___Congestion of nose  ___Red eyes
   ___Cough

13. Has a doctor ever told you that you had a condition that was related to your work?

   ___Yes  ___No

   a. If yes, what was the condition?
   (list) ________________________________________________
   b. What kind of treatment did you get for it? ______________
   c. Did you miss work for it? _____________________________

14. Are there any job tasks that you consider especially dangerous?

   (please list) ____________________________________________

18. Have you ever received health and safety training at work. For example, if your job was to pull animal hides out of a tank, did you receive training about the safest way to do that?
Discuss which questions were identified as demographic, health and exposure.

- How are questions in each category used?
- What observations did the participants have about the questions?
- What information would be useful in writing questions?
  - Knowing demographics/work characteristics of workforce, background of exposure, known health effects
- Discuss the importance of knowing the purpose of the question before including it. Also, ask how you might find out about ways of administering the questionnaire, including pilot testing.
  - Pilot testing
    - to revise wording or order of questions
    - revise timing
    - omit if doesn’t work well
    - issues emerge
e. Designing a Questionnaire Exercise 2

Divide the class into groups of 4. Participants should read the instructions and design a questionnaire. Instructor leads students through a discussion of the survey they develop.

You are asked to get information about health problems of the workers in the described workplace and what they perceive as the biggest risks to their health. Your questionnaire is limited to 10 questions. Make sure you consider 1) health problems of workers in the industry and 2) the biggest health risks to the workers in this industry.

SURVEY OF INJURIES AND ILLNESSES IN TANNERY WORKERS

Instructor notes:
1. Name of worker _______________________
2. Gender: Male ___ Female: ____________
3. Fill in the table, below, describing all your past jobs, beginning with your current job.
4. Name of tannery: ______________________

<table>
<thead>
<tr>
<th>Job Titles at tannery</th>
<th>Job Description</th>
<th>Years at the job</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Have you ever been injured in this workplace?
   a. If yes, What caused the injury?_____________________________________
   b. What injury occurred?______________________________________________
   c. What year did this happen?_______________________________________
   d. Did you go to a doctor for this?__________________________________
   e. Did you miss work?______________________________________________

6. Have you ever become ill in this workplace?
   a. If yes, What caused the illness?___________________________________
   b. What was the illness?_____________________________________________
   c. What year did this happen?_______________________________________
   d. Did you go to a doctor for this?__________________________________
   e. Did you miss work?______________________________________________
   f. Did you see a doctor?____________________________________________

7. What do you consider the most hazardous areas or jobs in your workplace?

List ________________________________________________________________

Lead discussion about:
1) The importance of piloting a questionnaire in the population of interest before administering it. Need to make sure it is understandable and comprehensive.
2) The value of an open-ended question vs. checklist
3) Open ended will capture language/jargon and will not confine them to the investigator’s view. However, this is lengthier to fill out and is difficult in a population with low literacy.
### f. Designing a Questionnaire Exercise 3

#### FactSheet #9

You administered the questionnaire to everyone who was working in the tannery. You analyzed the data and got the following results regarding “health” on the job. (This data is based on data collected in a tannery in India)

Employees said they suffer from:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Injuries</td>
<td>20.1%</td>
<td>shaving, lifting, delivery, stretching, drying</td>
</tr>
<tr>
<td>Backache</td>
<td>16.9%</td>
<td></td>
</tr>
<tr>
<td>Cough with phlegm</td>
<td>19.5%</td>
<td>pickling</td>
</tr>
<tr>
<td>Difficulty breathing</td>
<td>3.8%</td>
<td>pickling, delivery of salt</td>
</tr>
<tr>
<td>Cold</td>
<td>9.8%</td>
<td></td>
</tr>
<tr>
<td>Eye irritation</td>
<td>5%</td>
<td>chromium tanning, pickling</td>
</tr>
<tr>
<td>Occupational asthma</td>
<td>2.2%</td>
<td>chromium</td>
</tr>
<tr>
<td>Chrome ulcers</td>
<td>2%</td>
<td>chromium tanning</td>
</tr>
<tr>
<td>Dermatitis</td>
<td>2.6%</td>
<td>application of dye</td>
</tr>
<tr>
<td>Post-traumatic bone deformities</td>
<td>1.8%</td>
<td>shaving</td>
</tr>
<tr>
<td>And amputations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Discussion

Look at results in light of surveying only workers who are currently working

✓ Injuries are preventable
✓ Some things are more easily corrected than others
✓ Need regular examinations
✓ When find a problem need to address the individual medial conditions as well as prevention measures
✓ Strategies for skin protection and respiratory protection are different- different levels of complexity
✓ Might expect eye, nose, throat irritation, and cough with phlegm may all be related
✓ Cold-may or may not be work related—may be seasonal, or symptoms may not be cold but symptoms from some workplace exposure
✓ Low frequency may have high severity
✓ Maybe completely preventable, demand more resources
### g. Interpreting Results Exercise

Below is a table (WorkSheet # 3) that has the health conditions that were found from the questionnaire survey. Use the table in the previous activity to fill in the right column of this table.

<table>
<thead>
<tr>
<th>Adverse Health Condition</th>
<th>Exposures in tannery that may be associated with these conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute unintentional injuries</td>
<td></td>
</tr>
<tr>
<td>Backache</td>
<td></td>
</tr>
<tr>
<td>Cough with phlegm</td>
<td></td>
</tr>
<tr>
<td>Difficulty breathing</td>
<td></td>
</tr>
<tr>
<td>Common cold</td>
<td></td>
</tr>
<tr>
<td>Eye irritation</td>
<td></td>
</tr>
<tr>
<td>asthma</td>
<td></td>
</tr>
<tr>
<td>Chrome ulcers</td>
<td></td>
</tr>
<tr>
<td>Contact dermatitis</td>
<td></td>
</tr>
<tr>
<td>Post-traumatic bone deformities/amputations</td>
<td></td>
</tr>
</tbody>
</table>


h. Interpreting Results Presentation and Discussion

Instructor presentation on Principles of Occupational Diseases.

Instructor presents the following 6 points on overheads:

Principle # 1
Disease expression is the same for environmentally and non-environmentally caused diseases

Principle #2
Many diseases are multifactorial—they have environmental and non-environmental causes

Principle #3
One environmental hazard may potentiate the effect of other hazards

Principle #4
The latency period between toxin exposure and disease development is predictable

Principle #5
The dose of the exposure is a good predictor of the likelihood and type of effect

Principle #6
People (hosts) differ in their response to toxic exposures

Discussion

Instructor leads discussion:

How is information—like the results of this questionnaire—useful?

✔️ It gives you an idea of the health problems faced by the workers in this plant.
✔️ If you have some idea of the possible exposures, you can try to relate the health complaints to those hazardous conditions.
✔️ The conditions that were identified by the workers are “sentinel health events.” They signify that there is an exposure that should not be occurring and they can focus the intervention.

What further questions do I have and what further work do I need to do?

Some of the health problems you uncovered are clearly related to exposures in the tannery and can be acted upon now that, the sources of acute injury are obvious. Other problems must be researched further. The student may ask:

1. What further information do I need to understand which exposures are linked to which illnesses?

2. Do I need to do a careful review of the scientific literature on this topic?

3. Do I need to conduct a more careful and broader study of tannery workers?

4. What industrial hygiene information do I need to answer the question of causation?
For injuries nothing. **For diseases, a list of chemical agents and review of their health effects.** For each of the adverse health conditions listed in Worksheet #3. What further information would you need to establish work-relatedness. Go through each adverse health condition listed and discuss the following questions

5. Is there a need for intervention in this workplace to reduce some of the conditions that were found in the questionnaire?

*Injuries are preventable.*

What are the limitations of this technique?

- According to the principles just shown, the workers’ health complaints may or may not be related to workplace exposures. But your role is to determine the effect of the workplace on the health of the workers.
- Your survey is cross-sectional—you only surveyed individuals that currently work in the plant.
- You may be missing illnesses or injuries that cause workers to leave that workplace, so the incidence of disease in this population may be higher than previously expected.
- Chronic or long latency diseases will be left out.
i. Summary Points

1. Surveillance of health outcomes offers a more complete picture of illness and injury in a workplace/setting.
2. Results may be used as sentinel indicators of the need for intervention and continuing surveillance.
3. The six principles of occupational and environmental disease must be considered when conducting health surveys in the workplace.
6. **Quantitative Assessment**

   a. **Section Overview**

**Objectives**

1. Interpret data from an occupational hygiene investigation of a tannery.
2. Use quantitative data in making a decision about prioritizing interventions.

**Materials**

- Student materials
- Overhead projector

**Recommended Method of Delivery**

60 minutes Students will use data provided to develop exposure recommendations. Instructor will lead discussion of results.
Instructor makes a short presentation about not making a judgment about everything.
Make sure you know what you are going to do with the information you collect.
b. Hazard Judgment Presentation, Discussion and Exercise

Presentation #6: Hazard Judgement

*Slide show presentation is on CD Rom; handouts are at the end of this Manual.*

c. Prioritizing Hazards Using Quantitative Exposure Measurements Exercise

An occupational hygiene investigation of several tanneries measured exposure to a variety of chemical and physical agents. The results of the survey are shown in the following table. Working in small groups and using the quantitative assessment results (Fact Sheet #10), the occupational exposure limit sheet (Fact Sheet #11) and the qualitative exposure assessment information from earlier activities to prioritize the hazards. Use the chart to help organize the information.

**FactSheet # 10**

<table>
<thead>
<tr>
<th>Agent</th>
<th>Location</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>beam house</td>
<td>90 dBA</td>
<td>93 dBA</td>
<td>97 dBA</td>
</tr>
<tr>
<td></td>
<td>finishing area</td>
<td>80 dBA</td>
<td>90 dBA</td>
<td>112 dBA</td>
</tr>
<tr>
<td>Respirable Dust</td>
<td>liming</td>
<td>19 mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>buffing</td>
<td>6.63 mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>shaving</td>
<td>6.23 mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Particulate</td>
<td>liming</td>
<td>59 mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>buffing</td>
<td>25.2 mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>shaving</td>
<td>23.0 mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>autospraying</td>
<td>0.8 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetone</td>
<td>autospraying</td>
<td>0.3 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xylene</td>
<td>autospraying</td>
<td>12.8 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toluene</td>
<td>autospraying</td>
<td>5.3 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
<td>autospraying</td>
<td>3.6 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethyl acetate</td>
<td>autospraying</td>
<td>11.5 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromium</td>
<td>tanning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td>beam house</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>tanning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>finishing</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Exercise**

**Similar Exposure Groups (SEG)**

Use the information you have collect so far (Checklist, walkaround survey, quantitative exposure information) to determine possible Similar Exposure Groups. That is, for each agent and route of exposure, which workers do you think have similar exposure levels or intensities?

For example, for noise exposure, which workers would you group together?

Repeat this process for the other agents and routes of exposure.
Exposure Rating

For each SEG and agent, assign an exposure rating to each using a scale of 0-4 with 0 being the lowest exposure and 4 being the highest exposure. Comparing the quantitative exposure measurements with applicable occupational exposure limits is helpful in making this assessment, however, agents or working conditions identified in the qualitative assessment, but which have no quantitative information should also be included in your priority assessment.

Exposure Effects Rating Scheme (Mulhausen and Damiano, 1998)

<table>
<thead>
<tr>
<th>Category</th>
<th>Relationship to Exposure Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Greater than Occupational Exposure Limit</td>
</tr>
<tr>
<td>3</td>
<td>Between 50% and 100% of Occupational Exposure Limit</td>
</tr>
<tr>
<td>2</td>
<td>Between 10% and 50% of Occupational Exposure Limit</td>
</tr>
<tr>
<td>1</td>
<td>Less than 10% of Occupational Exposure Limit</td>
</tr>
</tbody>
</table>

Health Effect Rating

What additional information do you need to assign a health effect rating? Who could you contact or where could you look to obtain this information?

Using the information gathered, epidemiology, toxicology, clinical information and the scale shown in the following table, assign a health effect rating to each hazardous agent.

Discuss the uncertainty in your assigned ratings; How much uncertainty is there? Is the uncertainty in the exposure rating or health effect rating or both?

Health Effects Rating Scheme (Mulhausen and Damiano, 1998)

<table>
<thead>
<tr>
<th>Category</th>
<th>Health Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Life-threatening or disabling injury or illness</td>
</tr>
<tr>
<td>3</td>
<td>Irreversible health effects of concern</td>
</tr>
<tr>
<td>2</td>
<td>Severe, reversible health effects of concern</td>
</tr>
<tr>
<td>1</td>
<td>Reversible health effects of concern</td>
</tr>
<tr>
<td>0</td>
<td>Reversible effects of little concern, or no known or suspected adverse health effects</td>
</tr>
</tbody>
</table>

Place a point on the following graph to show the severity of the exposure and the severity of the health outcome for each agent you have identified and assessed.
Worksheet # 4: Quantifying Risk

<table>
<thead>
<tr>
<th>Health Effect Rating</th>
<th>4</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 2 3 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exposure Rating

Use the following sources to develop fact sheet for this exercise:
- MSDS
- Labels
- NIOSH TLV spiral
- List of agencies—partnering
- ILO encyclopedia
- Websites (ILO datasheets)

Discussion Questions

Which agent and area of the tannery would you intervene first? Why?

Which agent and area of the tannery would you intervene next? Why?

Have each small group report the results of their analysis to the large group.
d. **Summary Points**

1. It is valuable to categorize hazards by types to facilitate thinking about all possible hazards.
2. Knowledge of the location and type of a process and its relationship to specific hazards can help focus interventions.
6. Communicating about Hazards

   a. Section Overview

Objectives

1. Select a target audience to communicate with about the hazards and risks in the sentinel event.
2. Describe hazard and risk.
3. Select method for communicating about the hazards and risks to workers who work in this process.
4. Communicate to the selected audience about preventing injuries and illnesses to workers who work in this process.

Materials

- Flipchart paper enough for each student group
- Markers for each group
- Presentation overheads
- Tape

Recommended Method of Delivery

15 Minutes  Introduction and discussion about the importance of communication in exposure assessment. Instructor should ask the class to generate a list of groups that need to be considered in communicating with about occupational hazards.

20 minutes  Presentation 5: Risk Communication
            Instructor should present lecture on risk communication.

55 Minutes  Exercise
            Students will work in small groups to communicate about the incident that occurred in this case study, or on the issues they used in the development of their survey tool. Students should be given approximately 35 minutes to complete the poster or flier and 20 minutes to present the poster to the class.
b. Risk Communication Discussion

Discussion
Communication with management, workers, communities, public officials, health professionals and others is an opportunity to prevent future injuries, illnesses and death. Using the death of the worker in this case as a sentinel event provides the opportunity to assess the hazards and risks, and alert those who are in a position to make changes. The steps in communicating the findings from the investigation of this event includes making decisions about:

The following are thought questions that should be written on the board or flipchart.

Who needs the information? Who is the audience?

The audience is varied and can include:
Managers
Employees
Local officials
Health care providers
NGOs
Unions
Employer organizations

What information do they need?

The information they need includes hazards, risks, control strategies, resources, technical assistance in technology, training, communication, recordkeeping.

How can you best communicate the information?

Information can be communicated at meetings, using flyers, media, hot-line, posters, other publications, presentations.

What resources are available to help the audience?

University programs, public health programs, employer organizations, manufacturers, NGOs

When should the information be released?
c. **Risk Communication Presentation**

Presentation by Instructor

*Slide Show Presentation in handouts in back or on CD Rom in Power Point*

*Emphasize breadth of audience and possible partners*
*Importance of getting information out accurately, reliably, and quickly*
*Answering questions and listening to recommendations for solutions*
*Goal is to reduce injuries and illnesses, not to eliminate work places and jobs*
*Open communication is best way to reach the goals*
d. Developing a communication tool

You have completed the incident investigation of the death and illness that resulted from the incident in the beam house at a tannery. You have also developed a survey tool and conducted a survey of workers in another industry. Your investigation and subsequent survey revealed that tanneries (or other industry) have many hazards and risks. You decide that it is important to communicate about this incident so that other workers will not die or get hurt. In your groups select an audience and method of communication. Develop and deliver the information to the class. You will have about 35 minutes to develop the piece. Put the information on the paper provided to share with the class.

<table>
<thead>
<tr>
<th>Audience</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tannery Employers</td>
<td>Flyer</td>
</tr>
<tr>
<td>Tannery Workers</td>
<td>Poster</td>
</tr>
<tr>
<td>Government Officials</td>
<td>Outline of presentation</td>
</tr>
<tr>
<td>NGOs</td>
<td>Public service announcement for radio or newspaper</td>
</tr>
<tr>
<td>Employer Organizations</td>
<td></td>
</tr>
<tr>
<td>Health Care Providers</td>
<td></td>
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</tbody>
</table>

After students complete the assignment post the papers at the front of the class. Ask each group to explain who the audience was and what the message was. After all have been presented discuss advantages and disadvantages to the method of communication.

Note:
accuracy
phone numbers for assistance,
and names of contacts for more information are provided
groups anticipated distribution
e. Summary Points

1. Providing information about preventing injuries and illnesses to employers and workers is an important component of risk communication.
2. Talking to employers and workers about hazards and actions that can be taken to reduce the risk of injury and illness involves careful planning, address specific concerns, being honest and open, coordinating and collaborating with other credible sources and meeting the needs of the media.
7. **Course Evaluation**

*Instructor should allow 30 minutes for course evaluation.*